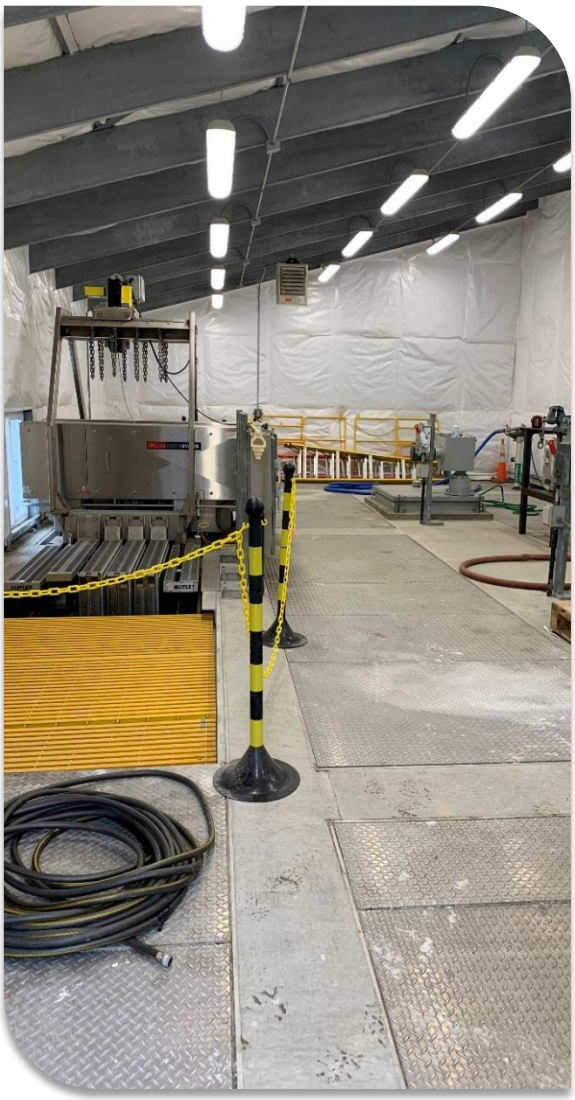

Trane U.S. Inc.

Engineering Report for the City of Bremerton Eastside Treatment Plant Improvements – Phase I

October 2023

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Engineering Report for the City of Bremerton Eastside Treatment Plant Improvements – Phase I

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Acronyms & Abbreviations

A	
AACE	Association for the Advancement of Cost Engineering
ACH	Air changes per hour
B	
BOD	Biological oxygen demand
C	
City	City of Bremerton
Consor	Consor North America, Inc.
CSO	Combined sewer overflows
D	
DOE	Department of Ecology
E	
East Plant	Eastside Wastewater Treatment Plant
EPA	Environmental Protection Agency
EPCP	East Plant Control Panel
H	
HRC	High-rate clarification
HSC	Hydraulic system center
M	
MCC	Motor control center
MGD	Million gallons per day
MLLW	Mean lower low water
N	
NEC	National Electrical Code
NEPA	National Environmental Protection Act
NFPA	National Fire Protection Association
NPDES	National Pollutant Discharge Elimination System
O	
O&M	Operations and Maintenance
OIT	Operator interface terminal
OPCC	Opinion of probable construction cost
P	
PDC	Power distribution center
PLC	Programmable logic controller
S	
SCADA	Supervisory control and data acquisition
SCC	System control center
SEPA	State Environmental Protection Act
SERP	State Environmental Review Process

T	
THD	Total Harmonic Distortion
Trane	Trane US Inc.
TSS	Total suspended solids
U	
UGA	Urban growth area
UV	Ultraviolet
V	
VFD	Variable Frequency Drive
W	
WAC	Washington Administrative Code
West Plant	Westside Wastewater Treatment Plant

CHAPTER 1

Executive Summary

1.1 Introduction

This Engineering Report discusses the design selection process for replacing the existing ultraviolet (UV) treatment equipment and electrical and control equipment within the existing Eastside Wastewater Treatment Plant (East Plant) located in the City of Bremerton (City). This Engineering Report is intended to fulfill the requirements of the Washington Administrative Code (WAC) 173-240-060 (Engineering Reports). **Table 1-1** summarizes the requirements and the sections in the report where the requirements are addressed.

Table 1-1 | WAC 173-240-060 Requirements and Sections

WAC 173-240-060 Requirement	Requirement Description	Engineering Report Section Where Addressed
(3)(a)	The name, address, and telephone number of the owner of the proposed facilities, and the owner's authorized representative.	2.1 on Page 2-1
(3)(b)	A project description that includes a location map and a map of the present and proposed service area.	3.1 on Page 3-1
(3)(c)	A statement of the present and expected future quantity and quality of wastewater.	3.4.2.3
(3)(d)	The degree of treatment required based upon applicable permits and rules, the receiving body of water, the amount and strength of wastewater to be treated, and other influencing factors.	3.2 and 3.3
(3)(e)	A description of the receiving water	3.2
(3)(f)	The type of treatment process proposed and a discussion of the alternatives evaluated and the reasons they are unacceptable	3.4.2
(3)(g)	The basic design data and sizing calculations of each unit of the treatment works. Expected efficiencies of each unit and also of the entire plant, and character of effluent anticipated.	3.5
(3)(h)	Discussion of the various sites available and the advantages and disadvantages of the site or sites recommended.	3.5
(3)(i)	A flow diagram that shows general layout of the various units, the location of the effluent discharge, and a hydraulic profile.	4.1 and 4.2
(3)(j)	A discussion of infiltration and inflow problems, overflows and bypasses, and proposed corrections and controls.	Chapter 5
(3)(k)	A discussion of special provisions for treating industrial wastes.	Not Applicable[1]

(3)(l)	Detailed outfall analysis or other disposal method selected.	Not Applicable[2]
(3)(m)	A discussion of the method of final sludge disposal and any alternatives considered.	Not Applicable, general description see Sec 3.4.2.1
(3)(n)	Provision of future needs.	3.5.3
(3)(o)	Staffing and testing requirements of the facilities.	Chapter 6
(3)(p)	An estimate of the costs and expenses of the proposed facilities and the method of assessing costs and expenses.	Chapter 7
(3)(q)	A statement regarding compliance with any applicable state or local water quality management plan or any plan adopted under the Federal Water Pollution Control Act as amended.	Chapter 8
(3)(r)	A statement regarding compliance with the State Environmental Policy Act (SEPA) and the National Environmental Policy Act (NEPA), if applicable.	3.3

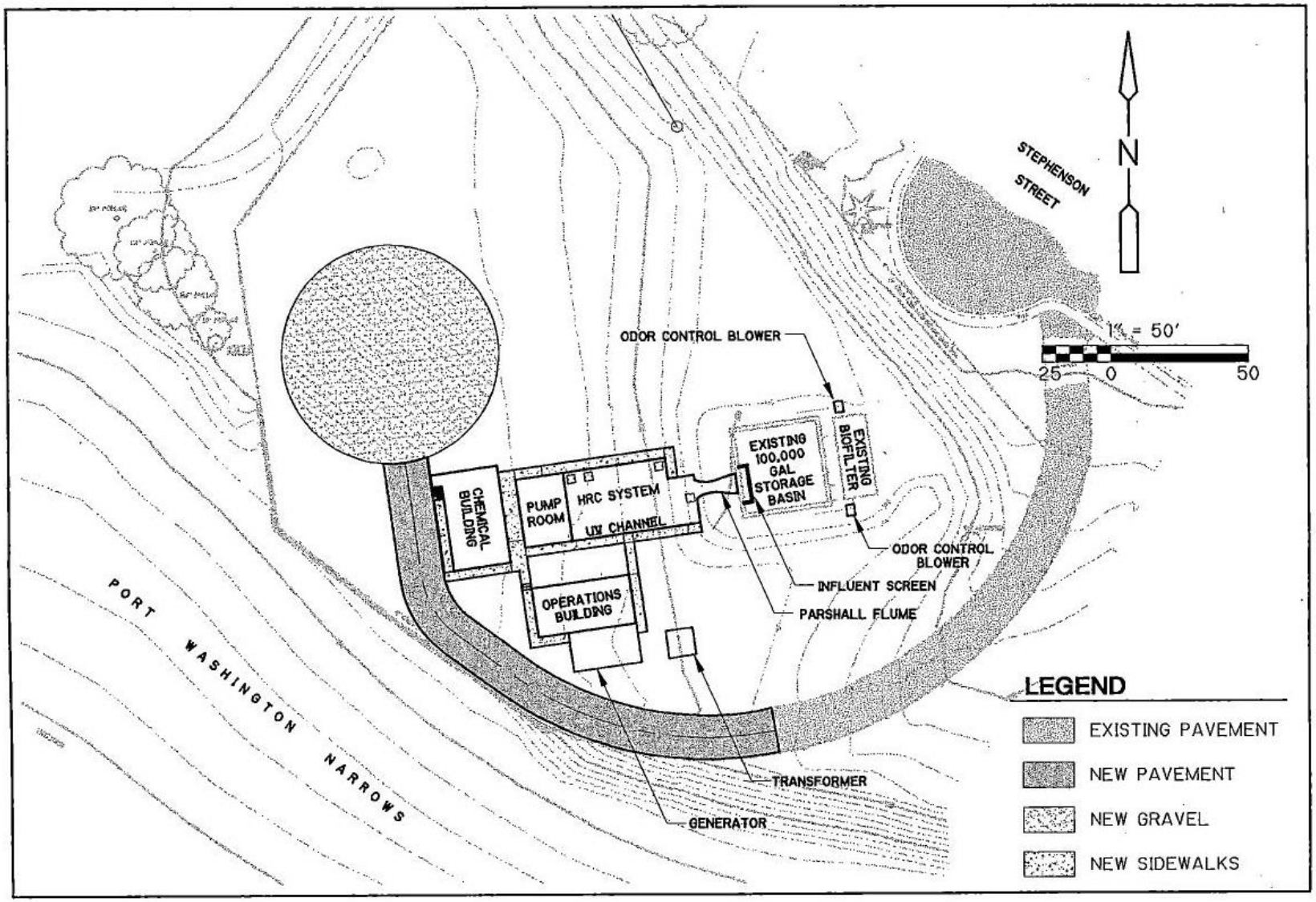
Notes:

1. The influent of the East Plant is stormwater and municipal wastewater. No industrial waste would be treated.
2. Existing outfall will not be modified as part of this project.

1.2 East Plant Description

The City of Bremerton has two wastewater treatment plants: the Westside Wastewater Treatment Plant (West Plant) and the East Plant. The East Plant was constructed in 2001 to meet state regulations on frequency of combined sewer overflows (CSO) and Puget Sound water quality standards. The East Plant consists of an influent screen, an Actiflo high-rate clarification (HRC) system, a UV light disinfection system, and a 100,000-gallon storage tank. Treated effluent is discharged to Port Washington Narrows, Puget Sound. The HRC and UV are housed in the HRC/UV Building at the East Plant. In addition, the plant has an Operations Building that houses the electrical, instrumentation, and controls components; a Chemical Building; an influent screen structure; and a biofilter (not used). An overview of the plant is shown in **Figure 1-1.** The East Plant operates during wet weather periods and treats combined sewage from East Bremerton when the volume of combined sewage exceeds the capacity of sewage conveyance system to the West Plant.

Figure 1-1 | East Plant Site Plan



1.3 Project History

CDM Smith completed the January 2001 Engineering Report that was approved by the Department of Ecology (Ecology) in January 2001. That report discussed the design criteria, hydraulic profile, and treatment alternatives for construction of the East Plant. The report recommended a treatment system consisting of 100,000 gallons of short term storage, an influent screen, high-rate clarification, UV disinfection, and outfall repair. The East Plant was constructed and put into operation in 2001.

HDR completed the *City of Bremerton Wastewater Comprehensive Plan Update* for the City of Bremerton in 2014, reviewing the adequacy of existing and future wastewater system capacity and planning for improvements. Most of the plan focused on the existing and future capacity of the West Plant, as the primary treatment plant for the City, but the plan also concluded that the East Plant hydraulic capacity is sufficient for treating current and projected sewer flows through 2033.

The City is currently working on an update to their comprehensive plan. This report relies mostly on previously completed reports, but also references preliminary population projections from the comprehensive plan update to support conclusions made in this report with the most up to date information.

This project is being designed for an energy savings performance contracting public works contract. This type of contract is an alternative contract available to public agencies in Washington State and is authorized by RCW 39.35C. One of the features of this type of contract is that the competitive procurement process has already been completed at the design stage as compared to the traditional design bid build process. In the process of design, the pricing along with the other benefits of the individual systems are investigated and competed wholistically against one another. This program is administered by the WA State Dept. of Enterprise Services.

1.4 Existing Conditions

The existing Trojan UV4000 system at the East Plant is near the end of its service life and requires replacement to ensure reliability of operation. The plant has experienced other operational challenges associated with the UV treatment channel, including foaming in the upstream channel of the UV system, issues with the turbidity monitoring control system, and communication problems with the UV system.

1.5 Alternatives Comparison

The 2001 Engineering Report concluded that UV disinfection was most appropriate for the needs of the East Plant. Because the City has had no issues meeting disinfection requirements using UV treatment, other methods of disinfection were not investigated as part of this improvements project. The City's current UV system is a Trojan UV4000. The three manufacturers and UV systems considered for replacing the UV equipment were:

1) Trojan UV Signa (i.e., replace in-kind)
2) Suez Aquaray HiCAP
3) Xylem Wedeco Duron

A high-level cost comparison was completed for the three UV disinfection systems, shown in Table 1-2. All three systems require modifications to the existing channel, with the Trojan system requiring the fewest modifications. Only the Suez Aquaray system requires the purchase of a jib-crane for maintenance of the

UV lamps. The Wedeco Duron unit requires an additional bank of UV lamps to meet treatment requirements.

Table 1-2 | UV Disinfection Systems Cost Comparison

ITEM	COSTS		
	Trojan UV Signa	**Suez Aquaray**	**Xylem Wedeco**
No. Banks	3 (+1 future)	3 (+1 future)	4 (+1 future)
Max Duty Power Draw (kw)	63.9	102.0	82.9
UV Equipment	$603,700	$650,000	$537,275
Channel Modifications[2]	$130,800	$173,900	$176,000
Integrator E&IC Design	$49,900	$74,900[1]	$74,900[1]
Jib Crane	$ -	$5,000	$ -
TOTALS:	**$784,400**	**$903,800**	**$788,175**

Notes:

1. E&IC costs are based on integration of the Trojan UV Signa system. A 50% increase in integration costs is assumed for accommodation of a new manufacturer's controls system into existing plant control panel, as well as increased system startup and commissioning time.
2. Channel modification costs assume concrete fill as required to support UV equipment within the existing channel.

The cost estimates in Table 1-2 are representative only of the UV system equipment, channel modifications, and electrical and I&C work related to the UV system, and do not include other work under the scope of this project that will remain the same regardless of UV manufacturer selection (demolition of existing equipment; upgrades to HRC system controls; UV/HRC building exhaust fan, etc.). A more detailed cost estimate of the selected alternative inclusive of the full scope of work is included in subsequent sections of this report.

Non-monetary considerations for UV system alternatives include:

- Limited space in the existing HRC/UV building to mount a jib crane for the Suez Aquaray unit, likely requiring additional concrete work
- Additional maintenance for a fourth bank of UV lamps for the Xylem Wedeco Duron unit
- Energy-efficiency of the new UV system
- Operator training time for learning a new UV system

The Trojan UV Signa system was selected for the upgrade of the UV equipment at the plant. Although the capital cost for the Wedeco Duron system is estimated to be comparable, the Trojan UV Signa equipment requires fewer channel modifications, has a controls system already compatible with existing equipment at the plant, and is the most energy efficient in terms of maximum duty power draw. The plant has been pleased with the operation of the existing Trojan unit and is familiar with the unit maintenance needs and control system.

1.6 Current Project and Proposed Improvements

The City of Bremerton coordinated with Trane U.S. Inc. (Trane) to quantify energy efficiency savings for an upgraded UV system. Trane contracted with Consor North America, Inc. (Consor) to prepare an engineering report to document proposed upgrades to the East Plant to address the aging UV system and the operational challenges listed previously. Despite the operational challenges, the existing UV4000 system has been effective at achieving desired levels of treatment during its use at the plant. Therefore, proposed improvements do not change the method of treatment by which the plant achieves

disinfection. Proposed improvements include replacing the existing UV system with a new UV system located within the existing channel, along with the associated electrical, instrumentation, and controls components. New water sprayers will be installed upstream of the UV to control foaming. The manufacturer quotes for new UV systems are included in Appendix A of this report. Preliminary mechanical design drawings of the proposed facility improvements related to the new UV system and a preliminary specification list is included in Appendix B, and a preliminary cost estimate for the construction of the work is included in Appendix C.

CHAPTER 2

Owner Information

2.1 Owner Information

The owner of the East Plant is the City of Bremerton. The owner's representative is listed below.

Eric Burris
Wastewater Manager
1600 Oyster Bay Avenue S.
Bremerton, WA 98312
eric.burris@ci.bremerton.wa.us
(360) 473-5400

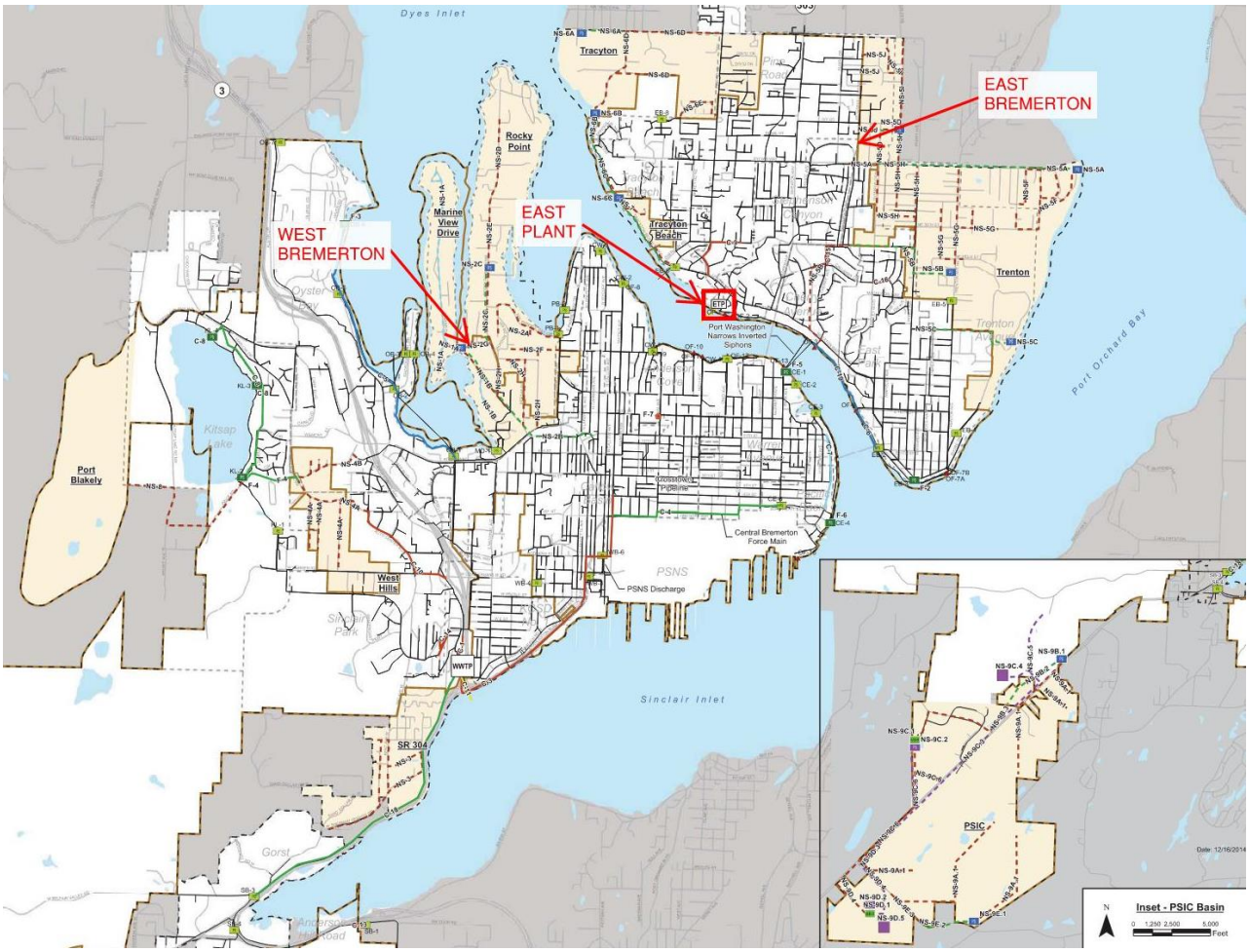
CHAPTER 3

Project Description

3.1 Existing and Proposed Service Area

The City of Bremerton is located on the west side of Puget Sound and is separated into two portions by Port Washington Narrows. The northeastern portion of the City is commonly called East Bremerton and the southwestern portion of the City is commonly called West Bremerton. **Figure 3-1** shows the service area of Bremerton and highlights the location of the East Plant. During extreme wet weather events, East Bremerton's combined sewage is diverted to the East Plant. ***The service area of the East Plant will not change as part of this project.***

Figure 3-1 | Bremerton East Plant Existing Service Area



3.2 Receiving Body of Water and Discharge Outfall

Treated effluent is discharged to Port Washington Narrows, Puget Sound, which is designated as Class A - Marine Waters in the vicinity of the outfall. The outfall is approximately 480 feet long. The outfall diffuser is a 36" single port elastomeric diffuser check valve. ***The outfall and diffuser will not be changed or altered as part of this project.***

3.3 Regulatory Requirements

The East Plant is regulated under an NPDES (National Pollutant Discharge Elimination System) Permit, #WA0029289, that was issued on October 30, 2018, and expires on November 30, 2023. Table 3-1 shows the effluent limits for total suspended solids (TSS) and settleable solids, taken from chapter 173-245-WAC.

This project will follow requirements for the State Environmental Protection Act (SEPA) and National Environmental Protection Act (NEPA), as applicable. On October 4, 2023, this project was determined to be a categorically exempt action pursuant to WAC 197-11-800(3). This code exemption allows repair, remodeling, maintenance, or minor alteration of existing public facilities or equipment involving no material expansions or changes in use beyond that previously existing, without environmental review. The SEPA exemption memorandum is included in Appendix D.

Table 3-1 | Bremerton East Plant Effluent Limits

Outfall 002		
Parameter	**Annual Average**	
TSS Removal Efficiency	Equal to or greater than 50% removal of influent TSS	
Settleable Solids	0.3 mL/L/hr[1]	
Parameter	**Minimum**	**Maximum**
pH	6.0 standard units	9.0 standard units
Parameter	**Monthly Geometric Mean**	
Fecal Coliform Bacteria	400/100 mL	
Parameter	**Monthly**	
Number of Discharge Events	Report	
Discharge Volume	Report	

Notes:

1. mL/L/hr = Milliliters per liter per hour

3.4 Existing & Future Conditions

3.4.1 Existing & Future Demographics, Land Use, & Population Projections

For the land use and zoning information surrounding the service area, please refer to the *City of Bremerton Wastewater Comprehensive Plan Update* (HDR, December 2014). The East Plant parcel is 2.07 acres. ***The existing and future land use for the parcel is not expected to be impacted as part of this project.***

The current *City of Bremerton Comprehensive Plan* (2016 Plan) indicates a 2010 population estimate for the Bremerton service area, including the Bremerton Urban Growth Area (UGA), of 46,811. The 2016 Plan also projects a population increase of 18,301 between 2016 and 2036 for the same areas, for a total future population of 65,112. The City is currently undergoing an update to their comprehensive sewage plan that will recalculate projected population growth. Per preliminary numbers from the plan update, the existing

population estimate for the Bremerton service area, including Bremerton and Bremerton UGA, is 53,610 people as of 2020. The new study estimates that the population within the Bremerton service area is projected to increase to 76,624 in 2044.

3.4.2 Existing & Future Treatment

3.4.2.1 Overview

The plant is designed for a minimum flow rate of 1.5 million gallons per day (MGD), a nominal flow rate of 10 MGD, and a maximum hydraulic flow rate of 20 MGD. Treatment components at the facility include a 100,000-gallon storage tank, an Actiflo HRC system, and a UV light disinfection system to treat the CSO flows from East Bremerton. Solids removed at this plant are stored in the storage tank. When capacity becomes available again in the sewer system after a high flow event, the solids are conveyed to the West Plant for removal and treatment. For more information regarding current liquid and solids treatment processes, please refer to the *City of Bremerton Wastewater Comprehensive Plan Update* (HDR, December 2014). While the UV system is proposed to be replaced in kind due to age, the existing UV4000 system has been effective at achieving desired levels of treatment during its use at the plant. Therefore, proposed improvements do not change the method of treatment by which the plant achieves disinfection and ***the fundamental treatment process at this facility will not change as part of this project.***

3.4.2.2 Existing and Future HRC/UV Building

The existing HRC/UV Building is approximately 1,250 square feet and was constructed in 2003. The equipment that is now in the HRC/UV building was previously installed open and exposed in 2001. The building is a light-gage metal building supported on a below-grade concrete vault structure that makes up the UV channel and other treatment processes. The above-grade portion of the building houses equipment such as mixers, the UV system, a sludge scraper, and hydrocyclones. The metal building consists of light gage steel purlins supported on light gage steel studs. The tank structure includes aluminum I-beams and cover plates supported on reinforced concrete beams and retaining walls. The foundation consists of a concrete mat foundation. The HRC/UV Building is joined with the Pump Room on the west side of the structure.

The proposed changes to the structure include support of new equipment off the existing light gage steel studs, concrete vault walls, and slab. The support framing will consist of light gage steel and FRP connections.

The National Fire Protection Association (NFPA) 820 standard provides requirements for ventilation, electrical classification, materials of construction, and fire protection measures. In Table 5.2.2 of the standard for Liquid Stream Treatment Processes, row 26 indicates that ventilation is not required for ultraviolet disinfection units (*NFPA 820*, 2020). Additional ventilation requirements in Table 9.1.1.4 states that enclosed spaces with wastewater exposed to the room atmosphere require 12 air changes per hour (ACH) for a Class I, Group D, Division 2 structure. Table 3-2 and Table 3-3 summarize the NFPA requirements related to systems and areas affected by this project.

Table 3-2 | NFPA 820 Disinfection Unit Requirements

Area	Fire and Explosion Hazard	Ventilation	Extent of Classified	NEC Area Electrical Classification (All Class I, Group D)	Materials of Construction	Fire Protection Measures
Ultraviolet Disinfection Unit	N/A	NR	N/A	Unclassified	NR	H

Note the following codes are used in this table:
N/A: Not applicable
NR: No requirement

Table 3-3 | NFPA 820 Minimum Ventilation Rates

Description	Ventilation Rate, Air Changes per Hour, or Velocity		
	Class I, Division 1	Class I, Division 2	Unclassified
Wet wells, screen rooms, and other enclosed spaces with wastewater exposed to the room atmosphere	< 12 air changes per hour	12 air changes per hour	-

A new exhaust fan will be installed in the HRC/UV building as part of this project to achieve 12 ACH. The new exhaust fan should have an air flow rate of approximately 2,900 cubic feet per minute and should be turned on to running any time the plant is operational. The preliminary design drawings including the proposed heating, ventilation, and air conditioning (HVAC) modifications are included as **Appendix B**. Detailed design will include locations of intake louvers, as necessary.

The impact of NFPA 820 on work requirements should be confirmed with building officials at the beginning of final design to ensure that planned replacements will not inadvertently trigger other upgrade requirements.

3.4.2.3 Existing and Future Flows and Water Quality

The existing flow rates at the East Plant were taken from the plant's influent flow data from 2018 to 2022. According to the data, the plant was only online for several events, with most of them occurring from November to January.

Because the East Side plant treats mostly stormwater, future flows are not expected to increase directly proportionally with population growth. However, it is reasonable to assume that expected population growth in the City will likely result in an increase of paved areas, generating more stormwater runoff flowing into the collection system and conveying to the East Plant under heavy wet weather conditions. Given this possibility, future flow rates were conservatively estimated in this report by scaling up linearly with the projected increase in population using the City's updated comprehensive sewage plan information. **Table 3-4** summarizes the current and projected annual average flow, average peak instantaneous flow, and maximum peak hour flow. These assumptions should be revisited at the conclusion of the City's plan update.

Table 3-4 | Bremerton East Plant Existing and Future Flows

Flow Event	2018	2019	2020	2021	2022	2044
Annual Average Flow (MGD[1])	2.7	3.49	3.66	2.96	3.45	4.65
Average Peak Instantaneous Flow[2] (MGD[1])	6.18	7.22	8.35	6.32	6.77	9.96
Max Peak Hour Flow[3] (MGD[1])	9.51	9.16	9.92	10.49	11.28	14.40

Notes:
1. MGD = million gallons per day
2. Peak Instantaneous Flow: the largest volume of flow during a one-minute period.
3. Peak Hour Flow: the largest volume of flow during a continuous 60-minute period.

As mentioned, the influent flow to the East Plant is primarily stormwater, so water quality is not expected to change significantly as a result of projected population growth. The existing influent and effluent wastewater characteristics were evaluated using the plant's recorded data from 2018 to 2022 and assumed to remain unchanged for the 2044 projections (an average of values from 2018 through 2022 was assumed representative of future values). Because the primary and secondary treatment processes will not change as a result of the proposed work, the performance of TSS and biological oxygen demand (BOD) removal should remain the same.

Current effluent water quality meets the regulatory requirements. The amount of effluent Fecal Coliform Bacteria depends on the performance of the new UV system and will be discussed later in this report. **Table 3-5** summarizes the existing average values of important parameters in the influent and effluent from 2018 to 2022, and projected future influent concentrations.

Table 3-5 | Bremerton East Plant and Future Influent and Effluent Water Quality

	Parameter	2018	2019	2020	2021	2022	2044
Influent	TSS[1] (mg/L)	116	160	110	106	146	196
	BOD[2] (mg/L)	70	156	85	76	74	127
	Settleable Solids (ml/L)			3.3	4.1		3.7
Effluent	TSS (mg/L)	8	11	11	22	20	19
	BOD (mg/L)	20	42	34	27	24	39
	Settleable Solids (ml/L)			0.09	0.1		0.1
	Fecal Coliform Bacteria (counts/100mL)	32	20	26	98	42	See section 3.5.1
Removal Efficiency	TSS (%)	93	92	89	80	85	90
	BOD (%)	71	73	60	64	68	69

Notes:
1. TSS = total suspended solids
2. BOD = biological oxygen demand

3.4.2.4 Existing UV System

The existing UV4000 system, shown in **Figure 3-2**, was installed in 2001 and is near the end of typical design life. The existing unit is designed for a peak treatment capacity of 15 MGD with the potential to expand to handle peak hydraulic capacity of 20 MGD by adding a UV bank. There are currently 12 lamps in each module, 3 modules per bank, and 2 banks in the channel, for a total of 72 lamps in the system. The system has a minimum dose of 30,000 µW-sec/cm^2. The minimum UV Transmittance is 50%.

A fixed weir is installed near the channel effluent pipe to control the downstream water level. The existing water sprayers installed downstream of the UV channel are fed by a 1-inch diameter utility water feedline and are designed to distribute water to the water surface of the UV channel. The plant operator reported that the downstream sprayers are never used, but if used, they would be opened by manually turning on the gate valve in the sidewalk outside. The sprayers are in good condition but cannot prevent foaming in the upstream channel due to their location in the downstream portion of the channel.

Figure 3-2 | Existing East Plant UV System

The existing UV channel is approximately 5'-10" wide by 10'-10" deep and is formed by reinforced concrete walls and a concrete slab foundation. Portions of the top of the channel are covered by a walkway consisting of aluminum cover plates and I-beams spanning between the concrete supports. It appears that the UV channel access hatches, originally shown as being framed by aluminum I-beams on the construction drawings, were substituted with grating supported on shelf angles on each side of the channel. The channel appears to be in good condition. **Table 3-6** summarizes the configuration of UV channel.

Table 3-6 | Bremerton Existing East Plant UV Configuration

Parameter	Unit	Value
No. of Channels	EA	1
Length	FT	46
Width	FT	5.83
Depth	FT	10.83
Maximum Headloss	IN	12

The existing panels associated with the UV4000 system include two power distribution centers (PDCs), one hydraulic system center (HSC), and one system control center (SCC). The two existing PDCs are installed near the equipment, as shown in **Figure 3-3**. The SCC is installed in the Operations Building.

Figure 3-3 | Existing UV Panels

The Operations Building also houses the 480V/3-phase switchgear and an 800A rated Siemens System/89 Motor Control Center (MCC) for the plant. The MCC is a 4-wire design and includes a neutral bus in the main incoming section. There are two 225A feeder units that supply 480V/3-ph power to each of the local disconnects for the UV system in the HRC/UV building. The disconnects supply power to the two PDCs. There are local controls for the UV system mount on the PDCs.

The HRC/UV building currently houses the two 480V/3-phase local power disconnects and local controls for the UV system. The HRC/UV building electrical, panels, and wiring methods are not designed for Hazardous Classified Locations as defined by NFPA 70 and NFPA 820.

The Operations Building also houses three control panels which include the primary controls for the UV, HRC, and the plant control system. Each of the control panels include Allen Bradley SLC 5/05 programmable logic controllers (PLC) and Allen Bradley PanelView Plus 6 Operator Interface terminals (OIT). The PLCs are nearing end of life and the OITs are obsolete. The plant SCADA system utilizes Ethernet communications to the PLCs. The UV PLC also communicates with the two UV PDCs via Modbus RS-485 communications.

All of the electrical conduit raceways from the operations building to the HRC/UV building are buried underground.

There are two turbidity metering systems, two pH analyzers, and UV Transmission instrumentation installed in the lab area of the operations building. The equipment is either not functional or has poor performance. The City is not currently using this equipment.

3.4.2.5 Proposed UV System

The proposed equipment upgrade is to replace the Trojan UV4000 with a Trojan UV Signa. The Trojan UV Signa is current equivalent model of the previously named UV4000. A new fixed weir will be installed to control the downstream water level in the UV channel. A level sensor will be installed to monitor the water level. Water sprayers will be installed upstream of the UV channel to control foaming by spraying water onto the surface of channel and allowing the droplets to break the foam bubbles. Additional details on sizing of the UV system, channel accommodations for the new UV system, and electrical and controls upgrades for the new system are provided in Section 3.5.

3.5 UV Equipment Design

3.5.1 Design Criteria

The *Criteria for Sewage Works Design* (Washington State Department of Ecology, 2008, referred to as the *Orange Book*) identifies important factors for sizing a UV disinfection system. It should be noted that a capacity analysis of the UV system is not included in the scope of this project, and it is assumed that the flow conditions and UVT requirements for the new UV system have not changed. The size of the selected UV Signa matches the sizing of the existing UV4000, which is in line with the projected flows in Table 3-4. The effluent quality leaving the new UV system shall comply with the NPDES permit. Table 3-7 summarizes the design criteria of a new UV system.

Table 3-7 | UV System Design Criteria

Condition	Criteria
Peak Treatment Flow	15 MGD
Peak Hydraulic Flow	20 MGD
Minimum UVT %	50
Effluent TSS	15 mg/L, 30 Day Average Grab Samples
Effluent Fecal Coliform	400 (#/100 mL)

Proper hydraulic design is essential for UV disinfection. The maximum water surface elevation within the channel must not exceed the manufacturer's recommendations of 1-2 inches above the UV lamps. A counterbalanced flap gate or weir is typically used to maintain water surface elevations. Headloss must be accounted for when determining bulb submergence and water surface elevation.

3.5.2 Basis of Design

3.5.2.1 New UV Treatment Unit

The Trojan UV Signa is an inclined UV system that places UV banks staggered at an angle within the channel to maximize disinfection time, as shown in Figure 3-4. The lamps are located within protective quartz sleeves. Trojan recommended the UV Signa for the East Plant based on the same peak flow condition of 15 MGD and peak hydraulic condition of 20 MGD. The minimum UV transmittance is 50%. Under these conditions, the proposed system contains three banks per channel, each with 20 lamps, for a total of 60

lamps. Each bank will have one UV sensor. A fourth bank in-series can be added to allow for the ultimate plant capacity of 20 MGD. The system uses dose-pacing to vary lamp intensity down to 30 percent while controlling bank on/off status according to flow and UV transmittance.

The UVT minimum of 50% was specified to match previous unit design which has operated well at the plant with no permit violations. This plant treats combined sewer with enhanced clarification as primary treatment, with no secondary treatment. Suspended solids can shield organisms from exposure to UV, and color and organics can absorb UV energy, reducing its effectiveness as a disinfectant. It is expected that UVT of high rate clarification effluent can be lower than the UVT of effluent from a typical secondary treatment process. It is expected that the plant will continue to operate the new system at 100% power.

Figure 3-4 | Trojan UV Signa

A flow conditioner wall will be added to the upstream of the channel to ensure evenly distributed flow over the UV banks. To accommodate the new unit dimensions, the width of the existing UV channel will be reduced through placement of reinforced concrete for the full height of the channel. New at-grade concrete equipment pads may also be required at the exterior of the structure to support new or relocated equipment panels. The length and height of the existing UV channel will remain unchanged. Table 3-8 summarizes the dimensions of modified channel.

A staging area adjacent to the channel is needed to place lamp cable and hydraulic hose. A new fixed and non-adjustable weir will be provided by Trojan and mounted downstream of the channel to control the water level.

Table 3-8 | Modified Channel Size

Parameter	Unit	Value
No. of Channels	EA	1
Length	FT	46
Width	FT	4.7
Depth	FT	10.83

The lead time of the Trojan UV Signa system is 26 to 30 weeks after the receipt of the approved submittal. Allowing approximately 4 to 6 weeks for submittal review, response, and approval provides a total lead time of up to 36 weeks, or 8.5 months. Should this project require a reduced schedule, there is the option for the City to pre-purchase equipment or the specify that the contractor submit a complete submittal with their bid for construction.

New water sprayers composed of PVC nozzles will be installed upstream in the UV channel to prevent foaming. The 1-inch diameter PVC utility water that connects to the existing water sprayers will be extended and routed around the channel to connect to the new water sprayers. Valving will be installed between the existing downstream sprayers and new upstream sprayers so that operators can choose which to use.

Cutsheets of the proposed UV Signa system as provided by Trojan are included as **Appendix A** to this report. The preliminary design drawings of the UV system replacement and channel modifications are included as **Appendix B**.

3.5.2.2 Upgraded Electrical & Controls

The existing UV system electrical, instrumentation, and controls will be replaced with new panels provided by Trojan. The new UV Signa system requires one double PDC panel, one HSC panel, and one SCC panel for three banks. To accommodate the potential installation of a fourth bank for capacity expansion, another single PDC panel and HSC panel will need to be added in the future. Trojan will also provide a low-level sensor system and UV Transmittance monitoring system for the new unit.

Proposed panel locations are constrained by the limited concrete surface area in the HRC/UV building for mounting panels and by National Electrical Code (NEC). Several options for panel locations were evaluated, and will continue to be evaluated through final design. **Figure 3-5** shows the first option considered and currently planned for 30% design. Option 1 is to mount new and future PDC panels on the concrete floor near the UV equipment and mount new and future HSC panels on the concrete floor between the existing mixers. Further evaluation is required to ensure proper conduit routing and sufficient panel clearance. Alternatively, as an second option, it is possible to mount HSC panels near the UV equipment and mount PDC panels with NEMA Type 4x enclosure on an equipment pad along the existing sidewalk outside of the building. This alternative option adds sitework to route the sidewalk around a new equipment pad, adds structural work to elevate the equipment pad to match floor grade of the HRC/UV Building, adds penetrations through the UV/HRC building wall, and would require operators to be outside exposed to weather if work with the PDC panels is required. Operators have confirmed that this is not a preferred option.

Figure 3-5 | Option 1 HSC Panels Location

The new UV system will also require upgrades to electrical and controls equipment. Other electrical and controls modifications at the plant and described in this section are included as part of this project to remove unused equipment and improve operator controls.

The proposed UV system main 480V/3-phase power supply will be supplied from the Siemens System/89 MCC located in the Operations Building. The existing 225A circuit breaker feeder unit for Power Distribution Center 1 (PDC-1) will be replaced with a dual feeder MCC unit with a 125A breaker for PDC-1 and a 60A breaker for the future PDC-2. A new dual feeder MCC unit with two 15A breakers will be installed to supply power to the HSCs.

The existing conduits and local circuit breaker disconnects in the HRC/UV building for the PDCs will be replaced. New disconnects will be installed for HSC-1 and the future HSC-2.

The UV replacement SCC panel is to be provided, programmed, and commissioned by the equipment manufacturer.

The existing controls for the HRC and the plant control system are to be replaced. The PLCs will be upgraded to Allen Bradley Series 5380 utilizing series 5069 IO modules as required. The OITs will be upgraded to Allen Bradley PanelView Plus 7 10". The contractor is to supply open UL Listed back panels to be field installed in existing enclosures. All panel work performed will require Underwriters Laboratory field evaluation UL508A listing. Allen Bradley equipment will be sole sourced for this project, as it is compatible with existing systems at the plant and because the City is standardizing on their equipment across their facilities for ease of operation and maintenance. The City will follow proper procurement methods for sole sourcing equipment.

The HRC manufacturer (Actiflo) will provide programming for the HRC system, and the City's system integrator will provide programming for the plant control system.

The City is planning to install DSL fiber communications for use with interfacing PLCs with the existing SCADA system. A Cisco IE 3200 Ethernet Switch has been purchased for this purpose and will be field installed by the Contractor in the plant control system East Plant Control Panel (EPCP). The UV SCC PLC, HRC PLC, and plant control PLC will be terminated via Cat 6 cable to this switch. The UV SCC PLC also communicates to the UV power distribution center(s) using Modbus communications.

The City is to provide SCADA programming and, as such, is not included in this project scope.

This project will also include replacement of the Variable Speed Drives (VFD) controlling MXR-102 and SLC-101 and replacement of the power monitoring currently installed in the MCC. VFDs are to be Allen Bradley 525 and the power monitor is to be Allen Bradley Power Monitor 5000 with door mounted display. The city will sole source Allen Bradley for compatibility with their existing systems and will follow proper procurement methods for sole sourcing equipment. The VFD MCC units are to be modified to accommodate the new VFDs per the drawings, however there is little impact to the existing wiring. The Power monitor and VFDs will be capable of Ethernet communications and terminated with Cat 6 cable for communications with the switch in the EPCP.

Because the UV system will be powered from the same MCC as the new VFDs, it was confirmed with the UV manufacturer (Trojan) that Trojan equipment will not produce harmonic distortion that affects client-side devices. Trojan equipment complies with IEEE 519 for any lsc/IL ratios (including <20) if the input voltage THD is in the 1-2% range. The VFDs have also been specified to have Line Reactors as requested by the Owner to afford some protection from line side voltage disturbances.

The instrumentation installed in the lab area of the Operations Building is to be removed, including electrical connections and conduits, which may be salvaged by City. This instrumentation includes:

- Both Turbidity systems (Raw water & Effluent)
- Existing UV transmittance system
- Both pH analyzers (Raw water & Post Coagulant)

The UVT monitoring system is not currently functional and will be replaced as part of the new UV system package. However, the City does not use the existing UVT system due to issues with fouling of the UVT probe and because they operate the UV system at 100% power when the plant is in service. The raw and effluent turbidity metering systems are not part of the upgraded controls. The proposed chemical feed systems will be based on influent flow. The pH analyzers are not used.

The influent flow PLC will be programmed to control the Chemical Pump Dosing instead of the current dosing that is based on turbidity.

The UV room is classified as a hazardous area because of the raw sewage that flows underfloor. An exhaust fan will be installed to provide 12 air changes per hour, therefore derating the area to Class I, Div. 2 according to NFPA 820. The supply and exhaust air flow will be monitored. Because it is an indoor location, a combustible gas detection system is also required.

Additional instrumentation to be installed includes:

- UV Transmittance Controller and Sensor
- UV Intensity Sensor – 3ea.
- UV Bank in place proximity switches – 3ea.
- Low level switch

- Water level signal switch

3.5.3 Expected Effluent Characteristics

As discussed in Section 3.4.2.2, the expected TSS and BOD removal efficiency is 88% and 63%, respectively. The Trojan UV Signa system can achieve the desirable Fecal Coliform requirement, 400/100 mL (1 day maximum of consecutive, daily grab samples).

3.5.4 Provisions for Future Needs

The new UV Signa system is designed for a 20-year planning horizon and will replace an aging existing UV system.

A benefit of the new system is that the Solo Lamp Driver feature has lamp dimming capabilities from 100 percent down to 30 percent power. The increased turndown capability of the lamps as well as the 45-degree angle bank placement that uses fewer, longer bulbs than the existing UV system, create energy savings for the plant. A preliminary audit to quantify the energy savings from the upgraded UV system will be prepared by Trane.

CHAPTER 4

Flow Diagrams & Hydraulic Profiles

4.1 Process Flow Diagrams

Figure 4-1 shows the East Plant process flow diagram with new UV equipment. There is no effective change to the treatment plant process flow with the proposed project improvements.

4.2 Existing & Proposed Plant Hydraulic Profiles

The hydraulic profile in the East Side plant as-builts from 2001 shows approximately 3.39 feet and 2.15 feet of available head between the settling tank and the UV channel at the nominal flow rate of 10 MGD and peak hydraulic capacity of 20 MGD, respectively. The maximum water surface height within the UV channel to avoid submergence of the settling tank is 84.96 inches.

Figure 4-2 shows the existing hydraulic profile from the 2001 plant as-builts. Note that the datum was changed after 2001. The conversion from old datum to new datum is -112.35 feet.

Trojan can provide a 3-bank system with 20 lamps per bank that fits within the existing UV channel with a maximum water surface elevation of 70 inches at 15 MGD upstream of a proposed flow conditioner. With the addition of a fourth bank, the maximum water surface elevation is 73 inches at 20 MGD upstream of the flow conditioner.

The expected headlosses through the UV banks are as follows:

- 1.92 inches at 15 MGD
- 4.32 inches at 20 MGD

The elevation of the new fixed weir—which is also the minimum regulated water surface elevation that will trigger the low-level sensor—is 26.11 feet (City of Bremerton Datum). The maximum downstream water surface elevation is 25.86 feet. Figure 4-3 shows the proposed hydraulic profiles at peak treatment capacity of 15 MGD and peak hydraulic capacity of 20 MGD at new datum.

Figure 4-1 | Bremerton East Plant Process Flow Diagram

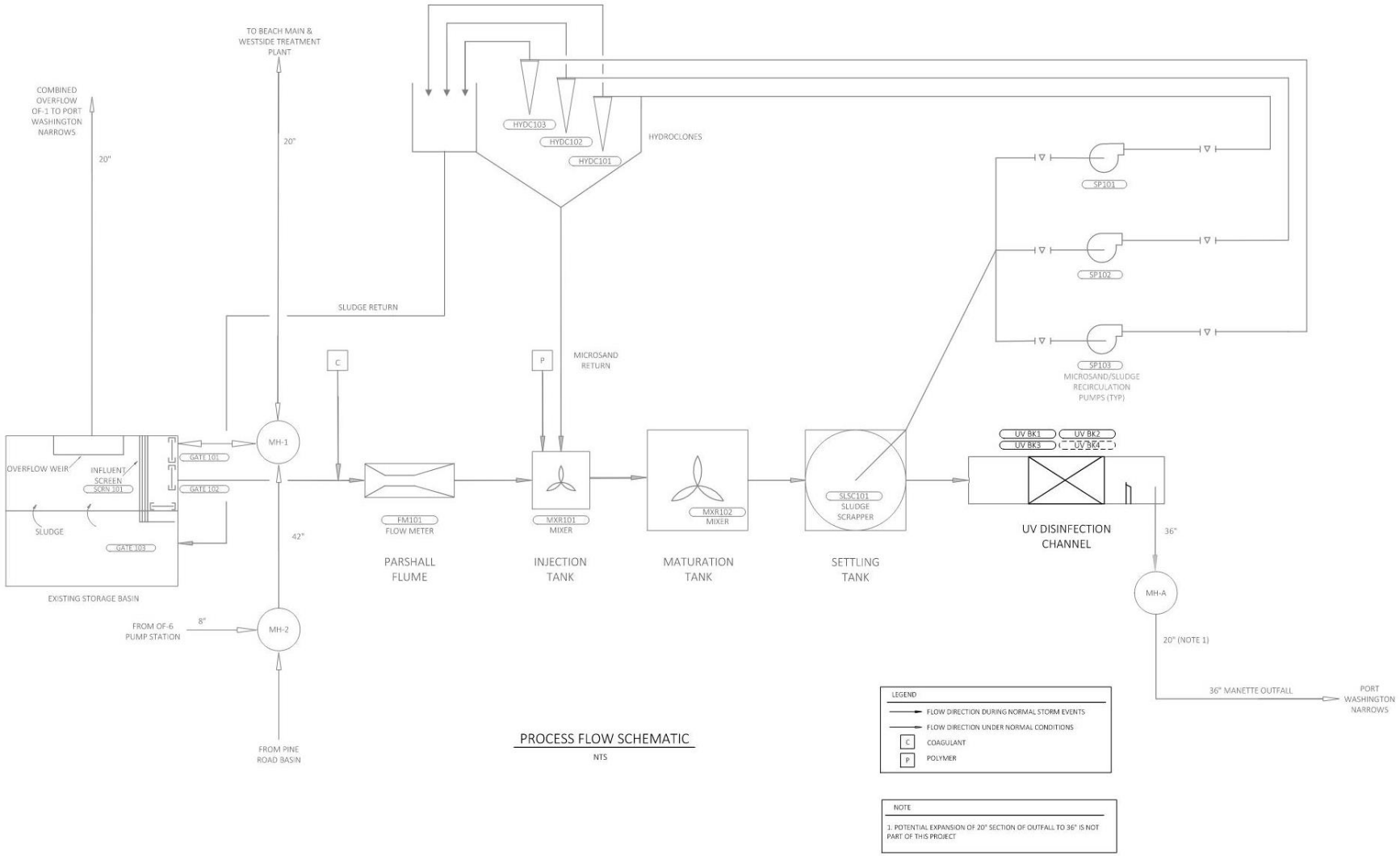


Figure 4-2 | Bremerton East Plant Existing Hydraulic Profile

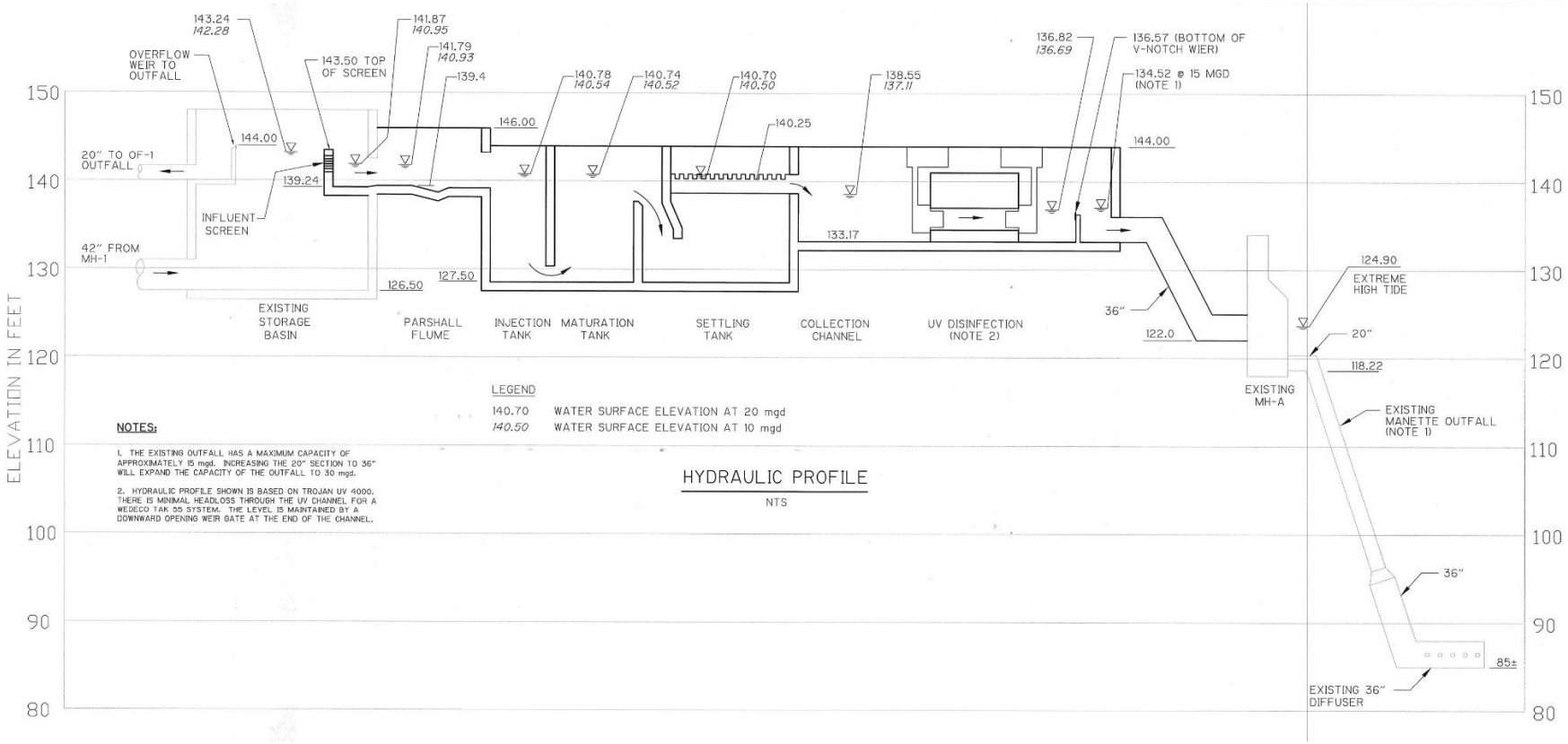
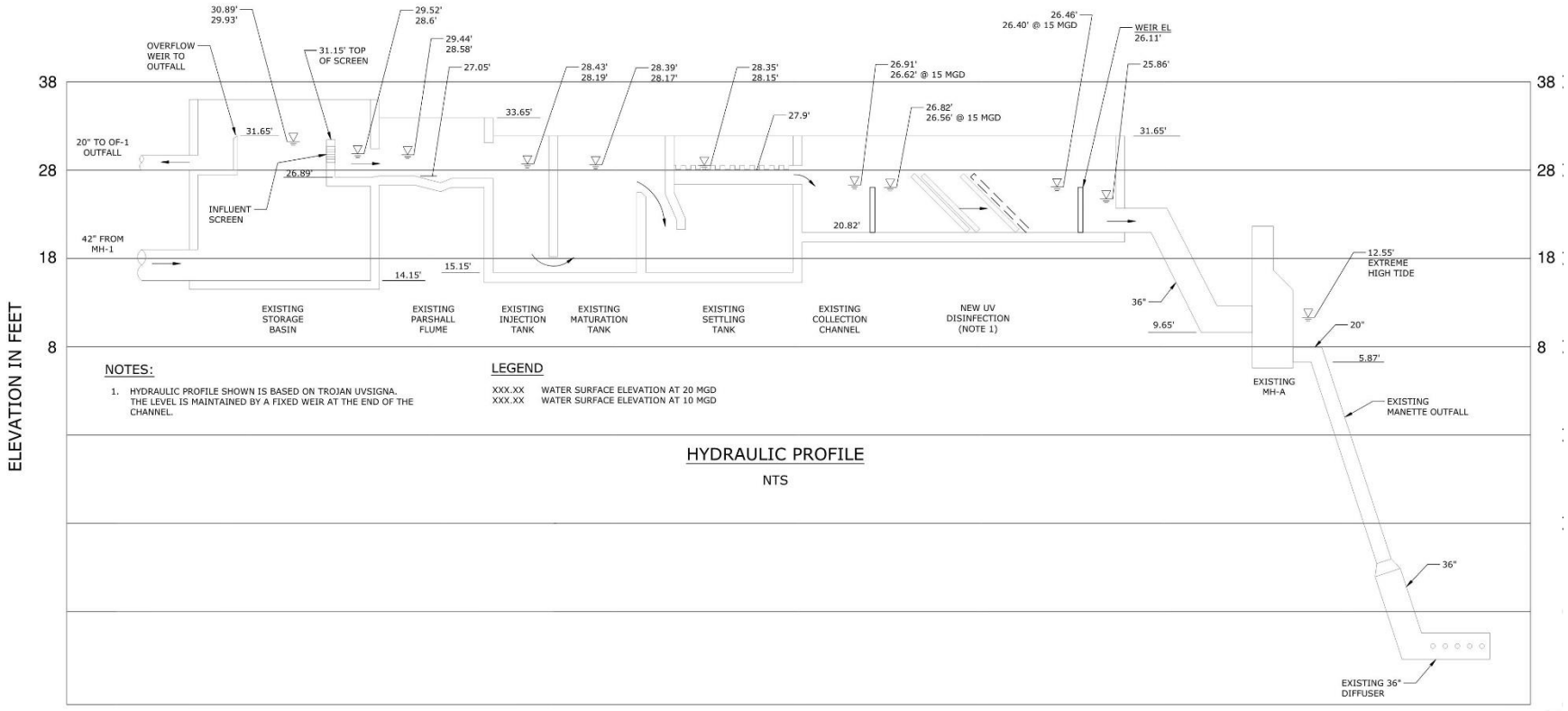


Figure 4-3 | Bremerton West Plant Future Hydraulic Profile



CHAPTER 5

Proposed Construction Sequencing

One of the more significant costs of replacing disinfection equipment within an existing treatment train is the need for a plant bypass during construction. Construction duration for the proposed improvements is expected to be 2 to 3 months due to the large amount of control and electrical gear to be replaced. This duration does not include time for equipment procurement, during which the plant can remain operational if needed. Because the plant is only needed during extreme wet weather (typically December through February), summer construction could avoid the need for a plant bypass. Due to the extended lead times on equipment, the project is expected to begin construction in the summer of 2025. The plant has not historically been used between May and October, providing a 3-month window available for construction.

CHAPTER 6

Staffing, O&M, & Testing Requirements

No additional plant staffing will be required for the proposed improvements.

The Trojan UV Signa system has an automatic lifting arm mechanism to lift banks out of the channel when needed, so no ancillary crane or crane operation is necessary. Lamp changeouts and routine maintenance can be performed while the banks are lifted over the channel and the system is still in operation, and lamp replacement occurs every 15,000 hours, averaging approximately 1 lamp per year based on the current operation time. Daily checks of the SCC are recommended to identify any alarms. Monthly inspections are necessary for the HSC and the water level sensor rods. The water sensor rods may need to be cleaned for debris, algae or damage.

Mechanical and chemical cleaning for the Trojan UV Signa system is automated with hydraulically driven wiper collars filled with a chemical cleaning gel surrounding the quartz sleeves within the channel itself. The cleaning is performed at preset intervals and occurs while the lamps are submerged and operating.

The cleaning solution replacement can be done while the UV bank is in the channel and is performed every six months. Other maintenance procedures for the mechanical and chemical cleaning system includes addition of grease to the hydraulic cylinders annually and replacement of the wiper seals every two years.

The contractor shall work with plant operators and the equipment manufacturer for system testing and validation after installation and before commissioning into full service.

CHAPTER 7

Cost Opinions

An opinion of probable construction cost (OPCC) was developed in 2023 dollars using RSMeans Heavy Construction Cost Data, similar project bid tabs and OPCCs, engineer experience, current supplier costs, and contractor input. The OPCC was developed based on the preliminary concepts and layouts of the improvements and are considered Class 4 opinions, per the Association for the Advancement of Cost Engineering (AACE) International. The Class 4 OPCC was prepared in accordance with the guidelines for planning-level evaluations, based on the *AACE International Recommended Practice No. 18R-97 Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries – TCM Framework: 7.3 – Cost Estimating and Budgeting.*

The following markups have been used to account for the construction cost:

- Contractor mobilization/demobilization = 10%
- General conditions = 8%
- Contractor overhead, and profit (O&P) = 12%
- Local sales tax = 9.2%
- Contingency = 35%

The following markup can be added to the OPCC to estimate the full project cost (design and construction):

- Engineering, construction management, legal, and administration = 50%

The project cost estimate is summarized in **Table 7-1**. See **Appendix C** for the detailed OPCC. It should be noted that the cost for the UV Signa equipment is based on the latest quote from Trojan. Equipment quotes are valid for 30 days and is subject to change outside of the 30-day period.

Table 7-1 | East Plant UV System Replacement 30% OPCC

Improvement	Cost Estimate
UV System Replacement	$3,133,000
Subtotal Construction Cost	**$ 3,133,000**
Final Design and Contract Management	$ 784,000
Owner contingency (5%) and Tax (9.2%)	$ 575,000
Total Project Cost	**$ 4,492,000**

The Operations and Maintenance (O&M) costs in **Table 7-2** for a 20-year planning horizon were developed based on the following assumptions:

- Labor cost: $10/hour
- Electricity Cost: $0.10/kWh
- Discount rate: 3%
- Inflation rate from 2023 to 2024: 12%
- Inflation rate from 2025 to 2026: 8%
- Long term inflation: 5%

Table 7-2 | East Plant UV System 20-Year O&M Cost Estimate

O&M Task	Cost	Frequency	20-Year Present Value Cost
Labor[1]	$ 3,000	/Year	$ 83,000
Power[2]	$ 300	/Year	$ 6,000
Lamp Replacement	$ 100	/Year	$ 2,000
Total Present Value 20-Year O&M Cost			**$ 91,000**

Notes:
1. UV system preventative maintenance, operation troubleshooting, and lamp replacement.
2. $0.10/kWh per 2023 PSE industrial rate

CHAPTER 8

Project Compliance

The East Plant must always be ready to accept flow under wet weather conditions to ensure the City maintains compliance with the CSO regulations that are addressed in RCW 90.48.480 and WAC 173-245, allowing only one CSO per year per CSO site.

The Environmental Protection Agency (EPA) has delegated authority to issue NPDES permits to the Washington Department of Ecology. Bremerton's NPDES Permit, WA0029289, was issued in compliance with the provisions of the State of Washington Water Pollution Control Law Chapter 90.48 Revised Code of Washington and the Federal Water Pollution Control Act (the Clean Water Act) Title 33 United States Code, Section 1342 et seq. The East Plant must always be able to achieve the requirements in NPDES Permit while in operation.

APPENDIX A
Manufacturer Cutsheets

consor

PROPOSAL FOR BREMERTON - UV4000 REPLACEMENT (CSO), WA
QUOTE: 230174

05/18/2023

TrojanUVSigna™ incorporates revolutionary innovations, including TrojanUV Solo Lamp™ technology, to reduce the total cost of ownership and drastically simplify operation and maintenance. It is the ideal solution for facilities wanting to upgrade their disinfection system easily and cost-effectively.

We are pleased to provide the enclosed TrojanUVSigna proposal. Please do not hesitate to contact us if you have any questions regarding this proposal. We look forward to working with you.

With best regards,

Jackie Corlett
Trojan Technologies
(604) 754-8431
jcorlett@trojantechnologies.com

Local Representative:

Bill Reilly, Jr.
Wm. H. Reilly & Co.
(503) 223-6197

DESIGN CRITERIA

Peak Design Flow:	**15 MGD (US)**
Future Design Flow:	**20 MGD (US)**
UV Transmittance:	**50%** (minimum)
Total Suspended Solids:	**15 mg/l** (**30 day average,** grab sample)
Disinfection Limit:	**400 Fecal Coliform per 100 ml**, 1 day Maximum of consecutive daily grab samples
UV Dose:	**30 mJ/cm2** (RED MS2 bioassay validation)

DESIGN SUMMARY

CHANNEL	
Number of Channels:	**1**
Minimum Channel Length Required:	**35.6 ft** (Existing over 45’ – to be confirmed)
Channel Width at UV Banks:	**4.7 ft** (Existing is 5’) 5.83'
Channel Depth Recommended:	**7.8 ft** (Existing is 10’ – 10”)
UV BANKS	
Number of Banks per Channel:	**3** – Current, 4 – Future
Number of Lamps per Bank:	**20**
Total Number of UV Lamps:	**60** – Current, 80 – Future
Maximum Duty Power Draw:	**63.9 kW**
UV PANELS	
Power Distribution Center Quantity:	**1** – Double Panel (Current), 1 – Single Panel (Future)
Hydraulic System Center Quantity:	**1** – Current, 1 – Future
System Control Center Quantity:	**1**
ANCILLARY EQUIPMENT	
Level Controller Quantity and Type:	**1 – Fixed Weir**
Integral Bank Walls:	**Included**
On-line UVT Monitoring:	**Hach UVAS sc Sensor – Included**
Spare Parts:	**Included**
Start up | Freight	**Included**
ELECTRICAL REQUIREMENTS	
1. Each Power Distribution Center requires an electrical supply of one (1) 480/277V 60Hz, 3 Phase, 4 Wire + GND, 64.8 kVA **2.** Electrical supply for Hydraulic System Center will be (1) 480V 60Hz, 3 Phase, 3 Wire + GND, 2.5 kVA **3.** Electrical supply for System Control Center will be (1) 120V 60Hz, 1 Phase, 2 Wire + GND,1.8 kVA **4.** The On-line UVT monitor requires (1) 120 Volts, 1 Phase, 2 Wire + GND, 1A **5.** Electrical disconnects are not included in this proposal. Refer to local electrical codes	

COMMERCIAL INFORMATION

Total Capital Cost: $ 603,700 (USD)

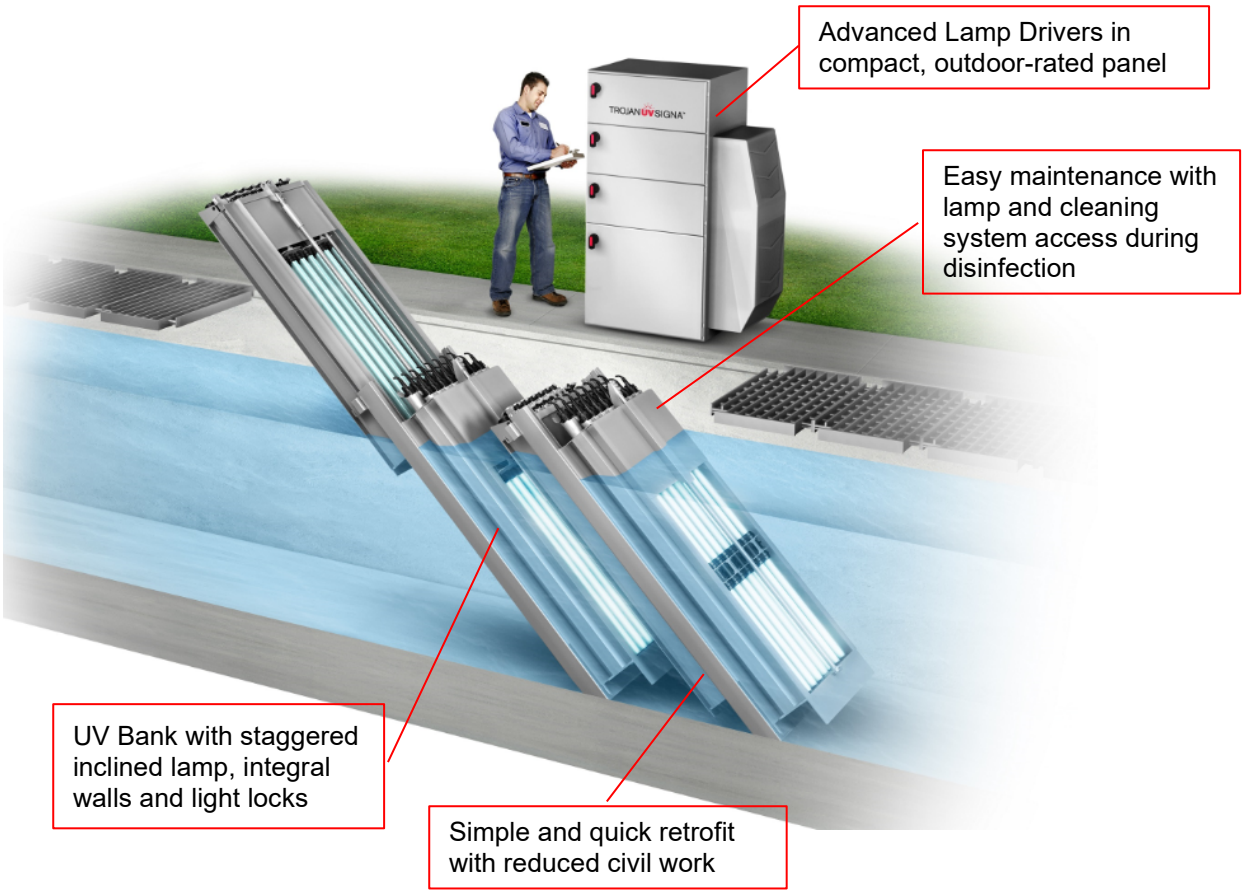
This price excludes any taxes or duties that may be applicable.
Standard equipment warrantees and start up by Trojan-certified technicians are included.

Easy and Cost-Effective Maintenance

- The 1000 watt TrojanUV Solo Lamp combines the benefits of both low pressure and medium pressure lamps
- Fewer lamps, long lamp life and easy change-outs save time and money
- Lamp change-outs and cleaning solution replacement are done while the UV system is in the channel – minimizing downtime and simplifying maintenance
- Routine maintenance can be performed while banks are in the channel, but an Automatic Raising Mechanism (ARM) makes other tasks, such as winterization, simple, safe and easy
- Lamp plugs with LED status indicators and integral safety interlock prevent an operator from accidentally removing an energized lamp
- ActiClean WW™ chemical/mechanical cleaning system to keep sleeves clean during operation

SYSTEM OVERVIEW

SOLO LAMP TECHNOLOGY

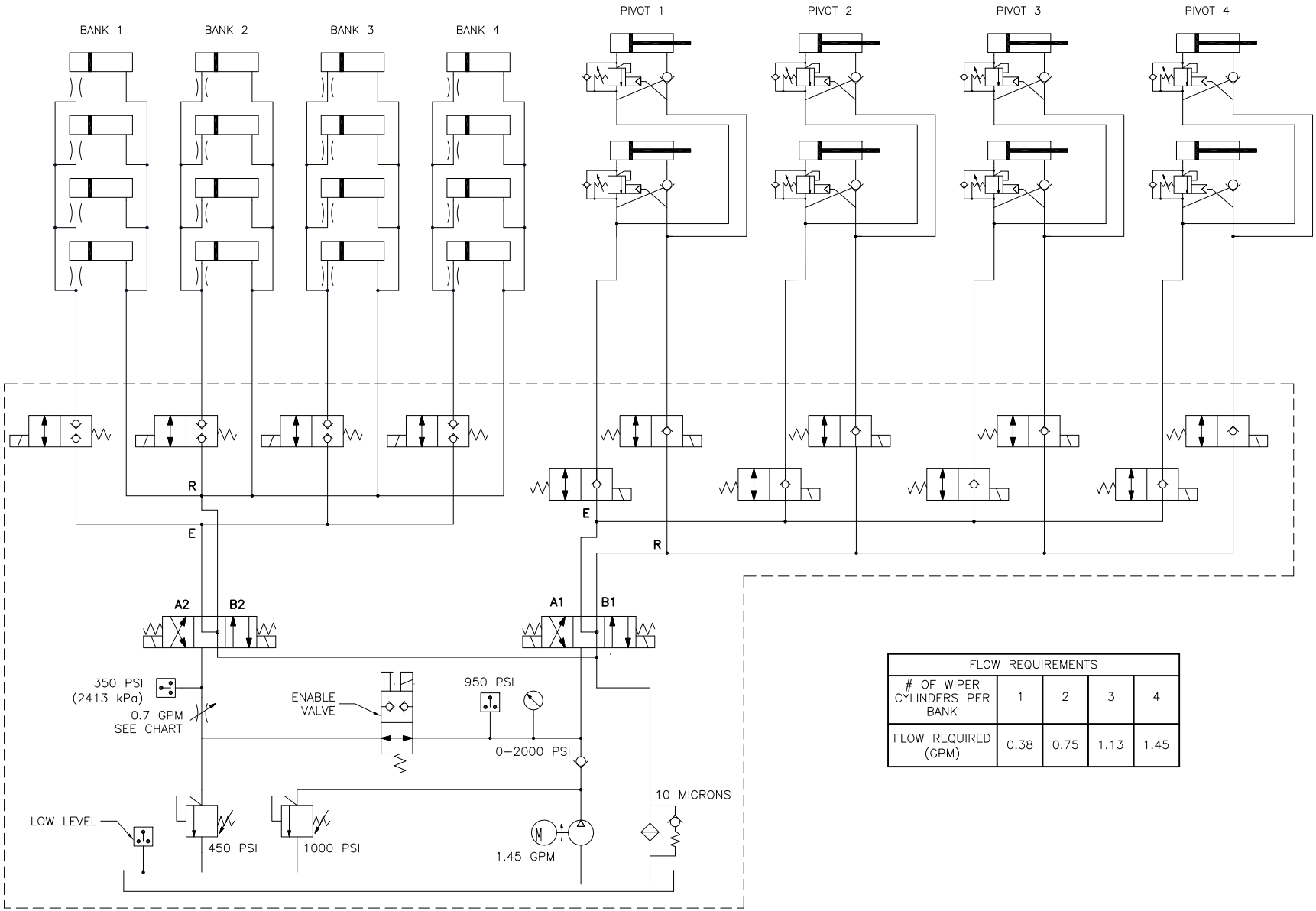


Simple to Design and Install

- Light locks on the UV banks control water level within the channel, reducing dependence on downstream weirs and preventing short-circuiting above the lamp arc
- UV Banks include integral reactor walls to make installation easy and prevent short circuiting at the channel walls
- Stringent tolerances on concrete channel walls are not required – making retrofits simple and cost-effective

Supported by Trojan Technologies

- Trojan Technologies warrants all components of the system (excluding UV lamps) against faulty workmanship and materials for a period of 12 months from date of start-up or 18 months after shipment, whichever comes first.
- UV lamps are warranted for 15,000 hours of operation or 3 years from shipment, whichever comes first. Lamp warranty is pro-rated after 9,000 hours of operation. This means that if a lamp fails prior to 9,000 hours of use, a new lamp is provided at no charge.
- Trojan offers an unparalleled Lifetime Performance Guarantee. The spirit of this guarantee is simple: the Trojan equipment, as sized for the project, will meet the disinfection requirements for the life of the system.



FLOW REQUIREMENTS				
# OF WIPER CYLINDERS PER BANK	1	2	3	4
FLOW REQUIRED (GPM)	0.38	0.75	1.13	1.45

HYDRAULIC SYSTEMS SCHEMATIC

SCALE: NOT TO SCALE

TROJANUV

DESCRIPTION: STD, TROJANUVSIGNA HSC G4 WIPER/PIVOT HYDRAULIC DIAGRAM

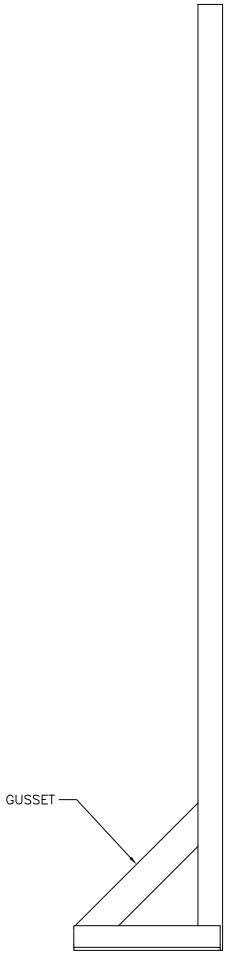
DRAWN BY :	MVW	DATE :	13AP15
CHECKED BY :	SML	DATE :	13AP23
APPROVED BY :	SAH	DATE :	13AP23
SCALE (8.5X10) :	NOT TO SCALE	LOG NUMBER :	N/A

STANDARD DRAWING NO. SG0026

REFERENCE NO. 907717C

DWG NO. D01

REV. A



SIDE VIEW
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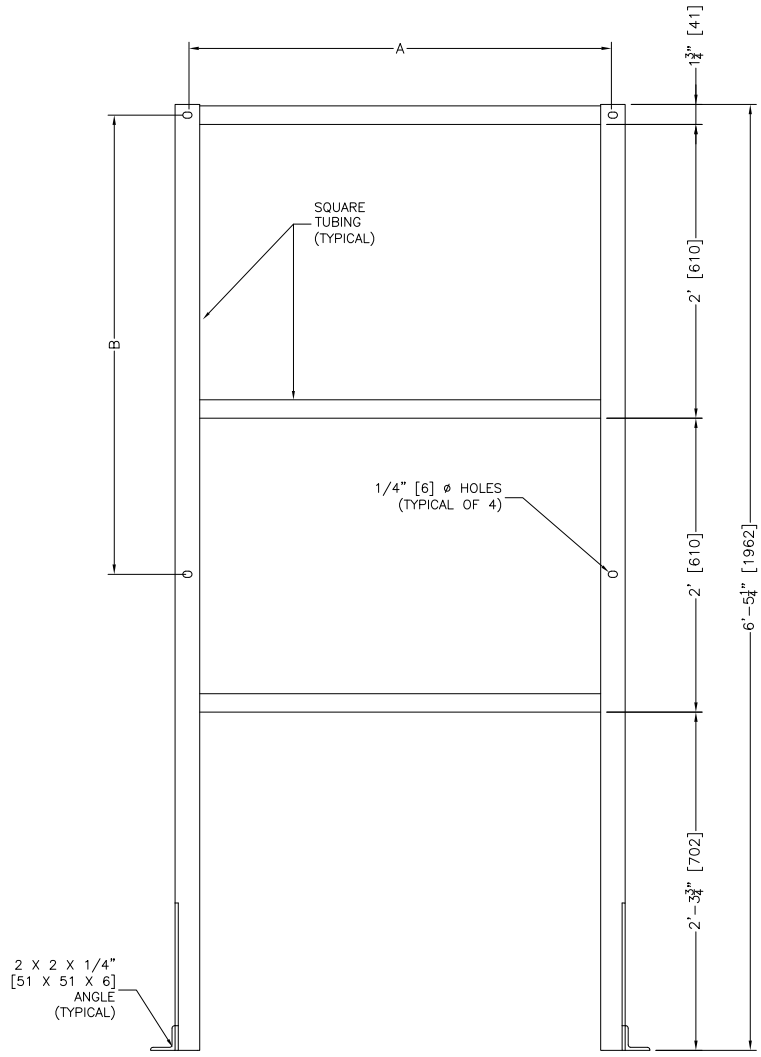

FRONT VIEW
SCALE:AS SHOWN

TOP VIEW
SCALE:AS SHOWN

NOTE:
: [ ] INDICATES DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
: PEDESTAL MATERIAL CAN BE 304 SST, 316 SST, OR PAINTED MILD STEEL.

SCC SIZE (HEIGHT X WIDTH)	A	B
30 X 24 [762 X 610]	1'-10½" [572]	2'-7½" [800]
30 X 30 [762 X 762]	2'-4" [724]	2'-7½" [800]
36 X 30 [914 X 762]	2'-4" [724]	3'-1½" [953]
36 X 36 [914 X 914]	2'-10½" [876]	3'-1½" [953]
42 X 30 [1067 X 762]	2'-4" [724]	3'-7½" [1105]
42 X 36 [1067 X 914]	2'-10½" [876]	3'-7½" [1105]
48 X 36 [1219 X 914]	2'-10½" [876]	4'-1½" [1257]

TROJANUV

DESCRIPTION: STD, TROJANUVSIGNA SCC PEDESTAL

STD. DRAWING NO. SG0027

DRAWN BY : SAH	DATE : 13AU29
CHECKED BY : MMB	DATE : 13AU29
APPROVED BY : SLO	DATE : 13AU29
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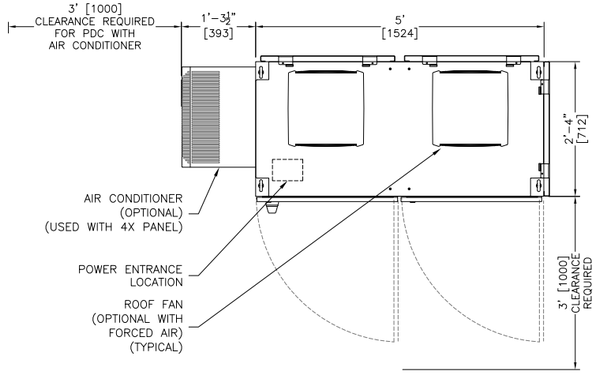
REFERENCE NO. 322194C

DWG NO. D01 | REV. A



PLAN VIEW

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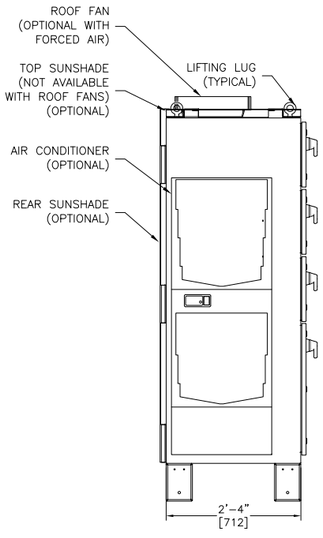
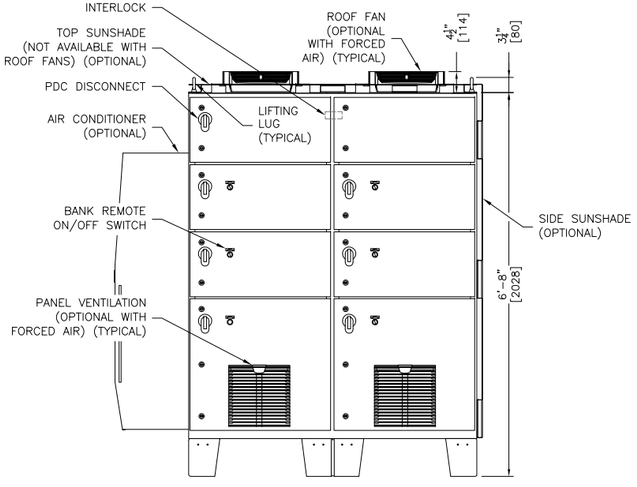


LEFT SIDE VIEW

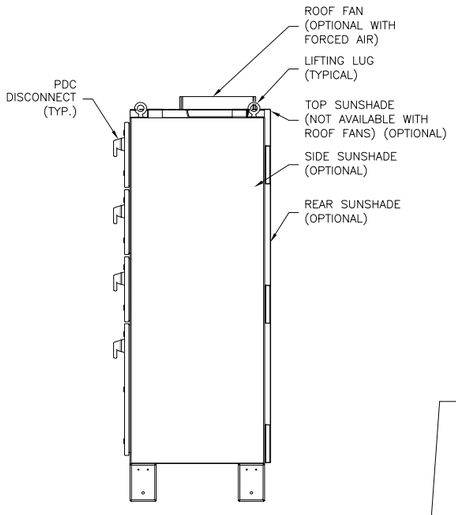
SCALE: AS SHOWN



FRONT VIEW OF PDC (6 BANK)

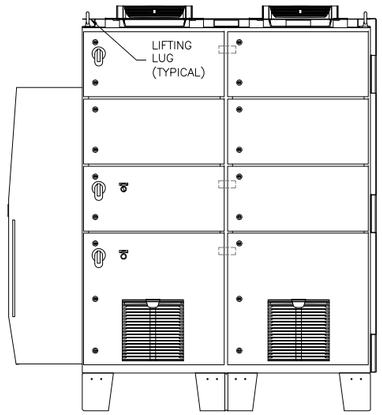
SCALE: AS SHOWN

NOTE: MAXIMUM 6 BANKS OF 8 TO 16 UV LAMPS PER BANK.
ONE (1) DOOR PER BANK.



RIGHT SIDE VIEW

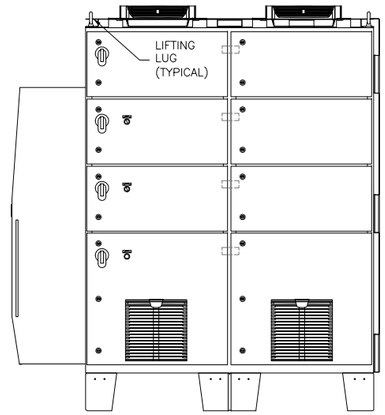
SCALE: AS SHOWN



FRONT VIEW OF PDC (2 BANK)

SCALE: AS SHOWN

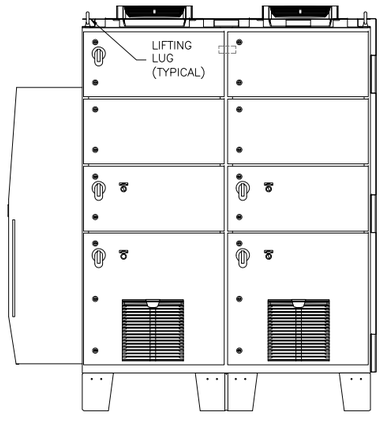
NOTE: MAXIMUM 2 BANKS OF 18 TO 24 UV LAMPS PER BANK.
TWO (2) DOORS PER BANK.



FRONT VIEW OF PDC (3 BANK)

SCALE: AS SHOWN

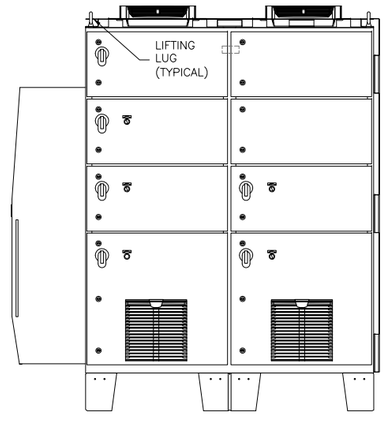
NOTE: MAXIMUM 3 BANKS OF 18 TO 24 UV LAMPS PER BANK.
TWO (2) DOORS PER BANK.



FRONT VIEW OF PDC (4 BANK)

SCALE: AS SHOWN

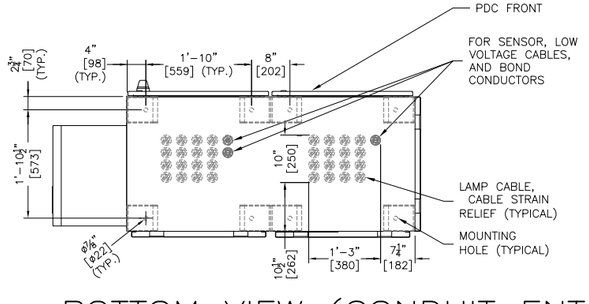
NOTE: MAXIMUM 4 BANKS OF 8 TO 16 UV LAMPS PER BANK.
ONE (1) DOOR PER BANK.



FRONT VIEW OF PDC (5 BANK)

SCALE: AS SHOWN

NOTE: MAXIMUM 5 BANKS OF 8 TO 16 UV LAMPS PER BANK.
ONE (1) DOOR PER BANK.



BOTTOM VIEW (CONDUIT ENTRANCE)

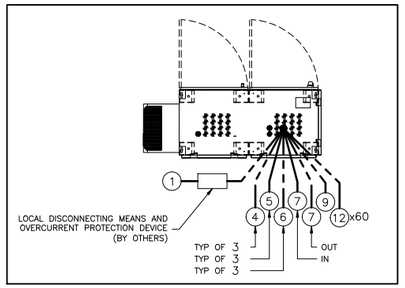
SCALE: AS SHOWN

NOTES:
: [ ] INDICATES DIMENSIONS IN mm UNLESS OTHERWISE SPECIFIED.
: METRIC DIMENSIONS SHOWN ARE CONVERSIONS FROM IMPERIAL.
: 304 SST, TYPE 4X (WITH A/C) (STANDARD), 316 SST, TYPE 4X (WITH A/C) (OPTIONAL).
: OPTIONAL AIR CONDITIONER CAN BE MOUNTED ON RIGHT SIDE OR LEFT SIDE OF PDC. LEFT-SIDED A/C IS SHOWN.
:. 304SST/316SST, TYPE 12 (WITH FORCED AIR – INSTALLED IN ENVIRONMENTALLY CONTROLLED ROOM (MAXIMUM AMBIENT TEMPERATURE OF 82°F [30°C]) (OPTIONAL)
: PDC TO BE FLOOR MOUNTED.
: APPROXIMATE DOUBLE PDC WEIGHT = 1600 lbs. [726 kg]
: CONDUIT CUT OUTS ARE SHOWN IN APPROXIMATE LOCATIONS ONLY AND WILL VARY SLIGHTLY DUE TO SITE SPECIFIC PANEL REQUIREMENTS.

TROJANUV
A TROJAN TECHNOLOGIES BUSINESS

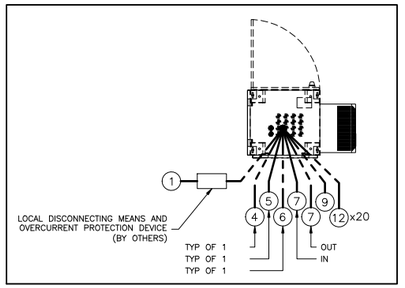
DESCRIPTION: TROJANUVSIGNA 2 ROW, DOUBLE POWER DISTRIBUTION CENTER

DRAWN BY : MMB	DATE : 18MR04	STD. DRAWING NO. 337861C
CHECKED BY : SPM	DATE : 19MY27	REFERENCE NO. SG0036
APPROVED BY : EC	DATE : 19MY27	DWG NO. D01 / REV. C
SCALE (11x17) : 3/8" = 1'-0"	LOG NUMBER : N/A	



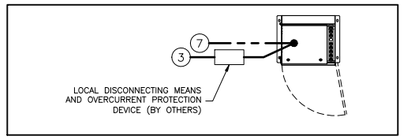
PDC INTERCONNECT DETAIL

SCALE:NOT TO SCALE



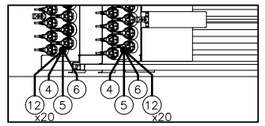
PDC INTERCONNECT DETAIL

SCALE:NOT TO SCALE



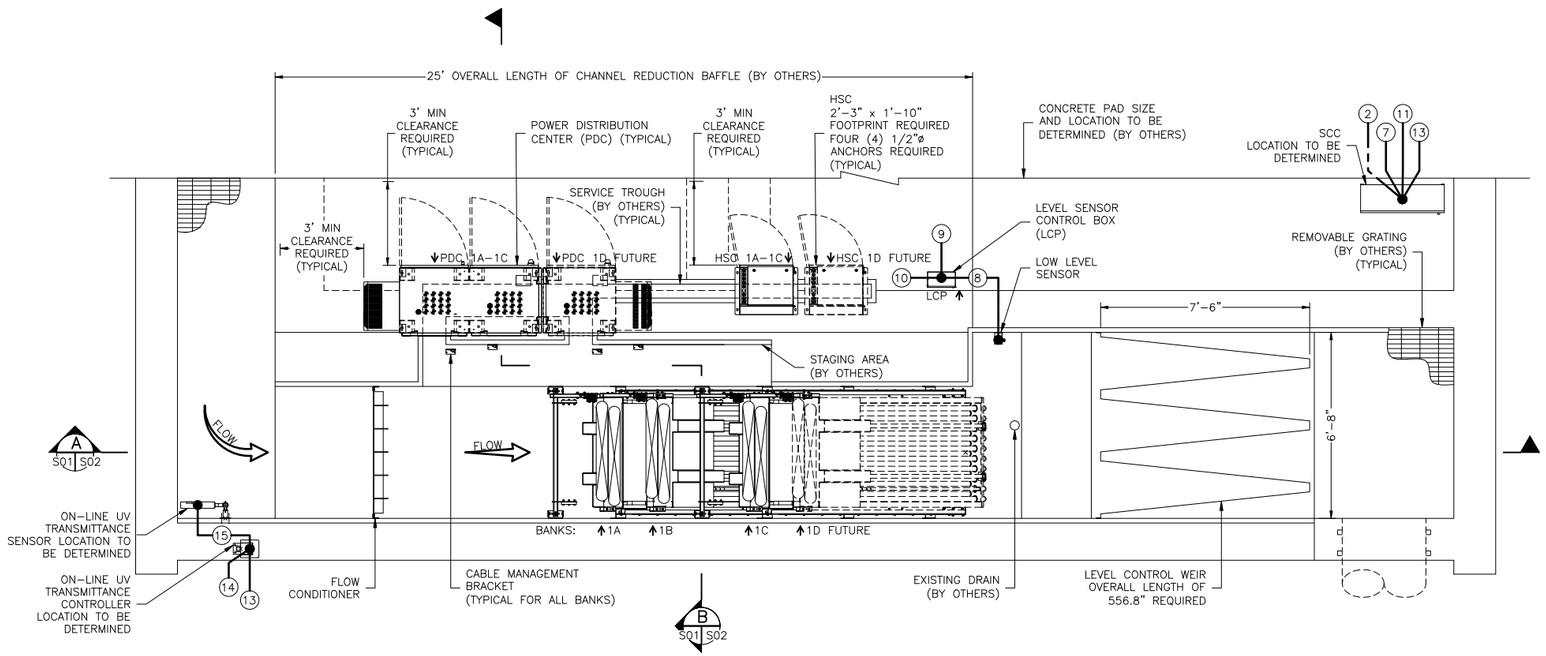
HSC INTERCONNECT DETAIL

SCALE:NOT TO SCALE



UV BANK INTERCONNECT DETAIL

SCALE:NOT TO SCALE
NOTE: TYPICAL FOR ALL UV BANKS.
TROUGH NOT SHOWN FOR CLARITY.



PLAN VIEW

SCALE: AS SHOWN

TROJAN UVSIGNA™

EQUIPMENT INTERCONNECTIONS

No.	DESCRIPTION	FROM	TO
1	POWER DISTRIBUTION CENTER (PDC)* POWER SUPPLY 480Y/277V, 3 PHASE, 4 WIRE + GROUND 84.0 AMPS MAXIMUM CURRENT/PHASE 69.4 kVA/PDC POWER DRAW	DISTRIBUTION PANEL (DP) (BY OTHERS) (NOT SHOWN)	PDC (TOP OF PANEL) (DOUBLE)
	POWER DISTRIBUTION CENTER (PDC)* POWER SUPPLY 480Y/277V, 3 PHASE, 4 WIRE + GROUND 34.0 AMPS MAXIMUM CURRENT/PHASE 23.2 kVA/PDC POWER DRAW	DISTRIBUTION PANEL (DP) (BY OTHERS) (NOT SHOWN)	PDC (TOP OF PANEL) (SINGLE)
2	SYSTEM CONTROL CENTER (SCC)* POWER SUPPLY 120V, 1 PHASE, 2 WIRE + GROUND 1.8 kVA, 15 AMPS	DP (BY OTHERS) (NOT SHOWN)	SCC
3	HYDRAULIC SYSTEM CENTER (HSC)* POWER SUPPLY 480V, 3 PHASE, 3 WIRE + GROUND 2.5 kVA, 3 AMPS	DP (BY OTHERS) (NOT SHOWN)	HSC
4	BONDING CONDUCTOR 8 AWG TYPE TWH STRANDED	PDC(s) (UNDERSIDE OF PANEL)	UV BANK(s)
5	UV INTENSITY 4-20MA ANALOG INPUT (SUPPLIED)	UV BANK(s)	PDC(s) (UNDERSIDE OF PANEL)
6	BANK IN PLACE PROXIMITY SENSOR 3 CONDUCTOR CABLES (SUPPLIED)	PROXIMITY SENSOR(s)	PDC(s) (UNDERSIDE OF PANEL)
7	MODBUS BELDEN 3106A OR EQUIVALENT (ONE LINE PER CHANNEL)	SCC	HSC(s) & PDC(s) (UNDERSIDE OF PANEL) (DAISY CHAINED)
8	DISCRETE LOW LEVEL SIGNAL 12 VDC - 2 CONDUCTORS	LOW LEVEL SENSOR	LEVEL SENSOR CONTROL BOX (LCP)
9	DISCRETE WATER LEVEL SIGNAL 2 CONDUCTORS	LEVEL SENSOR CONTROL BOX (LCP)	PDC(s) (UNDERSIDE OF PANEL)
10	LEVEL SENSOR CONTROL BOX (LCP)* POWER SUPPLY 120V, 1 PHASE, 2 WIRE + GROUND, 0.12 kVA	DP (BY OTHERS) (NOT SHOWN)	LEVEL SENSOR CONTROL BOX (LCP)
11	FLOW METER 4-20 mA, DC ANALOG INPUT (BY OTHERS)	FLOW METER PANEL (NOT SHOWN) (BY OTHERS)	SCC
12	LAMP CABLES (SUPPLIED BY TROJAN) (ROUTED BY OTHERS)	UV BANK	PDC (UNDERSIDE OF PANEL)
13	ON-LINE UV TRANSMITTANCE CONTROLLER SIGNAL 4-20 mA	ON-LINE UV TRANSMITTANCE CONTROLLER	SCC
14	ON-LINE UV TRANSMITTANCE CONTROLLER POWER SUPPLY 120V, 1 PHASE, 2 WIRE + GROUND, 1.8 kVA	DP (NOT SHOWN) (BY OTHERS)	ON-LINE UV TRANSMITTANCE CONTROLLER
15	ON-LINE UV TRANSMITTANCE SENSOR COMMUNICATION (SENSOR CABLE PROVIDED BY HACH)	ON-LINE UV TRANSMITTANCE SENSOR	ON-LINE UV TRANSMITTANCE CONTROLLER

*** GROUND CONNECTION REQUIRED TO PLANT GRID (BY OTHERS).**

NOTES:

: DO NOT SLOPE CHANNEL FLOOR.
: CHANNEL WIDTH MUST BE KEPT WITHIN A TOLERANCE OF -/+1½" AT UV BANK FRAME AND -/+¼" FOR REST OF CHANNEL.
: ALL CHANNEL ELEVATIONS MUST BE KEPT WITHIN A TOLERANCE OF -/+¼" AGAINST A COMMON DATUM ELEVATION.
: ANCHOR BOLTS ARE NOT SUPPLIED BY TROJAN TECHNOLOGIES,
: SYSTEM CONDUIT, WIRING, DISTRIBUTION PANELS & INTERCONNECTIONS BY OTHERS.
: ELECTRICAL REQUIREMENTS SHOWN ARE TO SUPPLY TROJAN UV EQUIPMENT ONLY.
: REMOVABLE GRATING SECTIONS SHALL BE EASILY REMOVED BY ONE PERSON. MAXIMUM WEIGHT OF THE SECTIONS SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF THE APPLICABLE JURISDICTION.
: CONTRACTOR TO REVIEW ALL TROJAN TECHNOLOGIES INSTALLATION INSTRUCTIONS PRIOR TO EQUIPMENT INSTALLATION.
: EFFLUENT LEVELS SHOWN REFLECT HYDRAULICS ASSOCIATED WITH TROJAN EQUIPMENT ONLY. EFFLUENT LEVELS MAY BE ALTERED DUE TO CHANNEL DEBRIS OR GEOMETRY.
: HYDRAULIC HOSE ELEVATIONS NOT TO EXCEED 12" ABOVE HSC MOUNTING ELEVATION.
: INCLUDED CABLE LENGTH ALLOWS FOR 26.0' ROUTING (RISE + RUN) BETWEEN CABLE/HOSE MANAGEMENT BRACKET AND UNDERSIDE OF PDC. (9.0' ROUTING ASSUMED BASED ON THIS LAYOUT.)
: INCLUDED HOSE LENGTH ALLOWS FOR 24.0' ROUTING (RISE + RUN) BETWEEN CABLE/HOSE MANAGEMENT BRACKET AND HOSE CONNECTION ON THE HSC. (17.5' ROUTING ASSUMED BASED ON THIS LAYOUT.)
: SITE TO PROVIDE APPROVED (ENGINEERED) ANCHOR POINTS FOR PERSONNEL TO USE AS PART OF THEIR FALL RESTRAINT SYSTEM AROUND OPEN CHANNELS. THE ANCHOR POINTS MUST BE POSITIONED SO THAT THE PREFERRED RETRACTABLE LIFELINE OF 8 FEET IS OF SUFFICIENT LENGTH TO ACCESS THE WORK AT THE CHANNEL.
**** SOLID GRATING REQUIRED TO BLOCK ULTRAVIOLET (UV) LIGHT.**

PRELIMINARY, NOT FOR CONSTRUCTION

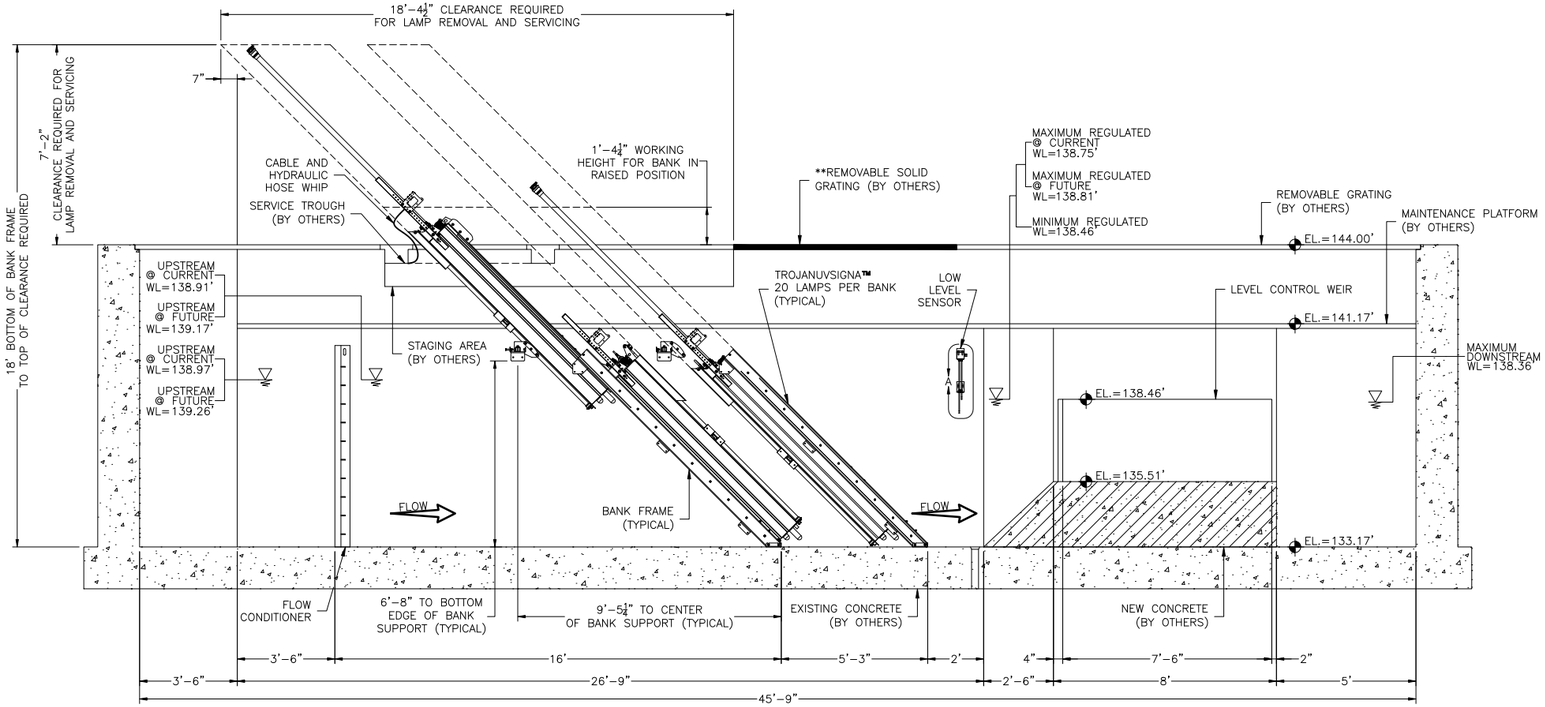
VERIFY DIMENSIONS BEFORE COMMENCING CIVIL OR DESIGN WORK

DESIGN CRITERIA		
	PEAK FLOW	15.00 MGD (CURRENT) 20.00 MGD (FUTURE)
	U.V TRANSMITTANCE AT 253.7 nm	50 %
	SUSPENDED SOLIDS	15 mg/L (30 DAY AVG.)
	DISINFECTION STANDARD	400 FECAL COLIFORM / 100mL (1 DAY MAXIMUM)

TROJANUV™
A TROJAN TECHNOLOGIES BUSINESS

DESCRIPTION: LAYOUT, TROJANUVSIGNA BREMERTON, WA

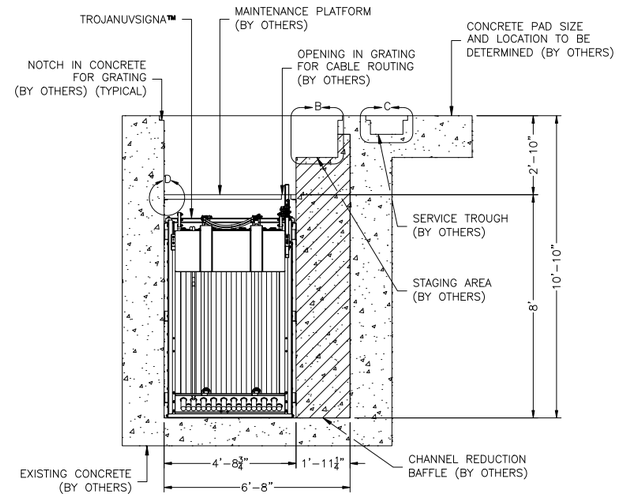
DRAWN BY : SJ	DATE : 23MY10	QUOTE NO. 230174
CHECKED BY : AJ	DATE : 23MY19	PROJECT NO. N/A
APPROVED BY : SS	DATE : 23MY23	DWG NO. S01 / REV. A
SCALE (11x17) : 3/16" = 1'-0"	LOG NUMBER : N/A	



A SECTION

S01 S02 SCALE: AS SHOWN

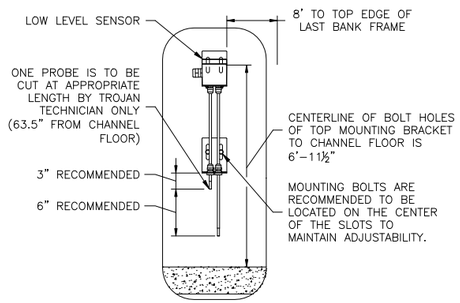
NOTE: HSC's, PDC's, SCC, ONLINE UVT SENSOR, ONLINE UVT CONTROLLER AND LEVEL SENSOR CONTROL BOX NOT SHOWN FOR CLARITY.



B SECTION

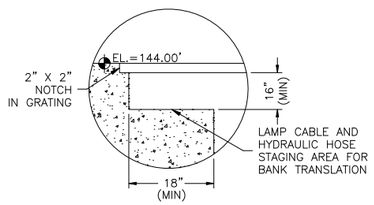
S01 S02 SCALE: AS SHOWN

NOTE: PDC, FLOW CONDITIONER, ONLINE UVT SENSOR, ONLINE UVT CONTROLLER AND REMOVABLE GRATING (BY OTHERS) NOT SHOWN FOR CLARITY.



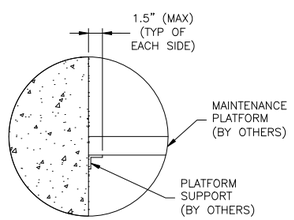
DETAIL A

SCALE:NOT TO SCALE



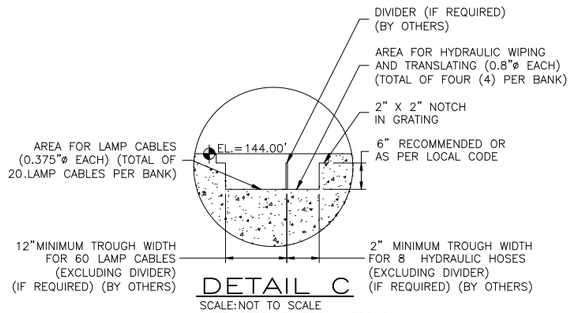
DETAIL B

SCALE:NOT TO SCALE



DETAIL D

SCALE:NOT TO SCALE



DETAIL C

SCALE:NOT TO SCALE

NOTE: REFER TO TROJAN TROUGH CABLE INSTALLATION GUIDELINE DC000601-017 OR LOCAL CODE IF MORE RESTRICTIVE. TROUGH WIDTHS BASED ON SOLID STYLE GRATING.

NOTES:

: DO NOT SLOPE CHANNEL FLOOR.
: CHANNEL WIDTH MUST BE KEPT WITHIN A TOLERANCE OF −/+1½" AT UV BANK FRAME AND −/+¼" FOR REST OF CHANNEL.
: ALL CHANNEL ELEVATIONS MUST BE KEPT WITHIN A TOLERANCE OF −/+¼" AGAINST A COMMON DATUM ELEVATION.
: ANCHOR BOLTS ARE NOT SUPPLIED BY TROJAN TECHNOLOGIES,
: SYSTEM CONDUIT, WIRING, DISTRIBUTION PANELS & INTERCONNECTIONS BY OTHERS.
: ELECTRICAL REQUIREMENTS SHOWN ARE TO SUPPLY TROJAN UV EQUIPMENT ONLY.
: REMOVABLE GRATING SECTIONS SHALL BE EASILY REMOVED BY ONE PERSON. MAXIMUM WEIGHT OF THE SECTIONS SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF THE APPLICABLE JURISDICTION.
: CONTRACTOR TO REVIEW ALL TROJAN TECHNOLOGIES INSTALLATION INSTRUCTIONS PRIOR TO EQUIPMENT INSTALLATION.
: EFFLUENT LEVELS SHOWN REFLECT HYDRAULICS ASSOCIATED WITH TROJAN EQUIPMENT ONLY. EFFLUENT LEVELS MAY BE ALTERED DUE TO CHANNEL DEBRIS OR GEOMETRY.
: HYDRAULIC HOSE ELEVATIONS NOT TO EXCEED 12" ABOVE HSC MOUNTING ELEVATION.
: INCLUDED CABLE LENGTH ALLOWS FOR 26.0' ROUTING (RISE + RUN) BETWEEN CABLE/HOSE MANAGEMENT BRACKET AND UNDERSIDE OF PDC. (9.0' ROUTING ASSUMED BASED ON THIS LAYOUT.)
: INCLUDED HOSE LENGTH ALLOWS FOR 24.0' ROUTING (RISE + RUN) BETWEEN CABLE/HOSE MANAGEMENT BRACKET AND HOSE CONNECTION ON THE HSC. (17.5' ROUTING ASSUMED BASED ON THIS LAYOUT.)
: SITE TO PROVIDE APPROVED (ENGINEERED) ANCHOR POINTS FOR PERSONNEL TO USE AS PART OF THEIR FALL RESTRAINT SYSTEM AROUND OPEN CHANNELS. THE ANCHOR POINTS MUST BE POSITIONED SO THAT THE PREFERRED RETRACTABLE LIFELINE OF 8 FEET IS OF SUFFICIENT LENGTH TO ACCESS THE WORK AT THE CHANNEL.
** SOLID GRATING REQUIRED TO BLOCK ULTRAVIOLET (UV) LIGHT.

PRELIMINARY, NOT FOR CONSTRUCTION

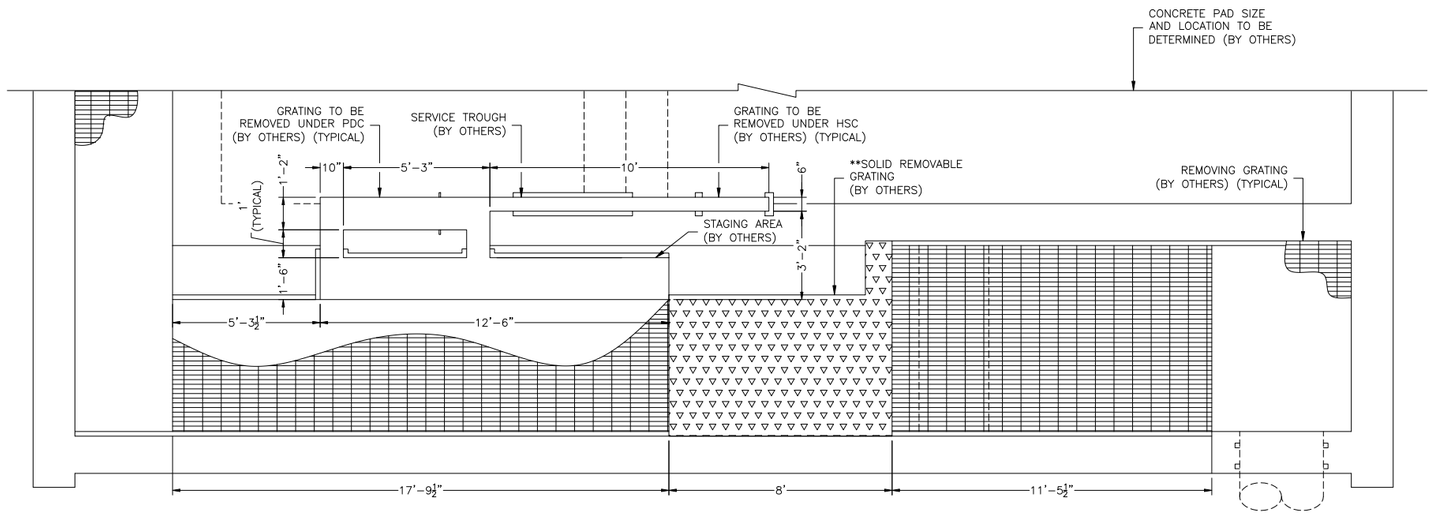
VERIFY DIMENSIONS BEFORE COMMENCING CIVIL OR DESIGN WORK

TROJANUV™ A TROJAN TECHNOLOGIES BUSINESS

DESCRIPTION: LAYOUT, TROJANUVSIGNA BREMERTON, WA

DRAWN BY : SJ	DATE : 23MY10
CHECKED BY : AJ	DATE : 23MY19
APPROVED BY : SS	DATE : 23MY23
SCALE (11x17) : 3/16" = 1'-0"	LOG NUMBER : N/A

QUOTE NO. 230174
PROJECT NO. N/A
DWG NO. S02
REV. A

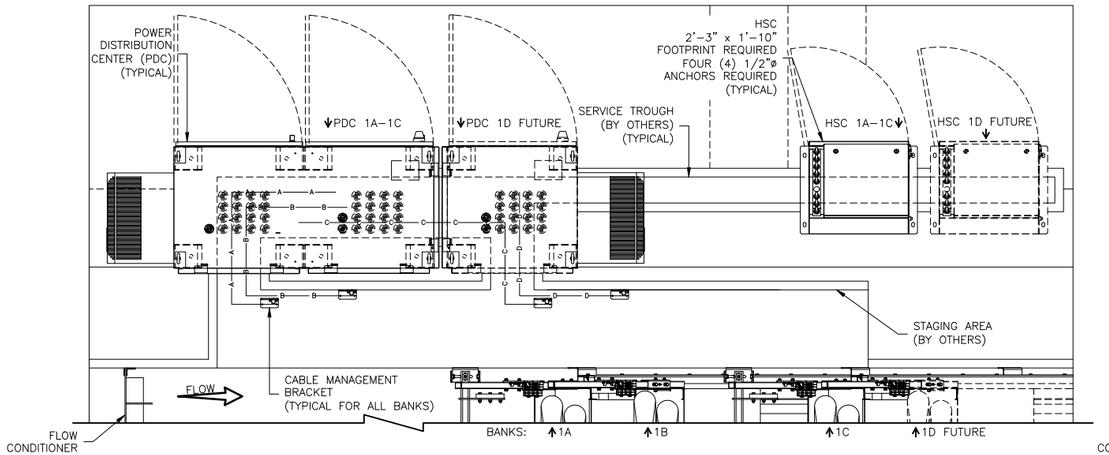


GRATING AND TROUGH PLAN VIEW

SCALE: AS SHOWN
NOTE: DESIGN OF GRATING SECTIONS SHOULD BE SIZED TO ALLOW FOR EASY REMOVAL BY SERVICE TECHNICIANS. SOLID GRATING MUST BE PROVIDED IN AREA INDICATED TO BLOCK UV LIGHT.

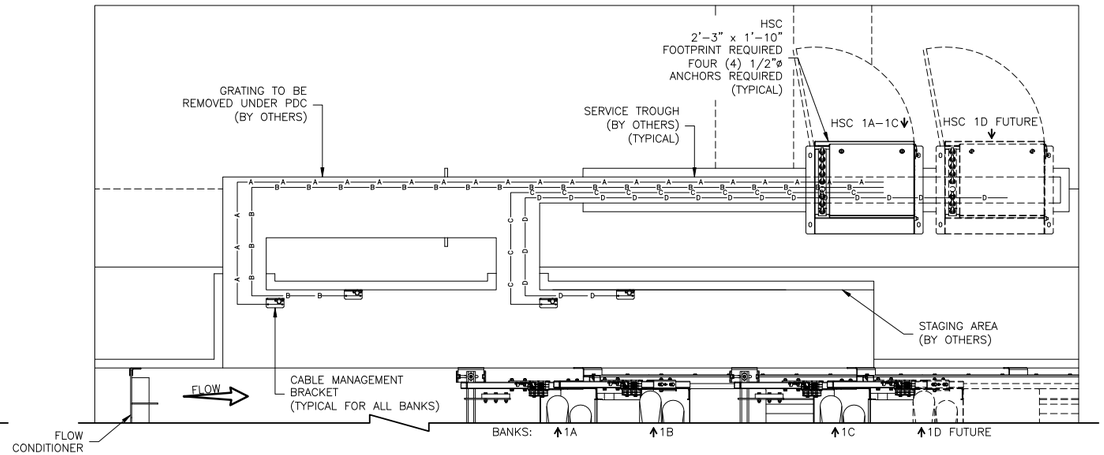
NOTES:

: DO NOT SLOPE CHANNEL FLOOR.
: CHANNEL WIDTH MUST BE KEPT WITHIN A TOLERANCE OF −/+1½" AT UV BANK FRAME AND −/+¼" FOR REST OF CHANNEL.
: ALL CHANNEL ELEVATIONS MUST BE KEPT WITHIN A TOLERANCE OF −/+¼" AGAINST A COMMON DATUM ELEVATION.
: ANCHOR BOLTS ARE NOT SUPPLIED BY TROJAN TECHNOLOGIES,
: SYSTEM CONDUIT, WIRING, DISTRIBUTION PANELS & INTERCONNECTIONS BY OTHERS.
: ELECTRICAL REQUIREMENTS SHOWN ARE TO SUPPLY TROJAN UV EQUIPMENT ONLY.
: REMOVABLE GRATING SECTIONS SHALL BE EASILY REMOVED BY ONE PERSON. MAXIMUM WEIGHT OF THE SECTIONS SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF THE APPLICABLE JURISDICTION.
: CONTRACTOR TO REVIEW ALL TROJAN TECHNOLOGIES INSTALLATION INSTRUCTIONS PRIOR TO EQUIPMENT INSTALLATION.
: **EFFLUENT LEVELS SHOWN REFLECT HYDRAULICS ASSOCIATED WITH TROJAN EQUIPMENT ONLY. EFFLUENT LEVELS MAY BE ALTERED DUE TO CHANNEL DEBRIS OR GEOMETRY.**
: **HYDRAULIC HOSE ELEVATIONS NOT TO EXCEED 12" ABOVE HSC MOUNTING ELEVATION.**
: **INCLUDED CABLE LENGTH ALLOWS FOR 26.0' ROUTING (RISE + RUN) BETWEEN CABLE/HOSE MANAGEMENT BRACKET AND UNDERSIDE OF PDC. (9.0' ROUTING ASSUMED BASED ON THIS LAYOUT.)**
: **INCLUDED HOSE LENGTH ALLOWS FOR 24.0' ROUTING (RISE + RUN) BETWEEN CABLE/HOSE MANAGEMENT BRACKET AND HOSE CONNECTION ON THE HSC. (17.5' ROUTING ASSUMED BASED ON THIS LAYOUT.)**
: **SITE TO PROVIDE APPROVED (ENGINEERED) ANCHOR POINTS FOR PERSONNEL TO USE AS PART OF THEIR FALL RESTRAINT SYSTEM AROUND OPEN CHANNELS. THE ANCHOR POINTS MUST BE POSITIONED SO THAT THE PREFERRED RETRACTABLE LIFELINE OF 8 FEET IS OF SUFFICIENT LENGTH TO ACCESS THE WORK AT THE CHANNEL.**
**** SOLID GRATING REQUIRED TO BLOCK ULTRAVIOLET (UV) LIGHT.**



LAMP CABLE ROUTING PLAN

SCALE: NOT TO SCALE



HYDRAULIC HOSE ROUTING PLAN

SCALE: NOT TO SCALE
NOTE: PDC NOT SHOWN FOR CLARITY.

PRELIMINARY, NOT FOR CONSTRUCTION
VERIFY DIMENSIONS BEFORE COMMENCING CIVIL OR DESIGN WORK

TROJANUV™
A TROJAN TECHNOLOGIES BUSINESS

DESCRIPTION: LAYOUT, TROJANUVSIGNA BREMERTON, WA		QUOTE NO. 230174
DRAWN BY : SJ	DATE : 23MY10	PROJECT NO. N/A
CHECKED BY : AJ	DATE : 23MY19	DWG NO. S03 / REV. A
APPROVED BY : SS	DATE : 23MY23	
SCALE (11x17) : 3/16" = 1'-0"	LOG NUMBER : N/A	

Aquaray HiCAP®
UV Disinfection System

September 28, 2023

Budget Proposal

Bremerton, WA - East Side WWTP

Aquaray UV Disinfection Systems are manufactured by Veolia in the USA to meet the requirements for Domestic Preferences in the Infrastructure Investment and Jobs Act.

Contact information:

Prepared By:

Veolia Water Technologies Treatment Solutions USA, Inc.
George Vrachimis
Tel : 201-676-2777
Email: george.vrachimis@veolia.com

Local Sales Representative:

APSCO LLC
Joe Kernkamp
Tel: 206-890-4039
Email: jkernkamp@apsco-llc.com

September 28, 2023

Re: Aquaray HiCAP® Ultraviolet Disinfection System
Bremerton, WA - East Side WWTP

Veolia is pleased to submit our preliminary budget proposal for the Aquaray HiCAP® Vertical Lamp ultraviolet disinfection system for the above referenced project. The proposed design is based on our Aquaray HiCAP® System which features vertically mounted, high output 1,000 watt amalgam lamps with variable output for greater power conservation

Some of the proposed Aquaray HiCAP® Vertical Lamp UV System's features include:

- 1000 watt LPHO Amalgam UV lamps to reduce lamp count and equipment footprint
- Third Party Validated
- Easy maintenance without the need to remove equipment from channel for lamp and ballast replacement.
- Automatic dose control is achieved by turning on/off lamps row by row in combination with dimming each lamp in response to a flow signal, ensuring that the plant is operated economically while still providing the required performance.
- IP68 Rated for Submergence

For a peak flow of 15 MGD and a minimum UVT of 50%, Veolia proposes to furnish one (1) UV disinfection channel. The proposed UV system will have UV modules, each with 36 lamps, mounted one (1) across by three (3) UV banks in series. The UV system will deliver a minimum UV dose of 30 mJ/cm^2 at the peak flow with all UV banks in service.

At the future peak flow of 20 MGD, Veolia proposes to add one (1) additional module to the channel for a total of four (4) modules for the system. The UV system will deliver a minimum UV dose of 30 mJ/cm^2 at the peak flow with all UV banks in service.

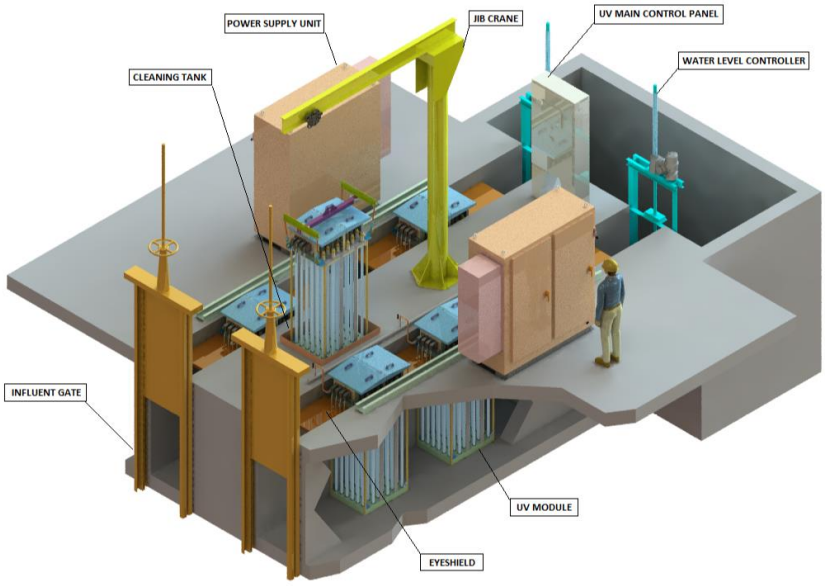
If you have any questions or require any additional information, please don't hesitate to contact our local representative or the undersigned.

Sincerely,

For VEOLIA Water Technologies Treatment Solutions USA, Inc.

George Vrachimis

I. AQUARAY® HiCAP VERTICAL LAMP SYSTEM DESCRIPTION



- The Aquaray® HiCAP's vertical open channel type configuration, unique staggered lamp array and perpendicular flow enables the plant operators to service the system with ease and simplicity.

- The UV lamps are mounted vertically and perpendicular to the flow, where all electrical connections are made out of the water. All the lamps are easily accessed through the lid of the top enclosure. This makes routine service such as lamp changes, performed without having to remove the lamp modules from the channel.

- Electronics, such as ballasts and communication cards, are all located in a remote enclosure away from the UV channel

- The UV lamps are mounted in a uniform staggered array. This ensures a semi-tortuous path for the effluent that avoids discharge of undisinfected wastewater.

- Flow pacing is achieved by a combination of dimming each row of lamps from 100% down to 40% output and turning lamp rows on and off in relation to a plant flow signal. Each UV module has four (4) rows of lamps arranged asymettrically to assure a tortuous flow path that enhances overall dose applied while insuring significant backmixing that yields better inactivation than other designs.

- Each UV module has a dedicated electric motor that powers a simple mechanical wiper plate mounted on an acme screw drive. No failure of one wiping system component will result in the loss of wiping capability for the entire UV system.

- All UV modules are completely removable from the UV channel, allowing for regularly scheduled channel cleaning to remove algae or debris.

HIGH OUTPUT LAMP ARRANGEMENT:

The ultraviolet lamps are mounted vertically so that all electrical connections are made out of the water and within the protection of an IP68 stainless steel enclosure. Unlike other designs, all the lamps are easily accessed through the lid of this enclosure. Therefore, routine service such as lamp changes can be made without having to remove the lamp modules from the channel.

The lamps are also mounted in a uniform staggered array, This ensures a semi-tortuous path so that every particle of water will come into intimate contact with the most intense point of lamp output.

MODULE ARRANGEMENT:

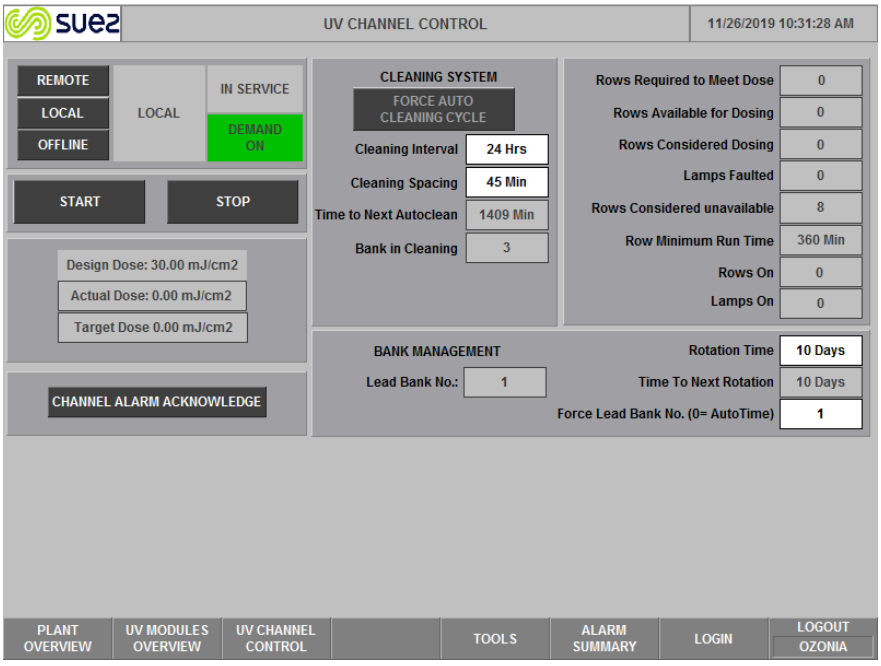
The number and layout of the modules within the channel is determined based on the required UV dosage and a UV path for the water that eliminates any possibility of hydraulic short-circuiting. See “DESIGN BRIEF” for details of module arrangement for this project

CONTROL AND MONITORING:

Each HiCAP module in the disinfection system receives its power from the Power Supply Unit via power cables provided by Veolia. A separate MCP (Main Control Panel) houses the PLC and Operator Interface (OI/HMI). The system operates in the fully automatic mode and the HMI displays up-to-date information about the status of the equipment. It requires no previous computer experience and includes easy to understand on-screen instruction to assist the operators.

The HMI shows the number of modules in service and the number of lamps within the modules that are in use. Information that is used to determine the number of lamps required can be taken from a modified flow signal. The modified flow signal (by owner) for control over each channel can be calculated from the overall plant flow.

A representative UV intensity reading is displayed continuously on the OI based on information being received from a sensor mounted in each bank of modules.



Should it become necessary, the operator can assume manual control of the system. In this mode, he or she has the ability to check all the system functions and to control the lamp array.

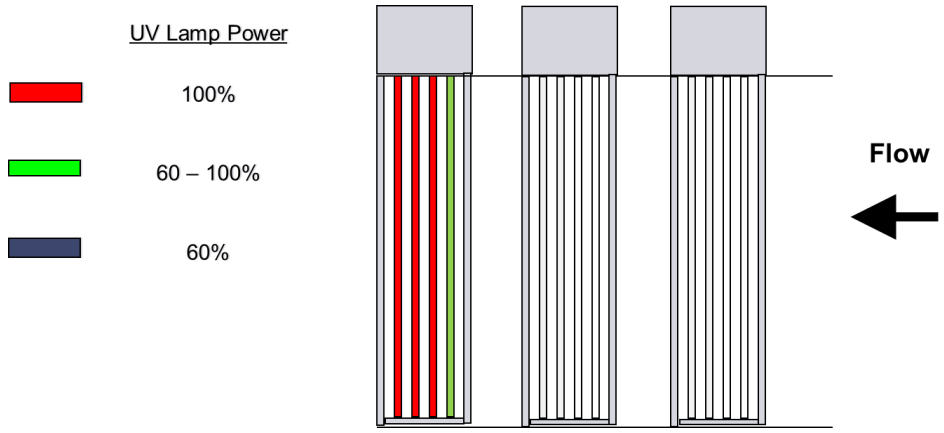
Other system information, such as channel flow and individual module status, can also be accessed.

FLOW PACING:

Due to the wide variety of flows that occur in a wastewater treatment plant, the Aquaray® HiCAP Vertical Lamp System is designed to minimize energy consumption and extend lamp life by accurately controlling the number and outputs of lamps in service. The ***Aquaray® HiCAP System*** incorporates a unique way of conserving energy via a combination of **turning on/off and dimming of UV lamps.**

This feature allows the system to switch on or off lamps and vary between lamp output power levels in response to the flow pattern of the wastewater treatment plant via the 4-20mA signal received from the plant flow meter and UVT analyzer.

During the diurnal flows described, the UV system will respond to the change in flows by turning on/off lamps on a row-by-row basis then dimming each row as needed from 60-100% lamp power.



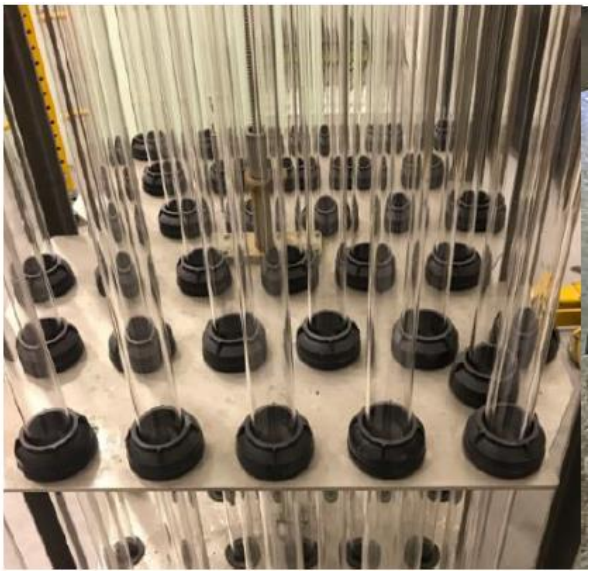
SYSTEM CLEANING:

Any UV system gradually accumulates a coating on the quartz sleeves housing the lamps. This routine fouling must be removed periodically.

The Aquaray® HiCAP System offers a fully automatic, in-channelcleaning system which reduces maintenance.

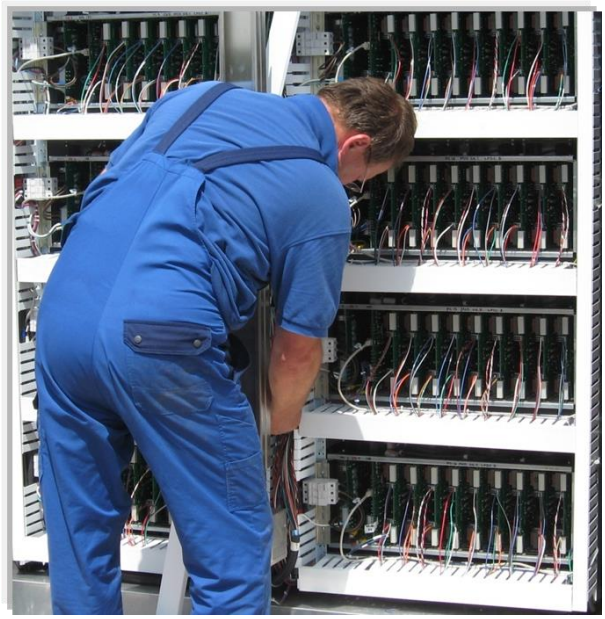
The automatic wiping system is usually operated once daily and the wipers are then replaced once every two years. This system is included in our proposal.

The wipers are individually replaceable split nylon brushes with adjustable compression rings to allow for optimum wiper contact as the brush wears over time.



SERVICE:

Every piece of equipment within a wastewater plant requires service. The Aquaray® HiCAP System has been developed to permit easy troubleshooting and quick replacement of components. The majority of maintenance activities can be carried out while the equipment is still located within the channel. The recommended spares included in this proposal will ensure that the system can be maintained efficiently and brought back to full operation in the shortest possible time.



II. DESIGN BRIEF

Parameter		Units
Peak Flow	15	MGD
Design UV Transmittance	50	%UVT
TSS, Monthly average	<15	mg/L
Fecal Coliform Permit, Monthly average	<400	CFU/100 mL
Minimum Validated UV Dose	30	mJ/cm^2

III. PROPOSED AQUARAY® HiCAP SUBMERSIBLE VERTICAL LAMP SYSTEM DESIGN:

Description	Value
System Designation	Aquaray® HiCAP
Number of Channels	1
Number of Modules Across (Modules per Bank)	1
Number of Modules in Series (# of Banks)	3
Channel Width, in.	47.5”
Channel Length, ft.	27’ – 8” (includes space for future module)
Minimum Channel Depth, in.	91”
Nominal Water Depth, in.	74-82”
Aquaray® Modules/Channel	3
Total Number of Modules	3
Number of Lamps/Module	36
Total Number of Lamps	108
Headloss at 20 MGD, in.	3.05”
Headloss at 15 MGD, in.	1.71”
Power Consumption per Lamp, W	1000 watts
Power Consumption at 15 MGD, kW	102.0 kW
Max Operating Power, kW	117.0 kW
Power Requirement	480V/3ph/60Hz

IV. SCOPE OF SUPPLY

UV System Component	Quantity
Number of Aquaray® HiCAP Modules	3
Total Number of UV Lamps (Excluding Spares)	108
Number of UV Intensity Sensors (One per bank)	3
Number of Power Supply Units (PSUs)	1
Number of UV Main Control Panels (UMCPs)	1
Number of Power Cables	18
Number of Data Cables	9
Number of Cable Trays	1
Number of Stepdown Transformers	1
Number of Mounting Rails/Eye Shields	4
Number of Conductivity Level Switches	1
Number of Level Control Weirs	1 set
Spares	• 10% lamps • 10% sleeves • 1 UV sensor • 10% Wipers • 5% Ballasts • Citric acid • Operators Kit (UV goggles, UV warning signs, gloves)
Field Service	10 days in 2 trips
Freight to job site	Included

V. ITEMS PROVIDED BY OTHERS

Note that the following items are to be provided by others (unless indicated otherwise above):

- UV channel construction
- Channel grating
- Any Piping, Channel Drains, Inlet Isolation Gates and Valves
- Remote computer system
- Installation of the equipment
- Integration with the SCADA system
- Pulling of all cables and interconnecting of cables at the PSUs
- 4-20 mA Signals
- Embedded conduits
- Sample collection and laboratory analysis during performance testing
- Online UVT Analyzer
- 1/2-Ton Jib Crane

VI. PRICING, TERMS AND CONDITIONS

Budget Price	$650,000 per emailed quote
Taxes	Not included
Payment Terms	• 10% Net Cash, Payable in thirty (30) days from date of submittal of initial drawings for approval; • 85% Net Cash, Payable in progress payments thirty (30) days from dates of respective shipments of the Products; • 5% Net Cash, Payable in thirty (30) days from Product installation and acceptance or Ninety (90)
Submittals	8-10 weeks
Equipment Delivery	20-22 weeks after submittal approval
Freight	INCOTERMS DAP
Warranty	1 year after start-up or 18 months after delivery, whichever occurs first

Typical Aquaray® Vertical Lamp

Ultraviolet Disinfection System Installations

Plant Location: Auburn, NY

Peak Flow: 25 MGD

Number of Channels: 1

Number of Modules: 3

Aquaray® HiCAP Vertical Lamps

Ultraviolet Disinfection System Installations

Plant Location: Doha I, Qatar

Peak Flow: 40 MGD HLD for Reuse

Number of Channels: 1

Number of Modules: 3 per bank (24 total)

Aquaray® HiCAP Vertical Lamps

Ultraviolet Disinfection System Installations

Plant Location: Doha II, Qatar

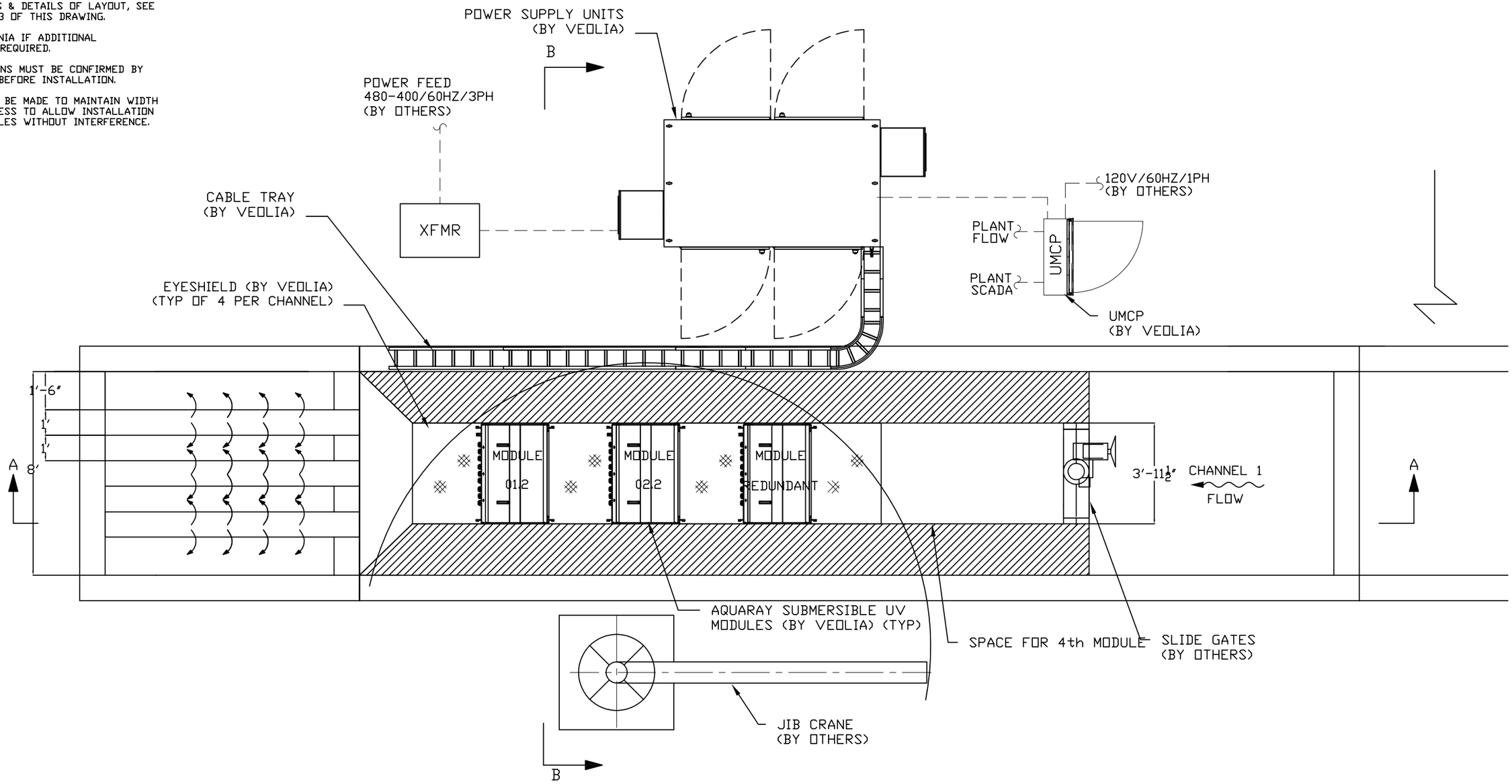
Peak Flow: 60 MGD

Number of Channels: 3

Number of Modules: 10 per channel (30 total)

NOTES:

1. FOR SECTIONS & DETAILS OF LAYOUT, SEE SHEETS 2 & 3 OF THIS DRAWING.
2. CONTACT OZONIA IF ADDITIONAL INFORMATION REQUIRED.
3. ALL DIMENSIONS MUST BE CONFIRMED BY CONTRACTOR BEFORE INSTALLATION.
4. EFFORT MUST BE MADE TO MAINTAIN WIDTH AND SQUARENESS TO ALLOW INSTALLATION OF THE MODULES WITHOUT INTERFERENCE.



PLAN VIEW

PRELIMINARY
NOT FOR CONSTRUCTION

REV.	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
A	ORIGINAL ISSUE		SF	GV	GV	4/21/23

TOLERANCES UNLESS NOTED
DECIMALS ANGLES
.X
.XX FRAC
.XXX

VEOLIA

CUSTOMER INFORMATION
PERSIGO WWTP

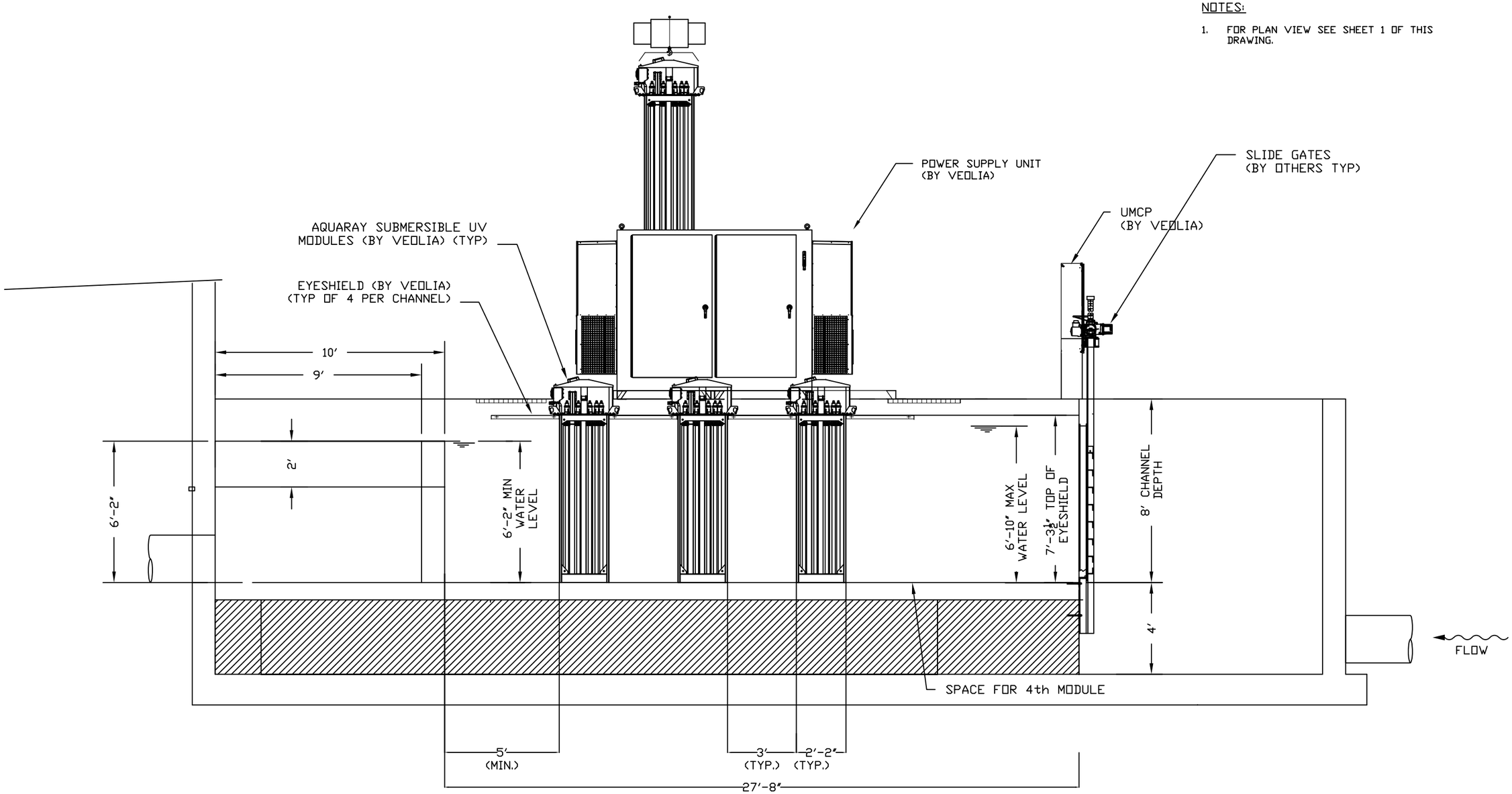
AQUARAY SUBMERSIBLE
DISENFECTION SYSTEM
PLAN VIEW

DRAWING NUMBER: XX510XXX-WTS-EL-252-0202-XX-XXXX
REVISION: A
REF.: -
DOC. OWNER: -
PROJECT NO.
PART/MATERIAL NO.
SCALE: NTS
SIZE: D
SHEET: 01 OF 03

FILE LOCATION: C:\Users\RR431\OneDrive\Desktop\1 ch. 1 x 3 wets.dwg
LAST SAVED: Thursday, September 28, 2023 10:26:10 AM

NOTES:

1. FOR PLAN VIEW SEE SHEET 1 OF THIS DRAWING.



PRELIMINARY
NOT FOR CONSTRUCTION

SECTION A-A

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
A	ORIGINAL ISSUE		SF	GV	GV	4/21/23

TOLERANCES UNLESS NOTED
DECIMALS .X .XX .XXX
ANGLES
FRAC

VEOLIA

CUSTOMER INFORMATION
PERSIGO WWTP

AQUARAY SUBMERSIBLE
DISENFECTION SYSTEM
SECTION A-A

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DOC. OWNER: -
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PART/MATERIAL NO.
SCALE: NTS
SIZE: D
SHEET: 02 OF 03

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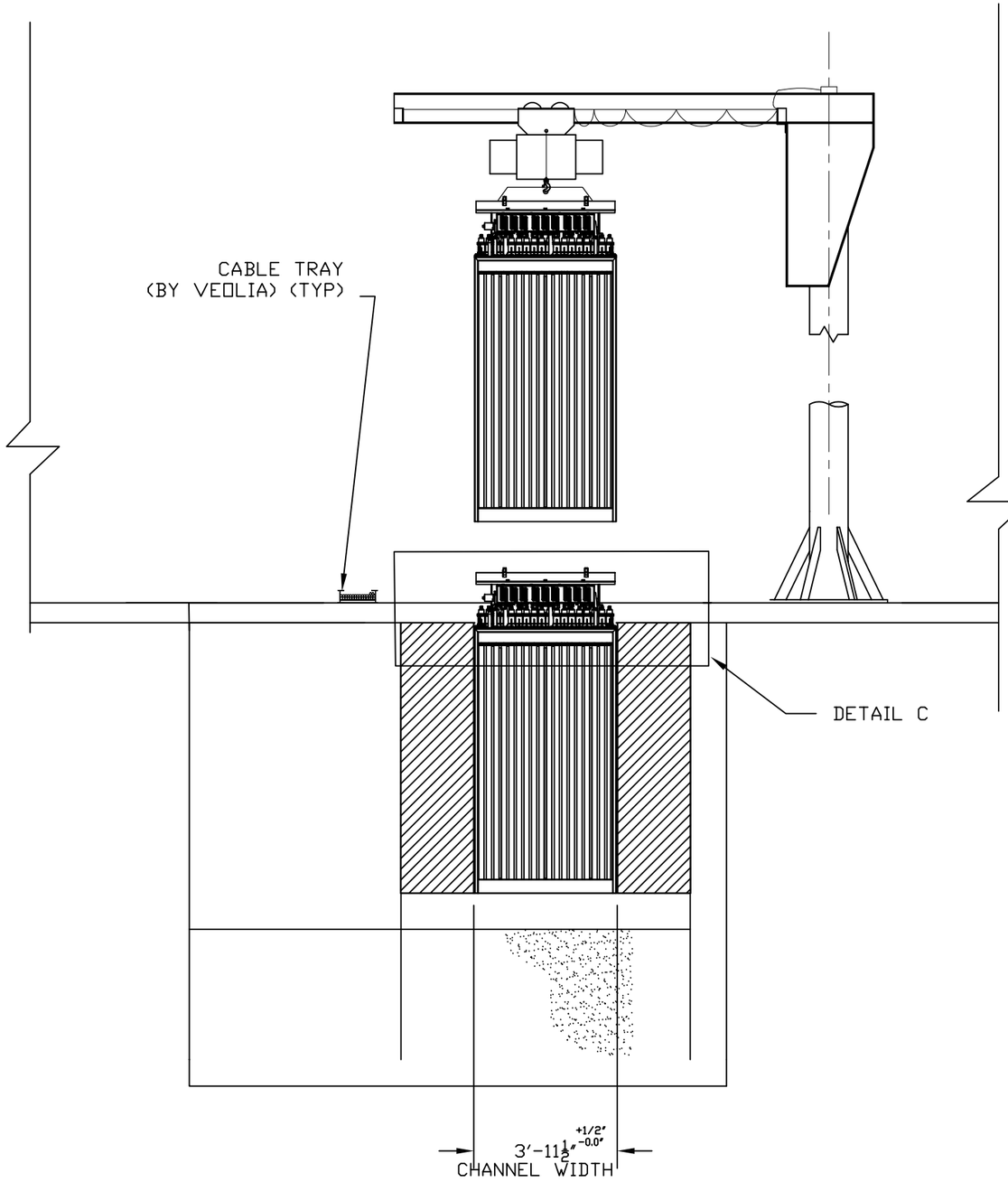
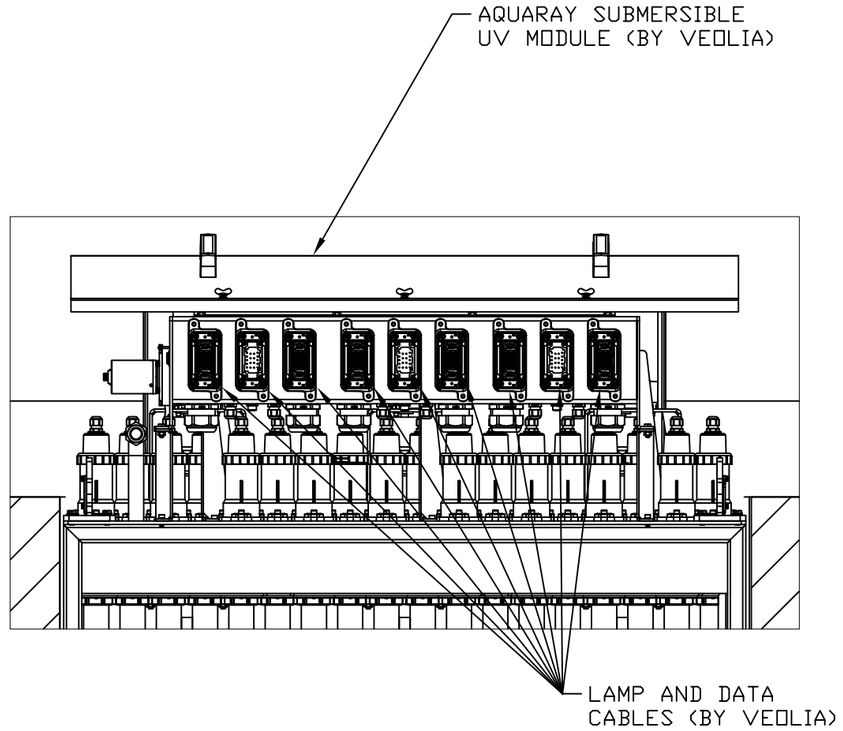


SECTION B-B



DETAIL "C"

REV	DESCRIPTION	ECO	DWN	APPR	APPR	DATE
A	ORIGINAL ISSUE		SF	GV	GV	4/21/23

TOLERANCES UNLESS NOTED
DECIMALS: .X, .XX, .XXX — ANGLES — FRAC

VEOLIA

CUSTOMER INFORMATION: PERSIGO WWTP

AQUARAY SUBMERSIBLE DISENFECTION SYSTEM
SECTION B-B

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REF.: -
DOC. OWNER: -
PROJECT NO.
PART/MATERIAL NO.
SCALE: NTS
SIZE: D
SHEET: 03 OF 03
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Budget Proposal

Bremerton, WA - East Side

Prepared for:

Consor Engineering
Shambhavi Thite

October 20, 2023

Xylem Water Solutions USA, Inc.
4828 Parkway Plaza Blvd Suite 200
Charlotte, NC 28217

October 20, 2023

Consor Engineering
Shambhavi Thite
<Customer Address>

Project Name: Bremerton, WA - East Side
Project Number: J23091230607
Revision Number: 1

Dear Shambhavi Thite,

We are pleased to submit the following proposal for the Bremerton, WA - East Side UV opportunity based on the information provided within your inquiry.

The Duron system is a modular open channel UV system that offers owners best in class operational efficiency and an entirely operator-oriented design. We would like to highlight a few key items with our proposal provided:

- **65° Vertical Incline Design -** WEDECO has used our 30+ years of experience in the UV industry to develop this staggered lamp array design, combining the advantages of vertical and horizontal designs. This design results in better hydraulics and decreased footprint.
- **Latest lamp technology** - Our system includes our latest low-pressure, high-intensity Ecoray lamps which have a guaranteed life of 14,000 hours. At 800 watts per lamp, the Duron system also requires fewer lamps and associated replacement components.
- **Redundancy/Reliability** – The wiping and lifting systems are electrically powered and independent of each other which eliminates the need for an external hydraulics system. Further if one electric motor fails, it does not prevent all other systems from operating like a hydraulically driven lifting and wiping system does.
- **True "intensity based" dose pacing control** - WEDECO is unique in the marketplace by taking into account real-time sensor readings of UV intensity, as a function of lamp output, aging and sleeve fouling. This is combined with real-time UV transmittance data to offer true dose pacing for all effluent conditions.
- **TotalCare** - WEDECO's established and proven TotalCare Program provides our customers with proactive services all designed to minimize the cost of ownership to operate and maintain a UV system. TotalCare services can provide our customers with system health checks, efficiency audits, training and preventative maintenance contracts.

Please refer to our local representative Mike McKamey of Beaver Equipment, 206-678-3775 or us if you have any questions. We look forward to working with you on this exciting project.

Sincerely,

James Nielsen - Western US
Territory Manager
(725) 276-2167

Odelia Ryan
Applications Engineer

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1 Xylem Overview

Xylem is a leading global water technology provider, enabling customers to transport, treat, test and efficiently use water in public utility, residential and commercial building services, industrial and agricultural settings. The company does business in more than 150 countries through a number of market-leading product brands, and its people bring broad applications expertise with a strong focus on finding local solutions to the world's most challenging water and wastewater problems.

Xylem's treatment business offers a portfolio of products and systems designed to effectively meet the demands and challenges of treating water and wastewater. From smarter aeration to advanced filtration to chemical-free disinfection, Xylem leverages its well-known Treatment brands, Flygt, Leopold, Sanitaire, and Wedeco, to offer hundreds of solutions backed by a comprehensive, integrated portfolio of services designed to ensure we can meet our customers' needs in a number of different industries including municipal water and wastewater, aquaculture, biogas and agriculture, food and beverages, pharmaceuticals, and mining.

Our scientists and engineers utilize their deep applications expertise and continually listen and learn from our customers' situations to create solutions that not only use less energy and reduce life-cycle costs, but also promote the smarter use of water.

Wedeco has accepted the challenge of the 21st century. With the Wedeco brand for UV Disinfection, ozone oxidation & AOP solutions, we own the advanced technologies for chemical-free and environmentally friendly treatment of drinking water, wastewater and process water as well as further industrial treatment processes. We constantly invest a large portion of our energy in the development of high-tech components, systems and equipment, as well as in the study of new areas of application for UV, ozone & AOP. In doing so, we have always given special attention to the increase in energy efficiency of our Products equipped with our unique UV lamps and ozone electrodes.

The special characteristics of the Wedeco Ecoray UV lamp are its special doping and the unique long-life coating. Because of these features, a constantly high UV light yield is achieved with a substantially extended lamp service life at the same time. In addition, by using this technology it is not necessary to apply liquid mercury inside the lamp. Wedeco UV lamps cannot be surpassed in economic efficiency.

In relation to expenditure of energy, the High-Intensity/Low-Pressure Technology provides a light yield three times higher than comparable UV lamps of widely used Medium Pressure Technology. A higher light yield also means a lower heat generation at the same time.

Thanks to this, Wedeco UV lamps become less susceptible to varying water temperatures. Even the formation of deposits on the quartz sleeves as well as lamp aging is considerably lower than with alternative UV lamp technologies in Herford and Essen.

WEDECO Ecoray UV lamp

Xylem's Wedeco ozone systems combine maximum flexibility and reliable operating characteristics for small to large ozone capacities. The ozone generator system and control unit can be combined and supplemented with option sets that allow for various application requirements.

Effizon evo 2G ozone electrodes are the core of our technology and achieve an unmatched level of reliability and energy efficiency. The electrodes are manufactured completely from inert materials, without the need for fuses or coatings, making them highly resistant to corrosion. This means that the Wedeco ozone generators are practically maintenance free with no need for regular cleaning or replacement of the electrodes.

We rely on consistently high-quality standards in all divisions of the company. Moreover, product quality and manufacturing operations are constantly monitored and optimized in continuous improvement processes. Established quality controls give Xylem and you the security of knowing that Wedeco UV, Ozone & AOP systems will always operate reliably.

WEDECO Effizon® evo 2G Ozone electrode

For more information please visit us at
http://www.xylem.com/treatment/

2 General Process Description

2.1 DESIGN

- Design Flow Rates
  - Peak Design Flow — 15 MGD
  - Future Peak Flow — 20 MGD
- Total Suspended Solids (Maximum) — <15 mg/l
- Allowable Effluent Temperature Range — 41-86°F
- UV Transmittance at 253.7 nm — 50%, minimum
- Effluent Disinfection Standard
  - Fecal Coliforms (30 day geometric mean) — 400 Fecal Coliforms/100 mL
- UV Dose
  - Minimum Design UV Dose (based on IUVA/UVDGM (MS2) bioassay) — 30 mJ/cm²

2.2 PROCESS DESCRIPTION

The UV system has been designed to replace the exisitng UV 4000Plus by delivering the required UV dose with four duty banks in one channel. The system can be expanded by one bank in order to accommodate the future flow. The level control is a downward opening gate.

3 Technical Description

CONFIGURATION:	Duron8 22 i 1 - 4(5) x 1 eW eL	
DESCRIPTION	**UNITS**	**VALUE**
Total Number of lamps		88 (110)
Number of lamps per channel		88 (110)
Number of channels		1
Number of banks per channel		4
Number of modules per bank		1
Number of lamps per module		22
CHANNEL DIMENSIONS:	Inches	
Width along UV banks		52.1
Width along level control		70
Min TWL		53.6
Max Influent TWL		73.2
Design Influent TWL		60.7
Overall channel height		106.3
Approx. length		37’-5”
HEADLOSS (at peak flow):	Inches	
Across UV Banks (incl baffle plate)		7.1
Across level control		13.4
Recommended min freeboard		4.0
Total Head loss		29.5
POWER CONSUMPTION:	kW	
Total Connected System Power (All lamps on @ 100% Power)		82.9

4 Price & Scope of Supply

4.1 WEDECO SCOPE OF SUPPLY

- All required UV modules incl. lamps and support framework for installation of the UV modules
- 66 ft (20 m) power cabling from lamps to ballasts
- ICA / Ballast Enclosure(s) in Type 12, Fan-cooled, Painted Steel
- Allen Bradley CompactLogix PLC w/ PV+7 10" HMI and SCADA communication
- Power supply requirements:
    - Ballast Enclosure(s): 480 V / 3Ph / 60Hz, 4 wire + ground (WYE)
    - ICA Enclosure: 120V / 1Ph
- Electric motor driven automatic wiping system
- Integrated electric module lifting system
- UV-intensity sensors [one per bank]
- Low level probe [one per channel]
- YSI Online UV transmittance monitor
- OptiDose Dose-Pacing and lamp dimming control system
- Downward opening gate w/ electric actuator (one per channel)
- Ultrasonic Level Sensor (one per channel)
- Remote Service Support
- Three (3) operating and maintenance manuals in English language
- Factory testing of all parts and equipment prior to shipment
- Packaging & Freight to site
- Manufacturer's field services on site (5 trip(s) / 15 site days)

4.2 BUDGET PRICE

Duron Standard Equipment	
Total	***$537,275 with optional adders***

Optional Adders	
Type 4X, Air-conditioned, 304 Stainless Steel Electrical Enclosure(s)	Please contact us for additional information.

5 Commercial Terms & Conditions

5.1 LEAD TIMES AND VALIDITY

Commercial Details	
Submittal time:	8-10 weeks after approved purchase order
Delivery time:	32-36 weeks after approved submittals
Terms of Delivery:	Incoterms 2020 DAP destination. Title and risk of loss will transfer to buyer upon delivery. Offloading and arrangement of the equipment is not included.
Terms of Payment:	This proposal is based upon WEDECO's General Terms of Business. Price is based upon the following payment terms (net 30 days): • 10% net 30 days upon initial submittal of mechanical/electrical drawings for approval • 80% net 30 days from the date of the respective shipments of the product • 5% installation of the Xylem equipment, NTE 150 days after shipment (whichever comes first) • 5% start-up / training on the Xylem equipment, NTE 180 days after shipment (whichever comes first)
Warranties:	Lamp Warranty: Guaranteed 14,000 hours of operation, prorated after 9,000 hours. System Warranty: 18 months from date of delivery or 12 months from date of substantial completion of UV equipment whichever comes first.
Pricing Validity:	The Forty-Five (45) days from date of submission.

5.2 TERMS AND CONDITIONS

This proposal is governed by and subject to Terms and Conditions of Sales-Xylem Americas effective on the date the order is accepted which terms are available at http://www.xyleminc.com/en-us/Pages/terms-conditions-of-sale.aspx and incorporated herein by reference and made a part of the agreement between the parties.

6 Attachments

6.1 BROCHURE

xylem
Let's Solve Water

Duron 8

IGNITE POWERFUL LIGHT FOR THE MOST FLEXIBLE WASTEWATER DISINFECTION SYSTEM

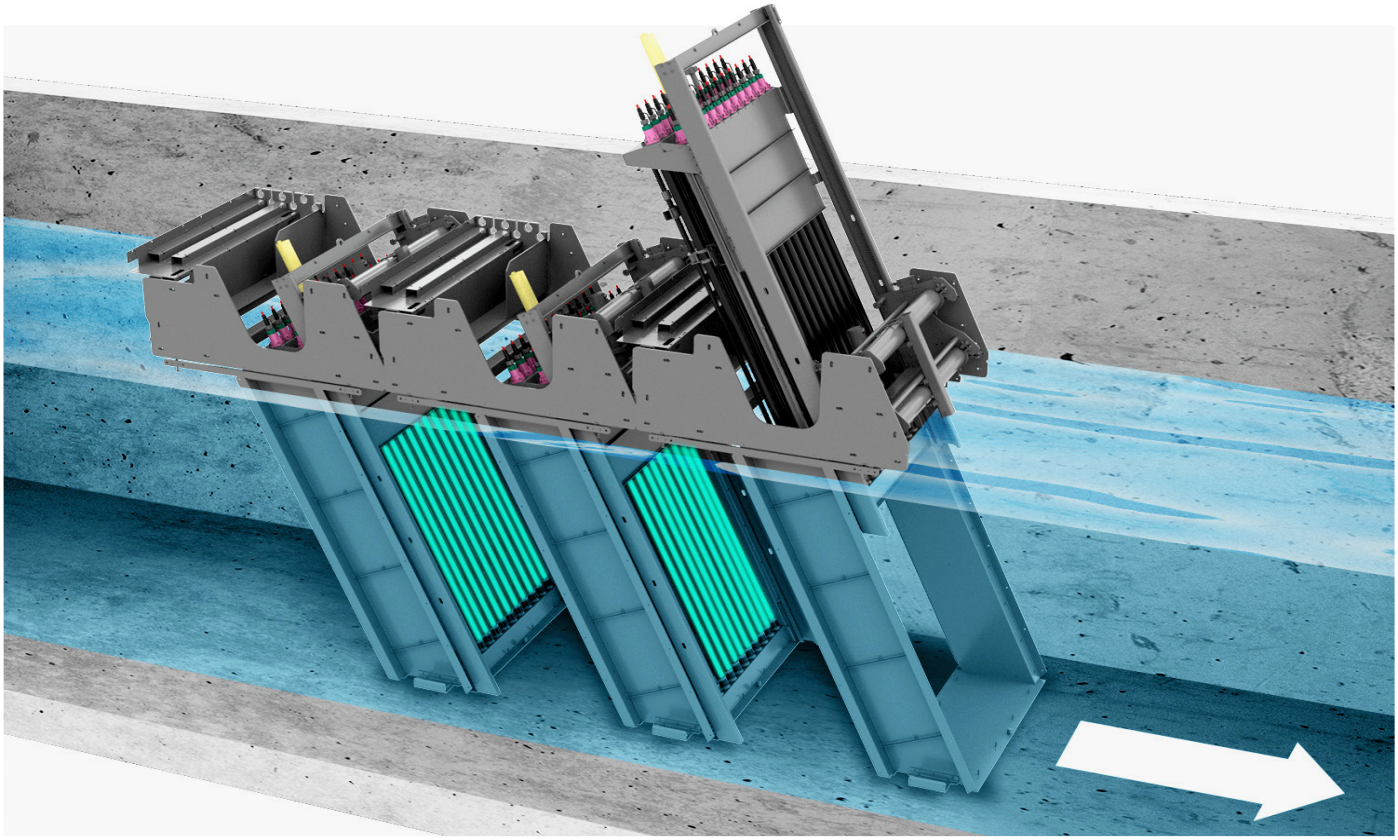
The Wedeco Duron 8 is an open-channel UV disinfection system for wastewater applications. It is designed to allow for easy retrofit of existing chlorine contact basins using one of the most powerful Ecoray UV lamps, a Xylem technology made in Germany.

Tested under a broad range of effluent conditions, it provides a sustainable disinfection solution without any hazardous byproduct formation. It ensures the highest disinfection performance up to reuse standards as well as for low-quality effluents.

Flexible. Efficient. Failproof.

With the Duron 8, Xylem's continual thrust toward innovation has added the most powerful UV disinfection system yet to the Wedeco Duron Series. In addition to stronger disinfection in a more compact space, the Duron 8 offers easy, low-cost maintenance and advanced monitoring technology.

WEDECO
a xylem brand



More affordable with fewer lamps

Higher powered unique 800 W Ecoray® UV lamps and more flexible module lamp arrangement allow for more efficient designs and cut overall installation and operational costs by over 25%.

Easy maintenance

Fewer UV lamps and easy access to all components with integral module lifting allow for simple and fast maintenance. Short lamps increase safety for operators on site.

Simple retrofit capability

Duron 8 provides the largest flow capacity per channel in the industry to cut down total costs of installation. It is highly customizable to help convert more chlorine contact basins into chemical free UV disinfection systems.

Superior ease of installation

Adjustable mounting bars allow for higher channel tolerances, ensuring fail-safe and fast installation. Fewer control boxes and smart cable routing reduce electrical works.

Peace of mind

Third-party validation and built-in redundancy ensure high performance and run times. New app-based connectivity enables easy monitoring and intuitive troubleshooting via mobile device.

UV transmittance range (1 cm)
<20 to >75%

Minimum flow rate
500 m³/h / 3 mgd

Third-party validation type
NWRI, UVDGM

UV lamp technology
800 W Ecoray® LPHO

Lamp life
14,000 hours

UV intensity monitoring
One sensor per bank

Control system
OptiDose

UV module protection class
IP 67

Module lifting
Integral, automatic or manual

Level control device
Fixed or motorized weir

Variable output
50 to 100% power

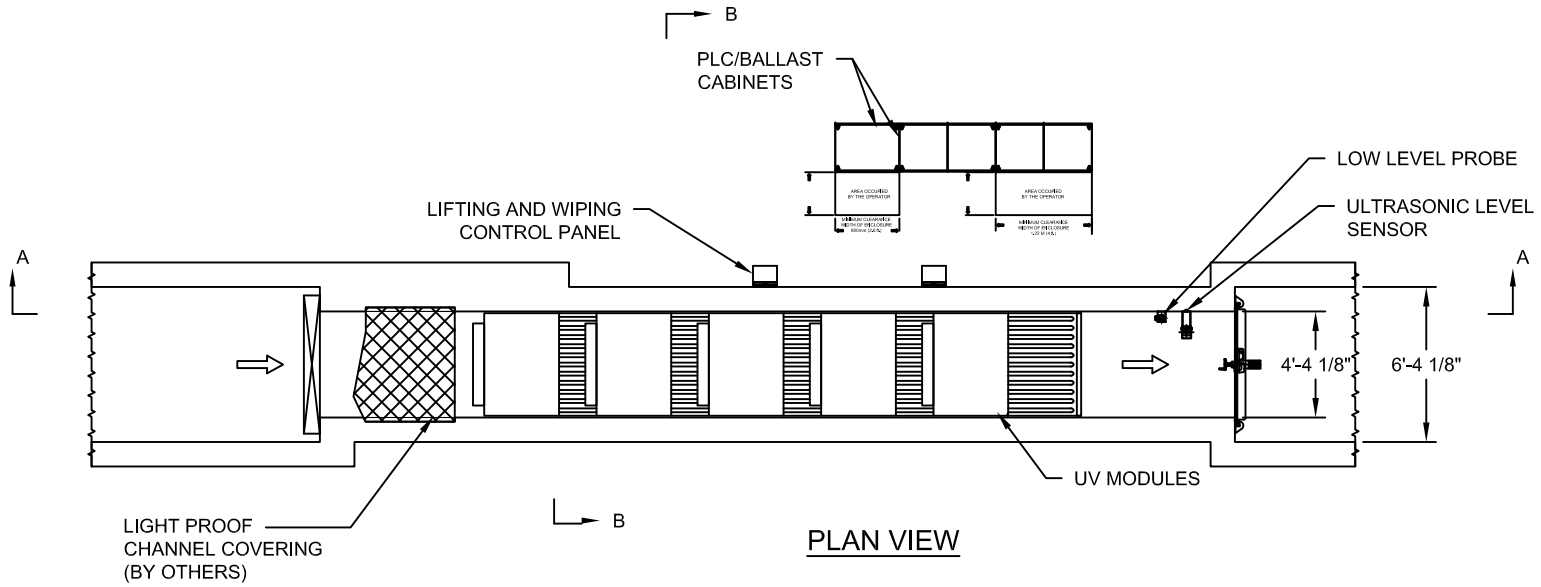
Common outputs
System status, lamp status, alarm messages, process values

UV electrical standards
CE/ UL/cUL

UV electrical requirements
CE: 400/230 V, 50/60 Hz, 3Ph, N, PE, TNS
UL/cUL: 480Y/277 V, 60 Hz, 3Ph, 4-wire (L1, L2, L3, N, GND)

Ambient air temperature
5–50°C/41–122°F

Protection class
IP54, UL/cUL Type 12 (4X optional)



PLAN VIEW

SECTION A-A

SECTION B-B

NOTES:

1. LAMP CABLES FROM LAMP TERMINATION AT THE MODULE TO CONTROL ENCLOSURE TERMINATION NOT TO EXCEED 50 FT. ALL CONDUITS AND CABLING SHALL BE IN ACCORDANCE WITH LOCAL AND NATIONAL ELECTRICAL CODES. REFER TO WEDECO STDS-360 FOR LAMP CABLE TERMINATION PROCEDURE
   MINIMUM LAMP CABLE LENGTH IS 10m OR 33'
   MAXIMUM NUMBER OF LAMP CABLES PER CONDUIT SHALL NOT EXCEED 12 CABLES.
2. ALL WIREWAY/CONDUIT TO HAVE LONG RADIUS BENDS. (CONTRACTOR TO SIZE AND SUPPLY).
3. SYSTEM CONTROL ENCLOSURES TO BE CLIMATE CONTROLLED BUILDING (BY OTHERS)
4. ALL CIVIL DIMENSION TOLERANCES TO BE ±3/16 UNLESS OTHERWISE STATED.
5. COVERING OF CHANNEL BY OTHERS.
6. ISOLATION GATE e.g. INLET GATE VALVE (SUPPLIED BY OTHERS) IF REQUIRED.
7. DISINFECTION CANNOT BE GUARANTEED IF MAXIMUM WATER LEVELS ARE EXCEEDED.
8. ANCHOR BOLTS FOR WEDECO SUPPLIED EQUIPMENT TO BE PROVIDED WITH EQUIPMENT.
10. ELECTRICAL EQUIPMENT TO BE LOCATED IN ACCORDANCE WITH LOCAL/NATIONAL ELECTRICAL CODES.
11. BOTTOM OF UV CHANNEL MUST BE FLAT WITHIN ±3/32". CHANNEL WALLS TO BE PERPENDICULAR TO BOTTOM OF CHANNEL WITHIN ±3/32".
12. GIVEN DIMENSIONS RELATE TO THE CORRECT INSTALLATION AND OPERATION OF WEDECO EQUIPMENT AND SHOULD BE ADHERED TO.
13. CONTROL ENCLOSURES PROVIDED BY WEDECO, TYPE 4X
14. BALLAST ENCLOSURES TO BE INSTALLED UNDER PROTECTIVE CANOPY PROVIDED BY OTHERS.

REV	REV # ECN #	SHEET (ZONE)	DESCRIPTION	DATE	APPROVAL

REVISIONS

FOR INFORMATION ONLY

PROJECT

LOCATION

CUSTOMER

CONSULTING ENGINEER

NAVISION NUMBER | JOB NUMBER

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE
X/X = ±1/16 .X = ±.05 .XX = ± .02 .XXX = ± .005 ANG = ± 1°

THIRD ANGLE PROJECTION

DESIGNER | DATE

APPROVED BY | DATE

WEDECO
a xylem brand
www.xyleminc.com

TITLE
UV DISINFECTION SYSTEM GENERAL ARRANGEMENT

MODEL NO.
DURON-8 22i1-4(5)x1

SIZE	DRAWING NO.	REV
B		

SCALE	WEIGHT	MATERIAL	FINISH	SHEET
				OF 1

APPENDIX B
Preliminary Design Drawings

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BREMERTON WASHINGTON

EASTSIDE TREATMENT PLANT IMPROVEMENTS PHASE 1

OCTOBER 2023

30% SUBMITTAL

CLIENT PROJECT NUMBER: PO-XXXXXX
CONSOR PROJECT NUMBER: W20001WA.00

PROJECT CONTACTS

OWNER'S REPRESENTATIVE:
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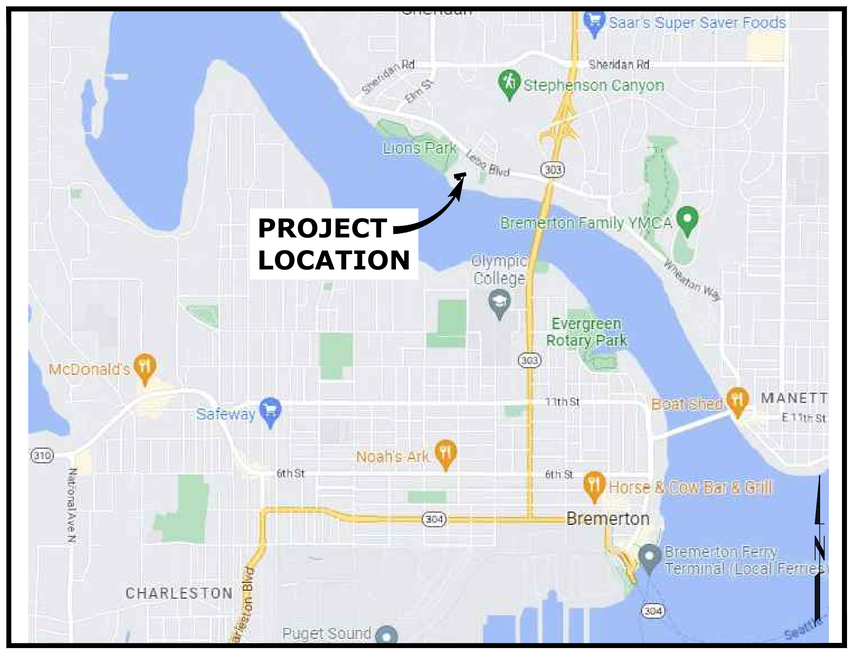
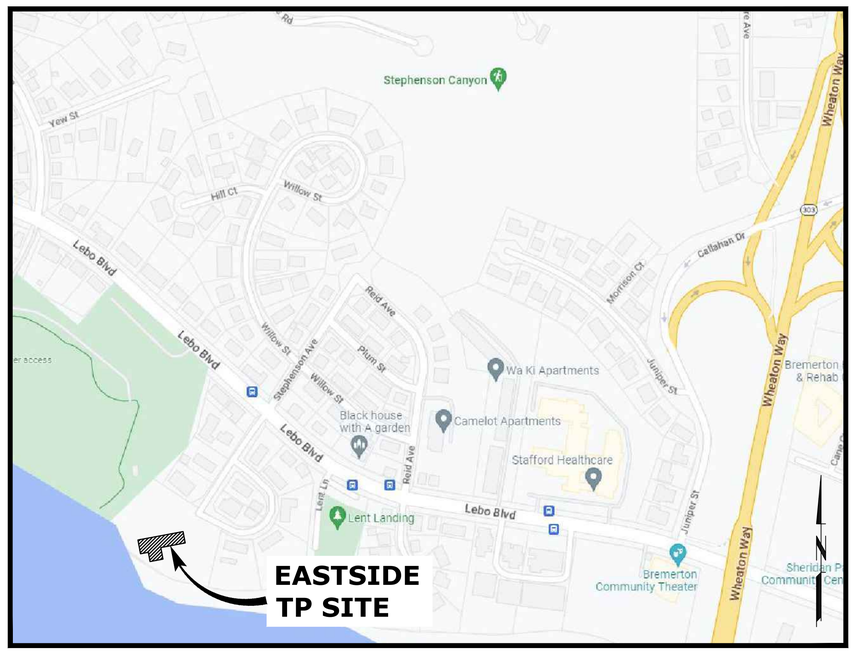
PHONE: 206.462.7030

ELECTRICAL ENGINEER:
TROY COLLISON, PE
INDUSTRIAL SYSTEMS, INC.

STRUCTURAL ENGINEER:
JOE GALUSHA, PE
CG ENGINEERING



VICINITY MAP



LOCATION MAP

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1102 BROADWAY PLAZA, SUITE 401
TACOMA, WASHINGTON 98402
PHONE: 253.627.1520

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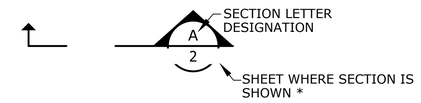
SHEET IDENTIFICATION	
DISCIPLINE TYPE	**DESCRIPTION**
G	GENERAL
C	CIVIL
L	LANDSCAPE
A	ARCHITECTURAL
S	STRUCTURAL
M	MECHANICAL
H	HVAC
P	PLUMBING
E	ELECTRICAL
N	CONTROL
SHEET TYPE	**DESCRIPTION**
0	GENERAL
100	PLAN VIEWS
200	ELEVATION VIEWS
300	SECTION VIEWS
500	DETAILS
600	SCHEDULES & DIAGRAMS
900	ISOMETRIC/RENDERINGS

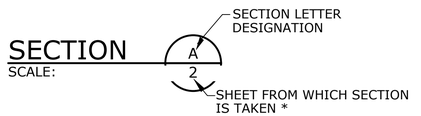
LEGEND

- SQUARE BOLLARD/FENCE POST
- TREE - CONIFER
- TREE - DECIDUOUS
- STRUCTURES TO BE DEMOLISHED AND REMOVED
- BORING LOCATIONS/MONITORING WELL
- DRAINAGE SWALE
- PAVEMENT
- SIDEWALK
- GRAVEL
- BURIED STRUCTURE
- FENCE
- 142 PROPOSED NEW CONTOURS

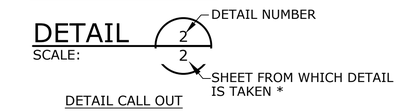
SECTION AND DETAIL DESIGNATIONS

SECTION DESIGNATIONS

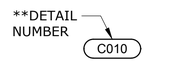




DETAIL DESIGNATIONS



DETAIL CALL OUT



STANDARD DETAIL CALL OUT

* NOTE: IF PLAN AND SECTION FOR DETAIL CALL-OUT AND DETAIL ARE SHOWN ON THE SAME DRAWING, DRAWING NUMBER IS REPLACED WITH A DASH.
** NOTE: STANDARD DETAILS ARE ON DETAIL SHEETS.

NOTES

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BREMERTON EASTSIDE TREATMENT PLANT IMPROVEMENTS PHASE 1

GENERAL

SHEET INDEX, LEGEND, AND NOTES

PROJECT NO.: W20001WA.00 | SCALE: AS SHOWN | DATE: OCTOBER 2023

SHEET
G-002
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N:\Projects\22\W210001WA.00 - Trane - Bremerton Eastside TP Improv. Ph1\12.0 CADD\12.5-Sheets\210001_G-001.dwg G-002 10/9/2023 2:05 PM DEREK.CLOUD 24.1s (LMS Tech)

a	CIRCUIT BREAKER AUXILARY CONTACT, CLOSED WHEN BREAKER IS CLOSED
A	AMMETER, AMPERES
(A)	ABOVE
AB	ANCHOR BOLT
AC	ALTERNATING CURRENT
A/D	ANALOG TO DIGITAL
AF	AMPERE FRAME
AFD	ADJUSTABLE FREQUENCY DRIVE
AIC	AMPERES INTERRUPTING CAPACITY
ALT	ALTERNATE / ALTERNATOR
A/M	AUTO/MANUAL CONTROLLER
ANN	ANNUNCIATOR
ARCH	ARCHITECT
AS	AMMETER SWITCH
AT	AMMETER TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
b	CIRCUIT BREAKER AUS. CONTACT, CLOSED WHEN BREAKER IS OPEN
B	BLACK
(B)	BELOW
BCG	BARE COPPER GROUND
BK	BANK
BLKG	BLOCKING
BM	BEAM
BTM/BOT	BOTTOM
BTWN	BETWEEN
C	CONDUIT, CONTACTOR
CAB	CABINET
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CC	CONTROL CABLE, CLOSING COIL
CCP	COAGULANT CONTROL PANEL
CHH	COMMUNICATION HANDHOLE
CI	CAST IRON
CJP	COMPLETE JOINT PENETRATION
CKT	CIRCUIT
CLR	CLEAR
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
COND	CONDUCTOR
CONN	CONNECTION
CONT	CONTINUOUS
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CR	CONTROL RELAY
CS	CONTROL SWITCH
CT	CURRENT TRANSFORMER
D	DRAIN
DBL	DOUBLE
DC	DIRECT CURRENT
DET	DETAIL
DI	DUCTILE IRON
DIA	DIAMETER
DIM	DIMENSION
DISTR	DISTRIBUTION
DP	DISTRIBUTION PANEL
DPDT	DOUBLE POLE, DOUBLE THROW
DPST	DOUBLE POLE, SINGLE THROW
DSC	DISCONNECT
E	EASTING, ELECTRICAL
EA	EACH
ECPC	EAST SIDE PLANT CONTROL PANEL
ELEC	ELECTRICAL
EF	EXHAUST FAN
EHH	ELECTRICAL HANDHOLE
EL/ELEV	ELEVATION
EMERG	EMERGENCY
ENCL	ENCLOSURE
EQPT	EQUIPMENT
ETM	ELAPSED TIME METER
EX/EXIST	EXISTING
EXP	EXPANSION
FACP	FIRE ALARM CONTROL PANEL
FDN	FOUNDATION
FDR	FEEDER
FH	FULL HEIGHT
FLEX	FLEXIBLE
FLR	FLOOR
FLUOR	FLUORESCENT
FO	FIBER OPTIC
FREQ	FREQUENCY
FS	FAR SIDE

FTG	FOOTING
FU	FUSE
FVNR	FULL VOLTAGE, NON REVERSING
FVR	FULL VOLTAGE, REVERSING
FWD	FORWARD
GA	GAUGE
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
GLB	GLUE-LAMINATED BEAMR
GND	GROUND
HMI	HUMAN MACHINE INTERFACE
HOW	HAND-OFF-AUTOMATIC
HOR	HAND-OFF-REMOTE
HORIZ	HORIZON
HP	HORSEPOWER
HRCCP	HIGH RATE CLARIFICATION CONTROL PANEL
HSC	HYDRAULIC SYSTEM CENTER
HTR	HEATER
HV	HIGH VOLTAGE
HZ	HERTZ (CYCLES PER SECOND)
INSTR	INSTRUMENT, INSTRUMENTATION
IP	INTERNET PROTOCOL
I/O	INPUT/OUTPUT
JB	JUNCTION BOX
KA	KILOAMPERES
KCMIL	THOUSANDS OF CIRCULAR MILS
KP	KING POST
KSI	KIPS PER SQUARE INCH
KV	KILOVOLTS
KVA	KILOVOLT AMPERES
KVAR	KILOVOLT AMPERES REACTIVE
KVARH	KILOVOLT AMPERES REACTIVE HOURS
KW	KILOWATTS
KWH	KILOWATT HOURS
L	LENGTH
LBS	POUNDS
LCP	LIGHTNING CONTROL PANEL
LF	LINEAR FEET
LP	LIGHTNING PANEL
LTG	LIGHTING
M	MOTOR
mA	MILLIAMPERES
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MECH	MECHANICAL
MF	MOMENT FRAME
MFR	MANUFACTURER
MOV	MOTOR OPERATED VALVE
MSB	MAIN SWITCH BOARD
MTG	MOUNTING
MTS	MANUAL TRANSFER SWITCH
N	NORTHING
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRIC CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOC.
NEUT	NEUTRAL
NO	NORMALLY OPEN
NS	NEAR SIDE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OL	THERMAL OVERLOAD RELAY
OPP	OPPOSITE
OT	OVER TEMPERATURE
OVHD	OVERHEAD
P	PUMP
PB	PULLBOX, PUSHBUTTON
PCP	POLYMER CONTROL PANEL
PDC	POWER DISTRIBUTION CENTER
PE	PHOTOELECTRIC
PEC	PHOTOELECTRIC CELL
PF	POWER FACTOR
pH	MEASURE OF ACIDITY OR ALKALINITY
PH	PHASE
PL	PLATE
PLC	PROGRAMMABLE LOGIC CONTROLLER
PLCS	PLACES
PM	POWER MONITOR
PNL	PANEL

PNLBD	PANELBOARD
PPPC	POLYMER PREPARATION CONTROL PANEL
PRI	PRIMARY
PS	PRESSURE SWITCH
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
P/T	POST TENSIONED
PTZ	PAN TILT ZOOM
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
RCPT	RECEPTACLE
RCT	REPEAT CYCLE TIMER
REINF	REINFORCING
REQ'D	REQUIRED
RGS	RIGID GALVANIZED STEEL
RJ	RESTRAINED JOINT
RPM	REVOLUTIONS PER MINUTE
RT	RESET TIMER
SCC	SYSTEM CONTROL CENTER
SCHED	SCHEDULE
SCP	SCREEN CONTROL PANEL
SCR	SILICON CONTROLLED RECTIFIER
SD	SMOKE DETECTOR
SDBC	SOFT-DRAWN BARE COPPER
SEC	SECONDS, SECONDARY
SF	SUPPLY FAN
SIG	SIGNAL
SIM	SIMILAR
SN	SOLID NEUTRAL
SOG	SLAB ON GRADE
SPD	SURGE PROTECTIVE DEVICE
SPDT	SINGLE POLE, DOUBLE THROW
SPEC(S)	SPECIFICATION(S)
SS	SOLID STATE
STD	STANDARD
SW	SWITCH, SHEAR WALL
SWBD	SWITCHBOARD
SWGR	SWITCH GEAR
SYNC	SYNCHRONIZING
T	TANGENT
TB	TERMINAL BLOCK
TC	TELEPHONE CABINET
TEMP	TEMPERATURE / TEMPORARY
TOC	TOP OF CONCRETE
TOS	TOP OF STEEL
TSP	TWISTED SHIELDED PAIR
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TW/TOW	TOP OF WALL
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
UV	ULTRAVIOLET
UVSS	UV SYSTEM SUPPLIER
UW	UTILITY WATER
V	VOLTS
VA	VOLT-AMPERES
VAR	VOLT-AMPERES REACTIVE
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VFY	VERIFY
VH	VAR-HOUR
VIF	VERIFY IN FIELD
VS	VOLTMETER SWITCH
W	WHITE
WHDM	WATTHOUR DEMAND METER
WHM	WATTHOUR METER
WP	WEATHERPROOF
XFMR	TRANSFORMER

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BREMERTON EASTSIDE TREATMENT PLANT IMPROVEMENTS PHASE 1

GENERAL

ABBREVIATIONS

PROJECT NO.: W20001WA.00 | SCALE: AS SHOWN | DATE: OCTOBER 2023

SHEET

G-003

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PLAN
SCALE: 1" = 10'

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GENERAL

EXISTING SITE PLAN

PROJECT NO.: W20001WA.00 | SCALE: AS SHOWN | DATE: OCTOBER 2023

SHEET
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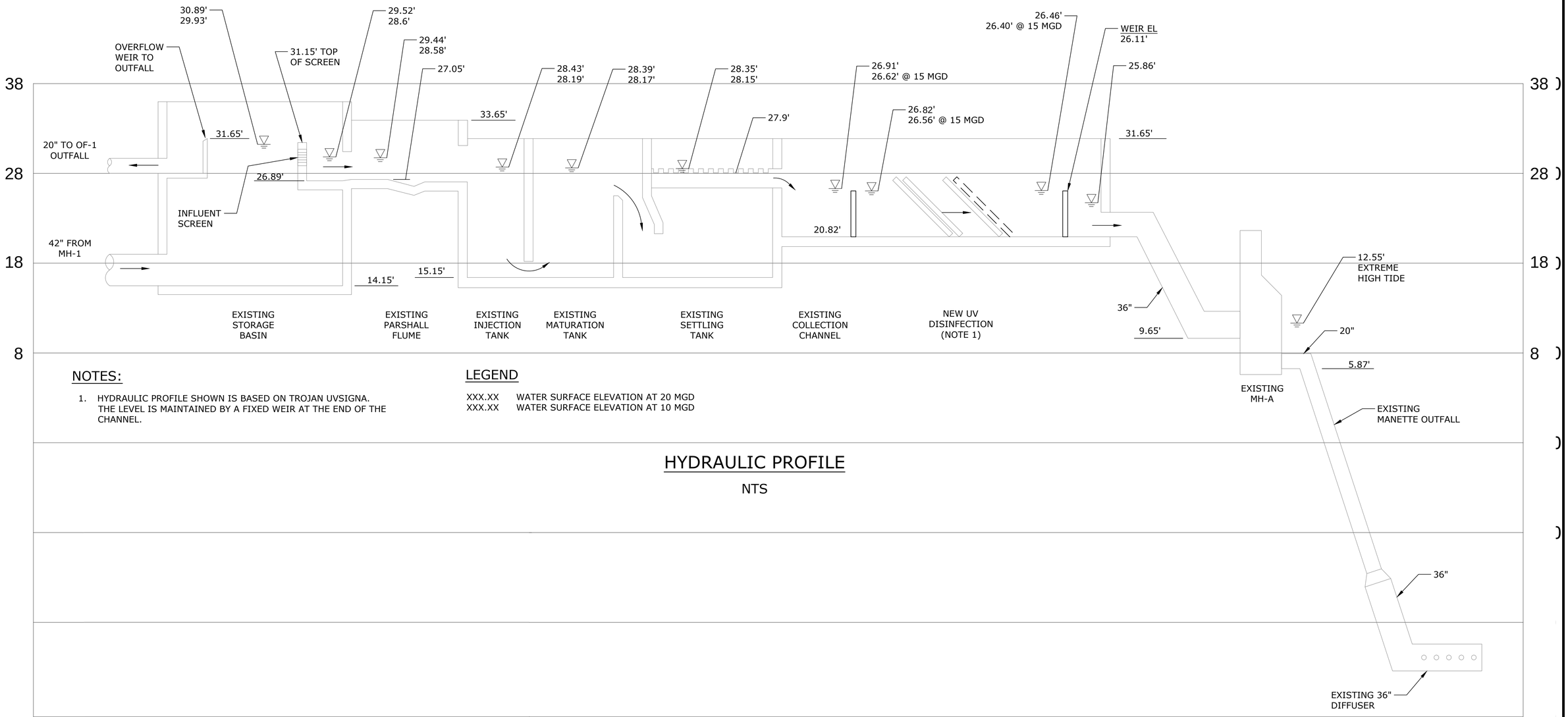

NOTES:

1. HYDRAULIC PROFILE SHOWN IS BASED ON TROJAN UVSIGNA. THE LEVEL IS MAINTAINED BY A FIXED WEIR AT THE END OF THE CHANNEL.

LEGEND

XXX.XX WATER SURFACE ELEVATION AT 20 MGD
XXX.XX WATER SURFACE ELEVATION AT 10 MGD

HYDRAULIC PROFILE

NTS

PEFORMANCE REQUIREMENTS		
FECAL COLIFORM LIMIT	CFU/100ML	400
UV CHANNEL		
NUMBER OF CHANNELS	EA	1
LENGTH	FT	46
WIDTH	IN	56.4
DEPTH	IN	140
MAXIMUM HEADLOSS	IN	4.32
UV DOSAGE		
MINIMUM DOSE	uW-SEC/SQCM	30,000

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BREMERTON EASTSIDE TREATMENT PLANT IMPROVEMENTS PHASE 1

GENERAL

HYDRAULIC PROFILE & DESIGN CRITERIA

PROJECT NO.: W20001WA.00 | SCALE: AS SHOWN | DATE: OCTOBER 2023

SHEET
G-005
5 of 39

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CONTRACTOR STAGING AREA 2 (SEE NOTE 1)

EXISTING CHEMICAL BUILDING

EXISTING PUMP ROOM

EXISTING HRC SYSTEM

EXISTING UV CHANNEL

UV DISINFECTION

EXISTING OPERATIONS BUILDING

UV SCC PANEL

EXISTING GENERATOR PAD

EXISTING TRANSFORMER PAD

EXISTING PARSHALL FLUME

EXISTING 100,000 GAL STORAGE BASIN

INFLUENT SCREEN

EXISTING BIO-FILTER

ODOR CONTROL BLOWER (TYP)

CONTRACTOR STAGING AREA 1 (SEE DET 1, THIS SHEET AND NOTE 1)

SITE MAIN ACCESS GATE, SEE NOTE 2

1 1/4-TW-CPVC

1-D-PVC

3-SS-PVC

4-SS-PVC

1/2)(2)-C-PVC(PVC)

1 1/2-P-PVC

2-UW-PVC

2-PW-PVC

36-EFF-RCP

2-UW-PVC

2-PW-PVC

1/2(2)-C-PVC-(PVC)

1/2-SA-PVC

1-UW-PVC

3/4-SA-PVC

4-UW-PVC

8-S-DI

2-UW-PVC

1/2-SA-PVC

1/2-HYD-SS

3/4-SA-PVC

1/2-SA-PVC

1/2-SA-PVC

1/2-HYD-SS

3/4-PW-PVC

2-PW-PVC

4-PW-PVC

UGT

UGP

136 140 144 146 138 142

STAGING AREA 1 (1)

PLAN
SCALE: 1" = 10'

NOTES:

1. COORDINATE WITH PLANT STAFF FOR EXACT EXTENTS OF STAGING AREA. STAGING AREA 1 SHOULD BE PRIORITIZED WITH STAGING AREA 2 USED ONLY AS NEEDED. LIMITS OF STAGING AREA 1 ARE APPROXIMATE (NOT SURVEYED). CONTRACTOR SHALL FIELD VERIFY STAGING AREA EXTENT AS NEEDED FOR PLANNING PURPOSES.

2. KEEP MAIN GATE TO SITE CLOSED EXCEPT WHEN ACCESSING THE SITE. THE GATE MUST BE LOCKED WHEN NO WORKERS ARE ON THE SITE. COORDINATE GATE LOCKS WITH CITY STAFF.

3. CONTRACTOR IS RESPONSIBLE FOR SECURITY OF STAGING AREA.

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CIVIL

PROPOSED CIVIL PLAN

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SHEET
C-101
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PIPE SYMBOLS

DESCRIPTION	SYMBOL
PROPOSED	
HIDDEN	
BELOW GRADE	
EXISTING	
EXISTING HIDDEN	
DEMOLISH	
FUTURE	
CENTERLINE	
PIPE CUT	
PIPE BREAK	
PIPE BREAK (SINGLE LINE)	

PIPE JOINTS

DESCRIPTION	SYMBOL
FLANGED	
MECHANICAL JOINT	
GROOVED	
PVC	
STEEL	
PUSH-ON	
TAP	
SERVICE SADDLE	

PIPE FITTINGS

DESCRIPTION	SYMBOL
90° ELBOW	
45° ELBOW	
22.5° ELBOW	
11.25° ELBOW	
BASE ELBOW	
TEE	
CROSS	
LATERAL	
REDUCER (CONCENTRIC)	
REDUCER (ECCENTRIC)	
REDUCING 90° ELBOW	
EXPANSION JOINT (RESTRAINED)	
EXPANSION JOINT (UNRESTRAINED)	
DISMANTLING JOINT	
FLANGE COUPLING ADAPTER (FCA)	
RESTRAINED FLANGE COUPLING ADAPTER (RFCA)	
FLANGED x FLARED	

GENERAL NOTES:

1. THIS IS A STANDARD LEGEND, NOT ALL OF THE INFORMATION MAY BE USED ON THIS PROJECT.

2. ONLY FLANGED END CONNECTIONS ARE SHOWN HERE. OTHER FITTING PATTERNS ARE SHOWN SIMILARLY ON THE CONSTRUCTION DRAWINGS. ALSO SEE PIPING SPECIFICATIONS.

VALVE SYMBOLS

DESCRIPTION	PLAN	SECTION	SINGLE LINE
BALL VALVE			
BUTTERFLY VALVE			
BUTTERFLY VALVE (WAFER / LUGGED)			
CHECK VALVE (SWING)			
CHECK VALVE (BALL)			
DIAPHRAGM VALVE			
GATE VALVE			
GLOBE VALVE			
KNIFE GATE VALVE			
PINCH VALVE			
PLUG VALVE			

VALVE SYMBOLS

DESCRIPTION	PLAN	SECTION	SINGLE LINE
PRESSURE REDUCING VALVE (STRAIGHT)			
PRESSURE REDUCING VALVE (ANGLED)			
BACK PRESSURE REGULATOR VALVE (STRAIGHT)			
PRESSURE GAUGE			
AIR VALVE (COMBINATION)			
AIR VALVE (AIR RELEASE)			
AIR VALVE (AIR/VACUUM)			
FLOW METER			M

GENERIC PIPING NOTES:

1. LAY PIPE TO UNIFORM GRADE BETWEEN INDICATED ELEVATION POINTS.

2. SIZE OF FITTINGS SHOWN ON DRAWINGS SHALL CORRESPOND TO ADJACENT STRAIGHT RUN OF PIPE, UNLESS OTHERWISE INDICATED. TYPE OF JOINT AND FITTING MATERIAL SHALL BE THE SAME AS SHOWN FOR ADJACENT STRAIGHT RUN OF PIPE.

3. LOCATION AND NUMBER OF PIPE HANGERS AND PIPE SUPPORTS SHOWN IS ONLY APPROXIMATE. CONTRACTOR SHALL DESIGN SUPPORTS AS SPECIFIED.

4. ALL JOINTS SHALL BE WATERTIGHT. WALL PIPES SHALL BE USED WHEREVER PIPING PASSES FROM A STRUCTURE TO A BACKFILL.

5. ALL FLEXIBLE CONNECTORS AND COUPLING ADAPTERS SHALL BE PROVIDED WITH THRUST PROTECTION AS SPECIFIED, UNLESS OTHERWISE NOTED. THRUST PROTECTION SHALL BE ADEQUATE FOR TEST PRESSURES SPECIFIED.

6. SYMBOLS, LEGENDS AND PIPE USE IDENTIFICATIONS SHOWN SHALL BE FOLLOWED THROUGHOUT THE DRAWINGS, WHEREVER APPLICABLE. NOT ALL OF THE VARIOUS COMPONENTS ARE NECESSARILY USED IN THE PROJECT.

7. ALL BURIED PIPING SPECIFIED TO BE PRESSURE TESTED, EXCEPT FLANGED, WELDED OR SCREWED PIPING, SHALL BE PROVIDED WITH THRUST PROTECTION AS SPECIFIED, UNLESS OTHERWISE NOTED.

8. NUMBER AND LOCATION OF UNIONS SHOWN ON DRAWINGS IS ONLY APPROXIMATE. PROVIDE ALL UNIONS NECESSARY TO FACILITATE CONVENIENT REMOVAL OF VALVES AND MECHANICAL EQUIPMENT.

9. WHERE A GROOVED END COUPLING IS SHOWN, IT SHALL BE THE RIGID JOINT TYPE, UNLESS OTHERWISE SPECIFIED. WHERE A FLANGED COUPLING ADAPTER IS SHOWN, A STANDARD FLANGE SHALL BE JOINED TO THE COUPLING ADAPTER.

PIPE PENETRATIONS

WALL SPOOL (FLANGED)

WALL SPOOL (FLANGED x MJ)

LINK SEAL

30% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE

0 ½ 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

HLB DESIGNED

JLC DRAWN

SAS CHECKED

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OCTOBER 2023
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TRANE

BREMERTON EASTSIDE TREATMENT PLANT IMPROVEMENTS PHASE 1

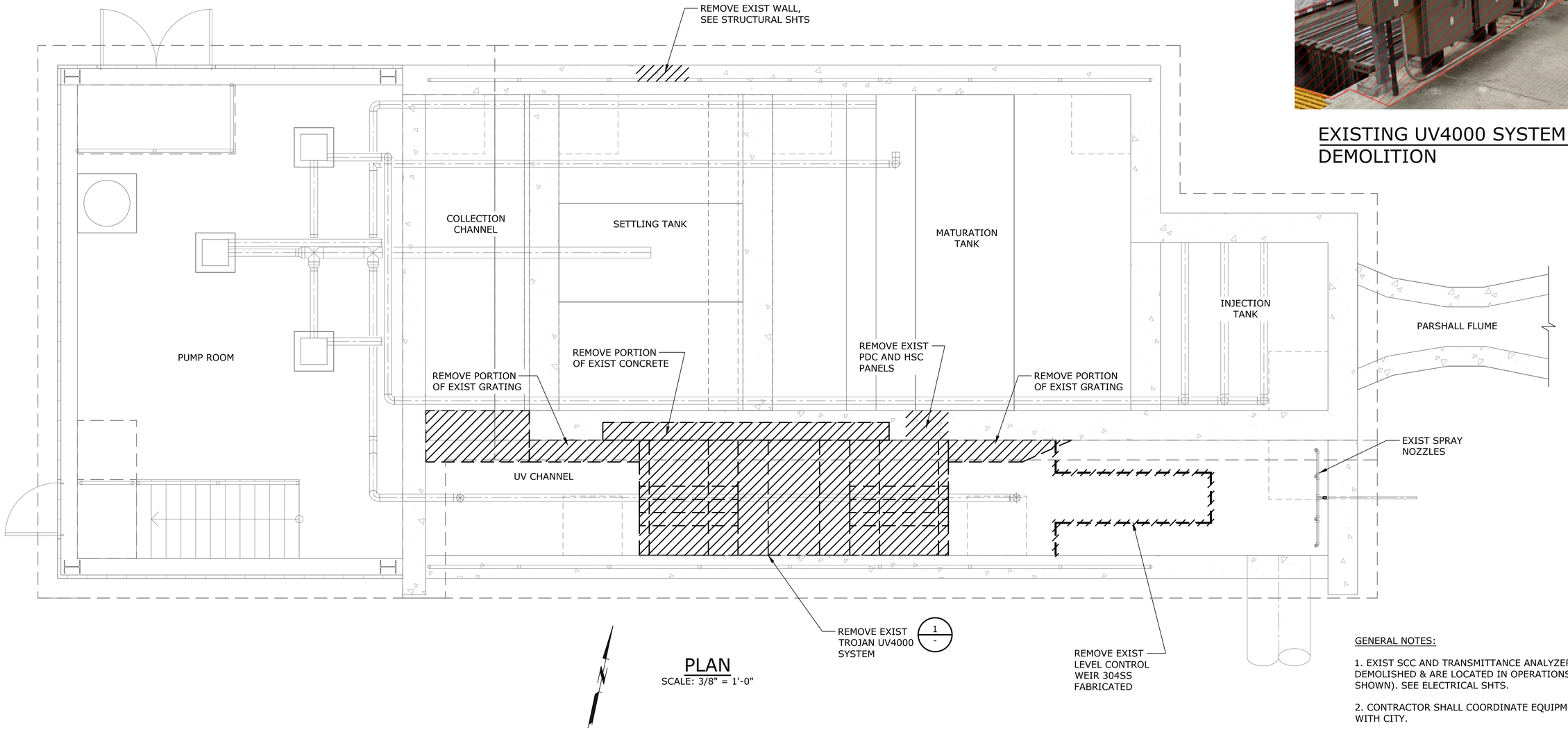
MECHANICAL

LEGEND

SHEET M-001

PROJECT NO.: W20001WA.00 | SCALE: AS SHOWN | DATE: OCTOBER 2023

EXISTING UV4000 SYSTEM DEMOLITION (1 / -)



PLAN
SCALE: 3/8" = 1'-0"

GENERAL NOTES:

1. EXIST SCC AND TRANSMITTANCE ANALYZER SHALL ALSO BE DEMOLISHED & ARE LOCATED IN OPERATIONS BUILDING (NOT SHOWN). SEE ELECTRICAL SHTS.

2. CONTRACTOR SHALL COORDINATE EQUIPMENT SALVAGE WITH CITY.

30% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE
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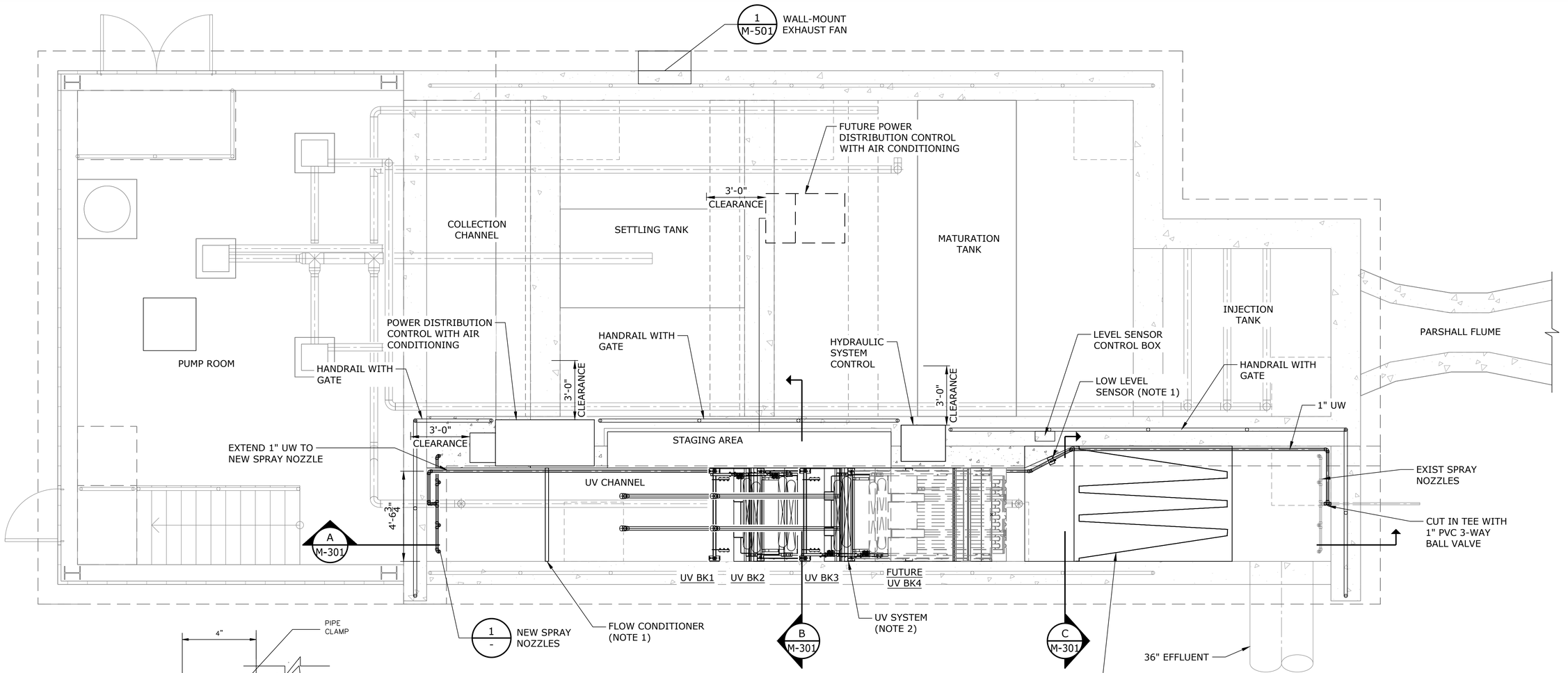
BREMERTON EASTSIDE TREATMENT PLANT IMPROVEMENTS PHASE 1

MECHANICAL

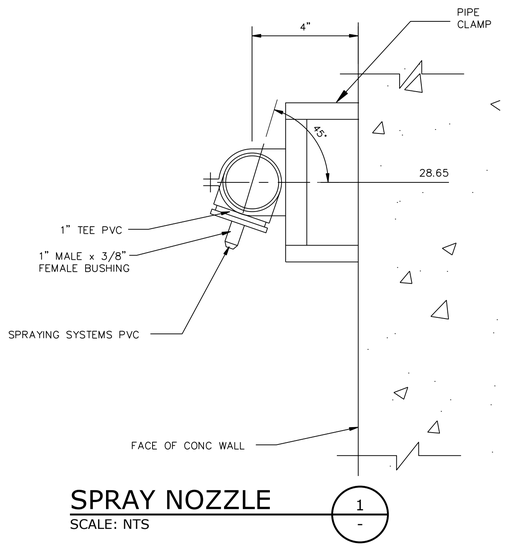
DEMOLITION PLAN

PROJECT NO.: W20001WA.00 | SCALE: AS SHOWN | DATE: OCTOBER 2023

SHEET
M-101
8 of 39



PLAN
SCALE: 3/8" = 1'-0"



SPRAY NOZZLE
SCALE: NTS
1
-

GENERAL NOTES:

1. NEW SCC AND TRANSMITTANCE ANALYZER SHALL BE SUPPLIED BY UVSS AND REPLACED IN-PLACE IN OPERATIONS BUILDING. THE SIZE OF SCC WILL BE FINALIZED DURING SUBMITTAL.

NOTES:

1. LEVEL CONTROL WEIR, FLOW CONDITIONER, AND LEVEL SENSOR SYSTEM SHALL BE DESIGNED AND SUPPLIED BY UVSS.
2. UV SYSTEM SHOWN IS THE TROJAN UVSIGNA SYSTEM.

30% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE
0 ½ 1
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TRANE

BREMERTON EASTSIDE TREATMENT PLANT IMPROVEMENTS PHASE 1

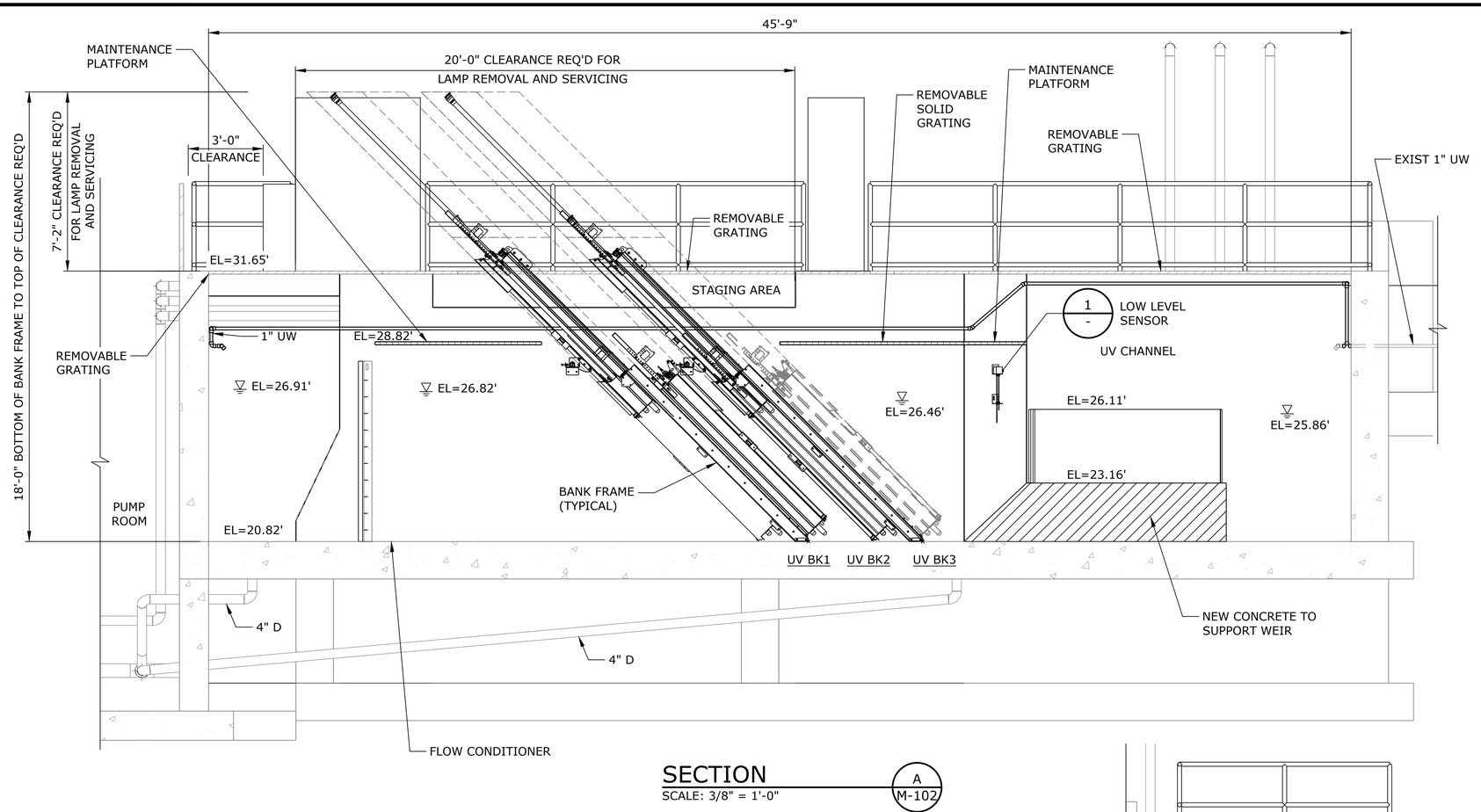
MECHANICAL

PROPOSED HRC/UV SYSTEM PLAN

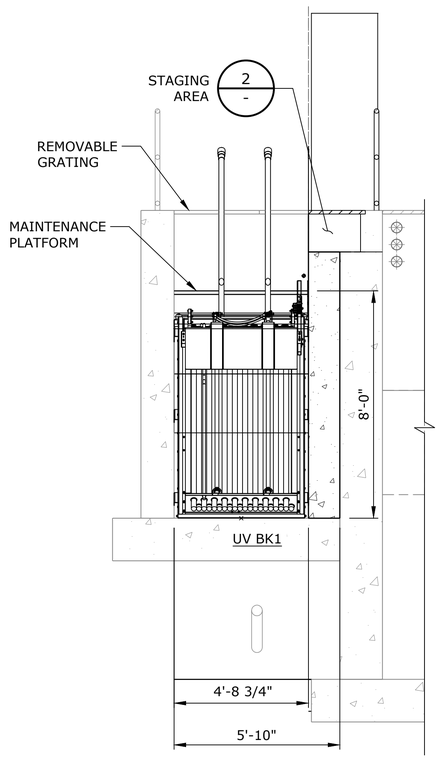
PROJECT NO.: W20001WA.00 | SCALE: AS SHOWN | DATE: OCTOBER 2023

SHEET
M-102
9 of 39

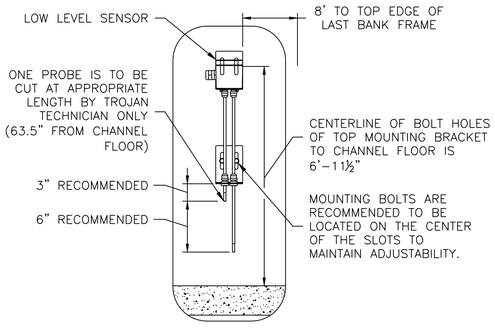
N:\Projects\22\W210001WA.00 - Trane - Bremerton Eastside TP Improv. Ph1\12.0 CADD\12.5-Sheets\210001_M-102.dwg M-102 10/4/2023 1:44 PM DEREK.CLOUD 24.1s (LMS Tech)



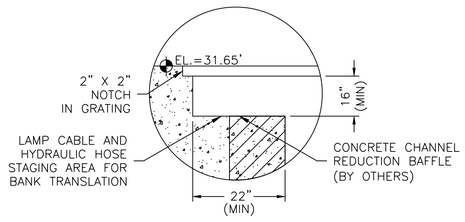
SECTION
SCALE: 3/8" = 1'-0"
A M-102



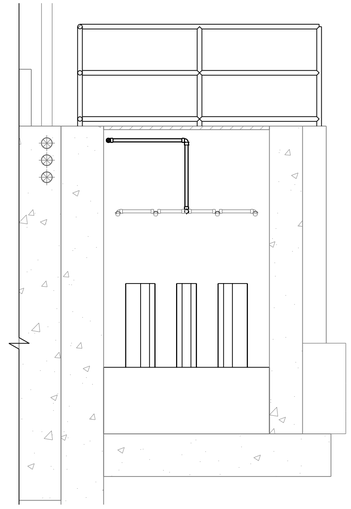
SECTION
SCALE: 3/8" = 1'-0"
B M-102



LOW LEVEL SENSOR
SCALE: NTS
1 -



STAGING AREA
SCALE: NTS
2 -



SECTION
SCALE: 3/8" = 1'-0"
C M-102

NOTES:

1. LEVEL CONTROL WEIR SHALL BE DESIGNED AND SUPPLIED BY UVSS. THE WEIR SHALL BE ADEQUATELY SUPPORTED OVER THE FULL HEIGHT OF THE WEIR.
2. UV SYSTEM SHOWN IS THE TROJAN UVSIGNA SYSTEM.
3. THE WEIR SHALL BE ADEQUATELY SUPPORTED OVER THE FULL HEIGHT OF THE WEIR.

30% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE
0 ½ 1
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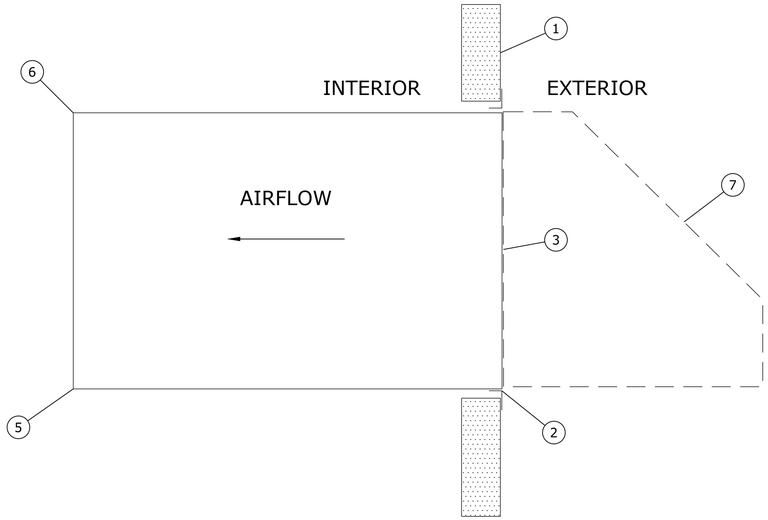
BREMERTON EASTSIDE TREATMENT PLANT IMPROVEMENTS PHASE 1

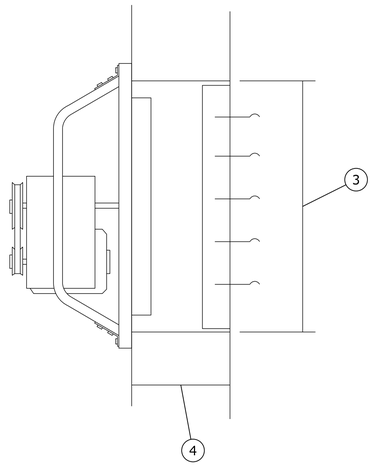
MECHANICAL

PROPOSED HRC/UV SYSTEM SECTIONS

PROJECT NO.: W20001WA.00 | SCALE: AS SHOWN | DATE: OCTOBER 2023

SHEET M-301





KEY NOTES:

1. EXIST UV FACILITY WALL
2. MOUNTING ANGLES W/ FASTENERS (SUPPLIED BY OTHERS)
3. WALL PENETRATION, SEE STRUC SHTS
4. FAN & DAMPER MIN DISTANCE
5. TEMPORARY BRACING SUPPORT, SEE NOTE 2
6. PERMANENT FAN SUPPORT, SEE NOTE 3
7. 90 DEG WEATHERHOOD

WALL MOUNT EXHAUST FAN ELEVATION (1 / M-102)

SCALE: NTS

EXHAUST FAN SCHEDULE (NOTE 1)					
OPTION	FAN SIZE	DAMPER SIZE SQUARE	WALL OPENING SQUARE	FAN & DAMPER MIN DISTANCE	WEIGHT
1	20	22	27 1/4	12	30
2	30	32	39 3/4	13	45

NOTES:

1. CONTRACTOR SHALL SELECT A FAN SIZE TO PROVIDE MIN 12 ACH. CONTRACTOR SHALL CONFIRM DIMENSIONS WITH SELECTED FAN MANUFACTURER.
2. CONTRACTOR SHALL PROVIDE TEMPORARY BRACING SUPPORT FOR END OF UNIT UNTIL PERMANENT SUPPORT BRACES ARE INSTALLED.
3. CONTRACTOR SHALL PROVIDE PERMANENT METHOD OF FAN SUPPORT PER MANUFACTURER RECOMMENDATIONS.

30% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE
0 ½ 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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BREMERTON EASTSIDE TREATMENT PLANT IMPROVEMENTS PHASE 1

MECHANICAL

DETAILS

PROJECT NO.: W20001WA.00 | SCALE: AS SHOWN | DATE: OCTOBER 2023

SHEET M-501

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TRANE U.S., Inc.

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NOT USED

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NOT USED

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46 66 63.A Temporary Ultraviolet Treatment System (OPTIONAL)

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NOT USED

END OF SECTION

APPENDIX C

Detailed Cost Estimate

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TRANE U.S., INC.
CITY OF BREMERTON
EASTSIDE TREATMENT PLANT IMPROVEMENTS - PHASE I
30% DESIGN – ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST (CLASS 4 ESTIMATE)

Date of Estimate: JULY 2023
Date of Contract: MAY 2023
Demo/Mobilization: NOVEMBER 2024
Estimated Completion: DECEMBER 2025

Item No.	Item Description	Quantity	Unit	Unit Cost	Total
Site Civil					
1	N/A[1]	0	LS	$ -	$ -
				Site Civil Subtotal	*$ -*
Structural					
2	Channel Wall & Weir Modification Install	1	LS	$ 130,800.00	$ 130,800.00
3	Aluminum Grating & Handrail	1	LS	$ 7,500.00	$ 7,500.00
4	Concrete Pad	0.5	CY	$ 1,300.00	$ 650.00
				Structural Subtotal	*$ 138,950.00*
Mechanical					
5	Existing UV4000 Demolition	1	LS	$ 45,000.00	$ 45,000.00
6	New UV Signa System[2]	1	LS	$ 603,700.00	$ 603,700.00
7	New Sprayer Nozzles	5	EA	$ 560.00	$ 2,800.00
8	New Sprayer PVC Piping, Supports, & Fittings	1	LS	$ 15,000.00	$ 15,000.00
9	Exhaust Fan	1	LS	$ 1,950.00	$ 1,950.00
10	Mechanical Install	1	LS	$ 350,000.00	$ 350,000.00
				Mechanical Subtotal	*$ 1,018,450.00*
Electrical, Instrumentation & Controls					
10	Contractor/Integrator Design	1	LS	$ 49,900.00	$ 49,900.00
11	UVCP (Trojan Supplied)	1	LS	$ -	$ -
12	EPCP	1	LS	$ 35,900.00	$ 35,900.00
13	HRCCP	1	LS	$ 56,200.00	$ 56,200.00
14	Instruments	1	LS	$ 28,000.00	$ 28,000.00
15	Electrical Demolition	1	LS	$ 46,800.00	$ 46,800.00
16	Electrical Install	1	LS	$ 198,800.00	$ 198,800.00
17	Other	1	LS	$ 117,650.00	$ 117,650.00
				Electrical, I&C Subtotal	*$ 533,250.00*

		Subtotal	***$ 1,690,650.00***
Contractor O&P	*15%*	*$*	*254,000.00*
General Conditions	*15%*	*$*	*292,000.00*
Construction Contingency	*25%*	*$*	*560,000.00*
		Construction Subtotal	***$ 2,797,000.00***
Escalation Contingency	*12%*	*$*	*336,000.00*
Construction Subtotal (June 2025)		***$***	***3,133,000.00***
Final Design and Contract Management	*25%*	*$*	*784,000.00*
Owner Contingency	*5%*	*$*	*196,000.00*
		Subtotal	***$ 4,113,000.00***
Tax	*9.2%*	*$*	*379,000.00*
		Total	***$ 4,492,000.00***

Class 4			
Low Range	$ 3,144,400	to	$ 3,818,200
High Range	$ 5,390,400	to	$ 6,738,000
Medium Range	$ 4,267,400	to	$ 5,278,100

Notes:

1 No site civil work anticipated at 30% design
2 Includes UV Signa equipment & ancillary equipment, including panels, fixed weir level control, flow conditioner, UVT monitoring, level sensors, spare parts, freight, and time for start-up support
3 CONSOR's construction cost estimate ("estimate") is in dollars valued as of the date of this estimate. This estimate is an opinion of probable cost based on information available at the time of its development. Final costs will depend on
- actual field conditions.
- actual material and labor costs.
- market conditions for construction.
- regulatory factors.
- final project scope.
- method of implementation.
- schedule (time to completion? time of commencement? Speed of execution?), and
- other variables.

This estimate is based on our perception, which is based on experience and research, yet nevertheless, an assessment, of current conditions at the project location. This estimate reflects our professional opinion of current costs and is subject to change as the project design evolves. CONSOR has no control over, nor can it forecast variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means, and methods of executing the work, or of determining prices, of the impact of competitive bidding or market conditions, practices, or bidding strategies. CONSOR neither warrants nor guarantees that proposals, bids, or actual construction costs will reflect the costs presented, which are for illustrative purposes only.

APPENDIX D

SEPA Exemption Memo

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DEPARTMENT OF COMMUNITY DEVELOPMENT

MEMORANDUM

To: Ned Lever, Managing Engineer, City of Bremerton Public Works
From: Andrea L. Spencer, Director of Community Development & SEPA Official
Date: October 4, 2023
Subject: SEPA Determination for the Eastside Treatment Plant Upgrade Project

---

The City's Department of Public Works & Utilities has requested that the City issue a SEPA determination for the proposed "Eastside Treatment Plant Upgrade Project." The project proposes replacement of old UV System equipment with new equipment that can continue to be supported by the manufacturer. All proposed work is inside the building. The station capacity and purpose will not change.

As SEPA Official, I have determined that this is a categorically exempt action pursuant to WAC 197-11-800(3). This code exemption allows repair, remodeling, maintenance, or minor alteration of existing private or public structures, facilities or equipment, including utilities, recreation, and transportation facilities involving no material expansions or changes in use beyond that previously existing, without environmental review. Given that the action is categorically exempt, issuance of a City SEPA determination is not required.

Andrea L. Spencer, Director AICP
Department of Community Development