Public Works Department Sanitary System Planning and Design

# Public Sanitary Sewer Pump Station Design and Construction Standards



February 2024

# Contents

1-0 INTRODUCTION	1
2-0 DESIGN REQUIREMENTS	1
2-1 Feasibility Report	1
2-2 Capacity Analysis	1
2-3 Geotechnical Report	2
2-4 Pump Sizing	2
2-5 Site Conditions	2
3-0 CIVIL PLAN REQUIREMENTS	3
4-0 PUMP STATION EQUIPMENT	4
4-1 Pre-sedimentary Manhole	4
4-2 Wet Well	4
4-3 Valve Vault	5
4-4 Scada Control Building	6
4-5 Onsite Emergency Generator	6
4-6 Terminal Disconnect Panel	6
4-7 Onsite Odor Control Station	6
4-8 Water Service	7
4-9 Water Backflow Assembly	7
4-10 Onsite Yard Hydrant	7
5-0 SCADA TELEMETRY AND CONTROL DEVICES	7
5-1 Motor Control Center (MCC)	7
5-2 Motor Starters	8
5-3 Remote Telemetry Unit (RTU)	8
5-4 Intrinsically Safe Relay (ISR)	8
5-5 Programmable Control Logic (PLC)	8
5-6 Flow Meter	8
5-7 Ultrasonic Level Transducer	8
5-8 Digital Pressure Transmitter Gauge	9
5-9 Analog Pressure Gauge	9
5-10 Backup Floats	9
5-11 Solenoid Control Valves	9
5-12 Programming	9
6-0 PRESSURE SEWER MAINS	9
6-1 Pipe Diameter	9
6-2 Flow Velocity	9



6-3 Pipe Material	9
6-4 Pipe Cover	
6-5 Marking Tape	
6-6 Toning Wire	
6-7 Test Stations	
6-8 Air Release Valve Vaults	
6-9 Discharge Manhole	
6-10 Hydrostatic Testing	
7-0 ELECTRICAL SPECIFICATIONS	
7-1 Codes, Rules, and Regulations	
7-2 Electrical Service	
7-3 Inspections and Tests	
7-4 Primary Disconnect Switch	
7-5 Automatic Transfer Switch (ATS)	
7-6 Motor Testing	
7-7 Motor Terminations	
7-8 Rigid Metal Conduit (GRC)	
7-9 Liquid Tight Flexible Metallic Conduit	
7-10 PVC Coated Rigid Metal Conduit	
7-11 Conduit Routing	
7-12 Conduit Materials	
7-13 Conduit Size	
7-14 Conduit Fittings	
7-15 Flexible Conduit fittings	
7-16 Conduit Installation	
7-17 Grounding	
7-18 Unions in Classified Locations	
7-19 Seals in Hazardous Locations	
7-20 Locknuts	
7-21 Bushings	
7-22 Grounding Bushings	15
7-23 Hubs	15
7-24 Liquidtight Metallic Flex Connectors	16
7-25 Cord and Cable Fittings (CGB)	16
7-26 Conductor Material and Size	16
7-27 Conductor Identification	



7-28 Insulation	16
7-29 Wire Connectors	16
7-30 Wire Installation	
7-31 Color Code	
7-32 Miscellaneous	
7-33 Device Boxes	
7-34 Pull Boxes	
7-35 Terminal Boxes	
7-36 Devices	
7-37 Conduit Clamps	
7-38 Hanger Rod	
7-39 Channels, Fittings, Hangers, Clamps, and Accessories	
8-0 CONSTRUCTION REQUIREMENTS	
8-1 Construction Submittals	
8-2 Final Inspection	
8-3 Operations and Maintenance Manual	20
8-4 Startup	
8-5 Record Drawings	20
8-6 Guarantees	
9-0 PUMP STATION STANDARD DETAILS	



# PUBLIC SANITARY SEWER PUMP STATION DESIGN AND CONSTRUCTION STANDARDS

#### **1-0 INTRODUCTION**

The City of Vancouver's (City) Public Works Department provides wastewater collection and treatment for a service area of about 58 square miles. This area has various topographical challenges that require the City to operate and maintain 45 lift and pump stations throughout our sewer system. These stations help convey flow to our two (2) wastewater treatment plants: Westside and Marine Park Wastewater Treatment Plants.

The City of Vancouver has adopted the submersible pump station design described herein as its standard public pump station configuration.

The contractor shall contact <u>S&B Inc.</u> for the SCADA System requirements and integration early in the design process.

The contractor shall furnish all mechanical and electrical equipment required for a complete submersible pumping station including two (2) submersible pumps with rails, a third spare pump, flush valve, internal piping, chemical feed station, MCC wired for a triplex pump setup, level control system, check valves, SCADA, and standby power. Stations with large flows may require three (3) pumps and a fourth spare.

Engineers designing public pump stations for developments are required to contact the Engineering Division at the beginning of the process to discuss site specific conditions and the preliminary site plan and force main design. New development pump stations shall be submitted as a stand-alone ENG for review.

#### **2-0 DESIGN REQUIREMENTS**

This section will cover all design considerations required for approval from the City for public sanitary sewer pump stations.

#### 2-1 Feasibility Report

Engineers will be required to submit a preliminary pump station feasibility report. Contact City staff for final scoping. Address all primary pump station design elements (See Detail PS-1.1A), include flow estimates and all required pump info (system curves, model numbers, etc). Show pump station location and note approximate finish grade for the wet-well. Include a preliminary site plan and pump station service basin map with parcel numbers, basin acreage, and zoning uses. Submit the pump station feasibility report to the City for review and approval prior to application.

#### 2-2 Capacity Analysis

The engineer shall submit design calculations for the sizing of the pump station. Stations shall be sized for build-out of the basin being served. Upsizing the gravity mains into the pump station to accommodate emergency storage volumes will be required. The criteria used shall be that contained in the City of Vancouver's Sanitary Sewer Master Plan. Use 75gpcd for residential flows and 800gpad for non-residential flows. The peaking factor is based on the following formula:

### PF = 2.63 - 0.26ln(Qave-mgd)

Inflow and infiltration allowances are specific to the basin. Contact the City's Engineering Division for I&I allowance within the station's basin.



At the City's discretion, Developments located outside of an existing pump station's original contribution area that propose new flows to the station are required to complete a station operation and capacity analysis. Developments are required to upgrade all related station components to meet current design standards.

### 2-3 Geotechnical Report

A geotechnical report is required to be submitted to the City along with the feasibility report.

# 2-4 Pump Sizing

Each pump in a duplex station shall be capable of delivering the expected peak flow of unscreened raw sewage against the total dynamic head (TDH) including static lift, pipe friction, and station losses. Each pump in a triplex station shall be capable of delivering half of the peak flow. If expected flows are not anticipated to reach peak values for several years, a proposal to initially install smaller pumps or impellers will be considered. However, all piping and electrical components shall be sized for buildout. The future developer will be required to provide the City with full build-out pumps (and a spare third pump) when the daily average flows exceeds the initial phase one (1) flow rates.

Pumps shall be Flygt Pumps supplied with protection relay MiniCas 120, or pre-approved equal.

Each motor shall have the appropriate horsepower as indicated by the pump manufacturer. Motors shall be three (3) phase. All openings and passages shall be large enough to permit passage of a three (3) inch diameter sphere of material which can pass through a four (4) inch collection system. Service shall be 480 volts whenever possible. Confirm availability with Clark Public Utilities. A "spare" pump will be required for all stations. This spare pump will include the motor, power cable, volute, flush valve, and impeller.

Submit pump curves with the feasibility report for the proposed pumps including the Model Number, Series Number, Type, and impeller size.

# 2-5 Site Conditions

Each pump station shall be placed on a separate parcel dedicated to the City of Vancouver. A deed is required to transfer parcel ownership. The pump station site shall be a minimum of 60 ft x 60 ft with direct access from the public street, vehicle staging, and a security fence. Design the site to facilitate access and maintenance. Maintenance vehicles must be able to pull directly to the wet well and presedimentation manhole. A minimum turn radius of 46 feet is required to negotiate turns. A turning template is available on the City's website with the Transportation standards.

Pump Station Standard Detail PS-1.1A shows minimum site plan requirements. The engineer shall use this plan only as a guide and is required to prepare a site-specific plan. An additional 30 ft x 60 ft vehicle stacking space may be required for maneuvering at stations that access busy streets. Structure and other feature locations may also need to be moved to avoid conflicts. There will be no landscaping within the boundary of the pump station property.

No offsite storm runoff is allowed to drain onsite.

Fencing for site shall be six (6) feet high black vinyl commercial chain link fence, round posts and caps, top rails, knuckled selvage with black plastic privacy slats. Additional security fencing may be required in certain locations. Concrete curbing shall be placed at the base of the fence to isolate and contain drainage on the site. See Pump Station Standard Detail PS-3.4.



All pump stations will require the developer to provide an on-site emergency generator. See Pump Station Standard Detail PS-2.4.

Sewage pump stations should include adequate lighting in all equipment areas to allow for repair and maintenance during non-daylight hours. An exterior site light pole with motion sensor and HOA switch is required. Additional lights may be required by the City for pump stations located in remote areas. See Pump Station Standard Detail PS-3.3.

The City will also consider proposed modifications to the standard site layout and the SCADA control building for aesthetic reasons. Submit such modifications for review prior to submitting development plans for review.

Exceptions to fencing, landscaping, and irrigation outside of pump station enclosure requirements may be granted for developments wishing to incorporate these elements into their overall site plan. Developers will be responsible for all landscape and irrigation maintenance.

### **3-0 CIVIL PLAN REQUIREMENTS**

All public pump station projects require submittal of civil plans prepared, signed, and sealed by an engineer licensed in the State of Washington. Designs are required to address pre-application and utility review requirements, land entitlement (staff report) conditions, and the codes and standards. Pump Station ENG plans are also required to include the following minimum items:

- Cover sheet and legend
- Location and vicinity map
- Pump station service boundary map including acreage, land use type, parcel numbers, etc.
- Pump station calculations sheet, to include the following:
  - Projected flows
  - Wet-well sizing calculations
  - Wet-well buoyancy calculations
  - Pre-sedimentary manhole buoyancy calculations
  - Valve vault buoyancy calculations
  - Force main design (velocity, pipe sizing, total force main volume)
  - Pump sizing calculations
  - System head curves
  - Emergency storage (detention time of wet-well and piping system during power outage)
- Existing conditions plan
- Site demolition plan (when applicable)
- Pump station site plan
- Pump station piping plan
- Pump station electrical plan
- Pump station grading plan
- Pre-sedimentary manhole and wet-well plan and profile views
- Valve vault plan and profile views
- Pressure sewer main design with plan and profile views
- SCADA control building layout and elevation views
- SCADA control building plumbing and lighting plan
- SCADA control building mechanical HVAC plan
- SCADA control building architectural framing plans, sections, and details
- SCADA control building structural foundation plans, sections, and details
- Site dewatering plan



- Temporary bypass pumping plan (when applicable)
- Power distribution one-line diagram(s)
- Motor Control Center One-Line Diagram(s)
- Miscellaneous devices/panels one-line diagram(s)
- Conduit schedule(s)

Plan review and approval is required prior to construction. Final plan sets shall address all City review redlines. An applicant's submittal for plan approval constitutes their agreement to construct all of the sewer facilities shown on the approved plans. Plan approval is a declaration that sewer pump station construction as specified and conditioned will be consistent with the following requirements:

- Pump station construction is legally and physically buildable to specified standards.
- The design satisfies the WSDOT Standard Specifications, City Amendments to those specifications, these General Requirements and Details, and other applicable standards.
- Completed construction will be suitable for public ownership.

All design changes to approved plans require City review and approval.

### **4-0 PUMP STATION EQUIPMENT**

This section below contains information and guidelines for all equipment located onsite for public sanitary sewer pump stations.

### 4-1 Pre-sedimentary Manhole

Pre-sed manholes are required to intercept heavy solids (rocks) and floating materials (rags). Effluent piping assembly and float elevations are designed to pass liquids to the wet well and to provide overflow. Design the pre-sed manhole, effluent piping, hatch, and safety rail. See Pump Station Standard Details PS-1.2A & PS-1.2B.

Install lifting lugs on the pre-sedimentary manhole lid. No steps are required. Provide standard rubber boot seals approved equal, for all pre-sed manhole pipe penetrations. The pre-sed manhole shall be completely lined with Raven 405 epoxy liner or approved equal, minimum 125mils thick.

Provide an H-20 rated door cover with orange safety grating for the pre-sed manhole, four (4) feet by four (4) feet minimum. Pre-sed manhole cover shall come with hasp for locking with City of Vancouver padlocks. The hatch opening shall be surrounded by a steel powder-coated yellow safety railing. See Pump Station Standard Detail PS-1.3.

Prepare and include flotation calculations for the pre-sedimentary manhole.

# 4-2 Wet Well

The engineer shall design an appropriately sized wet well. Align inlets from pre-sed manhole perpendicular to a line drawn through the pumps. The minimum wet well diameter for a duplex station (with pumps smaller than 13.5HP) is eight (8) feet. Wet wells serving triplex stations or duplex stations with large motors shall be a minimum diameter of ten (10) feet. All metal components shall be 316 stainless steel or 304 stainless with approval from the City. The contractor shall furnish and install the wet well according to the project plans and the City's General Requirements and Details. Contact City Engineering offices for any wet wells greater than 30 feet deep. See Pump Station Standard Details PS-1.2A & PS-1.2B.



The wet well shall be sized to accommodate the ultimate flows to be pumped. The wet well capacity shall be adequate to allow the pump motors to cycle at or above the minimum cycle times required by the given motor.

Prepare and include flotation calculations for the wet-well.

The engineer is referred to the Wastewater Pump Station Design Manual prepared by the Bureau of Environmental Services of the City of Portland, and to Chapter 26, Pumping Station Design Second Edition, Editor-in-Chief, Robert Sanks, for more detailed discussions of wet well sizing for constant speed pumps.

Calculate and submit for review the detention time provided by the wet well and piping system in the event of a power outage. All pump stations will require the developer to provide an on-site emergency generator. See Pump Station Standard Detail PS-2.4.

Install lifting lugs on the wet well cover. No steps are required. Provide modular mechanical seals, Link-Seal or equal, at the discharge pipe penetrations. The wet well shall be completely lined with Raven 405 epoxy liner or approved equal, minimum 125mils thick.

Provide an H-20 rated door cover with orange safety grating for the wet well, six (6) feet by four (4) feet minimum (sized for pumps and size of wet well), frame size per pump manufacturer, with hasp for locking with City of Vancouver padlocks. The hatch opening shall be surrounded by a steel powder-coated yellow safety railing. See Pump Station Standard Detail PS-1.3.

Cast a three (3) inch diameter vent hole into the lid and install an approved flush stainless-steel grate in the wet well cover.

Mount 3/8" diameter 316 stainless steel cable hooks on the wet-well lid. Mount individual hooks on either side of the pump guide rails. Mount a rack of at least six (6) hooks on the terminal vault side. Provide stainless Kellum grips, galvanized are not acceptable. See Pump Station Standard Detail PS-1.4.

#### 4-3 Valve Vault

Precast concrete vault for valves shall be sized for the pipe size and components shown on the plans and Pump Station Standard Detail PS-1.5. Triplex stations and stations with piping larger than four (4) inches will require a larger vault. If the vault selected has a standard depth of four (4) feet or more, paver blocks may be used to reduce the depth to less than four (4) feet; Minimum six (6) inches from bottom of pressure main to paver blocks. This four (4) foot depth requirement only applies to force mains six (6) inches or smaller in diameter.

The vault cover shall include a three (3) door configuration with orange safety grating, H-20 rated, and a heavy-duty hasp sized for City of Vancouver padlocks. Provide a two (2) inch schedule 80 PVC drain line from a sump in the floor of the vault to the wet well with a P-trap and a duckbill check valve. The P-Trap shall be primed by water introduced from a 3/8" waterline plumbed under the vault. Locate the duckbill check valve, where it can be accessed for maintenance. Minimum slope shall be two (2) percent. Provide an OSHA rated ladder for access.

The ladder shall be permanently secured to the base and cover of the vault and have a removable three (3) foot long extension with hooks to hang it from the top ladder rung when not in use.

Prepare and include flotation calculations for the valve vault.



#### 4-4 Scada Control Building

A nine (9) foot by twelve (12) foot wood-framed SCADA control building shall be provided by the contractor for the electrical panels. The City will consider alternate shelter designs made for aesthetic reasons. Submit designs for review prior to EPlans submittal.

The SCADA control building will need a City approved CMI building permit to be completed prior to building construction. Include structural plans and calculations completed and stamped by a licensed structural engineer in the state of Washington. The contractor is responsible for all plans, permits, and fees related to the CMI permit process.

#### 4-5 Onsite Emergency Generator

Provide a permanent standby power generator sized specifically for the pump station. The system shall be complete with engine, alternator, electrical and control systems, cooling and exhaust systems, automatic transfer switch, internally mounted battery charger, 24-hour capacity fuel tank, sound dampening enclosure, and all other related parts. See Pump Station Standard Detail PS-2.4.

All transfer switches, battery charger, and control panels shall be of the same manufacturer as the standby power generator. The system shall be provided by:

Cummins Northwest, LLC Oregon Power Generation 4711 N Basin Avenue Portland OR 97217-3557 503-289-0900 www.cumminsnorthwest.com

#### 4-6 Terminal Disconnect Panel

Physically separate control panels from the wet well and meet NEC requirements. Electrical junction boxes should be easily accessible without entering the wet well. To allow efficient change-out of instrumentation, terminate wet-well instruments at a pump disconnect panel located adjacent to the wet-well, see Pump Station Standard Detail PS-2.0A & 2.0B for more information. Any necessary seal-offs shall be located OUTSIDE of wet well so they can be cut out without wet well entry. The pump plug and receptacle shall be sized for the buildout plugs.

#### 4-7 Onsite Odor Control Station

Furnish and install a Furrow Pumps Inc. calcium nitrate feed system or approved equal. The minimum system, required at most stations, consists of a 1025-gallon horizontal, flat bottomed, single walled cross-linked polyethylene storage tank with containment wall, control panel with timer, fifteen (15) amp breaker, GFCI outlet, and fan; one (1) peristaltic metering pump; one (1) tank parts kit; and all necessary pipe, valves, fittings, conduit, electrical fittings, and wire to install the station as recommended by the manufacturer. See Pump Station Standard Detail PS-2.3.

Install a two (2) inch PVC, Schedule 80, vent pipe on top of the tank. The feed line shall be 3/8" OD tubing sleeved through 1/2" PVC conduit; only long-sweep elbows allowed to the pump which is located in the control cabinet. Discharge line shall be 1/2" PVC conduit from the pump to wet-well. Locate the pump enclosure assembly in the shade if possible.

Furnish and install a 120-volt, fifteen (15) amp, electrical circuit dedicated for power supply to the calcium nitrate feed system.



#### 4-8 Water Service

Install a standard one (1) inch water service to serve the station. Provide a  $5/8^{"} \times 3/4^{"}$  water meter. The service from the main to the water meter and all downstream onsite water supply piping shall be seamless type K soft annealed copper. PEX or PVC will not be approved. See Water Standard Detail W-1.

#### 4-9 Water Backflow Assembly

Provide a reduced pressure backflow. Install 3/4-inch conduit from electrical panel to the backflow enclosure. Install a metal "FD" device box with a fifteen (15) amp GFCI receptacle and weatherproof duplex receptacle snap cover, Crouse-Hinds "WLDR". See Water Standard Detail W-23.

#### **4-10 Onsite Yard Hydrant**

Install a freeze protected yard hydrant near the wet-well. Supply the hydrant with one (1) inch copper downstream of the backflow assembly. See Pump Station Standard Detail PS-3.5.

#### **5-0 SCADA TELEMETRY AND CONTROL DEVICES**

This section contains all design and installation requirements for the City's Supervisory Control and Data Acquisition (SCADA) program for public sanitary sewer pump stations. The SCADA system shall be provided by:

#### S&B Inc.

Phone 425-644-1700 Fax 425-746-9312 Sales@sb-inc.com Service@sb-inc.com

Control equipment and field instrumentation to be procured by the contractor through S&B Inc:

- Siemens TIAstar motor control center (MCC)
- S&B Inc remote telemetry unit (RTU) including cellular antenna and cabling
- S&B Inc intrinsically safe relay box (ISR) supplied pre-attached to RTU.
- Siemens mag 5100W flow meter including submergence kit. Lightning protection, and cabling •
- Siemens mag 5000 flow meter transmitter head wall mounted 24VDC •
- Siemens P320 digital pressure gauge with diaphragm seal •
- Mercoid PBLT2-5-40 ultrasonic level transducer with stainless steel desiccant vent air filter
- Anchor Model S40NO float switch "normally open"
- System Sensor model BK-4WTB air sensor
- Siemens 3SE03-AR1 door intrusion alarm limit switch
- All required testing and calibration needed during pump station startup period •

#### 5-1 Motor Control Center (MCC)

The MCC shall be furnished by S&B Inc and installed by the contractor. The manufacturer, its designated field service group, or S&B Inc shall program, test, commission and certify operation of the MCC equipment.

The Motor Control Center shall be the TIAstar model by Siemens without exception. It shall be a NEMA 1A rated enclosure in an ANSI Grey finish. The MCC shall include a main circuit breaker, surge protection device, transformer, panelboard, motor starters, and feeder breakers. All PROFINET enabled devices will be network connected from the MCC to the PLC using 600VAC rated cable – Siemens model 6XV18402AH10 or equal.



Thermal magnetic circuit breakers shall be provided for branch circuit protection and over current protection of all control, and auxiliary circuits. Install a wired in branch panel surge protection (Hubbel model HBL3W100) to protect all control and auxiliary circuits. The MCC shall be properly sized, NEMA rated, and under voltage release for operation and protection of the pump motors. Breakers shall be the same as the MCC manufacturer. Ground fault and short circuit protection of the motors shall be by dual element fuses manufactured by Bussmann or approved equal.

For each pump install a current transformer on one of the three-line side motor branch circuit conductors in front of each soft start. Each motor shall have a running analog ammeter. Scale the full running amps to as close to 50 percent resolution on each ammeter as possible. All underground wiring shall be in PVC coated rigid steel conduit, OCAL BLUE, Robroy Plastibond Red, or approved equal.

#### **5-2 Motor Starters**

All motor starters shall be programmed by the Control System Integrator (S&B Inc). The City uses Siemens model 3RW44 Reverse Voltage Solid State Motor Starters (RVSS) without exception. Each starter must include a profinet communication module.

### 5-3 Remote Telemetry Unit (RTU)

The telemetry controls shall be mounted in a control panel which shall be a NEMA twelve (12) type fabricated painted steel enclosure. Mount the RTU with clear line of sight to the wet-well.

The RTU will include breakers, fuses, relays, power supplies, Programmable Logic Control (PLC), communication modules, and terminal blocks. Wiring raceway shall be neatly arranged on a removable steel back plate. A touch control panel shall be door mounted on the RTU for local operator control of the station. The RTU shall be manufactured by S&B Inc, without exception.

# 5-4 Intrinsically Safe Relay (ISR)

Place all Intrinsically Safe devices within a NEMA twelve (12) fabricated, painted steel enclosure, pre-attached to the RTU. Inside shall be intrinsically safe relays and barriers, desiccant vent filters for terminal blocks. The ISR control panel shall be manufactured by S&B Inc, without exception.

# 5-5 Programmable Control Logic (PLC)

The PLC shall be a Siemens S7-1500 series processor without exception. All input, output, and communication cards will utilize the ET200SP series form factor. The CPU memory card shall be 4MB minimum. The touch panel shall be a Siemens Comfort Series, nine (9) inch minimum. PROFINET communication will be used to connect the PLC to all PROFINET enabled devices in the Siemens MCC, other PLC equipment, and touch panel.

#### 5-6 Flow Meter

Flow Monitoring shall be done by Siemens Mag 5100W meter and Siemens Mag5000 Transmitter Head (24VDC), model 7ME6910-1AA10-1AA0. The Transmitter head is to be remote mounted using wall mount kit model FDK: 085U1053. Provide a submergence kit for the meter body, model FDK: 085U0220. Provide adequate cable lengths of Siemens Standard and Special electrode cables for the remote mounting application. The flow meter kit is furnished by S&B Inc.

#### 5-7 Ultrasonic Level Transducer

Level monitoring shall be done by a Mercoid PBLTX-5-40 Level Probe. Provide and install a Desiccant Vent Filter, model A-297, in the ISR low voltage termination junction box. See Pump Station Standard Detail PS-2.6. The level transducer is furnished by S&B Inc.



### 5-8 Digital Pressure Transmitter Gauge

The digital pressure gauge assembly with diaphragm seal in the valve vault is furnished by S&B Inc. See Pump Station Standard Detail PS-1.6.

### 5-9 Analog Pressure Gauge

The analog pressure gauge in the valve vault shall be a mechanical bourdon tube type with diaphragm seal, analog dial, with a minimum four (4) inch diameter single-face. See Pump Station Standard Detail PS-1.6.

### 5-10 Backup Floats

Direct acting float switches shall be supplied to control the operation of the sewage pumps at levels outside of SCADA parameters. Emergency-Off, High, and High-High floats. The float switches shall be polyurethane foam resin bodies encapsulating mercury tube switches that are the "Normally Open" type. The float switches shall be Anchor Scientific Inc., Roto-Float, Type S - Suspended, model S40N0, UL listed for pilot duty and industrial control equipment, or approved equal. Provide intrinsically safe relays. Backup float switches are furnished by S&B Inc.

### 5-11 Solenoid Control Valves

Solenoid valves are used to control the vault and bldg. P-trap primer's, as well as the wet-well fill water. Install the valves in the electrical control building as shown on Pump Station Standard Details PS-1.7A and PS-1.7B.

### 5-12 Programming

All control system programming shall be performed by the City's Control System Integrator, S&B Inc, without exception. This includes motor starters inside the MCC, PLC, touch panel, and Master Telemetry Unit (MTU) updates. The communication between the MTU and RTU will be configured and validated by S&B Inc.

#### 6-0 PRESSURE SEWER MAINS

This section covers all design and construction requirements for public pump station pressure sewers within the City's public right-of-way or public sewer easements.

# 6-1 Pipe Diameter

The minimum pressure sewer size shall be four (4) inch diameter.

# 6-2 Flow Velocity

The minimum velocity shall be three (3) feet per second. A velocity of five (5) feet per second is preferred to ensure proper operation of the swing check valves. Design velocities should not exceed ten (10) feet per second.

# 6-3 Pipe Material

_	Approved Material	Specifications
Wet-well to Valve vault	Ductile Iron Pipe (DIP)	
	Class 52, epoxy coated	ANSI A21.51 or AWWA C151, DR 18 min.
	interior	
Pressure Sewer Main	High Donsity Polyothylopo	ASTM F-714, ASTM D-3350, PE: 34534C &
	(HDPF)	ASTM D-1248, type III, Class C, Category 5,
		grade P34, AWWA C906, DR 17 min. DIPS
	Polyvinyl Chloride (PVC)	AWWA C900 (Blue Brute) DR 18 min.



The pressure sewer shall contain no bends greater than 45 degrees, downstream of the valve vault.

Restrained mechanical joints for pipe joints, where noted on the plans shall be U.S. Iron Pipe "TR Flex". Restrained mechanical joints for fitting joints, where noted on the plans, shall be EBAA Iron "Megalug" series 1100, or approved equal.

#### 6-4 Pipe Cover

The minimum cover of the pressure sewer shall be three (3) feet. Limit high-points in the force main where practical.

#### 6-5 Marking Tape

The installation shall include furnishing and installing plastic marking tape continuously along the center line of the pipe, eighteen (18) inches above the pressure sewer. The marking tape shall be green, inert polyethylene, impervious to known alkalis, acids, chemical reagents, and solvents likely to be encountered in soil. The tape shall be a minimum of four (4) mils thick Identifying lettering shall be a minimum of one (1) inch high in permanent black lettering imprinted continuously over the entire length. Tape shall be Reef Industries, Terra Tape; Allen, Markline; or equal. See Standard Detail PS-2.9.

#### 6-6 Toning Wire

Toning wire shall be installed on all pressure sewers. Toning wire shall be green RWU#90 or equal. The wire shall be installed in such a manner as to be able to properly trace the pressure sewer without loss or deterioration of signal or without the transmitted signal migrating off the toning wire.

The toning wire shall be laid flat and securely affixed to the top of the pressure sewer main at six (6) foot intervals. The toning wire shall be protected from damage during all phases of construction. No breaks or cuts in the toning wire or the toning wire insulation shall be permitted

Toning wire system shall be tested by the contractor during initial startup and testing in front of City Wastewater Crews to demonstrate that the entire toning wire system is installed and functioning properly.

All spliced or repaired wire connections in the toning wire system shall be made by soldering. The buried service wire repair closure shall be a Raychem GHFC-2-90 H-Frame Gel Closure or approved equivalent.

Spliced connections shall only be allowed at intersections of common pressure sewers and test stations. The splices for common pressure sewers shall be located above the convergence of the pressure sewers. Test stations shall be required at all toning wire convergences.

#### 6-7 Test Stations

The first test station shall be at the valve vault (beginning of the pressure sewer) and the last test station shall be adjacent to the discharge manhole. If the distance between the first and last test stations is more than 450 feet, then additional test stations shall be required. Test stations shall be required at every horizontal bend in the pressure sewer main. Test stations shall be shown and detailed on the engineering plans. See Pump Station Standard Detail PS-2.8.

#### 6-8 Air Release Valve Vaults

Design the pressure sewer to minimize the number of high points along the profile. However, topographic considerations and the desire to minimize the depth of the pressure sewer may not always make this practical. Install a sewage air release valve per Pump Station Standard Detail PS-2.5A, manufacturer and model noted on the plans, at each high point. Valves shall be installed in vaults with



flushing facilities and an odor control canister, when required by Sewer Engineering. See Pump Station Standard Detail PS-2.5B. Larger pressure sewer mains, may require vacuum breaker valves.

### 6-9 Discharge Manhole

The discharge manhole shall be lined with Strong-Seal Systems Strong-Seal High Performance Mix, or with Raven 405. Strong-Seal High Performance Mix is an acid resistant calcium aluminate cementitious liner product. Minimum thickness shall be 1/2" Raven 405 is an ultra-high build, 100% solids based, epoxy coating. Minimum thickness shall be 125 mils. For either type of liner, equipment, preparation, application, and curing shall be performed as recommended by the manufacturer. Lining of additional downstream manholes may also be required. See Pump Station Standard Detail PS-3.0.

### 6-10 Hydrostatic Testing

All sizes of pipe shall be tested hydrostatically as per the requirements of: <u>ASTM F2164 Standard</u> <u>Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure</u> <u>Piping Systems Using Hydrostatic Pressure (astm.org)</u>

Leak tests to be conducted in accordance with ASTM F2164. Pressure shall be 1.5 times the design working pressure (psi) at the lowest point in the test section. Reduce by ten (10) psi and monitor for one (1) hour. A passing pressure remains within five (5) percent of the target value for one (1) hour.

### 7-0 ELECTRICAL SPECIFICATIONS

This section contains all design and construction requirements for all electrical work onsite within public sanitary sewer pump stations.

### 7-1 Codes, Rules, and Regulations

Electrical design for sewage pump stations shall conform to the National Electrical Code (NEC), National Electrical Safety Code (ANSI), and all federal, state, and local codes. Particular attention should be given during design to classifying the various enclosed spaces in the sewage pump station to ensure adequate ventilation.

All electrical design shall meet the requirements of the City Design Specifications, Amendments to the Construction Specifications and Standard Drawings for public sanitary sewer pump stations.

# 7-2 Electrical Service

Electrical service shall be 3-phase 480V unless otherwise approved by the City.

# 7-3 Inspections and Tests

All electrical work shall be inspected before concealment.

After installation and prior to the energizing of any cables or equipment, megger all service entrance conductors, power cables, motor feeders, lighting feeders, switchgear busses, and MCC busses. Readings shall be taken between pairs of phases and between each phase and ground. Equipment and cable operating at 600 volts or less shall be tested with a 500-volt megger.

Test all service entrance equipment and branch circuits for shorts and grounds prior to energizing. Provide written megger test report on each item tested to the City, listing: circuit tested, test voltage, test duration, test result, ambient temperature, weather conditions, and tester's initials.

#### 7-4 Primary Disconnect Switch

Install a UL service-rated, three-pole, double-throw, fusible, horsepower rated, primary disconnect switch in a NEMA 3R enclosure immediately adjacent to the electrical utility meter. Provide fuse



rejection clips and approved equal fuses. The disconnect shall incorporate a cover interlock and provide means to padlock the operating handle in the up, neutral, and bottom positions.

### 7-5 Automatic Transfer Switch (ATS)

Furnish and install an automatic transfer switch (ATS), poles, amperage, and voltage to withstand current ratings shown on the plans. Each automatic transfer switch shall consist of a mechanically held power transfer switch unit and a microprocessor controller, interconnected to provide complete automatic operation. All transfer switches, battery charger, and control panels shall be of the same manufacturer as the standby power generator.

#### 7-6 Motor Testing

Visual tests shall be conducted in front of City staff for approval at time of startup, to show correct amperage and pump impeller rotation.

Megger readings shall be in accordance with NEMA standards but in no case less than 25 M-ohm.

#### 7-7 Motor Terminations

Motor conductors shall be color coded at motor starter termination, each splice point (if applicable), and at motor terminal box as per color code in section 7-31.

#### 7-8 Rigid Metal Conduit (GRC)

Rigid steel, hot dipped galvanized inside and outside after threading. Republic, National or equal. Acceptable for applications inside "dry well" not defined as liquid tight flexible metallic conduit and SCADA Control Bldg. Not acceptable for direct burial.

#### 7-9 Liquid Tight Flexible Metallic Conduit

Use to connect electrical apparatus subject to vibration such as motors, heaters, solenoids, limit switches, etc. Flex shall not be used for connection to panel boards, motor control centers, motor starters or load centers except for specific prevention of noise transmission. Limit lengths to 36".

#### 7-10 PVC Coated Rigid Metal Conduit

OCAL "Blue", Robroy Plastibond Red, or approved equal. Use for all direct burial. GRC Conduit also acceptable for applications inside "dry well" not defined as liquid tight flexible metallic conduit. Conduit shall be rigid steel with a 40 mil PVC exterior coating, minimum, and a nominal two (2) mil urethane interior coating.

#### 7-11 Conduit Routing

Exposed conduits shall be installed vertically on wall and horizontal runs shall be installed square with building lines.

#### 7-12 Conduit Materials

All interior conduits shall be rigid galvanized steel, or PVC coated GRC. Exterior or underground raceways shall be PVC coated GRC.

#### 7-13 Conduit Size

Minimum size conduit shall be 3/4", except 1/2" for switch legs. Control conduit shall be 3/4" minimum.

#### 7-14 Conduit Fittings

In exposed conduit runs, expansion fittings shall be weatherproof with external bonding jumper, four



(4) inches longitudinal movement, bushed conduit ends. In concealed conduit runs, expansion fittings shall be watertight, internal bonding jumper, neoprene construction and allow 3/4-inch movement in any direction.

Exposed conduit fittings shall be cast, threaded type, Crouse-Hinds Form-7, or approved equal, with cast covers and neoprene gaskets. Condulets in conduit runs 1-1/2" or larger shall be "Mogul" type.

GRC couplings shall be factory threaded, or T&B "Erickson" type or equal. Threadless fittings are specifically prohibited.

Conduit "chase" nipples shall have nylon, pre-insulated throats.

#### 7-15 Flexible Conduit fittings

All steel compression type, pre insulated, rain tight. Fittings with die cast aluminum or pot metal components are not acceptable.

#### 7-16 Conduit Installation

All conduits onsite shall be installed as follows:

- Cut end of all conduits square and ream. Fittings shall be compatible with conduit used, secured wrench-tight, and form a smooth transition from conduit to fittings. Make all bends with an approved conduit bender. All bends in metallic conduit must be made while the conduit is "cold". Conduits shall not be flattened or wrinkled.
- Conduits encased in concrete shall be securely attached and anchored to prevent movement during pouring, tamping and vibration of the concrete. Ends shall be sealed with factory seals. Replace conduits containing concrete as directed by Engineer.
- Empty conduits shall be swabbed out clean and dry, and nylon pull cords installed. Spare conduits two (2) inch and larger shall have 1/4" pull line installed. Spare conduits shall be capped using caps made for the purpose. Tape, rags, or similar methods will not be recognized, and locations clearly marked with a monument or other permanent marker.
- Run conduit in neat rows with smooth concentric bends. Support multiple runs from Unistrut or Kindorf hangers in all exposed areas and maintaining 3/4" minimum spacing between conduits. Diagonal, crossed, or haphazard, non-supported runs will not be allowed.
- Install insulated grounding bushings on the ends of all rigid steel conduit, except where conduits terminate in threaded hubs on cast boxes or cabinets, in which case insert manufacturer's standard insulating sleeves and grounding terminal(s).
- Provide suitable expansion fittings for raceways crossing expansion joints in concrete slabs or provide other suitable means to compensate for building expansion and contraction.
- Wooden plugs inserted in concrete or masonry are not acceptable as base for raceway fastenings. Use only approved concrete expansion anchors for fastening to concrete. In exposed area, "permanent" concrete fasteners, such as Zamac type, shall not be used. The intention is to allow future adjustment or relocation of raceways.
- Raceways or pipe straps shall not be welded to steel structures. Unistrut or channel may be clamped or bolted to steel structure, and conduit and clamps bolted to the channel.



- Conduits shall emerge from concrete at right angles and shall have none of curved portion of • bend exposed.
- Conduit shall be of the greatest practical single length between joints, and all joints shall be made up with approved conductive jointing compound, T&B, KOPR-SHIELD, or approved equal. Conduits shall not be bent through more than 90-degrees. Not more than the equivalent of three (3) 90-degree bends (270 degrees total) shall be installed between pull points.
- Do not use nails to fasten boxes or conduits. Do not use wire to support conduit.
- Dry pack with non-shrink grout around conduits that penetrate finished concrete or masonry walls, floors, or ceilings.
- Underground Raceways as follows:
- Separate parallel runs of two or more conduits in single trench with spacers designed for purpose. Install spacers at intervals not greater than those specified in the NEC for support of type conduit used. Support conduits installed in fill areas suitably to prevent accidental bending until backfilling is complete.
- o Do not backfill underground conduit until it has been inspected by Electrical Inspector and Engineer or his representative/City Electrician. Ensure that ends are capped.
- Mark with buried six (6) inches wide, Red, warning tape inscribed "Electric Line" as per NEC's current standard. A single warning tape shall be installed in trenches up to 24" in width, an additional tape shall be installed for each additional eighteen (18) inches of trench width. or fraction thereof. For example, 30" trench would require two (2) tapes.
- Minimum cover for conduits shall be eighteen (18) inches to the top of raceway, marked with warning tape.
- Make all conduit installed underground watertight and sealed. Conduit containing water shall be pumped dry and swabbed. If water is infiltrating and cannot be removed, then re-route conduits as directed without additional charge.
- During construction, all installed conduits shall be plugged temporarily with duct tape or by 0 other adequate means to prevent the entrance of dirt, trash, or other foreign material. Any conduit which may become clogged through neglect of the contractor to protect them, shall be replaced by the contractor without additional cost to the City.
- Submit electronic as-built drawings to the City utility inspector prior to final site concrete 0 pour. Show the location of all underground conduits with dimensions. A dimension shall be given from building corners where conduits leave building lines and then at least 100 feet thereafter. The intermediate dimensions shall reference to at least two (2) permanent structures per location.
- Final connection to motors and to other equipment shall be made with eighteen (18) inch • minimum lengths of liquid-tight, polyvinyl chloride jacketed, flexible steel conduit where the required conduit size is three (3) inches or less. Where conduit size is greater than three (3) inches, rigid steel conduit shall be continued to the motor terminal box.



• Running thread shall be limited to lengths not to exceed six (6) inches, exposed portions of running thread shall be treated with a "cold-galvanized" finish such as CRC "Zinc Re-Nu".

#### 7-17 Grounding

Provide a complete grounding system as shown and as required by the NEC and the local enforcing authority with common grounding point at the main motor control center or switchboard.

All equipment grounding conductors shall be copper, Type THW or THHN insulation, green in color, sizes as noted on the drawings, or as required by NEC. No. ten (10) AWG stranded shall be the minimum size unless specifically noted otherwise.

All conduit runs shall have a minimum of one (1) No. ten (10) AWG 600-volt, stranded copper, green colored, insulated ground wire unless specifically noted otherwise on drawings.

All grounding terminations to bus and/or equipment shall be with one (1) hole compression type lugs. All grounding conductors' splices shall be made with compression sleeves.

Provide grounding conductors, other than grounded neutral conductors, where shown on the drawings to provide an effective ground path or a silent ground.

All boxes and raceways shall be grounded by use of lugs and the raceway shall not be used as the equipment ground conductor.

#### 7-18 Unions in Classified Locations

Type UNF or UNY suitable for hazardous locations, cast ferrous alloy, electroplated or hot dipped galvanized.

#### 7-19 Seals in Hazardous Locations

Hot dipped galvanized cast ferrous alloy, sealing compound of same manufacture, UL listed for class 1 areas. Crouse-Hinds EYSX Expanded Fill Sealing Fittings shall be used. Test and inspect prior to filling seals.

# 7-20 Locknuts

Two (2) inches and smaller, heavy galvanized steel. Larger than two (2) inches, malleable iron, galvanized.

#### 7-21 Bushings

Electro galvanized steel or malleable iron with molded phenolic or nylon insulating collar.

#### 7-22 Grounding Bushings

Malleable iron, galvanized, with molded nylon insulating collar, grounding lug. Grounding wedges or grounding locknuts shall not be used.

#### 7-23 Hubs

Hubs shall provide watertight conduit connection to sheet metal boxes in exterior or below grade applications. Zinc, galvanized steel or galvanized malleable iron, with nylon insulated throats, Meyers hub or approved equal. Hubs shall be used for top, side, rear or front conduit entries. "Sealing-type" lock nuts may be used for bottom entry.



#### 7-24 Liquidtight Metallic Flex Connectors

Heavy cadmium plated malleable iron with grounding insert and pre- insulated throat.

### 7-25 Cord and Cable Fittings (CGB)

Portable cable connectors shall form secure connections to prevent moisture and gasses from passing through. They shall be rated for Class 1, Division 2, Group A,B,C,D. They shall be steel zinc electroplate with chromate finish coat and include a neoprene bushing sized for proper cord and cable diameter. Crouse-Hinds, or equal.

#### 7-26 Conductor Material and Size

All conductors shall be stranded copper. No aluminum or solid conductor shall be used.

Conductor sizes shall not be less than shown. Conductors shall be not smaller than No. twelve (12) AWG for lighting and power circuits, or No. fourteen (14) AWG for control circuits, unless otherwise indicated.

#### 7-27 Conductor Identification

All wiring shall be identified at all terminations and splice points including pull, device, terminal, and junction boxes where a break in the wiring occurs. List all circuits emanating from panel boards and load centers by function on directory card. Lighting circuits may be excluded from this requirement unless in proximity of other conductors requiring marking.

Control wiring shall be identified with approved wire markers bearing designation shown on contract drawings. All wiring of No. ten (10) AWG and smaller shall be tagged with type-written, heat-shrink wire markers, such as Brady "SCN" type, or approved equal. Adhesive backed, wrap around wire markers are specifically prohibited. Identification shall either be the circuit number if a lighting or convenience circuit, or the control number from wiring schematics. It is the intention of this section to provide a unique wire number to each wire in the control scheme at each station.

Pull wire with adequate pig tails left in the junction box for makeup.

#### 7-28 Insulation

General use: Type "XHHW" above or below grade. Type "THHN"/"THWN" permitted for dry locations in sizes No, six (6) AWG and below.

#### 7-29 Wire Connectors

Where control wire terminations are not provided mechanical clamp connection, control wire shall be terminated with nylon insulated, compression terminals, Thomas and Betts "Stak-on", or approved equal. No more than two (2) conductors shall be placed at each termination unless terminal is specifically identified for such use.

#### 7-30 Wire Installation

All wire shall be continuous from outlet to outlet. Splices, where required, may be made in outlet, pull and terminal boxes only.

Terminals or connectors shall be approved for type of conductor materials used. Arrange wiring in cabinets, panels, motor control centers, and neatly cut to proper length, and remove surplus wire.

Apply Stake on connectors to control wiring for connection to screw terminals, and bridle and secure in approved manner.



#### 7-31 Color Code

Power feeders using all black insulated wiring shall have phases identified with colored vinyl tape at all terminations and splices (this includes motor starter terminations and at the motor terminal box). Conductors of sizes No. eight (8) AWG and smaller shall be color coded by the manufacturer along the entire conductor length, field re-identification will not be permitted.

Color code wire to conform to code requirements or as indicated below:

#### a) 240/120 or 208/120 volt

A-phase	Black
B-phase	Red
C-phase	Blue
Neutral	White

#### b) 480/277 or 480/3ph

Brown
Orange
Yellow
Grey (or white with tracer)

#### 7-32 Miscellaneous

Use pulling compounds as recommended by the wire manufacturer. Do not exceed recommended pulling tensions.

All wire contained in the same raceways shall have an insulation value to match the highest voltage between conductors of all circuits contained therein.

#### 7-33 Device Boxes

Exposed switch and receptacle boxes shall be cast ferrous alloy, hot dipped or electro galvanized with integrally cast hubs for all conduit entrances, with all drilling and threading done before galvanizing. Manufacturer shall be Crouse-Hinds type 'FD" or equal. Type 'FS" boxes are not acceptable. Concealed boxes may be stamped or welded steel construction, two (2) inch minimum depth with stainless steel or cast cover plates.

Weatherproof cover and device plates shall be of the same material, neoprene gaskets, with stainless steel screws, Crouse-Hinds "WLRD" or equal. Interior cover plates shall be stainless steel, or stamped steel Crouse-Hinds type "DS" or equal. Plastic cover plates are specifically excluded.

#### 7-34 Pull Boxes

Interior Application:

Enclosures for indoor use shall be NEMA Type twelve (12), with hinged door, gasket.

Larger enclosures shall be Hoffman Bulletin A-12 or approved equal. Smaller enclosures shall be Hoffman Bulletin A-51 or approved equal.

Enclosures in chemical rooms or wet wells shall be English or Carlon non-metallic, NEMA four (4) or stainless steel NEMA 4X, and except for device boxes, shall have full back plates where terminations are required.

Exterior and Below Grade Applications:



Enclosure's use shall be NEMA Type four (4) or 4X, with hinged door, gasketed, watertight, and except for device boxes, shall have full back panel.

Larger enclosures shall be Hoffman Bulletin A-4 or approved equal. Smaller enclosures shall be Hoffman Bulletin A-51 or approved equal.

#### 7-35 Terminal Boxes

Boxes and terminals shall comply with the requirements of other sections of these specifications.

All control wiring shall be spliced on approved terminals housed in an enclosure sized for the components. Provide terminal junction boxes where required for splices whether specifically shown or not. Provide terminal boxes with full back panels where shown on the drawings.

Terminal Junction Boxes may also be required where called out on the drawings for splicing power conductors. Refer to detail for wiring in pedestal adjacent to wet well.

#### 7-36 Devices

Devices shall be as indicated (or approved equal):

Duplex receptacles = HUBBELL CR120-I Single pole switches = HUBBELL CS115-I Three-way switches = HUBBELL CS315-I GFCI receptacles = HUBBELL GF5252-I

#### 7-37 Conduit Clamps

One (1) hole, cadmium plated or galvanized heavy gauge steel, or galvanized malleable clamps iron with clamp-back spacers shall be used in all exposed locations that Kindorf channel is not used. Acceptable: RACO 1300 Series clamps with Series 1340 clamp backs or equal. Stamped steel one-hole or two-hole straps are specifically prohibited except in concealed locations.

#### 7-38 Hanger Rod

Galvanized steel or electro galvanized, and zinc chromate coated steel, 3/8" minimum. Approved manufacturers, Midland Ross "Kindorf", Unistrut.

#### 7-39 Channels, Fittings, Hangers, Clamps, and Accessories

Hot dipped galvanized, or electro galvanized, and zinc chromate coated steel. Channels shall be fourteen (14) gauge minimum, 13/16" or 1-5/8" deep by 1-5/8" wide minimum. Approved manufacturers, Midland Ross "Kindorf", Unistrut.

#### 8-0 CONSTRUCTION REQUIREMENTS

This section contains all construction requirements throughout the build process of public sanitary sewer pump stations.

A preconstruction meeting shall be held prior to beginning construction on any public pump station. Contact the City Construction Services Office at (360) 487-7750 to arrange this meeting.

Installation of the pump station shall be in accordance with the approved plans and the written instructions furnished by the manufacturers.

Pre-sedimentary manhole and wet-well floor elevations and IE's shall be surveyed by the contractor and



approved by the City prior to backfill.

The contractor is required to have the pre-sedimentary manhole and wet-well epoxy lining inspected by an independent third-party inspector.

#### 8-1 Construction Submittals

The contractor shall submit manufacturer's literature on all items of equipment proposed for use in the station. Submit to the City of Vancouver's Construction Services Office (360-487-7750), for review and approval prior to ordering any equipment. Submittals shall include, but are not limited to the following:

- Pumps including pump curves showing operating conditions and efficiencies
- Pump flush valve
- Wet well and pre-sedimentary manhole epoxy coating
- Safety railing
- Vaults
- Covers (hatches)
- Hatch safety grating
- Chamber ladder
- Check valves
- Gate valves
- Air release valves
- Solenoid valves
- RPBA
- Hot Box
- Odor control tank
- Odor control pump
- Odor control pump housing
- J-boxes and onsite electrical equipment
- SCADA controls included as one submittal:
  - o Backup floats
  - Remote telemetry unit (RTU)
  - Intrinsically safe relay box (ISR)
  - Motor control center (MCC)
  - o Ultra-sonic level control
  - o Flow meter
  - Analog dial pressure gauge
  - Digital pressure gauge
- Terminal disconnect panel
- Automatic transfer switch (ATS)
- Generator including sound attenuation enclosure, fuel tank, and internal battery charger
- Control building HVAC equipment
- Control building lighting equipment
- Control building plumbing fixtures and equipment
- Onsite fencing

# 8-2 Final Inspection

The contractor shall request final inspection with the City staff, Contractor, and other interested parties.

Prior to final inspection, the pre-sedimentary manhole, wet-well, and all piping shall be cleaned and



flushed of all debris.

#### 8-3 Operations and Maintenance Manual

The contractor shall furnish four (4) complete and bound detailed operation and maintenance manuals each with an electronic copy available on electronic media. Provide one factory original manual and three neat and legible copies. The manual shall cover the initial startup, operating procedures, and maintenance and servicing procedures on the major component parts provided in the pump station. One (1) manual shall be shipped with the station. The remainder shall be sent to the Engineering Division at the City of Vancouver.

### 8-4 Startup

Provide final as-built electrical, construction and mechanical record drawings to the City for review and approval at least ten (10) working days prior to startup (to enable prior PLC program verification). Provide 72 hours advance notice to the City's Construction Office and the Operations Pump Station Mechanics prior to startup. This notice is in addition to notice provided with the record drawing submittal.

The manufacturer shall provide the services of a factory trained representative from the generator, pump, and SCADA suppliers for a minimum period of one (1) day to perform the initial startup of the pump station. The representative shall instruct operating personnel on required maintenance and service procedures. The representative shall also operate the station for a second day if necessary to fully test the components and train City crews.

Each station component shall be operated, tested, and demonstrated during startup. This includes filling the wet well and force main, activating each set point and float, triggering, and observing alarms, pump starting, pump drawdown tests, generator shut down and ATS startup tests, or other onsite tests as required by the City's pump mechanics before acceptance of pump station.

The odor control tank and generator fuel tank shall be supplied to the City after startup and final inspection with full tanks.

# 8-5 Record Drawings

The station's design engineer shall prepare as-built record drawings. Follow City of Vancouver General Requirements Section 1-4. Clearly indicate all modifications to plan features and elements. Show all electrical, communications, piping, and conduits. Mark the drawings as *Record Drawings* and include an acknowledgement by the preparing engineer.

# 8-6 Guarantees

The manufacturer shall guarantee the pump station for workmanship and to be free from defects for a period of two (2) years from date of final Civil Project acceptance.

The contractor is responsible for the complete and satisfactory operation and function of all equipment and materials, regardless of the manufacturer's guarantee on any item furnished. It is the contractor's responsibility to place all equipment in operation, furnish all lubrication, packing and other accessories necessary for initial operation, and ensure proper operating and maintenance instructions are prepared before final acceptance.



#### 9-0 PUMP STATION STANDARD DETAILS

PS-1.1A	Typical Site Plan
PS-1.1B	Typical Site Piping Plan
PS-1.1C	Typical Site Electrical Plan
PS-1.1D	Typical Site Grading Plan
PS-1.2A	Wet-Well and Pre-Sedimentary Manhole Plan Views
PS-1.2B	Wet-Well and Pre-Sedimentary Manhole Profile Views
<b>PS-1.3</b>	Wet-Well and Pre-Sedimentary Manhole Safety Railing
PS-1.4	Wet-Well Mechanical Details
PS-1.5	Valve Vault Plan and Profile Views
PS-1.6	Valve Vault Mechanical Details
PS-1.7A	SCADA Building Floor and Reflected Ceiling Plans
PS-1.7B	SCADA Building Elevations
PS-1.7C	SCADA Building Plumbing and Electrical Plans
PS-1.8	SCADA Building Framing Details
PS-1.9	SCADA Building Wireless Antenna
PS-2.0A	Terminal Disconnect Pedestal
PS-2.0B	Cable Tray Details
<b>PS-2.3</b>	Onsite Odor Control Station
PS-2.4	Onsite Emergency Generator
PS-2.5A	Pressure Sewer Air Release Valve Vault (Standard)
PS-2.5B	Pressure Sewer Air Release Valve Vault (w/ Odor Control)
PS-2.6	Ultrasonic Level Transducer
PS-2.7	Pressure Sewer Main Isolation Valve
PS-2.8	Standard Locating Test Station
PS-2.9	Toning Wire and Marking Tape
PS-3.0	Pressure Sewer Discharge Manhole
PS-3.1	Typical Electrical One-Line Diagram
PS-3.2	Typical Conduit Schedule
PS-3.3	Typical Electrical Details
PS-3.4	Onsite Curbing and Fencing
PS-3.5	Onsite Yard Hydrant
W-1	Standard One-Inch (1") Water Service
W-10	Standard Fire Hydrant
W-23	Standard Water Backflow Assembly



21





#### GENERAL NOTES:

- 1. ALL VAULTS, PADS & CONCRETE LIDS SHALL BE FLUSH & LEVEL TO FINISHED GRADE.
- 2. SITE TO BE ADJUSTED TO MEET ALL SET-BACK REQUIREMENTS AS NEEDED.
- 3. PUMP STATION TO BE PLACED ON A PARCEL DEDICATED TO THE CITY OF VANCOUVER.
- 4. SITE PLAN SHOWN IS THE MINIMUM SIZE REQUIREMENT FOR A PUBLIC SEWER PUMP STATION. THE CITY MAY REQUEST AN ADDITIONAL PAVED VEHICLE STACKING AREA FOR PUMP STATIONS LOCATED OFF MAJOR ROADWAYS.
- 5. CLEAR LINE OF SITE REQUIRED FROM WET-WELL TO CONTROL PANEL LOCATED INSIDE SCADA BUILDING.
- 6. FIRE HYDRANT TO BE LOCATED NEAR ENTRANCE.
- 7. PUMP STATION TO HAVE STANDARD 1" WATER SERVICE WITH 5/8" x 3/4" WATER METER.
- 8. BACKFLOW ASSEMBLY TO BE INSTALLED WITH METAL INSULATED HOT-BOX.
- 9. INSTALL A MINIMUM TWENTY (20) FT WIDE COMMERCIAL RATED DRIVEWAY DROP PER COV TRANSPORTATION DETAIL T01-07.





#### PIPING GENERAL NOTES:

- 1. ALL ON-SITE WATER SERVICE PIPING TO BE COPPER TYPE-K.
- 2. FIRE HYDRANT TO BE LOCATED NEAR ENTRANCE.
- 3. PUMP STATION TO HAVE STANDARD 1" WATER SERVICE WITH 5/8" x 3/4" WATER METER.
- 4. BACKFLOW ASSEMBLY W/ METAL INSULATED BOX TO BE INSTALLED OUTSIDE OF PUMP STATION FENCING.
- 5. ALL DRAIN & VENT PIPING INTO WET-WELL AND PRE-SED MANHOLE REQUIRES AN APPROVED DUCKBILL CHECK VALVE.
- 6. REFER TO PS-1.1A FOR TYPICAL SITE PLAN DETAILS AND PS-1.1C FOR ON-SITE ELECTRICAL PLAN.
- 7. REFER TO PS-1.2B FOR PRE-SEDIMENTARY MANHOLE PIPE ASSEMBLY SIZING.



#### ELECTRICAL GENERAL NOTES:

- BOXES.
- CONDUIT SHALL BE PLAIN RIGID STEEL.
- PUMP STATIONS.
- MANHOLE (SEE DETAIL ON PS-3.3).





1. ALL ELECTRICAL WORK PERFORMED SHALL BE IN ACCORDANCE WITH CURRENT ELECTRICAL STANDARDS AS SPECIFIED BY THE NATIONAL ELECTRICAL CODE (NEC) AND NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA).

2. NOTE REQUIREMENTS FOR CLASS 1 DIV 1 WIRING AREAS, COMPLIANCE TO NEC ARTICLES 500, 501, & 504 METHODS, SPECIAL ATTENTION TO CABLE ADAPTERS LISTED FOR INSTALLATION LOCATION. INSTALLATION METHOD SHALL PROVIDE FOR EASY REPLACEMENT OF ELECTRICAL DEVICES IN WET AREA AT THE TERMINAL DISCONNECT PANEL. SEAL OFF ALL CONDUIT LEAVING JUNCTION

3. ALL UNDERGROUND CONDUIT SHALL BE RIGID STEEL PVC COATED, INDOOR

4. PUD TRANSFORMER TO BE LOCATED NEAR PUMP STATION OFF-SITE.

5. 3-PHASE 480V IS THE PREFERRED POWER SUPPLY FOR NEW PUBLIC SEWER

6. SITE LIGHT SHALL BE LITHONIA #SSA 12-4C-PT-UL-DDBXD OR APPROVED EQUAL. LIGHT TO HAVE MOTION SENSOR MOUNTED ON POLE, CONNECT TO FIELD MOUNTED 3-POSITION HOA SWITCH (ALLEN BRADLEY #800H-JR2A OR APPROVED EQUAL) W/ BLACK FINISH, DIRECT LIGHT TOWARDS WET-WELL & PRE-SED

7. CABLE TRENCH AND RACEWAY SHALL BE CAST INTO WET-WELL LID.

8. LOCATE TERMINAL DISCONNECT PEDESTAL OUTSIDE OF CLASSIFIED AREA AND ENSURE MOTOR TERMINATION RECEPTACLES ARE EIGHTEEN (18) INCHES OR GREATER ABOVE FINISHED GRADE. SCREENED MESH PROTECTION AND FACTORY TERMINATIONS ARE SHOWN ON DETAIL PS-2.0A

CONDUIT TAG, REFER TO CONDUIT SCHEDULE (PS-3.2) FOR DETAILS.





#### GRADING GENERAL NOTES:

- AWAY FROM SITE.
- SEPARATELY.
- 5. CABLE TRAY AND RACEWAY SHALL BE CAST INTO WET-WELL LID.

#### LEGEND:



PROPOSED DRAINAGE DIRECTION (MINIMUM 1%)

X

ELEVATION POINT

		_	v /	•	
_					

EXAMPLE PUMP STATION ELEVATIONS TABLE					
EL. NO.	DESCRIPTION	ELEVATION (B.O.C.)	ELEVATION (T.O.C.)		
1	SW INSIDE CORNER OF PUMP STATION	XX.XX	BOC + 6"	z	
2	NW INSIDE CORNER OF PUMP STATION	XX.XX	BOC + 6"		
3	NE INSIDE CORNER OF PUMP STATION	XX.XX	BOC + 6"		
4	SE INSIDE CORNER OF PUMP STATION	XX.XX	BOC + 6"	Ň	Z
5	SW INSIDE CORNER OF STACKING AREA	XX.XX	BOC + 6"	AD	ISIG
6	NW INSIDE CORNER OF STACKING AREA	XX.XX	BOC + 6"	L H H	RKS D DI
7	NE INSIDE CORNER OF STACKING AREA	XX.XX	BOC + 6"	μ	N NO
8	SE INSIDE CORNER OF STACKING AREA	XX.XX	BOC + 6"	SII	
9	BOTTOM OF COMMERCIAL DRIVEWAY DROP	XX.XX	-	<b>A</b>	PUE ANN
10	TOP OF COMMERCIAL DRIVEWAY DROP	XX.XX	-	<u>ic</u>	S PL
11	RIM OF TRENCH DRAIN	XX.XX	-	⊁	
12	RIM OF TRENCH DRAIN	XX.XX	-		CIT RTM SYS1
13	RIM OF CATCH BASIN	XX.XX	-		EPAI RY 8
14	RIM OF CATCH BASIN	XX.XX	-		DE
15	RIM OF PRE-SEDIMENTARY MANHOLE	XX.XX	FLUSH TO GRADE		SAN
16	RIM OF WET-WELL	XX.XX	FLUSH TO GRADE		
17	TERMINAL DISCONNECT PEDESTAL BASE	XX.XX	-		
18	SE CORNER OF VALVE VAULT	XX.XX	FLUSH TO GRADE		
19	NW CORNER OF VALVE VAULT	XX.XX	FLUSH TO GRADE		
20	SE CORNER OF GENERATOR PAD	XX.XX	FLUSH TO GRADE		
21	NW CORNER OF GENERATOR PAD	XX.XX	FLUSH TO GRADE		
22	SE CORNER OF SCADA CONTROL BUILDING	XX.XX	-		
23	NW CORNER OF SCADA CONTROL BUILDING	XX.XX	-	PUMP	STATION
24	SE CORNER OF ODOR CONTROL CONTAINMENT WALL	XX.XX	BOC + 2'-6"	DET	AIL NO.
25	NW CORNER OF ODOR CONTROL CONTAINMENT WALL	XX.XX	BOC + 2'-6"	PS-	-1.1D
26	RIM OF SANITARY SEWER MANHOLE	XX.XX	-		

#### 1. ALL VAULTS, PADS & CONCRETE LIDS SHALL BE FLUSH & LEVEL TO FINISHED GRADE.

CITY OF Vancouver WASHINGTON

2. CONCRETE FOR SITE SHALL BE 6" THICK, CLASS 4000 W/ #4 REBAR @ EIGHTEEN (18) INCHES ON CENTER EACH DIRECTION (SEE PS-3.4).

3. SURROUNDING TOPOGRAPHY AROUND PUMP STATION TO BE GRADED AND SLOPED

4. GENERATOR AND ODOR CONTROL CONCRETE PADS REQUIRED TO BE POURED

6. EXPANSION JOINTS REQUIRED (3/8" x 6" MIN) FOR ALL CONCRETE STRUCTURES ONSITE, SEAL SURFACE W/ SIKAFLEX-1C SL OR APPROVED EQUAL, RELIEF CUTS REQUIRED.



#### **KEY NOTES:**

- (1)SEVEN (7) FT DIAMETER PRE-CAST CONCRETE PRE-SEDIMENTARY MANHOLE W/ H-20 COMMERCIAL RATED TOP-SLAB FLAT-TOP LID. PRE-SED MANHOLE SHALL BE COMPLETELY EPOXY LINED (SEE NOTE 1)
- (2) EIGHT (8) FT MINIMUM DIAMETER PRE-CAST CONCRETE WET-WELL W/ H-20 COMMERCIAL RATED TOP-SLAB FLAT-TOP LID. WET-WELL SHALL BE COMPLETELY EPOXY LINED (SEE NOTE 1), TEN (10) FT DIA. REQ'D FOR TRIPLEX
- (3) PRE-SED MH ACCESS HATCH, 48" x 48" MIN CLR OPENING, AL DIAMOND PLATE, SINGLE LEAF HATCH, H20 RATED, SPRING ASSISTED W/ SINGLE-HINGED SAFETY GRATE AND RECESSED PAD-LOCK
- (4)WET-WELL ACCESS HATCH, 48" x 72" MIN CLR OPENING, AL DIAMOND PLATE, DUAL-LEAF HATCH, H20 RATED, SPRING ASSISTED W/ DUAL HINGED SAFETY GRATE AND RECESSED PAD-LOCK
- (5) FLYGT SUBMERSIBLE PUMP W/ N-TYPE IMPELLER AND FLUSH VALVE
- (6) THREE (3) INCH FLYGT DISCHARGE ELBOW, (SUPPLIED W/ PUMP)
- (7)STAINLESS STEEL INTERMEDIATE GUIDE RAIL BRACKET (SUPPLIED W/ PUMP)
- (8) TWO (2) INCH DIAMETER PUMP GUIDE RAILS W/ HATCH BRACKETS (SUPPLIED W/ PUMP)
- (9) DISCHARGE PIPE SUPPORT TWENTY (20) FT FROM FLR, (SEE DETAIL PS-1.4)
- (10) DI PUMP DISCHARGE PIPING, SIZED TO MATCH PRESSURE SEWER MAIN DIAMETER

#### GENERAL NOTES:

- 1. BOTH THE PRE-SED MANHOLE AND WET-WELL SHALL BE ENTIRELY LINED W/ 125MIL MIN EPOXY COATING, RAVEN 405 OR APPROVED EQUAL.
- 2. ALL HARDWARE AND FASTENERS SHALL BE 316 STAINLESS STEEL UNLESS OTHERWISE NOTED.
- 3. ALL DI PIPING INSIDE WET-WELL SHALL BE EPOXY COATED AND LINED.
- 4. ALL WATER OR DRAINAGE PENETRATIONS TWO (2) INCHES OR SMALLER SHALL BE GROUT SEALED.
- 5. ALL STORM AND GRAVITY SEWER PENETRATIONS SHALL USE A STANDARD RUBBER BOOT CONNECTION.
- 6. PRESSURE SEWER MAIN PIPING EXITING WET-WELL SHALL BE SEALED WITH LINKSEAL MODEL S-316 MODULAR SEAL.
- 7. CLEARANCE FROM VOLUTE TO WET-WELL FLOOR SHALL BE SET PER THE PUMP MANUFACTURER
- 8. REFER TO PS-1.1B FOR ALL PLUMBING AND DRAINAGE CONNECTIONS TO PRE-SED MANHOLE AND WET-WELL.





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- 8. REFER TO PS-1.1B FOR ALL PLUMBING AND DRAINAGE CONNECTIONS TO PRE-SED MANHOLE AND WET-WELL.









**KEY NOTES:** CITY OF Vancouver WASHINGTON (1)CONCRETE VAULT, SIZED AS REQ'D (2) VAULT ACCESS HATCH, AL DIAMOND PLATE, TRIPLE LEAF, MIN 48" x 120" CLR OPENING, H20 RATED, SPRING ASSISTED W/ HINGED SAFETY GRATE, RECESSED PADLOCK CLIP (3) SWING CHECK VALVE, FLG (4) RESILIENT WEDGE GATE VALVE, FLG \*\*-{}} (5) RESILIENT WEDGE GATE VALVE W/ HANDWHEEL FI G (6) BLIND FLANGE W/ 4" CAMLOCK & THREADED CAP (7)RFCA FLANGED COUPLER (8) SIEMENS FLOW METER, FLG (9) 2" ARV ASSEMBLY A.R.I. D-025, SEE PS-1.6 (10) WYE DI, FLG (11) 45 DEG BEND DI, FLG (12) SPOOL DI, LENGTH AS REQ'D, FLG (13) FLEX COUPLING TRANSITION (ROMAC OR APPROVED EQUAL) VIEWS (14) 4" DIAL PRESSURE GAUGE ASSEMBLY W/ DIAL, 0-50 PSI SINGLE FACE, SEE PS-1.6 (15) SIEMENS P320 DIGITAL PRESSURE TRANSMITTER PROFILE GAUGE W/ DIAPHRAM SEAL, SEE PS-1.6 OSHA APPROVED ALUMINUM WALL MOUNT (16) ACCESS LADDER W/ EXTENSION CITY OF VANCOUVER DEPARTMENT OF PUBLIC WORKS SANITARY SYSTEMS PLANNING AND DESIGN (17) AND PRESSURE SEWER MAIN TEST STATION, SEE PS-2.8 (LOCATED OUTSIDE PS FENCING) PLAN (18) ELEC J-BOX. SEE PS-1.1C & PS-3.1 (19) PUMP STATION ISOLATION VALVE CAN, SEE PS-2.7 VAULTI (20) ADJUSTABLE PIPE SUPPORT, SEE PS-1.6 (21) 12" DIA SUMP DRAIN, W/ AL GRATING (22) PIPE CLAMPS AS REQ'D (SEE PS-1.6) VALVE (23) FACTORY CABLING (SUPPLIED BY MFR) ALL HARDWARE AND FASTENERS SHALL BE 316 STAINLESS STEEL 2. ALL MECHANICAL JOINT PIPE AND FITTINGS SHALL HAVE RESTRAINED 3. ALL DI PIPING INSIDE WET-WELL SHALL BE EPOXY COATED AND LINED. 4. ALL PENETRATIONS INTO VALVE VAULT ONE (1) INCH OR GREATER SHALL BE SEALED W/ LINK-SEAL MODEL S-316 MODULAR SEAL OR PUMP STATION ALL PENETRATIONS INTO VALVE VAULT LESS THAN ONE (1) INCH SHALL DETAIL NO.

VAULT DEPTH OF FOUR (4) FT IS REQUIRED FOR FORCE MAINS LESS THAN EIGHT (8) INCHES IN DIAMETER.

**PS-1.5** 







#### MECHANICAL GENERAL NOTES:

- ALL FLOOR DRAINS, CLEANOUTS, AND PLUMBING FIXTURES SHALL HAVE P-TRAPS AND VENTED AS PER PLUMBING CODE.
- 2. ALL WATER PIPING TO BE COPPER PIPE, TYPE K, UNLESS OTHERWISE NOTED. INSTALL COPPER PIPING W/ 1' CLEARANCE BETWEEN TOP OF PIPING AND BLDG FOUNDATION.
- SLOPE CONCRETE FLOOR TO FLOOR DRAIN. INSTALL P-TRAP AND WATER PRIME. 3.
- BURIED DRAIN PIPING SHALL BE SCH 80 PVC PIPE. 4
- INSTALL WALL HEATER CENTER ON WALL (SHOWN OFFSET FOR CLARITY). 5.
- 6. COORDINATE PLUMBING, HVAC, & ELECTRICAL WORK TO ACHIEVE COMPLETE OPERATING SYSTEMS.
- 7. FAN TO BE MOUNTED MINIMUM 7'-0" ABOVE FLOOR DRAIN & SUSPENDED FROM THE ROOF FRAMING. FAN TO BE SUSPENDED ON VIBRATION ISOLATED HANGERS PER MANUFACTURERS REQUIREMENTS.
- 8. INSTALL INTAKE LOUVER 12" ABOVE FINISH FLOOR.

#### MECHANICAL KEY NOTES:

- (1) PLASTIC SERVICE SINK W P-TRAP, MCMASTER-CARR OR APPROVED EQUAL
- (2) 1000 WATT WALL HEATER, CADET OR APPROVED EQUAL
- (3) 6" W x 15" L TRENCH DRAIN W/ PRIMED P-TRAP, ZURN OR APPROVED EQUAL.
- (4) NON-POTABLE WATER SOLENOID CONTROL VALVES (SEE PS-3.1).
- (5) 24" x 23" INTAKE LOUVER W/ MOTORIZED DAMPENER, GREENHECK OR APPROVED EQUAL, COLOR TO BE WHITE, SEE MECH NOTE 8.
- (6) 24" x 24" EXHAUST LOUVER GREENHECK OR APPROVED EQUAL, COLOR TO BE WHITE, SEE MECH NOTE 7.
- (7) EXHAUST FAN W/ 3-SPEED CONTROL, GREENHECK OR APPROVED EQUAL, 1550 MAX FAN RPM, SEE MECH NOTE 7

- FOR SITE LIGHTING. SEE PS-3.3.
- 5.
- APPROVED EQUAL











#### **GENERAL NOTES:**



#### NOTES:

- ALL PIPING AND APPURTENANCES ARE TO BE PVC CONDUIT PIPING, UNLESS SPECIFIED OTHERWISE.
- 2. UTILIZE SWEEPS ONLY (NO ELBOWS) FOR CONDUIT DIRECTIONAL CHANGES. SEE PS-3.2 FOR ELECT INFO
- BE 316 STAINLESS STEEL.
- 5. FROM TANK TO CHEMICAL PUMP
- 6. SEE DETAIL PS-1.1A FOR CONCRETE SPECIFICATION.
- 7. POLYETHYLENE.
- APPROVED BY COV SEWER ENGINEERING.
- 9.
- 10. ORIENT CONTROL UNIT PANEL TO FACE NORTH TO MINIMIZE EXPOSURE TO DIRECT SUNLIGHT
- FROM HORIZONTAL TANK TO CHEM FEED PUMP.
- TO ALLOW FLUID TO DRAIN BACK INTO TANK.









#### NOTES:











7. THE TONING WIRE SHALL BE LAID FLAT AND SECURELY AFFIXED TO THE TOP OF THE FORCE MAIN AT 6FT INTERVALS.

	TONING WIRE AND MAR	PUMP STATION DETAIL NO.				
个	Vancouver		DRAWN BY	APPROVED BY	APPROVAL DATE	DC_20
	Vancouver		BTC	SLH	02 - 2024	Г <b>Ј</b> -2.ј
Y	WASHINGTON	DEPARTIMENT OF PUBLIC WORKS	REVISION	APPROVED BY	APPROVAL DATE	
		SANITART STSTEWS FLANNING AND DESIGN	-	-	-	





			EXAMPLE PUMP ST	ATION CONDUI	T SCHEDULE	
TAG	FROM	ТО	FUNCTION	SIZE	COUNT PER CONDUIT	NOTES
U-1	UTILITY UNDERGROUND	CPUD XFMR	UTILITY PRIMARY SERVICE	AS REQ'D	AS REQ'D	INSTALL PER CPUD STANDARDS
F-1	CPUD XFMR	METER / MAIN	480V 3ø 4W SUPPLY	AS REQ'D	AS REQ'D	INSTALL PER CPUD STANDARDS
F-2	METER / MAIN	ATS	STATION POWER - UTILITY FEED	AS REQ'D	AS REQ'D	
F-3	GENERATOR	ATS	STATION POWER - AUXILIARY	AS REQ'D	AS REQ'D	(ALL COPPER CONDUCTORS THROUGHOUT)
F-4	ATS	MAIN BREAKER	MOTOR CONTROL CENTER (MCC)	AS REQ'D	AS REQ'D	-
FG-1	METER / MAIN	ELECTRODE	GROUND BONDING PER NEC 250.66	1"	(2) #6 G	GROUND BONDING TO GROUNDING ROD (2X)
FG-2	METER / MAIN	COLD WATER PIPE	GROUND BONDING PER NEC 250.66	1"	#4 G	GROUND BONDING TO DOMESTIC WATER PIPE
FG-3	METER / MAIN	ENCASE FLECTRODE	GROUND BONDING PER NEC 250,52(3)	NR	#4 G	GROUND BONDING TO BUILDING PER NEC250-5
P-1	XP TERMINAL BOX	MCC SOFT START	PUMP 1	AS REO'D	AS REO'D BY PUMP SIZE	DUCT SEAL AT TERMINAL DISCONNECT PANEL
P-2		MCC SOFT START	PLIMP 2	AS REQ'D	AS REO'D BY PUMP SIZE	DUCT SEAL AT TERMINAL DISCONNECT PANEL
P-3	GENERATOR	MCC 1P1	GENERATOR	1"	(5) #8, #10 G	GENERATOR BATTERY CHARGER / BLOCK HEATE
P-4	RTILCABINET	MCC 1P1	RTU POWER	3/4"	(4) #12 #12 G	RTILPOWER
P-5	BLDG OUTLETS	MCC 1P1		3/4"	(2) #12 #12 G	120V 15A GECL CIRCUIT BREAKER
P-6	BLDG LIGHTING	MCC 1P1		3/4"	(2) #12 #12 G	
P_7	WALL HEATER	MCC 1P1	WALL HEATER	3/4"	(2) #12, #12 G	120V 1000W
1 /				5/4	(2) "12, "12 0	1200, 10000
P-8	MCC 1P1	EXHAUST FAN DISCONNECT	EXHAUST FAN CONTROL	3/4"	(2) #12, #12 G	120V, 1/8HP, 4.3A; PROVIDE WITH A LOCAL DISC
P-9	MCC 1P1	BACKFLOW PREVENTER	HEAT TRACE CONTROL	3/4"	(2) #12, #12 G	-
P-10	MCC 1P1	SITE LIGHTING	POLE MOUNTED SITE LIGHTS	1-1/4"	(2) #12, #12 G	AREA SITE LIGHT/ POLE MOUNTED WITH HOA C
P-11	ODOR CONTROL OUTLET	MCC 1P1	ODOR CONTROL PUMP GFCI RECEPTACLE	1"	(3) #12, #12 G	SEAL OFF AT ODOR CONTROL STATION
P-12	TERMINAL DISCONNECT PANEL	мсс	SPARE	1"	_	SPARE CONDUIT FOR FUTURE USE
1 12			STARE	-		
6.4				2 / 4 !!		
C-1	GENERATOR	AIS	GENERATOR STATUS / CONTROL	3/4"	(7) #14, #14 G	
C-2	AIS	RTU CABINET	GENERATOR STATUS, ATS STATUS	3/4"	(11) #14, #14 G	24VDC CONTROL CIRCUITS
C-3	TERMINAL DISCONNECT PANEL	MCC	PUMP MOTOR STATUS	1"	(8) #14, #14 G	PANEL
C-4	RTU CABINET	MCC	FLOAT CONTROLS. SPD FAULT	3/4"	(6) #14, #14 G	24VDC CONTROL CIRCUITS
<u>с</u> г				1"	(10) #14 #14 C	
C-5	TERMINAL DISCONNECT PANEL		INTRINSICALLY SAFE CIRCOTTS (24V)	L	(10) #14, #14 G	DOCT SEAL AT TERMINAL DISCONNECT PANEL
C-6	ISR ENCLOSURE	RTU CABINET	INTRINSICALLY SAFE CIRCUITS (24V)	1"	(12) #14, #14 G	24VDC CONTROL CIRCUITS
C-7	INTRUSION SWITCH	RTU CABINET	DOOR JAMB MAGNETIC SWITCH	3/4"	(2) #14, #14 G	24VDC INTRUSION SIGNAL TO PLC
C-8	RTU CABINET	J-BOX	J-BOX FOR SOLENOID VALVES	3/4"	(4) #14, #14 G	
C-9	J-BOX	SV1	FLUSHING VALVE SV1	1/2" FLEX	(2) #14, #14 G	FLUSHING SOLENOID VALVES CONTROL CIRCUIT
C-10	J-BOX	SV2	FLUSHING VALVE SV2	1/2" FLEX	(2) #14, #14 G	
C-11	AIR SENSOR	RTU CABINET	AIR QUALITY SENSOR	3/4"	(2) #14, #14 G	AIR QUALITY DETECTION
C-12	ODOR CONTROL	RTU CABINET	ODOR CONTROL PUMP	1-1/2"	(8) #14, #14 G	24VDC CONTROL DOSAGE / SPEED SIGNAL.
C-13	THERMOSTAT	EXHAUST FAN	EXHAUST FAN TEMPERATURE CONTROL	3/4"	(2) #12, #12G	WIRING PER CITY PUMP STATION DETAIL PS-3.3
C-14	EXHAUST FAN DISCONNECT	EXHAUST FAN	EXHAUST FAN POWER	3/4"	(2) #12, #12G	WIRING PER CITY PUMP STATION DETAIL PS-3.3
C-15	INTAKE LOUVER	INTAKE LOUVER ACTUATOR	INTAKE LOUVER OPERATION	1/2" FLEX	(2) #12, #12G	WIRING PER CITY PUMP STATION DETAIL PS-3.3
				-		
<u> </u>		СІТ	ELOW ELEMENT (IS)	1 1/2"	(2) MER CARLES	(2) 3/8" DIA MER CARLES SEAL OF AT VALVE V
5-1	СІТ			1"	(A) #1A #1A G	
5-2				2/4"		
5-3		RTU CABINET		5/4	BELDEN 8760	
S-4	TRANSMITTER	RTU CABINET	PRESSURE TRANSMITTER	-	(1) MFR CABLE	SEAL OFF AT VALVE VAULT
۲_۲		RTHCARINET	LEVEL FLEMENT (IS)	3/4"	BEI DEN 8760	
3-5			(3)	5/ -		
D-1	RTU CABINET	MCC	PROFINET (INDUSTRIAL ETHERNET)	1"	(2) PROFINET CABLES	
D-2	ANTENNA	RTU CABINET	CELLULAR ANTENNA SERVICE MAST	2"	CELLULAR SERVICE	CELLULAR SERVICE

	-		
.2(3)	CITY OF Vancouver WASHINGTON		
R		BY APPROVED BY APPROVAL DATE SLH 02-2024 N APPROVED BY APPROVAL DATE	
CONNECT ONTROL AND MOTION DETECTION		DRAWN E BTC REVISIO	
SEAL AT TERMINAL DISCONNECT	TYPICAL CONDUIT SCHEDULI	CITY OF VANCOUVER DEPARTMENT OF PUBLIC WORKS SANITARY SYSTEMS PLANNING AND DESIGN	
AULT	PUMP DET/ <b>PS</b>	STATION AIL NO.	

(2





REBAR SIZE	CABLE	LOCATION				
#8 - 1"	#4 SOL2/0 STR	BLDG FLOOR				
DESCRIPTION						
GND. INSULATED STRANDED COPPER, #4 AWG						
Y CONNECTOR - SEE TABLE ABOVE						





- 1. LAYOUT AND INSTALL FENCE POSTS TO MAINTAIN MAXIMUM 2" SPACE BETWEEN BOTTOM OF FENCE AND CURB (SEE CURBING DETAIL BELOW).
- 2. FENCING FOR SITE TO BE 6FT HIGH BLACK VINYL COMMERCIAL CHAIN LINK FENCE, INSTALL ROUND POSTS AND CAPS, TOP RAILS, KNUCKLED SELVAGE, AND PLASTIC PRIVACY SLATS.
- 3. DEPENDING ON SITE LOCATION, THE CITY MAY REQUIRE ADDITIONAL SECURITY FENCING.



- AND PLASTIC SLATS.







#### PUMP STATION CONCRETE SECTION DETAIL

#### VEHICLE STACKING AREA SECTION DETAIL







- 1. FIRE HYDRANT INSTALLATIONS SHALL BE MUELLER SUPER CENTURION, M&H 129, CLOW MEDALLION, EAST JORDON OR APPROVED EQUAL AND MUST BE APPROVED BY THE CITY INSPECTOR PRIOR TO BACKFILLING.
- 2. IN GENERAL, FIRE HYDRANT LOCATIONS SHALL BE AS SHOWN ON THE PLANS AND SHALL CONFORM TO THIS DETAIL. FIRE HYDRANTS SHALL NOT BE SET UNTIL LOCATION AND DEPTH ARE APPROVED BY THE CITY.
- 3. THE FIRE HYDRANT SHALL BE INSTALLED SO THAT IT IS PLUMB IN ALL DIRECTIONS.
- 4. THE FACE OF THE STORZ CAP GASKET SHALL BE LUBRICATED WITH FUCHS FM 387 GREASE OR AN APPROVED EQUAL.
- 5. NO DOMESTIC OR FIRE PROTECTION SERVICES SHALL BE TAPPED OFF OF THE FIRE HYDRANT PIPING.
- 6. A CONCRETE PAD NO LESS THAN 4'x4", SHALL BE CENTERED AROUND THE FIRE HYDRANT.
- 7. THE CONCRETE PAD SHALL BE PLACED FLUSH IN ELEVATION AND ADJOINED W/BACK OF CURB (IF THE SIDEWALK IS DETACHED OR DOESN'T EXIST) OR BACK OF SIDEWALK (IF SIDEWALK IS ATTACHED). EXPANSION JOINT MATERIAL SHALL BE PLACED BETWEEN THE CONCRETE PAD AND CURB/SIDEWALK.
- 8. CONCRETE PAD SHALL BE FINISHED TO APWA SIDEWALK STANDARDS.
- 9. ALL JOINTS SHALL BE RESTRAINED UTILIZING MECHANICAL RESTRAINT SYSTEMS. CONCRETE THRUST BLOCKS SHALL NOT BE ALLOWED.
- 10. FIRE HYDRANTS SHALL BE FACTORY PAINTED OR QUALITY FIELD PAINTED WITH RODDA SILICONE ALKYD ENAMEL HEAVY DUTY GLOSS SAFETY YELLOW 7-32616-1 TO NEW CONDITION.
- 11. FIRE HYDRANT MAINS SHALL BE 8" MIN., A 6" MAIN CAN BE USED FOR A DEAD-END RUN OF LESS THAN 50' TO A HYDRANT SUBJECT TO ADEQUATE FIRE FLOW.
- 12. DESIGN SEPARATION SHALL BE 3 INCHES, WITH AN AS-BUILT SEPARATION OF 2-4 INCHES.
- 13. BOLLARDS SHALL NOT BE INSTALLED AS FIRE HYDRANT PROTECTION.

CITY OF Vancouver Washington	STANDARD FIRE HY	WATER DETAIL NO.			
	CITY OF VANCOUVER DEPARTMENT OF PUBLIC WORKS WATER ENGINEERING	DRAWN BY	APPROVED BY	APPROVAL DATE	W-10
		GPH	TWC	01 - 2023	
		REVISION	APPROVED BY	APPROVAL DATE	
		-	-	-	



NOTES:

- 1. A WASHINGTON STATE APPROVED REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) SHALL ONLY BE INSTALLED IN THE ORIENTATION (VERTICAL OR HORIZONTAL) FOR WHICH THEY ARE APPROVED. ASSEMBLY MUST BE ACCESSIBLE.
- 2. ALL BACKFLOW PREVENTERS MUST BE LEAD FREE AND PLACED AS CLOSE TO THE PROPERTY LINE AND/OR BACKSIDE OF THE METER AS POSSIBLE. ASSEMBLY MUST BE ACCESSIBLE.
- 3. A PLUMBING PERMIT IS REQUIRED-CONTACT THE APPROPRIATE JURISDICTION'S PERMITS COUNTER
- 4. THE WATER LINE SHALL BE DISINFECTED, THOROUGHLY FLUSHED AND PRESSURE TESTED PRIOR TO INSTALLING THE BACKFLOW ASSEMBLY.
- 5. DO NOT INSTALL IN A PIT, TRENCH OR AN AREA SUBJECT TO FLOODING.
- 6. HEAT AND/OR INSULATION SHALL BE PROVIDED TO PREVENT FREEZING.
- 7. A PLUMBING PERMIT IS REQUIRED-CONTACT THE APPROPRIATE JURISDICTION'S PERMITS COUNTER
- 8. RPBA MUST BE TESTED WITHIN 30 DAYS AFTER INSTALLATION, RELOCATION OR REPAIR, THEN ANNUALLY BY A WA. STATE CERTIFIED BACKFLOW TESTER. RESULTS SHALL BE SENT TO THE CITY WATER QUALITY GROUP.
- 9. DRAIN SHALL BE SIZED PER THE AWWA CROSS CONNECTION CONTROL MANUAL

# (ABOVE GROUND INSTALLATION ONLY)



#### STANDARD WATER BACKFLOW ASSEMBLY

CITY OF VANCOUVER DEPARTMENT OF PUBLIC WORKS WATER ENGINEERING 
 DRAWN BY
 APPROVED BY
 APPROVAL DATE

 GPH
 TWC
 01 - 2023

 REVISION
 APPROVED BY
 APPROVAL DATE

WATER DETAIL NO.

V-23