CITY OF MOLALLA
CLACKAMAS COUNTY, OREGON

PREDESIGN REPORT

WASTEWATER TREATMENT PLANT UPGRADES

PROJECT NO. 198.28
November 2021

The Dyer Partnership
Engineers & Planners, Inc.

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Coos Bay, Oregon 97420
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REGISTERED PROFESSIONAL ENGINEER
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INTRODUCTION

Section 1 - Introduction

This Predesign Report presents and describes the basis for the proposed design of the Wastewater Treatment Plant Upgrades originally described in the City of Molalla's Wastewater Facility and Collection System Master Plan (The Dyer Partnership, 2018). Background information on the City's wastewater facilities is also summarized in this section.

Technical Memoranda are presented in subsequent sections for each of the process design areas and upgrades. The content of these Technical Memoranda includes such topics as objectives, purpose and scope, design criteria, alternatives, recommendations, descriptions, control, process schematics and plans, and issues to be resolved during detailed design.

- Section 3.1 Plant Site Facilities
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- Section 6.3 Construction Documents
- Section 6.4 Cost Estimates

The Technical Memoranda are followed by presentation of a preliminary schedule, a description of operations during construction, a preliminary cost estimate, and a summary of construction documents and specification section headings. The Predesign Report plan review set, bound separately, but incorporated into this Predesign Report includes a list of preliminary drawings.

The scope of this Predesign Report includes the improvements referred to in the Wastewater Facility and Collection System Master Plan (The Dyer Partnership, 2018). Due to the projected population forecast for the planning year 2043, the Wastewater Treatment Plant (WWTP) Upgrades will be installed in phases. The content of this Predesign Report covers Phase I upgrades.

1.1 Background

The City of Molalla's WWTP was originally constructed in 1955. Due to population growth, density of development, and other factors, the original WWTP was abandoned and a new WWTP was constructed in 1980. The City's existing Wastewater Treatment Plant is comprised of an influent screening system, aerated lagoon, Transfer Pump Station, two facultative lagoons (Lagoon No. 1 and No. 2), tertiary treatment systems, disinfection system, and an Effluent Pump Station.

The City operates the wastewater system under National Pollutant Discharge Elimination System (NPDES) Permit No. 101514, issued May 12, 2014 by the Oregon Department of Environmental Quality (DEQ). There are two permitted outfalls. Outfall 001 is located on the Molalla River at River Mile 20. Currently, discharge is only permitted to the Molalla River Outfall 001 from November 1st to April 30th. Outfall 002 is the recycled water outfall for several DEQ approved recycled water land application sites. Effluent is land applied in accordance with permit requirements from May 1st through October 31st.

The aerated and facultative lagoons (Lagoon No. 1 and No. 2) are the main biological processes used for treatment of the City's wastewater. The aerated lagoon and facultative lagoons are 41 years old, and hydraulically undersized, and organically overloaded; all based on existing loads. Insufficient hydraulic detention time in the aerated lagoons prevents significant oxidation of biodegradable constituents. Deficient hydraulic detention time in the facultative lagoons inhibits proper treatment, but also impedes the City's ability to store wastewater during the summer months. Tertiary treatment systems are overloaded and often struggle to remove solids reliably and at necessary flux rates.

As a result of the existing influent loads and deficiencies, the WWTP has historically performed in violation of the NPDES Permit. During the winter months, the City has violated the Total Suspended Solids (TSS) concentration and mass load limits set forth in the NPDES Permit. During the summer months, because of WWTP capacity limitations and recycled water land application restrictions, the City is often forced to discharge effluent to the Molalla River, in violation of the discharge limits. The condition of the WWTP is such that it is not possible to operate reliably and dependably in accordance with the current NPDES Permit, nor be reasonably expanded to serve the anticipated population growth.

This subsection provides a brief summary of previous reports and documents that pertain to the proposed upgrades described in this Predesign Report. Permit and regulatory requirements are summarized in Section 1.7.

1.1.1 Wastewater Facility and Collection System Master Plan

In 2018, the City entered into a Mutual Agreement and Order (MAO) with the DEQ. Reference Section 2.5.2 and Appendix A for additional information regarding the MAO and Amendment. A Wastewater Facility and Collection System Master Plan (WWFCSMP) was prepared for the City's wastewater facilities by The Dyer Partnership to meet the requirements of the MAO and serve as a planning document for infrastructure improvement needs. Oregon DEQ approved the WWFCSMP in November of 2018. Recommended improvements as originally defined in the WWFCSMP, and as amended based on phasing objectives, are as follows:

WWTP

- Expand the influent screening system. This project was completed in 2019.
- Construct a new grit removal system.
- Construct a new influent flow equalization basin and modify the existing aerated lagoon (i.e. Aeration Basin).
- Construct a new SBR.
- Construct a new effluent filtration system.
- Construct a new disinfection system.
- Convert the existing lagoons into Effluent Storage Ponds.
- Construct a new Aerobic Digester.
- Construct a new SBR Building with blower and electrical rooms.
- Construct a new Aerobic Digester Building with blower and electrical rooms.
- Construct a new biosolids dewatering screw press and cake storage area.
- Install new plant-wide Supervisory Control and Data Acquisition (SCADA) system.
- Ancillary systems to support above listed improvements.

Collection System

- Continue Infiltration and Inflow (I/I) investigation and repair work.

- Expand sewer system to serve existing and future development within the Urban Growth Boundary (UGB).

- Upgrade pump stations throughout the collection system to address deficiencies, improve reliability, and serve future growth.

Collection system I/I improvements and expansion are expected to continue annually in the future but are not covered as part of this Predesign Report. The City has recently, in the past three years, completed several collection system improvement projects, as identified and prioritized in the WWFCSMP. Influent wastewater flows to the WWTP have early indications of I/I reductions.

1.1.2 Population Forecast

Based on Portland State University Population Research Center (PSU PRC) data published on June 30, 2017, the WWFCSMP (The Dyer Partnership, 2018) projected a population of 16,977 people for the planning year 2043. The PSU PRC released updated population forecast data on June 30, 2020. Table 1.1.2.1 summaries the updated population forecast data for the City of Molalla. The WWTP Upgrades will be based upon a forecasted population of 15,939 people for the planning year 2043.

TABLE 1.1.2.1
PSU POPULATION FORECAST

Year	Population[1]
2020	10,237
2025	11,290
2030	12,515
2035	13,814
2040	15,141
2043	15,939
2045	16,472

1. City of Molalla population forecast prepared by PSU PRC on June 30, 2020.

1.1.3 Recycled Water Use Plan

A Recycled Water Use Plan (RWUP) was completed by The Dyer Partnership in May of 2018. The RWUP describes the City's recycled water use program when land applying recycled water during the irrigation season (May 1st through October 31st). The current RWUP targets Class C recycled water based on the inclusion of the Cemetery as a recycled water user. The beneficial users and minimum class of recycled water are summarized in Table 1.1.3.1.

TABLE 1.1.3.1
SUMMARY OF BENEFICIAL PURPOSES

Site	Beneficial Purpose	Minimum Class of Recycled Water
Coleman Ranch	Pasture (with some hay production) Irrigation	D
Cemetery	Grass Irrigation	C
WWTP	Pasture Irrigation	D

The City is in the process of expanding the recycled water users by adding over an additional ~100 acres. The expansion will require an amendment, to be executed during the design of the WWTP, to the Recycled Water Use Plan. The WWTP will initially be designed to target Class C recycled water. The design will allow for a higher level of recycled water in the future. The point of compliance for the WWTP year-round will be post-disinfection, and immediately prior to recycled water storage.

Recycled water quality requirements for Class C are summarized in Table 1.1.3.2.

TABLE 1.1.3.2
QUALITY OF RECYCLED WATER

Parameter	**Class C**
Oxidized	Yes
Disinfected	Yes
Total Coliform (organisms/100 mL)	
7-day median	23
Maximum in any sample	-
Maximum in 2-consecutive samples	240
E. coli (organisms/100 mL)	
30-day log mean	
Maximum in any sample	
Monitoring frequency	1/week

1.1.4 Lagoon Test Report

A lagoon leakage test was completed in July of 2017 by The Dyer Partnership. The leak testing was conducted in accordance with the Guidelines for Estimating Leakage for Existing Sewer Lagoons (Oregon DEQ). The guidelines for estimating leakage from existing sewage lagoons produced by the DEQ states that seepage rates as high as 1/8-inch per day or less are considered normal. Seepage exceeding ¼-inch per day indicates a seal failure or absence of adequate initial seal. The lagoon leakage test did not exceed ¼-inch per day.

1.1.5 Biosolids Management

The City of Molalla's Biosolids Management Program is governed by Oregon Administrative Rules (OAR) 340-050 and the Code of Federal Regulations (CFR) Section 40, Part 503. As part of the NPDES Permit requirements, the City is required to generate a Biosolids Management Plan (BMP). The City's most recent BMP was published on September 10, 2013.

With the existing WWTP, sludge, including algal-alum sludge from the Dissolved Air Flotation (DAF) backwash, mainly settles and accumulates in the facultative / storage lagoons (Lagoon No. 1 and No. 2). Some sludge also settles in quiescent zones in the aeration basin. The majority of sludge settles near the inlet of Lagoon No. 1. Sludge resides in the lagoons for long periods of time, generally years. While in the lagoons, sludge is passively and anaerobically digested. The biosolids are well digested and fairly inert. For odor mitigation and to prevent hardening, sludge residing within the lagoons is kept submerged with a water cap.

As a result of the solids retention time and anaerobic digestion, the existing WWTP produces Class B biosolids in accordance with 40 CFR Part 503 regulations. Per the BMP (2013), pathogen reduction requirements are achieved through 40 CFR 503.32(b)(2), and vector attraction reduction requirements are achieved through 503.33(b)(2).

Biosolids data was obtained and reviewed to quantify the biosolids characteristics that reside in the lagoons. Removal and disposal requirements were analyzed to prepare for when the lagoons are converted to Effluent Storage Ponds. Based on the annual biosolids sampling, as outlined in the 2016 WWTP Biosolids Annual Report Form, the land applied biosolids were in compliance with the regulatory concentration limits. A summary of WWTP biosolids characteristics is summarized in Table 1.1.5.1 and Table 1.1.5.2.

TABLE 1.1.5.1
SUMMARY OF HEAVY METALS CONCENTRATIONS IN WWTP BIOSOLIDS (2016)

Metal	Concentration Limits (mg/kg) [1]		Concentration (mg/kg) in Sludge
	Cumulative	Ceiling	2016
Arsenic	41	75	0.168
Cadmium	39	85	0.22
Chromium	1,200	-	1.32
Copper	1,500	4,300	8.42
Lead	300	840	0.536
Mercury	17	57	0.0922
Molybdenum	18	75	0.675
Nickel	420	420	1.72
Selenium	100	100	< 0.200
Zinc	2,800	7,500	33

1. 40 CFR Part 503, Subpart B, ND – non-detected

TABLE 1.1.5.2
SUMMARY OF NUTRIENT CONCENTRATIONS IN WWTP BIOSOLIDS (2016)

Nutrient	% Dry Weight[1]
TKN	3.61%
NO_3-N	<0.058%
NH_4-N	1.51%
PO_4	8.86%
K	0.07%
pH	7.4
Total Solids	4.3%
Vol. Solids	44.1%

1. 40 CFR Part 503, Subpart B, ND – non-detected

Recently, the solids removed from the lagoons have been taken to a landfill for disposal. In 2018, 215 dry tons were removed from the Aeration Basin and 699 dry tons were removed from the lagoons, all of which was landfill disposed. In 2020, 411 dry tons were removed from the lagoons and landfill disposed.

1.1.6 Environmental Report

An Environmental Report, written by Pacific Habitat Services, Inc., is being prepared for completion in December of 2021.

1.1.7 Geotechnical Report

A Geotechnical Report, authored by Foundation Engineering, Inc., was prepared and finalized in August of 2021. A summary of the report is included in Section 4.1 of this Predesign Report. A full copy of the report is included under separate cover.

1.1.8 Value Analysis

A Value Analysis (VA) study was completed in 2020 by Civil West Engineering Services, Inc. The VA team's objective was to analyze the recommendations in the WWFCSMP, to ensure the recommendations were appropriate for the City. The VA team did not find anything of substance that would alter the recommendations in the WWFCSMP.

1.2 Wastewater Flows and Loads

1.2.1 Wastewater Flows

The current and projected flows for the WWTP, based on the updated PSU PRC population forecast, are summarized in Table 1.2.1.1.

TABLE 1.2.1.1
SUMMARY OF CURRENT AND PROJECTED WWTP FLOWS[1]

Parameter	2017	2043	
Population	9,939	15,939	
AAF	1.85 MGD	186 gpcd	2.96 MGD
ADWF	1.11 MGD	113 gpcd	1.80 MGD
AWWF	2.48 MGD	249 gpcd	3.98 MGD
$MMDWF_{10}$	1.91 MGD	192 gpcd	3.06 MGD
$MMWWF_5$	3.21 MGD	282 gpcd	4.50 MGD
Peak Average Week	4.51 MGD	402 gpcd	6.40 MGD
$PDAF_5$	6.62 MGD	552 gpcd	8.80 MGD
PIF	9.7 MGD	757 gpcd	12.07 MGD

1. Per capita flow rates for year 2043 wet weather flows are estimated using current wet weather I/I rates for existing portions of the collection system and lower rates in areas with new sewers.

Design flow rates are defined as follows:

- AAF: Average Annual Flow
- ADWF: Average Dry Weather Flow
- AWWF: Average Wet Weather Flow
- $MMDWF_{10}$: Maximum Monthly Average Dry Weather Flow with a ten percent Probability of Occurrence
- $MMWWF_5$: Maximum Monthly Average Wet Weather Flows with a twenty percent Probability of Occurrence
- Peak Average Week: Maximum flow over seven-day period
- $PDAF_5$: Peak Daily Average Flow associated with a 5-Year Storm
- PIF_5: Peak Instantaneous Flow attained during a 5-Year PDAF

1.2.2 Wastewater Characteristics

The current and projected influent Biochemical Oxygen Demand (BOD_5) and TSS loads for the WWTP are summarized in Tables 1.2.2.1 and 1.2.2.2, respectively. Influent BOD_5 and TSS load data is provided for the discharge season, irrigation season, dry weather season, and annually.

TABLE 1.2.2.1
EXISTING WWTP INFLUENT WW CONCENTRATIONS AND LOADS

Design Data – Annual						
	BOD			TSS		
	mg/L	lb/d	Monthly Avg – lb/d	mg/L	lb/d	Monthly Avg – lb/d
Annual Average	187	1783	-	175	1705	-
Minimum	35	387	659	27	419	601
Maximum	661	5436	3066	759	8746	2962
Design Data – Discharge Season (Nov – Apr)						
	BOD			TSS		
	mg/L	lb/d	Monthly Avg – lb/d	mg/L	lb/d	Monthly Avg – lb/d
Average	109	1682	-	103	1615	-
Minimum	35	551	923	27	419	672
Maximum	409	4832	2656	428	6155	2919
Design Data – Irrigation Season (May – Oct)						
	BOD			TSS		
	mg/L	lb/d	Monthly Avg – lb/d	mg/L	lb/d	Monthly Avg – lb/d
Average	265	1883	-	249	1798	-
Minimum	39	387	659	53	476	601
Maximum	661	5436	3066	759	8746	2962
Design Data – Dry Weather Season (July – Sept)						
	BOD			TSS		
	mg/L	lb/d	Monthly Avg – lb/d	mg/L	lb/d	Monthly Avg – lb/d
Average	316	2025	-	297	1891	-
Minimum	97	713	1147	90	665	1192
Maximum	661	4868	3066	732	5201	2962

TABLE 1.2.2.2
FUTURE (2043) WWTP INFLUENT WW CONCENTRATIONS AND LOADS

Design Data - Annual						
	BOD			TSS		
	mg/L	lb/d	Monthly Avg - lb/d	mg/L	lb/d	Monthly Avg - lb/d
Annual Average	187	2859		175	2735	
Minimum	35	620	1056	27	672	964
Maximum	661	8717	4917	759	14026	4750
Design Data - Discharge Season (Nov – Apr)						
	BOD			TSS		
	mg/L	lb/d	Monthly Avg - lb/d	mg/L	lb/d	Monthly Avg - lb/d
Average	109	2698		103	2590	
Minimum	35	883	1481	27	672	1077
Maximum	409	7749	4260	428	9871	4682
Design Data - Irrigation Season (May – Oct)						
	BOD			TSS		
	mg/L	lb/d	Monthly Avg - lb/d	mg/L	lb/d	Monthly Avg - lb/d
Average	265	3020		249	2883	
Minimum	39	620	1056	53	763	964
Maximum	661	8717	4917	759	14026	4750
Design Data - Dry Weather Season (July – Sept)						
	BOD			TSS		
	mg/L	lb/d	Monthly Avg - lb/d	mg/L	lb/d	Monthly Avg - lb/d
Average	316	3248		297	3033	
Minimum	97	1144	1840	90	1066	1911
Maximum	661	7807	4917	732	8341	4750

Influent pH and Ammonia Nitrogen (Ammonia-N) concentration data are summarized in Table 1.2.2.3.

TABLE 1.2.2.3
INFLUENT PH AND AMMONIA-N CONCENTRATIONS

Design Data - Annual		
	Ammonia (mg/L)	**pH (S.U.)**
Average	29	7.3
Minimum	4	6.5
Maximum	54	8.1
	Design Data - Discharge Season (Nov – Apr)	
	Ammonia (mg/L)	**pH (S.U.)**
Average	21	7.3
Minimum	4	6.5
Maximum	52	8.1
	Design Data - Irrigation Season (May – Oct)	
	Ammonia (mg/L)	**pH (S.U.)**
Average	34	7.2
Minimum	12	6.5
Maximum	54	8.08
	Design Data - Dry Weather Season (July – Sept)	
	Ammonia (mg/L)	**pH (S.U.)**
Average	38	7.2
Minimum	19	6.52
Maximum	54	8.08

The WWTP's influent Ammonia-N data is similar to textbook values. Textbook values for Ammonia-N loading (dry weight basis) range from 0.011 to 0.026 pound per capita per day (lbpcd), with a typical value of 0.017 lbpcd. Historical daily and monthly Ammonia-N per capita load data is summarized in Tables 1.2.2.4 and 1.2.2.5, respectively.

TABLE 1.2.2.4
AMMONIA-N PER CAPITA LOADS (DAILY)

	Annual	**Discharge Season**	**Irrigation Season**	**Dry Weather Season**
	Ammonia - N (lbpcd)	**Ammonia - N (lbpcd)**	**Ammonia - N (lbpcd)**	**Ammonia - N (lbpcd)**
Average	0.015	0.013	0.016	0.017
Minimum	0.007	0.007	0.010	0.012
Maximum	0.026	0.022	0.026	0.026

TABLE 1.2.2.5
AMMONIA-N PER CAPITA LOADS (MONTHLY AVERAGES)

	Annual	**Discharge Season**	**Irrigation Season**	**Dry Weather Season**
	Ammonia - N (lbpcd)	**Ammonia - N (lbpcd)**	**Ammonia - N (lbpcd)**	**Ammonia - N (lbpcd)**
Average	0.015	0.013	0.017	0.018
Minimum	0.010	0.010	0.013	0.016
Maximum	0.020	0.017	0.020	0.020

Temperature data was analyzed as part of the WWFCSMP. Minimum influent wastewater temperature was 9.5 degrees Celsius (deg C). Average winter time temperature was 13.5 deg C.

1.3 WWTP Description

The City collects, conveys and provides treatment and disposal of the sewage generated by its residents and commercial users within the City limits. Currently, the City's wastewater collection system consists of approximately 160,299 linear feet of gravity collection pipes, 4,376 linear feet of pressure sewer mains, 534 manholes and five pump stations.

1.3.1 Existing Treatment Facilities

Raw wastewater is conveyed to the treatment facility through a Headworks system consisting of two automated influent screening systems, mechanical bar screen, and Parshall Flume for flow measurement. Screened raw sewage flows by gravity to a 1.3 Million Gallons (MG) asphalt-concrete lined aeration basin (i.e. aerated lagoon) designed with six aerators.

A Transfer Pump Station, installed in 2002, conveys wastewater from the aeration basin to the first of two facultative lagoons installed in series, which provide both treatment and storage. Lagoon No. 1 is approximately 11.4 acres and has a maximum volume of 45 MG at a 12 ft water level. Lagoon No. 2 is approximately 13.6 acres and has a total volume of 53 MG at a 12 ft water level.

Tertiary treatment is provided by two dissolved air flotation units and four multi-media filters. After filtration, calcium hypochlorite is used for disinfection immediately prior to entering the chlorine contact basin. Disinfected effluent flows by gravity to the Effluent Pump Station, where it is either land applied or discharged to the Molalla River, depending upon the time of year.

Solids are primarily stored, and undergo anaerobic digestion, at the beginning of Lagoon No. 1. Sludge is typically kept within the process for years. Historically, biosolids were infrequently removed. However, the City has taken action in recent years to remove accumulated solids. The lagoons have adequate volume to store sludge for extended periods of time, but excess sludge accumulation in the lagoons contributes detrimentally to biological and hydraulic performance of the lagoons.

Design data and component specifications for the existing WWTP are detailed in Tables 1.3.1.1 and 1.3.1.2.

TABLE 1.3.1.1
2007 DESIGN DOCUMENT FLOWS

Parameter	2005 (MGD)	2015 (MGD)	2025 (MGD)
ADWF	0.8	1.1	1.4
MMDWF	1.28	1.7	2.3
AWWF	1.3	2.3	3
MMWWF	2.04	3.1	4.1
PDF	7.06	8.5	10.3

1. Derived from Wastewater Treatment Plant Improvement Drawings (Tetra Tech/KCM, 2007).

TABLE 1.3.1.2
EXISTING WWTP DESIGN DATA

Item	Description / Design Data	
Headworks	Mechanical Fine Screen	¼-inch, screen washing, compaction
	Quantity	2
	Capacity, each	9.25 MGD
	Bypass	Bar screen – manually cleaned
	Parshall Flume	
	Throat Width	24-inches
	Capacity	21.4 MGD
	Influent Sampler	Isco
Aeration Basin	Basin Dimensions	
	Size (bottom of basin)	200 ft by 54 ft
	Side Slopes (horiz:vert)	2:1
	Maximum Side Water Depth	10 ft with 2 ft freeboard
	Basin Volume	1.3 MG
	Basin Structure	Asphalt concrete
	Aerators	
	Type	Aspirating
	Quantity	6
	Horsepower, each	10 hp
Transfer Pump Station	Pumps	
	Type	Centrifugal submersible with VFD
	Quantity	Three
	Horsepower, each	Two 110 hp, one 50 hp
	Capacity	11.23 MGD
	Discharge Force Main	
	Size, Qty	18-inch, 2
	Length	1,630-feet
	Flow Meter	18-inch diameter, electromagnetic
Lagoon No. 1	Dimensions	
	Surface Area	11.4 acres at 6 ft water depth
	Maximum Depth	12 ft with 3 ft freeboard
	Working Depth	9 ft
	Volume	137 acre-feet (45 MG)
	Basin Liner	Native clay
	Outlet	
	Size	10-inch
	Type	Surface weir, fixed pipe on bottom

Item	Description / Design Data	
Lagoon No. 2	Dimensions	
	Surface Area	13.6 acres at 6 ft water depth
	Maximum Depth	12 ft with 3 ft freeboard
	Working Depth	9 ft
	Volume	163 acre-feet (53 MG)
	Basin Liner	Native clay
	Outlet	
	Size	10-inch
	Type	Fixed pipes at two depths
Dissolved Air Flotation	Capacity Unit #1	
	Surface Area	750 square feet
	Maximum Loading Rate	2.59 gpm/sf, including recycle
	Hydraulic Capacity, each	2.8 MGD, including recycle
	Chemical Feed Rates	
	Polyaluminum Chloride	35 - 70 mg/L
	Operating Parameters	
	Pressurized Recycle Flow	350 to 700 gpm
	Operating Pressure	45 to 80 psi
	Solids to Air Ratio	0.03
	Maximum Horizontal Velocity	3.1 ft/s
	Maximum Daily Sludge	2290 lbs dry solids, 15,300 gallons
	Recycle Flow Meter	
	Type	Propeller
	Size	6-inch
	Range	0 - 2 MGD
	Influent Flow Meter	
	Type	Electromagnetic
	Size	12-inch
	Range	0 - 10 MGD
	Capacity Unit #2	
	Surface Area	1,075 square feet
	Maximum Loading Rate	2 gpm/sf, including recycle
	Hydraulic Capacity, each	3.1 MGD, including recycle
	Chemical Feed Rates	
	Polyaluminum Chloride	35 - 70 mg/L

Item	Description / Design Data	
Dissolved Air Flotation (cont.)	Operating Parameters	
	Pressurized Recycle Flow	350 to 700 gpm
	Operating Pressure	125 psi
	Solids to Air Ratio	0.03
	Maximum Horizontal Velocity	3.1 ft/s
	Maximum Daily Sludge	1,670 lbs dry solids, 10,000 gallons
	Recycle Flow Meter	
	Type	Ultrasonic, Strap On
	Size	6-inch
	Range	0 - 2.5 MGD
	Influent Flow Meter	
	Type	Electromagnetic
	Size	14-inch
	Range	0 - 14 MGD
Gravity Filters	Capacity	
	Number of Filters	4
	Surface Area, Total	573 square feet
	Maximum Loading Rate	4.85 gpm/square feet
	Capacity, each	1 MGD
	Media	
	Type	Gravel, sand, anthracite coal
	Depth	12-inches sand, 24-inches coal
	Backwash	
	Type	Automatic on time or pressure diff.
	Backwash Rate	20 gpm/sf
	Surface Wash Rate	103 gpm
	Air Scour Blower	
	Type	Rotary, positive displacement
	Size	15 hp
	Air Scour Rate	3 scfm/sf
	Air Scour Flow	429 scfm @ 4 psig
	Backwash Flow Meter	
	Type	Propeller
	Size	16-inch
	Range	0 - 17 MGD
	Filter Effluent Flow Meter	
	Type	Electromagnetic
	Size	18-inch
	Range	0 - 23 MGD

Item	Description / Design Data	
Disinfection	Type	Calcium Hypochlorite
	Residual, Minimum	2 mg/L
	Chlorine Contact	
	Sidewater Depth	4-feet, 1 foot of freeboard
	Volume	67,500 gallons
Effluent Pump Station	Pumps	
	Type	Vertical turbine
	Quantity	2 + 1 Future
	Horsepower, each	300 hp with VFD
	Capacity, each	5 MGD
	Discharge Force Main	
	Size	24-inches
	Length	Five miles
Standby Power	Generator Set	
	Type	Diesel
	Size	750 kW
	Transfer Switch	Automatic
	Facilities Served	Entire WWTP (One Eff. Pump)
Controls	SCADA	Plant-Wide
Discharge Monitoring Structure	Dechlorination	
	Feed Solution	Ascorbic acid
	Chemical Feed Pumps	2 - 13 gph
	Feed Control	Flow and Cl_2 residual
	Effluent Sampler	
	Type	Flow paced
	Instrumentation	
	Type	Temp, DO, Chlorine
	Flow Measurement	
	Type	Electromagnetic
	Size	12-inch
Molalla River Outfall	Material	HDPE
	Size	24-inch
	Length	23-feet
	Diffuser Design	
	Number of Ports, Type	3, Duckbill
	Diameter of Ports	8-inches
	Minimum Summer Submergence	1-inch
	Minimum Winter Submergence	12-inches

1.4 Present WWTP Condition and Deficiencies

1.4.1 WWTP

The existing Wastewater Treatment Plant has evolved to the point that it cannot consistently, under current conditions, perform in compliance with the discharge requirements nor be easily expanded to serve the anticipated population growth. The population is projected to increase significantly in the next twenty years. The Wastewater Treatment Plant, in the absence of major upgrades, will violate NPDES Permit requirements at an ever-increasing rate.

High concentrations of algae are generated in the lagoons. Algal solids are difficult to effectively remove and manage, and are consequently continuously recycled within the system, and infrequently wasted.

Elevated solids throughout the system reduce the hydraulic capacity of tertiary treatment processes, create a bottleneck, and ultimately restrict the City's ability to discharge effluent at rates necessary to achieve liquid storage goals in the lagoons. This limits the City's ability to drawdown lagoons to levels that will allow sufficient equalization throughout the year.

The aerated and facultative lagoons (Lagoon No. 1 and No. 2) are low maintenance, but inherently have limited operational control to achieve increasingly stringent permit limits. Lagoon performance is influenced by factors outside of Operator control, including: temperature, solar radiation, wind speed, loading, actual detention time, and other factors. Limited operational control, coupled with the presence of excess solids, prevent the City from consistently achieving discharge requirements and water recycling objectives.

Effluent storage and disposal, specifically the land application of recycled water, is a major obstacle to facility operations. The City is unable to land apply recycled water, or store recycled water, to avoid discharging to waters of the state during the months of May and October, and sometimes June, in violation of the NPDES Permit.

A summary of the major WWTP deficiencies is provided in Table 1.4.1.1.

TABLE 1.4.1.1
SUMMARY OF WWTP DEFICIENCIES

Component	Deficiency
Headworks	Excludes grit removal
Aeration Basin	Undersized to initiate appreciable treatment
	Asphalt-concrete is not watertight
	Limited operational control
	Energy inefficient
	Inadequate mixing
Transfer Pump Station	Undersized for future flows (PIF)[1]
Lagoon No. 1 and No. 2	Historically excessive solids accumulation
	Undersized to achieve treatment objectives
	Limited operational control to achieve discharge limits
	Limited level control and withdrawal options
	Dike erosion
	Undersized transfer line between Lagoons No. 1 and No. 2
	Inadequate storage
	Periodic odors
Dissolved Air Flotation	Undersized given existing solids and hydraulic loading
	DAF No. 1 is in need of repairs
	O&M intensive, energy intensive
	No waste sludge treatment
Gravity Filters	Undersized given solids and hydraulic loading
	O&M intensive
	No waste sludge treatment
Disinfection	Tablet chlorination system safety concerns
	High operational costs
Chlorine Contact Basin	No redundancy
	Undersized based on current and future flows
	No baffling, short circuiting
Effluent Pump Station & Force Main	Undersized for future flows[1]
Discharge Monitoring Station	O&M intensive
Land Application of Recycled Water	Insufficient liquid storage and land area for future flows
Biosolids Management	Solids are rarely wasted and continuously stored at WWTP
	Dredging of solids is cumbersome
	Disposing of solids is operationally intensive and expensive

1. Assumes no flow equalization.

1.5 Proposed Upgrades

The Wastewater Treatment Plant will be upgraded in phases. A general overview of Phase I and II upgrades is provided in this section. The content of this Predesign Report consists of Phase I Wastewater Treatment Plant Upgrades. A brief discussion on the ongoing SBR site selection process is also included in this section.

1.5.1 Phase I WWTP Upgrades

Influent Flow Equalization Basin. Convert a portion of the existing aerobic lagoon into an influent flow equalization basin. The remaining portion of the equalization basin will be filled in to allow for the construction of a future expansion to the new Aerobic Digestion System.

Transfer Pump Station. Install new pumps and a new control panel. The existing wet well will be reused.

Grit Removal System. Constructing a new grit removal system is recommended to sustain the longevity of wastewater process equipment as well as maintain optimum efficiency of downstream treatment processes.

Sequencing Batch Reactor. The secondary treatment equipment will consist of four SBR basins. The SBR will be installed up-front without phasing.

Effluent Storage. The existing facultative lagoons (Lagoons No. 1 and No. 2) will undergo upgrades, including solids removal, for conversion to Effluent Storage Ponds. Upgrades to the Effluent Storage Ponds will be completed in phases, as defined in this Predesign Report.

Aerobic Digesters. A new Aerobic Digester, with diffusers for mixing and aeration, will be constructed. One Aerobic Digester Tank (with two basins) will be constructed in Phase I, and the second tank will be constructed in the future when flows and loads require an expansion.

Biosolids Processing Facility. A screw press will be installed for biosolids dewatering. The press will be installed in the new biosolids processing facility and will produce Class B dewatered biosolids into either a short-term storage bay or directly into a dumpster or dump truck for pending disposal. The dewatering system will be designed with provisions to add components to produce Class A biosolids, in the future, if needed.

Effluent Filtration System. A new effluent filtration system will be installed. The system will consist of two parallel units, each with a capacity of 4.5 Million Gallons per Day (MGD).

Ultraviolet (UV) Disinfection System. A new Ultraviolet (UV) disinfection system will be installed for disinfecting effluent flows year-round.

SBR Building. A new SBR Building will be constructed to house control panels, SBR blowers, and ancillary equipment. Three (two duty, one standby) SBR blowers will also be installed to supply the required air to supply oxygen to influent organic and nitrogenous loads delivered to the SBR.

Aerobic Digester Building. An Aerobic Digester Building will be constructed to house control panels, Aerobic Digester blowers, and ancillary equipment. For Phase I, two Aerobic Digester blowers will also be installed to supply the required air for solids digestion. An additional blower will be installed when the Aerobic Digester capacity is expanded.

New Standby Generator (500 kW). To power the new Process Areas during a power outage, a new standby generator, sized at 500 kilowatt (kW), will be installed at the SBR site area.

Existing DAF and Gravity Filters. Demolition of existing DAF and gravity filters will be performed after commissioning of the SBR facility and draining of the existing lagoons.

1.5.2 Phase II WWTP Upgrades

The upgrades are installed in phases to reduce the financial impact to existing users and more closely align infrastructure costs to the population growth trajectory. Accordingly, the following items will be incorporated into Phase II upgrades.

Effluent Pump Station. Phase II upgrades will include the procurement and installation of a third effluent pump. In the interim, the Effluent Storage Ponds will serve as emergency storage, if or when an effluent pump (or effluent force main) is not in service.

Effluent Storage Expansion. Additional recycled water storage will be added in the future when flows necessitate an expansion. Additionally, Recycled Water Storage Pond No. 2 (formerly Lagoon No. 1) will be lined in the future, if necessary.

Aerobic Digester. An expansion to the Aerobic Digestion System will occur when required by solids loads.

UV Disinfection System. The UV disinfection system will be expanded, in the future, to produce Class A disinfected effluent, if needed.

Standby Generator. The existing 750 kW standby generator will be replaced in Phase II.

Existing Lab Improvements. Improvements to the existing lab are deferred until Phase II.

1.6 SBR Site Selection

Multiple locations were considered for the SBR and ancillary systems (effluent filtration system, UV disinfection system, Non-Potable Water System, SBR Building, etc.). The locations include: the area to the south of the existing lagoons, the area to the east of the existing influent screening system, inside of the existing Lagoon No. 2, as well as the land area directly to the west of the existing lagoon No. 2. Locating the SBR to the west of the existing WWTP would include property acquisition.

Each site was evaluated based on financial and non-financial considerations. Based on the City's objectives to locate the improvements immediately adjacent to the existing processes, locating the SBR and ancillary systems within Lagoon No. 2 was ultimately selected. However, due to the anticipated costs and construction sequencing considerations, the City is in the process of pursuing the option of acquiring a portion of land to the west of the existing WWTP to relocate the SBR and ancillary systems.

If the land to the west of the existing WWTP is acquired, the existing SBR and ancillary systems would be relocated to this location. This would facilitate uninterrupted operation of the lagoon facility during construction of the SBR, and eliminate the need for a temporary dike and associated construction complexities. Relocation of the SBR facility would also provide an opportunity to evaluate re-using the existing Lagoon No. 2 outlet structure.

1.7 Plant Reliability Criteria and Effluent Requirements

1.7.1 EPA Reliability Class for the Facility

In 1974, The US Environmental Protection Agency (EPA) developed system design criteria for minimum standards of reliability for wastewater treatment works. The minimum standards are defined into three classes of reliability. Following is a description of the reliability classifications.

Reliability Class I. Works that discharge into navigable waters that could be permanently or unacceptably damaged by degraded quality effluent for only a few hours. Examples of this class include discharges near drinking water reservoirs, into shellfish waters, or in close proximity to areas used for water contact sports.

Reliability Class II. Works that discharge into navigable waters that would not be permanently or unacceptably damaged by short-term effluent quality degradations, but could be damaged by continued (on the order of several days) effluent quality degradation. An example of this class is a discharge into recreational waters.

Reliability Class III. Works not otherwise classified as Reliability Class I or II.

For the City's WWTP, it is recommended that the plant be designed for Class I Reliability Criteria based on the following criteria:

- The existing system is considered an EPA Reliability Class I facility, and the existing outfall in the Molalla River will continue to be used.
- The Molalla River is considered waters of the state.
- Plant overflows or upsets will discharge to the Molalla River or Bear Creek.

The requirements for Class I reliability, as they relate to the proposed upgrades, are summarized in Table 1.7.1.1.

TABLE 1.7.1.1
CLASS I RELIABILITY REQUIREMENTS

Component	Reliability Criteria
All	Components upstream of the influent flow equalization basin will be able to hydraulically process the Peak Instantaneous Flow (PIF) rate without overflowing or damaging equipment, with the largest unit out of service. The system will contain enough flexibility to enable the wastewater flow to any unit out of service to be distributed to the remaining units in service. Components downstream of the influent flow equalization basin will be able to hydraulically process the peak daily flow rate without overflowing or damaging equipment, with the largest unit out of service.
Transfer Pump Station	Minimum of two pumps. Due to its location downstream of the influent flow equalization basin, the Transfer Pump Station will be designed with a firm capacity of peak daily flow (PDAF) with the largest pump off line.

Component	Reliability Criteria
Grit Removal	Single unit. Designed for peak daily flow (PDAF).
Aeration Basins (SBR)	Sized using modeling to generate preferred treatment to meet discharge permit limits during MMDWF and MMWWF events. Minimum of two basins designed for peak daily flow (PDAF) and maximum month dry weather flow with largest basin off line.
Aeration Blowers (SBR)	Supply the design air capacity with the largest blower out of service. Provide a minimum of two units.
Air Diffusers (SBR)	Isolation of largest section of diffusers (within a basin) without measurably impairing oxygen transfer.
Sedimentation (SBR)	Minimum of two basins designed for peak daily flow (PDAF) and maximum month dry weather flow with largest basin off line. Note that the SBR includes clarification process within the same SBR reactor.
Effluent Filtration	Minimum of two units designed for the peak decant rate that will occur during the maximum month dry weather flow with largest unit off line.
Disinfection	Minimum of two units. For UV, disinfection must treat with a minimum dose of 30 mJ/cm^2 peak daily flow (PDAF) with all units on or maximum daily flow with largest unit out of service, whichever is greater. For Class C standards, the disinfection system will be designed for 60 mJ/cm^2 based upon the peak decant rate that will occur during the MMDWF.
Electrical Power	To include primary power from the utility provider and an on-site generator. The backup generator shall have sufficient capacity to operate all vital process components, critical lighting, and ventilation during peak daily flow conditions (PDAF).

1.7.2 NPDES Permit

The City operates its wastewater system under NPDES Waste Discharge Permit No. 101514, issued May 12, 2014 by the DEQ. A copy of the City's current NPDES Permit is included in Appendix A. Currently, from May 1st through October 31st, no discharge is allowed to waters of the state (Outfall 001, Molalla River). During this time, all effluent is required to be disposed of through recycled water reuse (Outfall 002).

As part of the Wastewater Facility and Collection System Master Plan (The Dyer Partnership, 2018) it was determined that a modification of the NPDES Permit was warranted. Accordingly, on May 17, 2018, the City of Molalla submitted to DEQ a Permit Modification Letter, Permit Modification Request Technical Memoranda, and Permit Modification Draft Permit. On January 2, 2019, the City submitted a NPDES Permit Modification Request Mass Load Limit Evaluation Report. These transmittals requested, with suitable justification, a number of modifications to the City's current NPDES Permit. A new NPDES Permit will be issued upon commissioning of the new WWTP, the elements of which are assumed to be consistent with the proposed NPDES Permit as defined in the NPDES Permit Modification Request Mass

Load Limit Evaluation Report. Upon commissioning the new WWTP, the new NPDES Permit will amend the existing NPDES Permit in the following manner:

- Allow summer season discharge during the months of May, June and October; Replace the 18 deg C discharge limitation with an excess thermal load allocation for each of the months May, June and October as allowed by the Molalla River Total Maximum Daily Load (TMDL);
- Allow for summer season (May 1st – October 31st) mass limits to be based on Willamette River water quality standard of 10 milligrams per Liter (mg/L) BOD_5 and 10 mg/L TSS;
- Allow for winter season (November 1st – April 30th) mass limits to be based on Willamette River water quality standard of 30 mg/L BOD_5 and 30 mg/L TSS;
- Allow for summer season (May 1st – October 31st) mass limits to be based on the dry weather design flow for the upgraded treatment plant of 3.06 MGD; and
- Allow for winter season (November 1st – April 30th) mass limits to be based on the wet weather design flow for the upgraded treatment plant of 4.5 MGD.

Critical elements of the new NPDES Permit requirements based upon future flows, are summarized below and in Table 1.7.2.1.

- November 1st – April 30th: During this time period the permittee must comply with the limits in Table 1.7.2.1 while discharging to waters of the state.
- May 1st – October 31st: During this time period the permittee must comply with the limits in Table 1.7.2.1 while discharging to waters of the state.
- The effluent quality must comply with the limits in Table 1.7.2.1 during the term of this permit.

TABLE 1.7.2.1
NPDES PERMIT WASTE DISCHARGE LIMITATIONS

Parameter	Units	Average Monthly[e]	Average Weekly[e]	Daily Maximum[e]
BOD_5 (May 1 – October 31)	mg/L	10	15	-
	lbs/day	255	383	510
	% removal	85	-	-
TSS (May 1 – October 31)	mg/L	10	15	-
	lbs/day	255	383	510
	% removal	85	-	-
BOD_5 (November 1 – April 30)	mg/L	30	45	-
	lbs/day	1126	1689	2252
	%	85	-	
TSS (November 1 – April 30)	mg/L	30	45	-
	lbs/day	1126	1689	2252
	%	85	-	
pH[b]	SU	Between 6.0 and 9.0		
Design Effluent Flow Dry Season	MGD	3.06	-	-
Design Effluent Flow Wet Season	MGD	4.5	-	-
Total Residual Chlorine[c]	mg/L	0.07	-	0.18
E. coli[ad]	MPN/100 ml	126	-	406
Ammonia	mg/L	16.7	-	25.9
Excess Thermal Load (May)	Shall not exceed a 7-day moving average of the daily excess thermal loads of 77.95 million kcals/day.			
Excess Thermal Load (June)	Shall not exceed a 7-day moving average of the daily excess thermal loads of 72.38 million kcals/day.			
Excess Thermal Load (July, August, September)	No Thermal Load Available – Effluent temperature must be less than 16°C.			
Excess Thermal Load (October)	Shall not exceed a 7-day moving average of the daily excess thermal loads of 42.43 million kcals/day.			
Temperature	Effluent discharge will cease when 7-day moving average effluent temperature exceeds 18.0 degrees C.			
Dilution	Discharge may not commence until gauged stream flow exceeds 350-cfs and will cease when the average stream flow for the previous seven-day-period is less than-350 cfs.			

Notes:
a. No single *E. coli* sample may exceed 406 organisms per 100 mL. The permittee may take at least 5 consecutive re-samples at 4-hour intervals beginning within 48 hours after the original sample. was taken and the geometric mean of the 5 re-samples is less than or equal to 126 *E. coli* organisms/100 mL to demonstrate compliance with the limit.
b. May not be outside the range of 6.0 to 9.0 S.U.
c. DEQ has established a minimum Quantitation Limit of 0.05 mg/L for Total Residual Chlorine. In cases where the average monthly or maximum daily limit for Total Residual Chlorine is lower than the Quantitation Limit, DEQ will use the reported Quantitation Limit as the compliance evaluation level.
d. Reported as a monthly geometric mean.
e. The daily mass load limit is suspended on any day in which the flow to the treatment facility exceeds twice the average dry weather flow of 1.8 MGD.

Additional information for the limits in Table 1.7.2.1.

- The BOD_5 concentration limits are considered equivalent to the minimum design criteria for BOD_5 specified in OAR Chapter 340, Division 41.

- Mass load limits for winter time discharge are based on 4.5 MGD. Mass load limits for summer time discharge are based on 3.06 MGD.

When not discharging to the Molalla River the City can land apply recycled water in accordance with the NPDES Permit and Recycled Water Use Plan. Prior to the commissioning of the new WWTP, the City intends to amend the current RWUP (The Dyer Partnership, 2018) and add an additional 100+ acres of pasture land to their recycled water program.

In accordance with the beneficial purpose in Internal Management Directive: Implementing Oregon's Recycled Water Use Rules (Oregon DEQ, 2009), Class C recycled water is required for irrigation of pasture for animals and Class C is required for cemetery irrigation. The new WWTP will be designed to achieve Class C recycled water standards. Discharge requirements for Outfall 002 are summarized in Table 1.7.2.2.

TABLE 1.7.2.2
QUALITY OF RECYCLED WATER

Parameter	Class C
Oxidized	Yes
Disinfected	Yes
Total Coliform (organisms/100 mL)	
7-day median	23
Maximum in any sample	-
Maximum in 2-consecutive samples	240

The year-round compliance point will be immediately after the UV disinfection system and prior to the Effluent Storage Pond.

SECTION 2:

GENERAL PROCESS DESIGN

Section 2 – General Process Design

2.1 Approach

The proposed Wastewater Treatment Plant Upgrade project consists of several upgrades to the Wastewater Treatment Plant (WWTP). See Section 1 for further details. Upgrades to the WWTP have been divided into several categories as previously listed in Section 1. In this section, the general process design for proposed Wastewater Treatment Plant Upgrades is further defined, particularly the basis of design. The following process information will be discussed in this section.

Process Design Criteria. The design criteria include wastewater characteristics, flows, and loads.

Hydraulic Profile. This section provides a hydraulic profile of the WWTP and proposed upgrades.

Process Schematics for Liquid Stream and Solids Stream. This section provides process schematics for both the proposed liquid and solids treatment streams.

Liquid Treatment. Content in this section includes a description of the existing liquid treatment and storage facilities at the City's WWTP, regulatory requirements, and proposed design criteria.

Solids Treatment. This subsection includes a description of the existing solids management strategies, regulatory requirements pertaining to biosolids treatment and handling, estimates of existing and future sludge quantities, and proposed design criteria for the new Aerobic Digester and Biosolids Dewatering Facility.

Effluent Disposal / Recycled Water Reuse. This subsection includes a description of the existing outfalls (001 and 002) and associated regulatory requirements.

Additional design data and specific design data on particular elements of the proposed upgrades are found in the Technical Memoranda in Section 3. For the WWTP upgrade, the design year 2043 was selected to provide a 20-year service life per the City of Molalla's Wastewater Facility and Collection System Master Plan (The Dyer Partnership, 2018) or WWFCSMP.

2.2 Process Design Criteria

2.2.1 Wastewater Characteristics

The existing WWTPs influent Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), Ammonia Nitrogen (Ammonia-N), temperature, and pH concentration and loads are summarized in Section 1. The BOD_5, TSS, Ammonia-N, and pH concentrations in the City's influent wastewater are within the typical characteristics of municipal raw sewage.

The annual average influent BOD and TSS are 0.18 pounds per capita per day (lbpcd) and 0.17 lbpcd, respectively. Influent BOD and TSS values are relatively consistent with textbook values. Textbook values for influent BOD loading range from 0.11 to 0.26 lbpcd. Typical value is 0.18 lbpcd. Textbook values for influent TSS loading range from 0.13 to 0.33 lbpcd. Typical value is 0.2 lbpcd.

At an average influent Ammonia-N of 0.015 lbpcd, the City's influent Ammonia-N data is also similar to textbook values. Textbook values for Ammonia-N loading (dry weight basis) range from 0.011 to 0.026 lbpcd. Typical value is 0.017 lbpcd.

2.2.2 Design Population, Flows and Loads

The City's existing and projected wastewater flows and loads for the years 2017 and 2043 are summarized in Table 2.2.2.1. A summary of the calculation methods utilized to determine these wastewater flows and loads may be found in the City's WWFCSMP (The Dyer Partnership, 2018), but with an adjustment to the year 2043 flow projections for a population forecast of 15,939 people.

TABLE 2.2.2.1
EXISTING AND PROJECTED WASTEWATER FLOWS

Parameter	2017	2043	
Population	9,939	15,939	
AAF	1.85 MGD	186 gpcd	2.96 MGD
ADWF	1.11 MGD	113 gpcd	1.80 MGD
AWWF	2.48 MGD	249 gpcd	3.98 MGD
$MMDWF_{10}$	1.91 MGD	192 gpcd	3.06 MGD
$MMWWF_5$	3.21 MGD	282 gpcd	4.50 MGD
Peak Average Week	4.51 MGD	402 gpcd	6.40 MGD
$PDAF_5$	6.62 MGD	552 gpcd	8.80 MGD
PIF	9.7 MGD	757 gpcd	12.07 MGD

2.3 Hydraulic Profile

A graphic representation of the hydraulic profile for the WWTP may be found in the 11 by 17 inch drawing set that accompanies this Predesign Report. The drawing labeled 10-G-8 (and subsequent plan sheets) show the basis for selected elevations of the specific process units. The existing plant elevations were obtained during site surveys conducted in the year 2021.

The elevations of the proposed upgrades were determined by existing site conditions and the proposed upgrades. The incorporation of future process units, specifically an expansion to the UV system to achieve a Class A standard, were considered in the development of the hydraulic profile.

Elevations for the existing influent screens, gate manhole, transfer pump station, effluent storage ponds, and effluent pump station remain unchanged. The elevation of the Sequencing Batch Reactor (SBR) was established such that effluent from the SBR will flow by gravity through the UV disinfection system, effluent filters, and to fill Effluent Storage Pond No. 2 (during summer time flow conditions).

The hydraulics offer the ability to process 8.8 Million Gallons per Day (MGD) through the effluent filters when discharging to Effluent Storage Pond No. 1, even though they will typically only be operated during the summer time with a maximum dry weather flow of 4.5 MGD. The hydraulics were also such that the City can discharge the peak daily flow from Effluent Storage Pond No. 1 to the effluent pump station.

Total volumes for the SBR basins are based on the projected flows, loads, and effluent discharge requirements. The various liquid elevations for the SBR were predicted based on manufacturer process models.

The hydraulic calculations for the summer time flows and winter time flows are included in Appendix E.

2.4 Process Schematics

Process schematics depicting the liquid and solid stream process units for the proposed plant are located in the 11 by 17 inch drawing set that accompanies this Predesign Report. A general liquid stream process schematic for the proposed plant is illustrated in the drawing labeled 20-P-2. The general solid stream process diagrams is presented on 20-P-3. More detailed process information for each liquid process unit is illustrated in drawing sheets labeled 20-P-300 through 20-P-810. More detailed solids process information is provided in drawings 20-P-900 through 20-P-920.

2.5 Liquid Stream Treatment

The design criteria for the main liquid stream treatment portions of the upgrades are presented in this section.

2.5.1 Regulatory Requirements

The City of Molalla operates its wastewater system under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. 101514, issued May 12, 2014 by the Department of Environmental Quality (DEQ). This permit expired June 1, 2019, but has been administratively extended. A copy of the City's NPDES Permit is included in Appendix A. The proposed upgrades are predicated on the to be issued new NPDES Permit, as modified according to specifics listed in Section 1.

2.5.2 Mutual Agreement and Order (MAO)

Historically, the existing WWTP has operated out of compliance with respect to discharge permit requirements during the summer and winter time. The City of Molalla and DEQ entered into MAO No. WQ/M-NWR-2016-246 in the year 2018. The MAO included interim effluent TSS limits. The MAO was amended in 2021 to include interim effluent BOD_5 limits. The MAO and amendment are included in Appendix A for reference.

2.5.3 DEQ Design Standard

The proposed WWTP Upgrades are all designed for reliability and redundancy requirements as set forth in state and federal requirements. In 1974, the US Environmental Protection Agency (EPA) published a technical bulletin titled Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability (EPA, 1974). Thereafter, the Oregon DEQ developed reliability criteria that supplemented the EPA criteria. All pumping stations are designed in accordance with DEQs Oregon Standards for Design and Construction of Wastewater Pump Stations (DEQ, 2001).

2.5.4 Other Regulatory Design Standards

Wastewater treatment facilities, including pump stations, are regulated under the National Fire Protection Association (NFPA). The proposed design will be in accordance with the NFPA 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities (NFPA, 2020) requirements.

The Occupational Safety and Health Administration (OSHA) Permit Required Confined Spaces Standard 29- Code of Federal Regulations (CFR) 1910.146 applies to the upgrades and limits individual access to spaces that might trap a person or contain noxious atmospheres.

2.5.5 Current Hydraulic Flows

The flow data used for this report is derived from the Discharge Monitoring Reports (DMRs) for the existing WWTP. The data from the DMRs was analyzed in the WWFCSMP, and amended in this Predesign Report, using DEQ guidelines for calculating various flow parameters. The detailed analysis is covered in the WWFCSMP. A summary table of the flow parameters is presented in Table 2.2.2.1.

2.5.6 Projected Hydraulic Flows

The increases in flows were calculated using the projected population increase, based on an updated population forecast from Portland State University's Population Research Center (PSU PRC). These flows are listed in Table 2.2.2.1.

2.5.7 Proposed Liquid Stream Treatment

The proposed upgrades to liquid stream include installation of an influent flow equalization basin, improvements to the Transfer Pump Station, new grit removal system, new SBR, new SBR Building (blower room and electrical room), new effluent filtration system, new Ultraviolet (UV) disinfection system, and improvements to the effluent storage ponds. Treated effluent will continue to be discharged to Molalla River during the winter months and recycled water will be land applied during the summer months. A Non-Potable Water System will be installed to provide continuous process water to various areas at the WWTP. The existing Non-Potable Water System is only accessible when the effluent pump station is operational. Process flows through the main components of the proposed system are described below. Detailed information on each component is included in Section 3.

2.5.8 Influent Flow Equalization

To decrease the size of downstream facilities, approximately 325,000 gallons of the existing aerated lagoon will be repurposed to serve as an influent flow equalization / surge basin. Peak Instantaneous Flows (PIF) will be conveyed from the Transfer Pump Station to the equalization basin. As part of the WWTP Upgrades, the basin will be dredged and a new concrete structure (due to high groundwater conditions) will be constructed.

2.5.9 Transfer Pump Station and Force Main

The Transfer Pump Station will undergo upgrades to allow conveyance of raw sewage to the new grit removal system and SBR. The existing Transfer Pump Station Controls Building will house the new control panel and Variable Frequency Drives (VFDs) for the new pumps.

2.5.10 Grit Removal

A new grit removal system will be located downstream of the Transfer Pump Station and immediately upstream of the SBR. The grit system will be sized at the projected Peak Daily Average Flow (PDAF) for the design year 2043. Grit removal is recommended to sustain the longevity of wastewater process equipment as well as maintain optimum efficiency of downstream treatment processes.

2.5.11 Sequencing Batch Reactor (SBR)

Flow, after metering via magnetic flow meters for each SBR basin, will pass to the pre-react basins in the continuous flow SBR basins. The SBR basins each will cycle through fill, aerate, settle, and decant modes. The timing for the modes will be offset, so that each basin will decant at different times. During high flow conditions there will be continuous discharge. After treatment and settling, the effluent will discharge to the disinfection system during the time period when discharging to the Molalla River or to the effluent filtration system when the plant is producing recycled water.

2.5.12 Effluent Filtration System

A new effluent filtration system will be installed to provide effluent filtration prior to the UV disinfection system. The effluent filtration system will be utilized during the summer months, to achieve Class C recycled water standards. Two units will be provided for redundancy purposes. The effluent filtration system will target Class A standards (less than 2 Nephelometric Turbidity Units (NTU), 24 hour mean).

2.5.13 Ultraviolet (UV) Disinfection System

A new UV disinfection system will be installed. Two banks of lamps will be installed in series with multiple lamp racks within each bank. Individual racks can be removed for maintenance while maintaining the rest of the system in service. The lamps will be flow paced by staging banks on and off in response to the output signal from the flow meter on the influent side of the UV system. The lamps will also be activated by the liquid level sensor within each UV reactor. The design will initially target Class C recycled water but the layout will allow for the future expansion of the UV system to achieve Class A standards. The City will keep the ability to use Effluent Storage Pond No. 2, which will typically only be needed during the shoulder months during wet weather conditions.

2.5.14 Effluent Storage

The existing facultative lagoons will be converted to effluent storage ponds. Lagoon No. 1 will become Effluent Storage Pond No. 2. Lagoon No. 2 will become Effluent Storage Pond No. 1. Based on recent collection system upgrade projects and apparent reductions in influent flows, the City intends to initially only use Effluent Storage Pond No. 1. Effluent Storage Pond No. 1 will be lined and undergo improvements to address bank erosion. A new discharge multi-level outlet structure will be added to improve withdrawal options from the pond.

2.5.15 Effluent Discharge

The NPDES Permit requirements will be issued upon commissioning of the WWTP upgrades. Reference Section 1.7.2 for assumptions related to the new NPDES Permit.

Generally, from May 1st to October 31st, filtered and disinfected effluent from the SBR will be conveyed to the effluent storage ponds. Effluent from the Recycled Water Storage Pond No. 1 will be conveyed to the Effluent Pump Station as needed based on irrigation demands during the irrigation season. A modulating actuated valve will be used in conjunction with a magnetic flow meter to maintain a liquid level in the Effluent Pump Station wet well. During the irrigation season the Effluent Pumps Station will typically operate to maintain an Operator adjustable pressure set point. If allowed by the new NPDES Permit, effluent will be discharged to the Molalla River during the months of May, June, and October.

From November 1st to April 30th disinfected effluent (without filtration) will be conveyed to Effluent Storage Pond No. 1 or directly to the Effluent Pump Station. If necessary, in the event that water quality in the effluent storage pond is compromised, effluent from the recycled water storage pond could be re-treated through the SBR for additional treatment by conveying it to the Transfer Pump Station. When transitioning from the Molalla River discharge season to recycled water, the effluent storage ponds will be completely drained.

2.5.16 Proposed Liquid Stream Equipment and Sizing Criteria

The process equipment was sized to meet the projected flows and loads for the year 2043. A brief description of the sizing criteria is discussed below. Detailed equipment specifications are included in Section 3.

Transfer Pump Station
Design of the Transfer Pump Station will be in accordance with the latest edition of the Oregon Standards for Design and Construction of Wastewater Pump Stations (DEQ, 2001). The influent flow equalization basin will infrequently store Peak Instantaneous Flows (PIF), facilitating the sizing of the Transfer Pump Station at a $PDAF_5$ flow of 8.8 MGD, which represents the peak daily flow rate for the planning year 2043.

The Transfer Pump Station is sized such that it will process the $PDAF_5$ with the largest pump out of service. The Transfer Pump Station will also be sized such that it will pump the dry weather flows without excessive pump cycles. The force main that will convey the raw sewage to the grit removal system will be sized based on DEQ guidelines to achieve a fluid velocity range between three to eight feet per second.

Other general design criteria for the Transfer Pump Station includes:

- Design consistent with EPA Class I reliability.
- Pumps with a minimum of five years' service history for similar duty size.
- Inlet, station, and force main piping with all necessary pressure control and measurement features, air / vacuum release valves, isolation valves, couplings, and other appurtenances.
- A complete system of alarms and alarm telemetry to facilitate operation and maintenance of the pump station at all times.

Influent Flow Equalization Basin
The influent flow equalization basin is sized to accommodate the peak instantaneous flow attained during a 5-Year $PDAF_5$ event for the planning year 2043. During the 5-Year $PDAF_5$ event, peak instantaneous flows will backup into the influent flow Equalization (EQ) basin and be slowly metered back into the WWTP. The influent flow equalization basin is sized at approximately 325,000 gallons.

Grit Removal
A new grit removal system will be installed immediately prior to the SBR. The grit system will be sized to process the $PDAF_5$ flow. A single unit will be provided.

Secondary Treatment
The continuous flow SBR is sized to treat the $PDAF_5$ flow, based on the projected flows for a 5-year, 24-hour storm for the planning year 2043. The SBRs will be sized using modeling to meet discharge permit limits during Maximum Monthly Dry Weather Flow (MMDWF) and Maximum Monthly Wet Weather Flow (MMWWF) events. Oregon DEQ guidelines require a minimum of two basins designed for peak

daily flow ($PDAF_5$), and sizing based on maximum month dry weather flow with the largest basin off line. The proposed SBR will be sized using four basins for additional operational flexibility.

The basins will normally operate on a four-hour cycle, and on two-hour cycles during storm flows. The treatment system is sized to handle the projected maximum month BOD_5, TSS, and Ammonia-N loads calculated in the WWFCSMP but amended based on the updated population forecast, while performing in compliance with the required discharge permit requirements.

Effluent Filtration
The effluent filtration system will receive secondary effluent from the SBR and provide filtration prior to the UV disinfection process during the recycled water season. Effluent filtration removes particulate matter, and improves the disinfection efficacy of the UV disinfection system. The effluent filtration system will include two units for redundancy, and be sized for the anticipated peak decant rate that would occur for the planning year 2043 from the SBR system during MMDWF conditions.

Disinfection System
For UV systems, minimum sizing for regulatory standards is based on a minimum UV dose of 30 millijoule for square centimeter (mJ/cm^2) at $PDAF_5$ with all units operational, or at max dry weather flow with the largest unit offline, whichever results in the larger design. Ultraviolet transmittance and intensity meters are required, per DEQ guidelines.

The disinfection system is designed to treat the $PDAF_5$ while treating the effluent to the levels described in Section 1. When discharging to the Molalla River, the permit disinfection limit is 126 *E. coli* per 100 milliliters (mL) on a 30-day geometric mean, with no single sample above 406 colonies per 100 mL.

For recycled water irrigation, the Class C disinfection standard is less than 23 organisms/100 mL based on a 7-day median, and maximum of 240 organisms/100 mL. The compliance point would remain immediately following the UV system, prior to the effluent storage ponds, year-round. A disinfection dose of 60 mJ/cm^2 is required, with a maximum mean particle size of 10 microns, and an influent TSS concentration to the UV system of less than 10 mg/L (30-day average). With effluent filtration upstream of the UV disinfection system, the influent TSS concentration to the UV will be less than 5 mg/L, and the effluent will be less than 2 NTU (2 hour mean).

Other design criteria for the disinfection system include the ability to clean the system and to perform maintenance on lamps and ballasts while the system is in operation.

Ultraviolet systems are based on physical disinfection method, and therefore are not governed by the EPA, OSHA, or any regulatory safety requirements. The NFPA 820 does not define any specific requirements for UV disinfection systems. Although there are not specific regulations pertaining to safety for UV systems, design features will be incorporated and appropriate Operator training will occur to ensure the safety of Operations Staff.

Effluent Storage
Adequate storage and equalization is critical to accomplish summer time irrigation objectives and avoid discharging to the Molalla River in accordance with permit requirements. The liquid storage and equalization volume available within the existing lagoons is severely limited, partly because the facultative lagoons currently serve the dual purpose of operating as facultative lagoons and storage ponds.

Upon commissioning of the new WWTP, the existing facultative lagoons will undergo improvements to function as effluent storage ponds. Initially, Effluent Storage Pond No. 1 (former Lagoon No. 2) will be used, based on recent flow data and collection system upgrade projects. The City will monitor flows and storage requirements to ultimately determine when Storage Pond No. 2 will need to be lined, if necessary.

The effluent storage ponds will receive disinfected effluent from the WWTP. Final effluent will be stored in the ponds, before eventually being conveyed to the Effluent Pump Station, as needed, based on land application plans for each recycled water site.

According to DEQ, the storage ponds should be sized based on a month-by-month hydraulic balance that accounts for wastewater discharge volumes, precipitation, evaporation, and permitted discharge volumes for each month consistent with the City's current and future Recycled Water Use Plans (RWUPs). A summary of the analysis is included in Section 3. A water balance for the effluent storage system requirements was prepared based on the following criteria:

- Future dry weather flows (including MMDWF).
- Precipitation data derived from the City of Molalla's National Oceanic and Atmospheric Administration (NOAA) station.
- Evaporation data based on historical means for Corvallis in the Climatology Handbook (1969).
- Irrigation of recycled water based on land area available.

Oregon DEQ does not require the storage ponds to be lined with a synthetic liner, but recommends use of a synthetic liner (minimum thickness of 0.8 millimeters or 30 mils) based upon the DEQ Internal Management Directive - Implementing Oregon's Recycled Water Use Rules (DEQ, 2017). A soil-bentonite or native clay liner is acceptable, consistent with current DEQ direction all soil materials along the sides and bottoms of the ponds must have a permeability equal to or less than 1 by 10^{-7} centimeters per second (2.83 x 10^{-4} ft per day). The required soil-bentonite liner thickness must be determined in consideration of the depth of the City's ponds and according to Darcy's equation and must incorporate an appropriate safety factor for construction variability. Consistent with Section 5.6 of DEQ Internal Management Directive - Implementing Oregon's Recycled Water Use Rules (DEQ, 2017) in no case should the soil or soil-bentonite liner thickness be less than 12-inches.

Existing ponds that do not pass DEQs lagoon leakage requirements will generally require a preliminary hydrogeological study and potentially a system of ground water monitoring wells. Pursuant to Oregon Administrative Rules 340-040-0030 the groundwater monitoring system must be able to detect both up-gradient and down-gradient groundwater conditions for the pond system area. The groundwater monitoring system must consist of at least three monitoring wells and must be capable of determining the rate and flow direction of ground water movement and water quality from the pond system area. The City would need to demonstrate continued compliance with the concentration limits established for the site by the DEQ pursuant to OAR 340-040-0030.

DEQ also requires that the storage ponds be equipped with level gauges and be designed to provide three feet of freeboard. The storage pond discharge should be equipped with flow measurement as well as a sampling station for on-going water quality monitoring.

Emergency Standby Power
A new 500 kilowatt (kW) standby generator, sized to provide emergency standby power to the newly constructed critical facilities, will be installed. The new 500 kW generator will power the SBR, SBR Building and systems, effluent filtration system, UV disinfection system, non-potable water system, and

other ancillary systems. The backup generator will have sufficient capacity to operate all vital process components, critical lighting, and ventilation during peak daily flow conditions.

2.6 Solids Treatment

The design criteria for the solids handling processes are presented and discussed in this section including a description of the existing facilities, regulatory requirements, and estimates of current and future solids quantities.

Various solids streams will exist at the new Wastewater Treatment Plant. Large particles are removed at the existing influent screening system. Grit will be removed and washed using the vortex grit removal system and grit classifier located immediately prior to the new SBR.

The waste sludge from the SBR will undergo further biological treatment (aerobic digestion) to meet the EPA requirements for a Class B biosolid and then be dewatered to a cake. Ultimately, the biosolids will be taken to the landfill, at least in the near term.

2.6.1 Existing Facilities

Solids undergo anaerobic digestion and are stored in the facultative lagoons, mostly in Lagoon No. 1. Sludge resides within the process for years, and biosolids are generally infrequently managed. Historically, the City has retained contract companies to remove, dewater, and either land apply biosolids or dispose of them at a landfill.

2.6.2 Regulatory Requirements

Biosolids are regulated by both the EPA and DEQ to ensure quality standards are met. Regulations address trace metal concentrations, pathogen content, odor potential and basic operational practices. Beneficial reuse of biosolids has long been preferred. Landfilling disposal of dewatered biosolids is increasingly common throughout Oregon and the United States due to increasingly stringent regulations.

Biosolids are generally categorized into one of two classifications: Class A and Class B. Class A biosolids contain very low levels of pathogens. To achieve Class A criteria biosolids must undergo heating, composting, digestion or lime addition that reduces pathogens to very low levels. Once this is achieved, Class A biosolids can be land applied without any pathogen related restrictions at a site. If Class A biosolids meet the low metals concentration standards under EPA’s Part 503 regulations they are considered to be Exceptional Quality. Class A EQ biosolids can be bagged and marketed to the public for application to lawns, gardens and multiple other landscape uses.

Class B biosolids have less stringent standards for treatment and contain small amounts of pathogens compared to Class A biosolids. Class B requirements ensure that pathogens in biosolids have been reduced to levels that protect public health and the environment and include certain restrictions for crop harvesting, grazing animals, and public contact. As is true of their Class A counterpart, Class B biosolids must undergo heating, digestion or increased pH processes before leaving the Wastewater Treatment Plant. Both Class A and B biosolids must conform to vector attraction reduction requirements. Unlike Class A, Class B biosolids cannot be bagged or marketed to the public for application to gardens, landscapes or other public uses. Rather, Class B biosolids are typically land applied to agricultural sites under permits and with restricted public access. When managed in this way, biosolids land application provides beneficial reuse or recycling of nutrients and organic matter.

Aerobic digestion is defined as the biological oxidation of organic sludges under aerobic conditions (in the presence of oxygen (O_2)). Aerobic digestion is one of the processes defined to meet requirements for Class B biosolids. To meet Class B biosolids requirements the regulations state that the solids retention time must be at least sixty days at 15 degrees Celsius (deg C). Aerobic digestion is used to reduce the quantity of sludge for disposal.

The City's biosolids management program is governed by OAR 340-050 and the CFR Section 40, Part 503. As part of the permit requirements, the City is required to generate a Biosolids Management Plan (BMP). The City's most recent BMP was published on September 10, 2013.

2.6.3 Biosolids Reuse

Application of biosolids onto agricultural land must be done in accordance with accepted agronomic rates; nitrogen is usually the key nutrient. In addition, the application of heavy metals must be monitored and kept within approved limits. Technical guidance regarding the land application of biosolids was provided by the Internal Management Directive - Implementing Oregon's Biosolids Program (DEQ, 2005).

2.6.4 Projected Sludge Generation and Aerobic Digester Design Criteria

Future quantities of sludge were calculated using the SBR process proposed for the WWTP. The required digester volume was calculated based on the incoming BOD_5 load (maximum month conditions), temperature, SBR process modeling, solids retention times, sludge yield and Mixed Liquor Suspended Solids (MLSS) concentrations in the Waste Activated Sludge (WAS). The amount of air required for sludge digestion was also evaluated. The following is a summary of the key design parameters.

- **BOD Loading.** This parameter was based on the maximum month BOD_5 loads for the planning year 2043. Phase I upgrades for the Aerobic Digestion System are for the design year 2035. The projected population for the Phase I design year 2035 is 13,814 people.
- **Temperature.** 15 deg C was utilized as the design temperature.
- **Vector Attraction Reduction.** Minimum 38 percent Volatile Solids Reduction (VSR).
- **Oxygen Required.** 2 pounds (lb) O_2 per lb Volatile Solids (VS) destroyed.
- **Airflow Rate.** 15 to 20 cubic feet per minute (cfm)/1,000 cubic feet (cu ft)
- **Oxygen Residual.** 1 mg/L of DO at worst design condition. 2 mg/L of Dissolved Oxygen (DO) at average design condition.
- **Mixing Energy.** 20 to 40 cfm/1,000 cu ft for fine and coarse bubble aeration diffusers.
- **TSS in Supernatant.** Approximately 300 mg/L TSS.
- **Sludge Yield.** The observed sludge yield of 0.80 was used based on the SBR basin design values.
- **Solids Retention Time.** A solids retention time of sixty days was used. The sixty-day value represents the time needed to comply with Class B biosolids objectives.

- **WAS and Biosolids for Hauling.** For the planning year 2043, and based on process modeling of the SBR process during maximum month conditions, the WAS production rate is 3,933 pounds per day (lb/d). For the Phase I design year of 2035 (for Aerobic Digestion system), the WAS production is estimated at 3,409 lb/d (maximum month).

- **Biosolids Percent Solids Concentration.** A finished biosolids concentration of 1.4 to 2.0 percent was projected using decanting.

2.6.5 Biosolids Dewatering

A new dewatering screw press will be used to decrease the total volume and moisture content of biosolids, reducing the required storage space and the number of trips eventually necessary to haul biosolids offsite, for landfill disposal. Digested biosolids are treated with polymer to allow flocculation and easier dewatering.

The dewatering press produces liquid pressate, which is conveyed by gravity to the Transfer Pump Station for further treatment, and a dewatered cake with a solids content of approximately 14 to 18 percent solids.

A storage area for the dewatered biosolids (i.e. cake) would be located immediately adjacent to the screw press area. Initially, a dumpster will be utilized to convey the cake to landfill for disposal. Landfill disposal is not weather-dependent and can occur year-round.

A screw press suitable for the City of Molalla, assuming aerobically digested sludge, can process sludge at approximately 400 lb/hr (annual average) and 480 lb/hr (maximum). On average, a dewatering screw press would need to run approximately 28 to 30 hours per week. During maximum month load conditions, the screw press could be operated at a higher throughput (480 lb/hr), and an increased run-time (hrs/wk). Screw press operation is reliable and offers considerable flexibility due to the proposed volume of storage in the Aerobic Digestion System.

SECTION 3:

SPECIFIC PROCESS DESIGN

Section 3 – Specific Process Design

This section provides additional design details for each major Process Area. Section 2 discussed process design criteria and concepts. An outline of the Process Areas covered in this section is provided in the following table.

TABLE 3.0.0.1
PROCESS IMPROVEMENTS[1]

Description	Design Memorandum Number	Process Area[2]
Plant Site Facilities	3.1	100
Transfer Pump Station	3.2	300
Influent Flow Equalization Basin	3.3	310
Grit Removal / Flow Splitting	3.4	400
Sequencing Batch Reactor (SBR)	3.5	500
Effluent Filter System	3.6	510
UV Disinfection System	3.7	600
Effluent Storage Ponds	3.8	700
Effluent Pump Station	3.9	800
Non-Potable Water System	3.10	810
Aerobic Digestion	3.11	900
Biosolids Dewatering Facility	3.12	920

1. For information regarding the SBR Building and Aerobic Digester Building reference Sections 4.2 and 4.3, respectively.
2. These numbers represent an indexing system that is used in the project drawings.

The Process Areas 100 through 920 are described in this section by a series of Technical Memoranda. The Technical Memoranda are divided into the following subsections:

- **Purpose and Scope** states what the Process Area does and what it covers.
- **Associated Sections** references other sections of the report that impact the area.
- **Process Schematics and Drawings** graphically presents drawings of the processing system. Generally, the process schematics are grouped in the project drawing “P” sheets.
- **Design Criteria** describes the specifications, method, procedures, or standards that must be met in developing the system.
- **System Description** provides a general overview of the Process Area.
- **Instrumentation, Control, and Measurement** identifies elements in the design, such as valves and instrumentation that allow measurements, regulation or maintenance of the functions for the process.
- **Design Issues Yet to be Resolved** describes major elements that Dyer anticipates in process design that are not fully developed in this Predesign Report.

- **Instrument List** tabulates the instruments that are shown on the process diagrams.

- **Design Data** summarizes preliminary design parameters.

P R E D E S I G N   R E P O R T   M E M O R A N D U M

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	3.1
Subject:	Process Area 100
	PLANT SITE FACILITIES
Date:	August 18, 2021
Prepared By:	Clint Taylor, E.I.T.

3.1.1 Purpose and Scope

This section provides information regarding the physical nature and general layout of the existing Wastewater Treatment Plant WWTP) site and site modifications required for the planned WWTP upgrades. Items of discussion include the following:

- Site Description
- Site Access
- Site Drainage
- Yard Piping
- Plant Utilities
- Landscaping
- Design Issues Yet to be Resolved

3.1.2 Plans

The 11 by 17-inch drawing set that accompanies this report includes plan sheets that illustrate the layout of the existing treatment plant and modifications to the existing site as a result of the improvements associated with the wastewater system improvement project. Reference the 100 series drawings for additional information.

3.1.3 Site Description

Existing WWTP
The existing treatment plant site is located off of Toliver Road, approximately 1,700 feet west of Highway 213. A chain link fence surrounds the facility. There is a double wide swinging gate on the north end of the property that provides access from Toliver Road. A paved access roadway connects the paved plant parking / access area to Toliver Road. The land is characterized by generally flat agricultural land with a gentle slope to the north due to Bear Creek running through the site.

The existing Wastewater Treatment Plant property is approximately 58 acres including the access roadway. This area is fully fenced and is a combination of wastewater process equipment/systems, pavement, lawn, grass, wetland and lagoon areas. A ten-acre section to the south of the existing treatment facility has been left undeveloped for future expansion.

The City of Molalla's Wastewater Treatment Plant was constructed in the year 1980 and consists of an influent screening system, Parshall Flume, aerated lagoon, facultative lagoon, Dissolved Air Flotation (DAF) system, gravity filters, tablet chlorination disinfection system, a chlorine contact basin, and an Effluent Pump Station. The WWTP also includes an Operations / Lab Building that includes a meeting room, laboratory, motor control equipment, disinfection system, and DAF equipment.

WWTP Upgrades
The planned upgrades for the WWTP include construction of an influent flow equalization basin, new transfer pumps and controls, new grit removal system, new Sequencing Batch Reactor (SBR), new effluent filtration system, new Ultraviolet (UV) disinfection system, new Non-Potable Water System, Effluent Storage Pond No. 1 liner, new Aerobic Digester, new Biosolids Dewatering Facility, new SBR Building, new Aerobic Digester Building, and other ancillary improvements.

The SBR, effluent filtration system, UV disinfection system, Non-Potable Water System, SBR Building, and new standby generator, will be constructed in a developed portion of the Lagoon No. 2, as shown on the drawings. The WWTP upgrades will be constructed in a particular sequence, to provide continuous treatment of the raw wastewater that enters the facility.

Limitations and Constraints
The new SBR site location within the northwest corner of Lagoon No. 2 results in the need for a cofferdam (temporary dike), dewatering activities, and the placement of select fill within the cofferdam to raise the SBR site to the planned grades as shown on the drawings. Reference Section 4.1 for additional information regarding geotechnical considerations. Due to costs and construction complexities, relocating the SBR to the west of the WWTP, on private property, is currently being evaluated.

3.1.4 Site Access

Access to the plant site will be maintained through the main gate located on the north side of the plant; via an existing paved access road from Toliver Road. Vehicular access to the SBR site will be from the existing access road that is currently located on the north side of Lagoon No. 2. Access to the SBR site by foot traffic will be available by new stairs that will be installed in the vicinity of the existing Operations / Lab Building and ending at the SBR site.

The WWTP will be designed such that all equipment will have suitable accessibility to facilitate maintenance activities. The SBR will have two stairways, to provide easy access to the grit removal system and SBR components. The effluent filtration system and UV disinfection system will both have an elevated platform to offer easy accessibility for maintenance purposes. The Aerobic Digester will include one stairway for access, and walkways on the tank for accessibility purposes. The biosolids screw press will also have an elevated platform for maintenance access.

3.1.5 Site Drainage

Onsite drainage at the existing WWTP is currently collected in catch basins that discharge to Bear Creek. The existing storm drainage system will remain in place without any major alterations.

The site grading plan is in process. Tentatively, portions of the new SBR site will convey surface water to the Transfer Pump Station or the existing drainage ditch running along the western side of the WWTP site. Roof drains from each of the new structures will be connected to the expanded drainage system. Area drains located next to the process equipment will be connected to drain lines that will discharge to the Transfer Pump Station.

3.1.6 Yard Piping

Yard piping is buried piping outside of structures and within the treatment plant fence. The yard piping includes: aeration piping, Waste Activated Sludge (WAS) piping, tank drain lines, non-potable water piping, sanitary sewer lines and laterals, storm drain piping, and effluent piping. The drawings, provided under separate cover, graphically illustrate the yard piping layout. Section 5.2 provides general descriptions of the piping systems.

The majority of the existing piping will be undisturbed and left in place. Terminal points for unused existing piping will be securely plugged before abandonment. Any existing piping that sits under new structures will be protected with a concrete slurry.

3.1.7 Plant Utilities

Sanitary Sewer
The sanitary sewer upstream of the existing influent screening facility will remain in place. The gate manhole located adjacent to the Transfer Pump Station will also continue to operate. Normally, raw wastewater will be conveyed through the sanitary sewer piping from the influent screening facility to the gate manhole, and eventually to the Transfer Pump Station. During peak flows, specifically flows in excess of the peak daily flow, raw wastewater will temporarily be stored in the influent flow equalization basin.

Gravity sewer piping from the existing Operations / Lab Building will continue to be routed through existing piping that ultimately directs the flow to the Transfer Pump Station by way of the gate manhole. Sewer piping that is currently directed to the aeration basin will need to be re-routed to the gate manhole.

Potable Water
The treatment plant site receives potable water from the City distribution system. An 8-inch diameter water line extends from Highway 213, along Toliver Road, before reducing down to a 2-inch service line near the site entrance. The water system consists of a backflow preventor that conveys water to downstream process areas at the WWTP. A new potable water connection, with new backflow preventor, will be delivered to the Biosolids Dewatering Facility for the polymer make-down system as well as the screw press.

Non-Potable Water

A new Non-Potable Water System will be installed to provide a continuous non-potable water source to the WWTP site. The Non-Potable Water System will consist of a tank for storage, duplex pumping system, control panel with Variable Frequency Drives (VFDs), and a distribution network. The distribution network will be comprised of existing and new piping and yard hydrants.

The demand for non-potable water will be intermittent and variable. Consequently, control will be based on a pressure transducer. A hydropneumatic pressure tank will be included to reduce pump cycling. Water level in the non-potable storage tank will be indicated by a level transducer and non-potable water usage will be monitored by means of a magnetic flow meter.

The non-potable yard hydrants (i.e. utility stations) will be used for a variety of wash down operations and will deliver water with a pressure between 65 and 75 pounds per square inch (psi). Additional non-potable water demand will be required for the influent screens. Distribution piping for the non-potable water system will be either HDPE or PVC pipe.

Site Communications

The existing telephone system will remain in place without any modifications. Fiber will be used for inter-building communications. Category 6 cable will be used for communication inside buildings. A new Supervisory Control and Data Acquisition (SCADA) control panel, if necessary, to integrate the plant-wide systems will be installed in the existing Operations / Lab Building. Dyer is currently reviewing the existing WWTP PLC to determine the need for a new panel.

Electrical

A new electrical service and standby generator will be provided for the SBR site. There is a tap location remaining in the primary vault at the gate that can be used to provide a primary feed to a new transformer at the SBR site. A new 500 kilowatt (kW) standby generator, diesel powered, will be installed at the SBR site to provide backup power to the SBR site process areas.

The existing 750 kW generator will remain in service, and power the Transfer Pump Station, existing screening system, Effluent Pump Station, and existing Operations / Lab Building. Refer to Section 5.4 for electrical information.

3.1.8 Landscaping

Since the majority of the existing site will be impacted by new construction, landscaping on and around the site will be at a minimum. Any open, unimproved areas will be seeded with grass. Drainage swales will also be seeded and maintained as grassy swales.

3.1.9 Design Issues Yet to Be Resolved

- New storm drain system layout and sizing.
- Sewer system extension invert elevations.
- Determine the need for a new SCADA Programmable Logic Controllers (PLC) in the Operations / Lab Building.
- Potholing of the utilities in the area to the west of the DAF units to facilitate routing of the effluent line to the Effluent Pump Station. This will also likely require storm drain adjustments.

- Potholing utilities in area around Transfer Pump Station for routing of drain lines from Effluent Storage Pond No. 1 and Aerobic Digester.

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	3.2
Subject:	Specific Process Area 300
	TRANSFER PUMP STATION
Date:	June 18, 2021
Prepared By:	Jesten Brenner, P.E.

3.2.1 Background and Purpose

Raw wastewater from the City of Molalla's collection system is conveyed to the Wastewater Treatment Plant (WWTP) with a 24-inch diameter gravity sewer main. At the WWTP raw wastewater is screened prior to entering the aerated lagoon. The Transfer Pump Station conveys raw wastewater from the aerated lagoon to Lagoon No. 1 for secondary treatment.

The Transfer Pump Station was originally constructed in 2002, and consists of three submersible pumps. Two of the pumps are 110 horsepower (hp) and have a capacity of 5,800 gallons per minute (gpm) at 51 feet of Total Dynamic Head (TDH) each. The other pump is 50 hp with a capacity of 2,500 gpm at 49 feet of TDH. The maximum pumping capacity of the Transfer Pump Station is 7,800 gpm, 11.23 Million Gallons per Day (MGD).

The Transfer Pump Station wet well is in good condition structurally. New pumps are required when pumping raw wastewater to the new Sequencing Batch Reactor (SBR), and also due in part to the overall age of the existing pumps. The controls for the new pump system will be housed in the existing Transfer Pump Station Control Building. Bypass pumping of the Transfer Pump Station is necessary during the construction of improvements. Reference Section 6.2 for information regarding operations during construction.

This section will provide information regarding the general design of a Transfer Pump Station and force main upgrades.

3.2.2 Schematics and Plans

The drawing set that accompanies this report includes plan sheets that illustrate the schematics and plans associated with the Transfer Pump Station improvements. Refer to Process Area 300, which illustrates the upgrades to the Transfer Pump Station.

3.2.3 Design Criteria

The Oregon Department of Environmental Quality (DEQ) defines a pump station's capacity as the pumping capacity of the pump station with the largest pump out of service. To meet the Peak Daily

Average Flow (PDAF) capacity based on the planning year 2043, the Transfer Pump Station must have a firm capacity of 6,111 gallons per minute (gpm). Flows in excess of the projected PDAF will be temporarily stored in the new influent flow equalization basin.

In addition to meeting the future PDAF, the pump station must also be designed to reliably convey the current and future Average Dry Weather Flows (ADWF) of 771 gpm and 1,250 gpm, respectively.

Variable Frequency Drives (VFDs) will be utilized to control pump speeds based on influent flow rates. The current and projected flows, originally defined in the City of Molalla's Wastewater Facility and Collection System Master Plan (The Dyer Partnership, 2018) and amended in this Predesign Report, are presented in the table below. A complete summary of the current and projected WWTP flows is shown in Table 3.2.3.1.

TABLE 3.2.3.1
CURRENT AND PROJECTED FLOW RATES

	2017 Flow, gpm	2043 Flow, gpm
ADWF	771	1,250
AWWF	1,722	2,764
$PDAF_5$	4,597	6,111
PIF	6,736	8,382

Based on DEQ guidelines, the pipeline velocity in the force main piping should be maintained between 3 and 10 feet per second (ft/sec). Velocities less than 3 ft/sec could induce disposition of solids within the pipeline. Whereas, velocities in excess of 10 ft/sec could generate excessive headloss within the system. Wet wells should be designed to prevent the accumulation of solids and should provide features that simplify cleaning when needed.

3.2.4 System Description

Pump Selection
The new pump station will consist of a total of four pumps: three submersible pumps and one skid mounted centrifugal pump. The above grade dry prime suction pump (i.e. skid mounted pump) will be located adjacent to the wet well and be used as a redundant stand-by pump.

Flows in excess of the PDAF, experienced during a peak rainfall event, will be stored in the influent flow equalization basin that is hydraulically connected to the wet well.

All four pumps will operate on three-phase, 460-volt power. The pumps will be equipped with VFDs. All submersible pumps will be rated at 65 hp at a speed of 1800 revolutions per minute (rpm). The skid mounted pump will be 75 hp. A single pump turned down with the VFD will handle the current average dry weather flow (ADWF) of 771 gpm.

Three pumps operating concurrently will have a firm capacity of 6,111 gpm at 75 feet TDH. In the event of a pump failure, the skid mounted stand-by pump will operate with the remaining two submersibles to process the PDAF. The Transfer Pump Station will restrict the wastewater flow conveyed to the new SBR facility to the peak day flow with the use of a magnetic flow meter on the discharge header.

Wet Well
The existing wet well will be reused, but modified to accept the new pumps and appurtenances. The existing wet well has internal dimensions of 13.5 feet by 17.25 feet. Reference the design data table in this section for additional details. The existing influent trough and flow openings will be removed and a new concrete fillet will be installed to direct the wastewater to the pumps as directed by the pump manufacturer.

Force Main
The design of the Transfer Pump Station is based on the new force main that will convey the raw sewage to the new elevated grit removal system. The new force main will be an 18-inch diameter ductile-iron and PVC pipe. The proposed alignment of the force main will follow the route of the existing force mains, until it turns south and travels to the new grit removal system. Reference the preliminary drawings for force main alignment information. The existing force mains will be slurry filled and abandoned in place.

Access
Vehicle access to the Transfer Pump Station will remain from the adjacent existing paved roads through the WWTP property. Access to the wet well will be through the existing lockable aluminum hatches.

Safety
New safety gratings will be provided under the wet well hatches to prevent City personnel from falling into the wet well.

Overflow
No overflow is planned for the Transfer Pump Station. With the skid mounted stand-by pump, standby generator, and influent flow equalization structure, an overflow point is not necessary.

Non-Potable Water
Non-Potable water is currently available at the Transfer Pump Station Process Area and will remain in service after the upgrades are completed. The non-potable water utility station will be connected to the new non-potable water system at the SBR site.

Backup Power
Backup power for the upgraded Transfer Pump Station will be fed by the existing plant 750 kilowatt (kW) standby diesel generator, located adjacent to the Effluent Pump Station, during times of utility power loss.

Sanitary Sewer
The existing gate manhole than conveys the wastewater from the influent screens, aerated lagoon, and other site sewer to the existing Transfer Pump Station will continue to be used in a similar fashion. The sewer from the existing tertiary systems, Operations / Lab Building, and gravity filters will be modified to accommodate wastewater flow from that area to the Transfer Pump Station.

Flow Meter
The existing 18-inch diameter magnetic flow meter will be installed, with appropriate setback distances, on the new force main associated with the Transfer Pump Station.

Hoist and Trolley
The existing 3-ton hoist and trolley, which is integral to the canopy structure, will continue to be used with the new submersible pumps. Detailed design will investigate the location of the existing hoist to ensure it is positioned to remove the new pumps.

3.2.5 Instrumentation, Control, and Measurement

Control of the Transfer Pump Station will be through a single control panel installed in the existing Transfer Pump Station electrical room, located immediately west of the existing Transfer Pump Station. All alarms and operational data for the pump station will be transmitted to the new plant-wide Supervisory Control and Data Acquisition (SCADA) system. Control of the wet well level will be through a submersible pressure transducer with mercury float switches for backup. The pump station will include a new pressure transmitter for monitoring pressure at the pump station.

3.2.6 Design Issues Yet to Be Resolved

- Electrical design.
- Design of new flow directing channels in wet well.
- Location for the pump controls in the Aerobic Digester electrical room will be further evaluated.
- Hoist location.
- Check valve on lower connecting pipe from gate manhole to the new influent flow equalization basin.

3.2.7 Instrument List

The following table summarizes the instrumentation equipment required for the Transfer Pump Station:

TABLE 3.2.7.1
INSTRUMENTATION LIST FOR TRANSFER PUMP STATION

Process Area 300: Transfer Pump Station				
Transfer Pump Station				
1	PT		Pressure Transducer	Level transducer.
2	LSH		Float	Wet well high-water level.
3	LS		Float	Pump No. 1-3 On
4	LS		Float	Pump No. 1-2 On
5	LS		Float	Pump No. 1 On
6	LS		Float	Pump Off
7	LSL		Float	We well low-water level.
8	FE/FIT		Magnetic Flow Meter	Totalized flow to SBR.
9	PT		Pressure Transmitter	Pressure transmitter for pump discharge header.

3.2.8 Design Data

TABLE 3.2.8.1
DESIGN DATA FOR TRANSFER PUMP STATION

Item	Data
Transfer Pump Station	
Station Type	Quadraplex
Pump Type	Variable Speed Non-Clog Submersible Centrifugal and Skid Mounted Centrifugal
Total Number of Pumps	4
Pump No. 1 – No. 3 Horsepower	65 HP
Pump No. 4 Horsepower	75 HP
Pump No. 1 Capacity	2500 gpm @ 71 Feet TDH
Pump No. 1 and 2 Capacity	5000 @ 74 Feet TDH
Pump No. 1, 2, and 3 Capacity	6112 MGD @ 75 Feet TDH
Average Wet Well Detention Time	6.7 Minutes (ADWF)
Wet Well	
Depth	25 Feet (23.33 ft interior)
Size	13.5 ft x 17.25 ft
Operational Volume	698.63 CUFT
Level Control	Pressure Transducer with Float Backup
Auxiliary Power	Existing Standby Generator (750 kW)
Alarm Telemetry	Plant-wide SCADA System
EPA Class	I
Force Main	
Length	355 Feet
Type	18 Inch Ductile Iron & PVC
Profile	Flat, Ascending
Discharge	SBR Headworks / Grit Removal System
Air Release	Yes
Vacuum Release Valves	Yes
Average Detention Times	6.09 Minute (ADWF)
Sulfide Control	None
Elevations	
Rim Elevation	299.4 ft
27 Inch Inlet I.E.	280.2 ft
High Water Level Alarm	281.5 ft
Pump #3 On	281.0 ft
Pump #2 On	279.5 ft
Pump #1 On	278.5 ft
All Pumps Off	277.0 ft
Low Water Level Alarm	276.3 ft
Bottom of Wet Well	274.4 ft

PREDESIGN REPORT MEMORANDUM	
Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	3.3
Subject:	Specific Process Area 310
	INFLUENT FLOW EQUALIZATION BASIN
Date:	July 13, 2021
Prepared By:	Jesten Brenner, P.E.

3.3.1 Purpose and Scope

The purpose of the influent flow equalization basin is to provide peak flow storage when excessive Infiltration and Inflow (I/I) enters the collection system during a Peak Instantaneous Flow (PIF) event. To accomplish flow equalization storage objectives, a portion of the existing aeration basin will be used as the flow equalization basin, and the remaining area will be filled in to provide area for the future Aerobic Digester, other structures, or equipment as needed. The volume dedicated to flow equalization will be approximately 325,000 gallons.

The proposed flow equalization basin will be hydraulically connected to the Transfer Pump Station's wet well, facilitating the storage of peak instantaneous flows during an extreme wet weather flow event. The Transfer Pump Station will convey the Peak Daily Average Flows (PDAF). Flows in excess of the PDAF will be stored in the flow equalization structure. Capturing the peak instantaneous flows in the flow equalization basin allows for significant downsizing of process units downstream of the Transfer Pump Station. Downsizing of process units correlates to lower capital investments and reduced life-cycle costs at the WWTP.

To convert the existing aeration basin into the influent flow equalization basin additional improvements are necessary. The asphalt-concrete liner of the existing aeration basin is cracked; therefore, the proposed upgrades include the demolition of the existing structure and the construction of a new concrete structure.

3.3.2 Process Schematics and Plans

A graphic description of the process may be found in the drawing set that accompanies this report. Refer to Process Area 310 for information specific to the influent equalization basin.

3.3.3 Design Criteria

The design of the new equalization basin will meet the following general criteria:

- Sized to temporarily store the peak instantaneous flow. Additional capacity was added to the minimum storage of the flow equalization basin to improve operational flexibility and emergency storage needs.

- Sloped slab to facilitate basin cleaning.

Additionally design considerations include: clearance around the basin, accessibility, washdown water, handrails, safety, and maintenance.

3.3.4 System Description

The City of Molalla's collection system has significant I/I, not unlike other communities in Western Oregon. However, in recent years, the City has completed several collection system improvement projects, aimed at reducing rain induced flows. Results indicate a reduction of infiltration and inflow into the City's collection system based on short-term data.

To decrease the size of downstream wastewater facilities, a portion of the existing aeration basin (i.e. aerated lagoon) will be repurposed to serve as an influent flow equalization basin. The aerated lagoon will be completely demolished and a portion will be constructed as the equalization basin. The remaining area and volume of the existing aeration basins will be filled. The volume dedicated to flow equalization will be approximately 325,000 gallons.

3.3.5 Instrumentation, Controls, and Measurement

A staff gauge will be incorporated in the new influent flow equalization basin so operation staff can monitor the wastewater depth. The Transfer Pump Station is hydraulically connected to the equalization basin. The pump station will include liquid level monitoring and alarm relay capabilities with the plant-wide Supervisory Control and Data Acquisition (SCADA) system.

3.3.6 Design Issues Yet to Be Resolved

- Structural design for the new influent flow equalization basin.

- Demolition of the aerated lagoon will include sludge removal. The volume of sludge removal will be determined during design, immediately prior to bidding.

- Addition of a new check valve located in between gate manhole and new influent flow equalization basin.

3.3.7 Design Data

TABLE 3.3.7.1
DESIGN DATA FOR INFLUENT FLOW EQUALIZATION BASIN

Item	Data
Type	Concrete
Number of Basins	1
Length (Feet)	100
Width (Feet)	60
Depth to HWL (Feet)	8.0
Wall Height (Feet)	11.5
Total Capacity (Gal)	325,000 Gallons

PREDESIGN REPORT MEMORANDUM	
Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	3.4
Subject:	Specific Process Area 400
	GRIT REMOVAL / FLOW SPLITTING
Date:	July 1, 2021
Prepared By:	Ryan Quigley, P.E.

3.4.1 Purpose and Scope

The purpose of the new grit system (i.e. Headworks) is to provide grit removal from the raw sewage that is pumped from the Transfer Pump Station. Following the grit removal system is a flow splitter box designed to equally split flow between the four-basin Sequencing Batch Reactor (SBR).

3.4.2 Process Schematics and Plans

A graphic description of the process may be found in the 11 by 17 inch drawing set that accompanies this report. Refer to Process Area 400 for information specific to the influent grit removal system and the flow splitting system.

3.4.3 Design Criteria

The design of the new grit removal system and flow splitting structure will meet the following general criteria:

- The system will handle the future Peak Daily Average Flows (PDAF) for the planning year 2043. Sizing of the grit removal system is based on the utilization of the influent flow equalization basin to capture peak instantaneous flow events.

- The design will include a bypass channel within the elevated structure along with two slide gates to manually direct flows.

- The grit system will include a grit chamber utilizing the vortex principle to remove grit and inorganics from the influent stream and a grit classifier to wash and dewater the removed material.

- Incorporation of outdoor freeze protection.

- Flow splitting will be accomplished by routing the flow, after grit removal, into a deep rectangular tank. The flow within the structure will discharge into four separate pipes near the bottom of the tank. These pipes will then convey the influent flow into the four pre-react zones of the SBR.

- Flow measurement will be accomplished by employing magnetic flow meters on each pipe that feeds the four SBR pre-reaction zones.

- Each pipe to the SBR basins will include a plug valve to allow the Operator to make adjustments, as required, to balance flow between SBR basins, or to take SBR basins off line.

Additionally, other design considerations include: clearance around the equipment, accessibility, and Operation & Maintenance (O&M) considerations.

3.4.4 System Description

The new grit system will consist of an elevated structure that will receive the influent flow for grit removal and flow splitting. The lower structure will house the grit classifier / washer and refuse container.

Elevated Grit Removal System
The 18-inch diameter force main from the Transfer Pump Station will convey raw wastewater to the elevated grit system. Raw sewage enters the channel and is directed into the vortex grit removal chamber where the majority of the heavier solids and inorganics settle out. The settled solids will periodically be pumped out to the grit classifier / washer based on the solids loading rate of the incoming screened sewage.

The non-potable water supply will be used to fluidize the solids in the grit chamber during the pumping sequence at a flowrate of approximately 50 gallons per minute (gpm). In the event of an overflow of the primary channel, the flow will overtop the slide gate at the bypass channel allowing for the influent flow to be directed into the flow splitting tank. A float switch will notify Operation Staff of the overflow condition via an alarm call-out system by way of the new Supervisory Control and Data Acquisition (SCADA) system.

Influent flow that passes through the grit removal system, or bypass channel, will then flow into the flow splitting tank. At the bottom of the flow splitting tank, there are four 12-inch diameter pipes that will convey the flow into their respective SBR basins. These four pipes will each utilize a magnetic flow meter and plug valves. The purpose of the plug valves is to provide additional flow throttling, if needed, and to isolate each magnetic meter or SBR basin for maintenance purposes. The flow splitting tank will have a drain line located at the bottom of the tank which will drain back to the Transfer Pump Station via an underground pipe.

A non-potable utility station will be located on the upper grit removal system for maintenance purposes.

The lower portion of the grit system is sheltered beneath the structure of the upper grit removal system. The lower area consists of a grit washer / classifier to support the function of the grit removal system. The grit washer / classifier will utilize the non-potable water system, at a flowrate of 20 gpm, for grit washing and compressed air, at a flowrate of 5 Standard Cubic Feet per Hour (SCFH), for grit aeration. The wash water and overflow from the classifier will drain back to the Transfer Pump Station via an underground pipe. A non-potable utility station and air compressor will also be located in the lower area.

Grit Classifier
A grit classifier is located in the lower area and receives pumped grit from the grit vortex chamber. The pumped grit is introduced into the settling pool of the classifier where the grit particles settle out. Air is

introduced into a portion of the grit hopper to aid in organic separation for odor reduction. The settled grit is washed and then dewatered as it ascends the conveyor screw. At the top of the conveyor screw, the settled grit is discharged through a chute that is positioned directly over a refuse receptacle. Excess liquid from the settling pool is discharged through an underdrain and returned to the Transfer Pump Station via an underground pipe. Grit that is deposited in the refuse receptacle in the lower area is accessible and available for disposal by the local sanitary hauler.

3.4.5 Instrumentation, Controls, And Measurement

Grit Removal

- Normal grit pump operation will be controlled by a timer and will operate at regular timed intervals.
- The fluidizer vanes will inject non-potable water into the grit chamber while the grit pump is in operation. The flow of non-potable water will be controlled by a solenoid valve to minimize water usage.
- Aeration air will be supplied by a dedicated air compressor located near the classifier. The compressed air will be controlled by a solenoid valve.
- The grit classifier will operate while the grit pump is in operation and will continue to run for several minutes after the grit pump has discontinued pumping.
- Unit control will be monitored and configured by a manufacturer supplied control panel.

3.4.6 Design Issues Yet to Be Resolved

- Structural components of the grit removal system and flow splitting structure.

3.4.7 Instrument List

TABLE 3.4.7.1
INSTRUMENTATION LIST FOR GRIT REMOVAL SYSTEM

Process Area 400: Grit Removal System				
1	FE/FIT		Magnetic Flowmeter	Flowrate to SBR Basin # 1 (Also relayed to SBR panel)
2	FE/FIT		Magnetic Flowmeter	Flowrate to SBR Basin # 2 (Also relayed to SBR panel)
3	FE/FIT		Magnetic Flowmeter	Flowrate to SBR Basin # 3 (Also relayed to SBR panel)
4	FE/FIT		Magnetic Flowmeter	Flowrate to SBR Basin # 4 (Also relayed to SBR panel)
5	LSH		Float	High Level Alarm in Grit Inlet
6	SV-1		Solenoid Valve	Wash Water Valve
7	SV-2		Solenoid Valve	Partial Drain Valve
8	SV-3		Solenoid Valve	Air Infusion Valve
9	LSH		Float	High Level Alarm in Sonic Grit System

3.4.8 Design Data

TABLE 3.4.8.1
DESIGN DATA FOR GRIT REMOVAL SYSTEM / FLOW SPLITTING SYSTEM

Item	Data
Grit Removal	
Type	Vortex Grit Concentrator
Number	1
Capacity	8.8 MGD
Grit Pump Hp	5
Pista Paddle Drive Motor Hp	1.5
Grit Classifier	
Type	Shaftless Classifier
Number	1
Drive Hp	1
Flow Rate	250 gpm
Pounds Per Hour	2.47 Tons/Hour
Flow Splitting Tank	
Type	Concrete Drop Box
Number	One
Outlet Pipe Quantity	Four
Outlet Pipe Size	12 Inch
Flow Range (Per Outlet Pipe)	0.45 MGD to 2.25 MGD
SBR Influent Flow Measurement	
Type	Magmeter
Number	4
Size	12 Inch
Flow Range	277.4 to 11,007 gpm

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla Wastewater Treatment Plant Upgrades
Section:	3.5
Subject:	Specific Process Area 500 **SEQUENCING BATCH REACTOR**
Date:	June 24, 2021
Prepared By:	Tyler J. Molatore, PE

3.5.1 Purpose and Scope

This Technical Memorandum document provides the design parameters and characteristics of the secondary treatment system, specifically the Sequencing Batch Reactor (SBR) and ancillary components. The main biological process for secondary treatment will consist of a SBR. Inclusive with the SBR will be blowers, Waste Activated Sludge (WAS) pumps, diffusers, mixers, decanters, SBR control panel, Supervisory Control and Data Acquisition (SCADA) system, instrumentation, and other supporting systems.

3.5.2 Process Schematics and Plans

A graphic description of the process may be found in the 11 by 17 inch drawing set that accompanies this report. Refer to Process Area 500 for information specific to the Sequencing Batch Reactor Process Area.

3.5.3 Design Criteria

The following codes and standards apply:

- National Fire Protection Association (NFPA) 820: Standard for Fire Protection in Wastewater Treatment and Collection Facilities.
- US Occupational and Safety Health Administration (OSHA).
- Oregon, Department of Environmental Quality Guidelines: Reliability Requirements for Sewage Treatment Facilities in Western Oregon.

The new Sequencing Batch Reactor will be designed to meet the following general criteria:

- Provide capacity to treat the projected Peak Daily Average Flow (PDAF) with two feet of freeboard.
- Receive raw wastewater from the grit removal system.

- Have the flexibility to operate one to four basins at a time.

- Provide a means for decanting each basin independently to a bottom water level of 14 feet.

- Provide a means of draining each basin independently.

- Provide a means to transfer waste sludge between basins or to the Aerobic Digester (Phase I and II).

- Provide fine bubble diffusion to mix and aerate the mixed liquor. Provide submersible mixers for mixing when aeration system is off. Provide three rotary positive displacement blowers, two duty and one standby. Each duty blower will serve two basins.

- Provide a sampling port for each basin at ground level.

- Provide access to each basin from ground level.

- The controls will provide the following: 1) a Programmable Logic Controller (PLC) based system for the automatic operation of equipment and process control. The PLC system shall allow for Operator interface and have a centralized control center; 2) Dissolved Oxygen (DO) probes in each tank to optimize the output of the blowers; 3) a means for manual operation of equipment; 4) magnetic flow meter for measuring and logging waste activated sludge pumped to Aerobic Digester; 5) a Total Suspended Solids (TSS) probe in each tank; and 6) a pressure transducer in each tank to monitor liquid level and floats to activate the storm cycle.

Additionally, other design considerations include: clearance around the equipment, accessibility, lighting and placement of utility stations.

Wastewater Flows and Loads
Design of the Wastewater Treatment Plant (WWTP) is consistent with the recommendations within the City of Molalla's Wastewater Facility and Collection System Master Plan (The Dyer Partnership, 2018). The Wastewater Facility and Collection System Master Plan (WWFCSMP) evaluated current and future flows and loads, evaluated WWTP improvement alternatives, and recommended a continuous flow SBR. This type of SBR was selected due to the use of minimal equipment, increased flexibility, simplicity, ease of operation and successful performance in previous projects.

Design flows and loads are summarized in Table 3.5.3.1. Flow and load projections have been updated based on recently published Portland State University Population Research Center (PSU PRC) population data for the planning year 2043.

TABLE 3.5.3.1
WASTEWATER FLOWS (2017 & 2043)

Parameter	2017	2043	
Population	9,939	15,939	
AAF	1.85 MGD	186 gpcd	2.96 MGD
ADWF	1.11 MGD	113 gpcd	1.80 MGD
AWWF	2.48 MGD	249 gpcd	3.98 MGD
$MMDWF_{10}$	1.91 MGD	192 gpcd	3.06 MGD
$MMWWF_5$	3.21 MGD	282 gpcd	4.50 MGD
Peak Average Week	4.51 MGD	402 gpcd	6.40 MGD
$PDAF_5$	6.62 MGD	552 gpcd	8.80 MGD
PIF	9.7 MGD	757 gpcd	12.07 MGD

TABLE 3.5.3.2
DESIGN FLOWS AND LOADS (2043)

Parameter	Flow (MGD)	BOD (lbpd)	TSS (lbpd)	NH_3-N (lbpd)
AAF	2.96	3,110	3,280	239
MMDWF	3.06	3,660	3,630	271
MMWWF	4.5	2,230	2,570	207
Max Average Month BOD/TSS/NH_3-N Loads		4,917	4,750	319

The design minimum influent wastewater temperature is 9.5 degree Celsius (deg C).

Design Objectives
The City of Molalla operates its wastewater system under National Pollutant Discharge Elimination System (NPDES) Permit No. 101514, issued May 12, 2014 by the Department of Environmental Quality (DEQ). The following tables list, in part, the current NPDES Permit requirements.

TABLE 3.5.3.3
NPDES PERMIT (101514) BOD_5 AND TSS LIMITS

Parameter	Average Effluent Concentrations	
	Monthly	Weekly
BOD_5	10 mg/L	15 mg/L
TSS	10 mg/L	15 mg/L

TABLE 3.5.3.4
NPDES PERMIT (101514) ADDITIONAL PARAMETERS

November – April	Limits
BOD_5 and TSS Removal Efficiency	May not be less than 85% monthly average for BOD_5 and TSS
pH	Must be within the range of 6.0 to 9.0 S.U.
Ammonia (NH_3-N)	Monthly average concentration may not exceed 16.7 milligrams per Liter (mg/L). Daily maximum concentration may not exceed 25.9 mg/L.

Upon commissioning of the new WWTP, a new NPDES Permit will be issued. The anticipated permit requirements are specified in Section 1.7.2. To account for the inherent variability in influent wastewater characteristics, operational inconsistencies, and other factors, the new SBR will be designed to achieve water quality objectives that are more stringent than the anticipated NPDES Permit. This provides the City with increased confidence level of NPDES Permit compliance and operational flexibility. The target effluent quality for the SBR is provided in Table 3.5.3.5.

TABLE 3.5.3.5
TARGET SBR EFFLUENT QUALITY

Parameter	Target Effluent Concentrations Monthly / Weekly Average
BOD_5	< 10 mg/L
TSS	< 10 mg/L
NH_3-N (Summer)	< 1 mg/L
NH_3-N (Winter)	< 5 mg/L
pH	6-9 SU

3.5.4 System Description

General
The continuous flow SBR will be the main biological treatment process at the WWTP. Raw sewage from the grit removal system will be split equally between the SBR basins, under normal conditions or send all the flows to only one or two basins during low flow conditions or for maintenance purposes. Effluent from the SBR basins is collected by variable level weirs and sent to the UV disinfection system or the effluent filtration system depending on whether or not the City is producing recycled water.

The new SBR will be located in the northwest portion of the existing Lagoon No. 2. However, the City is in the process of evaluating the possibility of relocating the SBR site to the area directly west of the existing WWTP. Reference the proposed site plan as portrayed in drawing 100-C-2. A portion of the existing Lagoon No. 2 will be taken out of service to accommodate construction of the new SBR and ancillary components.

The design has been based on the continuous feed type SBR. This type of SBR was selected due to the wet weather peaking factors, use of minimal equipment, increased flexibility, simplicity, ease of operation and successful historical performance in Oregon and nationally.

The SBR operates in react, settle, and decant cycles. Each SBR basin has a pre-react zone, created by a concrete wall. The pre-react zone functions as a biological selector.

Phasing of the SBR was evaluated during the development of this Predesign Report. After evaluating the current population and future population, and accounting for the need to design for capacity for the next several years, it was determined that phasing did not offer many financial benefits. The entire SBR system will be constructed up-front.

NFPA 820 Classification
The SBR tanks are a Class 1, Division 2 rated hazardous location. The hazardous boundary extends 18-inches above the tank walls, out 18-inches beyond the walls, down the exterior tank walls to the ground, and continues out to 10 feet beyond the tank walls at ground level up to 18-inches off the ground.

SBR Tanks
Each of the four concrete SBR basins will consist of a pre-react zone, baffle wall, main basin and common effluent box. Raw wastewater will enter near the top of the pre-react zone and will travel through the bottom of the baffle wall, horizontally through the main basin to the decanter that will then discharge to the common effluent box.

Decanters
The decanters will consist of motor actuated weir style systems. A baffle in front of the trough will prohibit scum and floating material from entering the trough. The decanters will automatically raise and lower based on signals from the main SBR control panel. They can also be operated in a manual mode. The drive motor will sit on top of the walkway. The decanters will rest or park below the wall so that they can also act as an emergency overflow.

Waste Activated Sludge Pumps
Each SBR basin will have submersible solids handling WAS pump adjacent to the decanter which will convey waste activated sludge to the new Aerobic Digesters. Each pump will be on a rail system to allow for removal of the pump without having to empty the basin.

The discharge piping will allow the WAS to be pumped to either of the Aerobic Digester basins. The line between the SBR and Aerobic Digester will have a magnetic flow meter that will record and log the WAS flows.

The on-off operation of the pumps will be controlled via signals from the main SBR control panel. There will be a remote switch at the walkway for manual control of the pumps.

Submersible Mixers
Each basin will be equipped with two submersible mixers. Each mixer will be on a rail system to allow for removal without having to empty the basin. The on-off operation of the mixers will be controlled via signals from the main SBR control panel.

Aeration System
Each basin will have an air diffuser system for supplying air to the process. Each basin will include 950 fine bubble diffusers. An automatic butterfly valve, at each basin, will control the on-off operation of the air for each basin. The valves will receive signals from the main SBR control panel. The supply pipe for each basin will connect to one of two common air headers that originate at the blower room of the new SBR Building.

Three 100 horsepower (hp) positive displacement blowers will be used to supply the required air for process needs. One blower is dedicated to two basins with the third blower on standby. Each blower will have a Variable Frequency Drive (VFD) which will match air production to oxygen demand. The blowers will be equipped with check valves, isolation valves, pressure relief valves, temperature sensors, and power failure alarms. The SBR control panel will automatically control the on-off operation of the blowers. One thermal mass air flow sensor will be installed for each duty blower. If the blowers are called to run and the SBR panel does not receive indication of air flow from the thermal air flow meter, or air flow is too low, then an alarm will be activated.

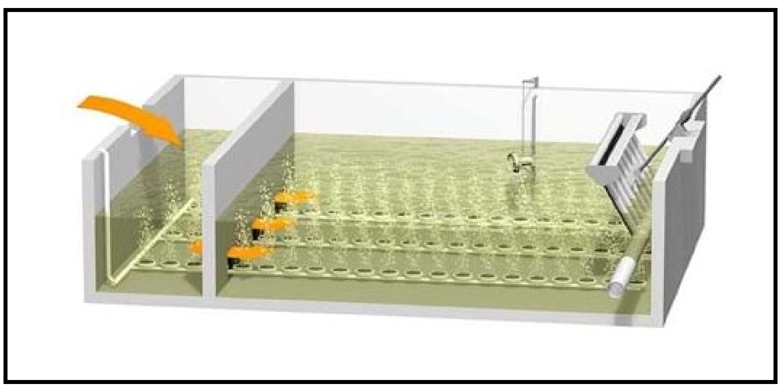
SBR Control Panel

The main SBR control panel will contain a main PLC. Process adjustments will be made with the 19-inch Human Machine Interface (HMI) panel on the face of the control panel or from the SCADA computer. A modem will provide direct communication with the manufacturer, who will retrieve data and reprogram the controller as required.

React Phase

Raw wastewater flows into the pre-react zone during the react phase. Typically, the basin contents are aerated or mixed under anoxic conditions. As the basin is filled, biological oxidation / reduction reactions take place simultaneously to treat the wastewater. At the beginning of the react phase, the blowers will not run, but the submersible mixers will keep the mixed liquor in suspension to allow denitrification using the raw soluble organics and nitrate. Denitrification reduces the aeration requirements and recovers some alkalinity lost during the nitrification process. Following the denitrification, the mixers are turned off and the mixed liquor is aerated. The blowers force air through the fine bubble diffuser system to introduce dissolved oxygen into the mixed liquor during aeration. Figure 3.5.4.1 illustrates the react phase.

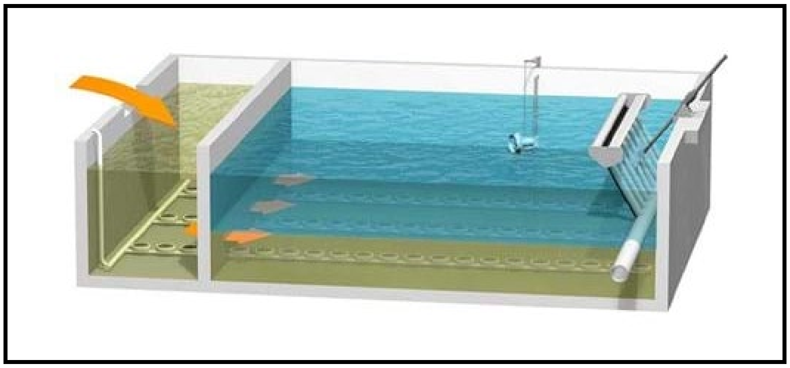
FIGURE 3.5.4.1
REACT PHASE



Settle Phase

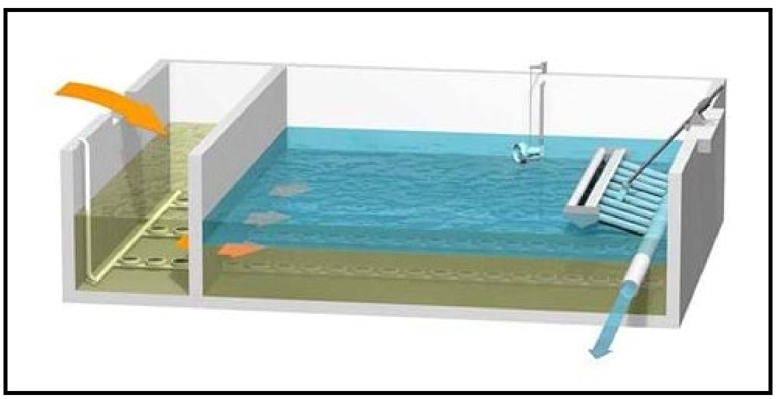
Aeration and mixing are suspended to facilitate solids settling to the bottom of the basin during the settle phase. Raw wastewater from the Transfer Pump Station continues to be conveyed to the pre-anoxic zone. As solids settle, a clear layer of water develops within the top of the water column in the basin. Figure 3.5.4.2 below illustrates the settle phase.

FIGURE 3.5.4.2
SETTLE PHASE



Decant Phase
The decanter descends into the liquid to transfer clarified supernatant and discharge it to the disinfection system during the decant phase. As with all phases of the SBR process, raw wastewater continues to flow into the pre-anoxic zone as the effluent is discharged during the decant phase. Figure 3.5.4.3 illustrates the decant phase.

FIGURE 3.5.4.3
DECANT PHASE



3.5.5 Instrumentation, Controls, and Measurement

The SBR process has four cycles: aeration off, aeration on, settling, and decant. Each cycle is a function of time. Normally, there will be six batches per day per unit with an aerated fill time of two hours, settle time of one hour, and decant time of one hour. The SBR will operate in 'Storm Mode' with twelve batches per day per unit during high influent flows. There will be 0.5 hours of aerated fill time, one hour of settle time, and 0.5 hours of decant time during 'Storm Mode'. All of the above times are adjustable may be changed to suit particular treatment objectives. Changes may be made manually at the Operator interface panel on the control cabinet or by the SBR manufacturer with the modem interface.

With four basins in operation, which is the normal mode, the cycles between the basins are alternated. When one basin is aerating the other is settling and decanting. At the end of an aeration cycle, an automatic air valve closes at the basin that was aerated and another air valve at another basin opens. Cycle times may be altered. However, aeration time cannot exceed one half of the total cycle time for either type cycle. Flow is continuously fed to all SBR basins. The SBR control system will allow for the automatic wasting of WAS (mixed liquor) from the SBR basins. The system shall operate on the principle of achieving and maintaining an Operator adjustable Solids Retention Time (SRT) to determine sludge wasting.

Two or three basin operation is possible since the basins receive continuous flow. This mode of operation should be used if maintenance or repair is required on one or more of the other SBR basins, or the plant influent flows are sufficiently low enough that two or three SBR basins can adequately treat plant flows and loads. The cycles are typically the same as with the four basins in operation.

WAS Pumps
Each SBR basin has a submersible pump that pumps waste activated sludge to the new Aerobic Digester. The pumps typically run during the decant phase. Length of run is dependent on quantity of solids needed to be wasted based on mixed liquor objectives. The run time and operation start and stop time for each WAS pump shall be easily adjustable by the Operator in-field through the operating software. Run and operation times shall be adjustable by time of day and volume of wasting. The program will allow lower wasting rates by the WAS pumps during low loading periods of the day, such as at night.

Controls for the pumps are located in the SBR control panel located within the SBR Building. LOCAL-OFF-AUTO switches are provided on the SBR control panel. Each position of the LOCAL-OFF-AUTO switch results in the following operation of the pump.

TABLE 3.5.5.1
WAS PUMPS HOA (SBR CONTROL PANEL)

Item	Operation
LOCAL	Remote switch governs pump operation.
OFF	Pump remains off.
AUTO	Pump will run based on commands from the SBR control panel.

Each pump also has a remote ON-OFF-AUTO switch at the walkways. Each position of the ON-OFF-AUTO switch results in the following operation of the pump.

TABLE 3.5.5.2
WAS PUMPS HOA (REMOTE)

Item	Operation
LOCAL	Pump runs continuously.
OFF	Pump remains off.
AUTO	Pump will run based on commands from the SBR control panel.

Each pump discharge pipe connects to a force main that conveys solids to the Aerobic Digester (Basin 1, 2, and 3 – Future Basin).

The WAS pump discharge pipe header has a magnetic flow meter and air release valve. The flow meter converter which has a totalizer and gpm readout is located on the SBR walkway, and WAS flows are shown on the SCADA system.

Mixers
Each SBR basin has submersible mixers that typically operate during the air off and aeration cycles. Length of run is determined by the manufacturer and Operator performance objectives. The run time and

operation start and stop time for each mixer pump shall be easily adjustable by the Operator in-field through the operating software.

Controls for the mixers are located in the SBR control panel located within the SBR Building. LOCAL-OFF-AUTO switches are provided on the panel. Each position of the LOCAL-OFF-AUTO switch results in the following operation of the mixer.

TABLE 3.5.5.3
MIXER HOA (SBR CONTROL PANEL)

Item	Operation
LOCAL	Remote switch governs mixer operation.
OFF	Mixer remains off.
AUTO	Mixer will run based on commands from the SBR control panel.

Each mixer also has a remote ON-OFF-AUTO switch at the walkways. Each position of the ON-OFF-AUTO switch results in the following operation of the mixer.

TABLE 3.5.5.4
MIXER HOA (REMOTE)

Item	Operation
LOCAL	Mixer runs continuously.
OFF	Mixer remains off.
AUTO	Mixer will run based on commands from the SBR control panel.

Decanters
Each SBR basin has a decanter that is designed to remove clarified effluent. The decanter drive allows the decanter to descend in pulses which will lower the decanter based on manufacturer rates. The drawdown is defined by the Top Water Level (TWL) and the Bottom Water Level (BWL). When the decanter is not operating, the decanter is positioned above the TWL. The decanter descension speed is controlled by a variable frequency drive. The discharge rate will be relatively constant from the time that the decanter enters the water to the time it reaches the BWL.

The decanter will travel from the park position to the TWL during the end of the settle phase. When the decant phase is initiated, the decanter will travel from the TWL to BWL. The normal decanter top and bottom limits, maximum vertical differential, is controlled by two sets of limit switches for regular and backup control. Adjusting the limit switches will have a corresponding effect on the vertical travel length. The decanter includes a scum guard to prevent floating solids (scum) from being discharged from the SBR basin.

Controls for the decanters are located in the SBR control panel located within the SBR Building. LOCAL-OFF-AUTO switches are provided on the panel. Each position of the LOCAL-OFF-AUTO switch results in the following operation of the decanter.

TABLE 3.5.5.5
DECANTER HOA (SBR CONTROL PANEL)

Item	Operation
LOCAL	Remote switch governs decanter operation.
OFF	Decanter remains off.
AUTO	Decanter will raise and lower based on commands from the SBR control panel.

Each decanter also has a remote OFF-AUTO-RAISE-LOWER switch next to the decanter drive. Each position of the OFF-AUTO-RAISE-LOWER switch results in the following operation of the decanter.

TABLE 3.5.5.6
DECANTER HOA (REMOTE)

Item	Operation
OFF	Decanter remains off.
AUTO	Decanter will raise and lower based on commands from the SBR control panel.
RAISE	Decanter will raise vertically.
LOWER	Decanter will lower vertically.

The rate at which the decanter raises and lowers is adjusted via the SBR control panel. Limit switches must be manually adjusted to change the vertical limits.

A signal from the SBR control panel to the UV disinfection system control panel is required during the start of SBR decanting to allow the disinfection equipment to be adequately energized to receive and disinfect the SBR discharge.

The normal and peak decant rates are 2,257 gallons per minute (gal/min) and 6,118 gal/min, respectively.

Aeration
Three (two duty, one standby) variable speed blowers will provide aeration to the biological process in the SBR. Two blowers are capable of satisfying oxygen demand requirements for carbonaceous and nitrogenous removal. Blowers are sized at maximum month loads. Motorized butterfly valves, associated with each SBR basin, are controlled to direct air delivery to each respective SBR basin. The blowers will alternate duty and standby to evenly distribute the run time for each blower.

Target design Dissolved Oxygen (DO) level during aeration cycle is 2 mg/L. Air flow to the SBR basins is controlled using DO probes within each basin. A Proportional Integral Derivative (PID) control loop adjusts blower speed to accomplish target DO levels within each basin.

Safety
Flotation life-rings will be provided along all walkways at the SBR.

Reliability / Redundancy
For redundancy purposes, a four basin SBR is proposed. The blowers are sized such that with the largest blower out of service the remaining units can maintain the design oxygen requirement. A backup WAS pump will be provided within the SBR supplier's scope of supply.

SBR Control Panel
The SBR is monitored by a PLC and SCADA system. If required, process adjustments are made with the Operator interface located on the front of the SBR control panel. A 19-inch HMI will be provided. The

SBR control panel is to be located in the electrical room of the SBR Building. The controller is also provided to provide a direct communication with the SCADA system and manufacturer's main office. The manufacturer will be capable of retrieving data and reprogramming the controller if required.

The front panel of the controller has indicating lamps for the following:

TABLE 3.5.5.7
INDICATING LIGHTS

Item	Operation
Decanters	Raising, lowering and alarm
Air Valves	Opening, closing and alarm
Waste Activated Sludge Pumps	Running and alarm
Blowers	Running and alarm
Treatment Step for Each SBR	Aeration, settling, decant, off
Cycle Indicator	Normal, storm
Mixers	Running and alarm

The SBR control panel will include alarm communication equipment that will allow alarms to be relayed to the plant-wide SCADA system and subsequently to the Operator via text, email, or phone.

SBR Drains
The SBR basins can be drained for cleaning and maintenance through a mud valve located at the bottom of each basin. The valve allows the basin to be drained back to the Transfer Pump Station.

SBR Level Sensors
Each SBR basin will have a submersible pressure transducer mounted in the SBR basin. The level transducer will provide information to the SCADA system such that the SBR basin level is shown on the plant SCADA system and Operator interface.

Each SBR basin will have two floats. One float is a storm float, signaling the SBR to enter storm mode. The second float is a high-water float, which will signal the SBR to raise the decanter to the highest position, and park the decanter while alarming to the SCADA system that high water levels have occurred.

SBR Dissolved Oxygen Sensors
Each SBR basin will include a DO sensor and adjacently mounted transmitter. The DO will relay a 4 to 20 milliamp (mA) signal to the SBR control panel. The DO input will be used to automatically adjust air flow rates.

Solids Retention Time
The SBR control panel will allow for the automatic wasting of mixed liquor from the SBR basins based on real-time TSS probes installed within each basin. The system shall operate on the principle of achieving and maintaining an Operator adjustable SRT to determine sludge wasting. The system will control sludge wasting based on the Operator selectable SRT target value, entered in days. The system will have the capability of automatically changing the sludge wasting rate, or suggest a new sludge wasting rate, which can be manually changed. The system shall also include the necessary operational safeguards to prevent the system from operating outside an acceptable range.

An SRT control overview screen for each basin will be located in the SBR control panel and SCADA system, including, but not limited to, the following information.

- Control mode selection, Automatic or Manual.
- Basin data, including Mixed Liquor Suspended Solids (MLSS) concentration, waste sludge flow rate, and waste sludge concentration.
- Wasting data, including mass wasted and pump run times.
- Historical wasting rates.
- Operator selectable target SRT (entered in days) target and sensor cleaning times.
- Trending screens for following information for each basin: basin MLSS concentrations, waste sludge concentrations, wasting rates, average SRT, and the average mass of solids in each basin.

Standby Power
If the primary power source is interrupted, the new 500 kW emergency power system will be automatically activated. The entire SBR process will remain operational for the full duration of power loss. An Uninterruptable Power Source (UPS) will be provided to allow for uninterrupted power to the SBR control panel during the switching of power sources.

Access Manways
Each SBR basin will include an access manway at ground level to facilitate access into each SBR basin for maintenance purposes.

Non-Potable Water Stations
Four non-potable water stations will be included at the elevated walkways of the SBR. Two will be located on one end, and two on the opposite end.

Flow Measurement
For recording influent flows, each SBR basin will include 12-inch diameter influent flow meters (magnetic) to record instantaneous and totalized flow data for each SBR basin. The magnetic flow meters will be designed and installed with suitable setback distances pre and post the sensors. A main magnetic flow meter (unrestricted) will be installed on the main effluent line from the SBR and prior to the UV disinfection system. A WAS flow meter will be installed on the WAS conveyance system to the Aerobic Digester.

Air Flow Sensors
Two air flow sensors will be included, one for each duty blower. The air flow sensors will be thermal mass air flow sensors, and relay a 4 to 20 mA signal to the SBR control panel. The air flow data is useful to confirm blower performance.

Flow Splitting
A splitter box will be designed and installed to equally split the influent flow between SBR basins. The splitter box will include one inlet and four outlets. Each outlet will include adjustable plug valves and magnetic flow meters. A drain will be included in the design to accommodate draining the splitter box, if necessary.

3.5.6 Design Issues Yet to Be Resolved

- Structural design of the SBR structure.
- Electrical and instrumentation design of SBR and ancillary systems.
- SCADA system.
- Alkalinity feed system requirements, if required.
- Splash plates for dissipating energy of influent flow to the SBR basins to prevent breaking aeration piping and diffusers.
- SBR site selection will require further evaluation due to cost, constructability and construction sequencing considerations.

3.5.7 Instrument List

TABLE 3.5.7.1
INSTRUMENTATION LIST FOR SBR

Process Area 500: Sequencing Batch Reactor				
SBR Basins, Typical Each				
1	DO		DO Meters	DO sensor, typical each basin.
2	LSH		Floats	Basin high water level, typical each basin.
3	LSL		Floats	Basin low water level, typical each basin.
4	FE/FIT		Magnetic Flow Meter	Totalized WAS flow.
5	TIT		Temperature Sensor	WAS pump temperature sensor, typical each.
6	M		Moisture Sensor	WAS pump moisture sensor, typical each.
7	PT		Pressure Transducer	Level transducer, typical each basin.
8	PI		Pressure Gauge	Discharge pressure on WAS pumps.
9	LI		Staff Gauge	Indicates SBR liquid level.
10	TSS		TSS Sensor	TSS sensor, typical each basin.
11	FE/FIT		Magnetic Flow Meter	Totalized SBR basin influent flow, typical each.
SBR Blowers, Typical Each				
1	FE/FIT		Air Flow Sensor	Air flow sensor, typical per each duty blower.
2	TIT		Temperature Sensor	Temperature of each blower, typical each.
3	PG		Pressure Gauge	Pressure gauges each blower.
General				
1	FE/FIT		Magnetic Flow Meter	Combined secondary effluent.

3.5.8 Design Data

TABLE 3.5.8.1
DESIGN DATA FOR SBR

Item	Data
Type	Continuous Flow
Number of Basins	4
HRT (Hours)	18
SRT (Days)	16.9
Volume / Basin (Gal)	620,000
Basin Dimensions	
Basin Length (ft)	118.6
Basin Width (ft)	39
TWL (ft)	18
BWL (ft)	14
Design MLSS (mg/L) at TWL	2,500
Design Flow Process Cycle	
No. Batches/Day	6 Per Unit
Aerated Fill Time (Hours)	2
Settle Time (Hours)	1
Decant Time (Hours)	1
Complete Cycle Time (Hours)	4
Storm Flow Process Cycle	
No. Batches/Day	12 Per Unit
Aerated Fill Time (Hours)	0.5
Settle Time (Hours)	1
Decant Time (Hours)	0.5
Complete Cycle Time (Hours)	2
Influent Flow Meters	
Type	Magnetic
Number	4 (1 Per Basin)
Diameter (Inches)	12
Capacity (gpm)	277.4 to 11,007.1
Aeration System	
Diffusers	Fine Bubble
No. Diffusers/Basin	950
Blowers	
Number	Three (Two Duty, One Standby)
Type	Positive Displacement with VFDs
Capacity (SCFM at 8.9 psig)	1,506
Horsepower, EA	100
Control	DO Paced
Actuated Air Valves	
Type	Electric, Non-Modulating
Number	4 (1 Per Basin)
Diameter (Inches)	8

Item	Data
Air Flow Sensors	
Type	Thermal Mass
Number	2
Diameter (Inches)	8
Capacity (SCFM)	60 to 6,000
Dissolved Oxygen and Temperature Analyzers	
Type	Probe and Transmitter
Number	4 (1 Per Basin)
WAS Pumps	
Type	Centrifugal, Submersible
Number	4 (1 Per Basin)
Horsepower, EA	2
Capacity (gpm at ft TDH)	200 gpm at 18 ft TDH
WAS Flow Meter	
Type	Magnetic
Diameter (Inches)	4
Number	1
Capacity (gpm)	27.7 to 1,100.7
TSS Analyzers	
Type	TSS
Number	4 (1 Per Basin)
Mixer	
Type	Submersible
Number	8 (2 Per Basin)
Horsepower, EA	15
Decanter	
Type	Variable Level
Number	4 (1 Per Basin)
Average Decant Rate (gpm)	2,257
Peak Decant Rate (gpm)	6,118
Level Transmitters	
Type	Pressure Transducer
Number	4 (1 Per Basin)
Level Switches	
Type	Float
Number	8 (2 Per Basin)
Low Level	4 (1 Per Basin)
High Level	4 (1 Per Basin)

PREDESIGN REPORT MEMORANDUM	
Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	3.6
Subject:	Specific Process Area 510
	EFFLUENT FILTER SYSTEM
Date:	November 2021
Prepared By:	Dan Walters, PE

3.6.1 Purpose

The purpose of the effluent filters is to remove particulate material from secondary effluent, produced by the Sequencing Batch Reactors (SBR), to reliably produce Oregon Class C quality recycled water. Filtration improves Ultraviolet (UV) disinfection effectiveness by removing particles that may shield the organisms from UV, or in which organisms are embedded, which can also reduce UV exposure.

3.6.2 Background

The existing Wastewater Treatment Plant (WWTP) includes two Dissolved Air Flotation (DAF) units and four multi- media wastewater filters. The DAF units and filters are operated throughout the entire year. The main purpose of the existing DAF units is to remove algae from the lagoon effluent. This allows for longer filter runs, as otherwise algae tends to reduce the flux rate of the filters. The existing filters remove additional solids in order to meet discharge limits and recycled water quality requirements

Lagoon effluent flows by gravity to the DAF units, then to an influent splitter box, feeding the four filters. Each DAF unit includes a circular clarifier, a tank in which to saturate the lagoon effluent, two recycle or pressurization pumps, an influent flow meter and an influent flow control valve.

The solids-laden liquid streams from the DAF units and the waste backwash water from the existing filters are returned to the Transfer Pump Station. This is problematic as the solids are not removed from the plant, just recycled. This causes solids overloading of the DAF units and filters.

By contrast, the new effluent filters will only operate during the recycled water irrigation season (dry weather) and with only one filter on-line. The other filter will be in standby mode. The filter influent will be SBR effluent instead of DAF treated lagoon effluent with much lower Total Suspended Solids (TSS) concentrations, typically less than 10 milligrams per Liter (mg/L) on average, and less than 20 mg/L peak.

3.6.3 Design Criteria

There are no specific filter design criteria for Oregon Class C recycled water production. Those for Oregon Class A recycled water production will be used.

The new effluent filters will be designed to meet the following requirements:

- There will be two filters for system redundancy, with one unit having the ability to meet the flow and treatment requirements. The filtration capacity for each will be 4.5 Million Gallons per Day (MGD); the anticipated peak SBR decant rate during recycled water irrigation season.
- The filter media will be a polyester cloth filter media with an opening with size of 10 microns.
- The filtration equipment must be certified as California Title 22 compliant and must be capable of producing an effluent that: 1) does not exceed 5 mg/L TSS for more than 72 minutes, and 2) never exceeds 10 mg/L TSS and 2 Nephelometric Turbidity Units (NTU).

Each filter will be equipped with the following:

- An effluent turbidimeter, continuously monitoring the filter effluent, and a filter level sensor so the system can automatically initiate a backwash cycle, alarm on high level, and alarm on overflow (high, high level). Turbidity will be recorded hourly.
- A fixed overflow weir where the filter influent in excess of what can be filtered is returned the to Transfer Pump Station.
- Piping connections for the waste backwash water, or backwash water return, and the filter influent overflow.

3.6.4 System Description

A 24-inch diameter line conveys secondary effluent from the SBRs to the 20-inch diameter filter influent line. As effluent filtration is not required during the discharge season, there is also a flow path from the SBRs directly to the UV disinfection system.

Note: If needed, both filters could be on-line, providing a combined filtration effluent flow of up to 8.8 MGD when feeding Effluent Storage Pond No. 1, only.

The filter influent enters the filter through a center drum on which the discs are mounted and through which they are fed.

Solids are separated from the water by the polyester cloth filter media mounted on both sides of multiple wedge segments comprising each of the discs, which are partially submerged. Within the disc segments, filtered solids are retained on the inside surface of the filter media cloth. The filtered water passes through the media to outside of the disc segments. Outside of the disc segments, filtered water accumulates and flows over an effluent weir into an effluent collection channel and out of the filter enclosure through the 20-inch filter effluent line.

During normal operations, when the water level in the inlet channel rises to a specific point, the control system automatically initiates a backwash cycle. Filter effluent is used as the clean backwash water supply. It is pumped to the backwash spray header and nozzles. The nozzles spray backwash water through the filter media cloth from outside the disc segments, washing solids off of the inside surface of the cloth filter media into a collection trough. From the trough, the waste backwash water in which the backwash solids are suspended flows out of the filter enclosure, and through a 6-inch diameter waste backwash water / drain line, then through the 20-inch overflow line described below to the Transfer Pump Station.

Should the filter influent flow exceed the filtration capacity, the level in the inlet box will rise. If it rises high enough, it will overtop a fixed overflow weir and the excess flow will exit the filter enclosure via a 20-inch diameter overflow line to the Transfer Pump Station. This is the line into which the 6-inch waste backwash water drain ties.

Each filter has a turbidimeter that will be connected to the control panel and integrated into the plant-wide SCADA system.

Filter effluent flows to the UV disinfection system.

Future Considerations
The upgrades will allow the City to pursue as needed Class A recycled water production without additional filters.

3.6.5 Instrumentation, Controls, and Measurement

Secondary Effluent Flow to Effluent Filtration System
The decant rate, set by the SBR controls, determines the secondary effluent flowrate, hence the filter influent flowrate. If that flowrate exceeds the then current filtration capacity, excess filter influent goes over a weir within the filter enclosure and back to the Transfer Pump Station.

Effluent Filter System Controls
Each filter will have a Programmable Logic Controller (PLC), a microprocessor-based panel for monitoring and control. The filter level control sensor will send a signal to the PLC. The PLC can initiate the backwash cycle automatically. The PLC which will also initiate an alarm in the event that a high level or overflow (high, high level) condition occurs.

3.6.6 Design Issues Yet to Be Resolved

- Placement of filter system panels, one per filter.

- Whether to provide actuated filter effluent valves. This would allow the filter to automatically divert filter effluent to the Transfer Pump Station should the filter effluent turbidity exceed the pre-set value. If the turbidity were too high, the filter effluent valve would be closed automatically, causing the filter influent to rise and top the overflow weir, sending the off-spec filter effluent to the Transfer Pump Station.

3.6.7 Design Data

TABLE 3.6.7.1
DESIGN DATA FOR EFFLUENT FILTERS

Parameter	Design Value
Type	Rotating disc filter with inside disc to outside disc filtration flow direction.
Maximum Flow	4.5 MGD per unit
Number of filters	2
Number of discs per filter	18
Total filter area per unit	1,085 square feet
Net filter area per unit, the submerged surface area (nominal)	705 square feet
Filtration rate at peak instantaneous flow of 4.5 MGD	4.5 gpm per square foot
Filter rotation drive	1.5 hp
Backwash Water Pump	15 hp
Total Waste Backwash Water	0.5 – 1.0 % of filtered flow
Filter performance characteristics with filter influent TSS $\leq$ 10 mg/L	Less than 5 mg/L TSS Less than 2.0 NTU

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrade
Section:	3.7
Subject:	Specific Process Area 600
	UV DISINFECTION SYSTEM
Date:	November 2021
Prepared By:	Dan Walters, P.E.

3.7.1 Purpose

The purpose of the Ultraviolet (UV) disinfection system is to disinfect secondary effluent or filter effluent, producing final effluent. The final effluent is discharged to the Molalla River or reused as Class C recycled water depending on time of year and National Pollutant Discharge Elimination System (NPDES) Permit requirements.

3.7.2 Background

The existing facility disinfects by chlorination. Hypochlorite tablets are dissolved to make a hypochlorite solution introduced downstream of the existing multimedia filter and well mixed with the bulk fluid (filter effluent) via an inline mechanical mixer on the way to the chlorine contact basin. The disinfected effluent flows from the chlorine contact basin to the Effluent Pump Station to be conveyed offsite through a force main to be discharged to the Molalla River or to be recycled via agricultural irrigation at approved sites. As the existing chlorine contact basin is relatively small, the force main provides the required contact time. Effluent to be discharged is dechlorinated at the discharge structure at the river.

The existing plant produces Class C recycled water as specified in the current Recycled Water Use Plan (The Dyer Partnership, 2018). A small portion of which is conveyed to the City cemetery to irrigate the landscaping. The balance of which is conveyed to the Coleman Ranch irrigation site.

Regulations, plans and expectations are subject to change. It is conceivable that the City will eventually target a higher class of recycled water (Class A), in the future. Therefore, the current upgrade will be designed;

- To meet Class C recycled water disinfection requirements, as well as the disinfection requirements for discharge.
- For additional UV units to be added in a future upgrade to achieve Class A recycled water.

The latter will be accomplished by considering future equipment in equipment configurations, process piping, signal wiring, and electrical power in the process areas for UV.

3.7.3 Disinfection Method

Disinfection by the UV system is due to germicidal wavelengths of ultraviolet light, like disinfection by sunlight. These are produced by UV lamps rather than the sun. The UV light deactivates microorganisms in wastewater, stopping reproduction, preventing the spread of pathogens.

The lamps are in close proximity to the wastewater being disinfected. Care is taken in design of the UV reactor to make sure that all of the water passes close enough to the lamps for long enough to receive enough of an adequate UV dose for the particular disinfection requirement.

A dose is expressed as an energy flux, indicating how much germicidal UV light energy passes through a unit area. The unit most often used is millijoules per square centimeter (mJ/cm^2). Minimum doses have been established for various disinfection requirements (i.e., requirements for Class C recycled water production versus Molalla River discharge). The minimum dose for Class C is 60 mJ/cm^2. Whereas, the minimum UV dose when discharging to the Molalla River is 30 mJ/cm^2.

3.7.4 Design Criteria

The design of the new UV disinfection system provided in the current upgrade project will meet the following general criteria:

- The system will disinfect with germicidal wavelengths of UV light generated by low pressure, high output ultraviolet lamps.
- The lamps will not come in contact with the secondary or filter effluent being disinfected and there are no quartz sleeves around the lamp to do so. Instead of sleeved lamps immersed in the effluent, the effluent will flow through fluoropolymer tubing in close proximity to the lamps which are surrounded by air.
- The system will be flow paced to reduce energy use, while still meeting the disinfection requirement.
- For discharge of final effluent to the Molalla River:
  - The monthly logarithmic mean indicator organism count, which for discharge is the *E. coli* count, must not exceed 126 organisms per 100 milliliters (mL), with no sample exceeding 406 organisms per 100 mL.
  - The minimum UV dose shall be greater than or equal to 30 mJ/cm^2.
- For Class C recycled water production:
  - The seven-day median indicator organism count, which for recycled water production is Total Coliform, count must not exceed 23 organisms per 100 mL, with no two consecutive samples exceeding 240 organisms per 100 mL.
  - The minimum UV dose shall be greater than or equal to 60 mJ/cm^2.

3.7.5 System Description

Flow Path
After the current upgrade project, the UV disinfection system will receive secondary effluent or filter effluent. During discharge to the Molalla River, the filters are bypassed and Sequencing Batch Reactors (SBR) effluent flows directly to the UV system.

The final effluent will flow from the UV disinfection system through the non-potable water tank, from which the non-potable pumps withdraw final effluent and pump it into the Non-Potable Water Distribution System. The remainder of the final effluent flows from the tank to the Effluent Storage Ponds.

UV System Equipment
The new UV disinfection system includes two parallel trains of UV equipment. Each train includes one reactor. The reactor is a fully enclosed, stainless-steel vessel. Access to the lamps is through access doors on top of the reactor.

The UV influent flow meter is located immediately upstream of the UV system, between the UV disinfection system and the tertiary filters. The UV control panel is currently to be located in the electrical room of the SBR Building, but further consideration to locating it by the UV system is ongoing.

The UV influent flows through horizontal fluoropolymer plastic tubes located within the UV reactor. Ultraviolet lamps surround the tubes for each tube to be exposed to the UV light from all sides. Ultraviolet reflecting alloys form the outer casing and reflect light back into the water.

Each reactor includes three banks of horizontally-oriented lamps in series. Ultraviolet lamps are a low pressure, high output non-amalgam type which generate a UV light wavelength of 254 nanometer (nm).

The non-contact type system requires less maintenance compared to traditional UV systems with quartz sleeves surrounding the lamps and immersed in the wastewater being disinfected. There are no special tools or chemicals needed to clean the sleeves.

The lamps are cooled by air to water heat exchangers. The lamp cooling system is integral to the UV disinfection system unit. Cooling pumps convey a portion of the water flowing through the UV system flow to the heat exchangers. From there it goes back to the main flow through the system.

An ultrasonic level element determines the liquid level within the inlet box for the reactor. This liquid level is used to activate the lamps and to provide flow-pacing, matching the number of lamps turned on to the flow. This flow pacing greatly reduces energy consumption.

As the level fluctuates, the UV system controls will turn lamps on and off, as needed. Lamps above empty tubes, or the water level, are turned off. Lamps below the water level are left on.

3.7.6 Instrumentation, Controls, and Measurement

UV Influent Flow
There will be a 24-inch diameter magnetic flow meter immediately upstream of the UV system, continuously measuring the secondary effluent or filter effluent flow directed to the UV disinfection system. The flow signal for this unit will be integrated into the SBR and UV panel control panels.

A UV system level instrument will continuously measure the level in the reactors, in turn used to activate entire rows of lamps corresponding to the liquid level in the UV reactor.

A real-time UV transmissivity unit will be installed to continuously monitor the effluent transmissivity. If the value drops below design set points, an alarm will be activated.

UV System Panel
The UV system has a PLC for monitoring and control. A touch screen interface, located on the exterior of the panel enclosure, will also be available for assessment of system status and to adjust parameters.

The level sensor and influent flow data will be transmitted to the UV panel and used to activate UV lamps based on the level and influent flow. UV intensity monitors will be installed for each bank of lamps. The output from these will be connected to the UV panel.

The UV panel will send operational data and alarms to the plant-wide Supervisory Control and Data Acquisition (SCADA) system for monitoring and control purposes. These will include: low water level, lamp out, ballast out, low UV intensity, and communication module failure.

3.7.7 Design Issues Yet to Be Resolved

- Determine design requirements to accommodate additional UV system components for production of Class A recycled water in the future.
- Design requirements for the Process Area canopy and other structural elements.
- Electrical system design.
- UV System control panel design and location.

3.7.8 Instrument List

TABLE 3.7.8.1
INSTRUMENTATION LIST FOR UV DISINFECTION SYSTEM

Process Area 600: UV Disinfection System				
1	LET		Level Transmitter	Reactor tank water level (supplied with the reactor)
2	FET/FIT		Magnetic Flow Meter	Totalized influent flow to the UV system.
3	TR		UV Transmittance	Instantaneous UV transmissivity
4	T		Temperature Sensor	Instantaneous water temperature

3.7.9 Design Data

TABLE 3.7.9.1
DESIGN DATA FOR UV DISINFECTION

Item	Data
Type	Horizontal, Noncontact UV
Number of Trains of UV Equipment	2
Number of Reactors per Train	1
Number of Banks per Reactor	3
Number of Cooling Pumps per Reactor	2 (total of 4)
Number of Fluoropolymer Tubes per Reactor	80
Number of Lamp Racks per Bank	9
Number of Lamps per Rack	12
Number of Lamps per Bank	106
Number of Lamps per Reactor	324
Number of Lamps, Total	648
Maximum Disinfection and Hydraulic Capacity	For Discharge: 9 MGD For Class C RW production: 4.5 MGD
UV Dose	For Discharge: 30 mJ/cm^2 For Class C RW production: 60 mJ/cm^2
UV Transmittance Sensor	1 total
UV Intensity Sensors	6 total, 1 per bank
Lamp Control	Flow Paced: Rows of lamps turned on & off, depending on level in the reactor
Lamp Type	Low Pressure, High Output, non-amalgam, “smart” lamps
Level Sensor	2 total, one per reactor: Ultrasonic type
Temperature Sensor	One, installed in effluent box of one of the two reactors.
Summary of Operating Conditions and Effluent Quality Requirements	Discharge For Class C Recycled Water Production: • Two reactors operating • Two banks per reactor operating, third bank standby • This meets the 50% redundancy requirement for banks operating at peak flow • UV Transmittance at 245 nm $\geq$ 65% For Discharge to the Molalla River: • UV influent normally not filtered • 30-day avg BOD & TSS both < 20 mg/L • Turbidity: 5 NTU (typical) • Max. allowable flow per train = 4.5 MGD • Monthly logarithmic mean indicator (*E. Coli*) count must not exceed 126 organisms per 100 mL, with no sample exceeding 406 organisms per 100 mL For Class C Recycled Water Production: • UV Influent must be filtered • 30-day avg BOD & TSS both < 10 mg/L • Turbidity: 2 NTU • Max. allowable flow per train = 2.25 MGD • 7-day median indicator organism (Total Coliforms) count must not exceed 23, with no two consecutive samples exceeding 240 organisms per 100 mL

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	3.8
Subject:	Specific Process Area 700
	EFFLUENT STORAGE PONDS
Date:	November 2021
Prepared By:	Dan Walters, PE Tyler Molatore, PE

3.8.1 Purpose

The purpose of the Effluent Storage Ponds are to store final effluent until the effluent is conveyed offsite via the Effluent Pump Station and associated force main.

3.8.2 Background

Existing Lagoons No. 1 and No. 2
There are two existing facultative wastewater treatment lagoons, Lagoons No. 1 and No. 2, designed to operate in series and to provide primary and secondary treatment. The lagoons were constructed in the late 1970s. Both lagoons have clay liners, constructed from native soil materials. The capacity data shown in Table 3.8.2.1 are based a maximum working depth of twelve feet of water depth above the lagoon floor. Above the 12-foot working depth zone, there is three feet of freeboard to the top of the lagoon berm.

TABLE 3.8.2.1
STORAGE CAPACITY DATA FOR LAGOONS NO. 1 AND NO. 2

Item	Storage Volume, MG
Lagoon No. 1	45
Lagoon No. 2	53

There are existing field drains under the lagoons that intercept seasonally high groundwater and discharge it to a drainage ditch system.

The construction contract drawings for the lagoons show band-shaped areas along the interior faces of the berms where riprap was to be installed. In addition, additional riprap was placed in the 1990s to further protect the berms from erosion by wind driven wave action.

Lagoon No. 1 has three floating mechanical mixer / aerators moored near its inlet. The remainder of Lagoon No. 1 is not mechanically aerated or mixed, nor is Lagoon No. 2.

The lagoon effluent flows by gravity to the existing tertiary treatment facilities consisting of Dissolved Air Flotation (DAF) units and multi-media filters. These processes remove algae and other particles from the lagoon effluent just upstream of the point where the hypochlorite disinfectant solution is added. Filter effluent flows by gravity to the hypochlorite addition point, through a rapid mix zone (i.e., inline mechanical mixer), then into the Chlorine Contact Basin. From there it flows by gravity to the Effluent Pump Station.

There is an associated flow control system that regulates the influent flow rate to the existing DAF thickeners and all downstream processes with one modulating inlet control valve per DAF unit. This regulates the flow rate through the existing DAF units, multi-media filters, the Chlorine Contact Basin and the Effluent Pump Station.

This existing flow control system will be demolished during the current upgrades, along with the DAFs and the multi-media filters.

Modifications to Lagoon No. 1

During the current upgrade project, Lagoon No. 1 will be drained and cleaned of accumulated solids. Its native clay liner will be spot repaired, if necessary. It will be recommissioned as Effluent Storage Pond No. 2.

After the upgrade project, Lagoon No. 1 will often sit empty. The lagoon will be available for supplemental effluent storage when additional storage is needed. This is anticipated in years with wet springs and falls, as the plant is currently not allowed to discharge in May and October, the first and last months of the irrigation season. See Section 3.8.5 for more on this topic.

Modifications to Lagoon No. 2

During the current upgrade project, Lagoon No. 2 will be drained, cleaned of accumulated solids, and then modified to create the new Effluent Storage Pond No. 1. It will be lined with an elastomeric membrane system over the original liner of native clay.

Prior to other modifications, the northwest portion of the northwest corner of Lagoon No. 2 is to be filled with compacted structural fill. The ground surface elevation for the filled area will be at approximately the same as that of the top of the northern berm. This filled area is where the Sequencing Batch Reactors (SBRs), new effluent filters, Ultraviolet (UV) disinfection system, and non-potable water tank and pumps will be located. A temporary cofferdam will be constructed so that this area can be emptied for construction work while the remainder of Lagoon No. 2 remains in service. The filled area will reduce the working volume of Lagoon No. 2 by 5 Million Gallon (MG). Refer to Table 3.8.2.1 for the current volume of Lagoon No. 2. The volume of Effluent Storage Pond No. 1 will be approximately 49 MG.

The other modifications to Lagoon No. 2 are listed hereafter:

- Remove the riprap covering large portions of the interior slopes of the berms.

- Restore the interior surfaces of the berms, and of the flat floor, to the original dimensions. The interior berm slopes were designed with 1H:3V slopes. This will probably require recontouring (cut and fill), to provide a smooth, uniform soil surface on which to install the membrane liner system.

- Installing an elastomeric membrane liner system, including a medium weight, loose weave geotextile under the entire liner. A geo-composite between the geotextile and the liner, and the liner.

  - The geotextile protects the prepared soil surface and the underside of the liner during and beyond construction.

  - The geo-composite will be placed under approximately fifty percent of the liner by area. It will be laid out to collect and transport bio-generated gas to the vents at 25 ft center to center spacing around the top of the liner. This is important as there are normally non-stabilized wastewater components in the soil after years of treatment lagoon use. Anaerobic microbial processes generate gas as that material is stabilized. That gas accumulates under the membrane liner and can form pockets of gas causing the liner to balloon in places ("whales").

- A new inlet structure near the southwest corner of the impoundment.

- Modifications to the existing line connecting both lagoons near the southeast corner of Lagoon No. 2, the invert of which is at floor level in Lagoon No. 1. This includes increasing the line size on the Lagoon No. 2 side, a pipe penetration through the new elastomeric membrane liner, and an isolation valve on the Lagoon No. 2 side.

- Installing two Solarbees, which are long distance, bulk fluid circulators, to minimize short circuiting, maximize the average oxygen content throughout the pond, maintain good water quality during storage, minimize blue green algae production, and reduce stratification. More information regarding the long distance circulators are provided later within this section.

- Installing an adjustable withdrawal pipe which can bend or swivel, mounted on a new outlet structure. The withdrawal pipe will be able to rotate in a vertical plane, putting the inlet of the pipe through a range of depth above the pond floor (from approximately two feet to 11 feet, a foot below the normal high water surface elevation).

  - The adjustable pipe is a means of withdrawing from different depths as a backup to the circulators. The pipe is provided for situations where the water quality in the reservoir near the outlet structure is showing variation by depth, despite the action of the circulators. It also allows one to withdraw from above or below a thermocline.

  - A drain line will also be installed at the new outlet structure. It can be used to withdraw effluent from near the floor of the reservoir during normal operation and to drain the reservoir when needed.

- Leak testing.

- Recommissioning the modified lagoon as Effluent Storage Pond No. 1.

Long Distance Circulators – SolarBees
Figures 3.8.2.1 through 3.8.2.3 provide images and illustrations of the SolarBees product. Figure 3.8.2.1 shows a SolarBee floating in a reservoir or residential lake.

FIGURE 3.8.2.1
SOLARBEE

Figure 3.8.2.2 displays an entire SolarBee unit with a j-hook inlet device allowing adjustment between the water surface elevation and inlet depth. Adjustments can be made via a chain between the one of the floats and the j-hook.

FIGURE 3.8.2.2
SOLARBEE DETAIL

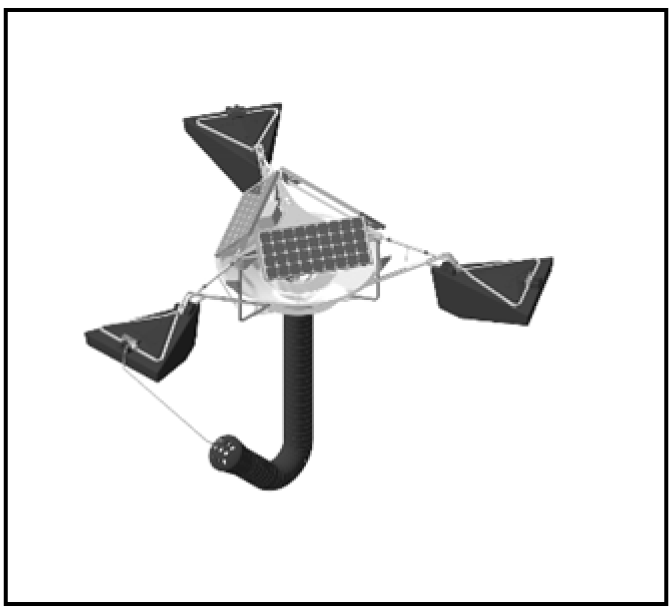
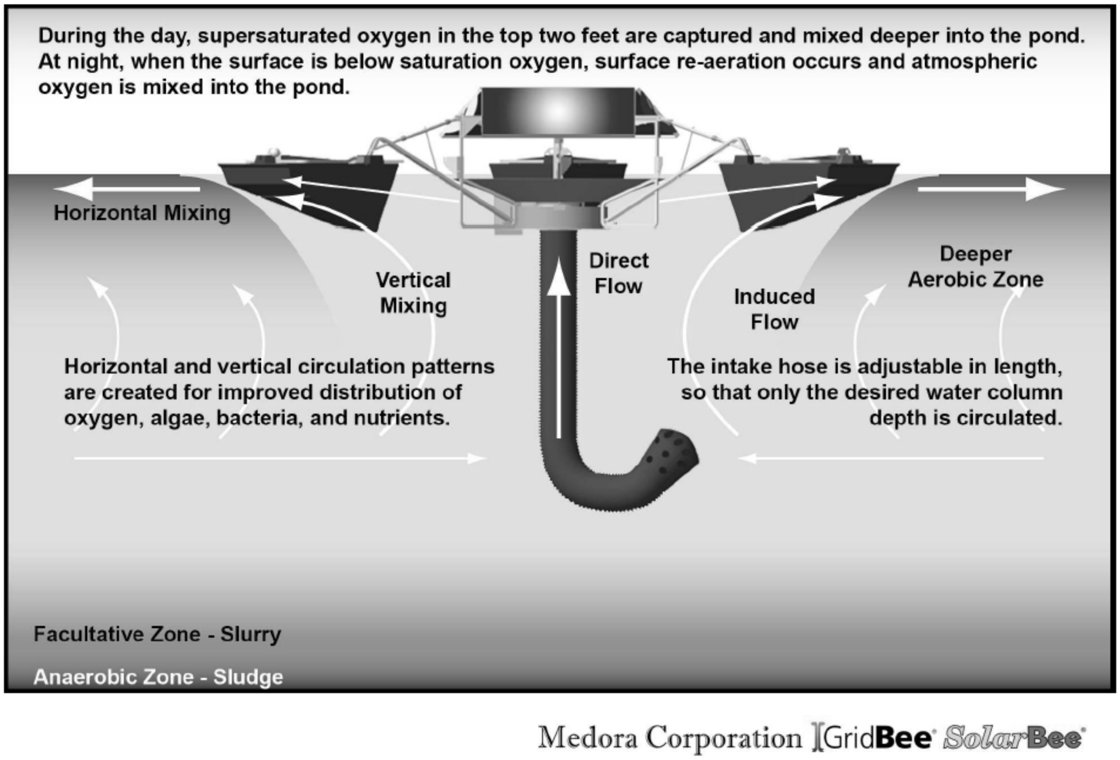


Figure 3.8.2.3 illustrates the long-distance circulation pattern set up by the unit.

FIGURE 3.8.2.3
CIRCULATION PATTERN ILLUSTRATION



- The units will be tethered to shore with enough slack in the tethering system to allow the circulator to move up and down with the water surface elevation between approximately two and 15 feet of depth, the overflow elevation.

- As the water level in the reservoir drops and the circulator nears the floor of the reservoir the following will occur:

  - The j-tube inlet piping will lay down on the reservoir floor.

  - The circulator will come to rest on the reservoir floor on legs designed to not damage the liner. To further protect the liner where a circulator will come to rest on the bottom at low reservoir depths, the elastomeric liner can be "doubled" in the landing zone The "doubling" will provide the thickness of two liners with the upper one welded all around its edges to the lower one.

- The circulators will communicate with the Supervisory Control and Data Acquisition (SCADA) system through a radio telemetry system. This will allow certain actions, such as turning the units on and off, to be accomplished from shore.

3.8.3 Design Criteria

The following codes and standards apply:

- US Occupational and Safety Health Administration (OSHA).
- Oregon, Department of Environmental Quality Guidelines: Reliability Requirements for Sewage Treatment Facilities in Western Oregon.

The effluent storage system will be designed based upon the following criteria:

- Provide adequate storage based on current and projected average and maximum month effluent flows.
- Provide supplemental effluent storage when needed.

Provide the following features for Effluent Storage Pond No. 1:

- A smooth, adequately compacted, soil base suitable for installation of a membrane liner system thereon.
- Elastomeric membrane liner system for water-tightness.
- A high carbon black content in the liner material to provide adequate protection from sunlight for good membrane longevity.
- Means to prevent the accumulation of gas and water between the membrane liner and the soil below.
- Long distance circulators to maximize the quality of the stored effluent and increase its homogeneity.
- A new inlet structure.
- A new outlet structure with:
    - A withdrawal pipe that can rotate in the vertical plane to withdraw effluent from a range of levels should that be advantageous despite the action of the circulators.
    - A drain pipe to withdraw from the bottom of the reservoir, including draining the reservoir.
    - Overflow weir segments to allow maximum flow to pass over the weirs without overflowing the Effluent Storage Pond berms.
- Modifications to the existing line between both lagoons to increase the line size on the Lagoon No. 2 side (constructability driven) and provide an isolation valve on the end of that larger section.
- Spare conduits for power and control from the SBR Building electrical room to the new outlet structure to facilitate installation of future equipment and instrumentation, if needed.

3.8.4 System Description

Membrane Liner
The selected membrane liner material is a 60-mil thick, linear, Low Density Polyethylene (LLPDE) type elastomeric membrane. This material has excellent resistance to the ultraviolet component of sunlight. The liner does not need to be covered above the minimum water surface level to protect it from the sun or to suppress plant growth. The manufacturer can provide a 20-year to 25-year warranty on the liner despite the “weathering” of the exposed liner.

The upper and lower surface of the liner material will be smooth. These surfaces could be textured to provide some slip resistance, causing reduction in the longevity of the liner. This is reflected by the shorter warranty period, generally 15-years. The same manufacturer also offers a material with a textured upper surface.

The cost of the liner system is substantial such that a few extra years between replacements could save considerable money over the years. High Density Polyethylene (HDPE), is the material most often installed for large, uncovered municipal membrane lined wastewater impoundments. The HDPE liner does not have comparable longevity and is normally warranted for five to ten years.

As the floor of the pond is flat, a geo-composite material will be incorporated under much of the liner, transporting any bio-generated gas from under liner, up the sloped berm and to liner vents at the top of the berm.

The effluent flow from the SBRs will be intermittent as they operate on a batch versus continuous flow basis. The flow equalization available in the Effluent Storage Ponds will allow a continuous flow to the Effluent Pump Station, despite discontinuous flow from the SBRs.

Variable Level Outlet Structure
The quality of the stored effluent can vary at different depths and will vary over time at any one depth. Therefore, the upgrade will include a new outlet structure, which will allow variable depth withdrawal. Operators will be able to raise and lower the free end of a withdrawal pipe, which rotates through a vertical plane, providing the operational flexibility to withdraw from the depth with the best quality effluent if quality varies significantly with depth despite the long-distance circulators.

3.8.5 Final Effluent Water Balance

The effluent storage water balance is based on the following criteria:

- Provide adequate storage based on the current and projected average and the maximum month effluent flows.
- Provide allocation for precipitation based on data derived from the National Oceanic and Atmospheric Administration (NOAA) station for the City of Molalla.
- Provide allowance for evaporation.
- Zero leakage from the effluent storage impoundments.

Historical Water Balance for Irrigation Season
A summary of the historical total seasonal plant influent flows, total seasonal irrigation volume, and the maximum net storage provided is provided in Table 3.8.5.1. The maximum net storage required

calculations use actual precipitation data summarized from Discharge Monitoring Reports (DMRs) and estimates for evaporation.

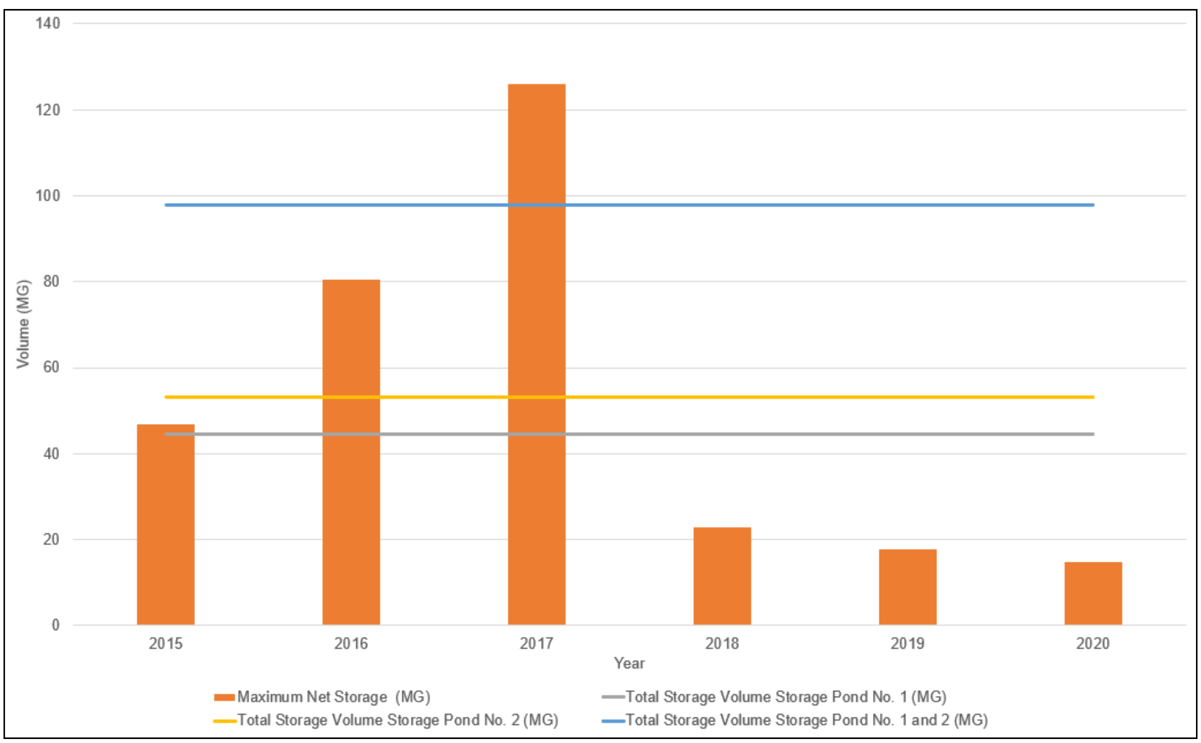
TABLE 3.8.5.1
HISTORICAL WATER BALANCE FOR IRRIGATION SEASON
(2015 TO 2020)

Year	Seasonal Total Plant Influent Volume	Seasonal Total Irrigation Volume	Seasonal Maximum Storage Volume Required
	(MG)	(MG)	(MG)
2015	158	133	47
2016	198	110	81
2017	189	55	126
2018	124	114	23
2019	107	112	18
2020	112	115	15

Lagoon No. 1 and Lagoon No. 2 provide 45 MG and 53 MG of storage, respectively.

Figure 3.8.5.1 illustrates the historical net storage (MG) and the available, combined storage capacity in existing Lagoon No. 1 and Lagoon No. 2.

FIGURE 3.8.5.1
HISTORICAL WATER BALANCE FOR IRRIGATION SEASON (2015 TO 2020)



As shown in Figure 3.8.5.1, the City exceeded the total storage availability in 2017. In contrast, however, in the years 2018, 2019, and 2020, the maximum net storage during the irrigation season was 23 MG.

The historical irrigation season summary in Figure 3.8.5.2 illustrates what the irrigation season water balance would be should both existing lagoons be used for effluent storage. The summary assumes that total volume for each lagoon would be available for storage. This is not currently possible as the lagoons provide both primary and secondary biological treatment and solids storage in addition to effluent storage. Therefore, the available recycled water storage, based on current conditions, is less than that shown in Figures 3.8.5.1 and 3.8.5.2.

FIGURE 3.8.5.2
HISTORICAL IRRIGATION SEASON SUMMARY (2015 TO 2020)

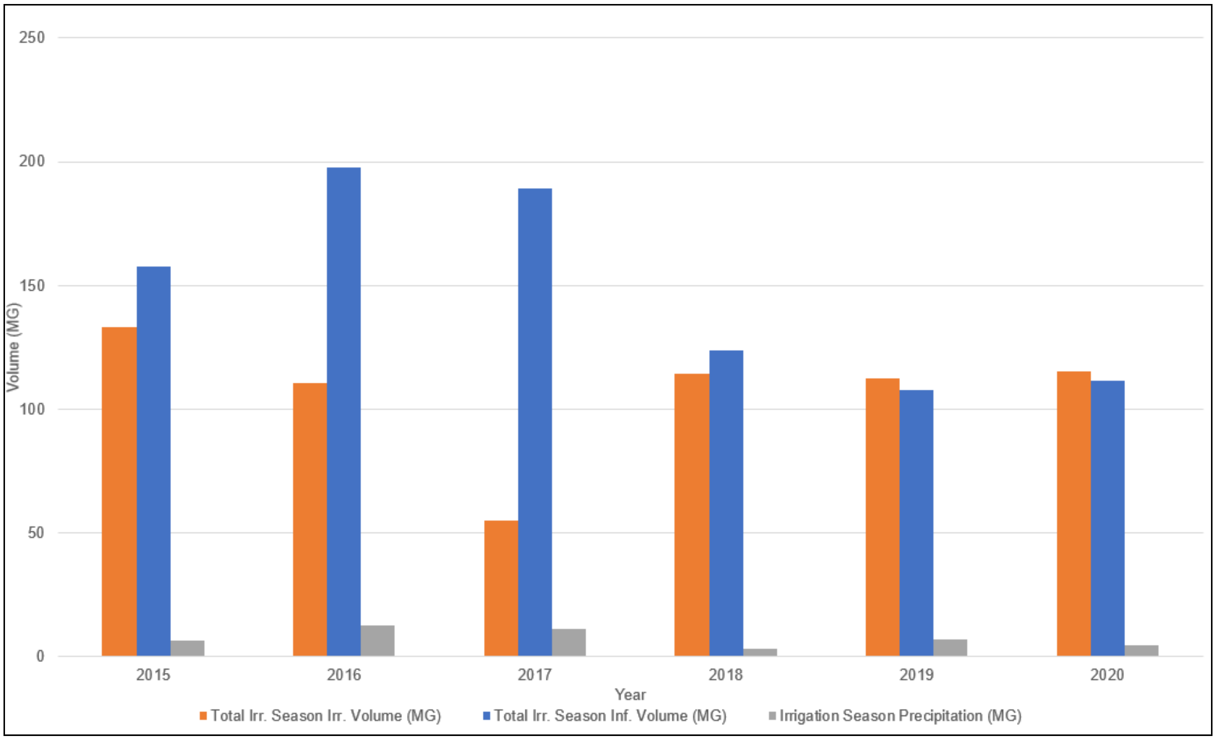
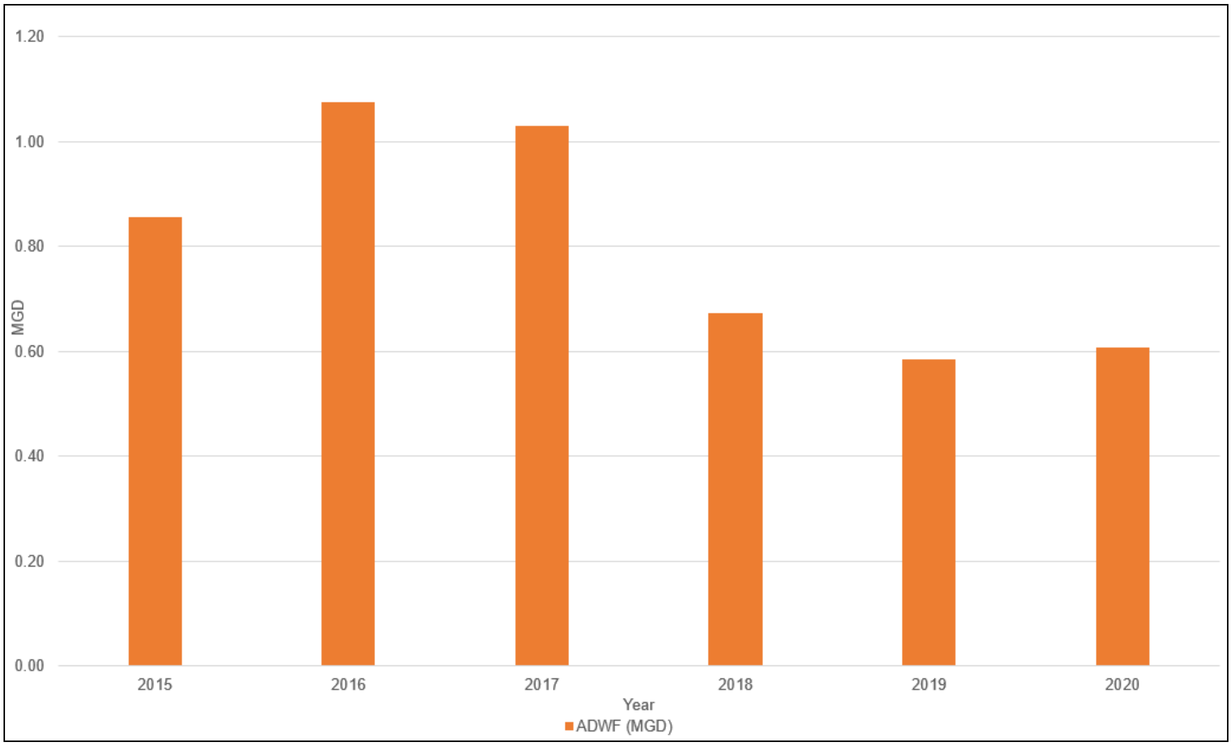


Figure 3.8.5.3 displays the Average Dry Weather Flow (ADWF) for the years 2015 to 2020, to illustrate the correlation between ADWF and storage requirements. When ADWFs are higher, usually due to a wet May or October, the volume required for storage increases.

FIGURE 3.8.5.3
HISTORICAL PLANT INFLUENT SUMMARY (2015 TO 2020)



Future Effluent Storage
As mentioned in Section 3.8.2, filling the northwest corner of Lagoon No. 2 will reduce the available storage capacity in the Effluent Storage Pond No. 1 to 49 MG. The total volume of storage available, including supplemental storage in Effluent Storage Pond No. 2, will be approximately 94 MG.

Historical Irrigation Efficiency
Based on the Recycled Water Use Plan (The Dyer Partnership, 2018), the existing irrigation sites (South and North Coleman Ranch) have a maximum irrigation capacity, during the irrigation season, of approximately 184 MG. This is based upon Class C setback requirements. However, with seasonal variabilities in precipitation, irrigation efficiencies, production lost due to weekend operation and other factors, historically the City has only been able to irrigate between 55 MG and 133 MG. By removing the 55 MG outlier, which occurred in 2017, between the years 2015 and 2020, the average total volume of recycled water irrigated is approximately 117 MG. From the years 2018 to 2020, the City irrigated between 112 to 115 MG. This correlates to an overall irrigation efficiency of 57 percent to 59 percent.

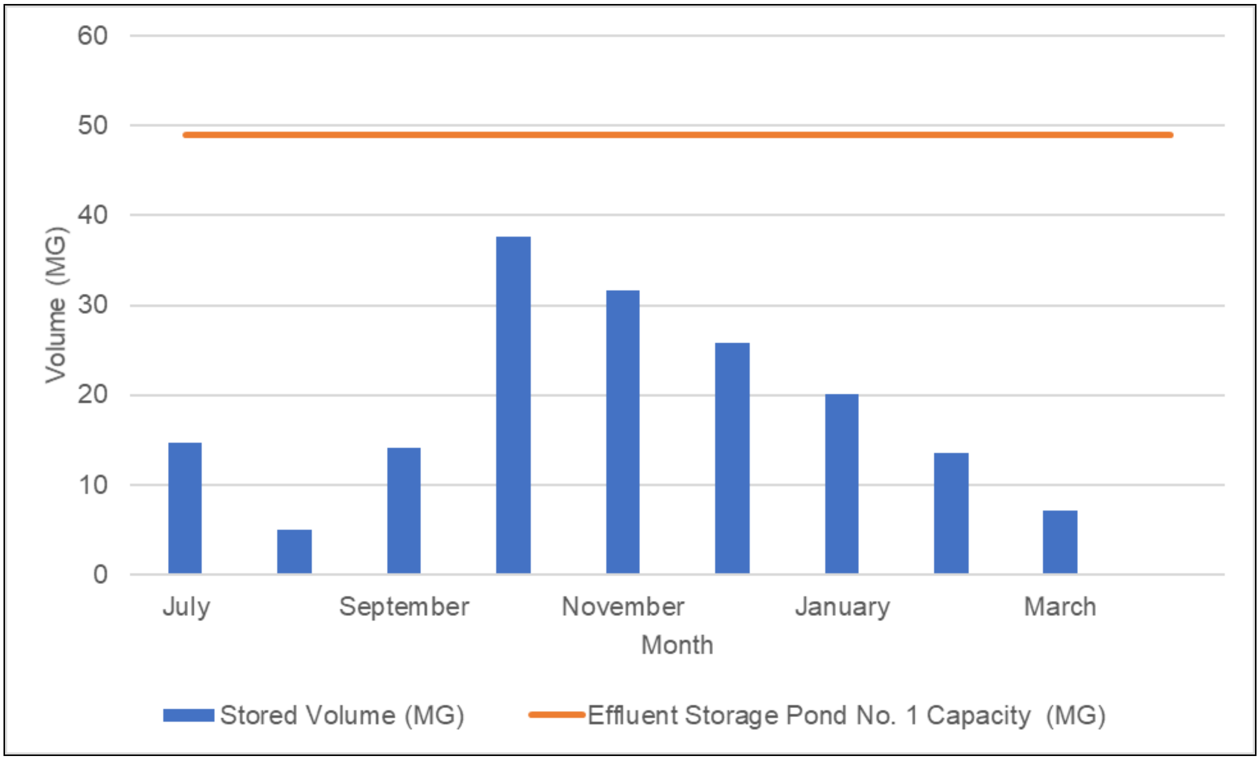
Future Water Balance
Water balances were developed for future conditions based upon the following:

- Updated Portland State University Population Research Center population forecast.
- Production of Class C recycled water.

- Expansion of the total irrigation site area by approximately 110 acres.
- Irrigation efficiency based on historical data.

During dry weather periods, as occurred in the years 2018 through 2020, the City can continue to irrigate at historical efficiency and satisfy a water balance continuing until the year 2030. Additionally, when per capita flows are similar to values experienced in 2018 through 2020, only Effluent Storage Pond No. 1 (12.6 acres, 49 MG) will be needed, and no additional irrigation area is required. This assumes that the effluent remaining in the storage pond at the end of October will be discharged to the Molalla River over the winter months to completely drain the pond, as shown in Figure 3.8.5.4.

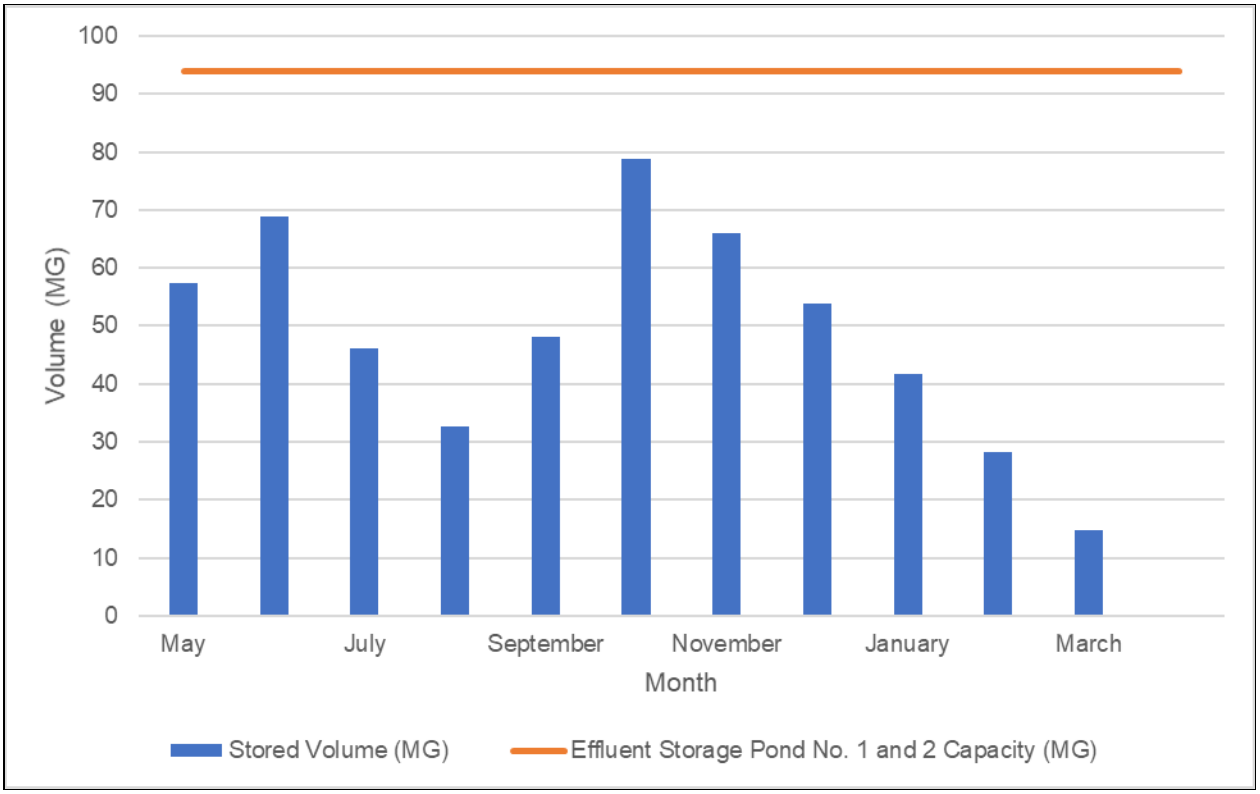
FIGURE 3.8.5.4
FUTURE STORAGE REQUIREMENTS - LOW FLOWS (2030)



When flows approach per capita values experienced in 2016 and 2017, typically the City experiences maximum month dry weather flow conditions in May or October. In these situations, the City will need to utilize Lagoon No. 1 for supplemental effluent storage, as well as expanding the total combined area of the irrigation sites. Increasing the irrigation efficiency would also be beneficial.

The City currently plans on immediately expanding their recycled water system by approximately 110 acres, bringing the total available irrigation area to 543 acres. At the current irrigation efficiency (58 percent), the City has adequate storage and Class C recycled water production capacity to satisfy the water balance, as shown in Figure 3.8.5.5.

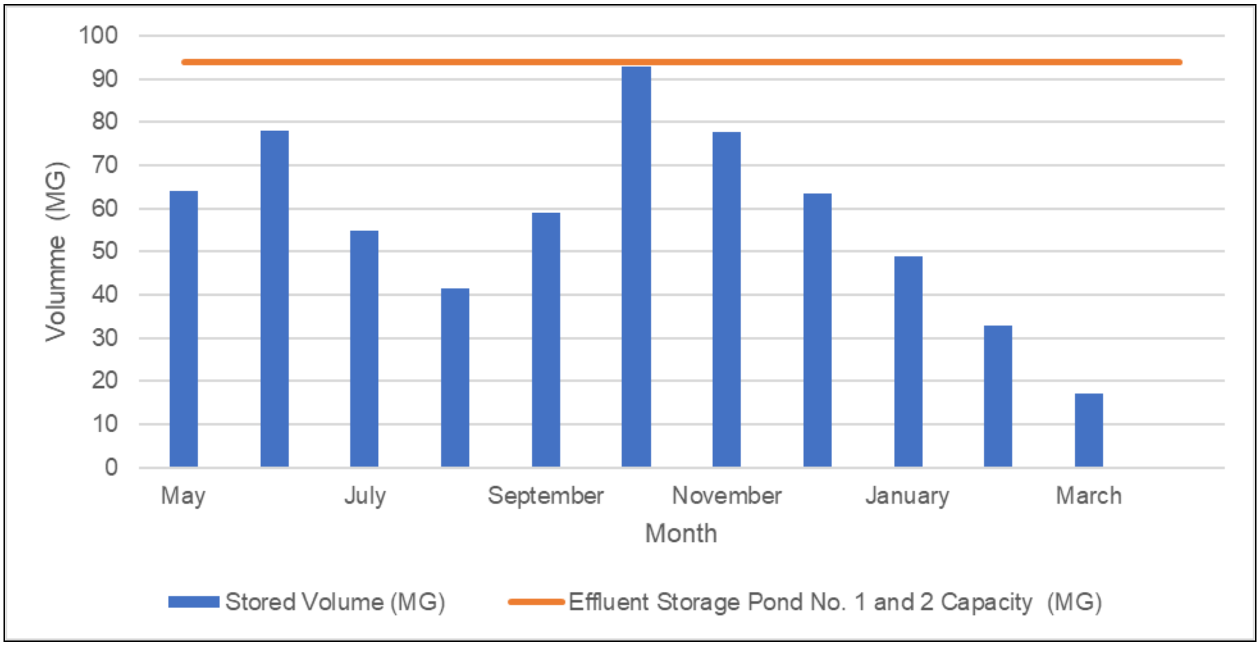
FIGURE 3.8.5.5
FUTURE STORAGE REQUIREMENTS - MMDWF CONDITION (2025)



If per capita plant influent flows for the year 2030 are similar to the years 2016 and 2017 per capita values, and if the City intends to maintain the current irrigation efficiency, the City will need to expand its total area of irrigation sites to a total of 580 acres.

A water balance for the year 2030 and Maximum Monthly Dry Weather Flow (MMDWF) condition is shown in Figure 3.8.5.5.

FIGURE 3.8.5.6
FUTURE STORAGE REQUIREMENTS – MMDWF CONDITION (2030)



Alternatively, if the City improves the irrigation efficiency to 64 percent, the City can satisfy the design year 2030 water balance with a total of 543 acres for irrigation. Another option is to increase the total storage volume by an additional five acres.

In conclusion, the City needs to plan for continued expansions to their total effluent storage capacity as well as to the total area of it irrigation sites, land application area, commensurate with the population growth anticipated.

Supplemental Effluent Storage
In the near-term, Effluent Storage Pond No. 2 will be used for supplemental effluent storage when Effluent Storage Pond No. 1 is full. In particular, it will be needed during an unusually wet spring or fall. In the long term, the City will evaluate further modifications and installing an elastomeric membrane liner in this pond as well.

Occasionally supplemental effluent storage will be needed when Effluent Storage Pond No. 1 is getting full and one of these, or similar, scenarios occur:

- During abnormally wet months of May or October when the City is unable to irrigate as the sites are too wet and is not allowed to discharge to the Molalla River.

- For emergency storage if there is effluent pump failure or effluent force main failure. All flows in excess of a single pump's capacity will be temporarily stored in the Effluent Storage Pond.

    - A force main failure would typically be resolved within hours or days and should have minimal impacts on the water balance.

    - In the event of a single effluent pump failure, the effluent from the UV system would be directed to the Effluent Storage Pond.

- Flows in excess of the capacity of one effluent pump, 3,500 gallons per minute (gpm) or five Million Gallons per Day (MGD), are generally related to peak rainfall events and should not significantly impact the water balance.
- When irrigating, a single pump can produce the capacity necessary for irrigating needs.
- When discharging to the Molalla River, the effluent will be capped at 3,500 gpm to the Effluent Pump Station.

The water balance above is based on information available now. Some of that information is likely to change over the next several years.

- The City continues with I&I work, which should reduce rain induced flows during maximum month dry weather flow conditions.
- Population growth may not match Portland State University predictions.
- The NPDES Permit is expected to provide more flexibility regards being allowed to discharge to the Molalla River in May and October when conditions allow.

3.8.6 Instrumentation, Controls, and Measurement

The reservoir will have a pressure transducer to monitor the water surface elevation. In addition, the SolarBees will communicate to the plant-wide SCADA system.

3.8.7 Design Issues Yet to Be Resolved

- Specifics of preparing existing clay liner surfaces for liner installation, including how wet the soil can be when installing the liner system over it and whether re-compaction of the native clay liner is needed apart from where repairs to the clay liner.
- The access and egress features are integral to the membrane liner design (i.e., stairs or ladders). A determination of what access and egress features are needed along with how many features and the locations for each feature.
- There are still questions regarding elevations for Lagoon No. 2. The drawings for the current project show a floor of lagoon elevation of approximately 302 feet and a top of berm elevation of approximately 318 feet. The difference is approximately 16 feet, approximately a foot more elevation difference than one would expect using the same floor elevation plus 12 feet maximum working depth (high level) plus 3 feet of freeboard to the top of the berm (302+12+3 = 317).
- What flow should the overflow weir and associated piping be able to accommodate?
    - The maximum Effluent Storage Pond No. 1 influent flow is approximately 8.8 MGD, the maximum SBR decant rate. One could try to accommodate all of that flow via the overflow weir and associated piping, which leads to the Transfer Pump Station. However, recycling that much flow to the head of the plant would soon overwhelm the influent flow equalization. Another approach would be move more flow through the Effluent Pump Station and out of the treatment plant. One idea is that when there is an overflow condition, might the valve

controlling flow to the Effluent Pump Station from effluent storage be automatically adjusted maximize flow to the pump station and offsite to the Molalla River?

- Current weir concept is one or more downward opening weir gates. The weirs would normally be fully raised, with the weir elevation being set for, say, 13.5 feet of depth. The weirs could be sized to allow the required flow over the weir with, say, 6 inches or less headloss across the weir, so that there would be approximately a foot of true freeboard remaining.

- Weir gates would allow Operation Staff to vary the weir elevation, finding an optimum position that compliments their other responses to the pond being too full.

3.8.8 Instrument List

TABLE 3.8.8.1
INSTRUMENT LIST FOR EFFLUENT STORAGE POND NO. 1

Process Area 700: Effluent Storage Pond				
1	PT		Pressure Transducer	Effluent Storage Pond level.

3.8.9 Design Data

TABLE 3.8.9.1
DESIGN DATA FOR EFFLUENT STORAGE POND NO. 1

Process Area 700: Effluent Storage Pond				
Depth Range				
		Normal range of reservoir depths:	0 to 12 feet	
		Freeboard:	3 ft	
Operating Scenario			**Recycling**	**Discharging**
Flow Rates	**To Effluent Storage Pond**	Minimum:	0.0 MGD	0.0 MGD
		Typical or Average:	ADWF	AWWF plus additional flow as needed to manage volume in storage
		Instantaneous Max:	4.5 MGD *(maximum Class C recycled water production rate)*	8.8 MGD (maximum SBR decant rate)
	From Effluent Storage Pond	Minimum:	0.0 MGD	0.0 MGD
		Typical or Average:	Limited by condition and available capacity at approved agricultural irrigation recycling sites	AWWF plus additional flow as needed to manage volume in storage
		Instantaneous Max:	Limited by condition and available capacity at approved agricultural irrigation recycling sites	Approx. 10 MGD – both effluent pumps running at 100% speed, maximum discharge flow

PREDESIGN REPORT MEMORANDUM	
Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	3.9
Subject:	Specific Process Area 800
	EFFLUENT PUMP STATION
Date:	October 2021
Prepared By:	Dan Walters

3.9.1 Purpose

The purpose of the Effluent Pump Station is to pump final effluent from the Effluent Storage Reservoir through the effluent force main to:

- Outfall 001 during discharge operations to discharge to the Molalla River for disposal.
- Outfall 002 during recycling operations to designated recycling sites for agricultural irrigation.

The outfall designations are from the current National Pollutant Discharge Elimination System (NPDES) Permit.

3.9.2 Background

The existing Effluent Pump Station was constructed in the year 2000 and consists of a wet well, a pump room, and a generator room. The Effluent Pump Station includes two variable speed, vertical turbine pumps. Each pump has an individual nominal capacity of 3,500 gallons per minute (gpm), 5 MGD, and each is equipped with a Variable Frequency Drive (VFD). The pumps calculated combined pumping capacity is approximately 10 MGD. The pump system will be capacity tested during the 2021/2022 discharge season as the pumps have been in service for over 20 years. Mechanical wear has likely reduced the actual capacity of each pump.

The Effluent Pump Station includes space for a future, same-sized, variable speed, vertical turbine pump and VFD. Firm capacity of the pump station would go from the capacity of one pump running to that of two pumps running and the third same-sized pump in standby.

The wet well is 12 feet in diameter. The working volume, between normal high water surface level elevation and normal low water surface level elevation, is small compared to the pumping capacity. Currently, the Effluent Pump Station wet well is hydraulically connected to the chlorine contact basin. The chlorine contact basin currently serves as an extension of the wet well, to avoid the following:

- Excessive pump cycling, which shortens motor life.

- Discontinuous flow, which is problematic for flow-paced control of chemical feed systems and samplers, as well as for interpreting and basing control on results from instruments and analyzers.

During the discharge operations, the existing effluent pumping system is automatically controlled to a flow set point. Flow control is achieved by modulating influent valves for the Dissolved Air Flotation (DAF) units and sets the flow throughout facilities downstream, including the existing granular media filters, chlorine contact basin, and the Effluent Pump Station. The chlorine contact basin is also the source for filter backwash supply. There are periods during which the controls automatically reduce the Effluent Pump Station flow to the normal minimum flow (i.e., one pump running near its minimum speed) to avoid drawing down the chlorine contact basin too fast to allow a full normal filter backwash.

The pumps are normally automatically controlled to maintain a discharge pressure set point of 100 to 104 pounds per square inch gauge (psig) during the recycled water irrigation season. This discharge pressure range provides an acceptable range of operating pressures at the recycled water irrigation sites.

The Effluent Pump Station related issues are not pertinent to the current design but will need to be considered for future upgrades.

- Pumping requirements and actual performance should be determined for both discharge and recycle operations.

- Whether the City would like to investigate uncoupling the irrigation system flow and pressure requirements from the conveyance system (i.e., the Effluent Pump Station and effluent force main).

3.9.3 System Description

The Effluent Pump Station automatic operation capabilities will not change after the current upgrade.

- The existing DAF units and filters will be demolished during the current upgrade, as will the associated flow control valves and some instrumentation.

- The existing control loops will no longer function.

- The same automated Effluent Pump Station control modes (i.e., flow set point, discharge set point) will be provided using a combination of new control valves, new and existing instrumentation, and new control loops.

3.9.4 Design Issues Yet to be Resolved

The following issues related to the Effluent Pump Station should be resolved for the current upgrade.

- Performance testing to determine actual capacity of effluent pumping system.

- Existing chlorine contact basin improvement.

Future Considerations
Updates to the Effluent Pump Station are recommended since the Effluent Pump Station equipment is nearing its useful life. It is anticipated that the Effluent Pump Station will be evaluated in more detail prior to the next upgrade.

3.9.5 Instrument List

TABLE 3.9.5.1
INSTRUMENT LIST FOR EFFLUENT PUMP STATION

Process Area 800: Effluent Pump Station				
1	FE/FIT		Magnetic Flow Meter[1]	Totalized and instantaneous flow from the Effluent Pumps Station
2	LET		Pressure Transducer	Pump station wet well depth; high level alarm; and high, high-level alarm

1. During the winter time, the flow from the effluent pump station will continue to be measured at the discharge monitoring station, and integrated into the WWTP Supervisory Control and Data Acquisition (SCADA) system. During the summer time, the flow from the effluent pump station will be determined by the Effluent Storage Pond No. 1 effluent flow meter.

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	3.10
Subject:	Specific Process Area 810
	NON-POTABLE WATER SYSTEM
Date:	September 4, 2021
Prepared By:	Tyler J. Molatore, P.E.

3.10.1 Background and Purpose

Plant water is needed for process equipment demands throughout the facility, such as the influent screens and hose washdown stations. Non-Potable Water is currently available at the Wastewater Treatment Plant (WWTP) only when the Effluent Pump Station is operational. Non-potable water is currently conveyed to plant facilities through a connection to the effluent force main. During time periods when the Effluent Pump Station is not operational, which generally occurs during the months of May and October, a connection to the City's potable water system with a backflow device is available.

With the plant upgrades, a non-potable water tank and duplex pumping system with Variable Frequency Drives (VFD) will be included to facilitate the continuous utilization of plant non-potable water at the WWTP. This section will provide information regarding the general design of a new Non-Potable Water Pump Station for the Wastewater Treatment Plant.

3.10.2 Schematics and Plans

The drawing set that accompanies this report includes plan sheets that illustrate the schematics and plans associated with the Non-Potable Water System. Refer to Process Area 810.

3.10.3 Design Criteria

The pump station will consist of two multi-stage centrifugal pumps with variable frequency drives, pressure transmitter, piping, valves, hydropneumatic pressure tank, flow meter, and other appurtenances.

Two pumps are provided for redundancy purposes. The pumps will have variable frequency drives to maintain a constant discharge pressure under variable head and flow conditions. The Non-Potable Water System and appurtenances will be connected to the emergency standby generator system.

3.10.4 System Description

Pump Selection
The Non-Potable Water System will consist of a pre-engineered, prefabricated, skid mounted, variable speed pumping system designed for municipal service. Design, fabrication, testing and service shall be the responsibility of the pump system manufacturer.

The pump system will include two 10-horsepower (hp) pumps. Each pump will be rated for 100 gallons per minute (gpm) at 231 feet Total Dynamic Head (TDH). The pumps will have variable frequency drives to maintain a constant pressure set point, Operator adjustable.

Non-Potable Water Hydropneumatic Tank
The new Non-Potable Water System will include a hydropneumatic tank to reduce the number of pump cycles as Process Areas intermittently demand water. The vertical multi-stage centrifugal pumps, with variable frequency drives, are typically designed to allow twenty cycles per hour. However, for better long-term performance, reducing the number of pump cycles is advised. The hydropneumatic tank will be sized based on anticipated demands from the process equipment.

Non-Potable Water Tank
The new Non-Potable Water System will be located immediately downstream of the UV disinfection system, and prior to the effluent storage ponds. A non-potable water tank is included to provide effluent storage to facilitate continuous access of non-potable water for conveyance by the pumping system. The non-potable water tank will be designed adjacent to the Sequencing Batch Reactor (SBR) structure, and will share a common wall.

Effluent from the Ultraviolet (UV) disinfection system will flow by gravity into the non-potable water tank and by gravity out of the non-potable water tank. Effluent from the non-potable water tank will normally flow to Effluent Storage Pond No. 1, but Operators will have the option of directing flow to Effluent Storage Pond No. 2, or directly to the Effluent Pump Station.

The non-potable water tank will be sized to account for intermittent cycling of the SBR. During low flows the intermittent nature of the SBR cycling will result in approximately two to three hours between cycles. The non-potable water tank will be sized such that the pumps can operate at 100 gpm for a duration of three hours.

Force Main
The new Non-Potable Water System will convey non-potable water to the new Process Areas, and connect to the existing non-potable water distribution piping network at the WWTP. Reference drawing 100-C-7 for the proposed connection point. For backup, the connection to the effluent force main will be maintained.

Access
The Non-Potable Water System will be accessible with suitable space for maintenance activities. The non-potable water tank will have access hatches for inspection purposes.

Overflow
Effluent from the non-potable water tank will directed to one of three locations: Effluent Storage Pond No. 1, Effluent Storage Pond No. 2, or directly to the Effluent Pump Station. Electrically actuated valves will be used to direct final effluent to the various locations. One electrically actuated valve will always be open, thereby allowing flow to exit the non-potable water tank. No overflow piping is necessary.

Backup Power
Backup power, during times of utility power loss, for the new Non-Potable Water System will be fed by the new 500 kilowatt (kW) standby generator located at the SBR site.

Flow Meter
A new magnetic flow meter will be installed, with appropriate setback distances, on the new force main associated with the Non-Potable Water System.

3.10.5 Instrumentation, Control, and Measurement

Control of the Non-Potable Water System will be through a new control panel installed adjacent (or on the skid) to the Non-Potable Water System. The pump station operation will be designed with a pressure transmitter located on the force main, used to activate pump(s) at certain speeds to maintain a certain pressure set point.

The control panel will be located underneath a suitable canopy. All alarms and operational data for the pump station will be transmitted to the new plant-wide Supervisory Control and Data Acquisition (SCADA) system.

The liquid level in the non-potable water tank will be variable based on flows. The liquid level in the non-potable water tank will be monitored by floats and a level transducer.

3.10.6 Design Issues Yet to Be Resolved

- Electrical design.
- Structural design of the non-potable water tank.
- Non-potable water site piping design.
- Canopy design.
- Non-potable hydropneumatic tank sizing.
- A small dose, two to five milligrams per Liter (mg/L), of sodium hypochlorite may need to be injected into the non-potable system on an as needed basis to minimize regrowth of pathogens using a chemical metering pump and a drum of sodium hypochlorite. An injection quill with isolation valve will be provided for sodium hypochlorite feed on the pump discharge piping.

3.10.7 Instrument List

The following table summarizes the instrumentation equipment required for the Non-Potable Water System.

TABLE 3.10.7.1
INSTRUMENTATION LIST FOR NON-POTABLE WATER SYSTEM

Process Area 810: Non- Potable Water System				
1	PT		Pressure Transducer	Tank level transducer.
2	LSH		Float	Tank high-water level.
3	LSL		Float	Tank low-water level.
4	FE/FIT		Magnetic Flow Meter	Totalized non-potable water flow.
5	PT		Pressure Transmitter[1]	Pressure transmitter for pump discharge header.

1. A backup pressure transmitter will also be provided.

3.10.8 Design Data

TABLE 3.10.8.1
DESIGN DATA FOR NON-POTABLE WATER SYSTEM

Item	Data
Non-Potable Water System	
Station Type	Duplex
Pump Type	Variable Speed Vertical Multi-Stage Centrifugal
Total Number of Pumps	2
Pump Horsepower	10 HP
Pump No. 1 Capacity	100 gpm @ 231 Feet TDH
Auxiliary Power	New Standby Generator
Pressure Transmitter	Yes
Non-Potable Water Tank	
Volume	20,000 Gallons
Level Control	Pressure Transducer with Float Backup
Force Main	
Type	3” Diameter PVC
Air Release Valve	Yes

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	3.11
Subject:	Specific Process Area 900
	AEROBIC DIGESTION
Date:	June 1, 2021
Prepared By:	Tyler J. Molatore, PE

3.11.1 Purpose and Scope

The objectives of the Aerobic Digestion Process Area are the following:

- Provide adequate Aerobic Digester Solids Retention Time (SRT) and air to process the Waste Activated Sludge (WAS) from the activated sludge process, Sequencing Batch Reactor (SBR), to a Class B biosolid.
- Thicken solids by decanting.
- Provide ability to transfer sludge within various digesters.
- Provide means of removing biosolids for pending dewatering and disposal.
- The Aerobic Digester will be installed in phases, and initially designed for year 2035 design loads.

The components in the Process Area include the following: Aerobic Digesters; biosolids transfer pumps; blowers (reference Section 4.3) and diffusers; new exposed, buried and submerged air piping; and instrumentation and controls. Reference the Biosolids Dewatering Facility (Section 3.12) for information pertaining to the dewatering screw press system.

3.11.2 Process Schematics and Plans

A graphic description of the process may be found in the 11 by 17 inch drawing set that accompanies this report. Please refer to the Process Area 900 included in the process series.

3.11.3 Design Criteria

The design criteria for the Aerobic Digester and ancillary systems is listed below.

Aerobic Digester

- Provide adequate tank volume to allow sixty days SRT for the projected sludge loading for the year 2035 (Phase I).
- Minimum 38 percent vector attraction reduction.
- Provide an overflow between basins.
- Provide the ability to sequentially fill digester tanks or fill each digester tank directly from WAS pumps.
- Provide adequate air distribution to accomplish mixing and aerobic digestion to produce a stabilized biosolids within the design residence time.
- Provide the ability to decant supernatant after settling from any digester basin. Target solids concentration within digesters of 1.4 to 2 percent.
- Provide a staff gauge for each basin.
- Have the ability to transfer sludge to any of the digester basins, Biosolids Dewatering Facility, or tanker truck loading.
- Provide Dissolved Oxygen / Oxidation Reduction Potential (DO/ORP) probe for process optimization and control.

Aeration Blowers

- Provide adequate air to meet the needs of the digesters (1 milligram per Liter (mg/L) DO worst case condition, 2 mg/L DO at average operating condition).
- Be able to take any one blower out of service while the other blowers continue to operate; and provide adequate air to the sludge to prevent odors.
- Have Variable Frequency Drive (VFD), energy efficient motors.
- Have all blowers (SBR and Aerobic Digester) use compatible parts to minimize the number of spare parts stocked on site.
- Provide interconnecting piping so that each blower system can serve any basin.

Controls

- Provide manual or level-based automatic control for operation of biosolids transfer pumps.
- Provide a low-level pump shutoff and high-pressure shutoff for the biosolids transfer pumps.
- Provide process control (DO/ORP) to regulate blower speed for energy efficiency and process control.

- Integrate system data into plant-wide Supervisory Control and Data Acquisition (SCADA) system.

- Include 19-inch Human Machine Interface (HMI) interface on Aerobic Digester control panel.

Table 3.11.3.1 provides the process design parameters.

TABLE 3.11.3.1
AEROBIC DIGESTER DESIGN PARAMETERS

Parameter	Value	Units
Maximum Month Feed Sludge Mass Load (2043)	3,933	lb/d
Maximum Month Feed Sludge Mass Load (2040)	3,736	lb/d
Maximum Month Feed Sludge Mass Load (2035)	3,409	lb/d
Maximum Month Feed Sludge Mass Load (2030)	3,088	lb/d
Maximum Month Feed Sludge Flow (2043)	55,480	gal/day
Maximum Month Feed Sludge Flow (2040)	52,703	gal/day
Maximum Month Feed Sludge Flow (2035)	48,089	gal/day
Maximum Month Feed Sludge Flow (2030)	43,560	gal/day
Average Feed Sludge Mass Load (2043)	2,488	lb/d
Average Feed Sludge Mass Load (2040)	2,363	lb/d
Average Feed Sludge Mass Load (2035)	2,156	lb/d
Average Feed Sludge Mass Load (2030)	1,953	lb/d
Average Feed Sludge Flow (2043)	35,096	gal/day
Average Feed Sludge Flow (2040)	33,339	gal/day
Average Feed Sludge Flow (2035)	30,413	gal/day
Average Feed Sludge Flow (2030)	27,550	gal/day
Feed Sludge Concentration	8500	mg/L
Feed Sludge % VS	80%	
Digester Solids Concentration	1.4 to 2%	

3.11.4 System Description

General
The Aerobic Digester receives WAS (secondary sludge) from the submersible SBR WAS pumps (one WAS pump per SBR basin) located within the SBR. Reference the SBR section for additional information regarding the WAS pumps. The Aerobic Digester will be designed to operate in series or parallel. A 3-inch WAS line will be installed from the SBRs to convey WAS to each basin of the Aerobic Digester. Sludge within the digester cells can be sequentially transferred to subsequent basin, or sent to the biosolids screw press. Solids within the Aerobic Digester are held for sixty days SRT, whereby they undergo endogenous respiration, nitrification, and denitrification. Raw sludge must, in general, be held for sixty days SRT to meet treatment objectives. For sludge to be converted to biosolids, it must be treated for sixty days at a water temperature of 15 degrees Celsius (deg C).

Air is added for mixing and to provide oxygen to microorganisms. The Aerobic Digester will be designed to allow periodic or continuous aeration. In general, periodically the Operator will turn the air off to a basin and allow it to settle. After the solids settle, the decanting mechanism in the basin will be lowered to allow the liquid supernatant to drain to the Transfer Pump Station for further treatment within the SBR. After decanting is completed, the air will then be reintroduced to the basin. Solids within Basin No. 2 will reach a point where minimal settling occurs when the air is turned off. The biosolids will then be pumped to the dewatering screw press system.

NFPA 820 Classification
The Aerobic Digester Process Area is an unclassified area.

Blowers
For Phase I, two new 100 horsepower (hp) blowers with VFD controls will be installed in the new Aerobic Digester Building. Space (and necessary piping) will be allocated in the building for an additional blower, to be installed in the future when loads necessitate additional tankage. Since mixing energy controls the process, Dyer is in the process of reducing the blower size and using mechanical mixers. Preliminarily this reduces the blowers to 50 hp each.

Ultimately, each digester tank (No. 1, 2, and 3) will have a dedicated blower, and the air-lines will be interconnected to allow delivery of air by any of the blowers, so that all digesters will have air in the event of a blower failure. The VFDs will be used to control the airflow to the system to minimize energy consumption. Each Aerobic Digester basin will have DO/ORP probes to automatically adjust airflow based upon target setpoints. All to reduce energy consumption and for process control purposes.

Biosolids Transfer Pumps
The biosolids transfer pumps are designed to convey solids sequentially through the basins. There will be a total of two biosolids transfer pumps for Phase I. An additional pump will be added for Phase II. The transfer pumps will be able to be controlled from the Aerobic Digester Control Panel, or local HAND-OFF-AUTO (HOA) switches located in the field at each transfer pump.

A low-level float switch in each tank will turn off the transfer pump if fluid levels dropped below Operator set points. A high-level float in each basin would turn off the transfer pump if the level in the tank exceeds the preset high-water level. The pumps will include a common high-pressure pump shutoff switch.

Decanters
Each tank has a swivel joint decanter which is used for decanting, to accomplish solids thickening. The pipe may be lowered or raised to the selected elevation. In general, the total drawdown cannot exceed approximately six feet. In the fully parked (upright) position, each decanter also acts as an automatic overflow to the Transfer Pump Station. A plug valve on the swivel joint decant piping allows the Operator to manually adjust the flow rate from each swivel joint decanter.

Flow Measurement
A magnetic flow meter will be installed on the main biosolids influent line to the screw press, for recording biosolids flow to the screw press. Reference the biosolids dewatering section for additional information. Another magnetic flow meter will measure the waste activated sludge transferred. Reference the SBR section for additional information.

Aerobic Digester Drains
The Aerobic Digester basins can be drained for cleaning and maintenance through mud valves located at the bottom of each basin. The valve allows the basin contents to be drained back to the Transfer Pump Station.

Access Manways
Each Aerobic Digester basin will include an access manway at ground level to facilitate access into the basins for maintenance purposes.

Non-Potable Water Stations
Two Non-Potable Water Stations will be included at the elevated walkways of the Aerobic Digester.

Safety
Flotation life-rings will be provided along all walkways at the Aerobic Digester.

Aerobic Digester Design Data
Aerobic Digester design data is provided in the following table.

TABLE 3.11.4.1
AEROBIC DIGESTER DESIGN DATA

Item	Data
Type	Aerobic Digester
Number of Basins (Phase I)	2
Number of Basins (Phases I + II)	3
SRT (Days)	60
Total Volume Phase I (Gal)	800,000
Total Volume Phases I + II (Gal)	1,200,000
Basin Dimensions	
Basin Length (ft)	118.6
Basin Width (ft)	25.05
TWL (ft)	18
WAS Flow Meter	
Type	Magnetic
Diameter (Inches)	4
Number	1
Capacity (gpm)	27.7 to 1,100.7
Aeration System	
Diffusers	Coarse Bubble
No. Diffusers/Basin	68
Blowers	
Number (Phase I)	Two (Two Duty)
Number (Phases I+II)	Three (Three Duty)
Type	Positive Displacement with VFDs
Capacity (SCFM at 8.5 psig)	1,360
Horsepower, EA	100
Control	DO/ORP Paced
Dissolved Oxygen and ORP Analyzers	
Type	Probe and Transmitter
Number	2 (1 Per Basin)
Transfer Pumps	
Type	Rotary Lobe
Number	2 (1 Per Basin)
Horsepower, EA	5
Capacity (gpm)	220 gpm
Decanter	

Item	Data
Type	Variable Level
Number	2 (1 Per Basin)
Level Transmitters	
Type	Pressure Transducer
Number	2 (1 Per Basin)
Level Switches	
Type	Float
Number	2 Per Basin
Low Level	1 Per Basin
High Level	1 Per Basin
Staff Gauges	
Number	2 (1 Per Basin)

3.11.5 Instrumentation, Controls, and Measurement

Influent sludge enters the digester tanks through a WAS pump pipe header from the SBR. The WAS header will contain valves, allowing the Operator to feed any of the digester tanks, however, tank No. 1 is the normal tank used for WAS feed. The design will include necessary piping and valving to convey WAS to the third aerobic digestion tank to be installed as part of Phase II improvements.

Aeration System
Each digester basin has an air diffuser system. Air control is provided by a manual valve on each drop pipe and through use of the blower VFDs.

At full build-out, three positive displacement blowers provide the air supply to the process. The discharge of each blower is designed separately to the Aerobic Digester basins. If all basins are full then all blowers require simultaneous operation. Under normal operation, Blower No. 1 feeds Digester Basin No. 1. Blower No. 2 feeds Digester Basin No. 2. Blower No. 3 feeds Digester Basin No. 3. In the event of a blower being out of service, manual butterfly valves on the air header will allow air to be supplied to other basins as needed. Reference the process schematics for additional details.

Controls for the blowers are controlled by the Aerobic Digester control panel, which communicates with the SBR control panel and SCADA system. The SBR and Aerobic Digester system will be supplied by the same manufacturer for system responsibility purposes. The front of the control panel will contain a green light for blower ON and a red light for blower FAULT. HAND-OFF-AUTO switches are provided on the panel for each blower. Each position of the HOA switch results in the following operation of the blower:

TABLE 3.11.5.1
HOA OPERATION

Item	Operation
HAND	Blower runs continuously.
OFF	Blower remains off.
AUTO	Blower operates per programming.

If a blower fails, an alarm signal is sent to the Aerobic Digester control panel, the SBR control panel, and SCADA system.

Indicator lights for running and alarm for each blower are located on the front of the Aerobic Digester control panel.

At full build-out, the Aerobic Digester control panel also contains controls for the three biosolids transfer pumps. The front of the control panel will contain a green light for pump ON and a red light for pump FAULT. The control system will allow the Operator to set start and stop points of the basin for which the pump will be pumping to, and allow for shutoff of the pumps based on level transducer input. Low level in the basin shall also shutoff the pump. In the event of a pressure transducer being out of service, the pumps shall have the ability to operate off of backup floats. The SCADA system shall also show all alarms of the pumps.

Each biosolids transfer pump will have a local control station and disconnect panel located adjacent to each pump. The local control station shall contain a HOA switch for the pump.

A common high-pressure shutoff switch shall be provided with each pump to prevent over pressurizing the transfer piping in the event of a valve being closed.

Aerobic Digester Level Sensors
Each Aerobic Digester basin will have a submersible level transducer. The level transducer will transmit data to the Aerobic Digester control panel, SBR control panel, and SCADA system. Each basin will also have two floats. One float is a high-level float, which will signal an alarm condition and prevent additional flow from entering the tank from the WAS pumps. Each basin will also have a low-level alarm float.

Aerobic Digester Dissolved Oxygen and ORP Sensors
Each Aerobic Digester tank will include a DO/ORP sensor and adjacently mounted transmitter. The DO/ORP will relay a 4 to 20 milliampere (mA) signal to the Aerobic Digester control panel and SCADA system. The DO/ORP input will be used to automatically adjust air flow.

Flow Measurement
A 4-inch diameter magnetic flow meter will be installed on the main biosolids influent line to the screw press, for recording biosolids flow to the dewatering screw press. The magnetic flow meter will be designed and installed with suitable setback distances pre and post the flow sensor. Reference the Biosolids Dewatering (Section 3.12) for additional information.

3.11.6 Design Issues Yet to Be Resolved

A listing of the issues yet to be resolved is provided below**.**

- Biosolids transfer pump sizing.
- Instrumentation and process control strategies.
- Decanting options.
- Structural design of structure.

- Electrical design of equipment.
- Piping considerations for third biosolids transfer pump.
- Mixer options to reduce blower size.
- Addition of an independent screw press feed pump for operational simplicity.

3.11.7 Instrument List

An instrument list for the Aerobic Digestion System is provided in Table 3.11.7.1.

TABLE 3.11.7.1
INSTRUMENTATION LIST FOR AEROBIC DIGESTION

Process Area 900: Aerobic Digestion				
Aerobic Digester Basins, Typical Each				
1	LSH		Float	Basin high water level, typical each basin.
2	LSL		Float	Basin low water level, typical each basin.
3	PIT		Pressure Transmitter	Discharge pressure, biosolids transfer pump.
4	PG		Pressure Gauge	Suction and discharge pressure, typical each transfer pump.
5	DO/ORP		DO/ORP Probe	DO and ORP sensor, typical each basin.
6	PT		Pressure Transducer	Level transducer, typical each basin.
Aerobic Digester Blowers, Typical Each				
1	TIT		Temperature Sensor	Temperature of each blower, typical each.
2	PG		Pressure Gauge	Pressure gauges each blower.

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	3.12
Subject:	Specific Process Area 920
	BIOSOLIDS DEWATERING FACILITY
Date:	June 25, 2021
Prepared By:	Ryan Quigley, P.E.

3.12.1 Purpose and Scope

The objectives of the biosolids dewatering Process Area is used to decrease the total volume and moisture content of the biosolids, reducing the required cake storage space and the number of trips eventually necessary to haul biosolids to a landfill for disposal.

The components in this Process Area include the following: biosolids transfer pumps, biosolids screw press; macerator; instrumentation and controls; and other ancillary equipment.

3.12.2 Process Schematics and Plans

A graphic description of the process may be found in the 11 by 17 inch drawing set that accompanies this report. Please refer to Process Area 920 drawings included in the process section.

3.12.3 Design Criteria

The biosolids handling system will be designed to meet the following general criteria:

Biosolids Macerator

- Install a new macerator on the influent biosolids to the screw press to reduce the potential for material to negatively impact screw press system performance.
- Macerator shall activate after flow is registered with the biosolids flow meter.
- Provide ability to bypass macerator for maintenance, if necessary.

Biosolids Dewatering

- Provide a screw press for dewatering 1.4 to 2 percent biosolids to 14 percent to 18 percent total solids.

- Have the ability to store and distribute the cake into a dumpster or the bed of a standard ten-yard capacity dump truck for disposal.
- Have the ability to capture pressate and wash water for return to the liquid stream via the Transfer Pump Station.
- Dewatering screw press system should be capable of being converted to Class A components in the future. Dewatering screw press area will be designed to accommodate future equipment, including control panels and electrical provisions.
- The screw press system should take into consideration the expansion to the Aerobic Digester and addition of another biosolids transfer pump.
- Provide polymer make-down system and flocculation tank to aid in biosolids dewatering.
- Provide an area for chemical storage and ensure proper accessibility and delivery considerations.
- Provide access walkways for easier access to equipment for inspection and maintenance purposes.

Controls and Instrumentation

- Provide a dewatering screw press control panel.
- Provide a macerator control panel.
- Provide manual or level based automatic control for operation of biosolids transfer pumps.
- Provide a low-level pump shutoff and high-pressure pump shutoff for the biosolids transfer pumps.
- Provide a magnetic flow meter for measuring and logging biosolids sent to the dewatering screw press.

Miscellaneous

- Provide a sink and eye wash for safety purposes.
- Include utility wash down station(s) within the facility to facilitate maintenance activities.
- Dewatering screw press area should be enclosed and insulated with necessary heaters for temperature control.
- Potable water backflow preventer for water delivered to polymer make-down system.

The following codes and standards apply to this Process Area:

- National Fire Protection Association (NFPA) 820: Standard for Fire Protection in Wastewater Treatment and Collection Facilities.

- US Occupational and Safety Health Administration (OSHA).

Table 3.12.3.1 provides the process design parameters for the dewatering screw press system, based on a 38 percent reduction in Volatile Suspended Solids (VSS) in the Aerobic Digester.

TABLE 3.12.3.1
SCREW PRESS DESIGN PARAMETERS

Parameter	Value	Units
Maximum Month Biosolids Mass Load (2043)	2,754	lb/d
Maximum Month Biosolids Mass Load (2040)	2,616	lb/d
Maximum Month Biosolids Mass Load (2035)	2,386	lb/d
Maximum Month Biosolids Mass Load (2030)	2,162	lb/d
Average Biosolids Mass Load (2043)	1,742	lb/d
Average Biosolids Mass Load (2040)	1,654	lb/d
Average Biosolids Mass Load (2035)	1,509	lb/d
Average Biosolids Mass Load (2030)	1,367	lb/d
Feed Sludge Concentration	14,000 to 20,000	mg/L

3.12.4 System Description

General
The biosolids dewatering system is provided to reduce the disposal costs of the finished biosolids product. The dewatering system consists of a macerator, flow meter, polymer injection system, flocculator, screw press, screw conveyor, and other ancillary equipment.

FIGURE 3.12.4.1
SCREW PRESS SYSTEM

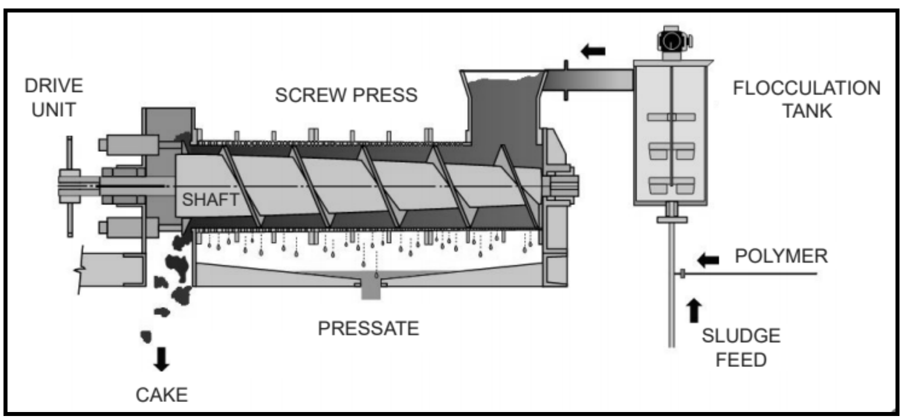
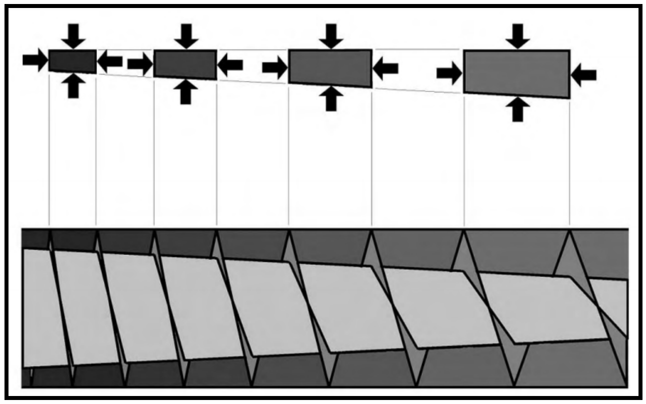


FIGURE 3.12.4.2
DEWATERING PROCESS



The dewatering equipment will be located in a new Biosolids Dewatering Facility located to the east of the Aerobic Digester. The new Biosolids Processing Facility will consist of a biosolids screw press room and a cake storage area.

Digested biosolids are conveyed from the Aerobic Digester to the dewatering screw press with the biosolids transfer pumps. Biosolids transferred are first conveyed to a magnetic flow meter and macerator to chop the incoming biosolids. Bypass piping with isolation valves allows Operation Staff to isolate the macerator or flow meter for maintenance, if required.

After the macerator and flow meter, polymer is introduced to the biosolids and the mixture is conveyed to the flocculation tank. The flocculation tank provides mixing to adequately floc the solids. Biosolids from the flocculation tank are then conveyed to the biosolids screw press for dewatering. Biosolids are dewatered in the screw press to approximately 14 to 18 percent total solids.

The resulting cake will be delivered to a new holding area adjacent to the biosolids dewatering screw press area. A new concrete slab and a roof system will be constructed for the holding area. Pressate from the dewatering unit and wash water will be collected in drains under the press and gravity flow to the existing Transfer Pump Station wet well where it will be pumped to the SBR.

Various dewatering screw press sizes were analyzed to determine the anticipated run-time per week. Based on year 2043 solids loads, the maximum month and annual average biosolids loads from the Aerobic Digester are 2,754 pounds per day (lb/d) and 1,742 lb/d, respectively. Dewatering screw presses ranging in capacity from 360 pounds per hour (lb/hr) to 500 lb/hr were evaluated. Ultimately a screw press with an average capacity of 400 lb/hr and a maximum throughput capacity of 480 lb/hr was selected. The anticipated run-time per week, based on maximum month loads and annual average loads, is approximately forty hours per week and thirty hours per week, respectively. The capacity of the proposed screw press is summarized in Table 3.12.4.1.

TABLE 3.12.4.1
DEWATERING SCREW PRESS CAPACITY (SHX-900)

Capacity	Capacity	% TS	Flow
lb/hr	lb/d	%	gpm
400	9,600	1	80
400	9,600	1.5	53
400	9,600	2	40
480	11,520	1	96
480	11,520	1.5	64
480	11,520	2	48

The biosolids transfer pumps will be sized to achieve a flow rate between 40 gallons per minute (gpm) and 100 gpm. The biosolids transfer pumps will include a Variable Frequency Drives (VFDs) in the screw press control panel to reduce the frequency of the motor to achieve the necessary turn-down.

The proposed screw press is model number SHX-900, as manufactured by FKC, Inc. The screw press is Class A compatible.

NFPA 820 Classification
The biosolids dewatering area is an unclassified area.

Disposal
The City will have several options for dewatered cake disposal once the improvements are completed. Initially, the City intends to transport the dewatered cake to a landfill for disposal.

Biosolids Dewatering Facility
A new Biosolids Dewatering Facility will be constructed. The building will consist of a screw press room with overhead door access. The room will include electric heaters, and be insulated (R-21 walls, R-28 ceiling).

3.12.5 Instrumentation, Controls, and Measurements

The screw press and conveyor will have a HAND-OFF-AUTO switch located on the front of the screw press control panel. Each position results in the following operation of the equipment.

TABLE 3.12.5.1
HOA OPERATION

Item	Operation
AUTO	Pumps, floc tank, polymer system, screw press, conveyor run as programmed.
OFF	Unit remains off.
HAND	Screw press, or other device, operates.

The unit shall will a torque sensor for monitoring an overloading condition. If a jam or overload condition exists in the conveyor or screw press, the unit will automatically turn off and send an alarm signal to the control panel and Supervisory Control and Data Acquisition (SCADA) system.

A magnetic flow meter will measure biosolids conveyed to the screw press and convey the data to the screw press control panel and SCADA system.

To ensure proper lubrication, the macerator will initiate operation after the biosolids magnetic flow meter registers flow for a period specified by the biosolids manufacturer.

The screw press control panel contains run time meters and start event counters for the screw press. This information is sent to the SCADA system where it is recorded, trended, logged, displayed, and stored.

The polymer make down system control panel contains a polymer flow digital readout. This information is sent to the SCADA system where it is recorded, trended, logged, displayed, and stored.

The unit will not automatically restart after a power failure.

Low liquid level sensors in each basin of the Aerobic Digester will trigger the transfer pump to shutoff, preventing damage to the pump. An alarm will be triggered in this situation.

The biosolids transfer pumps will have a pressure sensor and transmitter on the main header. If the pressure exceeds a set point, as defined by the pump manufacturer, pump operation will be terminated and an alarm condition will be activated and transmitted to the SCADA system.

3.12.6 Design Issues Yet to Be Resolved

- Cake storage area requirements.
- Biosolids transfer pump phasing considerations.
- Biosolids transfer pump sizing.

3.12.7 Instrument List

TABLE 3.12.7.1
INSTRUMENT LIST FOR BIOSOLIDS DEWATERING FACILITY

Process Area 920: Biosolids Dewatering				
Screw Press and Conveyor				
1	FE/FIT		Magnetic Flow Meter	Totalized biosolids flow.
2	SV-1		Screw press solenoid valve.	Wash water delivery.
3	SV-2		Screw press solenoid valve.	Wash water delivery.
4	SV-3		Screw press solenoid valve.	Wash water delivery.
5	PT		Level Transmitter	Flocculator high level probe.
6	MT		Conveyor motion detector.	Detect motion on conveyor.
Screw Press Feed Pump				
1	PIT		Pressure Transmitter	Discharge pressure, typical each transfer pump.
2	PG		Pressure Gauge	Pump header discharge pressure.

3.12.8 Design Data

TABLE 3.12.8.1
DESIGN DATA FOR BIOSOLIDS DEWATERING FACILITY

Item	Data
Biosolids Screw Press	
Type	Screw Press
Number	1
Capacity (Average)	400 lb/hr
Capacity (Maximum)	480 lb/hr
Screw Press Motor	5 hp with VFD
Cake Solids Content	14 to 18%
Polymer Feed Capacity (GPH)	5
Polymer Feed Pump	½ hp
Biosolids Flow Meter	
Type	Magnetic
Diameter (Inches)	4
Number	1
Capacity (gpm)	27.7 to 1,100.7
Biosolids Transfer Pumps	
Type	Rotary Lobe
Number	2 (+1 Future)
Horsepower, EA	5
Capacity (gpm)	110
Macerator	
Type	Macerator
Number	1
Diameter (Inches)	4
Capacity (gpm)	110
Macerator Motor	3 hp

SECTION 4:

FACILITIES DESIGN

Section 4 – Facilities Design

This section discusses the findings of the geotechnical investigation, construction and operation of the new Sequencing Batch Reactor (SBR) Building and Aerobic Digester Building. The Biosolids Dewatering Facility is summarized in Section 3.12. These facilities and the geotechnical report, shown in the table below, are described in design memoranda that follow.

TABLE 4.0.0.1
FACILITY DESIGN

Description	Design Memorandum Number	Process Area[1]
Geotechnical Considerations	4.1	
New SBR Building	4.2	520
New Aerobic Digester Building	4.3	910

[1] These numbers represent an indexing system that is used in the project drawings.

PREDESIGN REPORT MEMORANDUM	
Project:	City of Molalla Wastewater Treatment Plant Upgrades
Section:	4.1
Subject:	**GEOTECHNICAL CONSIDERATIONS**
Date:	August 9, 2021
Prepared By:	Ryan Quigley, P.E.

4.1.1 Introduction

During late July 2021, Foundation Engineering, Inc. conducted field explorations of the Wastewater Treatment Plant (WWTP) project site. In August 2021, The Dyer Partnership received a Geotechnical Investigation Report and Seismic Hazard Study discussing the field investigation, analysis, geotechnical design criteria, and construction recommendations. This section summarizes major points of the report. A copy of the geotechnical report is provided under separate cover.

The areas of discussion are the following: site conditions, subsurface conditions, and geotechnical design and construction recommendations.

4.1.2 Plans and Schematics

The 11 by 17 inch drawing set that accompanies this report contains a graphic description of the plant site upgrades.

4.1.3 Site and Subsurface Conditions

Plant Site

The existing WWTP property is approximately 58 acres. Of the 58 acres, the existing Wastewater Treatment Plant takes up an area of 35 acres. This area is fully fenced and is a combination of Operations / Lab Building, pavement, lagoons, and agricultural land. An 11-acre section to the south of the existing treatment facility has been left undeveloped for possible future expansion. The lay of the land is characterized by a gentle slope to the northwest, with surface elevations ranging from 288 to 328 feet.

Six exploratory boreholes (BH-1 through BH-6) were completed during Phase I. BH-1 and BH-2 were drilled at the proposed south improvement site located south of Lagoon No. 1 on November 23, 2020. BH-3 and BH-4 were drilled at the proposed northeast improvement site located northeast of Lagoon No. 2 on December 21, 2020. BH-5 was drilled on top of the existing berm in the vicinity of the planned Sequencing Batch Reactor (SBR) location on February 5, 2021. BH-6 was drilled in the footprint of the Aerobic Digester on April 23, 2021. The borings were drilled using truck and track-mounted drill rigs. BH-3 and BH-4 were completed using hollow-stem auger drilling methods. The borings are summarized as follows:

BH-1. Located to the southwest corner of the property south of Lagoon No. 1. BH-1 was drilled to a depth of 30.3 feet and encountered medium dense, medium plasticity clay to ±7 to 8 feet. The clay is underlain by dense, medium plasticity clayey sand to ±14.0 feet, followed by fine to medium sand, fine to coarse subrounded gravel. Dense silty gravel was encountered at ±14.0 feet. The gravel is underlain by a layer of scattered cobbles (3 to 6 inches in diameter) at ±17.5 feet. From ±20 feet the dense silty gravel becomes very dense to the bottom of the boring, elevation (±El. 293.1).

BH-2. Adjacent to BH-1 but slightly to the east. BH-2 was drilled to a depth of 31.3 feet and encountered soft silty clay with scattered organics, medium plasticity, and fine roots at ±1 foot. The clay is underlain by dense, medium plasticity clayey sand to ±10.0 feet, followed by gravelly dense clayey sand. Very dense silty gravel along with medium plasticity silt and fine to coarse sand was encountered from ±15 to 20.0 feet. The gravel, silt and sand is underlain by silty sand with some gravel from ±20.0 feet (±El. 313.9) to ±31.3 feet (±El. 292.7, the bottom of the boring).

BH-3. Located at the northeast part of the property northeast of Lagoon No. 2. BH-3 was drilled to a depth of 30.5 feet and encountered soft to stiff, medium plasticity clayey silt with scattered organics and fine sand to ±16.3 feet. The silt is underlain by very dense silty gravel to ±20.0 feet, followed by very dense silty gravelly sand to ±25.0 feet. Very dense silty sandy gravel was encountered from ±25.0 feet (±El. 290.2) to ±30.5 feet (±El. 284.7, the bottom of the boring).

BH-4. Adjacent to BH-3 but slightly to the southeast. BH-4 was dug to a depth of 30.6 feet and encountered soft to medium stiff, medium plasticity, clayey silt along with stiff sandy clayey silt at ±10.0 feet. The silt is underlain by stiff, low plasticity, silt with trace sand and organics to a depth of ±12.5 feet. Below the silt is a layer of medium stiff to stiff clayey silt to ±17.0 feet. Very dense, medium to high plasticity, silty sandy gravel was encountered from ±17.0 feet (±El. 296.7) to ±30.6 (±El. 283.1, the bottom of the boring).

BH-5. Located on the west side of the proposed SBR fill. BH-5 was drilled at the top of the existing lagoon berm at a surface elevation of ±El. 318. The drilling encountered fill to ±20.5 feet (±El. 297.5). The fill includes ±12 inches of silty crushed rock underlain by medium stiff, medium plasticity clayey silt with trace to some gravel to ±10 feet and stiff, medium plasticity silty clay from ±10 to 20.5 feet. The fill is underlain by alluvium to ±33.4 feet (±El. 284.6), the maximum boring depth. The alluvium includes stiff, medium plasticity silty clay to ±22.5 feet, very dense clayey gravel with some sand from ±22.5 to 32.5 feet, and very dense silty sandy gravel from ±32.5 to 33.4 feet.

BH-6. Located on the west side of the proposed Aerobic Digester. BH-6 was drilled within the footprint of Aerobic Digester at a surface elevation of ±El. 300.5. The drilling encountered ±8 inches of silty crushed rock (fill) underlain by alluvium to ±40.8 feet (±El. 259.7), the maximum boring depth. The alluvium includes stiff to very stiff, medium plasticity clayey silt to ±8.5 feet, predominantly very dense clayey gravel with some sand from ± 8.5 to 20 feet, and very dense silty sandy gravel from ±20 to 40.8 feet.

During the field investigation groundwater was not encountered suggesting the static water table was deeper than 30 feet (±El. 293) at the time of drilling.

4.1.4 Design and Construction Recommendations

General Earthwork and Materials
Select Fill should consist of ¾ to 1 inch minus, clean (less than five percent passing the #200 U.S. Sieve), well-graded crushed gravel or rock. A material gradation should be provided for approval prior to delivery to the site.

Granular Site Fill as defined in this report should consist of 3 or 4-inch minus, clean, (i.e., less than five percent passing the #200 U.S. Sieve), well-graded crushed rock. A material gradation should be provided to the Geotechnical Engineer for approval prior to delivery to the site.

Stabilization Rock should consist of 6-inch, clean, open-graded, angular, crushed rock, jaw run, or riprap. The Geotechnical Engineer will be provided an opportunity to review the intended fill for approval, prior to delivery to the site.

The Separation Geotextile should be a woven or non-woven geotextile with strength properties meeting the requirements of an American Association of State Highway and Transportation Officials (AASHTO) M 288-17 Class 2 geotextile. The geotextile should have hydraulic properties meeting the requirements of AASHTO M 288-17 with a minimum permittivity of 0.1 sec^{-1} and an apparent opening size of less than 0.6 mm.

The Separation Geotextile should be laid smooth, without wrinkles or folds, in the direction of construction traffic. Overlap adjacent rolls a minimum of two feet. Pin fabric overlaps or place the Select Fill in a manner that will not separate the overlap during construction. Seams that have separated will require removal of the Select Fill to establish the required overlap.

Compact the granular fill in loose lifts not exceeding 12 inches. Thinner, ±6 to 8-inch thick lifts will be required if light or hand-operated equipment is used. Use only hand-operated equipment to compact fill within five feet of walls. Compact the fill to a minimum of 95 percent relative compaction. The maximum dry density of American Society for Testing and Materials (ASTM) D 698 should be used as the standard for estimating relative compaction.

Field density tests should be run frequently to confirm adequate compaction of the imported granular fill. Granular fill that contains aggregates too coarse for density testing should be proof-rolled using a loaded ±10-yd^3 dump truck or other approved heavy construction vehicle. Efficient compaction of the section should be evaluated by a Foundation Engineering representative. Areas of pumping or deflection observed beneath the truck wheels should be reworked or over excavated and replaced with additional compacted Select Fill, Granular Site Fill, or Stabilization Rock and proof-rolled again.

Shoring for utility trenches and temporary excavations should conform to Oregon Occupational Safety and Health Administration regulations (OSHA, 2011). An OSHA Type B soil is appropriate for the stiff fine-grained soils, assuming construction occurs during dry weather. This soil may degrade to an OSHA Type C soil when exposed to sustained wet weather or in the presence of groundwater. The deeper, coarse-grained soil corresponds to an OSHA Type C soil. Worker’s safety in trenches or excavations is the sole responsibility of the Contractor.

The Contractors bidding on this project will be provided with a copy of the geotechnical report to review site conditions and recommendations for site preparation and foundation construction. The geotechnical engineer will be provided an opportunity to meet with the selected Contractor prior to construction to discuss the site conditions and the Contractor’s approach to the work.

SBR / Auxiliary Structures - Dewatering and Site Preparation
Construction of the SBR site area will require a temporary dike. First, Lagoon No. 2 will be lowered to a minimum operational depth of ±4 to 5 feet or as required by the City of Molalla.

Install a relatively water-tight cofferdam system around the footprint of the SBR platform.

Dewater inside the cofferdam to the extent practical. Dewatering may require the excavation of several shallow sump pits and installation of pumps to lower the water below the surface of the organic debris accumulated in the bottom of the lagoon. The sump pits should terminate above the underlying gravel stratum.

Excavate and remove all organic matter and debris accumulated in the bottom of the lagoon. It should be assumed an excavator equipped with a smooth-edged bucket will be needed to remove the lagoon debris. Even with dewatering, the lagoon bottom will likely be too soft to support trucks and/or conventional earthmoving equipment. Temporary haul roads constructed using Stabilization Rock may be needed to provide access.

The excavation should remove the unsuitable debris and terminate on firm, native soil. The thickness of the unsuitable debris is not known. The excavation depths required to remove the unsuitable debris should be confirmed by a Foundation Engineering representative during construction. Haul all excavated material from the site. No excavated material should be reused as site fill.

The existing berm slopes should be stripped of vegetation and organic matter prior to placing new fill.

If standing water remains in the excavation, Stabilization Rock may be used for the initial fill to raise the site above the water level. The initial Stabilization Rock should be spread and tracked in place using a dozer. At least 2 feet of Stabilization Rock should cover the subgrade prior to allowing compaction equipment on the fill.

Construct the SBR platform using Granular Site Fill, Select Fill, or combination thereof. The platform should be capped with a minimum of 12 inches of Select Fill.

The exterior portion of the SBR platform should be constructed using 2.5:1 Horizontal:Vertical (H:V) or flatter slopes.

Immediately following construction of the platform, we recommend installing a series of survey hubs on the top of the platform. The elevations of the hubs should be measured daily for a period of one to two weeks prior to the start of foundation construction to determine the magnitude and rate of settlement due to the weight of the structural fill. Foundation construction should be delayed until settlement slows to an acceptable rate (to be determined in consultation with Foundation Engineering).

Excavate for the SBR mat foundation and auxiliary structure's mat foundations / concrete slab. The depth should accommodate a minimum 12-inch thick building pad consisting of Select Fill. Areas of loosened or disturbed granular foundations soils should be compacted prior to backfilling.

Excavate for the spread footings supporting auxiliary structures. The depth should accommodate a minimum of 6 inches of Select Fill beneath the footings. Areas of loosened or disturbed granular foundations soils should be compacted prior to backfilling.

SBR / Auxiliary Structures - Foundation Design

Design the mat foundation and spread footings using an allowable bearing pressure of 4,000 lb/ft^2 (psf). This value may be increased by one-third for transient (seismic and wind) loading. This value assumes the footings will be constructed on a minimum of 6 inches of Select Fill and the mats will be constructed on minimum of 12 inches of Select Fill underlain by structural fill.

Assume a total settlement of ±1½ inch at the center of the SBR and ±1 inch at the corners due to the weight of the structural fill and SBR structure. Half of this settlement is anticipated to occur during site grading. The remaining settlement will occur post-construction. Differential settlement across the mat may be assumed to be approximately half of the estimated total settlement.

Assume up to ±1 inch of settlement for the auxiliary structures. Half of this settlement is anticipated to occur during site grading. The remaining settlement should occur post-construction.

Use a coefficient of friction of 0.5 to calculate the sliding resistance of footings and mat foundations bearing on compacted Select Fill.

Use an allowable passive resistance of 220 lb/ft^3 (pcf) for calculating the passive resistance of the footings. This value assumes the foundations are backfilled with compacted Select Fill.

Use a modulus of subgrade reaction, ks, of 250 lb/in^3 (pci), for the design of mat foundations and concrete slabs. Reinforce the slabs to reduce cracking and warping. Rebar, instead of wire mesh, is recommended.

Provide a suitable vapor barrier under the mat foundation and concrete floor slabs for the auxiliary structures that is compatible with the proposed method of slab curing.

Aerobic Digester and Aerobic Digester Building - Site Preparation
Strip the foundation areas ±4 inches or as required to remove existing sod, roots, concrete slabs, and any construction debris. Haul all strippings and debris from the site.

Excavate for the Aerobic Digester mat foundation and Aerobic Digester Building floor slab using an excavator equipped with a smooth-edged bucket to minimize disturbance to the foundation subgrade. The depth should accommodate a minimum 12-inch thick building pad consisting of Select Fill. Increase the building pad thicknesses to 24 inches if construction occurs during wet weather.

Cut temporary slopes for the below-grade portion of the Aerobic Digester no steeper than 1:1 (H:V) in the upper fine grained soil and no steeper than 1.5:1(H:V) in the underlying gravel. The temporary cuts may have to be flattened or benched if seepage from the slope face occurs during construction.

Where temporary slopes are not feasible, provide appropriate shoring. Shoring design is typically provided by the Contractor

Excavate for the spread footings supporting the Aerobic Digester Building using an excavator equipped with a smooth-edged bucket. The depth should accommodate a minimum of 6 inches of Select Fill beneath the footings.

Aerobic Digester Phase II (Expansion) - Site Preparation
Rubblize (i.e., break up or punch holes in) the existing asphalt concrete lining of the aeration pond to permit water passage.

Raise the site to the required grade using Granular Site Fill or Select Fill. The backfill should be capped with a minimum of 12 inches of Select Fill.

Excavate for the mat foundation using an excavator equipped with a smooth-edged bucket to minimize disturbance to the foundation subgrade. The excavation depth should accommodate a minimum 12-inch thick building pad consisting of Select Fill.

Influent Flow Equalization Basin - Site Preparation
Demolish the existing AC liner at the base of the aeration basin. Haul all construction debris from the site.

Excavate for the equalization basin mat using an excavator equipped with a smooth-edged bucket to minimize disturbance to the subgrade. The depth should accommodate a minimum 12-inch thick building pad consisting of Select Fill. Increase the building pad thickness to 24 inches if construction occurs during wet weather.

Cut temporary slopes no steeper than 1:1 (H:V) in the upper fine-grained soil and no steeper than 1:1.5 (H:V) in the underlying gravel. The temporary cuts may have to be flattened or benched if seepage from the slope face occurs during construction.

Install temporary sumps and collection pipes, as required, to dewater the foundation excavations prior to placing Select Fill. The temporary dewatering system should be installed prior to excavating to the planned subgrade elevation to minimize subgrade heaving. The extent of the required dewatering is not currently known and will have to be confirmed once the excavation begins.

Immediately cover cut slopes with plastic sheeting to maintain the moisture content and protect the slopes from erosion.

Where temporary slopes are not feasible, provide appropriate shoring. Shoring design is provided by the Contractor.

Equalization Basin - Foundation Design
Design the mat foundations and spread footings using an allowable bearing pressure of 3,000 psf. This value may be increased by one-third for transient (seismic and wind) loading. This value assumes the mats will be supported on a minimum of 12 inches of Select Fill and the footings will supported on a minimum of 6 inches of Select Fill underlain by undisturbed, stiff clayey silt or dense clayey / silty gravel. The foundation conditions should be confirmed by Foundation Engineering, Inc. during construction.

Assume foundation elements could settle up to ½ inch, if the foundations are designed and built as recommended herein.

Use a coefficient of friction of 0.5 to calculate the sliding resistance of footings and mat foundations bearing on compacted Select Fill.

Use an allowable passive resistance of 220 pcf for calculating the passive resistance of the footings. This value assumes the foundations are backfilled with compacted Select Fill.

Use a modulus of subgrade reaction, ks, of 250 pci, for the mat foundation and concrete slab design. Reinforce the slabs to reduce cracking and warping. Rebar, instead of wire mesh, is recommended.

Provide a suitable vapor barrier under the concrete floor slab for the blower room that is compatible with the proposed method of slab curing.

Design the below-grade portion of the wall for the Aerobic Digester using an equivalent fluid density of 55 pcf. This value assumes the walls will be backfilled with compacted Select Fill. In addition, we have assumed there will be an appropriate drainage system behind the wall to prevent the buildup of hydrostatic pressure.

Design the influent flow equalization basin walls using an equivalent fluid density of 90 pcf (i.e., 27.5 pcf due to the buoyant weight of the backfill plus a hydrostatic fluid density of 62.4 pcf). These values assume the walls will be backfilled with compacted Select Fill.

Design the influent flow equalization basin mat to resist a hydrostatic uplift pressure of ±845 psf.

Effluent Storage Pond No. 1 Lining
Lagoon No. 2 will be converted to Effluent Storage Pond No. 1 and undergo improvements. The improvements will be performed during dry weather only (i.e., summer through early fall).

Dewater the lagoon to the extent practical. Dewatering may require the excavation of several sump pits and installation of pumps to lower the water below the surface of the organic debris accumulated in the bottom of the lagoon.

Excavate and remove all organic matter and debris accumulated in the bottom of the lagoon. It should be assumed an excavator will be needed to remove the lagoon debris. The lagoon bottom, even with dewatering, will likely be too soft to support trucks and/or conventional earthmoving equipment. Temporary haul roads consisting of a Separation Geotextile and Stabilization Rock may be needed to provide access for the excavator and trucks.

The excavation should remove the unsuitable debris and terminate on firm, native soil. The thickness of the unsuitable debris is not known. The excavation depths required to remove the unsuitable debris should be confirmed by a Foundation Engineering representative during construction. Haul all excavated material from the site. No excavated material should be reused as site fill.

Grade the bottom of the lagoon as required. It should be assumed that, even with dewatering, the soils at the bottom will be too moist for compaction. Therefore, no compaction should be planned. Furthermore, Contractors should plan to use low ground pressure equipment, unless the subgrade is sufficiently stiff to support conventional earthwork equipment.

If standing water remains in the excavation, Stabilization Rock may be used for the initial fill to raise the site above the water level. The initial Stabilization Rock should be spread and tracked in place using a dozer. At least 2 feet of Stabilization Rock should cover the subgrade prior to allowing compaction equipment on the fill. If Stabilization Rock is used, cover it with a blanket of Granular Site Fill followed by Select Fill (to expedite fine grading of the lagoon bottom). Cover the rock with a Separation Geotextile to protect the planned membrane liner (or as specified by the liner manufacturer).

Provide a Separation Geotextile, a transition blanket or other material specified by the manufacturer, to protect the membrane during installation. Anchor the membrane in a trench dug in the top of the berms per the manufacturer's recommendations.

Staging Areas
Excavate to the depth required to accommodate a minimum of 18 to 24 inches of granular fill (Select Fill or combination of Granular Site Fill and Select Fill) over a Separation Geotextile. Do not allow continuous construction traffic on the rock section until a minimum of 24 inches of rock is in place.

The Contractor may be able to reduce the thickness of the granular fill by installing a geogrid between the granular fill and the underlying Separation Geotextile.

4.1.5 Design Issues Yet to Be Resolved

- Cofferdam design options, costs, and constructability evaluation.
- Evaluation of whether gravel needs to be washed for berm.

- Additional geotechnical work for possible relocation of SBR site to property directly west of existing WWTP.

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	4.2
Subject:	Specific Process Area 520
	NEW SBR BUILDING
Date:	June 8, 2021
Prepared By:	Tyler J. Molatore, P.E.

4.2.1 Purpose and Scope

The new Sequencing Batch Reactor (SBR) Building is designed to provide space for the following: SBR blowers; SBR control panel; Ultraviolet (UV) System control panel; panelboards; Motor Control Centers (MCCs); transformer; automatic transfer switch; and active harmonic filter.

4.2.2 Process Schematics and Plans

Refer to Process Area 520 for the proposed process schematics and the SBR Building plan and elevation views for additional information.

4.2.3 Background

A new SBR Building is required to provide space for the SBR blowers, control panels, and other electrical related items. Two rooms will be provided; one for the blowers and another for the electrical equipment.

4.2.4 Design Criteria

The following codes and standards apply:

- National Fire Protection Association (NFPA) 820: Standard for Fire Protection in Wastewater Treatment and Collection Facilities.

- US Occupational and Safety Health Administration (OSHA).

- Oregon Department of Environmental Quality Guidelines: Reliability Requirements for Sewage Treatment Facilities in Western Oregon.

The new SBR Building will incorporate the following design elements:

- Provide adequate space for electrical components, including sufficient Heating, Ventilation and Air Conditioning (HVAC) system.
- Provide adequate space for SBR blowers.
- Suitable accessibility for maintenance.
- Electrical disconnect switches for each blower.
- Condensate drains for blower piping.

4.2.5 System Description

A new SBR Building will be constructed adjacent to the SBR structure. The new stick-built building will house an electrical room, blower room. The SBR Building will be reinforced concrete slab-on-grade design.

Electrical Room
The electrical room will house the electrical panels and ancillary equipment, including the following:

- MCCs
- SBR control panel
- UV control panel (also considering locating this at the UV Process Area for improved Operator accessibility)
- Automatic transfer switch
- Active harmonic filter
- 120 Voltage Alternating Current (VAC) panelboard
- Future control panels
- Step-down transformer
- Ductless heat pump

The electrical panels will be either wall mounted or installed on concrete housekeeping pads.

A 6-foot by 6-foot 8-inch double door will be provided for maintenance access from the exterior of the building. The electrical room will be insulated (R-21 wall, R-28 ceiling), and include a ductless heat pump for temperature control.

Blower Room
The blower room is sized to house three SBR blowers. The blowers will be installed on raised concrete equipment bases, with perimeter expansion joints. The blowers will be installed with sound enclosures designed for a maximum of 80 decibel (dB) three feet outside of the enclosures. An exterior wall louver

will be provided for make-up air. An overhead door for maintenance access and mandoor from the exterior will be installed on the front side of the building. The blower room will be uninsulated.

Standby Power
If the primary power source is interrupted, the new 500-kilowatt (kW) emergency power system will be automatically activated to power the entire building and SBR blowers. The entire SBR process will remain operational for the full duration of power loss. An Uninterruptable Power Source (UPS) will be provided to allow for uninterrupted power to the SBR control panel during the switching of power sources.

NFPA 820 Classification
The SBR building is an unclassified area.

Access
Each room will be accessible via exterior doors. A paved area will be constructed around the SBR Building, SBR structure, and ancillary Process Areas.

4.2.6 Design Issues Yet to Be Resolved

- Structural design of new building.
- Building electrical, mechanical, and plumbing requirements.
- Electrical design and electrical room layout.

4.2.7 Instrument List

Reference Section 3.5 Sequencing Batch Reactor for an instrument list for the SBR blowers and ancillary equipment.

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	4.3
Subject:	Specific Process Area 910
	NEW AEROBIC DIGESTER BUILDING
Date:	June 8, 2021
Prepared By:	Tyler J. Molatore, P.E.

4.3.1 Purpose and Scope

The new Aerobic Digester Building is designed to provide space for the following: Aerobic Digester blowers; Aerobic Digester control panel; panelboards; transformer, and Motor Control Center (MCCs).

4.3.2 Process Schematics and Plans

Refer to Process Area 910 for the proposed process schematics and the Aerobic Digester Building plan and elevation views for additional information.

4.3.3 Background

A new Aerobic Digester Building is required to provide space for the Aerobic Digester blowers, control panels, and other electrical related items. Two rooms will be provided; one for the blowers and another for the electrical equipment.

4.3.4 Design Criteria

The following codes and standards apply:

- National Fire Protection Association (NFPA) 820: Standard for Fire Protection in Wastewater Treatment and Collection Facilities.
- US Occupational and Safety Health Administration (OSHA).
- Oregon Department of Environmental Quality Guidelines: Reliability Requirements for Sewage Treatment Facilities in Western Oregon.

The new Aerobic Digester Building will incorporate the following design elements:

- Provide adequate space for electrical components and Heating, Ventilation and Air Conditioning (HVAC) system.

- Provide adequate space for Aerobic Digester blowers.
- Suitable accessibility for maintenance.
- Electrical disconnect switches for each blower.
- Condensate drains for blower piping.

4.3.5 System Description

A new Aerobic Digester Building will be constructed adjacent to the Aerobic Digester structure. The new stick-built building will house an electrical room, and blower room. The Aerobic Digester Building will be reinforced concrete slab-on-grade design.

Electrical Room
The electrical room will house the electrical panels, including the following:

- MCCs
- Aerobic Digester control panel
- 120 Voltage Alternating Current (VAC) panelboard
- Step-down transformer

The electrical panels will be either wall mounted or installed on concrete housekeeping pads.

A 6-foot by 6-foot 8-inch double door will be provided for maintenance access from the exterior of the building. The electrical room will be insulated (R-21 walls, R-28 ceiling), and include a ductless heat pump for temperature control.

Blower Room
The blower room, at full built-out, is sized to house three Aerobic Digester blowers. Two blowers will be installed during Phase I improvements. An additional blower will be installed in the future when the Aerobic Digester is expanded.

The blowers will be installed on raised concrete equipment bases, with perimeter expansion joints. The blowers will be installed with sound enclosures designed for a maximum of 80 decibel (dB) three feet outside of the enclosures. An exterior wall louver will be provided for make-up air. An overhead door for maintenance access and mandoor from the exterior will be installed on the front side of the building. The blower room will be uninsulated.

NFPA 820 Classification
The Aerobic Digester Building is an unclassified area.

Access
Each room will be accessible via exterior doors and interior doors will connect each room with the adjacent room.

4.3.6 Design Issues Yet to Be Resolved

- Structural design of new building.
- Electrical design and electrical room layout.

4.3.7 Instrument List

Reference Section 3.11 Aerobic Digester for an instrument list for the Aerobic Digester blowers and ancillary equipment.

SECTION 5:

GENERAL SYSTEMS

Section 5 – General Systems

This section discusses design systems that are project wide in nature, that is, they span all Process Areas. These general systems, shown in the table below, are described in design memoranda that follow.

TABLE 5.0.0.1
GENERAL SYSTEMS

Description	Design Memorandum Number
Sampling and Metering	5.1
Piping	5.2
Coatings	5.3
Electrical	5.4
Instrumentation	5.5
Reliability	5.6

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	5.1
Subject:	General Systems
	SAMPLING AND METERING
Date:	June 25, 2021
Prepared By:	Tyler J. Molatore, P.E.

5.1.1 Sampling

Influent and effluent liquid streams will be representatively sampled for permit reporting and process control.

The existing influent sampler will remain in place without any needed improvements. Influent sampling is currently accomplished with a 24-hour composite, flow-paced sampler. The influent sampler is located on a concrete pad adjacent to the existing influent screening station. The influent sampler intake suction tube is placed in the main channel of the influent screening station.

The point of National Pollutant Discharge Elimination System (NPDES) Permit compliance, when discharging to Outfall 001 and 002, is immediately downstream of the Ultraviolet (UV) disinfection system, but upstream of the effluent storage pond. Effluent will be sampled with a new 24-hour composite, flow-paced sampler from signals received from the magnetic flow meter located upstream of the UV disinfection unit. The effluent sampler will be located on top of the concrete slab at the non-potable water tank. The effluent sampler will receive samples from the non-potable water tank.

In general, sampling ports will be located upstream and downstream of the major process unit to provide manual samples to be taken to assess unit process performance.

5.1.2 Metering

Table 5.1.2.1 lists instruments that will be used in the liquid and solid stream to monitor flows.

TABLE 5.1.2.1
METERING INSTRUMENTS

Metering Instruments Instrument	Purpose	Process Area	Quantity	Location
Influent Parshall Flume (Existing)	Influent Flow	-	1	Influent Screening System
Transfer Pump Station Flow	Flow Transferred to SBR	300	1	Transfer Pump Station
SBR Influent Flow	SBR Basin Influent Flow	500	4	SBR
SBR Effluent Flow	Process Control	500	1	SBR
SBR Blowers Air Flow	Process Control	520	2	SBR Building
WAS Flow	SBR Wasting	500	1	SBR
Effluent Storage Pond No. 1 Flow	Effluent Storage Pond No. 1 Flow	700	1	Effluent Storage Pond
Biosolids Flow	Biosolids Flow to Screw Press	920	1	Biosolids Dewatering
Non-Potable Water System Flow	Non-Potable Water Usage Flow	810	1	Non-Potable Water System

During the winter time, the flow from the effluent pump station will continue to be measured at the discharge monitoring station, and integrated into the WWTP Supervisory Control and Data Acquisition (SCADA) system. During the summer time, the flow from the effluent pump station will be determined by the Effluent Storage Pond No. 1 effluent flow meter.

5.1.3 Design Issues Yet to Be Resolved

- Verification of setback distances in accordance with flow meter manufacturer recommendations.
- Coordination of signal routing to various package control panels.

P R E D E S I G N   R E P O R T   M E M O R A N D U M

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	5.2
Subject:	General Systems
	PIPING
Date:	August 19, 2021
Prepared By:	Tyler J. Molatore, P.E.

5.2.1 Introduction

The purpose of this Technical Memorandum is to define and document the mechanical design criteria for the Wastewater Treatment Plant (WWTP) upgrades.

5.2.2 Design Codes and Standards

- American National Standards Institute (ANSI)
- American Society of Mechanical Engineers (ASME)
- American Waterworks Association (AWWA)
- American Welding Society (AWS)
- National Fire Protection Association (NFPA)
- Occupational Safety and Health Administration (OSHA)

5.2.3 Valve Selection

Manually operated and electronically actuated valve schedules will be defined as the project progresses. The main effluent valves that convey effluent from the Non-Potable Water System to the Effluent Pump Station, Effluent Storage Pond No. 1, and Effluent Storage Pond No. 2 will be electronically actuated. There will be a electronically modulating effluent valve located on the main effluent line from Effluent Storage Pond No. 1 to the Effluent Pump Station. This modulating valve will be integrated into the Effluent Pump Station such that during the summer time a certain liquid level will be maintained in the Effluent Pump Station wet well based on an Operator specified pressure set point. In general, valve selection will be as follows:

- For raw sewage and sludge systems, gate valves and plug valves will be used.

- For process air systems, final effluent, and plat water systems, valves 3-inches and larger will be butterfly valves. Valves 2½-inches and smaller will be ball valves.
- Check valves for wastewater and sludge systems will be swing check valves.
- Electric actuators will generally be 120 Volt (V) single phase on valves 4 inches and smaller and 480 V three phase on valves 4 inches and larger.

5.2.4 Piping Layout and Access

The following layout and access considerations will be observed during design.

- Piping should not be located above blowers, pumps, and compressors to avoid conflicts when removing equipment.
- For water drainage, locate a manual drain valve on the lowest point of every pipeline.
- Pipe supports and seismic bracing are generally not shown on the drawings. The drawings will, however, verify that adequate space is available for installation of supports.
- Flexible connections are required to for assembly and disassembly.
- Valves should be located to permit Operator accessibility, generally below eight feet.
- Do not place swing check valves in vertical piping runs.
- Locate piping such that it is not a tripping hazard.
- High points on conveyance piping should include air release valves.

5.2.5 Pipe Insulation and Freeze Protection

Piping that is exterior and small diameter will be insulated and heat traced to prevent freezing conditions.

5.2.6 Pipe Identification

New, exposed piping, both interior and exterior, will be identified by plastic coding markers with flow direction arrows. Legend markers and directional arrows will be located at: each side of walls, floors and ceilings, at one side of each piece of equipment, at piping intersections, and at approximately 50-foot centers.

Plastic tape will be used above buried piping. A single line of tape will be installed 2.5 feet above the centerline of buried pipe.

Magnetic tracer tape will be used with all buried non-ferrous, plastic and reinforced thermosetting resin pipe. The tape will be buried 12 to 18-inches below ground.

Stainless steel tags with the specified valve number stamped in 1/4-inch high letters will be installed on valve flanges in a position visible from floor level.

5.2.7 Pipe Testing

All piping will be tested. Aeration air system will be tested with air; however, the majority of the pipe systems, which are liquid systems, will be tested with water. Test pressures will be determined during design, as specified by the Uniform Plumbing Code (UPC), or Department of Environmental Quality (DEQ) requirements.

5.2.8 Abbreviations

The following systems are used or encountered during project design.

TABLE 5.2.8.1
ABBREVIATIONS

Symbol	Service	Usage or Fluid Description
A	Aeration Air	Aeration air for mixing and stabilization.
B/E	Bypass / Emergency	Bypass or emergency piping.
D	Drain	Drain from equipment or plumbing.
DB	Digested Biosolids	Biosolids transfer and flow to the screw press.
FE	Final Effluent	Disinfected discharge from the UV disinfection system.
G	Grit	Grit slurry from grit removal system.
HW	Hot Water	Plumbing at site buildings.
NPW	Non-Potable Water	Water from the Non-Potable Water System.
OF	Overflow	Secondary flow outlet to prevent uncontrolled overflows when the main outlet is plugged for the following processes: Grit Removal and Tertiary Filters.
RS	Raw Sewage	Influent to treatment plant.
RW	Recycled Water	Recycled water for land application.
SE	Secondary Effluent	Effluent leaving SBR that has been treated, but not disinfected.
SN	Supernatant	Decanted liquid from the digesters.
SS	Sanitary Sewer	Sewer from WWTP site.
STD	Storm Drain	Storm drain line used for rain water.
TD	Tank Drain	Drain from bottom of tanks.
TE	Tertiary Effluent	Effluent leaving the effluent filter system but not disinfected.
TW	Tempered Water	Water conditioned for the emergency shower.
V	Vent	Vent line used for equipment or plumbing at site buildings.
WAS	Waste Activated Sludge	Sludge from the SBR that is pumped to the digesters.
W	City Water	Potable water.

5.2.9 Systems Description

Table 5.2.9.1 describes the material, joints, and valves used in piping systems in this project.

FIGURE 5.2.9.1
PIPING SYSTEMS

Symbol	Service	Diameter	**Exposed** (or submerged with appropriate coating)				**Buried**			
			Material	**Joint**	**Fittings**	**Valves**	**Material**	**Joint**	**Fittings**	**Valves**
A	Aeration Air from Blowers to SBR and Digester	All	Stainless Steel	Welded/Flanged	Stainless Steel	Butterfly	Welded Steel	Flanged, Grouted, Welded	Welded Steel	None
	Aeration Air inside SBR and Digester	All	PVC, Sch. 80	Solvent Welded	Solvent Welded	None	-----	-----	-----	-----
D	Drain	3" and smaller	PVC, Sch. 80	Solvent Welded	Solvent Welded	Eccentric Plug	PVC	Solvent Welded	PVC	None
		4" and larger	Ductile Iron	Mechanical	Ductile Iron	Eccentric Plug	PVC	Mechanical	Ductile/Cast Iron	Eccentric Plug
DS	Digested Sludge	All	PVC, Sch. 80	Solvent Welded / Flanged / PVC / Sch. 80	PVC Sch. 80	Eccentric Plug	Ductile Iron / PVC, C900	Mechanical	Ductile/Cast Iron	Eccentric Plug
SE	Secondary Effluent	All	Ductile Iron	Flagned	Ductile/Cast Iron	Eccentric Plug	Ductile Iron	Mechanical	Ductile/Cast Iron	Eccentric Plug
TE	Tertiary Effluent	All	Ductile Iron	Flagned	Ductile/Cast Iron	Eccentric Plug	Ductile Iron	Mechanical	Ductile/Cast Iron	Eccentric Plug
FE	Final Effluent	All	Ductile Iron	Flanged	Ductile/Cast Iron	Eccentric Plug	Ductile Iron / PVC, C900	Mechanical	Ductile/Cast Iron	Eccentric Plug
G	Grit Slurry	All	PVC, Sch. 80	Solvent Welded / Flanged / PVC / Sch. 80	Solvent Welded	Eccentric Plug	-----	-----	-----	-----
HW	Hot Water	All	Copper Tube	Solder/Threaded/Flanged	Wrought Copper/Bronze	Ball	-----	-----	-----	-----
NPW	Non-Potable Water	All	Stainless Steel / PVC, Sch. 80	Threaded / Flanged / Solvent Welded	Stainless Steel / PVC, Sch. 80	Ball	PVC, Sch. 80	Bell and Spigot	PVC	Gate
RS	Raw Sewage	All	Ductile Iron	Flanged	Ductile Iron	Eccentric Plug	Ductile Iron / PVC, C900	Mechanical	Ductile/Cast Iron	Eccentric Plug
SD	Sanitary Drain	3" and smaller	PVC, Sch. 80	Threaded / Solvent Welded	PVC , Sch. 80	None				
		4" and larger	Cast Iron Soil Pipe	Hubless	Cast Iron	None	PVC	Mechanical / Bell and Spigot	Ductile/Cast Iron	Eccentric Plug
SN	Supernatant	All	Ductile Iron	Flanged / Grooved	Ductile Iron	Eccentric Plug	Ductile Iron / PVC, C900	Mechanical	Ductile/Cast Iron	Eccentric Plug
STD	Storm Drain	All	-----	-----	-----	-----	PVC	Mechanical	Ductile/Cast Iron	None
TD	Tank Drain	All	Ductile Iron	Flanged / Grooved	Ductile Iron	Eccentric Plug	Ductile Iron	Mechanical	Ductile/Cast Iron	Eccentric Plug
TW	Tempered Water	All	Cobber Tube	Solder / Threaded / Flanged	Wrought Copper/Bronze	Ball	K Copper Tube	Threaded / Flanged	Wrought Copper / Bronze	Gate
V	Vent	3" and smaller	PVC, Sch. 80	Threaded / Solvent Welded	PVC, Sch. 80	None	PVC	Solvent Welded	PVC	None
		4" and larger	Cast Iron Soil Pipe	Hubless	Cast Iron	None	PVC	Mechanical	Ductile/Cast Iron	None
WAS	Waste Activated Sludge	All	PVC, Sch. 80	Flanged / Solvent Welded	PVC, Sch. 80	Eccentric Plug	PVC, Sch. 80	Mechanical	PVC, Sch. 80	Eccentric Plug
W	City Water	2" and smaller	Cobber Tube	Solder / Threaded / Flanged	Wrought Copper/Bronze	Ball	PVC, Sch. 81	Mechanical	PVC, Sch. 81	Ball / Gate

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	5.3
Subject:	General Systems
	COATINGS
Date:	August 19, 2021
Prepared By:	Tyler J. Molatore, PE

5.3.1 Description

This section discusses coatings used in the Wastewater Treatment Plant (WWTP) Upgrade project. This includes metal, wood, plastics and cementitious surfaces on new improvements and modified or damaged existing components.

Four general coating systems will be used in addition to grease, buried pipe encasements and moisture barriers. Four general coating systems are shown below:

1. Epoxy of varying thickness, depending upon the application, is the basic metal surface coating.

2. Urethane is used as an overcoat for epoxy that is exposed to sunlight.

3. Polyamidoamine epoxy is used for immersed metals.

4. Latex is used for exposed plastic conduits and building surfaces that are not shop coated.

5.3.2 Coating Schedule

Table 5.3.2.1 relates surfaces to the coating system.

TABLE 5.3.2.1
COATING SCHEDULE

Coating Schedule		
Equipment and Ferrous Metals (in general)		
	Interior	Epoxy
	Exterior	Urethane
	Submerged / Immersed	Polyamidoamine epoxy
Non-Ferrous Metals (in general)		
	Interior and exterior	Uncoated
Piping and Conduit		
	Immersed cast iron or steel piping, and appurtenant hangers and supports	Polyamidoamine epoxy
	PVC and cPVC piping (and conduit) exposed to direct sunlight	Latex
	Interior, exposed piping valves, appurtenances, hangers, clamps and supports	Epoxy
	Exterior, exposed piping valves, appurtenances, hangers, clamps and supports	Urethane
Cementitious Surfaces		
	Exterior (in general)	Uncoated
	Interior	Latex
	Water Bearing Tanks, Wet Wells	Moisture coated
Wood Surfaces		
	Interior / Exterior	Latex
Door and Door Frames		
	Steel	
	Interior	Epoxy
	Exterior	Urethane
	Aluminum	Shop-Coated
Handrails, Gratings, Floor Plates, Hatches, Hangers, Pipe Supports		
	Interior and exterior	Uncoated
Aluminum or Stainless Steel Flashing, Light Standards, Supports and Louvers		
	Interior and exterior	Uncoated

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla Wastewater Treatment Plant Upgrades
Section:	5.4
Subject:	General Systems **ELECTRICAL**
Date:	September 10, 2021
Prepared By:	Gregg Scholz, P.E. – R&W Engineering, Inc.

5.4.1 Introduction

This section describes the electrical system upgrades necessary for facilitating the planned Wastewater Treatment Plant (WWTP) Upgrades. Specifically, the areas of discussion in this section include the following: electrical power service and distribution; emergency standby power; and control system.

5.4.2 Wastewater Treatment Plant

Existing Utility Service

The Molalla Wastewater Treatment Plant has three utility services at the plant provided by Portland General Electric (PGE). Two service transformers at the main plant area are fed from an underground primary vault near the entrance road gate. The third service is fed underground from a pole drop along Hwy 211 to a transformer near Lagoon No. 1, south of the lagoons.

The PGE transformer #2573 feeds 480Y/277 Volts (V) to the Effluent Pump Station switchboard. This switch board serves the plant effluent pump Variable Frequency Drives (VFDs) and the plant Transfer Pump Station Motor Control Center (MCC). The Transfer Pump Station MCC feeds the transfer pumps, aerators, and plant Headworks facility. The PGE meter readings show this service with a 12-month maximum demand value of 299 kilowatt (kW).

The PGE transformer #T159 feeds 480Y/277 V to the Operations / Lab Building MCC through a main fused switch and transfer switch. The Operations / Lab Building MCC serves irrigation pumps, pressurization pumps, filter process equipment, and sludge processing equipment around the Operations / Lab Building. The PGE meter readings show this service with a 12-month maximum demand value of 82 kW.

The PGE transformer near Lagoon No. 1 provides 480Y/277 V for aerators and a connection for temporary dredge pumping in the lagoons. There are no changes planned for this service.

Existing Standby Power
The treatment plant facility is provided with backup power using a 750 kW, diesel powered standby generator. The generator is housed in the Effluent Pump Station Building and is connected to the electrical distribution system with a generator switchboard.

The generator switchboard has a 1,000 A breaker that feeds standby power to the Effluent Pump Station switchboard through a 2000 A rated transfer switch. A second breaker in the generator switchboard, rated 800 A, provides standby power to the Operations / Lab Building service through an 800 A rated transfer switch in the Operations / Lab Building. The generator switchboard has space for two additional circuit breakers.

The main switchboard in the Effluent Pump Station has an 800 A feeder breaker that provides utility and standby power to the Transfer Pump Station and Headworks.

Existing Control System
The existing plant control system uses GE Fanuc 90-30 Programmable Logic Controllers (PLC) at the following locations.

1. Operations / Lab Building
2. Influent Screening Facility
3. Transfer Pump Station
4. Effluent Pump Station

These PLCs are networked to the Operations / Lab Building computer where plant systems are monitored and controlled using Cimplicity Supervisory Control and Data Acquisition (SCADA) for Operator interface.

Proposed Utility Upgrade
The new Sequencing Batch Reactor (SBR) treatment facility will require a 1200 A, 480Y/277 V minimum service for the equipment loads and building loads. The loads removed from other plant areas will not be adequate to serve these new loads from existing service equipment.

The PGE has verified that there is a tap location remaining in the primary vault at the gate that can be used to provide a primary feed to a new transformer for the SBR Building complex. This feeder will be routed along the west site boundary to the transformer located near the SBR Building. A vault and transformer pad will be required at the location determined by PGE using the new building site plan drawings.

A new service switchboard will be designed to provide power distribution from the transformer to the new SBR area loads. Service equipment will include an automatic transfer switch to provide switching to a new standby power unit. See proposed standby power upgrade section below.

The treatment plant overall electrical diagram is shown on the electrical drawings in the plan set. A load summary is included in Appendix B.

Proposed Standby Power
A new, diesel-powered standby generator is recommended for the SBR complex. The existing 750 kW is not adequate to provide standby power to the new facility. A new 500 kW rated unit will allow operation of the new critical facilities at the SBR area.

Proposed Control System
The General Electric Emerson PLCs are now obsolete and will need to be replaced as components begin to fail. A direct replacement PLC is now provided by Emerson and can be replaced with no programming changes required. The PLC in the Transfer Pump Station will be replaced by a new package control provided by the pumping system manufacturer. The Operations / Lab Building PLC will have most of the equipment control functions removed during the SBR construction.

Since most equipment suppliers are proposing the use of Allen Bradley PLCs for their equipment control, the existing plant PLCs will be replaced with compatible Allen Bradley PLCs, such as the CompactLogix line, as equipment begins to fail and budget allows. The replacement of the Effluent Pump Station PLC is in process by the City and the Transfer Pump Station PLC will be replaced by equipment supplier package control system during this construction.

Overall plant communication to the SCADA computer is done using ethernet protocol. The new plant communication system that will be designed to incorporate equipment supplier provided PLC controls will use ethernet communication over fiber optic and Cat 5E or 6 cables to accommodate the length of communication lines required to all the buildings. A network of managed and unmanaged ethernet switches will allow connection at each building or Process Area for Operator screens and equipment PLCs. Process-to-process interaction for control of dependent functions will be done between PLCs communicating over the ethernet network. Operators will have access to all plant functions that are programmed at each Human Machine Interface (HMI) screen and at the main plant computer.

Operator interface at the main SCADA computer will continue to use the Cimplicity monitoring software. The computer hardware should be evaluated to determine if an upgrade is necessary to maintain reliable operation during the final design stage.

5.4.3 Summary

The overall electrical and control system design will comply with the 2014 National Electrical Code (NEC) and Oregon Department of Environmental Quality (DEQ) standards for wastewater projects. Areas within the plant will be designated as hazardous based on National Fire Protection Association (NFPA) Standard 820, latest edition.

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla Wastewater Treatment Plant Upgrades
Section:	5.5
Subject:	General Systems **INSTRUMENTATION**
Date:	September 10, 2021
Prepared By:	Tyler J. Molatore, P.E.

5.5.1 General

This section describes the instrumentation system that will be used for process measurement, control, and recording. A preliminary list of instruments used in this project is included at the end of each process section listed in Section 3.

Location of the Supervisory Control and Data Acquisition (SCADA) system will be in the existing Operations Building. Operator interface at the main SCADA computer will continue to use the Cimplicity monitoring software. During the final design stage, the computer hardware will be evaluated to determine if an upgrade is necessary to maintain reliable operation.

Overall plant communication to the main SCADA computer will be done using ethernet protocol. The new Wastewater Treatment Plant (WWTP) package process panels will be designed with Allen Bradley Programmable Logic Controllers (PLCs), with communication over fiber optic and Cat 5E or 6 cables to accommodate the length of communication lines required to all the buildings. Operators will have access to all plant functions that are programmed at each Human Machine Interface (HMI) screen and at the main plant computer.

Electrically driven process equipment will be controlled from dedicated equipment panels located at each respective Process Area. In general, instruments that control the equipment, such as a float and pressure sensor, will be connected to the panel. All process equipment control panels will have alarm signals, and other information, that reports to the Cimplicity monitoring software.

A preliminary panel network drawing is provided in the plan set, drawing 20-P-4. Package process panel inputs / outputs are provided in the drawings that immediately following drawing 20-P-4.

5.5.2 Schematics and Plans

A graphic description of the panel network may be found in the 11 by 17 inch drawing set that accompanies this report. Refer to drawing 20-P-4.

5.5.3 Controlling and Monitoring Process Areas

The following methods will control and monitor the individual Process Areas:

- HAND-OFF-AUTO switches will allow equipment to be operated manually or automatically. HAND and OFF are manual controls and AUTO releases manual control for automatic operation that is particular to the equipment use.

- The new equipment will have dedicated control panels. The control panels will contain motor starters, variable frequency drives, bypass starters, programmable logic controller, and other instrumentation for automatically and locally starting or supervising the equipment. Each panel will have terminals and input / output blocks for interconnection with other equipment and controlling devices, such as, level, flow, and pressure instruments.

- All control panels will have alarms that will be conveyed to the SCADA system.

- The HMIs will be located on the following package process panels. The HMIs allow Operators to monitor the system, change adjustable parameters, initiate operation of systems, or perform other functions. The HMIs for the Transfer Pump Station control panel, Sequencing Batch Reactor (SBR) control panel, and Aerobic Digester control panel, grit removal system control panel, Ultraviolet (UV) system control panel, Effluent Filtration System control panel, and Biosolids Dewatering System control panel will be such that the entire plant-wide data will be accessible for review purposes.

- Uninterruptible Power Supplies (UPS) shall be provided for PLC power supplies and HMIs. The UPSs will provide a minimum thirty minutes of backup power, allowing adequate time for the standby generator to startup and transfer. The UPS shall receive incoming power from either utility power or standby generator power. The UPS will include a bypass switch to allow removal and/or repair to the UPS without disrupting power to the load.

- One laptop will be provided for offsite remote network access. Tablet (iPad or Android) computers are also an option for mobile onsite access and remote access if the City prefers this functionality.

- Indicating lights shall follow the convention. Red to indicate an abnormal condition, such as high pressure or level, or motor alarm. Green to indicate operation, such as motor running or valve open.

- Actuated valves will be provided with local OPEN-STOP-CLOSE pushbuttons and LOCAL / REMOTE selector switches integral with the actuator. The OPEN / CLOSE service valves will be provided with OPEN and CLOSED limit switches that actuate at the end of travel. The modulating valve, located on the Effluent Storage Pond No. 1 outlet, will be provided with OPEN and CLOSED limit switches that actuate at the end of travel, and with continuous 4 to 20 milliampere (mA) position feedback transmitters. The modulating valve will function such that it maintains a certain liquid level setpoint in the Effluent Pump Station wet well.

5.5.4 Alarm Handling

The PLC Input / Output (I/O) signals shall follow the following standards:

- **Discrete Inputs.** Dry contact field devices shall be powered from 120 Voltage Alternating Current (VAC) source in each PLC.

- **Discrete Outputs.** The PLC digital outputs shall be individually isolated, rated for 2 amps at 120 VAC.

- **Analog Inputs.** The PLC analog input signals shall be 4 to 20 mA at 24 Voltage Direct Current (VDC). The PLC analog inputs shall be individually isolated, allowing for 2-wire transmitters powered from independent Direct Current (DC) power supplies in each PLC.

- **Analog Outputs.** The PLC analog output signals shall be isolated 4 to 20 mA at 24 VDC into 750 ohms, powered from each PLC.

5.5.5 PLC Inputs and Outputs

Alarms will be displayed and acknowledged at the respective HMI workstations. Alarm history will be stored on each respective package panel and at the Cimplicity SCADA system.

5.5.6 Instrumentation

New instrumentation will be used throughout the plant and will be wired directly from the field device to the new PLC control systems. Table 5.5.6.1 lists the instrument types that are anticipated on the project.

TABLE 5.5.6.1
INSTRUMENT TYPES

Measurement	Instruments
Liquid Flow	Magnetic Flowmeters
Air Flow	Thermal Mass Flowmeters, SBR Blower & Air Flow Meters
Level	Ultrasonic Level Measurement & Pressure Cell Level Measurement
Temperature	Resistance Temperature Detection Elements
Pressure	Electronic Variable Capacitance or Silicon Strain Gauge Transmitters (Utilized with Discharge of Pumps)
Analytical	Dissolve Oxygen, Mixed Liquor Suspended Solids, Oxidation Reduction Potential (ORP) Instrumentation (Additional Equipment will be Determined during the Design Phase)

5.5.7 Existing Equipment

The existing influent screening system and Effluent Pump Station include Emerson PLCs. The old Headworks and Effluent Pump Station PLCs will be replaced with Allen Bradley PLCs. The new influent screening system, recently installed, will remain in service and be replaced in the future.

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	5.6
Subject:	General Systems
	RELIABILITY
Date:	October 2021
Prepared By:	Tyler J. Molatore, PE

5.6.1 General

This memorandum discusses the design criteria of the Wastewater Treatment Plant (WWTP) Upgrades with respect to those reliability standards and is subdivided as follows: locations and expansion; piping; component maintenance and repair; component reliability; and electrical system.

The Wastewater Treatment Plant components and Process Areas will be designed using US Environmental Protection Agency (EPA) Reliability Class I standards. Component reliability is discussed later in this Memorandum.

Location and Expansion
The location of the WWTP Upgrades will be constrained within the existing site. The new influent flow equalization basin will be located within the existing aeration basin. Upgrades to the Transfer Pump Station will re-use the existing wet well.

Although the SBR site location is currently under evaluation, currently the northwest corner of the existing Lagoon No. 2 will undergo improvements to accommodate the new grit removal system, Sequencing Batch Reactor (SBR), effluent filtration system, disinfection system, Non-Potable Water System, and SBR Building.

The new Aerobic Digester and Biosolids Dewatering Facility will be located between the existing aeration basin and Lagoon No. 2.

The existing Wastewater Treatment Plant is situated outside of the 100-year flood plain. The new treatment plant upgrades will be situated outside of the 100-year flood plain.

Piping
In general, piping will be designed to allow for adequate passage of design flows and maintaining cleansing velocities. Isolation valves, cleanouts, and takedown fittings will be installed to facilitate pipe maintenance.

Sludge conveyance pipe systems will be made for flushing and mechanical cleanout of sludge to prevent blockages.

Component Maintenance and Repair
Sufficient space will be designed around each component to allow for maintenance of the equipment.

Isolation valves will be provided in piping systems to allow the equipment to be removed without taking a basin or redundant component out of service.

Interior equipment positions will have large access doors to allow interior equipment to be removed and replaced. Skid mounted equipment and blowers will be designed for trundle movement through the doors.

All submersible pumps and mixers will be rail mounted and the top of the wet well will have provisions for a davit type crane.

Onsite Non-Potable Water System utility stations will be available for flushing and wash down of equipment.

Component Reliability

Influent Flow Equalization Basin

Equipment Reliability. The influent flow equalization basin consists of a single basin for retention of peak hourly flows during a storm event. The basin does not include any mechanical or electrical equipment and is hydraulically connected to the Transfer Pump Station wet well.

Emergency Power (Loss of Normal Power). Not applicable. The influent flow equalization basin does not include any equipment that would require electrical power during a power outage.

Transfer Pump Station

Pumps

Equipment Reliability. The Transfer Pump Station has three duty pumps and one standby pump. The pump station is sized to handle the 20-year projected peak daily flow with one of the four pumps out of service.

Emergency Power (Loss of Normal Power). The Transfer Pump Station will be connected to the existing emergency standby generator system, 750 kilowatt (kW). Reference Section 5.4 for additional electrical information.

Grit Removal and Flow Splitting

Grit Removal

Equipment Reliability. The grit removal system consists of a vortex grit basin with an associated grit classifier. A pump removes settled grit from the bottom of the basin and transfers the material to the classifier. Neither the grit chamber nor the classifiers are redundant. The grit removal system will have a bypass to allow for maintenance of the grit removal system.

Emergency Power (Loss of Normal Power). The grit removal system will be connected to the new emergency standby generator system (500 kW), located adjacent to the SBR.

Sequencing Batch Reactor

Sequencing Batch Reactor

Equipment Reliability. The SBR will have four identical basins each containing a decanter, Waste Activated Sludge (WAS) pump, mixer and instrumentation. During normal operations any one of the four basins can be temporarily taken out of service. Each basin is sized for one quarter of the 20-year projected peak daily flow.

Emergency Power (Loss of Normal Power). The SBR system will be connected to the new emergency standby generator system (500 kW), located adjacent to the SBR.

Aeration Blowers

Equipment Reliability. Three 100 horsepower (hp) aeration blowers will be installed. Two blowers have the capacity to service all four SBR basins, equating to one blower per two basins. The third aeration blower serves as a redundant backup. Electrically actuated valves will provide automatic control for directing air to the necessary basin. Any of the aeration blowers can send air to any tank. The two duty blowers will each have a thermal mass air flow sensor for air flow measurement. In the event of deficient air flow, an alarm will be activated.

A Dissolved Oxygen (DO) sensor will be located in each SBR basin to continuously measure the actual dissolved oxygen. The blower speed will be controlled based on the actual dissolved oxygen reading. In the event that the dissolved oxygen level drops below an Operator adjustable set point, an alarm will be initiated.

Emergency Power (Loss of Normal Power). The aeration blowers will be connected to the new emergency standby generator system (500 kW).

Air Diffusers

Equipment Reliability. Each basin has a single air diffuser system that is controlled with a single automatic air valve. The valves can be manually activated if the air actuator malfunctions.

Effluent Filtration

Disk Filter

Equipment Reliability. Two rotating disk filters will provide effluent filtration during the recycled water season. Each filter is capable of handling the maximum monthly dry weather flow with a peak decant rate of 4.5 Million Gallons per Day (MGD). If one of the filters malfunctions, then the other will be capable of handling 100 percent of the design flow.

The filters can process the peak daily flow hydraulically, if necessary. Although not required by the discharge permit, each effluent filter will be equipped with a turbidimeter to continuously measure the effluent turbidity when the filter is in production. If the effluent turbidity drops below an Operator adjustable set point, an alarm will be activated.

Emergency Power (Loss of Normal Power). The effluent filter system will be connected to new emergency standby generator system (500 kW).

Disinfection

Disinfection Equipment

Equipment Reliability. An ultraviolet disinfection system, consisting of two parallel disinfection units, will service the secondary effluent leaving the SBR or tertiary effluent from the effluent filters. The disinfection unit is capable of treating the peak decant flow rate while the SBR is operating in storm mode processing the peak daily flow rate.

When discharging to the Molalla River, a dose of 30 millijoule for square centimeter (mJ/cm^2) is required; therefore, only one Ultraviolet (UV) train is necessary to achieve the disinfection objectives. Both UV trains are necessary during recycled water production. Each train consists of three banks. Two banks serve as duty, and one as backup. For maintenance, the UV system is designed such that each train could be bypassed if necessary.

Emergency Power (Loss of Normal Power). The UV disinfection unit is connected to new emergency standby generator system (500 kW).

Non-Potable Water Pump Station

Pumps

Equipment Reliability. The Non-Potable Water Pump Station has one duty pump and one standby pump. Each pump is sized to deliver 100 gallons per minute (gpm) at 231 feet Total Dynamic Head (TDH). A 20,000-gallon non-potable water tank will provide storage of final effluent for distribution throughout the WWTP site when the SBR is not decanting. The WWTP also has access to City water (suitable backflow preventor already installed) that could be used at the site during a complete failure of the Non-Potable Water System. Additionally, there is another connection to the effluent force main.

Emergency Power (Loss of Normal Power). The Non-Potable Water Pump Station will be connected to the new emergency standby generator system (500 kW).

Electric Actuated Valves

Actuated Valves

Equipment Reliability. The new WWTP will have four new electrically actuated butterfly valves. One 30-inch diameter valve will be associated with directing final effluent from the non-potable water tank to Effluent Storage Pond No. 1. The 24-inch diameter valve will direct final effluent from the non-potable water tank to Effluent Storage Pond No. 2. An 18-inch diameter valve will direct final effluent directly to the Effluent Pump Station. Another 18-inch diameter modulating valve will control flow from Effluent Storage Pond No. 1 to the Effluent Pump Station.

Emergency Power (Loss of Normal Power). All of the valves will be connected to the emergency generator systems. The valves at the SBR site and Effluent Storage Pond site will be on the new emergency standby generator system (500 kW). The new modulating valve inside of the existing building will be on the existing standby generator (750 kW).

Effluent Storage and Disposal

Molalla River (November 1st to April 30th)

Equipment Reliability. Effluent discharge to the Molalla River can occur between November 1st to April 30th when stream flows exceed minimum flow requirements. Effluent is conveyed to the Molalla River using the existing Effluent Pump Station. The Effluent Pump Station has two pumps with a capacity between 500 and 7,000 MGD.

Effluent will be directed to the Effluent Pump Station, typically, from Effluent Storage Pond No. 1. This will provide a consistent flow rate to the Effluent Pump Station. The Effluent Storage Pond will provide effluent flow equalization. Future average wet weather flows are less than 4 MGD. The influent flow rate to the Effluent Pump Station will typically be set at less than the capacity of one effluent pump. This will enable the Effluent Pump Station to have complete redundancy. In the future, the City plans to install another effluent pump, to establish two duty and one standby pump at the future peak day flow.

In the event of an Effluent Pump Station failure, there is ample storage in the Effluent Storage Pond(s) during the winter time and summer time to provide emergency capacity. The actuated valves that direct flow to the Effluent Pump Station will be programmed to close upon failure of the Effluent Pump Station.

Effluent Storage Pond No. 1 will have a dedicated overflow pipe that will direct overflow to the Transfer Pump Station and influent flow equalization basin. Effluent Storage Pond No. 1 will also have a liquid level transducer, which will be connected to the SBR control panel and Supervisory Control and Data Acquisition (SCADA) system.

Emergency Power (Loss of Normal Power). The Effluent Pump Station is powered using the existing 750 kW emergency standby generator.

Recycled Water Irrigation (May 1st – October 31st)

Equipment Reliability. Effluent is conveyed to the recycled water irrigation sites using the existing Effluent Pump Station. If the City cannot irrigate or discharge to the Molalla River, typically in the months of May or October final effluent will be stored in the Effluent Storage Ponds, Effluent Storage Pond No. 1. During wet shoulder months, Effluent Storage Pond No. 2 may need to be used.

Emergency Power (Loss of Normal Power). The Effluent Pump Station is powered using the existing 750 kW emergency standby generator.

S***olids Treatment***

Aerobic Digester

Equipment Reliability. There are two Aerobic Digester tanks. Each tank is outfitted with a drain, decanter, transfer piping, influent WAS piping, aeration equipment, and instrumentation. The decanter, drains, and pumping systems act as redundant systems for removing liquid and sludge from the tanks.

The WAS pipework originates from the SBR and can be discharged into either tank. The pipe manifold system offers a way to move biosolids from one tank to another. Aeration is accomplished using two blowers; one blower is dedicated to each tank. No redundancy is required for the blowers. However, the blower piping is designed such that any blower can direct air to any tank. The Aerobic Digester Building includes space for a third blower when the Aerobic Digestion System is expanded.

Biosolids Dewatering

Equipment Reliability. Biosolids are conveyed to the biosolids screw press dewatering unit through a 4-inch diameter force main from the Aerobic Digestion System. The dewatered biosolids will be temporarily stockpiled onsite until ready for offsite disposal at a landfill. The sludge dewatering equipment does not play a critical role in the liquid stream process and can be temporarily taken out of service. The biosolids systems will not be connected to the existing or new standby emergency generator systems.

Electrical System

Motor Control

New motor controls will be installed in the new SBR Building, new Aerobic Digester Building, new Biosolids Dewatering Facility, and for the Transfer Pump Station improvements.

The new Sequencing Batch Reactor (SBR) treatment facility will require a 1200 A, 480Y/277 V minimum service for the equipment loads and building loads. There is a tap location remaining in the primary vault at the gate that will be used to provide a primary feed to a new transformer for the SBR area. A new service switchboard will be designed to provide power distribution from the transformer to the new SBR area loads. Service equipment will include an automatic transfer switch to provide switching to a new 500 kW standby power unit. Reference Section 5.4 for additional electrical information.

The SBR Programmable Logic Controller (PLC) panel and other package process panels will all have individual uninterruptible power supplies with duration to bridge any outages that may occur during power transfer.

Remote stations for equipment control will be in enclosures rated for the environment. (i.e., explosion-proof, and NEMA 4X.)

Automatic Control

Automatically controlled equipment will have manual control for starting and stopping (HAND-OFF-AUTO switches).

Modulating devices, such as Variable Frequency Drives(VFD), will have bypass starters and manual settings.

All equipment will be designed to restart in the control position designated before a power outage.

Alarms

Each control panel will have at least one common alarm that is connected to the alarm system, but most all of the panels will include several alarm call-out functions. Local alarms will be annunciated through either flashing lights or audible signals. Alarms will also activate the existing auto-dialer system to notify operating personnel.

Emergency Power

A new 500 kW generator will be installed at the SBR site, adjacent to the SBR. The generator will have an automatic transfer switch and 24-hour capacity diesel fuel tank. The generator will be sized to operate all critical equipment at the new SBR site for discharge permit compliance.

The existing standby generator will remain in service and be capable of powering the influent screening system, Transfer Pump Station, Effluent Pump Station, and existing Operations / Lab Building.

5.6.2 Design Issues Yet to Be Resolved

- Electrical design.
- Non-potable site piping system.
- Coordination with the City on PLC replacements for existing systems in advance of the project. The SCADA system will also be outside of the scope of this project.

SECTION 6:
IMPLEMENTATION

Section 6 – Implementation

This section discusses design system implementation on a project wide basis. The implementation sections are shown in the table below and described in the corresponding sections.

TABLE 6.0.0.1
IMPLEMENTATION

Description	Design Memorandum Number
Schedule	6.1
Operations during Construction	6.2
Construction Documents	6.3
Cost Estimates	6.4

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla Wastewater Treatment Plant Upgrades
Section:	6.1
Subject:	Implementation **SCHEDULE**
Date:	October 2021
Prepared By:	Steve Major, PE Tyler J. Molatore, PE

6.1.1 Description

This section discusses the overall project schedule consisting of a list of times at which tasks, events, and actions are intended to take place. A graphical schedule is located at the end of this section.

6.1.2 Schedule

Phase I – Design, Permits, and Value Engineering
This phase involves completing the Predesign Report, conducting the value engineering process, preparing the Final Design, all of which will undergo Oregon Department of Environmental Quality (DEQ) review. The value engineering process will be conducted after completion of the Predesign Report. A new National Pollutant Discharge Elimination System (NPDES) Permit will be issued upon commissioning of the new Sequencing Batch Reactor (SBR) facility. This phase of work is scheduled for completion by January 2023.

Phase II – Wastewater Treatment Plant Upgrades
This phase includes preparation of bidding documents, conducting the bidding process, and construction of the new influent flow equalization system, Transfer Pump Station improvements, elevated grit removal system, SBR, effluent filtration system, Ultraviolet (UV) disinfection system, Non-Potable Water System, yard piping, Effluent Storage Pond improvements, Aerobic Digester, SBR Building, Aerobic Digester Building, Biosolids Dewatering Facility, and new standby generator. The new SBR, and other systems and structures at the SBR site area, as well as the new Aerobic Digester and Biosolids Dewatering Facility, must be fully operational, and the existing lagoons must be drained, prior to taking the existing facility offline. A thirty-month construction duration is anticipated. The construction process is scheduled to be completed by October 2025. However, the new SBR is scheduled to be operational by December 2024. Should the SBR site be relocated, the construction schedule will be adjusted accordingly.

Phase III - Performance Evaluation Period
All new facilities will undergo a performance evaluation phase to ensure that all of the equipment and processes perform as specified and required. This evaluation period lasts for twelve months after final completion of the project, or October 2026.

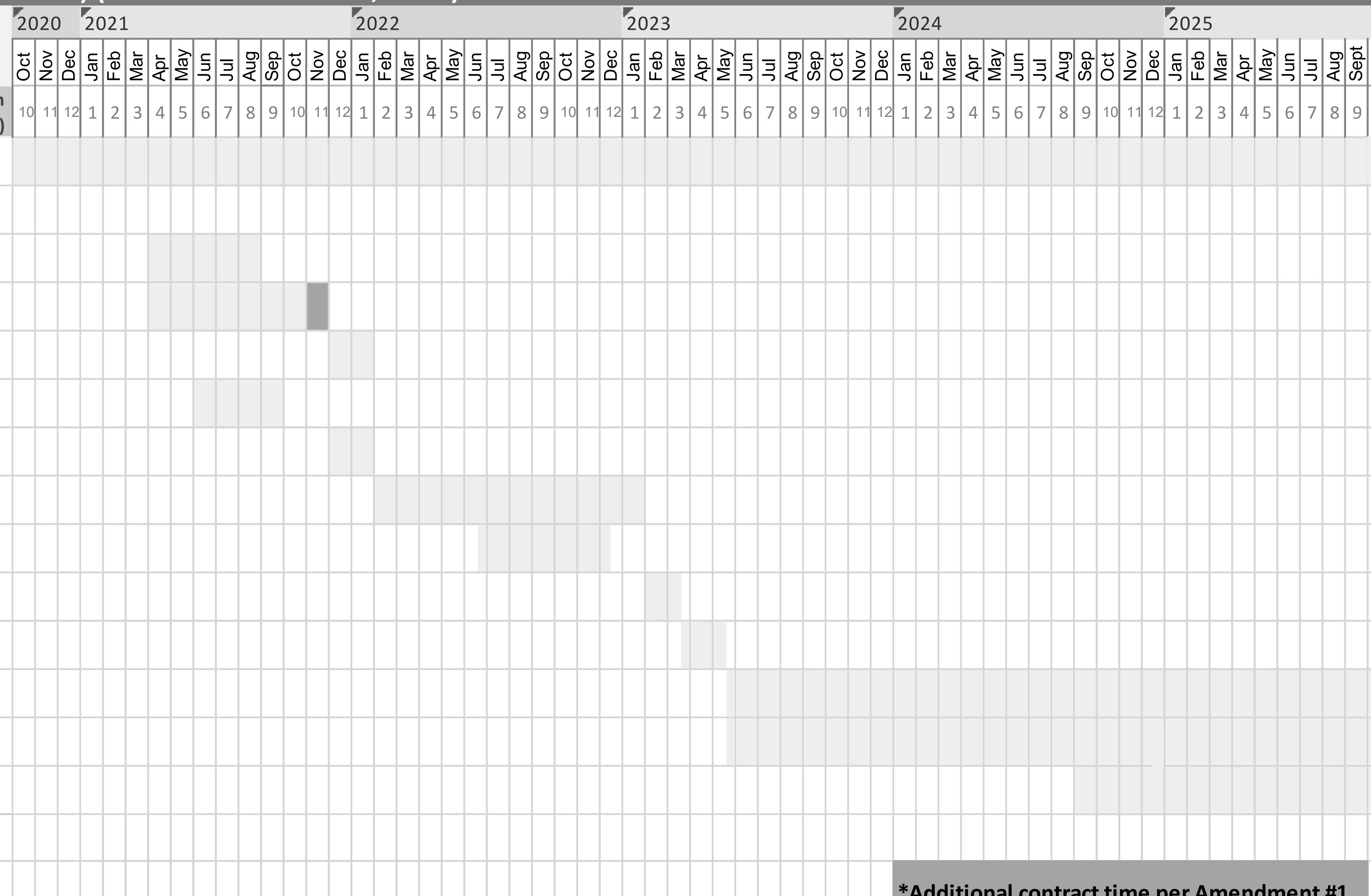
FIGURE 6.1.2.1
SCHEDULE

Wastewater Treatment Plant Upgrades (198.28) (Revised November 5, 2021)

Project Lead: Steve Major

City: Molalla, Oregon

WBS	Task Name	Start	Finish	Duration (Months)
1	Administration & Legal	10.01.20	10.15.25	60.5
2	Value Analysis (Completed)	-	-	-
3	Environmental Report	04.01.21	08.31.21	5
4	Predesign Report	04.01.21	11.30.21	8
5	DEQ Review & Approval of Predesign Report	12.01.21	01.31.22	2
6	Wetland Mitigation	06.01.21	09.30.21	4
7	Value Engineering	12.01.21	01.31.22	2
8	Design	02.01.22	01.31.23	12
9	Permitting	06.15.22	12.15.22	6
10	DEQ Review & Approval/ Final Contract Documents	02.01.23	03.15.23	1.5
11	Bidding-Construction Contracts	03.15.23	05.15.23	2
12	Construction Management	05.15.23	05.15.25	24
13	Construction	05.15.23	10.15.25	30
14	Contingency	09.01.24	10.15.25	13.5



PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	6.2
Subject:	Implementation
	OPERATIONS DURING CONSTRUCTION
Date:	September 15, 2021
Prepared By:	Tyler J. Molatore, P.E.

6.2.1 Description

The existing Wastewater Treatment Plant (WWTP) continuously receives and treats municipal sewage. This section discusses the construction sequencing and methods to provide continuous operations of the existing treatment system while constructing and sequentially transferring wastewater to the upgraded Wastewater Treatment Plant.

6.2.2 Construction Sequence

General

The existing Wastewater Treatment Plant will remain in service and uninterrupted until the new Wastewater Treatment Plant is constructed, commissioned, and the existing lagoon wastewater is processed through the existing tertiary, Dissolved Air Flotation (DAF) units and gravity filters, and disinfection system. Construction sequencing elements during construction of improvements are as follows:

- The construction schedule and work tasks will provide for continuous and uninterrupted treatment of wastewater and subsequent compliance with discharge requirements as set forth in the City's National Pollutant Discharge Elimination System (NPDES) Permit and Mutual Agreement and Order (MAO).

- The existing WWTP is required to be in service and in compliance with the City's NPDES Permit until the Transfer Pump Station, grit removal system, Sequencing Batch Reactor (SBR), effluent filtration system, disinfection system, and SBR Building are fully functional and receiving the influent raw sewage, and the existing lagoon wastewater is processed through the existing tertiary and disinfection systems. The existing WWTP includes the influent screening system, aeration basin, Transfer Pump Station, facultative lagoons, DAF units, gravity filters, disinfection system, chlorine contact basin, Effluent Pump Station, ancillary pumps, laboratory, and all other equipment currently in use by the City for operation of the existing Wastewater Treatment Plant.

- The existing 750 kilowatt (kW) emergency power supply and emergency power equipment / transfer switch for the existing Wastewater Treatment Plant will remain in operation at all times and provide uninterrupted service.

- Bypassing of untreated or partially treated sewage to surface water or drainage courses will be prohibited during construction. In the event accidental bypassing is caused by the Contractor's operations, the City will immediately be entitled to employ others to stop the bypassing without giving written notice to the Contractor.

- The new influent flow Equalization (EQ) basin will not be installed until the SBR is operational. Construction of the new flow equalization basin will occur during the summer time when influent flow EQ to the SBR is not required.

- Generally, in May and October, the City is unable to irrigate recycled water or discharge to the Molalla River. These months represent time periods by which upgrades to the process units downstream of the existing lagoons could occur. During these months, however, uninterrupted operation of the influent screening system, Transfer Pump Station, and facultative lagoons must remain.

Construction Sequencing

The construction sequence for the proposed improvements is separated into three major stages:

Stage 1

- The new Effluent Storage Pond No. 1 outlet structure will be constructed and operational prior to beginning site work related to construction of the new SBR and ancillary systems. The existing Lagoon No. 2 outlet structure will not be abandoned until the new Effluent Storage Pond No. 1 outlet structure and associated piping is installed and operational. The new outlet structure will be temporarily connected to the existing DAF units.

- Temporary cofferdam construction.

- The wastewater from the new SBR site area will be drained into the tertiary systems, or transferred into Lagoon No. 2 at a rate that will not adversely impact the existing treatment process. Sludge that resides in the bottom of this area will be removed and disposed of in accordance with local, state, and federal laws and regulations.

- Aerobic Digester will be constructed and commissioned.

- Aerobic Digester Building will be constructed and commissioned.

- Biosolids Dewatering Facility will be constructed and commissioned.

Stage 2

- Site work will occur during the summer months to develop the area allocated for the new SBR and associated systems and structures will be completed.

- The Contractor will be responsible for temporary bypass pumping and piping as required to facilitate improvements to the Transfer Pump Station.

- Force main piping from the Transfer Pump Station to the new grit removal system.

- Grit removal system and influent flow splitter structure.

- SBR.

- Effluent filtration system.

- UV disinfection system.

- Non-Potable Water System.

- SBR Building.

- Yard piping, including effluent piping to Effluent Storage Ponds, effluent piping to Effluent Pump Station, and all other piping as shown on the preliminary drawings.

- 500 kW standby generator.

- Supervisory Control and Data Acquisition (SCADA) control panel and integration of processes.

- Once the SBR and ancillary systems are operational, in the late fall or early winter the SBR will begin treating raw wastewater.

- In preparation for decommissioning of the existing WWTP and conversion of the lagoons to Effluent Storage Ponds, the wastewater from the existing lagoons and aeration basin will be processed through the existing DAF units, gravity filters, disinfection system, and subsequently discharged to the Molalla River during the winter discharging period. The objective of this step is to completely drain the existing lagoons and process the wastewater in accordance with NPDES Permit and MAO requirements, prior to the recycled water season. The point of compliance during this phase of construction will be at the discharge monitoring station.

- Two strategies for draining the lagoons provided in Table 6.2.2.1.

TABLE 6.2.2.1
LAGOON DRAINING STRATEGIES

Options	Techniques
Option No. 1	When operating the new SBR system and existing lagoon / tertiary systems, the Contractor would install temporary piping to direct the final effluent from the SBR system to the Effluent Pump Station. The Effluent Pump Station is being evaluated to determine actual capacity. Record drawings indicate a capacity of 10.1 Million Gallons per Day (MGD). During an effluent pump failure, the final effluent from the SBR would need to be automatically directed to the existing lagoons. This can be accomplished by closing the electrically actuated valve to the Effluent Pump Station and opening one of the valves to the ponds. The peak decant rate from the SBR is 8.8 MGD. Therefore, the maximum drainage rate from the lagoons would be approximately 1 MGD during peak SBR decant conditions.
Option No. 2	This option directs the SBR final effluent to the lagoons, and then the lagoon effluent would be processed through the existing tertiary and disinfection systems. The tertiary systems are rated for a capacity of 4 MGD. The actual capacity of the DAF units is approximately 3.5 MGD. With the SBR in operation the overall load to the lagoons will be decreased, thereby reducing the load to the tertiary systems.

- An evaluation of the time to drain the lagoons was conducted. The Average Wet Weather Flow (AWWF) for the years of 2014 through 2020 is summarized in the following table.

TABLE 6.2.2.2
HISTORICAL AWWF

Year	AWWF
2014	1.84
2015	1.89
2016	1.97
2017	2.39
2018	1.72
2019	1.09
2020	1.10

During winters with lower rainfall, the City will be able to process at least 2 MGD flow in excess of influent flows to effectively drain the existing lagoons. During wet winters, the City will still be able to drain the lagoons at a rate of at least 1.5 MGD, on average.

The existing lagoons have a total volume of 98 Million Gallons (MG). In October of 2019, Lagoon No. 1 and Lagoon No. 2 depths were 11.3 feet and 11.6 feet, respectively. In October of 2020, Lagoon No. 1 and Lagoon No. 2 depths were 10.9 feet and 12.2 feet, respectively. The approximate time to drain the lagoons is provided in Table 6.2.2.3.

TABLE 6.2.2.3
TIME TO DRAIN LAGOONS

Lagoon Drainage Rate (MGD)	Drainage Time (days)
1	98
1.5	65
2	49
2.5	39

- With the preliminary construction schedule, the allocated time to remove the sludge and drain the lagoons is anticipated to be up to five months. This correlates to an average discharge rate from the existing system of 0.65 MGD, assuming the lagoons are relatively full.

- Lagoon No. 2 would be drained initially, and then Lagoon No. 1.

- At some point the water quality in the Lagoon No. 1 may become increasingly difficult to treat to discharge permit standards through the DAF units. The City may need to pump and haul a certain portion of the lagoon contents that has treatability issues.

- Waste sludge from the gravity filters and DAF units would be collected separately and hauled away for disposal (or transferred to the new solids treatment system). The gravity filters may not be needed to achieve MAO discharge permit requirements, thereby eliminating need to manage backwash wastewater during the lagoon draining process. Dyer is working with the City to quantify the DAF waste flow and characteristics.

- During draining of the existing lagoons the City must maintain compliance with the Biochemical Oxygen Demand (BOD_5) and Total Suspended Solids (TSS) mass load limits as set forth in the MAO.

Stage 3

- Demolition of the existing tertiary treatment systems and other ancillary items.

- Influent flow equalization basin and associated piping. Construction of the new influent flow equalization basin will occur during the summer time when the opportunity to experience Peak Instantaneous Flow (PIF) does not exist.

- During lining of Effluent Storage Pond No. 1, Effluent Storage Pond No. 2 will be used. Bypass piping will be temporarily installed from the outlet of Effluent Storage Pond No. 2 to the outlet of Effluent Storage Pond No. 1.

- Site work and landscaping.

The overall construction schedule is shown in Table 6.2.2.4.

Project	Wastewater Treatment Plant Upgrade
City	City of Molalla
Project No.	198.28
Task	Construction Sequencing
Date	15-Sep-21
Overall Construction Duration	30 Months

Item	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25
Pond No. 2 Outlet and Cofferdam																														
Mobilization	■																													
Recycled Water Storage Pond No. 1 Outlet		■	■																											
Cofferdam		■	■																											
SBR Site Area Dewatering			■																											
Aerobic Digester and Biosolids Dewatering																														
Civil	■	■																												
Structural - Aerobic Digester			■	■	■	■																								
Mechanical - Aerobic Digester							■	■																						
Electrical - Aerobic Digester							■	■																						
Structural - Aerobic Digester Building			■	■																										
Architectural - Aerobic Digester Building					■	■																								
Mechanical - Aerobic Digester Building							■	■																						
Electrical - Aerobic Digester Building							■	■																						
Structural - Screw Press and Cake Storage			■	■																										
Architectural - Screw Press and Cake Storage					■	■																								
Mechanical - Screw Press an Cake Storage							■	■																						
Electrical - Screw Press an Cake Storage							■	■																						
Startup - Aerobic Digester and Bioslids Dewatering								■																						
SBR Site Area																														
SBR Fill				■	■	■	■																							
Civil						■	■																							
Electrical - Below Grade Conduits						■	■																							
Structural - SBR Site Area Structures						■	■																							
SBR Building and SBR																														
Civil - SBR Building and SBR								■																						
Structural - SBR Building								■	■																					
Architectural - SBR Building										■	■																			
Mechanical - SBR Building										■	■																			
Electrical - SBR Building												■	■	■																
Structural - SBR								■	■	■	■	■	■	■																
Mechanical - SBR														■	■	■														
Electrical - SBR															■	■	■													
Grit Removal System																														
Civil - Grit Removal System								■																						
Structural - Grit Removal System								■	■																					
Mechanical - Grit Removal System										■	■	■																		
Electrical - Grit Removal System											■	■																		
UV Disinfection System																														
Civil - UV Disinfection System															■															
Structural - UV Disinfection System															■															
Mechanical - UV Disinfection System																■	■													
Electrical - UV Disinfection System																■	■													
Effluent Filtration System																														
Civil - Effluent Filters															■															
Structural - Effluent Filters															■															
Mechanical - Effluent Filters																■	■													
Electrical - Effluent Filters																■	■													
Non-potable Water System																														
Civil - Non-potable Water System															■															
Structural - Non-potable Water System															■	■														
Mechanical - Non-potable Water System																	■													
Electrical - Non-potable Water System																	■													
Transfer Pump Station																														
Civil - Transfer Pump Station																	■													
Mechanical - Transfer Pump Station																		■	■	■										
Electrical - Transfer Pump Station																			■	■										
Bypass / Emergency Pumping - Transfer Pump Station																	■	■	■	■	■	■	■	■						
Standby Generator (SBR Site)																														
Civil - Standby Generator																■														
Structural - Standby Generator																■														
Electrical - Standby Generator																	■													
SCADA / Control Panel Integration																														
SCADA Control Panel / Integration																		■	■	■										
Startup SBR and Ancillary Equipment																														
Startup SBR and Ancillary Equipment																				■										
Aeration Basin and Lagoon Decommissioning																														
Drain and Remove Solids Aeration Basin																				■										
Drain and Remove Solids Lagoon No. 2																				■	■	■	■							
Drain and Remove Solids Lagoon No. 1																							■	■						
Demolition of Existing Systems																														
Demolition of Existing Systems																									■	■				
Influent Flow Equalization Basin																														
Civil - Influent Flow Equalization Basin																										■				
Structural - Influent Flow Equalization Basin																											■	■	■	
Mechanical - Influent Flow Equalization Basin																													■	
Startup - Influent Flow Equalization Basin																													■	
Effluent Storage Pond No. 1																														
Effluent Pond No. 1 Bypass Piping																										■	■	■	■	
Civil - Effluent Storage Pond No. 1																										■				
Lining - Effluent Storage Pond No. 1																										■	■	■	■	
Startup - Effluent Storage Pond No. 1																													■	
Site Work / Landscaping																														
Site Work																														■
Paving																														■
Landscaping																														■

Electrical and Instrumentation
The existing 750 kW standby emergency generator will continue to remain in operation without interruptions at all times during construction to provide emergency power to the existing Wastewater Treatment Plant. Once the improvements are completed, the 750 kW generator will remain in service, and provide standby power for the Effluent Pump Station, Transfer Pump Station, influent screening system, and Operations / Lab Building.

The new electric service and 500 kW standby generator for the SBR site area will be installed and operational for the new SBR treatment system. Installation of the new service will not impede the existing wastewater treatment system.

Water Service
The existing potable and non-potable water service will remain in operation at the existing Wastewater Treatment Plant until the new liquid stream processes are completed. A new connection to the Non-Potable Water System will occur prior to commissioning of the SBR and ancillary systems. Potable water service to the existing facilities and treatment system will not be changed. New potable water with a backflow preventor will be connected to the Biosolids Dewatering Facility for the screw press and polymer make-down system.

Telephone and Communication
The main telephone service will remain in the existing Operations Building. The new plant communication system will use ethernet communication over fiber optic and Cat 5E or 6 cables. A network of ethernet switches will allow connection at each building or Process Area for Operator screens and equipment Programmable Logic Controllers (PLCs).

Solids Treatment
The majority of solids in the facultative lagoons will be removed in advance of this project. Solids that remain in the existing lagoons and will require dredging or removal as part of the lagoon decommissioning and conversion process. Once the Aerobic Digester and screw press are operational, the solids can be processed through the new dewatering equipment. Consideration will be needed to address the presence of larger material in the lagoons.

Once the SBR is commissioned, there will likely be a time period by which no wasting will occur. Once the target mixed liquor is achieved, Waste Activated Sludge (WAS) from the SBR process will be directed to the new Aerobic Digestion System. The Aerobic Digestion System is scheduled to be operational prior to the new liquid stream process units.

Operations
The existing Operations / Lab Building will remain in operation throughout construction of the new facilities. Upgrades to the SCADA system will require that the existing Wastewater Treatment Plant, until it is decommissioned and the lagoon is fully drained, will remain in operation and in compliance with the NPDES Permit.

6.2.3 Design Issues Yet to Be Resolved

A listing of the issues yet to be resolved is provided below**.**

- Alternative project delivery methods (Construction Manager/General Contractor, etc).

- Volume of solids to be disposed of from the aeration basin and lagoons.

- Lagoon water quality sampling at various depths of the lagoon.
- The SBR site selection impacts to construction schedule.
- Weather related construction impact considerations.
- Considerations of MAO.
- The DAF wastewater effluent quality and quantity will be further evaluated to possibly not need the gravity filters to meet discharge permit compliance.

PREDESIGN REPORT MEMORANDUM

Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	6.3
Subject:	Implementation
	CONSTRUCTION DOCUMENTS
Date:	September 14, 2021
Prepared By:	Tyler J. Molatore, P.E.

6.3.1 Description

This section discusses the construction documents that will be prepared for bidding in accordance with standard Engineers Joint Contract Document Committee (EJCDC) format. Major components of the bid package along with a list of specification sections are shown on the following pages.

A preliminary list of drawings is included on drawing sheets 10-G-1 and 10-G-2 in the "Predesign Review Set" that accompanies this Predesign Report.

TABLE 6.3.1.1
BIDDING DOCUMENTS

Volume 1 – Bidding Documents	
Section No.	**Description**
100	Advertisement for Bids
200	Instruction to Bidders
400	Bid Forms
410	Bid
430	Bid Bond
435	First-Tier Subcontractor Disclosure Form
451	Bidder's Prequalification Form
460	Required Supplements
461	Non-Collusion Affidavit
462	Responsibility Affidavit
469	Certifications and Compliance Statements
480	Funding Agency Forms
495	Sample Forms
496	Notice of Intent to Award
497	Notice of Award
498	Certificate of Materials Origin, AIS Templates

TABLE 6.3.1.2
CONTRACT DOCUMENTS

Volume 2 – Contract Documents	
Section No.	**Description**
510	Notice of Award
520	Agreement Form Between Owner and Contractor
540	Exhibits to the Agreement (Contract Clauses, Geotechnical Report, DBE and Good Faith Forms)
550	Sample Forms
551	Notice to Proceed
552	Contractor's Application for Payment
553	Contract Change Order
554	Affidavit
555	Work Change Directive
556	Field Order
560	Other Exhibits
600	Bonds and Certificates
610	Performance Bond
615	Payment Bond
625	Certificate of Substantial Completion
700	General Conditions
800	Supplementary General Conditions
810	Permits
811	Inadvertent Discovery Plan
820	Funding Agency Requirements
822	Construction Sign for Funding Agency
830	Prevailing Wage Rates
831	Davis Bacon Prevision
832	Federal Labor Standards
850	Drawings and Schedules
900	Addenda

TABLE 6.3.1.3
SPECIFICATIONS

Division 1—General Requirements	
Section No.	**Description**
1000	Index
1010	Summary of Work
1014	Work Sequence
1015	Archaeological Finds
1025	Measurement & Payment
1040	Coordination
1041	Existing Utilities and Improvements
1046	Modifications to Existing Structures, Piping and Equipment
1050	Field Engineering
1060	Regulatory Requirements
1070	Abbreviations and Symbols
1100	Substitution of Major Equipment Items
1110	Special Project Requirements

1300	Submittals
1310	Construction Schedules
1340	Finish and Color Samples
1350	Operation and Maintenance Manuals
1430	Testing & Training
1501	Temporary Controls
1510	Temporary Utilities
1550	Mobilization & Demobilization
1590	Field Office
1605	Shipment, Protection, and Storage
1620	Record Drawings
1660	Performance and Operational Testing
1710	Final Cleanup & Restoration
1900	Seismic Design Requirements
1990	Reference Forms
Division 2—Sitework	
Section No.	**Description**
2000	Index
2050	Demolition & Abandonment
2100	Site Preparation
2140	Control of Water
2150	Shoring & Bracing
2160	Sewer Bypass Pumping
2200	Earthwork for Structures & Embankments
2221	Trench Excavation
2222	Earthwork for Pipelines & Conduits
2310	Boring, Tunneling and Jacking
2510	Asphalt Concrete Pavement
2525	Curbs and Gutters
2527	Sidewalk, Driveway Approaches and Handicap Ramps
2545	Surface Removal and Replacement
2570	Geotextile Fabric
2571	Nonwoven Geotextile Fabric
2605	Manholes and Cleanouts
2721	Catch Basins and Area Drains
2728	Ditching
2735	Subdrains
2776	Membrane Liner
2900	Landscaping
Division 3—Concrete	
Section No.	**Description**
3000	Index
3100	Concrete Formwork
3200	Concrete Reinforcement
3300	Cast-In-Place Concrete
3301	Concrete Testing, Sampling, & Inspection
3360	Concrete Floor Finish
3480	Precast Concrete

3600	Grout
Division 5—Metals	
Section No.	**Description**
5000	Index
5100	Structural Metals
5501	Anchor Bolts and Fasteners
5520	Handrails & Railings
5530	Grating and Stairs
5910	Hot-Dip Zinc Coating
Division 6—Wood and Plastics	
Section No.	**Description**
6000	Index
6100	Rough Carpentry
6092	Prefabricated Wood Trusses
6180	Glue Laminated Beams
6200	Finish Carpentry
Division 7—Thermal and Moisture Protection	
Section No.	**Description**
7000	Index
7100	Waterproofing and Moisture Proofing
7200	Insulation
7410	Metal Roofing
7466	Fiber Cement Siding
7600	Flashing and Sheet Metal
7630	Gutters & Downspouts
7900	Joint Sealers (Caulking & Sealants)
Division 8—Doors and Windows	
Section No.	**Description**
8000	Index
8100	Steel Doors and Frames
8330	Aluminum Hatches
8333	Aluminum Roll-up Doors
8400	Doors & Windows
8710	Finish Hardware
Division 9—Finishes	
Section No.	**Description**
9000	Index
9250	Gypsum Drywall
9690	Rubber Base
9720	FRP Panels
9900	Coatings
Division 10—Specialties	
Section No.	**Description**
10000	Index

10400	Signs
10520	Fire Extinguishers
Division 11—Equipment	
Section No.	**Description**
11000	Index
11001	Equipment
11060	Electric Motors
11101	Stop Gates
11146	Vortex Grit Removal Equipment
11147	Grit Classifier
11180	Sequencing Batch Reactor
11181	Air Control Valve
11182	Air Diffusion Equipment
11183	Positive Displacement Blowers
11184	Decant Mechanism
11185	Waste Sludge Pump
11186	SBR Control Panel and MCC
11187	SCADA System
11188	Portable Suspended Solids Probe
11189	Dissolved Oxygen Monitor
11190	Submersible Mixers
11200	Effluent Filters
11310	Transfer Pump Station
11331	Aerobic Digester
11332	Biosolids Transfer Pumps
11348	Non-potable Water System
11737	Ultraviolet Disinfection Equipment
11800	Biosolids Dewatering
11801	Biosolids Macerator
11900	Variable Frequency Drives
11921	Automatic Sampler
Division 13—Special Construction	
Section No.	**Description**
13000	Index
13100	Demolition of Existing Wastewater Treatment System
13120	Decommissioning of Existing Wastewater Treatment System
Division 14—Conveying Systems	
Section No.	**Description**
14000	Index
14655	Portable Hoist
Division 15—Mechanical	
Section No.	**Description**
15000	Index
15010	General Mechanical Requirements
15050	General Piping Requirements
15051	Piping Systems

15061	Steel Pipe
15062	Ductile Iron Pipe
15063	Stainless Steel Pipe
15064	Plastic Pipe
15066	Copper Piping
15085	Piping Connections
15095	Piping Appurtenances
15096	Pipe Hangers and Supports
15101	Gate Valves
15103	Butterfly Valves
15104	Telescoping Valves
15110	Eccentric Plug Valves
15115	Ball Valves
15118	Cushioned Swing Check Valves
15124	Reduced Pressure Backflow Preventers
15136	Wafer Style Silent Check Valves
15147	Solenoid Valves
15150	Specialty Valves
15151	Expansion Joints
15152	Manual Valve & Gate Operators
15240	Mechanical Sound, Vibration, & Seismic Control
15260	Mechanical Insulation
15400	Plumbing
15473	Electric Water Heaters
15632	Electric Unit Heaters
15770	HVAC
15850	Fans
15890	Air Distribution
15944	Louvers
15951	Controls
Division 16—Electrical Work	
Section No.	**Description**
16000	Index
16001	Commissioning
16005	Starting and Adjusting
16010	General Electrical Requirements
16015	Demonstration and Testing
16020	Heat Trace
16057	Electrical Systems Analysis
16075	Electrical Controls Identification
16080	Electrical Testing
16095	Minor Electrical Demolition
16100	Basic Electrical Materials and Methods
16200	Standby Generator System
16400	Service and Distribution
16401	Active Harmonic Filter
16450	Grounding
16500	Lighting
16900	Motors and Controls

Division 17—Instrumentation	
Section No.	**Description**
17000	Index
17000	Instrumentation and Control
17250	Magnetic Flow Meters
17260	Level Control Transducers
17270	Ultrasonic Level Sensor
17280	Pressure Gauges
17295	Staff Gauges
17500	Control Strategies
17500 (I)	Transfer Pump Station
17500 (II)	Grit Removal System
17500 (III)	Sequencing Batch Reactor
17500 (IV)	Effluent Filtration System
17500 (V)	UV Disinfection System
17500 (VI)	Non-Potable Water System
17500 (VII)	Aerobic Digester
17500 (VIII)	Biosolids Screw Press
17500 (IX)	Standby Generator System

PREDESIGN REPORT MEMORANDUM	
Project:	City of Molalla
	Wastewater Treatment Plant Upgrades
Section:	6.4
Subject:	Implementation
	COST ESTIMATE
Date:	October 2021
Prepared By:	Tyler J. Molatore, P.E.

6.4.1 Construction Cost Estimate

A preliminary cost estimate was originally included in the City of Molalla's Wastewater Facility and Collection System Master Plan (The Dyer Partnership, 2018). The cost estimate was updated as part of the Predesign Report phase based upon the recent progression with the preliminary design. An updated cost estimate is included in Table 6.4.1.1. Detailed cost estimates are included in Appendix C.

TABLE 6.4.1.1
CONSTRUCTION COST ESTIMATE

Item	Cost ($)	
Influent Flow Equalization Basin	$	1,204,000
Transfer Pump Station	$	910,000
Grit Removal System	$	979,000
SBR Facility	$	7,866,000
Effluent Filtration System	$	1,485,000
Disinfection System (UV)	$	1,851,000
Effluent Storage Pond No. 1 Improvements	$	2,838,000
Aerobic Digestion System	$	2,657,000
Biosolids Dewatering Facility	$	1,279,000
Standby Generator (500 kW)	$	212,000
Sludge Removal & Disposal (Aeration Basin, Lagoons No. 1 and No. 2)	$	300,000
Site Structures (SBR and Aerobic Digester Buildings)	$	883,000
Site Improvements and Yard Piping	$	4,126,000
WWTP Construction Estimate Total	**$**	**26,590,000**
Contingency (15%)	**$**	**3,988,500**
Total	**$**	**30,578,500**

This cost estimate has been prepared with information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project costs, implementation schedule and many other factors. The final project cost will vary from the cost estimate developed in this section. Project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions.

Costs have increased, as compared to the original cost estimate developed in 2018, due to a variety of reasons. Inflation, supply chain disruptions, and a number of other factors are having a large influence on pricing. According to the Associated General Contractors, from May 2020 to May 2021, Contractor purchase prices increased 24 percent. Costs for PVC have risen drastically due to resin shortages and other factors. Valves, ductile iron piping, and other products have seen a sharp rise in costs. As an example, 36-inch diameter PVC pipe was recently quoted at $474/foot, materials only.

The Sequencing Batch Reactor (SBR) site location is another factor that impacted costs. The location of the SBR was moved to the proposed location inside of the northwest corner of Lagoon No. 2. This requires a large amount of fill material. In addition, to keep Lagoon No. 2 in operation during construction of the SBR this requires a temporary dike and lengthens the duration of construction.

Costs were also added for effluent filtration. Based on the Collection System and Wastewater Treatment Plant (WWTP) Improvement Phasing Schedule Memorandum, August 28, 2019, the Phase I disinfection system was to consist of an updated sodium hypochlorite system. During the Predesign Report phase the sodium hypochlorite system was changed to an Ultraviolet (UV) disinfection system that could meet Class D recycled water standards. Changing disinfection systems was a direct advantage to the City since the compliance point for meeting the discharge permit was changed from the outfall and irrigation site to the treatment facility. After further review by the City, the City requested that the UV system meet Class C recycled water disinfection standards. The UV disinfection system manufacturers will not provide a performance guarantee unless the secondary effluent is filtered.

The following discusses some of the probable causes of the project cost increases:

Process Area 100: Plant Facilities

- Added costs for SBR site fill, temporary berm, and other items. The SBR site was selected in the northwest corner of Lagoon No. 2 which required a temporary dike with liner, select fill, and other improvements.

- Increase of pipe and valve costs.

- Access road improvements.

- Added stairs for accessing the SBR site from the main Operations Building.

Process Area 300: Transfer Pump Station

- The Wastewater Facility and Collection System Master Plan (The Dyer Partnership, 2018) planned for three submersible pumps. The proposed design consists of three submersible pumps and one skid mounted standby pump. This approach is proposed to lower the low-end flow rate of the pumping system to more effectively manage dry weather flows.

- Overall increase in pump costs.

Process Area 310: Influent Flow Equalization Basin

- The volume is currently 325,000 gallons, but downsizing is an option, as well as deferring filling-in the unused portion of the aeration basin until a later phase.

Process Area 500: SBR

- Overall increase in SBR equipment costs.
- The City considered phasing some of the equipment associated with the SBR but after further evaluation it was determined that phasing the SBR was not advantageous.

Process Area 510: Effluent Filtration

- Added costs for effluent filtration and associated appurtenances. Effluent filtration was not part of the planned Phase I and Phase II improvements. To meet Class C recycled water disinfection standards, filtration is required during non-river discharge months. Based on the analysis in the City of Molalla's Wastewater Facility and Collection System Master Plan (The Dyer Partnership, 2018), disk filtration was the least cost alternative.

Process Area 600: UV Disinfection System

- Added costs for the UV disinfection system. A UV disinfection system to achieve Class C standards is proposed. The UV disinfection system design provides an ability to expand to Class A standards in the future.
- Increase in number of valves to accommodate expansion to Class A disinfection standards.

Process Area 700: Effluent Storage

- Added costs for two solar circulators. Two solar circulators were added to Effluent Storage Pond No. 1 to prevent short circuiting and promote better homogeneous water quality in the storage pond.

Process Area 900: Aerobic Digestion System

- Overall increase in Aerobic Digester equipment costs.

Should the SBR site location be removed, the cost estimate will be updated accordingly.

6.4.2 Contingency

Given the uncertain market conditions, Dyer recommends for the contingency be set at 15 percent, due to the following factors:

- Increased complexity of the new SBR site construction.
- Progression of process and instrumentation concepts.

- Final effluent piping routing from SBR site to Effluent Pump Station. Possible conflicts with existing utilities.
- Confidence level of type and size of equipment.
- Items not shown or involved at this level of design.
- Engineer's opinions of cost based on lump sum pricing compared to the Contractor's detailed unit pricing and firm equipment costs.
- Indirect costs of construction in the Contractor's bid price.
- Supply chain disruptions.
- Resin costs.
- Uncertainties with inflation.
- Probability of differing site conditions during construction at the existing plant, namely, hidden utilities.
- Operation of the existing plant during construction. Draining of the existing lagoons during decommissioning process.

APPENDICES

APPENDIX A: MAO AND NPDES PERMIT

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION

OF THE STATE OF OREGON

IN THE MATTER OF:	)	MUTUAL AGREEMENT
	)	AND ORDER
The City of Molalla	)	NO. WQ/M-NWR-2016-246
Permittee.	)	CLACKAMAS COUNTY
	)	

WHEREAS:

1. On May 12, 2014, the Department of Environmental Quality (Department or DEQ) issued National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit Number 101514 (Permit) to the City of Molalla (Permittee). The Permit authorizes the Permittee to construct, install, modify or operate wastewater treatment, control and disposal facilities (facilities) and discharge adequately treated wastewaters into the Molalla River, waters of the state, in conformance with the requirements, limitations and conditions set forth in the Permit. The Permit expires on June 1, 2019.

2. Permittee has violated the Permit as follows:

A. On November 9, 2016, DEQ issued Permittee Notice of Civil Penalty Assessment and Order No. WQ/M-NWR-2016-163. The Notice assessed $5,150 in civil penalties for failing to comply with turbidity and bacteria limits in recycled water. This Mutual Agreement and Order (MAO) amends the penalty amount in Notice of Civil Penalty Assessment and Order No. WQ/M-NWR-2016-163 to recognize the withdrawal of the violation related to the lagoon leak test.

B. From October 12-31, 2016, Permittee discharged fully treated effluent to the Molalla River in violation of Schedule A, Condition 1 and ORS 468B.025(1)(a).

C. Failed to comply with TMDL planning and implementation requirements as described in Warning Letter with Opportunity to Correct No. 2016-WLOTC-1563, issued May 13, 2016.

////

D. From May 22 through June 1, 2017, Permittee discharged fully treated effluent to the Molalla River in violation of Schedule A, Condition 1 of the permit and ORS 468B.025(1)(a).

E. From June 14-26, 2017 Permittee discharged fully treated effluent to the Molalla River in violation of Schedule A, Condition 1 of the permit and ORS 468B.025(1)(a).

F. From October 12-31, 2017, the Permittee discharged fully treated wastewater to the Molalla River in violation of Schedule A, Condition 1 of the permit and ORS 468B.025(1)(a).

G. On September 6, 2017 violated ORS 468B.025(1)(b) when it discharged chlorinated effluent to Bear Creek that caused an exceedance of the acute toxicity water quality standard for chlorine.

H. In July, August, September and October of 2017, Permittee violated permit effluent limits for turbidity and total coliform bacteria in recycled water.

I Permittee exceeded the monthly total suspended solids (TSS) average concentration effluent limit of 10 milligrams per liter by discharging effluent with the following monthly average TSS concentrations: November 2015 - 11 mg/L, December 2015 - 11 mg/L January 2017 - 12 mg/L.

J. For an unknown amount of time following the implementation of the Class A standard in the August 29, 2014 Recycled Water Use Plan and prior to April 2016, it is possible that Permittee's turbidimeter was not providing accurate information. Any potential violations of the Recycled Water Use Plan or the Permit due to those errors in measurement are expressly resolved by this MAO.

3. DEQ and the Permittee recognize that until new or modified facilities are constructed and put into full operation, Permittee might continue to violate the seasonal discharge limit and its effluent limits for total suspended solids (TSS).

////

4. DEQ and Permittee recognize that the Environmental Quality Commission has the authority to impose a civil penalty and to issue an abatement order for violations of conditions of the Permit. Therefore, pursuant to ORS 183.415(5), DEQ and Permittee wish to settle those past violations referred to in Paragraph 2 and address future violations referred to in Paragraph 3 (unless caused negligently, willfully or intentionally) in advance by this Mutual Agreement and Order (MAO).

5. The U.S. Environmental Protection Agency appropriately delegated the federal NPDES permitting program to DEQ, making DEQ the primary administrator and enforcer of the NPDES permits. DEQ believes that this MAO furthers the goals of the NPDES permitting program by ensuring progress towards compliance and is consistent with DEQ's goal of protecting human health and the environment. However, DEQ and Permittee recognize that this MAO does not eliminate the possibility of additional enforcement of Permit requirements by the U.S. Environmental Protection Agency or citizens under the federal citizen suit provisions.

6. This MAO is not intended to limit, in any way, DEQ's right to proceed against Permittee in any forum for any unknown past or future violations not expressly settled herein.

7. This MAO is not intended to limit, in any way, Permittee's right to apply for an amended permit during the course of this MAO.

NOW THEREFORE, it is stipulated and agreed that:

8. The Environmental Quality Commission shall issue a final order:

A. Requiring Permittee to comply with the following compliance order:

(1) Development of a Wastewater Facility and Collection System Master Plan document that will comply with the applicable DEQ requirements for a facilities plan (herein called the "Master Plan"), as described in http://www.oregon.gov/deq/FilterDocs/FacilitiesPlansGuidelines.pdf according to the following schedule:

1) Notice to proceed 9/1/17.

2) By 7/2/18, submit draft Master Plan for DEQ review and approval.

3) Within 60 days of receiving all of DEQ comments on the draft Master Plan, revise the plan consistent with DEQ's comments and submit for DEQ review and approval.

4) Within 40 days of DEQ approval of Master Plan, Planning Commission to hold public hearings to recommend approval by City Council. Within 30 days following Planning Commission approval, City Council to hold its first public meeting for adoption of Master Plan and ordinance within.

5) The plan above must evaluate the removal of infiltration and inflow, removal of biosolids and expanded use of recycled water as both interim steps prior to any other plant upgrade or expansion and as ongoing activities to best manage the collection and treatment system and beneficially use of biosolids and recycled water.

6) Because Permittee will be submitting a permit modification application the results of which may change the recommendations of the facilities planning process, DEQ shall prioritize reviewing Permittee's application to the extent possible to ensure minimal delay.

7) If the results of DEQ's final decision on Permittee's permit modification application require revisions to the Master Plan, Permittee shall provide DEQ with an amended draft Master Plan within 180 days of DEQ's decision becoming final.

8) Within 60 days of receiving all of DEQ comments on the revised draft Master Plan, Permittee shall revise the plan consistent with DEQ's comments and submit for DEQ review and approval.

9) Within 45 days of DEQ approval of the revised final Master Plan, Planning Commission to hold public hearings to recommend approval by the City Council. Within 30 days following Planning Commission approval, City Council to hold its first public meeting for adoption of Master Plan and ordinance within.

10) Construction of the new WWTP identified in the final approved Master Plan must be completed no later than 12/1/2023.

11) DEQ shall have 6 weeks from the date of receipt to review any submittal from Permittee related to construction of the WWTP. Should the DEQ review period exceed this time limitation, the deadline contained in 8.A.(1)(10) shall be extended by an equivalent amount of time.

B. Requiring the Permittee to meet the following interim effluent limitations, measured as specified in the Permit, until completions of the upgrades identified in the final Master Plan:

	Units	Average Monthly	Average Weekly	Daily Maximum
TSS (November 1 – April 30)	mg/L	15	20	-
	lbs/day	240	300	480
	% removal	85	-	-

C. The Permittee will submit any plans and specifications for collection system and treatment plant upgrades or expansions to DEQ for review and approval. A Certification of Capacity stating that the Permittee agrees to provide sewer service and has sewerage system and treatment capacity to do so must be included with all plan and specification reviews submitted by the Permittee to DEQ, per OAR 340-052-0015(3)(c).

D. If the existing lagoons are used as part of the upgraded facility, the lagoons will be drained and the clay liners checked for leaks and repaired or replaced as necessary.

E. Any out of season discharges not authorized by the Permit that occur during the months of May, June and October will be addressed per DEQ's Enforcement Guidance Internal Management Directive in effect at the time of the violation provided the following conditions are met:

1. The Molalla WWTP lagoons have less than one month storage capacity available;

2. The fields designated to accept recycled water do not have the capacity to assimilate recycled water;

3. The Molalla River:

i. has had a 7-day moving average of 350 cubic feet per second or greater as measured at the USGS monitoring station number14200000 MOLALLA RIVER NEAR CANBY, OR; (if there is an active monitoring station which better characterizes Molalla River Flow near the outfall, this station may be substituted subject to DEQ approval), and/or

ii. the 7-day moving average effluent temperature does not exceed 18.0 C.

iii. These moving averages determination shall begin on the seventh day of discharging.

4. Permittee notifies:

i. DEQ as soon as possible that an out of season discharge may be necessary to prevent an overtopping of the WWTP lagoons, and

ii. DEQ when a discharge commences.

iii. the City of Canby water treatment facility when a discharge commences.

5. i. Permittee complies with the monitoring requirements in

Schedule B, Conditions 3 and 4 of the permit.

ii. Permittee's discharge does not exceed the effluent limits in Schedule A of the permit.

6. The above conditions, 1 through 5, shall be recorded in the Daily Monitoring Reports each day discharge occurs.

F. Requiring Permittee, upon receipt of a written Penalty Demand Notice from DEQ, to pay the following civil penalties:

1. $600 for each day of violation of the compliance order set forth in Paragraph 8A.

2. $1,500 for each day of out of season discharge occurring during the months of May, June and October where the conditions of Paragraph 8.E are not met.

3. For exceedance of the limits in 8.B, $300 for any exceedance of 50% or more of the limit, $150 for any exceedance of 20% or more, but less than 50% of the limit, and $75 for an exceedance of less than 20% of the limit.

G. Imposing upon permittee a civil penalty of $23,325 for the violations listed in Paragraph 10 below. The penalty may be mitigated to $4,665 through performance of a Supplemental Environmental Project in accordance with the provisions of Paragraph 12.

9. If any event occurs that is beyond Permittee's reasonable control and that causes or may cause a delay or deviation in performance of the requirements of this MAO, Permittee shall immediately notify DEQ verbally of the cause of delay or deviation and its anticipated duration, the measures that have been or will be taken to prevent or minimize the delay or deviation, and the timetable by which Permittee proposes to carry out such measures. Permittee shall confirm in writing this information within five (5) working days of the onset of the event. It is Permittee's responsibility in the written notification to demonstrate to DEQ's satisfaction that the delay or deviation has been or will be caused by circumstances beyond the control and despite due diligence of Permittee. If Permittee so demonstrates, DEQ shall extend times of

performance of related activities under this MAO as appropriate. Circumstances or events beyond Permittee's control include, but are not limited to, acts of nature, unforeseen strikes, work stoppages, fires, explosion, riot, sabotage, or war. Increased cost of performance or a consultant's failure to provide timely reports are not considered circumstances beyond Permittee's control.

10. The violations set forth in Paragraph 2 above are expressly settled herein for the following penalties, Paragraph 2.A, $5,100; 2.B, $3,000; 2.C, $1,725; 2.D, $3,000; 2.E, $3,000; 2.F, $3,000, and 2.G, $4,500 for a total civil penalty of $23,325. The violations cited in Paragraphs 2.H, 2.I and 2.J are resolved without penalty.

11. Based on evidence submitted by Permittee that no violation occurred, DEQ dismisses Violation 3 of Notice of Civil Penalty Assessment and Order No. WQ/M-NWR-2016-163.

12. The $23,325 civil penalty may be mitigated to $4,665 on the condition that Respondent completes a Supplemental Environmental Project approved by DEQ. A SEP proposal must be submitted to DEQ within 90 days of full execution of the MAO. An approved SEP will be incorporated into this MAO by amendment. If DEQ does not approve an SEP by March 1, 2019, the balance of the civil penalty, $18,660, becomes immediately due and owing. Payment of the $4,665 penalty not subject to mitigation through a SEP is due 30 days from full execution of this MAO.

13. Permittee and DEQ hereby waive any and all of their rights to any and all notices, hearing, judicial review, and to service of a copy of the final order herein. DEQ reserves the right to enforce this order through appropriate administrative and judicial proceedings.

14. Regarding the order set forth in Paragraph 8A above, Permittee acknowledges that Permittee is responsible for complying with that order regardless of the availability of any federal or state grant monies.

15. The terms of this MAO may be amended by mutual agreement of DEQ and

Permittee.

16. DEQ may amend the compliance order and conditions in, or terminate, this MAO upon finding that such modification is necessary because of changed circumstances or to protect public health and the environment. DEQ shall provide Permittee a minimum of thirty (30) days written notice prior to issuing an Order amending or terminating this MAO. If Permittee contests the Order, the applicable procedures for conduct of contested cases in such matters shall apply.

17. This MAO shall be binding on the parties and their respective successors, agents, and assigns. The undersigned representative of each party certifies that he or she is fully authorized to execute and bind such party to this MAO. No change in ownership or corporate or partnership status relating to the facility shall in any way alter Permittee's obligations under this MAO, unless otherwise approved in writing by DEQ.

18. All reports, notices and other communications required under or relating to this MAO should be directed to Tiffany Yelton Bram, DEQ Water Quality Northwest Regional Office, 700 NE Multnomah St., Suite 600, Portland, Oregon 97232, phone number 503 229 5219, with copies sent to Jeff Bachman, Office of Compliance and Enforcement, same address. The contact person for Permittee shall be Gerald Fisher, City of Molalla - Director of Public Works, 117 N. Molalla Avenue, P.O. Box 248, Molalla, OR 97038, 503.829.6855.

19. Permittee acknowledges that it has actual notice of the contents and requirements of this MAO and that failure to fulfill any of the requirements hereof will constitute a violation of this MAO and subject Permittee to payment of civil penalties pursuant to Paragraph 8.F above.

20. Any stipulated civil penalty imposed pursuant to Paragraph 8.F shall be due upon written demand. Stipulated civil penalties shall be paid by check or money order made payable to "**State Treasurer, State of Oregon**" and sent to the **DEQ, Business Office, 700 NE Multnomah Street, Suite 600, Portland, Oregon 97232**. Within 20 days of receipt of a "Demand for Payment of Stipulated Civil Penalty" Notice from DEQ, Permittee may request a hearing to contest the Demand Notice. At any such hearing, the issue shall be limited to

Permittee's compliance or non-compliance with this MAO. The amount of each stipulated civil penalty for each violation and/or day of violation is established in advance by this MAO and shall not be a contestable issue.

21. This MAO shall terminate at the end of the day on the date the final compliance task in Paragraph 8A above is to be completed. However, Permittee remains liable for stipulated penalties for any violations of the MAO occurring during the period the MAO was in effect and demanded pursuant to Paragraph 20.

CITY OF MOLALLA

9-17-18
Date

Dan Huff
City Manager

DEPARTMENT OF ENVIRONMENTAL QUALITY and
ENVIRONMENTAL QUALITY COMMISSION

10/4/18
Date

Kieran O'Donnell, Manager
Office of Compliance and Enforcement
on behalf of DEQ pursuant to OAR 340-012-0170
on behalf of the EQC pursuant to OAR 340-011-0505

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION

OF THE STATE OF OREGON

IN THE MATTER OF: CITY OF MOLALLA, Permittee.	)))))) AMENDMENT NO. 2 MUTUAL AGREEMENT AND ORDER NO. WQ/M-NWR-2016-246

WHEREAS:

1. On October 4, 2018, the Department of Environmental Quality (DEQ) and Permittee entered into Mutual Agreement and Order (MAO) No. WQ/M-NWR-2016-246.

2. Paragraph 15 of MAO states: "The terms of this MAO may be amended by the mutual agreement of the Department and Permittee.

NOW THEREFORE, it is stipulated and agreed that the compliance order of the MAO should be amended as follows:

3. Paragraph 8.B of the MAO is amended to include the following interim effluents for biochemical oxygen demand (BOD_5):

	Units	Average Monthly	Average Weekly	Daily Maximum
BOD_5 (November 1 – April 30)	mg/L	25	37	-
	lbs/day	400	600	800
	% removal	85	-	-

PERMITTEE

03/04/2021
Date

[signature]
Signature

Dan Huff
Name (print)

City Manager
Title (print)

DEPARTMENT OF ENVIRONMENTAL QUALITY and
ENVIRONMENTAL QUALITY COMMISSION

4/1/2021
Date

Kieran O'Donnell, Manager
Office of Compliance and Enforcement
on behalf of DEQ pursuant to OAR 340-012-0170
on behalf of the EQC pursuant to OAR 340-011-0505

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Oregon Department of Environmental Quality
Northwest Region – Portland Office
2020 SW 4th Avenue, Suite 400
Telephone: 503-229-5263

Issued pursuant to ORS 468B.050 and The Federal Water Pollution Control Act (The Clean Water Act)

ISSUED TO:

City of Molalla
PO Box 248
Molalla, OR 97038

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Location
Treated Wastewater	001	45.15°N -122.54085°W
Recycled Water	002	Specified in RWU Plan
Biosolids	N/A	Specified in BLA Plan

FACILITY TYPE AND LOCATION:

Pre-aerated lagoons with effluent filtration
Molalla STP, 12424 Toliver Road
Molalla, OR 97038

RECEIVING STREAM INFORMATION:

WRD Basin: Willamette
USGS Subbasin: Molalla-Pudding
Receiving Stream: Molalla River
LLID: 1227171452976-20.0-D
County: Clackamas

Treatment System Class Level: III
Collection System Class Level: II

EPA REFERENCE #: OR-002238-1
Issued in response to application #962753 received August 24, 2012, and based on the land use compatibility statement in the permit record.

Tiffany Yelton-Bram
Tiffany Yelton-Bram, Manager
WQ Source Control
Northwest Region

5/12/2014
Signature Date

June 1, 2014
Effective Date

PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorized to: 1) operate a wastewater collection, treatment, control and disposal system; and 2) discharge treated wastewater to waters of the state only from the authorized discharge point or points in Schedule A in conformance with the requirements, limits, and conditions set forth in this permit.

Unless specifically authorized by this permit, by another NPDES or WPCF permit, or by Oregon statute or administrative rule, any other direct or indirect discharge of pollutants to waters of the state is prohibited.

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List of Tables

SCHEDULE A
Waste Discharge Limits

1. Treated Effluent Outfall 001

a. May 1 – October 31: During this time period the permittee may not discharge to waters of the state.

b. November 1 – April 30: During this time period the permittee must comply with the limits in Tables A1 and A2 while discharging to waters of the state:

i. Biochemical Oxygen Demand (BOD_5) and Total Suspended Solids (TSS).

Table A1: BOD_5 and TSS Limits

Parameter	Average Effluent Concentrations, mg/L		Monthly Average lbs/day	Weekly Average lbs/day	Daily Maximum Lbs
	Monthly	Weekly			
BOD_5	10 mg/L	15 mg/L	160	240	320
TSS	10 mg/L	15 mg/L	160	240	320

Mass load limits are based on the average wet weather design flow to the facility which equals 1.92 MGD.

ii. Additional Parameters

Table A2: Limits for Additional Parameters

November - April	Limits
BOD_5 and TSS Removal Efficiency	May not be less than 85% monthly average for BOD_5 and TSS
E. coli Bacteria (see Note 1.)	Monthly geometric mean may not exceed 126 organisms per 100 ml. No single sample may exceed 406 organisms per 100 ml.
pH	May not be outside the range of 6.0 to 9.0 S.U.
Total Residual Chlorine	Monthly average concentration may not exceed 0.07 mg/L. Daily maximum concentration may not exceed 0.18 mg/L
Ammonia (NH_3-N)	Monthly average concentration may not exceed 16.7 mg/L. Daily maximum concentration may not exceed 25.9 mg/L.
Dilution	Discharge may not commence until gauged stream flow exceeds 350 cfs and will cease when the average stream flow for the previous seven-day-period is less than 350 cfs.
Temperature	Effluent discharge will cease when the 7-day moving average effluent temperature exceeds 18.0 degrees C.

Notes

1. No single *E. coli* sample may exceed 406 organisms per 100 mL; however, no violation has occurred if the permittee takes at least 5 consecutive re-samples at 4 hour intervals beginning within 28 hours after the original sample was taken and the log mean of the 5 re-samples is less than or equal to 126 *E. coli* organisms/100 mL.

2. Regulatory Mixing Zone

No wastes may be discharged or activities conducted that cause or contribute to a violation of water quality standards in OAR Chapter 340, Division 41 applicable to the Willamette Basin except within the following regulatory mixing zone:

> The allowable mixing zone includes that portion of the Molalla River with boundary dimensions equal to the length of the effluent diffuser plus 10-feet on each end with the mixing zone extending 5-feet upstream and 50-feet downstream of the diffuser. The Zone of Immediate Dilution (ZID) is defined as that portion of the allowable mixing zone within 5-feet of the diffuser.

3. Groundwater Protection

The permittee may not conduct any activities that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process related residuals must be managed and disposed of in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR Chapter 340, Division 40).

4. Use of Recycled Water (Outfall 002)

The permittee is authorized to distribute recycled water if it is:

a. Treated and used according to the criteria listed in Table A3.
b. Managed as described in its DEQ-approved Recycled Water Use Plan unless exempt as provided in Schedule D, condition 3.
c. Used in a manner and applied at a rate that does not adversely impact groundwater quality.
d. Applied at a rate and in accordance with site management practices that ensure continued agricultural, horticultural, or silvicultural production and does not reduce the productivity of the site.
e. Irrigated using sound irrigation practices to prevent:
   i. Offsite surface runoff or subsurface drainage through drainage tile;
   ii. Creation of odors, fly and mosquito breeding, or other nuisance conditions; and
   iii. Overloading of land with nutrients, organics, or other pollutants.

Table A3: Recycled Water Limits

Class	Level of Treatment (after disinfection unless otherwise specified)	Beneficial Uses
A	Oxidized, filtered and disinfected. Before disinfection, turbidity may not exceed: • 2 NTUs within a 24-hour period. • 5 NTUs more than five percent of the time within a 24-hour period • 10 NTUs at any time. After disinfection, total coliform may not exceed: • A median of 2.2 organisms per 100 mL based on daily sampling over the last 7 days that analyses have been completed. • 23 organisms per 100 mL in any single sample.	• Class B, Class C, Class D, and nondisinfected uses. • Irrigation for any agricultural or horticultural use. • Landscape irrigation of parks, playgrounds, school yards, residential landscapes, or other landscapes accessible to the public. • Commercial car washing or fountains when the water is not intended for human consumption. • Water supply source for non restricted recreational impoundments.
B	Oxidized and disinfected. Total coliform may not exceed: • A median of 2.2 organisms per 100 mL, based on the last 7 days that analyses have been completed. • 23 total coliform organisms per 100 mL in any single sample.	• Class C, Class D, and nondisinfected uses. • Stand-alone fire suppression systems in commercial and residential building, non-residential toilet or urinal flushing, or floor drain trap priming. • Water supply source for restricted recreational impoundments.
C	Oxidized and disinfected. Total coliform may not exceed: • A median of 23 total coliform organisms per 100 mL, based on results of the last 7 days that analyses have been completed. • 240 total coliform organisms per 100 mL in any two consecutive samples.	• Class D and nondisinfected uses. • Irrigation of processed food crops; irrigation of orchards or vineyards if an irrigation method is used to apply recycled water directly to the soil. • Landscape irrigation of golf courses, cemeteries, highway medians, or industrial or business campuses. • Industrial, commercial, or construction uses limited to: industrial cooling, rock crushing, aggregate washing, mixing concrete, dust control, nonstructural fire fighting using aircraft, street sweeping, or sanitary sewer flushing.

5. Biosolids

The permittee may land apply biosolids or provide biosolids for sale or distribution, subject to the following conditions:

a. The permittee must manage biosolids in accordance with its DEQ-approved Biosolids Management Plan and Land Application Plan.

b. Except when used for land reclamation and approved by DEQ, biosolids must be applied at or below the agronomic rate required for maximum crop yield.

c. The permittee must obtain written site authorization from DEQ for each beneficial use site before land application (see Schedule D, Condition 6.b.), and follow the minimum site-specific management conditions in the site authorization letter.

d. Biosolids must meet one of the pathogen reduction standards under 40 CFR §503.32 and one of the vector attraction reduction standards under 40 CFR §503.33.

e. Pollutants in biosolids may not exceed the ceiling concentrations shown in Table A4 below. Biosolids exceeding the pollutant concentrations in Table A4 must be applied at a rate that does not exceed the corresponding cumulative pollutant loading rates.

Table A4: Biosolids Limits

Pollutant	Ceiling concentrations[1] (mg/kg)	Pollutant concentrations[1] (mg/kg)	Cumulative pollutant loading rates[1] (kg/ha)
Arsenic	75	41	41
Cadmium	85	39	39
Copper	4300	1500	1500
Lead	840	300	300
Mercury	57	17	17
Molybdenum	75	N/A	N/A
Nickel	420	420	420
Selenium	100	100	100
Zinc	7500	2800	2800

Note:

1. Biosolids pollutant limits are described in 40 CFR§503.13, which uses the terms *ceiling concentrations*, *pollutant concentrations*, and *cumulative pollutant loading rates*. Biosolids containing pollutants in excess of the ceiling concentrations may not be beneficially reused by application to the land. Biosolids containing pollutants in excess of the pollutant concentrations, but less than the ceiling concentrations, may be beneficially reused by application to the land; however, the total quantity of biosolids applied to the land may not exceed the cumulative pollutant loading rates.

6. Septage Requirements

Septage may not be accepted at this facility for treatment or processing without written approval from DEQ.

7. Re-opener

Upon EPA approval of a Total Maximum Daily Load (TMDL) addressing any pollutants during the discharge period, this permit may be re-opened to include any waste load allocations (WLA), best management practice or any other condition the TMDL requires.

SCHEDULE B
Minimum Monitoring and Reporting Requirements

1. Monitoring and Reporting Protocols

a. Test Methods, Quantitation Limits, and Laboratory Quality Assurance and Quality Control
   i. Test Methods – monitoring must be conducted according to test procedures in 40 CFR Part 136.
   ii. Quantitation Limits (QLs)[1] – all compliance analyses must meet the QLs specified in the permit. Effluent characterization monitoring must use the QLs unless one of the conditions below is met.
      a) The monitoring result indicates nondetect at an MDL which is less than or equal to the QL, or
      b) Monitoring is being conducted solely for the purpose of effluent characterization, and matrix effects prevent the attainment of QLs[2]. In such cases, DEQ may authorize re-sampling. If requested by the permit holder, Tier 1 re-sampling may be combined with Tier 2 monitoring.

      Laboratories may need to modify methods as allowed in 40 CFR Part 136.6 or in EPA's Solutions for Analytical Chemistry Problems with Clean Water Methods, EPA 821-R-07-002, March 2007 in order to achieve some QLs.
   iii. Laboratory Quality Assurance and Quality Control (QA/QC) – the permittee must develop and implement a written QA/QC program that conforms to the requirements of 40 CFR Part 136.7.

b. Re-analysis and Re-sampling if QA/QC Requirements Not Met
If QA/QC requirements are not met any analysis, the results must be included in reports, but not used in calculations required by this permit. The permittee must re-analyze the sample if QA/QC requirements are not met. If the sample cannot be re-analyzed, the permittee must re-sample and analyze at the earliest seasonally appropriate opportunity.

c. Significant Figures and Rounding Conventions
Mass load limits all have two significant figures unless otherwise noted. The permittee must report the same number of significant digits as the permit limit for a given parameter. Regardless of the rounding conventions used by the permittee (such as, rounding 5 up for the calculated results or, in the case of laboratory results, rounding 5 to the nearest even number), the permittee must use the convention consistently, and must ensure that laboratories employed by the permittee use the same convention[3].

d. Reporting of Detection Levels and Quantitation Limits
When reporting sampling results, the permittee must record the laboratory detection level and quantitation limit as defined below for each analyte except biochemical oxygen demand (BOD), suspended solids (TSS), fats, oil and grease (FOG), bacteria and pH).
   i. Detection Level (DL): The Method Detection Limit (MDL) or Limit of Detection (LOD) and derived using 40 CFR Part 136 Appendix B; and
   ii. Quantitation Limit (QL): The Method Reporting Limit (MRL) or Limit of Quantitation (LOQ). It is the lowest level at which the entire analytical system gives a recognizable signal and acceptable calibration for the analyte. It is equivalent to the concentration of the lowest calibration standard assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed.

e. Reporting Sample Results
The permittee must follow the procedures listed below when reporting sampling results.

i. If a sample result is below the DL, the permittee must report the result as less than the specified DL. For example, if the DL is 1.0 µg/L and the result is non-detect, report "<1.0 µg/L" on the discharge monitoring report (DMR).

ii. If a sample result is above the DL but below the QL, the permittee must report the result as the DL preceded by DEQ's data code "e". For example, if the DL is 1.0 µg/l, the QL is 3.0 µg/L, and the result is estimated to be between the DL and QL, the permittee must report "e1.0 µg/L" on the DMR.

iii. If a sample result does not meet QA/QC requirements, the result must be included in the DMR along with a notation but must not be used in any calculation required by this permit.

iv. Requirements i. and ii. above do not apply to the following parameters: biochemical oxygen demand (BOD), suspended solids (TSS), fats, oil and grease (FOG), bacteria and pH.

f. Calculating and Reporting Mass Loads

The permittee must follow the procedures listed below when calculating and reporting mass loads.

Flow (MGD) X Concentration (mg/L) X 8.34 = Pounds per day

i. When concentration data are below the DL: To calculate the mass load from this result, use the DL. Report the mass load as less than the calculated mass load. For example, if flow is 2 MGD and the reported sample result is <1.0 µg/L, report "<0.02 lb/day" for mass load on the DMR (1.0 µg/L x 2 MGD x conversion factor = 0.017 lb/day, round off to 0.02 lb/day).

ii. When concentration data are above the DL, but below the QL: To calculate the mass load from this result, use the detection level. Report the mass load as the calculated mass load preceded by "e". For example, if flow is 2 MGD and the reported sample result is e1.0 µg/L, report "e0.02 lb/day" for mass load on the DMR (1.0 µg/L x 2 MGD x conversion factor = 0.017 lb/day, round off to 0.02 lb/day).

2. Influent Monitoring Requirements

The permittee must monitor influent just downstream of the Parshall flume and ahead of the pre-aeration basin in accordance with the table below.

Table B1: Influent Monitoring

Item or Parameter	Time Period	Minimum Frequency	Sample Type/Action	Report
flow (MGD)	year-round	daily	measurement by totalizing meter	1. daily values 2. monthly total 3. monthly average
flow meter calibration		annually	verification	report date that calibration was completed
BOD_5 and TSS (mg/L)	year-round	2/Week	24-hour composite	1. daily values 2. monthly average
pH (S.U.)	year-round	3/week	continuous	1. daily values 2. maximum daily value 3. minimum daily value

3. Compliance Effluent Monitoring
When discharging to the Molalla River, the permittee must monitor effluent for Outfall 001 at the discharge monitoring structure (DMS) located near the Molalla River and in accordance with the table below:

Table B2: Effluent Monitoring (November - April)

Item or Parameter	Minimum Frequency	Sample Type/Action	Report
flow (MGD)	daily	measurement by totalizing meter	1. daily values 2. monthly total 3. monthly average
BOD_5 and TSS (mg/L)	2/week	24-hour composite	1. daily values 2. monthly average 3. weekly averages 4. maximum weekly average 5. maximum daily value
BOD_5 and TSS mass load (lb/day)	2/week	calculation	1. daily values 2. monthly average 3. weekly averages 4. maximum weekly average 5. maximum daily value
BOD_5 and TSS percent removal (%)	monthly	calculation	monthly average percentage
pH (S.U.)	3/week	continuous	1. daily values 2. maximum daily value 3. minimum daily value
temperature (° C)	daily	continuous	1. daily maximum 2. weekly average of daily maximum
E. coli (colonies/100 mL or MPN/100mL depending on method)	1/week	grab	1. daily values 2. maximum daily value 3. monthly geometric mean
quantity chlorine used (lbs)	daily	measurement	1. daily values 2. monthly average
total residual chlorine (mg/L)	daily	continuous	1. daily values 2. maximum daily value 3. monthly average
Lagoon Depth	weekly	staff gauge reading	monthly values

4. Ambient Stream Monitoring (Molalla River)
The permit holder must report stream data using online USGS recordings from gauge station 14200000 located at river mile 6.01 according to the table below:

Table B3: Molalla River

Item or Parameter	Time period	Frequency	Sample type/action	Report
flow (cfs)	November-May	daily	on-line reading from USGS gauge station 14200000	1. daily values 2. monthly average
temperature	November-May	5/week	continuous	1. monthly average 2. 7-day average of daily maximum
alkalinity	November-May	annually	grab	daily values

5. **Effluent Toxics Characterization Monitoring**
The permittee must analyze effluent samples for the parameters listed in tables B4-B7 below. Samples must be collected at the DMS during two sample events each year in 2015 and 2016. Samples must be 24-hour composites except as noted in Table B4, B5 and B6 for Total Cyanide, Free Cyanide, Total Phenolic Compounds and Volatile Organic Compounds.

Table B4: Metals, Cyanide, Total Phenols, Nutrients and Hardness
(µg/L unless otherwise specified)

Pollutant[a]	CAS[b]	QL	Pollutant	CAS	QL
Antimony	7440360	0.10	Mercury	7439976	0.005
Arsenic (total)[c]	7440382	0.50	Nickel	7440020	10
Arsenic (Inorganic)[c]	7440382	1.0	Selenium	7782492	2.0
Arsenic III[c]	22541544	50	Silver	7440224	1.0
Beryllium	7440417	0.10	Thallium	7440280	0.10
Cadmium	7440439	0.10	Zinc	7440666	5.0
Chromium (total)	7440473	0.40	Cyanide (Free)[e]	57125	10
Chromium III[d]	16065831	10	Cyanide (Total)[e]	57125	5.0
Chromium VI[d]	18540299	10	Total Phenolic Compounds[f]		5.0
Copper	7440508	10	Nitrates-Nitrite (NO_3+NO_2-N)	14797558	100
Iron	7439896	100	Ammonia (NH_3-N)	7664417	1000
Lead	7439921	5	Hardness (Total as $CaCO^3$)		
Alkalinity					

a. All metals must be analyzed for total recoverable concentration unless otherwise specified.
b. Chemical Abstract Service
c. If the result for Total Arsenic does not exceed 1.0 µg/L, it is not necessary to monitor for Inorganic Arsenic and Arsenic III. Otherwise, Method 1632A must be used to monitor for Inorganic Arsenic and Arsenic III.
d. If the result for Total Chromium does not exceed 10 µg/L, then it is not necessary to monitor for Chromium III and Chromium VI.
e. When sampling for Cyanide, at least six discrete grab samples must be collected over the operating day with samples collected no less than one hour apart. The aliquot must be at least 100 mL and collected and composited into a larger container that has been preserved with sodium hydroxide to insure sample integrity. If the result for Total Cyanide does not exceed 5.0 µg/L, it is not necessary to test for free cyanide.
f. When sampling for Total Phenolic Compounds, at least six discrete grab samples must be collected over the operating day with samples collected no less than one hour apart. "Total Phenolic Compounds" is identified as Phenols in 40 CFR Part 136.3, Table 1B.

Table B5: Volatile Organic Compounds
(µg/L unless otherwise specified)

Pollutant[a]	CAS	QL	Pollutant[a]	CAS	QL
Acrolein	107028	5.0	1,1-dichloroethylene[e]	75354	0.50
acrylonitrile	107131	5.0	1,2-dichloropropane	78875	0.50
Benzene	71432	0.50	1,3-dichloropropylene[f]	542756	0.50
bromoform	75252	0.50	Ethylbenzene	100414	0.50
carbon tetrachloride	56235	0.50	methyl bromide[g]	74839	0.50
chlorobenzene	108907	0.50	methyl chloride[h]	74873	0.50
Chlorodibromomethane[b]	124481	0.50	methylene chloride	75092	0.50
chloroethane	75003	0.50	1,1,2,2-tetrachloroethane	79345	0.50
2-chloroethylvinyl ether	110758	5.0	tetrachloroethylene[i]	127184	0.50
chloroform	67663	0.50	Toluene	108883	0.50
dichlorobromomethane[c]	75274	0.50	1,1,1-trichloroethane	71556	0.50
1,1-dichloroethane	75343	0.50	1,1,2-trichloroethane	79005	0.50
1,2-dichloroethane	107062	0.50	Trichloroethylene[j]	79016	0.50
1,2-trans-dichloroethylene[d]	156605	0.50	vinyl chloride	75014	0.50

a. Permit holders with lagoon facilities that have retention times in excess of 24 hours may collect a single sample over the operating day. Permit holders with other types of facilities must collect six discrete samples (not less than 40 mL) over the operating day at intervals of at least one hour. The samples may be analyzed separately or composited. If analyzed separately, the analytical results for all samples must be averaged for reporting purposes. If composited, they must be proportionally composited in the laboratory at the time of analysis and this must be done in a manner that maintains the integrity of the samples and prevents the loss of volatile analytes. The quantitation limits listed above remain in effect for composite samples.
b. Chlorodibromomethane is identified as dibromochloromethane in 40 CFR Part 136.3, Table 1C.
c. Dichlorobromomethane is identified as Bromodichloromethane in 40 CFR Part 136.3, Table 1C.
d. 1,2-trans-dichloroethylene is identified as trans-1,2-dichloroethene in 40 CFR Part 136.3, Table 1C.
e. 1,1-dichloroethylene is identified as 1,1-dichloroethene in 40 CFR Part 136.3, Table 1C.
f. 1,3-dichloropropylene consists of both cis-1,3-dichloropropene and trans-1,3-dichloropropene. Both should be reported individually.
g. Methyl bromide is identified as Bromomethane in 40 CFR Part 136.3, Table 1C.
h. Methyl chloride is identified as chloromethane in 40 CFR Part 136.3, Table 1C.
i. Tetrachloroethylene is identified as tetrachloroethene in 40 CFR Part 136.3, Table 1C.
j. Trichloroethylene is identified as trichloroethene in 40 CFR Part 136.3, Table 1C.

Table B6: Acid-Extractable Compounds

(µg/L unless otherwise specified)

Pollutant	CAS	QL[a]	Pollutant	CAS	QL[a]
p-chloro-m-cresol	59507	1.0	2-nitrophenol	88755	2.0
2-chlorophenol	95578	1.0	4-nitrophenol	100027	5.0
2,4-dichlorophenol	120832	1.0	pentachlorophenol	87865	2.0
2,4-dimethylphenol	105679	5.0	Phenol	108952	1.0
4,6-dinitro-o-cresol[c]	534521	2.0	2,4,5-trichlorophenol[d]	95954	2.0
2,4-dinitrophenol	51285	5.0	2,4,6-trichlorophenol	88062	1.0

a. Some QLs may need methods with modification allowed in 40 CFR Part 136.6 or EPA's *Solutions for Analytical Chemistry Problems w/Clean Water Methods, March 2007.* **(url: http://water.epa.gov/scitech/methods/cwa/atp/upload/2008_02_06_methods_pumpkin.pdf)**

b. p-chloro-m-cresol is identified as 4-Chloro-3-methylphenol in 40 CFR Part 136.3, Table 1C.

c. 4,6-dinitro-o-cresol is identified as 2-Methyl-4,6-dinitrophenol in 40 CFR Part 136.3, Table 1C.

d. To monitor for 2,4,5-trichlorophenol, use EPA Method 625.

Table B7: Base-Extractable Compounds

(µg/L unless otherwise specified)

Pollutant	CAS	QL[a]	Pollutant	CAS	QL
acenaphthene	83329	1.0	3,3-Dichlorobenzidine	91941	1.0
acenaphthylene	208968	1.0	diethyl phthalate	84662	1.0
anthracene	120127	1.0	dimethyl phthalate	131113	1.0
benzidine	92875	10	2,4-dinitrotoluene	121142	1.0
benzo(a)anthracene	56553	1.0	2,6-dinitrotoluene	606202	1.0
benzo(a)pyrene	50328	1.0	1,2-diphenylhydrazine[d]	122667	5.0
3,4-benzofluoranthene[b]	205992	1.0	fluoranthene	206440	2.0
benzo(ghi)perylene	191242	1.0	fluorene	86737	1.0
benzo(k)fluoranthene	207089	1.0	hexachlorobenzene	118741	1.0
bis(2-chloroethoxy)methane	111911	2.0	hexachlorobutadiene	87683	2.0
bis(2-chloroethyl)ether	111444	1.0	hexachlorocyclopentadiene	77474	2.0
bis(2-chloroisopropyl)ether[c]	108601	2.0	hexachloroethane	67721	2.0
bis (2-ethylhexyl)phthalate	117817	1.0	indeno(1,2,3-cd)pyrene	193395	1.0
4-bromophenyl phenyl ether	101553	1.0	isophorone	78591	10
butylbenzyl phthalate	85687	1.0	napthalene	91203	1.0
2-chloronaphthalene	91587	1.0	nitrobenzene	98953	1.0
4-chlorophenyl phenyl ether	7005723	1.0	N-nitrosodimethylamine	62759	1.0
chrysene	218019	1.0	N-nitrosodi-n-propylamine	621647	2.0
di-n-butyl phthalate	84742	1.0	N-nitrosodiphenylamine	86306	1.0
di-n-octyl phthalate	117817	1.0	Pentachlorobenzene[e]	608935	10
dibenzo(a,h)anthracene	53703	1.0	phenanthrene	85018	1.0
1,2-Dichlorobenzene (o)	95501	0.50	pyrene	129000	1.0
1,3-Dichlorobenzene (m)	541731	0.50	1,2,4-trichlorobenzene	128821	5.0
1,4-Dichlorobenzene (p)	106467	0.50	Tetrachlorobenzene,1,2,4,5[e]	95943	1.0

a. Some QLs may need methods with modification allowed in 40 CFR Part 136.6 or EPA's *Solutions for Analytical chemistry Problems w/Clean Water Methods, March 2007.*
b. 3,4-benzofluoranthene is listed as Benzo(b)fluoranthene in 40 CFR Part 136.
c. Bis(2-chloroisopropyl)ether is listed as 2,2'-oxybis(2-chloro-propane in 40 CFR Part 136.
d. 1,2-diphenylhydrazine is difficult to analyze given its rapid decomposition rate in water. Azobenzene (a decomposition product of 1,2-diphenylhydrazine), should be analyzed as an estimate of this chemical.
e. To analyze for Pentachlorobenzene and Tetrachlorobenzene 1,2,4,5, use EPA Method 625.

6. Ambient and Additional Effluent Characterization Monitoring

DEQ will evaluate the results of monitoring required under Schedule B, condition 5: Effluent Toxics Characterization Monitoring, to determine whether the permittee will be required to conduct additional ambient water quality and/or effluent monitoring. DEQ will notify the permittee of its determination through a written "Monitoring Action Letter."

a. Sampling Plan
   If additional monitoring is needed, the permittee must submit a sample and analysis plan to DEQ for approval within 3 months of receipt of the DEQ Monitoring Action Letter. The sampling plan must include the following:
   i. Characterization of ambient water quality for any pollutants identified as having the reasonable potential to exceed the water quality criterion at the point of discharge .
   ii. Completion of Schedule B sampling requirements that could not be completed due to analytical interferences.
   iii. Characterization of effluent and ambient water quality for new pollutant parameter(s) adopted by the EQC after permit issuance.

iv. Characterization of effluent and ambient water quality, if necessary, when the receiving stream is listed as impaired on the DEQ 303(d) list for new parameter(s).
v. Sampling locations for receiving water must be located as far upstream from outfall location as necessary to insure that samples contain no effluent.
vi. Timing of sampling must coincide with the critical period.

b. Implementation
The permittee must begin implementing the approved plan within 3 months of DEQ approval.

7. Whole Effluent Toxicity Testing Requirements
The permittee must monitor final effluent for whole effluent toxicity as described below using the testing protocols specified in Schedule D, Condition 9, Whole Effluent Toxicity Testing for Freshwater. Samples for Outfall 001 must be collected at the DMS.

Table B8: WET Test Monitoring

Parameter	Minimum Frequency	Sample Type/Location
Acute toxicity	The permit holder must monitor 4 times over the permit cycle with each sample collected during a different month of the discharge period. All four samples may be collected in the first year of the permit or they may be collected during a different month each year over 4 years (i.e., Year 1, November, Year 2, December). When possible, conduct WET testing concurrent with Effluent Toxics Characterization Monitoring as described in Schedule B, Condition 5. If the four consecutive tests show no toxicity at the acute (ZID) and the chronic (RMZ) dilutions, no further testing is required. Otherwise, the permittee must re-test and if necessary, evaluate the cause of toxicity as described in Schedule D, Condition 9.	For acute toxicity: 24-hr composite taken at the DMS after dechlorination and before the effluent flume.
Chronic toxicity		For chronic toxicity: 24-hr composite, taken at the DMS after dechlorination and before the effluent flume.

8. Recycled Water Monitoring Requirements: Outfall no. 002
The permittee must monitor recycled water as listed below. The samples must be representative of the recycled water delivered for beneficial reuse at a location identified in the Recycled Water Use Plan.

Table B9: Recycled Water Monitoring

Item or Parameter	Minimum Frequency	Sample Type
flow (MGD) or quantity irrigated (inches/acre)	daily	measurement
flow meter calibration	annually	verification
quantity chlorine used (lbs)	daily	measurement
chlorine, total residual (mg/L)	daily	grab
pH	2/week	grab

Item or Parameter	Minimum Frequency	Sample Type
total coliform	daily (Class A) 3/week (Class B) 1/week (Class C)	grab
turbidity	hourly (Class A only)	measurement
nutrients (TKN, NO_2+NO_3-N, NH_3-N, Total Phosphorus)	quarterly	grab

9. Biosolids Monitoring Requirements

The permittee must monitor biosolids land applied or produced for sale or distribution as listed below. The samples must be representative of the quality and quantity of biosolids generated and the treatment process used to prepare the biosolids.

Table B10: Biosolids Monitoring

Item or Parameter	Minimum Frequency	Sample Type
nutrient and conventional parameters (% dry weight unless otherwise specified): 1) Total Kjeldahl Nitrogen (TKN) 2) Nitrate-Nitrogen (NO_3-N) 3) Ammonium Nitrogen (NH_4-N) 4) Total Phosphorus (P) 5) Potassium (K) 6) pH (S.U.) 7) Total Solids 8) Volatile Solids	as described in the DEQ-approved Biosolids Management Plan, but not less than the frequency in Table B11.	
pollutants: As, Cd, Cu, Hg, Pb, Mo, Ni, Se, Zn, mg/kg dry weight	as described in the DEQ-approved Biosolids Management Plan, but not less than the frequency in Table B11	
pathogen reduction	as described in the DEQ-approved Biosolids Management Plan, but not less than the frequency in Table B11.	as described in the DEQ-approved Biosolids Management Plan
vector attraction reduction	as described in the DEQ-approved Biosolids Management Plan, but not less than the frequency in Table B11.	as described in the DEQ-approved Biosolids Management Plan
record of biosolids land application: date, quantity, location.	each event	record the date, quantity, and location of biosolids land applied on site location map or equivalent electronic system, such as GIS.

Table B11: Biosolids Minimum Monitoring Frequency

Quantity of biosolids land applied or produced for sale or distribution per calendar year		Minimum Sampling Frequency
(dry metric tons)	(dry U.S. tons)	
Less than 290	Less than 320	Once per year
290 to 1,500	320 to 1,653	Once per quarter
1,500 to 15,000	1,653 to 16,535	Once per 60 days
15,000 or more	16,535 or more	Once per month

10. Permit Application Monitoring Requirements

The following information is provided for the convenience of the permit holder and does not represent a requirement under the current permit. The renewal application for this permit requires 3 scans for the parameters listed in the table below. This data may be collected up to 4.5 years in advance of submittal of the renewal application. DEQ recognizes that some facilities may find it difficult to collect 3 scans that are representative of the seasonal variation in the discharge from each outfall within the permit renewal timeframe, and is therefore calling attention to it within this permit.

Table B12: Effluent Monitoring Required for NPDES Permit Application
(a minimum of 3 scans required)

Parameter
Ammonia (as N)
Chlorine (Total Residual, TRC)
Dissolved Oxygen
Total Kjeldahl Nitrogen (TKN)
Nitrate Plus Nitrite Nitrogen
Oil and Grease

11. Minimum Reporting Requirements

The permittee must report monitoring results as listed below.

Table B13: Reporting Requirements and Due Dates

Reporting Requirement	Frequency	Due Date	Report Form (unless otherwise specified in writing)	Submit To:
1. Table B1: Influent Monitoring 2. Table B2: Effluent Monitoring	monthly	15th day of the following month	DEQ-approved discharge monitoring report (DMR).	DEQ Regional Office (See notes a & b)

Reporting Requirement	Frequency	Due Date	Report Form (unless otherwise specified in writing)	Submit To:
Table B3: Ambient monitoring	Monthly (November-May)	15th day of the following month	DEQ-approved discharge monitoring report (DMR).	DEQ Regional Office
Tables B4 – B7: Effluent Toxics Characterization	once (See Note c.)	end of the 25th month of this permit term	• DEQ - approved electronic summary template • 1 hard copy	DEQ Regional Office
Table B8: WET Test Monitoring	See Table B8	within the month after performing the test.	1 hard copy	DEQ Regional Office
1. Recycled water annual report (see Schedule D for more detail) 2. Table B9: Recycled Water Monitoring	annually	January 31	2 hard copies	One each to: • DEQ Regional Office • DEQ Water Reuse Program Coordinator
1. Biosolids land application annual report describing solids handling activities for the previous year and includes the information described in OAR 340-050-0035(6)(a)-(e). 2. Table B10: Biosolids Monitoring	annually	February 19	3 hard copies	One each to: • DEQ Regional Office • DEQ Biosolids Program Coordinator • EPA Region 10
Inflow and infiltration report	annually	March 1	1 hard copy	DEQ Regional Office

Notes:
- a. Name, certificate classification, and grade level of each responsible principal operator as well as identification of each system classification must be included on DMRs.
- b. Equipment breakdowns and bypass events must be noted on DMRs.
- c. Though the overall characterization only needs to be performed once during the permit cycle, a particular characterization may include multiple sampling events.

SCHEDULE D
Special Conditions

1. Inflow Removal

a. Within 180 days of the effective date of the permit, the permittee must submit to DEQ for approval an updated Inflow Removal Program. The program must consist of the following:
   i. Identification of all overflow points.
   ii. Verification that sewer system overflows are not occurring up to a 24-hour, 5-year storm event or equivalent.
   iii. Monitoring of all pump station overflow points.
   iv. A process for identifying and removing all inflow sources into the permittee's sewer system over which the permittee has legal control, including a time .schedule for identifying and reducing inflow.
   v. If the permittee does not have the necessary legal authority for all portions of the sewer system or treatment facility, a strategy and schedule for gaining legal authority to require inflow reduction and a process and schedule for identifying and removing inflow sources once legal authority has been obtained.

b. Within 60 days of receiving written DEQ comments, the permittee must submit a final approvable program and time schedule.

c. A copy of the program must be kept at the wastewater treatment facility for review upon request by DEQ.

d. An annual inflow and infiltration report must be submitted to the DEQ as directed in Schedule B. The report must include the following:
   i. Details of activities performed in the previous year to identify and reduce inflow and infiltration.
   ii. Details of activities planned for the following year to identify and reduce inflow and infiltration.
   iii. A summary of sanitary sewer overflows that occurred during the previous year.
   iv. Information that demonstrates compliance with the DEQ-approved Inflow Removal Plan required by condition 1.a above.

2. Emergency Response and Public Notification Plan

The permittee must develop and maintain an Emergency Response and Public Notification Plan per Schedule F, Section B, Conditions 7 & 8. The permit holder must develop the plan within six months of permit issuance and update the plan annually to ensure that telephone and email contact information for applicable public agencies are current and accurate. An updated copy of the plan must be kept on file at the wastewater treatment facility for Department review. The latest plan revision date must be listed on the plan cover along with the reviewer's initials or signature.

3. Recycled Water Use Plan

In order to distribute recycled water for reuse, the permittee must have and maintain a DEQ-approved Recycled Water Use Plan meeting the requirements in OAR 340-055-0025. The permittee must submit substantial modifications to an existing plan to DEQ for approval at least 60 days before making the proposed changes. Conditions in the plan are enforceable requirements under this permit.

4. Exempt Wastewater Reuse at the Treatment System

The permittee is exempt from the recycled water use requirements in OAR 340-055 when recycled water is used at the wastewater treatment system for landscape irrigation or for in-plant processes at a wastewater treatment system, and all of the following conditions are met:
   i. The recycled water is an oxidized and disinfected wastewater.
   ii. The recycled water is used at the wastewater treatment system site where it is generated or at an auxiliary wastewater or sludge treatment facility that is subject to the same NPDES or WPCF permit as the wastewater treatment system. Contiguous property to the parcel of land upon which the treatment system is located is considered the wastewater treatment system site if under the same ownership.
   iii. Spray or drift or both from the use does not occur off the site.
   iv. Public access to the site is restricted.

5. Biosolids Management Plan

The permittee must maintain a Biosolids Management Plan meeting the requirements in OAR 340-050-0031(5). The permittee must keep the plan updated and submit substantial modifications to an existing plan to DEQ for approval at least 60 days before making the proposed changes. Conditions in the plan are enforceable requirements under this permit.

6. Land Application Plan

a. Plan Contents

The permittee must maintain a land application plan that contains the information listed below. The land application plan may be incorporated into the Biosolids Management Plan.

i. All known DEQ-approved sites that will receive biosolids while the permit is effective.
ii. The geographic location, identified by county or smaller unit, of new sites which are not specifically listed at the time of permit application.
iii. Criteria that will be used in the selection of new sites.
iv. Management practices that will be implemented at new sites authorized by the DEQ.
v. Procedures for notifying property owners adjacent to proposed sites of the proposed activity before starting the application.

b. Site Authorization

The permittee must obtain written authorization from DEQ for each land application site before its use. Conditions in site authorizations are enforceable requirements under this permit. The permittee may land apply biosolids to a DEQ-approved site only as described in the site authorization, while this permit is effective, and with the written approval of the property owner. DEQ may modify or revoke a site authorization, following the procedures for a permit modification described in OAR 340-045-0055.

c. Public Participation

iii. No DEQ-initiated public notice is required for continued use of sites identified in the DEQ-approved land application plan.
iv. For new sites that fail to meet the site selection criteria in the land application plan, or that DEQ deems to be sensitive with respect to residential housing, runoff potential, or threat to groundwater, DEQ will provide an opportunity for public comment as directed by OAR 340-050-0015(10).
v. For all other new sites, the permittee must provide for public participation, following procedures in its DEQ-approved land application plan.

7. Wastewater Solids Transfers

a. *Within state.* The permittee may transfer wastewater solids including Class A and Class B biosolids, to another facility permitted to process or dispose of wastewater solids, including but not limited to: another wastewater treatment facility, landfill, or incinerator. The permittee must monitor, report, and dispose of solids as required under the receiving facility's permit.
b. *Out of state.* If wastewater solids, including Class A and Class B biosolids, are transferred out of state for use or disposal, the permittee must obtain written authorization from DEQ, meet Oregon requirements for the use or disposal of wastewater solids, notify in writing the receiving state of the proposed use or disposal of wastewater solids, and satisfy the requirements of the receiving state.

8. Hauled Waste Control

The permittee may accept hauled wastes at discharge points designated by the POTW after receiving written DEQ approval of a hauled waste control plan. Hauled wastes may include wastewater solids from another wastewater treatment facility, septage, grease trap wastes, portable and chemical toilet wastes, landfill leachate, groundwater remediation wastewaters and commercial/industrial wastewaters. Wastewater solids from out-of-state facilities must not exceed the ceiling concentration limits in Schedule A, Table A5: Biosolids Limits.

9. Lagoon Solids

At least 60 days, and preferably six months before removing accumulated solids from the lagoon, the permittee must submit to DEQ a biosolids management plan and land application plan as required in conditions 4 and 5 respectively.

DEQ will provide an opportunity for comment on the biosolids management plan and land application plan, as directed by OAR 340-050-0015(8). The permittee must follow the conditions in the approved plan.

10. Whole Effluent Toxicity Testing for Freshwater

a. The permit holder must conduct whole effluent toxicity (WET) tests as specified here and in Schedule B of this permit.

b. Acute Toxicity Testing - Organisms and Protocols

   i. The permittee must conduct 48-hour static renewal tests with *Ceriodaphnia dubia* (water flea) and 96-hour static renewal tests with *Pimephales promelas* (fathead minnow).

   ii. All test methods and procedures must be in accordance with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition, EPA-821-R-02-012, October 2002. Any deviation of the bioassay procedures outlined in this method must be submitted in writing to DEQ for review and approval before use.

   iii. Treatments to the final effluent samples (for example, dechlorination), except those included as part of the methodology, may not be performed by the laboratory unless approved by DEQ before analysis.

   iv. Unless otherwise approved by DEQ in writing, acute tests must be conducted on a control (0%) and the following dilution series: 6.25%, 10%, 25%, 50%, and 100%. An acute WET test will be considered to show toxicity if there is a statistically significant difference in survival between the control and 10% effluent reported as the NOEC $\leq$ 10 percent effluent.

c. Chronic Toxicity Testing - Organisms and Protocols

   i. The permittee must conduct tests with *Ceriodaphnia dubia* (water flea) for reproduction and survival test endpoint, *Pimephales promelas* (fathead minnow) for growth and survival test endpoint, and *Raphidocelis subcapitata* (green alga formerly known as *Selanastrum capricornutum*) for growth test endpoint.

   ii. All test methods and procedures must be in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, EPA-821-R-02-013, October 2002. Any deviation of the bioassay procedures outlined in this method must be submitted in writing to DEQ for review and approval before use.

   iii. Treatments to the final effluent samples (for example, dechlorination), except those included as part of the methodology, may not be performed by the laboratory unless approved by DEQ before analysis.

   iv. Unless otherwise approved by DEQ in writing, chronic tests must be conducted on a control (0%) and the following dilution series: 2%, 4%, 10%, 40%, and 100% A chronic WET test will be considered to show toxicity if the IC_{25} (25% inhibition concentration) occurs at dilutions equal to or less than the dilution that is known to occur at the edge of the mixing zone, that is, $IC_{25} \leq 4\%$

d. Dual End-Point Tests

   i. WET tests may be dual end-point tests in which both acute and chronic end-points can be determined from the results of a single chronic test. The acute end-point will be based on 48-hours for the *Ceriodaphnia dubia* (water flea) and 96-hours for the *Pimephales promelas* (fathead minnow).

   ii. All test methods and procedures must be in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, EPA-821-R-02-013, October 2002. Any deviation of the bioassay procedures outlined in this method must be submitted in writing to DEQ for review and approval before use.

   iii. Unless otherwise approved by DEQ in writing, tests run as dual end-point tests must be conducted on a control (0%) and the following dilution series: 2%, 4%, 10%, 40%, and 100%. Toxicity determinations for dual end-point tests must correspond to the acute and chronic tests described in conditions 9.b.iv. and 9.c.iv. above.

e. Evaluation of Causes and Exceedances
   i. If any test exhibits toxicity as described in conditions 9.b.iv. and 9.c.iv. above, the permittee must conduct another toxicity test using the same species and DEQ-approved methodology within two weeks unless DEQ approves otherwise.
   ii. If two consecutive WET test results indicate acute or chronic toxicity as described in conditions 9.b.iv. and 9.c.iv. above, the permittee must immediately notify DEQ of the results. DEQ will work with the permittee to determine the appropriate course of action to evaluate and address the toxicity.

f. Quality Assurance and Reporting
   i. Quality assurance criteria, statistical analyses, and data reporting for the WET tests must be in accordance with the EPA documents stated in this condition.
   ii. A bioassay laboratory report for each test must be prepared according to the EPA method documents referenced in this Schedule. The report must include all QA/QC documentation, statistical analysis for each test performed, standard reference toxicant test (SRT) conducted on each species required for the toxicity tests, and completed Chain-of-Custody forms for the samples including time of sample collection and receipt. Reports must be submitted to DEQ within 45 days of test completion.
   iii. The report must include all endpoints measured in the test: NOEC, LOEC, and IC_{25}.
   iv. The permittee must make available to DEQ upon request the written standard operating procedures they, or the laboratory performing the WET tests, use for all toxicity tests DEQ requires.

g. Reopener
   DEQ may reopen and modify this permit to include new limits, monitoring requirements, and/or conditions as determined by DEQ to be appropriate, and in accordance with procedures outlined in OAR Chapter 340, Division 45 if:
   i. WET testing data indicate acute and/or chronic toxicity.
   ii. The facility undergoes any process changes.
   iii. Discharge monitoring data indicate a change in the reasonable potential to exhibit toxicity.

11. Operator Certification

a. Definitions
   i. "Supervise" means to have full and active responsibility for the daily on-site technical operation of a wastewater treatment system or wastewater collection system.
   ii. "Supervisor" or "designated operator" means the operator delegated authority by the permittee for establishing and executing the specific practice and procedures for operating the wastewater treatment system or wastewater collection system in accordance with the policies of the owner of the system and any permit requirements.
   iii. "Shift Supervisor" means the operator delegated authority by the permittee for executing the specific practice and procedures for operating the wastewater treatment system or wastewater collection system when the system is operated on more than one daily shift.
   iv. "System" includes both the collection system and the treatment systems.

b. The permittee must comply with OAR Chapter 340, Division 49, "Regulations Pertaining to Certification of Wastewater System Operator Personnel" and designate a supervisor whose certification corresponds with the classification of the collection and/or treatment system, as specified on page 1 of this permit.

c. The permittee must have its system supervised full-time by one or more operators who hold a valid certificate for the type of wastewater treatment or wastewater collection system, and at a grade equal to or greater than the wastewater system's classification, as specified on page 1 of this permit.

d. The permittee's wastewater system may not be without the designated supervisor for more than 30 days. During this period, there must be another person available to supervise who is certified at no more than one grade lower than the classification of the wastewater system. The permittee must delegate authority to this operator to supervise the operation of the system.

e. If the wastewater system has more than one daily shift, the permittee must have another properly certified operator available to supervise system operation. Each shift supervisor, if any, must be certified at no more than one grade lower than the system classification.

f. The permittee is not required to have a supervisor on-site at all times; however, the supervisor must be available to the permittee and operator at all times.

g. The permittee must notify DEQ in writing of the name of the system supervisor. The permittee may replace or re-designate the system supervisor with another properly certified operator at any time and must notify DEQ in writing within 30 days of replacement or re-designation of operator in charge. The notice of replacement or re-designation must be sent to DEQ-Water Quality Division, Operator Certification Program, 2020 SW 4th Avenue, Suite 150, Portland, OR 97201

h. Upon written request, DEQ may grant the permittee reasonable time, not to exceed 120 days, to obtain the services of a qualified person to supervise the wastewater system. The written request must include a justification for the time needed, schedule for recruiting and hiring, date the system supervisor availability ceased, and name of the alternate system supervisor as required above.

12. Industrial Waste Survey/Pretreatment Program

The permittee must conduct an industrial user survey to determine the presence of any industrial users discharging wastewaters subject to pretreatment and submit a report on the findings to DEQ within 24 months of permit issuance. The purpose of the survey is to identify whether there are any categorical industrial users discharging to the POTW, and ensure regulatory oversight of these discharges to state waters. If the POTW has already completed a baseline IU Survey the results of this survey are to be provided to DEQ within two months of permit re-issuance.

Guidance on conducting IU Surveys can be found at
http://www.deq.state.or.us/wq/pretreatment/docs/guidance/IUSurveyGuidance.pdf

Once an initial baseline IU Survey is conducted it is to be maintained by the POTW and made available for inspection by DEQ. Every 5 years from permit renewal, the permittee must submit an updated IU survey.

13. Cooperative Operating Agreement with City of Canby

The permittee must maintain a copy of the Cooperative Operating Agreement with the city of Canby, and meet all Agreement conditions, particularly regarding contacting Canby when the permittee plans to begin discharging to the Molalla River.

14. Leak Test.

Within one year following permit issuance, the permittee must perform a lagoon leak test. Within 30 days after completing the test, the permittee must report the test results to DEQ. Depending on the test results, the permittee may need to take a further action, such as perform groundwater monitoring to determine if the leakage has adversely impacted groundwater quality.

SCHEDULE F
NPDES GENERAL CONDITIONS – DOMESTIC FACILITIES

SECTION A. STANDARD CONDITIONS

A1. Duty to Comply with Permit

The permittee must comply with all conditions of this permit. Failure to comply with any permit condition is a violation of Oregon Revised Statutes (ORS) 468B.025 and the federal Clean Water Act and is grounds for an enforcement action. Failure to comply is also grounds for DEQ to terminate, modify and reissue, revoke, or deny renewal of a permit.

A2. Penalties for Water Pollution and Permit Condition Violations

The permit is enforceable by DEQ or EPA, and in some circumstances also by third-parties under the citizen suit provisions 33 USC § 1365. DEQ enforcement is generally based on provisions of state statutes and Environmental Quality Commission (EQC) rules, and EPA enforcement is generally based on provisions of federal statutes and EPA regulations.

ORS 468.140 allows DEQ to impose civil penalties up to $10,000 per day for violation of a term, condition, or requirement of a permit. The federal Clean Water Act provides for civil penalties not to exceed $32,500 and administrative penalties not to exceed $11,000 per day for each violation of any condition or limitation of this permit.

Under ORS 468.943, unlawful water pollution, if committed by a person with criminal negligence, is punishable by a fine of up to $25,000, imprisonment for not more than one year, or both. Each day on which a violation occurs or continues is a separately punishable offense. The federal Clean Water Act provides for criminal penalties of not more than $50,000 per day of violation, or imprisonment of not more than 2 years, or both for second or subsequent negligent violations of this permit.

Under ORS 468.946, a person who knowingly discharges, places, or causes to be placed any waste into the waters of the state or in a location where the waste is likely to escape into the waters of the state is subject to a Class B felony punishable by a fine not to exceed $250,000 and up to 10 years in prison per ORS chapter 161. The federal Clean Water Act provides for criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment of not more than 3 years, or both for knowing violations of the permit. In the case of a second or subsequent conviction for knowing violation, a person is subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

A3. Duty to Mitigate

The permittee must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment. In addition, upon request of DEQ, the permittee must correct any adverse impact on the environment or human health resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

A4. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and have the permit renewed. The application must be submitted at least 180 days before the expiration date of this permit.

DEQ may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date.

A5. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any term, condition, or requirement of this permit, a rule, or a statute.
b. Obtaining this permit by misrepresentation or failure to disclose fully all material facts.
c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.
d. The permittee is identified as a Designated Management Agency or allocated a wasteload under a total maximum daily load (TMDL).
e. New information or regulations.
f. Modification of compliance schedules.
g. Requirements of permit reopener conditions
h. Correction of technical mistakes made in determining permit conditions.
i. Determination that the permitted activity endangers human health or the environment.
j. Other causes as specified in 40 CFR §§ 122.62, 122.64, and 124.5.
k. For communities with combined sewer overflows (CSOs):
   (1) To comply with any state or federal law regulation for CSOs that is adopted or promulgated subsequent to the effective date of this permit.
   (2) If new information that was not available at the time of permit issuance indicates that CSO controls imposed under this permit have failed to ensure attainment of water quality standards, including protection of designated uses.
   (3) Resulting from implementation of the permittee's long-term control plan and/or permit conditions related to CSOs.

The filing of a request by the permittee for a permit modification, revocation or reissuance, termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

A6. Toxic Pollutants
The permittee must comply with any applicable effluent standards or prohibitions established under Oregon Administrative Rule (OAR) 340-041-0033 and section 307(a) of the federal Clean Water Act for toxic pollutants, and with standards for sewage sludge use or disposal established under section 405(d) of the federal Clean Water Act, within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

A7. Property Rights and Other Legal Requirements
The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege, or authorize any injury to persons or property or invasion of any other private rights, or any infringement of federal, tribal, state, or local laws or regulations.

A8. Permit References
Except for effluent standards or prohibitions established under section 307(a) of the federal Clean Water Act and OAR 340-041-0033 for toxic pollutants, and standards for sewage sludge use or disposal established under section 405(d) of the federal Clean Water Act, all rules and statutes referred to in this permit are those in effect on the date this permit is issued.

A9. Permit Fees
The permittee must pay the fees required by OAR.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

B1. Proper Operation and Maintenance
The permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

B2. Need to Halt or Reduce Activity Not a Defense

For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee must, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost. It is not a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

B3. Bypass of Treatment Facilities

a. Definitions
   (1) "Bypass" means intentional diversion of waste streams from any portion of the treatment facility. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, provided the diversion is to allow essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs b and c of this section.
   (2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
b. Prohibition of bypass.
   (1) Bypass is prohibited and DEQ may take enforcement action against a permittee for bypass unless:
      i. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
      ii. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventative maintenance; and
      iii. The permittee submitted notices and requests as required under General Condition B3.c.
   (2) DEQ may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, if DEQ determines that it will meet the three conditions listed above in General Condition B3.b.(1).
c. Notice and request for bypass.
   (1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, a written notice must be submitted to DEQ at least ten days before the date of the bypass.
   (2) Unanticipated bypass. The permittee must submit notice of an unanticipated bypass as required in General Condition D5.

B4. Upset

a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operation error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.
b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of General Condition B4.c are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
   (1) An upset occurred and that the permittee can identify the causes(s) of the upset;
   (2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required in General Condition D5, hereof (24-hour notice); and

(4) The permittee complied with any remedial measures required under General Condition A3 hereof.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

B5. <u>Treatment of Single Operational Upset</u>

For purposes of this permit, a single operational upset that leads to simultaneous violations of more than one pollutant parameter will be treated as a single violation. A single operational upset is an exceptional incident that causes simultaneous, unintentional, unknowing (not the result of a knowing act or omission), temporary noncompliance with more than one federal Clean Water Act effluent discharge pollutant parameter. A single operational upset does not include federal Clean Water Act violations involving discharge without a NPDES permit or noncompliance to the extent caused by improperly designed or inadequate treatment facilities. Each day of a single operational upset is a violation.

B6. <u>Overflows from Wastewater Conveyance Systems and Associated Pump Stations</u>

a. Definition. "Overflow" means any spill, release or diversion of sewage including:
   (1) An overflow that results in a discharge to waters of the United States; and
   (2) An overflow of wastewater, including a wastewater backup into a building (other than a backup caused solely by a blockage or other malfunction in a privately owned sewer or building lateral), even if that overflow does not reach waters of the United States.

b. Reporting required. All overflows must be reported orally to DEQ within 24 hours from the time the permittee becomes aware of the overflow. Reporting procedures are described in more detail in General Condition D5.

B7. <u>Public Notification of Effluent Violation or Overflow</u>

If effluent limitations specified in this permit are exceeded or an overflow occurs that threatens public health, the permittee must take such steps as are necessary to alert the public, health agencies and other affected entities (for example, public water systems) about the extent and nature of the discharge in accordance with the notification procedures developed under General Condition B8. Such steps may include, but are not limited to, posting of the river at access points and other places, news releases, and paid announcements on radio and television.

B8. <u>Emergency Response and Public Notification Plan</u>

The permittee must develop and implement an emergency response and public notification plan that identifies measures to protect public health from overflows, bypasses, or upsets that may endanger public health. At a minimum the plan must include mechanisms to:

a. Ensure that the permittee is aware (to the greatest extent possible) of such events;
b. Ensure notification of appropriate personnel and ensure that they are immediately dispatched for investigation and response;
c. Ensure immediate notification to the public, health agencies, and other affected public entities (including public water systems). The overflow response plan must identify the public health and other officials who will receive immediate notification;
d. Ensure that appropriate personnel are aware of and follow the plan and are appropriately trained;
e. Provide emergency operations; and
f. Ensure that DEQ is notified of the public notification steps taken.

B9. <u>Removed Substances</u>

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must be disposed of in such a manner as to prevent any pollutant from such materials from entering waters of the state, causing nuisance conditions, or creating a public health hazard.

SECTION C. MONITORING AND RECORDS

C1. Representative Sampling

Sampling and measurements taken as required herein must be representative of the volume and nature of the monitored discharge. All samples must be taken at the monitoring points specified in this permit, and must be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points must not be changed without notification to and the approval of DEQ.

C2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices must be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices must be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected must be capable of measuring flows with a maximum deviation of less than ± 10 percent from true discharge rates throughout the range of expected discharge volumes.

C3. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR part 136 or, in the case of sludge use and disposal, approved under 40 CFR part 503 unless other test procedures have been specified in this permit.

C4. Penalties of Tampering

The federal Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit may, upon conviction, be punished by a fine of not more than $10,000 per violation, imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person, punishment is a fine not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both.

C5. Reporting of Monitoring Results

Monitoring results must be summarized each month on a discharge monitoring report form approved by DEQ. The reports must be submitted monthly and are to be mailed, delivered or otherwise transmitted by the 15th day of the following month unless specifically approved otherwise in Schedule B of this permit.

C6. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR part 136 or, in the case of sludge use and disposal, approved under 40 CFR part 503, or as specified in this permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the discharge monitoring report. Such increased frequency must also be indicated. For a pollutant parameter that may be sampled more than once per day (for example, total residual chlorine), only the average daily value must be recorded unless otherwise specified in this permit.

C7. Averaging of Measurements

Calculations for all limitations that require averaging of measurements must utilize an arithmetic mean, except for bacteria which must be averaged as specified in this permit.

C8. Retention of Records

Records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities must be retained for a period of at least 5 years (or longer as required by 40 CFR part 503). Records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit and records of all data used to complete the application for this permit must be retained for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of DEQ at any time.

C9. Records Contents

Records of monitoring information must include:

a. The date, exact place, time, and methods of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

C10. Inspection and Entry

The permittee must allow DEQ or EPA upon the presentation of credentials to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by state law, any substances or parameters at any location.

C11. Confidentiality of Information

Any information relating to this permit that is submitted to or obtained by DEQ is available to the public unless classified as confidential by the Director of DEQ under ORS 468.095. The permittee may request that information be classified as confidential if it is a trade secret as defined by that statute. The name and address of the permittee, permit applications, permits, effluent data, and information required by NPDES application forms under 40 CFR § 122.21 are not classified as confidential [40 CFR § 122.7(b)].

SECTION D. REPORTING REQUIREMENTS

D1. Planned Changes

The permittee must comply with OAR 340-052, "Review of Plans and Specifications" and 40 CFR § 122.41(l)(1). Except where exempted under OAR 340-052, no construction, installation, or modification involving disposal systems, treatment works, sewerage systems, or common sewers may be commenced until the plans and specifications are submitted to and approved by DEQ. The permittee must give notice to DEQ as soon as possible of any planned physical alternations or additions to the permitted facility.

D2. Anticipated Noncompliance

The permittee must give advance notice to DEQ of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.

D3. Transfers

This permit may be transferred to a new permittee provided the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of the permit and EQC rules. No permit may be transferred to a third party without prior written approval from DEQ. DEQ may require modification, revocation, and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under 40 CFR § 122.61. The permittee must notify DEQ when a transfer of property interest takes place.

D4. Compliance Schedule

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date. Any reports of noncompliance must include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

D5. <u>Twenty-Four Hour Reporting</u>

The permittee must report any noncompliance that may endanger health or the environment. Any information must be provided orally (by telephone) to the DEQ regional office or Oregon Emergency Response System (1-800-452-0311) as specified below within 24 hours from the time the permittee becomes aware of the circumstances.

a. Overflows.
   (1) Oral Reporting within 24 hours.
      i. For overflows other than basement backups, the following information must be reported to the Oregon Emergency Response System (OERS) at 1-800-452-0311. For basement backups, this information should be reported directly to the DEQ regional office.
         (a) The location of the overflow;
         (b) The receiving water (if there is one);
         (c) An estimate of the volume of the overflow;
         (d) A description of the sewer system component from which the release occurred (for example, manhole, constructed overflow pipe, crack in pipe); and
         (e) The estimated date and time when the overflow began and stopped or will be stopped.
      ii. The following information must be reported to the DEQ regional office within 24 hours, or during normal business hours, whichever is earlier:
         (a) The OERS incident number (if applicable); and
         (b) A brief description of the event.
   (2) Written reporting within 5 days.
      i. The following information must be provided in writing to the DEQ regional office within 5 days of the time the permittee becomes aware of the overflow:
         (a) The OERS incident number (if applicable);
         (b) The cause or suspected cause of the overflow;
         (c) Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
         (d) Steps taken or planned to mitigate the impact(s) of the overflow and a schedule of major milestones for those steps; and
         (e) For storm-related overflows, the rainfall intensity (inches/hour) and duration of the storm associated with the overflow.

      DEQ may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.
b. Other instances of noncompliance.
   (1) The following instances of noncompliance must be reported:
      i. Any unanticipated bypass that exceeds any effluent limitation in this permit;
      ii. Any upset that exceeds any effluent limitation in this permit;
      iii. Violation of maximum daily discharge limitation for any of the pollutants listed by DEQ in this permit; and
      iv. Any noncompliance that may endanger human health or the environment.
   (2) During normal business hours, the DEQ regional office must be called. Outside of normal business hours, DEQ must be contacted at 1-800-452-0311 (Oregon Emergency Response System).
   (3) A written submission must be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission must contain:
      i. A description of the noncompliance and its cause;
      ii. The period of noncompliance, including exact dates and times;
      iii. The estimated time noncompliance is expected to continue if it has not been corrected;
      iv. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and
      v. Public notification steps taken, pursuant to General Condition B7.
   (4) DEQ may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

D6. Other Noncompliance

The permittee must report all instances of noncompliance not reported under General Condition D4 or D5 at the time monitoring reports are submitted. The reports must contain:

a. A description of the noncompliance and its cause;
b. The period of noncompliance, including exact dates and times;
c. The estimated time noncompliance is expected to continue if it has not been corrected; and
d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

D7. Duty to Provide Information

The permittee must furnish to DEQ within a reasonable time any information that DEQ may request to determine compliance with the permit or to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit. The permittee must also furnish to DEQ, upon request, copies of records required to be kept by this permit.

Other Information: When the permittee becomes aware that it has failed to submit any relevant facts or has submitted incorrect information in a permit application or any report to DEQ, it must promptly submit such facts or information.

D8. Signatory Requirements

All applications, reports or information submitted to DEQ must be signed and certified in accordance with 40 CFR § 122.22.

D9. Falsification of Information

Under ORS 468.953, any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, is subject to a Class C felony punishable by a fine not to exceed $125,000 per violation and up to 5 years in prison per ORS chapter 161. Additionally, according to 40 CFR § 122.41(k)(2), any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit including monitoring reports or reports of compliance or non-compliance will, upon conviction, be punished by a federal civil penalty not to exceed $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

D10. Changes to Indirect Dischargers

The permittee must provide adequate notice to DEQ of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the federal Clean Water Act if it were directly discharging those pollutants and;
b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
c. For the purposes of this paragraph, adequate notice must include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

SECTION E. DEFINITIONS

E1. *BOD* or *BOD_5* means five-day biochemical oxygen demand.
E2. *CBOD* or *$CBOD_5$* means five-day carbonaceous biochemical oxygen demand.
E3. *TSS* means total suspended solids.
E4. *Bacteria* means but is not limited to fecal coliform bacteria, total coliform bacteria, *Escherichia coli* (*E. coli*) bacteria, and *Enterococcus* bacteria.
E5. *FC* means fecal coliform bacteria.
E6. *Total residual chlorine* means combined chlorine forms plus free residual chlorine
E7. *Technology based permit effluent limitations* means technology-based treatment requirements as defined in 40 CFR § 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR 340-041.

E8. *mg/l* means milligrams per liter.
E9. *μg/l* means microgram per liter.
E10. *kg* means kilograms.
E11. *m^3/d* means cubic meters per day.
E12. *MGD* means million gallons per day.
E13. *Average monthly effluent limitation* as defined at 40 CFR § 122.2 means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
E14. *Average weekly effluent limitation* as defined at 40 CFR § 122.2 means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.
E15. *Daily discharge* as defined at 40 CFR § 122.2 means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge must be calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge must be calculated as the average measurement of the pollutant over the day.
E16. *24-hour composite sample* means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow. The sample must be collected and stored in accordance with 40 CFR part 136.
E17. *Grab sample* means an individual discrete sample collected over a period of time not to exceed 15 minutes.
E18. *Quarter* means January through March, April through June, July through September, or October through December.
E19. *Month* means calendar month.
E20. *Week* means a calendar week of Sunday through Saturday.
E21. *POTW* means a publicly-owned treatment works.

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[1] DEQ recognizes that high TSS levels in influent can make achievement of QLs difficult, and at this time DEQ is not requiring that influent monitoring be performed using the QLs listed in the permit.

[2] Elevated TSS levels can result in matrix effects.
[3] For more information, refer to the Significant Figures IMD at http://www.deq.state.or.us/wq/pubs/imds/SigFigsIMD.pdf

APPENDIX B: ELECTRICAL LOAD SUMMARIES

SBR LOAD SUMMARY					DATE: 08/12/21	
QTY.	DESCRIPTION			LOAD		
	MOTOR LOADS	MOTOR SIZE				
4	WAS PUMP	2	HP	11.3	kVA	
8	MIXER	15	HP	139.7	kVA	
3	BLOWER	100	HP	309.3	kVA	
4	DECANTER	0.75	HP	5.3	kVA	
2	EFFL VALVE	0.5	HP	1.8	kVA	
2	FILTER	15	HP	34.9	kVA	
	NON-MOTOR LOADS					
	HVAC			30.0	kVA	
	UV			40.0	kVA	
	GENERAL RECEPT			45.0	kVA	
	SUBTOTAL			617.3	kVA	
	LARGEST MOTOR x 25%			25.8	kVA	
	NON-MOTOR LOADS x 25%			28.8	kVA	
	SPARE CAPACITY (40%)			268.7	kVA	
	NEW LOAD TOTAL:			940.6	kVA	1131.3 AMPS
	EXIST PK DEMAND (kW) x 125% (ASSUME 0.8PF)		kW	0.0	kVA	
	TOTAL:			940.6	kVA	1131.3 AMPS
	SERVICE SIZE @ 480V, 3-PH:					1200 AMPS

TREATMENT BLDG LOAD SUMMARY					DATE: 08/12/21	
QTY.	DESCRIPTION			LOAD		
	MOTOR LOADS	MOTOR SIZE				
1	AIR COMPRESSOR	15	HP	17.5	kVA	
1	SLUDGE SCREW PRESS	5	HP	6.3	kVA	
1	SLUDGE SCREW CONVEYOR	3	HP	4.0	kVA	
1	POLYMER MIXING	1	HP	1.7	kVA	
1	MACERATOR	5	HP	6.3	kVA	
	NON-MOTOR LOADS					
	TRANSFORMER			37.5	kVA	
	LIGHTING			9.0	kVA	
	TRANSFORMER 2			15.0	kVA	
	SUBTOTAL			82.3	kVA	
	LARGEST MOTOR x 25%			4.4	kVA	
	NON-MOTOR LOADS x 25%			11.6	kVA	
	SPARE CAPACITY (25%)			24.6	kVA	
	NEW LOAD TOTAL:			122.9	kVA	147.8 AMPS
	EXIST PK DEMAND (kW) x 125% (ASSUME 0.8PF)	82	kW	128.1	kVA	
	TOTAL:			251.0	kVA	301.9 AMPS
	SERVICE SIZE @ 480V, 3-PH:					800 AMPS

EFFLUENT PS LOAD SUMMARY						DATE: 08/12/21	
QTY.	DESCRIPTION			LOAD			
	MOTOR LOADS	MOTOR SIZE					
4	TRANSFER PUMPS	65	HP	319.3	kVA		
2	EFFL PUMPS	300	HP	600.3	kVA		
2	LIFT PUMPS	3	HP	8.0	kVA		
1	HOIST	1	HP	1.7	kVA		
1	HEADWORKS	10	HP	11.6	kVA		
4	BIOSOLIDS PUMP	7.5	HP	36.6	kVA		
3	DIGESTER BLOWERS	100	HP	309.3	kVA		
	NON-MOTOR LOADS						
	TRANSFORMERS			45.0	kVA		
	HVAC			30.0	kVA		
	SUBTOTAL			1361.7	kVA		
	LARGEST MOTOR x 25%			75.0	kVA		
	NON-MOTOR LOADS x 25%			18.8	kVA		
	SPARE CAPACITY (14%)			203.8	kVA		
	NEW LOAD TOTAL:			1659.3	kVA	1995.8	AMPS
	EXIST PK DEMAND (kW) x 125% (ASSUME 0.8PF)	300	kW	468.8	kVA		
	TOTAL:			2128.0	kVA	2559.6	AMPS
	SERVICE SIZE @ 480V, 3-PH:					2000	AMPS

APPENDIX C: COST ESTIMATES

City of Molalla Project 198.28	WWTP Upgrades Cost Summary 10/20/2021

Construction Cost Estimate - WWTP Upgrades

Item	Cost ($)
Influent Flow Equalization Basin	$ 1,204,000
Transfer Pump Station	$ 910,000
Grit Removal System	$ 979,000
SBR Facility	$ 7,866,000
Effluent Filtration System	$ 1,485,000
Disinfection System (UV)	$ 1,851,000
Effluent Storage Pond No. 1 Improvements	$ 2,838,000
Aerobic Digestion System	$ 2,657,000
Biosolids Dewatering Facility	$ 1,279,000
Standby Generator (500 kW)	$ 212,000
Sludge Removal & Disposal (Aeration Basin, Lagoon No. 1 and 2)	$ 300,000
Site Structures (SBR and Aerobic Digester Building)	$ 883,000
Site Improvements and Yard Piping	$ 4,126,000
WWTP Construction Estimate Total	**$ 26,590,000**
Contingency (15%)	**$ 3,988,500**
Total	**$ 30,578,500**

City of Molalla Project 198.28				Influent Flow Equalization 10/10/2021
Construction Cost Estimate - Influent Flow Equalizaton				
Description	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**
Construction Facilities & Temporary Controls	LS	1	$ 129,000	$ 129,000
Gravel Under Structure	CY	600	$ 55	$ 33,000
Concrete (Slab)	CY	550	$ 1,200	$ 660,000
Concrete (Walls)	CY	150	$ 1,200	$ 180,000
Piping, Valves	LS	1	$ 10,000	$ 10,000
Handrails	LF	160	$ 75	$ 12,000
Utility Station	EA	1	$ 1,000	$ 1,000
Backfill	CY	5980	$ 30	$ 179,400
			Total	**$ 1,204,000**

City of Molalla Project 198.28				Transfer Pump Station 10/10/2021
Construction Cost Estimate - Transfer Pump Station				
Description	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**
Construction Facilities & Temporary Controls	LS	1	$ 85,000	$ 85,000
Demolition & Wastewater Bypass	LS	1	$ 120,000	$ 120,000
Civil Site Work	LS	1	$ 16,000	$ 16,000
Submersible Pumps (Qty 3), Centrifugal (Qty 1)	EA	4	$ 100,000	$ 400,000
Controls	LS	1	$ 150,000	$ 150,000
Valves, Piping	LS	1	$ 50,000	$ 50,000
SCADA and Instrumentation	LS	1	$ 25,000	$ 25,000
Coatings	LS	1	$ 10,000	$ 10,000
18" Diameter Magnetic Flow Meter (Re-Use Existing)	LS	1	$ 4,000	$ 4,000
Electrical	LS	1	$ 50,000	$ 50,000
			Total	**$ 910,000**

City of Molalla Project 198.28				Grit Removal 10/20/2021
Construction Cost Estimate - Grit Removal				
Description	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**
Const. Facilities & Temporary Controls	LS	1	$ 105,000	$ 105,000
Vortex Grit Removal Equipment	LS	1	$ 375,000	$ 375,000
Grit Classifier Equipment	LS	1	$ 80,000	$ 80,000
Concrete (Pist Grit Structure)	CY	40	$ 1,200	$ 48,000
Concrete (Structure/Flow Channels)	CY	100	$ 1,200	$ 120,000
4" Diameter Grit Piping and Valves	LS	1	$ 7,500	$ 7,500
Utility Station	LS	1	$ 1,000	$ 1,000
Aluminum Grating	SF	100	$ 50	$ 5,000
12" Diameter Magnetic Flow Meter (SBR Influent)	EA	4	$ 10,000	$ 40,000
Slide Gates	EA	3	$ 10,000	$ 30,000
Mechanical	LS	1	$ 50,000	$ 50,000
Electrical	LS	1	$ 50,000	$ 50,000
Lighting	LS	1	$ 8,000	$ 8,000
Instrumentation, Controls, & SCADA	LS	1	$ 30,000	$ 30,000
Stairs	LS	1	$ 10,000	$ 10,000
Handrails	LF	75	$ 75	$ 5,625
Coatings	SF	900	$ 15	$ 13,500
			Total	**$ 979,000**

City of Molalla Project 198.28				SBR 10/20/2021
Construction Cost Estimate - SBR				
Description	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**
Const. Facilities & Temporary Controls	LS	1	$ 445,000	$ 445,000
Concrete (Walls)	CY	1,050	$ 1,200	$ 1,260,000
Concrete (Slab)	CY	1,600	$ 1,200	$ 1,920,000
SBR Equipment	LS	1	$ 3,438,000	$ 3,438,000
Controls, SCADA, Instrumentation	LS	1	$ 110,000	$ 110,000
Electrical	LS	1	$ 120,000	$ 120,000
Handrails	LF	2160	$ 75	$ 162,000
Manway Access Ports	EA	4	$ 10,000	$ 40,000
Lighting	LS	1	$ 55,000	$ 55,000
Mechanical	LS	1	$ 100,000	$ 100,000
Air Piping	LS	1	$ 85,000	$ 85,000
Coatings	LS	1	$ 50,000	$ 50,000
Portable Hoists	EA	8	$ 4,000	$ 32,000
Utility Stations	EA	4	$ 1,000	$ 4,000
Stairs	LS	1	$ 20,000	$ 20,000
Startup, Testing	LS	1	$ 25,000	$ 25,000
			Total	**$ 7,866,000**

City of Molalla				**Effluent Filters**
Project 198.28				**10/18/2018**
Construction Cost Estimate - Effluent Filters				
Description	**Unit**	**Qnt.**	**Unit Cst.**	**Tot. Cost**
Site Preparation	SF	2,130	$ 25	$ 53,250
Concrete (Slab)	CY	65	$ 1,200	$ 78,000
Electrical	LS	1	$ 65,000	$ 65,000
Piping	LS	1	$ 50,000	$ 50,000
Valves	LS	1	$ 45,000	$ 45,000
Controls, SCADA, and Instrumentation	LS	1	$ 25,000	$ 25,000
Canopy	SF	1,660	$ 150	$ 249,000
Utility Station	EA	1	$ 1,000	$ 1,000
Walkway	SF	300	$ 100	$ 30,000
Coatings	LS	1	$ 8,000	$ 8,000
Lighting	LS	1	$ 6,000	$ 6,000
Effluent Filters	LS	1	$ 875,000	$ 875,000
			Total	**$ 1,485,000**

City of Molalla Project 198.28				Disinfection System (UV) 9/21/2021
Construction Cost Estimate - UV (Class C)				
Description	**Unit**	**Qnt.**	**Unit Cost**	**Total Cost**
Site Preparation	SF	1730	$ 25	$ 43,250
Concrete (Slab)	CY	115	$ 1,200	$ 138,000
Walkway	SF	340	$ 100	$ 34,000
Electrical	LS	1	$ 75,000	$ 75,000
Piping	LS	1	$ 40,000	$ 40,000
Valves	LS	1	$ 45,750	$ 45,750
Controls, SCADA, and Instrumentation	LS	1	$ 25,000	$ 25,000
24" Diameter Flow Meter (UV Influent)	EA	1	$ 19,000	$ 19,000
Coatings	LS	1	$ 8,000	$ 8,000
Lighting	LS	1	$ 6,000	$ 6,000
Utility Station	EA	1	$ 1,000	$ 1,000
Canopy	SF	1440	$ 150	$ 216,000
UV Disinfection System Equipment	LS	1	$ 1,200,000	$ 1,200,000
			Total	**$ 1,851,000**

City of Molalla Project 198.28				Effluent Storage Improvements 10/20/2021
Construction Cost Estimate - Effluent Storage Pond Improvements				
Description	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**
Const. Facilities & Temporary Control	LS	1	$ 284,000	$ 284,000
Demolition & Site Preparation	LS	1	$ 189,000	$ 189,000
Earthwork	LS	1	$ 596,000	$ 596,000
Effluent Storage Pond No. 2 Liner w/ Underlayment	LS	1	$ 1,489,000	$ 1,489,000
Transfer Piping	LS	1	$ 30,000	$ 30,000
Circulators (SolarBees)	LS	1	$ 111,000	$ 111,000
Effluent Storage Pond No. 1 Outlet Structure	LS	1	$ 139,000	$ 139,000
			Total	**$ 2,838,000**

City of Molalla Project 198.28				Aerobic Digester 10/21/2021
Construction Cost Estimate - Aerobic Digester				
Description	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**
Const. Facilities & Temporary Controls	LS	1	$ 266,000	$ 266,000
Demolition and Site Preparation	LS	1	$ 177,000	$ 177,000
Excavation	CY	4,725	$ 30	$ 141,750
Gravel Under Structure	CY	190	$ 55	$ 10,450
Concrete (Walls)	CY	200	$ 1,200	$ 240,000
Concrete (Slab)	CY	550	$ 1,200	$ 660,000
Concrete (Walkways)	CY	60	$ 1,200	$ 72,000
Blowers, Diffusers, and Controls	LS	1	$ 875,000	$ 875,000
Decanters	EA	2	$ 15,000	$ 30,000
4" Diameter Magnetic Flow Meter (WAS)	LS	1	$ 4,000	$ 4,000
Instrumentation	LS	1	$ 20,000	$ 20,000
Electrical	LS	1	$ 55,000	$ 55,000
Lighting	LS	1	$ 25,000	$ 25,000
Utility Stations	EA	4	$ 1,000	$ 4,000
Coatings	LS	1	$ 10,000	$ 10,000
Handrail	LF	250	$ 75	$ 18,750
Portable Hoist	EA	2	$ 4,000	$ 8,000
Manway Access Ports	EA	2	$ 10,000	$ 20,000
Stairs	EA	2	$ 10,000	$ 20,000
			Total	**$ 2,657,000**

City of Molalla Project 198.28				Biosolids Dewatering Facility 10/21/2021
Construction Cost Estimate - Biosolids Dewatering Facility				
Description	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**
Const. Facilities & Temporary Controls	LS	1	$ 128,000	$ 128,000
Site Preparation	LS	1	$ 85,000	$ 85,000
Excavation	CY	75	$ 30	$ 2,250
Backfill (Structural)	CY	80	$ 55	$ 4,400
Gravel Under Structure	CY	160	$ 55	$ 8,800
Screw Press & Conveyor System	EA	1	$ 690,000	$ 690,000
Electrical	LS	1	$ 75,000	$ 75,000
Instrumentation	LS	1	$ 30,000	$ 30,000
Piping	LS	1	$ 25,000	$ 25,000
Biosolids Transfer Pumps	EA	3	$ 25,000	$ 75,000
Backflow Preventor	LS	1	$ 1,500	$ 1,500
Sink and Eyewash	LS	1	$ 1,000	$ 1,000
Utility Stations	EA	2	$ 1,000	$ 2,000
Macerator	LS	1	$ 15,000	$ 15,000
Coatings	LS	1	$ 10,000	$ 10,000
Biosolids Building	SF	460	$ 275	$ 126,500
			Total	**$ 1,279,000**

City of Molalla				Standby Generator - 500 kW
Project 198.28				**10/21/2021**

Construction Cost Estimate - Standby Generator (500 kW)

Description	Unit	Quantity	Unit Cost	Total Cost
Construction Facilities & Temporary Controls	LS	1	$ 23,000	$ 23,000
Standby Generator (500 kW) and ATS	LS	1	$ 175,000	$ 175,000
Aggregrate Base	LS	1	$ 1,500	$ 1,500
Concrete (Slab)	LS	1	$ 12,000	$ 12,000
			Total	**$ 212,000**

City of Molalla Project 198.28				Lagoon Dredging, Dewatering, & Disposal 10/21/2021
Construction Cost Estimate - Lagoon Dredging, Dewatering, & Disposal				
Description	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**
Aerated Lagoon, Lagoon No. 1 and 2 Dredging & Disposal	LS	1	$ 300,000	$ 300,000
			Total	**$ 300,000**

City of Molalla			e Structures (SBR and Aerobic Digester Buildings)	
Project 198.28				10/18/2018
Construction Cost Estimate - SBR and Aerobic Digester Buildings				
Description	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**
Const. Facilities & Temporary Controls	LS	1	$ 88,000	$ 88,000
Demolition and Site Preparation	LS	1	$ 59,000	$ 59,000
SBR Building	SF	1,353	$ 275	$ 372,075
Aerobic Digester Building	SF	1,216	$ 275	$ 334,400
HVAC	EA	2	$ 5,000	$ 10,000
Roll-Up Doors	EA	2	$ 10,000	$ 20,000
			Total	**$ 883,000**

City of Molalla				Site Improvements and Yard Piping
Project 198.28				**10/20/2021**
Construction Cost Estimate - Site Improvements and Yard Piping				
Description	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**
Construction Facilities & Temporary Facilities	LS	1	$ 413,000	$ 413,000
Demolition and Site Preparation	LS	1	$ 275,000	$ 275,000
Access Road Improvements	CY	300	$ 30	$ 9,000
Temporary Berm Installation (SBR Site Construction)	CY	15000	$ 30	$ 450,000
Temporary Berm Liner (SBR Site Construction)	SF	50000	$ 1.5	$ 75,000
Temporary Berm Removal (SBR Site Construction)	CY	15000	$ 30	$ 450,000
Dewatering (SBR Site Construction)	LS	1	$ 25,000	$ 25,000
SBR Site Fill (SBR Site Construction)	CY	25000	$ 30	$ 750,000
New Asphalt	TON	860	$ 150	$ 129,000
Asphalt Aggregate Base	CY	320	$ 30	$ 9,600
Stairs	LS	1	$ 15,000	$ 15,000
36" Diameter Raw Influent to Influent Flow Equalization Basin	LF	225	$ 382	$ 85,905
18" Diameter Raw Influent to Grit Removal System	LF	300	$ 138	$ 41,400
30" Diameter Final Effluent to Effluent Storage Pond No. 1	LF	750	$ 284	$ 213,038
24" Diameter Final Effluent from Eff. Stor. Pond No. 1 to No. 2	LF	390	$ 199	$ 77,591
18" Diameter Final Effluent	LF	1200	$ 138	$ 165,600
10" Diameter Effluent Storage Pond No. 1 Overflow	LF	500	$ 67	$ 33,350
3" Diameter Non-Potable Water Lines	LF	750	$ 44	$ 32,775
6" Diameter Drain Lines	LF	750	$ 46	$ 34,500
8" Diameter Air Lines	LF	240	$ 51	$ 12,144
3" Diameter WAS Lines	LF	405	$ 44	$ 17,699
30" Diameter Actuated Valve	EA	1	$ 49,000	$ 49,000
24" Diameter Actuated Valve	EA	1	$ 36,000	$ 36,000
18" Diameter Actuated Valve	EA	2	$ 32,000	$ 64,000
14" Diameter Actuated Valve (Modulating)	EA	2	$ 28,000	$ 56,000
14" Diameter Flow Meter	EA	1	$ 14,000	$ 14,000
Potable Water System	LS	1	$ 7,500	$ 7,500
Non-Potable Water System Equipment	LS	1	$ 80,000	$ 80,000
Non-Potable Water System Canopy	LS	1	$ 15,000	$ 15,000
Concrete (Non-Potable Water Tank)	CY	112	$ 1,200	$ 134,400
Erosion Control	LS	1	$ 25,000	$ 25,000
Landscaping	LS	1	$ 45,000	$ 45,000
Site Drainage	LS	1	$ 20,000	$ 20,000
Electrical	LS	1	$ 150,000	$ 150,000
Bollards	EA	15	$ 1,000	$ 15,000
Demo Existing Tertiary Systems (DAF Units and Gravity Filters)	LS	1	$ 50,000	$ 50,000
Chlorine Contact Chamber Improvements	LS	1	$ 50,000	$ 50,000
			Total	**$ 4,126,000**

APPENDIX D: EFFLUENT STORAGE WATER BALANCE

City of Molalla
Monthly Water Balance
Future (2025) - Wet Weather
Project Number 198.28

Influent Flow Information:	AWWF	2.82	mgd
	ADWF	1.26	mgd
Pond Information (7):	Average Pond Area	24	acres
	Future Additional Pond Area	0	acres
	Assumed Level at beginning of summer	0	ft
	Maximum water level	12	ft
	Maximum total storage capacity	288	ac-ft
	Maximum surge volume	288	ac-ft
	Irrigation area	433	acres
	Additional Irrigation Area	110	acres
	Irrigation efficiency	59%	
	Irrigation May and Oct	Yes	

Month	Influent (1)		Precipitation (2)		Evap. (3)			Irrigation (4)			Lagoon Leakage (5)			Molalla River Discharge (6)		Net Storage	Storage Accum.	Surge Volume
	(MG)	(ac-ft)	(in)	(ac-ft)	(in)	(ac-ft)	(MG)	(in)	(ac-ft)	(MG)	(in)	(ac-ft)	(MG)	(MG)	(ac-ft)	(ac-ft)	(ac-ft)	(ac-ft)
																	0	
May	70	213	2.59	5.2	4.1	-8.20	-2.67	0.77	-35.0	-11.4	0.0	0.0	0.0			175	175	175
June	40	121	2.07	4.1	5.1	-10.20	-3.32	1.78	-80.4	-26.2	0.0	0.0	0.0			35	211	211
July	32	98	0.52	1.0	6.9	-13.80	-4.50	3.47	-157.0	-51.2	0.0	0.0	0.0			-71	139	139
August	30	92	1.07	2.1	6.2	-12.40	-4.04	2.76	-124.9	-40.7	0.0	0.0	0.0			-43	96	96
September	30	92	2.02	4.0	4.2	-8.40	-2.74	0.90	-40.8	-13.3	0.0	0.0	0.0			47	143	143
October	31	94	4.29	8.6	1.9	-3.80	-1.24	0.11	-5.1	-1.7	0.0	0.0	0.0			94	237	237
November	64	197	6.38	12.8	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-81	-248	-38	199	199
December	127	389	7.13	14.3	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-143	-440	-37	162	162
January	93	286	7.31	14.6	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-110	-337	-36	126	126
February	76	234	4.99	10.0	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-93	-285	-41	85	85
March	95	293	5.13	10.3	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-112	-344	-41	45	45
April	54	166	3.2	6.4	3.1	-6.20	-2.02	0	0.0	0.0	0.0	0.0	0.0	-71	-217	-51	0	0
Total	742	2277	47	93	31.5	-63.0	-20.5	9.794	-443.2	-144.4	0.0	0.0	0.0	-609	-1870	Required	237	237

Average WWF	-3.4

(1) Influent based on AWWF and ADWF and historical distribution of flows.
(2) Precipitation data derived from NOAA Molalla station.
(3) Evaporation based on historical means for Corvallis in the Climatology Handbook, September 1969.
(4) Irrigation based on 2015 RWUP.
(5) Lined lagoon.
(6) Molalla River discharge is equal to influent flow plus surge volume at end of October plus precipitation in winter.
(7) Full depth utilization.

City of Molalla
Monthly Water Balance
Future (2030) - Dry Weather
Project Number 198.28

Influent Flow Information:	AWWF	3.45	mgd
	ADWF	1.54	mgd
Pond Information (7):	Average Pond Area	12.6	acres
	Future Additional Pond Area	0	acres
	Assumed Level at beginning of summer	0	ft
	Maximum water level	12	ft
	Maximum total storage capacity	151	ac-ft
	Maximum surge volume	151.2	ac-ft
	Irrigation area	433	acres
	Additional Irrigation Area	0	acres
	Irrigation efficiency	59%	
	Irrigation May and Oct	Yes	

Month	Influent (1)		Precipitation (2)		Evap. (3)			Irrigation (4)			Lagoon Leakage (5)			Molalla River Discharge (6)		Net Storage	Storage Accum.	Surge Volume
	(MG)	(ac-ft)	(in)	(ac-ft)	(in)	(ac-ft)	(MG)	(in)	(ac-ft)	(MG)	(in)	(ac-ft)	(MG)	(MG)	(ac-ft)	(ac-ft)	(ac-ft)	(ac-ft)
																	0	
May	36	110	2.59	2.7	4.1	-4.31	-1.40	0.77	-27.9	-9.1	0.0	0.0	0.0			81	81	81
June	27	82	2.07	2.2	5.1	-5.36	-1.74	1.78	-64.1	-20.9	0.0	0.0	0.0			15	95	95
July	25	77	0.52	0.5	6.9	-7.25	-2.36	3.47	-125.2	-40.8	0.0	0.0	0.0			-55	40	40
August	24	73	1.07	1.1	6.2	-6.51	-2.12	2.76	-99.6	-32.5	0.0	0.0	0.0			-32	8	8
September	20	62	2.02	2.1	4.2	-4.41	-1.44	0.90	-32.6	-10.6	0.0	0.0	0.0			27	36	36
October	24	74	4.29	4.5	1.9	-2.00	-0.65	0.11	-4.0	-1.3	0.0	0.0	0.0			72	108	108
November	71	218	6.38	6.7	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-79	-242	-17	91	91
December	140	431	7.13	7.5	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-148	-455	-17	74	74
January	103	317	7.31	7.7	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-111	-341	-16	58	58
February	85	259	4.99	5.2	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-92	-283	-19	39	39
March	106	325	5.13	5.4	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-114	-349	-19	21	21
April	60	184	3.2	3.4	3.1	-3.26	-1.06	0	0.0	0.0	0.0	0.0	0.0	-68	-208	-24	0	0
Total	721	2213	47	49	31.5	-33.1	-10.8	9.794	-353.4	-115.2	0.0	0.0	0.0	-612	-1879	Required	108	108

Average WWF	-3.4

(1) Influent based on AWWF and ADWF and historical distribution of flows.
(2) Precipitation data derived from NOAA Molalla station.
(3) Evaporation based on historical means for Corvallis in the Climatology Handbook, September 1969.
(4) Irrigation based on 2015 RWUP.
(5) Lined lagoon.
(6) Molalla River discharge is equal to influent flow plus surge volume at end of October plus precipitation in winter.
(7) Full depth utilization.

City of Molalla
Monthly Water Balance
Future (2030) - Wet Weather
Project Number 198.28

Influent Flow Information:	AWWF	3.45	mgd
	ADWF	1.54	mgd
Pond Information (7):	Average Pond Area	24	acres
	Future Additional Pond Area	0	acres
	Assumed Level at beginning of summer	0	ft
	Maximum water level	12	ft
	Maximum total storage capacity	288	ac-ft
	Maximum surge volume	288	ac-ft
	Irrigation area	433	acres
	Additional Irrigation Area	147	acres
	Irrigation efficiency	59%	
	Irrigation May and Oct	Yes	

Month	Influent (1)		Precipitation (2)		Evap. (3)			Irrigation (4)			Lagoon Leakage (5)			Molalla River Discharge (6)		Net Storage	Storage Accum.	Surge Volume
	(MG)	(ac-ft)	(in)	(ac-ft)	(in)	(ac-ft)	(MG)	(in)	(ac-ft)	(MG)	(in)	(ac-ft)	(MG)	(MG)	(ac-ft)	(ac-ft)	(ac-ft)	(ac-ft)
																	0	
May	77	237	2.59	5.2	4.1	-8.20	-2.67	0.77	-37.4	-12.2	0.0	0.0	0.0			196	196	196
June	44	135	2.07	4.1	5.1	-10.20	-3.32	1.78	-85.8	-28.0	0.0	0.0	0.0			43	239	239
July	36	109	0.52	1.0	6.9	-13.80	-4.50	3.47	-167.7	-54.6	0.0	0.0	0.0			-71	168	168
August	33	102	1.07	2.1	6.2	-12.40	-4.04	2.76	-133.5	-43.5	0.0	0.0	0.0			-42	126	126
September	33	102	2.02	4.0	4.2	-8.40	-2.74	0.90	-43.6	-14.2	0.0	0.0	0.0			54	180	180
October	34	104	4.29	8.6	1.9	-3.80	-1.24	0.11	-5.4	-1.8	0.0	0.0	0.0			104	284	284
November	71	218	6.38	12.8	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-90	-277	-46	238	238
December	140	431	7.13	14.3	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-160	-490	-44	194	194
January	103	317	7.31	14.6	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-122	-376	-44	150	150
February	85	259	4.99	10.0	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-104	-318	-49	101	101
March	106	325	5.13	10.3	0.0	0.00	0.00	0	0.0	0.0	0.0	0.0	0.0	-125	-384	-48	52	52
April	60	184	3.2	6.4	3.1	-6.20	-2.02	0	0.0	0.0	0.0	0.0	0.0	-79	-243	-59	0	0
Total	822	2524	47	93	31.5	-63.0	-20.5	9.794	-473.4	-154.2	0.0	0.0	0.0	-680	-2087	Required	284	284

Average WWF	-3.8

(1) Influent based on AWWF and ADWF and historical distribution of flows.
(2) Precipitation data derived from NOAA Molalla station.
(3) Evaporation based on historical means for Corvallis in the Climatology Handbook, September 1969.
(4) Irrigation based on 2015 RWUP.
(5) Lined lagoon.
(6) Molalla River discharge is equal to influent flow plus surge volume at end of October plus precipitation in winter.
(7) Full depth utilization.

APPENDIX E: HYDRAULIC CALCULATIONS

NOTE: Pond No. 1 and No. 2 were renamed during the Predesign Report. Lagoon No. 1 is Pond No. 2 and Lagoon No. 2 is pond No. 1.

City of Molalla
WWTF Final Design
Project No. 198.28
10/4/21
PIPE SYSTEM HYDRAULIC PROFILE

12.07 MGD (8,382 gpm) Existing Headworks to Gate MH

PIF FLOW

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the SBR to the Chlorine Contact Chamber at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (12.07 MGD) (gpm)	Gate MH HWL Elevation (ft)
8382	286.33

Ø Assumption	
Ø from 08/03/2021 Plans	

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	-	**Headworks (Existing)**	-	-	-	-	-	287.87
2	8382	Entrance	24	0.05		5.94	0.03	287.84
3	8382	Straight Pipe DI	24	140	246	5.94	0.96	286.88
4	8382	Exit Loss	24	1		5.94	0.55	286.33
5	8382	**Gate Manhole (Modified)**	84					286.33
						TOTAL HEAD LOSS (ft)	**1.54**	

City of Molalla
WWTF Final Design
Project No. 198.28
10/4/21
PIPE SYSTEM HYDRAULIC PROFILE

3.27 MGD (2,083 gpm) From Gate MH to EQ Basin

EQ BASIN FLOW 12.07 MGD - 8.8 MGD = 3.27 MGD

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the gate manhole to the eq basin at Molalla WWTP.
The eq basin will receive flow during flows exceeding 8.8 MGD with a peak flow to the eq basin occuring during PIF (12.07 MGD). At PIF the eq basin will receive 3.27 MGD

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (3.27 MGD) (gpm)	Transfer Pump Station HWL Elevation (ft)
2271	290.45

Ø Assumption
Ø from 08/03/2021 Plans

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	2271	**Gate Manhole (Modified)**	84					286.33
2	2271	Entrance	24	0.05		1.61	0.00	286.33
3	2271	Straight Pipe DI	24	140	17	1.61	0.01	286.34
4	2271	Exit Loss	24	1		1.61	0.04	286.38
5	2271	**EQ Basin**						286.38

TOTAL HEAD LOSS (ft) **0.05**

City of Molalla
WWTF Final Design
Project No. 198.28
10/4/21
PIPE SYSTEM HYDRAULIC PROFILE

8.8 MGD (6,112 gpm) Gate MH to Transfer PS

PDAF DUE TO EQ BASIN

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the gate MH to the Transfer PS at the Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (8.8 MGD) (gpm)	Transfer Pump Station HWL Elevation (ft)
6112	288.48

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1		**Gate Manhole (Modified)**						286.33
2	6112	Entrance	24	0.05		4.33	0.01	286.32
3	6112	Straight Pipe DI	24	140	11.5	4.33	0.03	286.29
4	6112	Exit Loss	24	1		4.33	0.29	286.00
5	6112	**Transfer Pump Station**						286.00

TOTAL HEAD LOSS (ft) 0.33

City of Molalla
WWTF Final Design
Project No. 198.28
11/4/21
PIPE SYSTEM HYDRAULIC PROFILE

8.8 MGD (6,112 gpm) Transfer PS to Grit Removal

PDAF

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the transfer PS to the SBR grit removal at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
8" to 12" Reducer	0.29
12" to 18" Reducer	0.29
18" to 24" Reducer	0.18
Lift Check Valve	
Swing Check Valve	2
12" Wye (Tee, as Elbow)	1

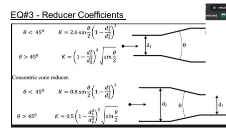
EQ#1 - Hazen Williams Major Loss

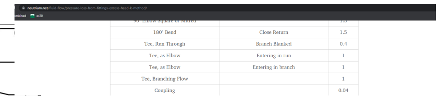
$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

EQ#3 - Reducer Coefficients





180° Bend	Close Return	1.5
Tee, Run Through	Branch Blanked	0.4
Tee, as Elbow	Entering in run	1
Tee, as Elbow	Entering in branch	1
Tee, Branching Flow		1
Coupling		0.04

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (8.8 MGD) (gpm)	Grit Removal HWL Elevation (ft)
Varies	341.67

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	6112	**Transfer Pump Station**						
2	6112	**Sum of Transfer Pump Piping**						10.49
3	2037	**Sum of North Pump Piping Headloss**						3.50
4	2037	90 Bend	8	0.39		13.00	1.02	
5	2037	8" to 12" Reducer	12	0.29		5.78	0.15	
6	2037	Straight Pipe DI	12	140	7	5.78	0.06	
7	2037	45 Bend	12	0.21		5.78	0.11	
8	2037	Straight Pipe DI	12	140	0.25	5.78	0.00	
9	2037	45 Bend	12	0.21		5.78	0.11	
10	2037	Straight Pipe DI	12	140	2.15	5.78	0.02	
11	2037	90 Bend	12	0.39		5.78	0.20	
12	2037	Straight Pipe DI	12	140	1.1	5.78	0.01	
13	2037	Swing Check Valve	12	2		5.78	1.04	
14	2037	Plug Valve	12	0.23		5.78	0.12	
15	2037	45 Bend	12	0.21		5.78	0.11	
16	2037	12" Wye (Tee, as Elbow)	12	1		5.78	0.52	
17	2037	12" to 18" Reducer	18	0.29		2.57	0.03	
18	2037	Straight Pipe DI	18	140	1	2.57	0.00	
19	2037	**Sum of Middle Pump Piping Headloss**						3.50
20	2037	90 Bend	8	0.39		13.00	1.02	
21	2037	8" to 12" Reducer	12	0.29		5.78	0.15	
22	2037	Straight Pipe DI	12	140	7	5.78	0.06	
23	2037	45 Bend	12	0.21		5.78	0.11	
24	2037	Straight Pipe DI	12	140	0.25	5.78	0.00	
25	2037	45 Bend	12	0.21		5.78	0.11	
26	2037	Straight Pipe DI	12	140	2.15	5.78	0.02	
27	2037	90 Bend	12	0.39		5.78	0.20	
28	2037	Straight Pipe DI	12	140	1.1	5.78	0.01	
29	2037	Swing Check Valve	12	2		5.78	1.04	
30	2037	Plug Valve	12	0.23		5.78	0.12	
31	2037	45 Bend	12	0.21		5.78	0.11	
32	2037	12" Wye (Tee, as Elbow)	12	1		5.78	0.52	
33	2037	12" to 18" Reducer	18	0.29		2.57	0.03	
34	2037	Straight Pipe DI	18	140	1	2.57	0.00	
35	2037	**Sum of South Pump Piping Headloss**						3.50
36	2037	90 Bend	8	0.39		13.00	1.02	
37	2037	8" to 12" Reducer	12	0.29		5.78	0.15	
38	2037	Straight Pipe DI	12	140	7	5.78	0.06	
39	2037	45 Bend	12	0.21		5.78	0.11	
40	2037	Straight Pipe DI	12	140	0.25	5.78	0.00	
41	2037	45 Bend	12	0.21		5.78	0.11	
42	2037	Straight Pipe DI	12	140	2.15	5.78	0.02	
43	2037	90 Bend	12	0.39		5.78	0.20	
44	2037	Straight Pipe DI	12	140	1.1	5.78	0.01	
45	2037	Swing Check Valve	12	2		5.78	1.04	
46	2037	Plug Valve	12	0.23		5.78	0.12	
47	2037	45 Bend	12	0.21		5.78	0.11	
48	2037	12" Wye (Tee, as Elbow)	12	1		5.78	0.52	
49	2037	12" to 18" Reducer	18	0.29		2.57	0.03	
50	6112	**Start of 18" RS from Transfer Pump Sta. to Grit Removal**						346.94
51	6112	Straight Pipe DI	18	140	3.375	7.71	0.03	346.91
52	6112	45 Bend	18	0.21		7.71	0.19	346.72
53	6112	Straight Pipe DI	18	140	10	7.71	0.09	346.63
54	6112	45 Bend	18	0.21		7.71	0.19	346.43
55	6112	PVC Pipe	18	150	310.5	7.71	2.41	344.02
56	6112	45 Bend	18	0.21		7.71	0.19	343.83
57	6112	PVC Pipe	18	150	44.98	7.71	0.35	343.48
58	6112	45 Bend	18	0.21		7.71	0.19	343.29
59	6112	PVC Pipe	18	150	100.27	7.71	0.78	342.51
60	6112	90 Bend	18	0.39		7.71	0.36	342.15
61	6112	Straight Pipe DI	18	140	15	7.71	0.13	342.02
62	6112	18" to 24" Reducer	24	0.18		4.33	0.05	341.97
63	6112	Straight Pipe DI	24	140	2	4.33	0.00	341.96
64	6112	Exit Loss	24	1		4.33	0.29	341.67
65	6112	**Grit Removal**						341.67

TOTAL HEAD LOSS (ft) 15.76

City of Molalla
WWTF Final Design
Project No. 198.28
10/4/21
PIPE SYSTEM HYDRAULIC PROFILE

8.8 MGD (6,112 gpm) Grit Removal to SBR Basin 1 and 4

PDAF

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the SBR grit removal to the SBR basins 1, 4 the Chlorine Contact Chamber at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
8" to 12" Reducer	0.29
12" to 18" Reducer	0.29
18" to 24" Reducer	0.18
Lift Check Valve	
Swing Check Valve	2
12" Wye (Tee, as Elbow)	1

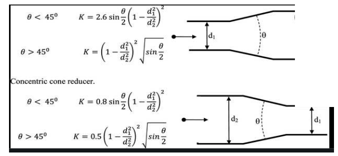
EQ#1 - Hazen Williams Major Loss

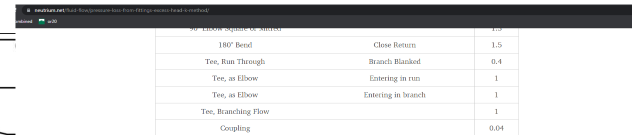
$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

EQ#3 - Reducer Coefficients





180° Bend	Close Return	1.5
Tee, Run Through	Branch Blanked	0.4
Tee, as Elbow	Entering in run	1
Tee, as Elbow	Entering in branch	1
Tee, Branching Flow		1
Coupling		0.04

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow to Each Basin (8.8 MGD / 4 = 2.2 MGD) (gpm)	SBR HWL Elevation (ft)
1528	336.09

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	6112	**Grit Removal**						336.50
2	1528	Straight Pipe DI	12	140	2.17	4.33	0.01	336.49
3	1528	Plug Valve	12	0.23		4.33	0.07	336.43
4	1528	Straight Pipe DI	12	140	15.8	4.33	0.08	336.35
5	1528	90 Bend	12	0.39		4.33	0.11	336.23
6	1528	Straight Pipe DI	12	140	6.34	4.33	0.03	336.20
7	1528	90 Bend	12	0.39		4.33	0.11	336.09
8	1528	**SBR Basin 1 or 4**						336.09

TOTAL HEAD LOSS (ft) **0.41**

City of Molalla
WWTF Final Design
Project No. 198.28
10/4/21
PIPE SYSTEM HYDRAULIC PROFILE

8.8 MGD (6,112 gpm) Grit Removal to SBR Basin 2 or 3

PDAF

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the SBR grit removal to the SBR basins 2, 3 the Chlorine Contact Chamber at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
8" to 12" Reducer	0.29
12" to 18" Reducer	0.29
18" to 24" Reducer	0.18
Lift Check Valve	
Swing Check Valve	2
12" Wye (Tee, as Elbow)	1

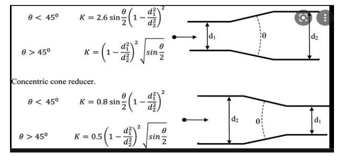
EQ#1 - Hazen Williams Major Loss

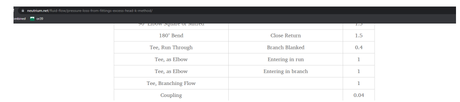
$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

EQ#3 - Reducer Coefficients





180° Bend	Close Return	1.5
Tee, Run Through	Branch Blanked	0.4
Tee, as Elbow	Entering in run	1
Tee, as Elbow	Entering in branch	1
Tee, Branching Flow		1
Coupling		0.04

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow to Each Basin (8.8 MGD / 4 = 2.2 MGD) (gpm)	SBR HWL Elevation (ft)
1528	336.09

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	1528	**Grit Removal**						336.48
2	1528	Straight Pipe DI	12	140	2.11	4.33	0.01	336.46
3	1528	Plug Valve	12	0.23		4.33	0.07	336.40
4	1528	Straight Pipe DI	12	140	11.8	4.33	0.06	336.34
5	1528	90 Bend	12	0.39		4.33	0.11	336.23
6	1528	Straight Pipe DI	12	140	4.65	4.33	0.02	336.20
7	1528	90 Bend	12	0.39		4.33	0.11	336.09
8	1528	**SBR Basin 2 or 3**						336.09

TOTAL HEAD LOSS (ft) 0.39

City of Molalla
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PIPE SYSTEM HYDRAULIC PROFILE

4.5 MGD (3,125 gpm) Through One Tertiary Filter

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the SBR decant box to the tertiary filter at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
18" to 24" Reducer	0.18

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (48.8 MGD) (gpm)	Tertiary Filter HWL Elevation (ft)
3125	325.64

	Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
	1	-	SBR Decant Box						
	3	-	**SBR Basin 1**						325.94
SBR Basins 1 & 2	4	3125	Entrance	24	0.05		2.22	0.00	325.94
	5	3125	Straight Pipe DI	24	140	1.09	2.22	0.00	325.93
	6	3125	90 Bend	24	0.39		2.22	0.03	325.93
	7	3125	Straight Pipe DI	24	140	32.92	2.22	0.02	325.90
	8	3125	Thru Flow Tee	24	0.26		2.22	0.02	325.88
	9	3125	Straight Pipe DI	24	140	3.88	2.22	0.00	325.86
	10	3125	Branch Flow Tee	24	0.78		2.22	0.06	325.86
	11	3125	Straight Pipe DI	24	140	1.09	2.22	0.00	325.80
	12	3125	Thru Flow Tee	24	0.26		2.22	0.02	325.80
Combined Piping	13	3125	Straight Pipe DI	20	140	7.65	3.19	0.01	325.78
	14	3125	90 Bend	20	0.39		3.19	0.06	325.77
	15	3125	Straight Pipe DI	20	140	1.9	3.19	0.00	325.71
	16	3125	90 Bend	20	0.39		3.19	0.06	325.70
	17	3125	Straight Pipe DI	20	140	0.69	3.19	0.00	325.64
	18	3125	**Tertiary Filter (furthest east)**						325.64

TOTAL HEAD LOSS (ft) **0.30**

City of Molalla
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10/4/21
PIPE SYSTEM HYDRAULIC PROFILE

4.5 MGD (3,125 gpm) Tertiary Filter to Non-Potable Effluent Vault

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the tertiary filter to the non pot effluent vault at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
18" to 24" Reducer	0.18

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (8.8 MGD) (gpm)	Non Pot Eff VLT HWL Elevation (ft)
3125	314.41

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	3125	**Tertiary Filter (furthest east)**					1.75	317.64
2	3125	Straight Pipe DI	20	140	1	3.19	0.00	315.89
3	3125	90 Bend	20	0.39		3.19	0.06	315.89
4	3125	Straight Pipe DI	20	140	1.16	3.19	0.00	315.83
5	3125	90 Bend	20	0.39		3.19	0.06	315.82
6	3125	Straight Pipe DI	20	140	15.13	3.19	0.02	315.76
7	3125	Thru Flow Tee	20	0.26		3.19	0.04	315.74
8	3125	Straight Pipe DI	20	140	14.5	3.19	0.02	315.70
9	3125	Thru Flow Tee	24	0.26		2.22	0.02	315.68
10	3125	Straight Pipe DI	24	140	6.58	2.22	0.00	315.66
10	3125	Branch Flow Tee	18	0.78		3.94	0.19	315.65
10	3125	Straight Pipe DI	18	140	1.1	3.94	0.00	315.46
10	3125	90 Bend	18	0.39		3.94	0.09	315.46
9	3125	Straight Pipe DI	18	140	1.08	3.94	0.00	315.37
10	3125	Exit Loss	18	1	2.08	3.94	0.24	315.36
12	3125	**UV Disinvedtion (2nd Parallel)**					0.27	315.12
13	3125	Straight Pipe DI	18	140	16.47	3.94	0.04	314.85
14	3125	90 Bend	18	0.39		3.94	0.25	314.81
15	3125	Straight Pipe DI	18	140	3.15	3.94	0.01	314.56
16	3125	Thru Flow Tee	18	0.26		3.94	0.06	314.55
17	3125	Straight Pipe DI	24	140	5.92	2.22	0.00	314.49
18	3125	Exit Loss	24	1		2.22	0.08	314.49
20	3125	**Non-Potable Water Pump Station/Effluent Vault**					0.00	314.41

TOTAL HEAD LOSS (ft)	**3.23**
TOTAL HEAD LOSS W/ FILTER BYPASS(ft)	**0.71**

City of Molalla
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PIPE SYSTEM HYDRAULIC PROFILE

4.5 MGD (3,125 gpm) Non-Potable Effluent Vault to Effluent Pump Station

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the SBR to the Chlorine Contact Chamber at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
18" to 24" Reducer	0.18

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L*\left(\frac{100}{C}\right)^{1.852}*Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (8.8 MGD) (gpm)	Tertiary Filter HWL Elevation (ft)
3125	290.40

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	3125	**Non-Potable Water Pump Station/Effluent Vault**					0.00	291.66
2	3125	Entrance	18	0.05	0.46	3.94	0.01	291.65
3	3125	Straight Pipe DI	18	140	3	3.94	0.01	291.64
4	3125	PVC Pipe	18	150	100	3.94	0.22	291.41
5	3125	45 Bend	18	0.21		3.94	0.05	291.36
6	3125	PVC Pipe	18	150	86.5	3.94	0.19	291.17
7	3125	45 Bend	18	0.21		3.94	0.05	291.12
8	3125	PVC Pipe	18	150	70.71	3.94	0.16	290.96
9	3125	90 Bend	18	0.39		3.94	0.09	290.87
10	3125	PVC Pipe	18	150	90.34	3.94	0.20	290.66
11	3125	Branch Flow Tee	24	0.78		2.22	0.06	290.60
12	3125	PVC Pipe	24	150	13.15	2.22	0.01	290.60
13	3125	45 Bend	24	0.21		2.22	0.02	290.58
14	3125	PVC Pipe	24	150	117.71	2.22	0.07	290.52
15	3125	PVC Pipe	24	150	34.82	2.22	0.02	290.50
16	3125	Branch Flow Tee	24	0.78		2.22	0.06	290.44
17	3125	PVC Pipe	30	150	30	1.42	0.01	290.43
18	3125	Exit Loss	30	1	31	1.42	0.03	290.40
19	3125	**Effluent Pump Station (Existing)**						290.40

TOTAL HEAD LOSS (ft) 1.26

City of Molalla
WWTF Final Design
Project No. 198.28
11/4/21
PIPE SYSTEM HYDRAULIC PROFILE

4.5 MGD (3,125 gpm) Non-Potable Effluent Vault to Storage Pond #2

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the non pot box to effluent storage ponds at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
18" to 24" Reducer	0.18

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L*\left(\frac{100}{C}\right)^{1.852}*Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (8.8 MGD) (gpm)	Storage Pond #2 HWL Elevation (ft)	Storage Pond #1 HWL Elevation (ft)
3125	313.90	321.90

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	3125	**Non-Potable Water Pump Station/Effluent Vault**						
2	3125	Entrance	30	0.05		1.42	0.00	314.47
3	3125	Straight Pipe DI	30	140	2.13	1.42	0.00	314.47
4	3125	90 Bend	30	0.39		1.42	0.01	314.47
5	3125	Straight Pipe DI	30	140	56.65	1.42	0.01	314.46
6	3125	45 Bend	30	0.21		1.42	0.01	314.45
7	3125	PVC Pipe	30	150	597.3	1.42	0.11	314.44
8	3125	90 Bend	30	0.39		1.42	0.01	314.33
9	3125	PVC Pipe	30	150	81.64	1.42	0.02	314.32
10	3125	Exit Loss	30	1		1.42	0.03	314.30
9	3125	**Storage Pond #2**						
8	3125	Thru Flow Tee	24	0.26		2.22	0.02	314.27
9	3125	PVC Pipe	24	150	370.72	2.22	0.21	314.25
10	3125	90 Bend	24	0.39		2.22	0.03	314.05
11	3125	PVC Pipe	24	150	70.82	2.22	0.04	314.02
12	3125	Exit Loss	24	1		2.22	0.08	313.98
13	3125	**Storage Pond #1**						313.90

TOTAL HEAD LOSS (ft) **0.57**

City of Molalla
WWTF Final Design
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PIPE SYSTEM HYDRAULIC PROFILE

4.5 MGD (3,125 gpm) Storage Pond #2 to Effluent Pump Station

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the Seffluent storage pond #2 to the effluent PS at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
14" to 18" Reducer	0.5
12" to 30" Reducer	0.8
18" to 30" Reducer	0.6
18" to 24" Reducer	0.45

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L*\left(\frac{100}{C}\right)^{1.852}*Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

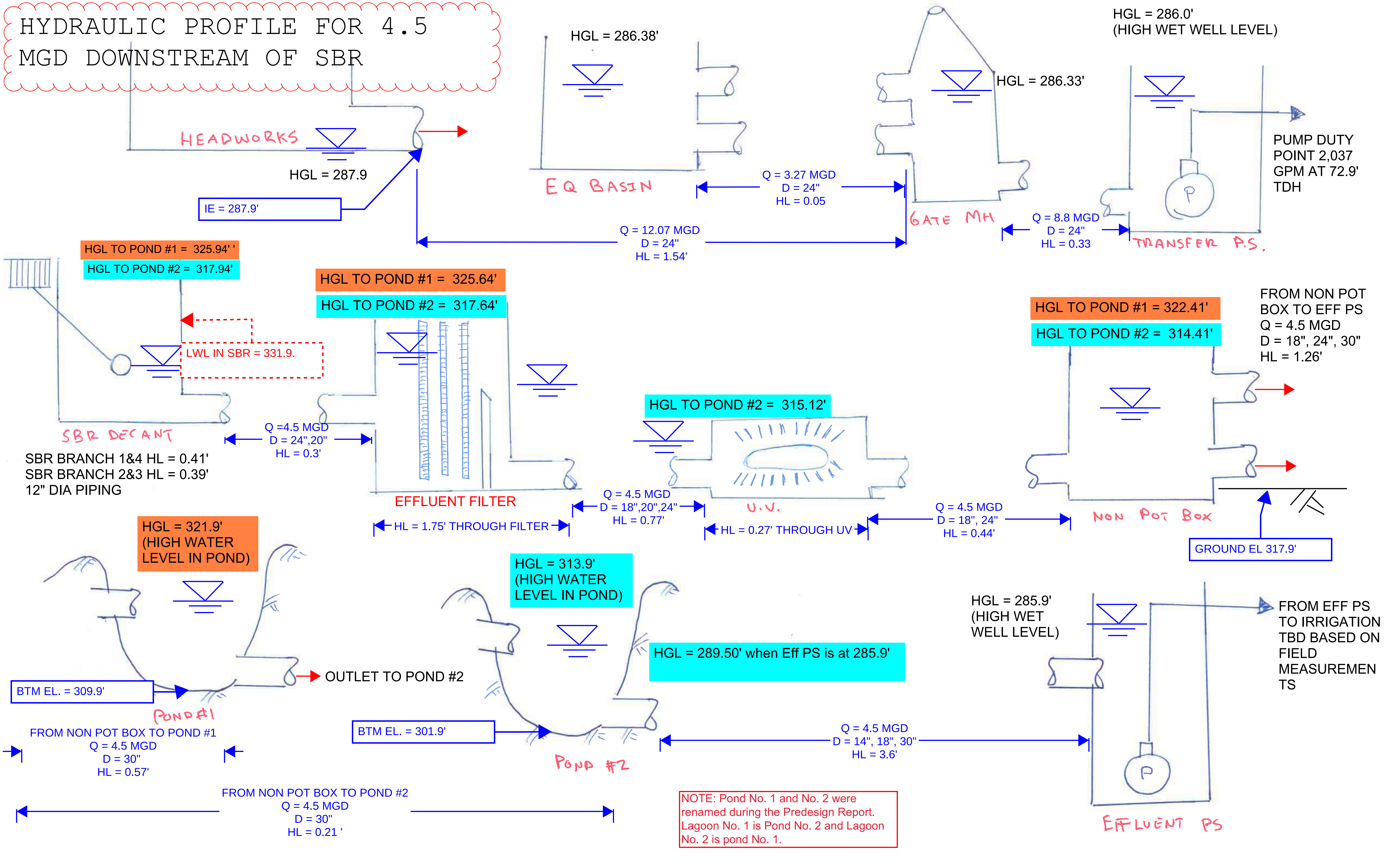
2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (8.8 MGD) (gpm)	Effluent Pump Station HWL Elevation (ft)
3125	289.50

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	3125	**Storage Pond #2**					0.00	
2	3125	Entrance	18	0.05		3.94	0.01	289.50
3	3125	PVC Pipe	18	150	7.61	3.94	0.02	289.49
4	3125	PVC Pipe	18	150	79.82	3.94	0.18	289.47
5	3125	90 Bend	18	0.39		3.94	0.09	289.29
6	3125	PVC Pipe	14	150	23.42	6.51	0.18	289.20
7	3125	14" to 18" Reducer	18	0.5		3.94	0.12	289.02
8	3125	45 Bend	18	0.21		3.94	0.05	288.90
9	3125	PVC Pipe	18	150	13.27	3.94	0.03	288.85
10	3125	45 Bend	18	0.21		3.94	0.05	288.82
11	3125	PVC Pipe	18	150	90.9	3.94	0.20	288.77
12	3125	90 Bend	18	0.39		3.94	0.09	288.57
13	3125	PVC Pipe	18	150	54.72	3.94	0.12	288.47
14	3125	90 Bend	18	0.39		3.94	0.09	288.35
15	3125	PVC Pipe	18	150	6.1	3.94	0.01	288.26
16	3125	90 Bend	18	0.39		3.94	0.09	288.24
17	3125	Existing DI Pipe	18	90	49.25	3.94	0.28	288.15
18	3125	90 Bend	18	0.39		3.94	0.09	287.86
19	3125	Existing DI Pipe	18	90	19.41	3.94	0.11	287.77
20	3125	90 Bend	18	0.39		3.94	0.09	287.66
21	3125	Existing DI Pipe	18	90	99.57	3.94	0.57	287.56
22	3125	90 Bend	18	0.39		3.94	0.09	286.99
23	3125	Existing DI Pipe	18	90	88.49	3.94	0.51	286.89
24	3125	90 Bend	18	0.39		3.94	0.09	286.38
25	3125	Existing DI Pipe	18	90	28.64	3.94	0.17	286.29
26	3125	18" to 30" Reducer	18	0.6		3.94	0.14	286.12
27	3125	Branch Flow Tee	30	0.78		1.42	0.02	285.98
28	3125	Existing DI Pipe	30	90	50	1.42	0.02	285.96
29	3125	Exit Loss	30	1		1.42	0.03	285.93
30	3125	**Effluent Pump Station (Existing)**						285.90

TOTAL HEAD LOSS (ft) **3.60**



HYDRAULIC PROFILE FOR 4.5 MGD DOWNSTREAM OF SBR
HEADWORKS
HGL = 287.9
IE = 287.9'
HGL = 286.38'
EQ BASIN
Q = 3.27 MGD
D = 24"
HL = 0.05
HGL = 286.33'
GATE MH
Q = 12.07 MGD
D = 24"
HL = 1.54'
HGL = 286.0'
(HIGH WET WELL LEVEL)
PUMP DUTY POINT 2,037 GPM AT 72.9' TDH
Q = 8.8 MGD
D = 24"
HL = 0.33
TRANSFER P.S.
HGL TO POND #1 = 325.94''
HGL TO POND #2 = 317.94'
LWL IN SBR = 331.9.
SBR DECANT
SBR BRANCH 1&4 HL = 0.41'
SBR BRANCH 2&3 HL = 0.39'
12" DIA PIPING
Q =4.5 MGD
D = 24",20"
HL = 0.3'
HGL TO POND #1 = 325.64'
HGL TO POND #2 = 317.64'
EFFLUENT FILTER
HL = 1.75' THROUGH FILTER
Q = 4.5 MGD
D = 18",20",24"
HL = 0.77'
HGL TO POND #2 = 315.12'
U.V.
HL = 0.27' THROUGH UV
Q = 4.5 MGD
D = 18", 24"
HL = 0.44'
HGL TO POND #1 = 322.41'
HGL TO POND #2 = 314.41'
FROM NON POT BOX TO EFF PS
Q = 4.5 MGD
D = 18", 24", 30"
HL = 1.26'
NON POT BOX
GROUND EL 317.9'
HGL = 321.9'
(HIGH WATER LEVEL IN POND)
OUTLET TO POND #2
BTM EL. = 309.9'
POND #1
FROM NON POT BOX TO POND #1
Q = 4.5 MGD
D = 30"
HL = 0.57'
HGL = 313.9'
(HIGH WATER LEVEL IN POND)
HGL = 289.50' when Eff PS is at 285.9'
BTM EL. = 301.9'
POND #2
FROM NON POT BOX TO POND #2
Q = 4.5 MGD
D = 30"
HL = 0.21 '
Q = 4.5 MGD
D = 14", 18", 30"
HL = 3.6'
HGL = 285.9'
(HIGH WET WELL LEVEL)
FROM EFF PS TO IRRIGATION TBD BASED ON FIELD MEASUREMEN TS
EFFLUENT PS
P
NOTE: Pond No. 1 and No. 2 were renamed during the Predesign Report. Lagoon No. 1 is Pond No. 2 and Lagoon No. 2 is pond No. 1.

NOTE: Pond No. 1 and No. 2 were renamed during the Predesign Report. Lagoon No. 1 is Pond No. 2 and Lagoon No. 2 is pond No. 1.

City of Molalla
WWTF Final Design
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10/4/21
PIPE SYSTEM HYDRAULIC PROFILE

12.07 MGD (8,382 gpm) Existing Headworks to Gate MH

PIF FLOW

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the SBR to the Chlorine Contact Chamber at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (12.07 MGD) (gpm)	Gate MH HWL Elevation (ft)
8382	286.33

Ø Assumption
Ø from 08/03/2021 Plans

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	-	**Headworks (Existing)**	-	-	-	-	-	287.87
2	8382	Entrance	24	0.05		5.94	0.03	287.84
3	8382	Straight Pipe DI	24	140	246	5.94	0.96	286.88
4	8382	Exit Loss	24	1		5.94	0.55	286.33
5	8382	**Gate Manhole (Modified)**	84					286.33
						TOTAL HEAD LOSS (ft)	**1.54**	

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PIPE SYSTEM HYDRAULIC PROFILE

3.27 MGD (2,083 gpm) From Gate MH to EQ Basin

EQ BASIN FLOW 12.07 MGD - 8.8 MGD = 3.27 MGD

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the gate manhole to the eq basin at Molalla WWTP.
The eq basin will receive flow during flows exceeding 8.8 MGD with a peak flow to the eq basin occuring during PIF (12.07 MGD). At PIF the eq basin will receive 3.27 MGD

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (3.27 MGD) (gpm)	Transfer Pump Station HWL Elevation (ft)
2271	290.45

Ø Assumption
Ø from 08/03/2021 Plans

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	2271	**Gate Manhole (Modified)**	84					286.33
2	2271	Entrance	24	0.05		1.61	0.00	286.33
3	2271	Straight Pipe DI	24	140	17	1.61	0.01	286.34
4	2271	Exit Loss	24	1		1.61	0.04	286.38
5	2271	**EQ Basin**						286.38

TOTAL HEAD LOSS (ft) **0.05**

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PIPE SYSTEM HYDRAULIC PROFILE

8.8 MGD (6,112 gpm) Gate MH to Transfer PS

PDAF DUE TO EQ BASIN

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the gate MH to the Transfer PS at the Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (8.8 MGD) (gpm)	Transfer Pump Station HWL Elevation (ft)
6112	288.48

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1		**Gate Manhole (Modified)**						286.33
2	6112	Entrance	24	0.05		4.33	0.01	286.32
3	6112	Straight Pipe DI	24	140	11.5	4.33	0.03	286.29
4	6112	Exit Loss	24	1		4.33	0.29	286.00
5	6112	**Transfer Pump Station**						286.00

TOTAL HEAD LOSS (ft) 0.33

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8.8 MGD (6,112 gpm) Transfer PS to Grit Removal

PDAF

PIPE SYSTEM HYDRAULIC PROFILE

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the transfer PS to the SBR grit removal at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
8" to 12" Reducer	0.29
12" to 18" Reducer	0.29
18" to 24" Reducer	0.18
Lift Check Valve	
Swing Check Valve	2
12" Wye (Tee, as Elbow)	1

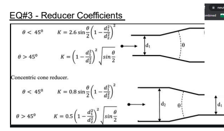
EQ#1 - Hazen Williams Major Loss

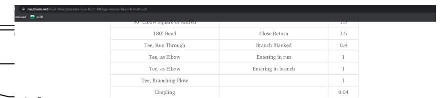
$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

EQ#3 - Reducer Coefficients





180° Bend	Close Return	1.5
Tee, Run Through	Branch Blanked	0.4
Tee, as Elbow	Entering in run	1
Tee, as Elbow	Entering in branch	1
Tee, Branching Flow		1
Coupling		0.04

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (8.8 MGD) (gpm)	Grit Removal HWL Elevation (ft)
Varies	341.67

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	6112	**Transfer Pump Station**						357.43
2	6112	**Sum of Transfer Pump Piping**						10.49
3	2037	**Sum of North Pump Piping Headloss**						3.50
4	2037	90 Bend	8	0.39		13.00	1.02	
5	2037	8" to 12" Reducer	12	0.29		5.78	0.15	
6	2037	Straight Pipe DI	12	140	7	5.78	0.06	
7	2037	45 Bend	12	0.21		5.78	0.11	
8	2037	Straight Pipe DI	12	140	0.25	5.78	0.00	
9	2037	45 Bend	12	0.21		5.78	0.11	
10	2037	Straight Pipe DI	12	140	2.15	5.78	0.02	
11	2037	90 Bend	12	0.39		5.78	0.20	
12	2037	Straight Pipe DI	12	140	1.1	5.78	0.01	
13	2037	Swing Check Valve	12	2		5.78	1.04	
14	2037	Plug Valve	12	0.23		5.78	0.12	
15	2037	45 Bend	12	0.21		5.78	0.11	
16	2037	12" Wye (Tee, as Elbow)	12	1		5.78	0.52	
17	2037	12" to 18" Reducer	18	0.29		2.57	0.03	
18	2037	Straight Pipe DI	18	140	1	2.57	0.00	
19	2037	**Sum of Middle Pump Piping Headloss**						3.50
20	2037	90 Bend	8	0.39		13.00	1.02	
21	2037	8" to 12" Reducer	12	0.29		5.78	0.15	
22	2037	Straight Pipe DI	12	140	7	5.78	0.06	
23	2037	45 Bend	12	0.21		5.78	0.11	
24	2037	Straight Pipe DI	12	140	0.25	5.78	0.00	
25	2037	45 Bend	12	0.21		5.78	0.11	
26	2037	Straight Pipe DI	12	140	2.15	5.78	0.02	
27	2037	90 Bend	12	0.39		5.78	0.20	
28	2037	Straight Pipe DI	12	140	1.1	5.78	0.01	
29	2037	Swing Check Valve	12	2		5.78	1.04	
30	2037	Plug Valve	12	0.23		5.78	0.12	
31	2037	45 Bend	12	0.21		5.78	0.11	
32	2037	12" Wye (Tee, as Elbow)	12	1		5.78	0.52	
33	2037	12" to 18" Reducer	18	0.29		2.57	0.03	
34	2037	Straight Pipe DI	18	140	1	2.57	0.00	
35	2037	**Sum of South Pump Piping Headloss**						3.50
36	2037	90 Bend	8	0.39		13.00	1.02	
37	2037	8" to 12" Reducer	12	0.29		5.78	0.15	
38	2037	Straight Pipe DI	12	140	7	5.78	0.06	
39	2037	45 Bend	12	0.21		5.78	0.11	
40	2037	Straight Pipe DI	12	140	0.25	5.78	0.00	
41	2037	45 Bend	12	0.21		5.78	0.11	
42	2037	Straight Pipe DI	12	140	2.15	5.78	0.02	
43	2037	90 Bend	12	0.39		5.78	0.20	
44	2037	Straight Pipe DI	12	140	1.1	5.78	0.01	
45	2037	Swing Check Valve	12	2		5.78	1.04	
46	2037	Plug Valve	12	0.23		5.78	0.12	
47	2037	45 Bend	12	0.21		5.78	0.11	
48	2037	12" Wye (Tee, as Elbow)	12	1		5.78	0.52	
49	2037	12" to 18" Reducer	18	0.29		2.57	0.03	
50	6112	**Start of 18" RS from Transfer Pump Sta. to Grit Removal**						346.94
51	6112	Straight Pipe DI	18	140	3.375	7.71	0.03	346.91
52	6112	45 Bend	18	0.21		7.71	0.19	346.72
53	6112	Straight Pipe DI	18	140	10	7.71	0.09	346.63
54	6112	45 Bend	18	0.21		7.71	0.19	346.43
55	6112	PVC Pipe	18	150	310.5	7.71	2.41	344.02
56	6112	45 Bend	18	0.21		7.71	0.19	343.83
57	6112	PVC Pipe	18	150	44.98	7.71	0.35	343.48
58	6112	45 Bend	18	0.21		7.71	0.19	343.29
59	6112	PVC Pipe	18	150	100.27	7.71	0.78	342.51
60	6112	90 Bend	18	0.39		7.71	0.36	342.15
61	6112	Straight Pipe DI	18	140	15	7.71	0.13	342.02
62	6112	18" to 24" Reducer	24	0.18		4.33	0.05	341.97
63	6112	Straight Pipe DI	24	140	2	4.33	0.00	341.96
64	6112	Exit Loss	24	1		4.33	0.29	341.67
65	6112	**Grit Removal**						341.67

TOTAL HEAD LOSS (ft) 15.76

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PIPE SYSTEM HYDRAULIC PROFILE

8.8 MGD (6,112 gpm) Grit Removal to SBR Basin 1 and 4

PDAF

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the SBR grit removal to the SBR basins 1, 4 the Chlorine Contact Chamber at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
8" to 12" Reducer	0.29
12" to 18" Reducer	0.29
18" to 24" Reducer	0.18
Lift Check Valve	
Swing Check Valve	2
12" Wye (Tee, as Elbow)	1

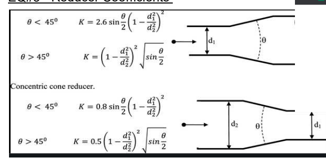
EQ#1 - Hazen Williams Major Loss

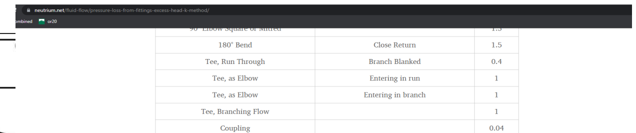
$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

EQ#3 - Reducer Coefficients




neutrium.net/fluid-flow/pressure-loss-from-fittings-excess-head-k-method/

180° Bend	Close Return	1.5
Tee, Run Through	Branch Blanked	0.4
Tee, as Elbow	Entering in run	1
Tee, as Elbow	Entering in branch	1
Tee, Branching Flow		1
Coupling		0.04

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow to Each Basin (8.8 MGD / 4 = 2.2 MGD) (gpm)	SBR HWL Elevation (ft)
1528	336.09

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	6112	**Grit Removal**						336.50
2	1528	Straight Pipe DI	12	140	2.17	4.33	0.01	336.49
3	1528	Plug Valve	12	0.23		4.33	0.07	336.43
4	1528	Straight Pipe DI	12	140	15.8	4.33	0.08	336.35
5	1528	90 Bend	12	0.39		4.33	0.11	336.23
6	1528	Straight Pipe DI	12	140	6.34	4.33	0.03	336.20
7	1528	90 Bend	12	0.39		4.33	0.11	336.09
8	1528	**SBR Basin 1 or 4**						336.09

TOTAL HEAD LOSS (ft) **0.41**

City of Molalla
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8.8 MGD (6,112 gpm) Grit Removal to SBR Basin 2 or 3

PDAF

PIPE SYSTEM HYDRAULIC PROFILE

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the SBR grit removal to the SBR basins 2, 3 the Chlorine Contact Chamber at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
8" to 12" Reducer	0.29
12" to 18" Reducer	0.29
18" to 24" Reducer	0.18
Lift Check Valve	
Swing Check Valve	2
12" Wye (Tee, as Elbow)	1

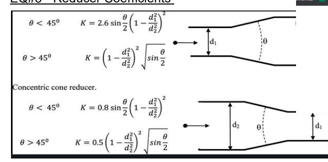
EQ#1 - Hazen Williams Major Loss

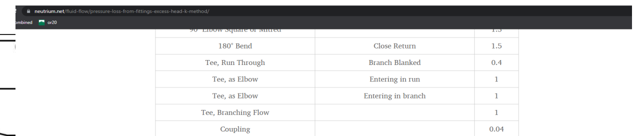
$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

EQ#3 - Reducer Coefficients





180° Bend	Close Return	1.5
Tee, Run Through	Branch Blanked	0.4
Tee, as Elbow	Entering in run	1
Tee, as Elbow	Entering in branch	1
Tee, Branching Flow		1
Coupling		0.04

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow to Each Basin (8.8 MGD / 4 = 2.2 MGD) (gpm)	SBR HWL Elevation (ft)
1528	336.09

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	1528	**Grit Removal**						336.48
2	1528	Straight Pipe DI	12	140	2.11	4.33	0.01	336.46
3	1528	Plug Valve	12	0.23		4.33	0.07	336.40
4	1528	Straight Pipe DI	12	140	11.8	4.33	0.06	336.34
5	1528	90 Bend	12	0.39		4.33	0.11	336.23
6	1528	Straight Pipe DI	12	140	4.65	4.33	0.02	336.20
7	1528	90 Bend	12	0.39		4.33	0.11	336.09
8	1528	**SBR Basin 2 or 3**						336.09

TOTAL HEAD LOSS (ft) **0.39**

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PIPE SYSTEM HYDRAULIC PROFILE

8.8 MGD (6,112 gpm) Through One Effluent Filter

PDAF

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the SBR decant box to the tertiary filter at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
18" to 24" Reducer	0.18

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L*\left(\frac{100}{C}\right)^{1.852}*Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (48.8 MGD) (gpm)	Tertiary Filter HWL Elevation (ft)
6112	321.37

	Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
	1	-	SBR Decant Box						
	3	-	**SBR Basin 1**						322.49
SBR Basins 1 & 2	4	6112	Entrance	24	0.05		4.33	0.01	322.49
	5	6112	Straight Pipe DI	24	140	1.09	4.33	0.00	322.47
	6	6112	90 Bend	24	0.39		4.33	0.11	322.47
	7	6112	Straight Pipe DI	24	140	32.92	4.33	0.07	322.36
	8	6112	Thru Flow Tee	24	0.26		4.33	0.08	322.29
	9	6112	Straight Pipe DI	24	140	3.88	4.33	0.01	322.21
	10	6112	Branch Flow Tee	24	0.78		4.33	0.23	322.20
	11	6112	Straight Pipe DI	24	140	1.09	4.33	0.00	321.97
	12	6112	Thru Flow Tee	24	0.26		4.33	0.08	321.97
Combined Piping	13	6112	Straight Pipe DI	20	140	7.65	6.24	0.04	321.90
	14	6112	90 Bend	20	0.39		6.24	0.24	321.86
	15	6112	Straight Pipe DI	20	140	1.9	6.24	0.01	321.62
	16	6112	90 Bend	20	0.39		6.24	0.24	321.61
	17	6112	Straight Pipe DI	20	140	0.69	6.24	0.00	321.37
	18	6112	**Tertiary Filter (furthest east)**						321.37

TOTAL HEAD LOSS (ft) 1.12

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PIPE SYSTEM HYDRAULIC PROFILE

8.8 MGD (6,112 gpm) Tertiary Filter to Non-Potable Effluent Vault

PDAF

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the tertiary filter to the non pot effluent vault at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
18" to 24" Reducer	0.18

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (8.8 MGD) (gpm)	Non Pot Eff VLT HWL Elevation (ft)
6112	315.47

FILTER BYPASS DURING FLOWS EXCEEDING 4.5 MGD

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	6112	**Tertiary Filter (furthest east)**					1.75	650.36
2	6112	Straight Pipe DI	20	140	1	6.24	329.00	648.61
3	6112	90 Bend	20	0.39		6.24	0.24	319.61
4	6112	Straight Pipe DI	20	140	1.16	6.24	0.01	319.37
5	6112	90 Bend	20	0.39		6.24	0.24	319.37
6	6112	Straight Pipe DI	20	140	15.13	6.24	0.08	319.13
7	6112	Thru Flow Tee	20	0.26		6.24	0.16	319.05
8	6112	Straight Pipe DI	20	140	14.5	6.24	0.08	318.90
9	6112	Thru Flow Tee	24	0.26		4.33	0.08	318.82
10	6112	Straight Pipe DI	24	140	6.58	4.33	0.01	318.74
10	6112	Branch Flow Tee	18	0.78		7.71	0.72	318.73
10	6112	Straight Pipe DI	18	140	1.1	7.71	0.01	318.01
10	6112	90 Bend	18	0.39		7.71	0.36	318.00
9	6112	Straight Pipe DI	18	140	1.08	7.71	0.01	317.64
10	6112	Exit Loss	18	1	2.08	7.71	0.92	317.63
12	6112	**UV Disinvedtion (2nd Parallel)**					0.27	316.71
13	6112	Straight Pipe DI	18	140	16.47	7.71	0.15	316.44
14	6112	90 Bend	18	0.39		7.71	0.25	316.29
15	6112	Straight Pipe DI	18	140	3.15	7.71	0.03	316.04
16	6112	Thru Flow Tee	18	0.26		7.71	0.24	316.01
17	6112	Straight Pipe DI	24	140	5.92	4.33	0.01	315.77
18	6112	Exit Loss	24	1		4.33	0.29	315.76
20	6112	**Non-Potable Water Pump Station/Effluent Vault**					0.00	315.47

TOTAL HEAD LOSS (ft)	**334.89**
TOTAL HEAD LOSS W/ FILTER BYPASS(ft)	**1.24**

City of Molalla
WWTF Final Design
Project No. 198.28
10/4/21
PIPE SYSTEM HYDRAULIC PROFILE

8.8 MGD (6,112 gpm) Non-Potable Effluent Vault to Effluent Pump Station

PDAF

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the SBR to the Chlorine Contact Chamber at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
18" to 24" Reducer	0.18

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (8.8 MGD) (gpm)	Tertiary Filter HWL Elevation (ft)
6112	290.40

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	6112	**Non-Potable Water Pump Station/Effluent Vault**					0.00	294.89
2	6112	Entrance	18	0.05	0.46	7.71	0.05	294.84
3	6112	Straight Pipe DI	18	140	3	7.71	0.03	294.82
4	6112	PVC Pipe	18	150	100	7.71	0.78	294.04
5	6112	45 Bend	18	0.21		7.71	0.19	293.85
6	6112	PVC Pipe	18	150	86.5	7.71	0.67	293.18
7	6112	45 Bend	18	0.21		7.71	0.19	292.98
8	6112	PVC Pipe	18	150	70.71	7.71	0.55	292.43
9	6112	90 Bend	18	0.39		7.71	0.36	292.07
10	6112	PVC Pipe	18	150	90.34	7.71	0.70	291.37
11	6112	Branch Flow Tee	24	0.78		4.33	0.23	291.14
12	6112	PVC Pipe	24	150	13.15	4.33	0.03	291.12
13	6112	45 Bend	24	0.21		4.33	0.06	291.06
14	6112	PVC Pipe	24	150	117.71	4.33	0.23	290.83
15	6112	PVC Pipe	24	150	34.82	4.33	0.07	290.77
16	6112	Branch Flow Tee	24	0.78		4.33	0.23	290.54
17	6112	PVC Pipe	30	150	30	2.77	0.02	290.52
18	6112	Exit Loss	30	1	31	2.77	0.12	290.40
19	6112	**Effluent Pump Station (Existing)**						290.40

TOTAL HEAD LOSS (ft) 4.49

City of Molalla
WWTF Final Design
Project No. 198.28
11/4/21
PIPE SYSTEM HYDRAULIC PROFILE

8.8 MGD (6,112 gpm) Non-Potable Effluent Vault to Storage Pond #2

PDAF

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the non pot box to effluent storage ponds at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
12" to 30" Reducer	0.75
18" to 24" Reducer	0.18

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (8.8 MGD) (gpm)	Storage Pond #2 HWL Elevation (ft)	Storage Pond #1 HWL Elevation (ft)
6112	313.90	321.90

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	6112	**Non-Potable Water Pump Station/Effluent Vault**						
2	6112	Entrance	30	0.05		2.77	0.01	315.95
3	6112	Straight Pipe DI	30	140	2.13	2.77	0.00	315.95
4	6112	90 Bend	30	0.39		2.77	0.05	315.94
5	6112	Straight Pipe DI	30	140	56.65	2.77	0.04	315.90
6	6112	45 Bend	30	0.21		2.77	0.03	315.86
7	6112	PVC Pipe	30	150	597.3	2.77	0.39	315.83
8	6112	90 Bend	30	0.39		2.77	0.05	315.45
9	6112	PVC Pipe	30	150	81.64	2.77	0.05	315.40
10	6112	Exit Loss	30	1		2.77	0.12	315.35
9	6112	**Storage Pond #2**						
8	6112	Thru Flow Tee	24	0.26		4.33	0.08	315.23
9	6112	PVC Pipe	24	150	370.72	4.33	0.71	315.15
10	6112	90 Bend	24	0.39		4.33	0.11	314.44
11	6112	PVC Pipe	24	150	70.82	4.33	0.14	314.33
12	6112	Exit Loss	24	1		4.33	0.29	314.19
13	6112	**Storage Pond #1**						313.90

TOTAL HEAD LOSS (ft) 2.05

City of Molalla
WWTF Final Design
Project No. 198.28
10/4/21

8.8 MGD (6,112 gpm) Storage Pond #2 to Effluent Pump Station

PDAF

PIPE SYSTEM HYDRAULIC PROFILE

1. EQUATIONS AND LOSS COEFFICIENTS

Description: The following calculations represent the hydraulics for the pipe system from the Seffluent storage pond #2 to the effluent PS at Molalla WWTP.

FRICTION LOSS COEFFICIENT TABLE

Item of Friction Loss	K or C value
Entrance	0.05
90 Bend	0.39
Straight Pipe DI	140
PVC Pipe	150
45 Bend	0.21
Plug Valve	0.23
Gate Valve	0.1
Existing DI Pipe	90
Exit Loss	1
Thru Flow Tee	0.26
Branch Flow Tee	0.78
12" to 24" Reducer	0.75
24" to 27" Reducer	0.19
22.5 Bend	0.2
14" to 30" Reducer	0.7
14" to 18" Reducer	0.5
12" to 30" Reducer	0.8
18" to 30" Reducer	0.6
18" to 24" Reducer	0.45

EQ#1 - Hazen Williams Major Loss

$$H_f = \frac{.002082L * \left(\frac{100}{C}\right)^{1.852} * Q^{1.852}}{D^{4.8655}}$$

EQ#2 - Minor Loss

$$h_L = K\frac{v^2}{2g}$$

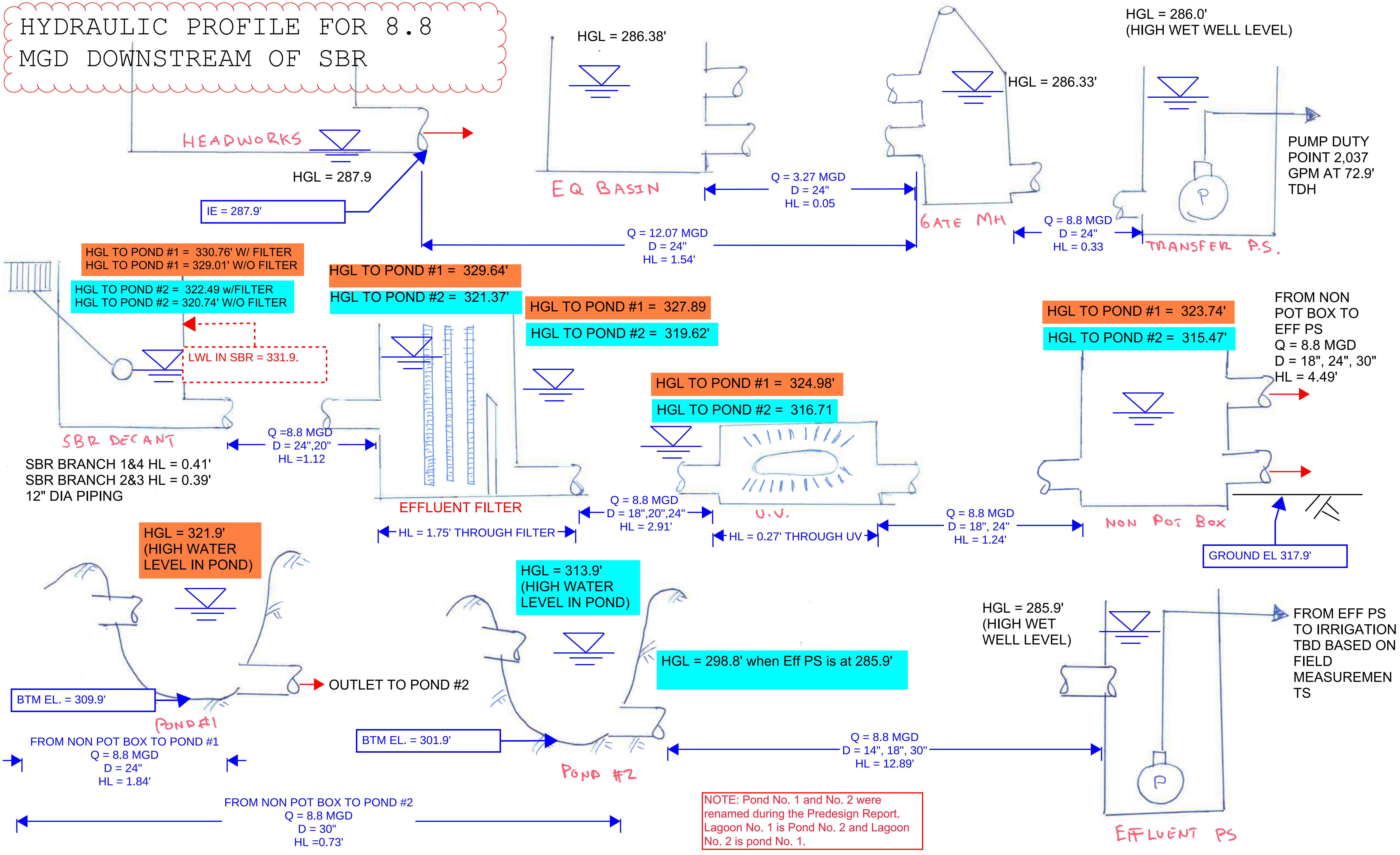
2. PIPE SYSTEM HEAD LOSS CALCULATIONS

INPUT VALUES

Flow (8.8 MGD) (gpm)	Effluent Pump Station HWL Elevation (ft)
6112	289.50

Item No.	Flow gpm	Item of Friction Loss	Diameter (in.)	K or C value	Length (ft.)	Velocity fps	Friction Head Loss (ft.)	HGL (ft.)
1	6112	**Storage Pond #2**					0.00	
2	6112	Entrance	18	0.05		7.71	0.05	298.79
3	6112	PVC Pipe	18	150	7.61	7.71	0.06	298.75
4	6112	PVC Pipe	18	150	79.82	7.71	0.62	298.69
5	6112	90 Bend	18	0.39		7.71	0.36	298.07
6	6112	PVC Pipe	14	150	23.42	12.74	0.62	297.71
7	6112	14" to 18" Reducer	18	0.5		7.71	0.46	297.09
8	6112	45 Bend	18	0.21		7.71	0.19	296.63
9	6112	PVC Pipe	18	150	13.27	7.71	0.10	296.44
10	6112	45 Bend	18	0.21		7.71	0.19	296.33
11	6112	PVC Pipe	18	150	90.9	7.71	0.71	296.14
12	6112	90 Bend	18	0.39		7.71	0.36	295.44
13	6112	PVC Pipe	18	150	54.72	7.71	0.42	295.08
14	6112	90 Bend	18	0.39		7.71	0.36	294.65
15	6112	PVC Pipe	18	150	6.1	7.71	0.05	294.29
16	6112	90 Bend	18	0.39		7.71	0.36	294.24
17	6112	Existing DI Pipe	18	90	49.25	7.71	0.98	293.88
18	6112	90 Bend	18	0.39		7.71	0.36	292.90
19	6112	Existing DI Pipe	18	90	19.41	7.71	0.39	292.54
20	6112	90 Bend	18	0.39		7.71	0.36	292.15
21	6112	Existing DI Pipe	18	90	99.57	7.71	1.99	291.79
22	6112	90 Bend	18	0.39		7.71	0.36	289.81
23	6112	Existing DI Pipe	18	90	88.49	7.71	1.77	289.45
24	6112	90 Bend	18	0.39		7.71	0.36	287.68
25	6112	Existing DI Pipe	18	90	28.64	7.71	0.57	287.32
26	6112	18" to 30" Reducer	18	0.6		7.71	0.55	286.75
27	6112	Branch Flow Tee	30	0.78		2.77	0.09	286.20
28	6112	Existing DI Pipe	30	90	50	2.77	0.08	286.10
29	6112	Exit Loss	30	1		2.77	0.12	286.02
30	6112	**Effluent Pump Station (Existing)**						285.90

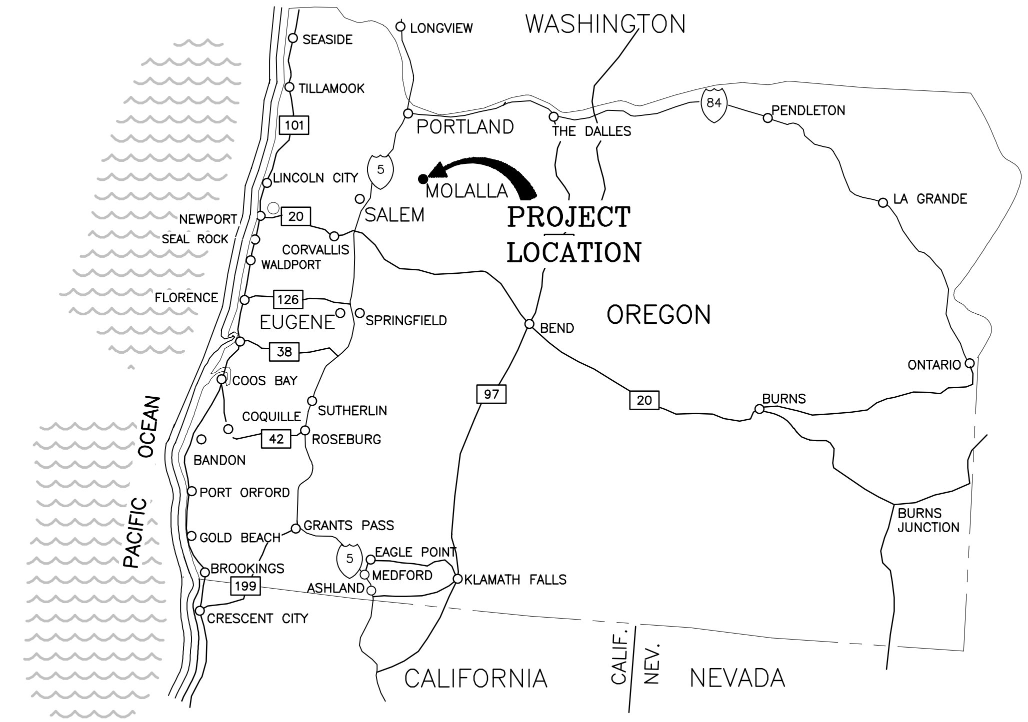
TOTAL HEAD LOSS (ft) **12.89**



HYDRAULIC PROFILE FOR 8.8 MGD DOWNSTREAM OF SBR
HEADWORKS
HGL = 287.9
IE = 287.9'
HGL = 286.38'
EQ BASIN
Q = 3.27 MGD
D = 24"
HL = 0.05
HGL = 286.33'
GATE MH
Q = 12.07 MGD
D = 24"
HL = 1.54'
HGL = 286.0'
(HIGH WET WELL LEVEL)
PUMP DUTY POINT 2,037 GPM AT 72.9' TDH
P
Q = 8.8 MGD
D = 24"
HL = 0.33
TRANSFER P.S.
HGL TO POND #1 = 330.76' W/ FILTER
HGL TO POND #1 = 329.01' W/O FILTER
HGL TO POND #2 = 322.49 w/FILTER
HGL TO POND #2 = 320.74' W/O FILTER
LWL IN SBR = 331.9.
SBR DECANT
SBR BRANCH 1&4 HL = 0.41'
SBR BRANCH 2&3 HL = 0.39'
12" DIA PIPING
HGL TO POND #1 = 329.64'
HGL TO POND #2 = 321.37'
Q =8.8 MGD
D = 24",20"
HL =1.12
EFFLUENT FILTER
HL = 1.75' THROUGH FILTER
HGL TO POND #1 = 327.89
HGL TO POND #2 = 319.62'
HGL TO POND #1 = 324.98'
HGL TO POND #2 = 316.71
Q = 8.8 MGD
D = 18",20",24"
HL = 2.91'
U.V.
HL = 0.27' THROUGH UV
Q = 8.8 MGD
D = 18", 24"
HL = 1.24'
HGL TO POND #1 = 323.74'
HGL TO POND #2 = 315.47'
FROM NON POT BOX TO EFF PS
Q = 8.8 MGD
D = 18", 24", 30"
HL = 4.49'
NON POT BOX
GROUND EL 317.9'
HGL = 321.9'
(HIGH WATER LEVEL IN POND)
BTM EL. = 309.9'
OUTLET TO POND #2
POND #1
FROM NON POT BOX TO POND #1
Q = 8.8 MGD
D = 24"
HL = 1.84'
HGL = 313.9'
(HIGH WATER LEVEL IN POND)
HGL = 298.8' when Eff PS is at 285.9'
BTM EL. = 301.9'
POND #2
FROM NON POT BOX TO POND #2
Q = 8.8 MGD
D = 30"
HL =0.73'
Q = 8.8 MGD
D = 14", 18", 30"
HL = 12.89'
HGL = 285.9'
(HIGH WET WELL LEVEL)
FROM EFF PS TO IRRIGATION TBD BASED ON FIELD MEASUREMENTS
P
EFFLUENT PS
NOTE: Pond No. 1 and No. 2 were renamed during the Predesign Report. Lagoon No. 1 is Pond No. 2 and Lagoon No. 2 is pond No. 1.

PROJECT DRAWINGS

WASTEWATER TREATMENT PLANT UPGRADES
PREDESIGN REPORT



LOCATION MAP

NOT TO SCALE

CITY OF MOLALLA
MOLALLA, OREGON

NOVEMBER, 2021

ENGINEER:

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.
1330 Teakwood Avenue / Coos Bay, Oregon 97420
(541) 269-0732 / WWW.DYERPART.COM

PROJECT NO. 198.28

811
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PROJECT CONTACTS

OWNER:

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117 N MOLALLA AVE
MOLALLA, OREGON 97308
503-829-6855

CIVIL ENGINEER:

THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.
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UTILITIES:

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COMCAST CABLE COMMUNICATIONS
503-596-3767

NW NATURAL
503-422-4012 EXT. 2427

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CONSTRUCTION WILL BE IN ACCORDANCE WITH THESE DRAWINGS, CITY OF MOLALLA STANDARD PLANS, AND CITY OF MOLALLA STANDARD CONSTRUCTION SPECIFICATIONS.

VERTICAL DATUM - NAVD88
HORIZONTAL DATUM - NAD83 (2011) EPOCH 2010.00

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CONSTRUCTION

DWG #.	SHT. #	DESCRIPTION
GENERAL		
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10-G-2	2	INDEX TO DRAWINGS
10-G-3	3	INDEX TO DRAWINGS
10-G-4	4	VICINITY MAP, GENERAL NOTES
10-G-5	5	ABBREVIATIONS, LEGEND, SYMBOLS & GENERAL NOTES
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10-G-7	7	DESIGN DATA CONTINUED
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10-G-9	9	HYDRAULIC PROFILE
10-G-10	10	HYDRAULIC PROFILE CONTINUED
10-G-11	11	SOLIDS STREAM HYDRAULIC PROFILE
PROCESS		
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20-P-2	13	GENERAL PROCESS DIAGRAM - LIQUID STREAM
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20-P-4	15	PLANT PANEL - SCHEMATIC
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MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

GENERAL
INDEX TO DRAWINGS

DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	10-G-1
DATE	SHEET NO.
NOV. 2021	1 OF 97

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MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

GENERAL
INDEX TO DRAWINGS

DESIGNED: — DRAWN: —

APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
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PROJECT NO.	DRAWING NO.
198.28	10-G-2
DATE	SHEET NO.
NOV. 2021	2 OF 97

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MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY
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CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

GENERAL
INDEX TO DRAWINGS

DESIGNED: —
DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH – SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	10-G-3
DATE	SHEET NO.
NOV. 2021	3 OF 97

VICINITY MAP
NTS

N

GENERAL NOTES

1. ALL WORK AND MATERIALS SHALL CONFORM TO THE CURRENT EDITION OF THE OREGON STANDARD SPECIFICATIONS FOR CONSTRUCTION AS AMENDED BY THE CITY OF MOLALLA PUBLIC WORKS STANDARDS AND CONSTRUCTION REQUIREMENTS PER THE PUBLIC WORKS DIRECTOR. ALL WORK WITHIN THE PUBLIC RIGHT-OF-WAY OR PUBLIC EASEMENTS REQUIRES A PUBLIC WORKS PERMIT.
2. THE CONTRACTOR IS RESPONSIBLE FOR THE PROCUREMENT OF ALL APPLICABLE PERMITS, LICENSES AND CERTIFICATES RELATIVE TO THE TRADES TO COMPLETE THE PROJECT AND FOR THE USE OF SUCH WORK WHEN COMPLETED. COMPLIANCE SHALL BE AT ALL LEVELS, FEDERAL, STATE, COUNTY, AND LOCAL, RELATING TO THE PERFORMANCE OF WORK.
3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION AND ARRANGE FOR THE RELOCATION OF ANY IN CONFLICT WITH THE PROPOSED CONSTRUCTION. THE LOCATIONS, DEPTH, AND DESCRIPTION OF EXISTING UTILITIES SHOWN WERE COMPILED FROM AVAILABLE RECORDS AND-OR FIELD SURVEYS. THE ENGINEER OR UTILITY COMPANIES DO NOT GUARANTEE THE ACCURACY OF THE COMPLETENESS OF SUCH RECORDS. ADDITIONAL UTILITIES MAY EXIST WITHIN THE WORK AREA.
4. OREGON LAW REQUIRES THE CONTRACTOR TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0000. THE CONTRACTOR MAY OBTAIN COPIES OF THE RULES FROM THE CENTER BY CALLING TOLL FREE TO (877)668-4001 OR BY ACCESSING THE INTERNET AT WWW.CALLBEFOREYOUDIG.ORG. THE CONTRACTOR MUST NOTIFY THE CENTER AT LEAST TWO (2) BUSINESS DAYS, BUT NOT MORE THAN TEN (10) BUSINESS DAYS, BEFORE COMMENCING AN EXCAVATION. CALL TOLL FREE TO (800)332-2344.
5. THE CONTRACTOR SHALL MAKE PROVISIONS TO KEEP ALL EXISTING UTILITIES (INCLUDING NON-LOCATABLE) IN SERVICE AND PROTECT THEM DURING CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR THE IMMEDIATE NOTIFICATION OF DAMAGE TO UTILITIES AND THE REPAIR OR REPLACEMENT OF DAMAGED UTILITIES USING MATERIALS AND METHODS APPROVED BY THE UTILITY OWNER. NO SERVICE INTERRUPTIONS SHALL BE PERMITTED WITHOUT PRIOR WRITTEN AGREEMENT WITH THE UTILITY OWNER.
6. THE CONTRACTOR SHALL NOTIFY PROJECT ENGINEER AND CITY OF MOLALLA PUBLIC WORKS INSPECTOR FORTY-EIGHT (48) HOURS IN ADVANCE OF STARTING CONSTRUCTION AND TWENTY-FOUR (24) HOURS BEFORE RESUMING WORK AFTER SHUT DOWNS, EXCEPT FOR NORMAL RESUMPTION OF WORK FOLLOWING SATURDAYS, SUNDAYS OR HOLIDAYS.
7. ALL CONSTRUCTION VEHICLES SHALL PARK ON THE CONSTRUCTION SITE OR AT A LOCATION(S) INDICATED ON THE APPROVED PLAN. HOURS OF CONSTRUCTION FOR PUBLIC IMPROVEMENTS SHALL BE 7:30 AM TO 4:30 PM, MONDAY THROUGH FRIDAY. CONSTRUCTION OF PUBLIC IMPROVEMENTS IS PROHIBITED SATURDAYS, SUNDAYS, OR GOVERNMENT HOLIDAYS. CONSTRUCTION ACTIVITIES INCLUDE ALL FIELD MAINTENANCE OF EQUIPMENT, REFUELING, AND PICK-UP OR DELIVERY OF EQUIPMENT AS WELL AS THE ACTUAL CONSTRUCTION ACTIVITY.
8. THE CONTRACTOR SHALL KEEP AN APPROVED SET OF PLANS ON THE PROJECT SITE AT ALL TIMES.
9. THE CONTRACTOR SHALL PERFORM ALL WORK NECESSARY TO COMPLETE THIS PROJECT IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS INCLUDING SUCH INCIDENTALS AS MAY BE NECESSARY TO MEET THE INTENT OF THE PROJECT CONTRACT DOCUMENTS AND APPLICABLE AGENCY REQUIREMENTS.
10. THE CONTRACTOR SHALL MAINTAIN AND COORDINATE ACCESS SATISFACTORY WITH THE NEEDS OF EMERGENCY SERVICE AGENCIES AND ALL AFFECTED PROPERTIES.
11. THE CONTRACTOR SHALL POTHOLE AND VERIFY LOCATION AND DEPTH OF ALL EXISTING UTILITIES PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL TAKE ALL NECESSARY FIELD MEASUREMENTS AND OTHERWISE VERIFY ALL DIMENSIONS AND EXISTING CONSTRUCTION CONDITIONS INDICATED AND OR SHOWN ON THE PLANS. SHOULD ANY ERROR OR INCONSISTENCY EXIST, THE CONTRACTOR SHALL NOT PROCEED WITH THE WORK AFFECTED UNTIL REPORTED TO THE PROJECT ENGINEER FOR CLARIFICATION OR CORRECTION.
12. ANY INSPECTION BY THE CITY, COUNTY, STATE, FEDERAL AGENCY, OR PROJECT ENGINEER SHALL NOT, IN ANY WAY RELIEVE THE CONTRACTOR FROM ANY OBLIGATION TO PERFORM THE WORK IN COMPLIANCE WITH THE APPLICABLE CODES AND REGULATIONS, CITY STANDARDS, AND PROJECT DOCUMENTS.
13. THE CONTRACTOR SHALL PROVIDE THE CITY AND PROJECT ENGINEER A TWENTY-FOUR (24) HOUR CONTACT PERSON AND NUMBER.
14. THE CONTRACTOR SHALL RECORD ALL CHANGES TO THE CONSTRUCTION PLANS. CHANGES SHALL INCLUDE REFERENCE MEASUREMENTS, MATERIALS TYPE, AND UTILITIES NOT PREVIOUSLY SHOWN ON THE PLANS. INFORMATION SHALL BE SUBMITTED TO THE PROJECT ENGINEER FOR THE COMPLETION OF RECORD DRAWINGS.
15. ALL SURVEY MONUMENTS ON THE PROJECT'S SITE OR THAT MAY BE SUBJECT TO DISTURBANCE WITHIN THE CONSTRUCTION AREA, OR THE CONSTRUCTION OF ANY OFF-SITE IMPROVEMENTS SHALL BE ADEQUATELY REFERENCED AND PROTECTED PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY. IF THE SURVEY MONUMENTS ARE DISTURBED, MOVED, RELOCATED, OR DESTROYED AS A RESULT OF ANY CONSTRUCTION, THE CONTRACTOR SHALL, AT THEIR COST, RETAIN THE SERVICES OF A REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF OREGON TO RESTORE THE MONUMENT TO ITS ORIGINAL CONDITION AND FILE THE NECESSARY SURVEYS AS REQUIRED BY OREGON STATE LAW. A COPY OF ANY RECORDED SURVEY SHALL BE SUBMITTED TO THE CITY PUBLIC WORKS DIRECTOR OR AUTHORIZED REPRESENTATIVE.
16. THE CONTRACTOR IS REQUIRED TO METER CONSTRUCTION WATER THROUGH A CITY BULK WATER METER. CONTACT MOLALLA UTILITY BILLING AT 503-829-6855 TO SET UP AN ACCOUNT.

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

GENERAL
VICINITY MAP, GENERAL NOTES

DESIGNED: —
DRAWN: —
APPROVED BY: ____ DATE: ____

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	10-G-4
DATE	SHEET NO.
NOV. 2021	4 OF 97

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PLOT DATE November 30, 2021

ABBREVIATIONS

A	AIR
AB	ANCHOR BOLT
AC	ASPHALTIC CONCRETE
ADPTR	ADAPTER
AFM	AIR FLOW METER
AGG	AGGREGATE
AL	ALUMINUM
APPROX	APPROXIMATE
ARV	AIR RELEASE VALVE
AT	ACOUSTICAL TILE
ATA	APPLIED AT
ATMR	MOISTURE RESISTANT AT
AUX	AUXILIARY
BD	BOARD
BKFL	BACKFILL
BLDG	BUILDING
BLKG	BLOCKING
BM	BENCH MARK
BR	BRICK
BWL	BOTTOM WATER LEVEL
C	CONDUIT
CARV	COMBINATION AIR RELEASE VALVE
CB	CATCH BASIN
CHEM	CHEMICAL
CI	CAST IRON
CFM	CUBIC FEET PER MINUTE
CL	CHLORINE
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CNTRL	CONTROL
CO	CLEAN OUT
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
CORP	CORPORATION
CPLG	COUPLING
CTR	CENTER
CUL	CULVERT
CV	COVED
D	DRAIN
DB	DIGESTED BIOSOLIDS
DEC	DOUGLAS ELECTRIC COOP
DEMO	DEMOLITION
DET	DETAIL
DI	DUCTILE IRON
DIA	DIAMETER
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DR	DRAIN
DS	DIGESTED SLUDGE
DST	DOWNSPOUT
D/W	DISHWASHER
DWG	DRAWING
EA	EACH
EFF	EFFLUENT
EL/ELEV	ELEVATION
ELB	ELBOW
ELEC	ELECTRICAL
EOP	EDGE OF PAVEMENT
EP	EPOXY PAINT
EPS	EFFLUENT PUMP STATION
EQ	EQUAL
ETR	EXISTING TO REMAIN
EW	EACH WAY
EXIST'G/E	EXISTING
EXT	EXTERIOR
FAC	FACTORY FINISH
FCA	FLANGE COUPLING ADAPTER
FD	FLOOR DRAIN
FE	FINAL EFFLUENT
FF/FIN. FLR	FINISH FLOOR
FG	FINISH GRADE
FH	FIRE HYDRANT
FIN	FINISH
FL	FLOWLINE
FLG	FLANGED
FM	FORCE MAIN
FND	FOUNDATION
FO	FIBER OPTIC
FOC	FACE OF CURB
FRIG	REFRIGERATOR
FRP	FIBERGLASS REINFORCED PLASTIC
FT	FEET
FTG	FOOTING
G	GRIT
GALV	GALVANIZED
GB/GYP.BD.	GYPSUM BOARD
GBX	MOISTURE RESISTANT GB
GFI	GROUND FAULT INTERRUPTER
GIP	GALVANIZED IRON PIPE
GL	GLAZING
GND	GROUND (ELEC)
GPD,H,M	GALLONS PER DAY, HOUR, MINUTE
GV	GATE VALVE
H	HEIGHT
HB	HOSE BIB
HDPE	HIGH DENSITY POLYETHYLENE
HMI	HUMAN MACHINE INTERFACE
HORIZ	HORIZONTAL
HP	HORSE POWER
HPT	HIGH POINT
HT	HEIGHT
HW	HOT WATER
HWL	HIGH WATER LEVEL
IE	INVERT ELEVATION
INFO	INFORMATION
INT	INTERIOR
INV	INVERT
IPS	INFLUENT PUMP STATION
ISF	INFLUENT SCREENING FACILITY
JB	JUNCTION BOX
L	LENGTH
LAT	LATERAL
LB	POUND
LF	LINEAR FEET
LG	LONG
LPT	LOWPOINT
LT	LEFT
LWL	LOW WATER LEVEL
MAT/MATL	MATERIAL
MAX	MAXIMUM
MECH	MECHANICAL
MFG	MANUFACTURING
MFR/MANUF	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MJ	MECHANICAL JOINT
MSTR	MASTER
MTL	METAL
NPW	NON-POTABLE WATER
NTS	NOT TO SCALE
NIC	NOT IN CONTRACT
OC/O.C.	ON CENTER
OD	OUTSIDE DIAMETER
OF	OVERFLOW
OH	OVERHEAD
P	PHASE (ELEC)/PUMP
PC	POINT OF CURVATURE
PD	PUMPED DRAINAGE
PE	PLAIN END
PERF	PERFORATED
PI	POWER INPUT
PL	PLATE
PLYWD	PLYWOOD
POL	POLYMER
PV	PLUG VALVE
PM	PRESSURE MAIN
P/P	POWER POLE/UTILITY POLE
PRESS.	PRESSURE
P/S	PUMPING STATION
PS	PIPE SUPPORT
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PST	PRESSATE
PT	PAINT
P.T.	PRESSURE TREATED
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
R	RADIUS
RAS	RETURN ACTIVATED SLUDGE
RB/RBR	RUBBER BASE
RCL	RECLAIMED WATER
RDCR	REDUCER
REF	REFERENCE
REINF	REINFORCING
REQ'D	REQUIRED
REQ'S	REQUIREMENTS
RFCA	RESTRAINED FLANGE COUPLING ADAPTOR
ROW	RIGHT OF WAY
R/R	RESTROOM
RS	RAW SEWAGE
RT	RIGHT
RW	REUSE WATER
SA	SERVICE AIR
SBR	SEQUENCING BATCH REACTOR
SC	SEALED CONCRETE
SCH	SCHEDULE
SD	SANITARY DRAIN
SE	SECONDARY EFFLUENT
SEC	SECTION
SHWL	STORM HIGH WATER LEVEL
SIM	SIMILAR
SN	SUPERNATANT
SP	SEALED PLYWOOD
SPEC	SPECIFICATIONS
SQ	SQUARE
SS	SANITARY SEWER
SST	STAINLESS STEEL
STA	STATION
STD	STORM DRAIN
STHNG	SHEATHING
STL	STEEL
SUBM	SUBMERSION
SOG	SLAB-ON-GRADE
SVC	SERVICE
TBC	TOP BACK CURB
TBM	TEMPORARY BENCH MARK
TCPLG	TRANSITION COUPLING
TD	TANK DRAIN
TE	TERTIARY EFFLUENT
TEMP	TEMPERED
TF	TERTIARY FILTER
TPS	TRANSFER PUMP STATION
T.O.	TOP OF
TOB	TOP OF BANK
TOE	TOE OF BANK
TOF	TOP OF FOOTING
TOS	TOP OF SLAB
TOW	TOP OF WALL
THD	THREADED
TRANS	TRANSITION
TS	TRANSFER SLUDGE
TYP	TYPICAL
UF	URETHANE FOAM
UON	UNLESS OTHERWISE NOTED
UVT	UV TRANSMITTANCE
V	VENT
VLV	VALVE
VAR	VARIES
VG	VALLEY GUTTER
VTR	VENT TO ROOF
W	CITY WATER POTABLE
WAS	WASTE ACTIVATED SLUDGE
WD	WOOD
WD	WOVEN WIRE MESH
WL	WATER LEVEL
W/	WITH
W/O	WITHOUT
YD	YARD
(W)	WEST
(E)	EAST
(N)	NORTH
(S)	SOUTH
ø	DIAMETER

GENERAL NOTES

1. VERTICAL DATUM BASED ON FOUND MONUMENT STAMPED DANT SOT 1935 (EL. = 183.86' - NAD 83-2011). [MARION COUNTY NGS DATA]
2. HORIZONTAL CONTROL IS SPC OREGON NORTH @ NGS "WOODBURN 2017 N:170,780 E:2,318,850.
3. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES, AS SHOWN ON THESE PLANS, IS BASED ON FIELD LOCATES AND RECORDS OF THE VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE MEASUREMENTS IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CONTACT "ONE-CALL" AT 811. THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS (503) 232-1987. FOR UTILITY LOCATES AT LEAST 48 HOURS BEFORE ANY EXCAVATION. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL VERIFY PERTINENT LOCATIONS AND ELEVATIONS ESPECIALLY AT CONNECTIONS AND AT POTENTIAL UTILITY CONFLICTS.
4. THE OVERHEAD ELECTRIC LOCAL DISTRIBUTION SYSTEMS AND INDIVIDUAL SERVICE LINES ARE NOT SPECIFICALLY INDICATED ON THE DRAWINGS BUT DO EXIST THROUGHOUT THE PROJECT SITE. THE CONTRACTOR SHALL EXERCISE CAUTION WHILE WORKING NEAR, OR UNDER, ALL ELECTRIC LINES.

CONTRACTORS NOTIFICATION REQUIREMENTS LAW

ATTENTION: OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR-952-001-0090. YOU MAY OBTAIN COPIES OF THE RULES BY CALLING THE CENTER.

REFERENCE SYMBOLS

C — SECTION DESIGNATION
300-A-1 — DRAWN ON DWG NO. 300-A-1
2 — DETAIL DESIGNATION
60-M-6 — DRAWN ON DWG NO. 60-M-6

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

LEGEND

EXISTING

SS	GRAVITY SEWERLINE
12" CMP SD	STORM DRAIN/ CULVERT
10" AC W	WATER LINE
WV	WATER VALVE
	FIRE HYDRANT
	POWER POLE
	POWER POLE W/GUY WIRE
T	UNDERGROUND TELEPHONE LINE
E	ELECTRICAL PEDESTAL
T	TELEPHONE PEDESTAL
	MAILBOX
W	WATER METER
	BUILDING
	EDGE A.C. PAVEMENT
	EDGE OF GRAVEL
	STREET SIGN
	STREAM/DITCH
	FENCE
	PROPERTY CORNER
	PROPERTY LINE/ROW
	SIDEWALK, CURB & GUTTER
	CATCH BASIN
DR	STORM DRAIN MANHOLE = DR
SS	SANITARY SEWER MANHOLE = SS
	SANITARY SEWER CLEANOUT
CP#4	SURVEY CONTROL POINT
TV	UNDERGROUND TELEVISION
E	UNDERGROUND ELECTRIC
OHP	OVERHEAD POWER LINE

NEW

LINES AND NOTATIONS USED TO IDENTIFY NEW CONSTRUCTION OR IMPROVEMENTS TO EXISTING FACILITIES VARY.

REFER TO SITE SPECIFIC PLAN DRAWING SHEETS FOR IDENTIFICATION OF NEW CONSTRUCTION AND/OR IMPROVEMENTS IN THAT PARTICULAR AREA.

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

GENERAL
ABBREVIATIONS, LEGEND, SYMBOLS & GENERAL NOTES

DESIGNED: CGP
DRAWN: CGP
APPROVED BY:
DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	10-G-5
DATE	SHEET NO.
NOV. 2021	5 OF 97

PLOT DATE November 30, 2021 4:44:47 PM
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DESIGN DATA

Parameter		Year 2017	Year 2043
Design Basis			
Population		9,939	15,939
Wastewater Flows, MGD			
Base Sewage		0.89	1.43
Base Infiltration		0.22	0.353
AAF		1.85	2.96
ADWF		1.11	1.8
AWWF		2.48	3.98
MMDWF		1.91	3.06
MMWWF		3.21	4.5
Peak Weekly		4.51	6.4
PDAF		6.62	8.8
PIF		9.7	12.07
Wastewater Loads, lb/d			
BOD5			
Average Day		1,783	2,859
Maximum Month		3,066	4,917
Maximum Day		5,436	8,717
TSS			
Average Day		1,705	2,735
Maximum Month		2,962	4,750
Maximum Day		8,746	14,026
Ammonia-N			
Average Day		149	239
Maximum Month		199	319
Maximum Day		258	414
Discharge Limits			
Outfall 001 (Molalla River)			
Nov. 1 - Apr. 30			
Monthly Average BOD/TSS (mg/l)		30	
Weekly Average BOD/TSS (mg/l)		45	
Monthly Average BOD/TSS (lb/d)		1126	
Weekly Average BOD/TSS (lb/d)		1689	
Daily Maximum BOD/TSS (lb/d)		2252	
May 1 - Oct. 31			
Monthly Average BOD/TSS (mg/l)		10	
Weekly Average BOD/TSS (mg/l)		15	
Monthly Average BOD/TSS (lb/d)		255	
Weekly Average BOD/TSS (lb/d)		383	
Daily Maximum BOD/TSS (lb/d)		510	
Minimum Monthly Average BOD/TSS Percent Removal		85	
pH		6-9	
Average Monthly Ammonia-N		16.7	
Daily Maximum Ammonia-N		25.9	
E coli Monthly Geometric Mean (# org/100 mL)		126	
E coli Not to Exceed (# org/100 mL)		406	
Total Residual Chlorine Shall Not Exceed (Monthly Average)		0.07	
Total Residual Chlorine Shall Not Exceed (Daily Maximum)		0.18	
Dilution		Minimum Stream Flow 350 CFS. Discharge to Cease when Average Stream Flow for Previous 7-day Period is less than 350 CFS.	
Temperature		Effluent Discharge to Cease when 7-day Moving Average Effluent Temperature Exceeds 18 deg C.	
Excess Thermal Load (May)		Shall not exceed a 7-day moving average of the daily excess thermal loads of 77.95 million kcals/day.	

Parameter		Year 2017	Year 2043
Design Basis			
Outfall 002 (Recycled Water Reuse)			
Classification		Class C	
Total Coliform 7-Day Median (# org/100 mL)		23	
Total Coliform Not to Exceed (# org/100 mL)		240	
NPDES Permit Compliance Point			
Nov. 1 - Apr. 30		Post-Disinfection, Pre-Effluent Storage	
May 1 - Oct. 31		Post-Disinfection, Pre-Effluent Storage	

Parameter		Design Value
Standby Power Systems		
750 kW Standby Generator (Existing)		
Reliability Class		1
Location		Effluent Pump Station
Type		Diesel Engine
Size		750 kW
Transfer Switch		Automatic
500 kW Standby Generator		
Reliability Class		1
Location		SBR
Type		Diesel Engine

Parameter		Design Value
Influent Screening (Existing)		
Type		In-Channel Fine Screen
Number		2
Peak Flow Capacity, EA		9.25 MGD
Bypass		Manually cleaned screen
Screenings Washing		Yes
Screenings Compaction		Yes
Influent Parshall Flume (Existing)		
Number		1
Throat Width		24 inches
Peak Flow Capacity		21.4 MGD
Minimum Flow Capacity		0.27 MGD
Process Area 300: Transfer Pump Station		
Wet well (Existing)		
Depth		25 Feet
Size		13.5 Feet by 17.25 Feet
Operating Volume		700 cf
Level Control		Level Transducer with Float Backup
EPA Class		1
Pump System		
Number of Pumps		4 (3 Duty, 1 Standby)
Pump Type		Subermisible w/ VFDs (Three)
		Centrifugal w/ VFD (One)
Pump Hp, EA		65 (Submersible), 75 (Centrifugal)
One Pump Operating Capacity		2500 gpm
Two Pump Operating Capacity		5000 gpm
Three Pump Operating Capacity		6112 gpm
Average Detention Time		6.7 min (ADWF)
Transfer Pump Station Flow Meter		
Type		Magnetic
Number		1
Diameter		18 Inches
Capacity		630 to 25,206 GPM
Process Area 310: Influent Flow Equalization Basin		
Size		325,000 gal
Dimensions		100 Feet x 60 Feet x 11.5 Feet
Process Area 400: Grit Removal System		
Grit Removal System		
Type		Vortex Grit Concentrator
Number		1
Capacity		8.8 MGD
Grit Pump Hp		5
Pista Paddle Drive Motor Hp		1.5
Grit Classifier		
Type		Shaftless Classifier
Number		1
Drive Hp		1
Flow Rate		250 GPM
Pounds Per Hour		2.47 Tons/Hour
SBR Influent Flow Splitter Box		
Type		Concrete Drop Box
Number Outlets		4
Outlet Pipe Diameter		12 inches

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

GENERAL
DESIGN DATA

DESIGNED: TJM DRAWN: CGP
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO. 198.28
DRAWING NO. 10-G-6
DATE NOV. 2021
SHEET NO. 6 OF 97

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DESIGN DATA CONTINUED

Parameter	Design Value
Process Area 500: SBR	
Basins	
Type	Continuous Flow
Number of Basins	4
HRT	18 Days
SRT	16.9 Days
Volume/Basin	620,000 Gal
Basin Length	118.6 Feet
Basin Width	39 Feet
TWL	18 Feet
BWL	14 Feet
Design MLSS (mg/L) at TWL	2,500
Design Flow Process Cycles	
No. Batches/Day	6 Per Unit
Aerated Fill Time	2 Hours
Settle Time	1 Hours
Decant Time	1 Hours
Complete Cycle Time	4 Hours
Storm Flow Process Cycles	
No. Batches/Day	12 Per Unit
Aerated Fill Time	0.5 Hours
Settle Time	1 Hours
Decant Time	0.5 Hours
Complete Cycle Time	2 Hours
SBR Influent Flow Meters	
Type	Magnetic
Number	4
Diameter	12 Inch
Capacity	277.4 to 11,007 GPM
Aeration System	
Type	Fine Bubble
No. Diffusers/Basin	950
Blowers	
Number	Three (2 Duty, 1 Standby)
Type	Positive Displacement w/ VFDs
Capacity	1,506 SCFM at 8.9 PSIG
Horsepower, EA	100
Control	DO Paced
Actuated Air Valves	
Type	Electric
Number	4, 1 Per Basin
Diameter	8 Inches
Air Flow Sensors	
Type	Thermal Mass
Number	2
Diameter	8 Inches
DO and Temperature Sensors	
Type	Probe and Transmitter
Number	4, 1 Per Basin
WAS Pumps	
Type	Centrifugal, Submersible
Number	4, 1 Per Basin
Horsepower, EA	2
Capacity, EA	200 GPM at 18 FT TDH

Parameter	Design Value
Process Area 500: SBR	
WAS Flow Meter	
Type	Magnetic
Number	1
Diameter	4 Inches
Capacity	27.7 to 1,100 GPM
TSS Analyzer	
Type	TSS Probe and Transmitter
Number	4, 1 Per Basin
Mixers	
Type	Submersible
Number	8, 2 Per Basin
Horsepower, EA	15
Decanter	
Type	Variable Level
Number	4, 1 Per Basin
Horsepower, EA	0.75
Length	30 Feet
Average Decant Rate	2,257
Peak Decant Rate	6,118
Level Transmitters	
Type	Pressure Transducer
Number	4, 1 Per Basin
Level Switches	
Type	Floats
Number	8, 2 Per Basin
Low Level	4, 1 Per Basin
High Level	4, 1 Per Basin
Process Area 510: Effluent Filtration	
Basins	
Type	Rotating Disk Filter
Number of Units	2
Capacity, EA	4.5 MGD
Peak Influent TSS	< 20 mg/L
Average Influent TSS	< 10 mg/L
Monthly Average Effluent TSS	< 5 mg/L
Filter Area Per Unit	1,085 square feet
Submerged Filter Area per Unit	705 square feet
Number of Discs per Unit	18
Media Pore Size	10 micron
Turbidimeters	One per Filter
SEW Drive Motor	1.5 hp
Backwash Water Pump	15 hp
Backwash Pump Flow Rate	124 gpm
Level Sensor	Included

Parameter	Design Value
Process Area 600: UV Disinfection System	
Class C Discharge Limits	
Total Coliform 7-Day Median (# org/100 mL)	23
Total Coliform Not to Exceed (# org/100 mL)	240
Molalla River Discharge Limits	
E coli Monthly Geometric Mean (# org/100 mL)	126
E coli Not to Exceed (# org/100 mL)	406
General	
Type	Horizontal, Noncontact UV
Number	1
Capacity	9 MGD
UV Dose (Class C Recycled Water)	60,000 WS/CM2
UV Dose (Molalla River Discharge)	30,000 WS/CM2
UV Transmittance @ 254 NM	0.65
Reactors	2
Banks Per Reactor	3
Total Number of Lamps	648
UV Intensity Meter	Yes
Lamp Control	Flow Paced/Shut Off
Lamp Type	Low Pressure, High Output
Level Sensor	Ultrasonic (One Per Reactor)
UVT Analyzer	Yes
Temperature Analyzer	Yes
Air to Water Heat Exchanger	24 (4 Per Bank)
Cooling Pumps	4 (Two Per Reactor)
Process Area 700: Effluent Storage Ponds	
Effluent Storage Pond No. 1	
Type	Effluent Storage Pond
Lined	Membrane Liner (60 mil, LLPDE)
Surface Area	12.6 Acres at Average Liquid Depth
Volume	49 MG
Mixing	Solar Circulators (Two)
Solar Panels	3 x 80 W
Level Transmitter	Pressure Transducer
Staff Gauge	Yes
Effluent Storage Pond No. 2	
Type	Effluent Storage Pond
Lined	Native Clay
Surface Area	11.4 Acres at Average Liquid Depth
Volume	45 MG
Effluent Storage Pond No. 1 Flow Meter	
Type	Magnetic
Number	1
Diameter	14 Inch
Capacity	381 to 15,247 GPM

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

GENERAL
DESIGN DATA CONTINUED

DESIGNED: TJM
DRAWN: CGP
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO. 198.28
DRAWING NO. 10-G-7
DATE NOV. 2021
SHEET NO. 7 OF 97

DESIGN DATA CONTINUED

Parameter	Design Value
Process Area 800: Effluent Pump Station (Existing)	
Effluent Pump Station	
Type	Vertical Turbine w/ VFDs
Number of Pumps	2 Existing, 1 Future
Capacity	500 to 7,000 GPM
Horsepower, EA	300
Wet well	
Type	12 Feet Diameter
Level Control	Level Transducer
Effluent Pump Station Reservoir (Former Chlorine Contact Chamber)	
Volume	67500 Gal
Instrumentation	
Pressure Transmitter	Yes
Turbidimeter	Yes
Chlorine Residual Analyzer	Yes
Effluent Force Main (Existing)	
Effluent Force Main	
Diameter	24 Inch
Length	27,000 Feet
Material	PVC and HDPE
Cascade Aeration System (Existing)	
Cascade Aeration System	
Vertical Drop	12 Feet
Approximate Length	80 Feet
Typical Rise	9 Inch
Typical Run	4 Feet, 6 Inches
Estimated Re-Aeration	0 to 6 ppm
Discharge Monitoring Structure (Existing)	
Discharge Monitoring Station	
Flowmeter	Magnetic
Number	1
Diameter	12"
Outfall 001	
Size	24 Inch
Length	23 Feet
Number of Ports	Three (Duckbill)
Diameter of Ports	8 Inch
Process Area 810: Non-Potable Water System	
Non-Potable Water System	
Type	Vertical Multi-stage Centrifugal w/ VFDs
Number	2
Pump Hp, EA	10 Hp
Capacity, EA	100 GPM @ 231 Feet TDH
Pressure Transmitter	Yes
Effluent Sampler	Yes
Non-Potable Flow Meter	
Type	Magnetic
Number	1
Diameter	3 Inch
Capacity	17 to 705 GPM

Parameter	Design Value
Process Area 810: Non-Potable Water System	
Non-Potable Water Tank	
Volume	20,000 Gal
Level Transmitters	
Type	Pressure Transducer
Number	1
Level Switches	
Type	Floats
Number	2
Low Level	1
High Level	1
Effluent Storage Pond No. 1 Actuated Effluent Valve	
Type	Electric
Number	1
Diameter	14"
Modulating	Yes
Effluent Storage Pond No. 1 Actuated Valve	
Type	Electric
Number	1
Diameter	30"
Modulating	No
Effluent Storage Pond No. 2 Actuated Valve	
Type	Electric
Number	1
Diameter	24"
Modulating	No
Effluent Pump Station Actuated Valve	
Type	Electric
Number	1
Diameter	18"
Modulating	No
Process Area 900: Aerobic Digester	
Aerobic Digester	
Tank No. 1 Volume	400,000
Tank No. 2 Volume	400,000
SWD	18 Feet
Digester Free Board	2 Feet
Decanter Type	Variable Level (1 per Basin)
Blowers	
Number	Two (2 Duty)
Type	Positive Displacement w/ VFDs
Capacity	1,360 SCFM @ 8.5 PSIG
Horsepower, EA	100
Control	DO/ORP Paced

Parameter	Design Value
Process Area 900: Aerobic Digester	
Biosolids Transfer Pumps	
Number	2
Type	Rotary Lobe w/ VFDs
Capacity	150 GPM
Horsepower, EA	7.5
Aeration System	
Diffusers	Coarse Bubble
Number of Diffusers per Basin	68
Level Transmitters	
Type	Pressure Transducer
Number	2, 1 Per Basin
Level Switches	
Type	Floats
Number	4, 2 Per Basin
Low Level	2, 1 Per Basin
High Level	2, 1 Per Basin
Staff Gauges	
Number	2 (1 per Basin)
Process Area 920: Biosolids Dewatering	
Screw Press	
Type	Screw Press
Number	1
Capacity (Average)	400 LB/HR
Capacity (Maximum)	480 LB/HR
Screw Press Motor, Horsepower	5 Hp w/ VFD
Cake Solids Content	14% to 18%
Conveyor, Horsepower	3
Polymer Feed System	5 GPH
Polymer Feed, Horsepower	0.5
Number Wash Water Solenoid Valves	3
Flocculation Tank Mixer Motor, Horsepower	1
Screw Level Transmitter	Yes
Screw Level Switch	Yes
Flocculation Tank Level Transmitter	Yes
Flocculation Tank Level Switch	Yes
Macerator	
Type	Macerator
Number	1
Diameter	4 Inches
Capacity	110 GPM
Motor Horsepower	3
Biosolids Flow Meter	
Type	Magnetic
Number	1
Diameter	4 Inch
Capacity	27 to 1,100 GPM

MOLALLA OREGON

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PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

GENERAL
DESIGN DATA CONTINUED

DESIGNED: TJM DRAWN: CGP
APPROVED BY: ________ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
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PROJECT NO. 198.28
DRAWING NO. 10-G-8
DATE NOV. 2021
SHEET NO. 8 OF 97

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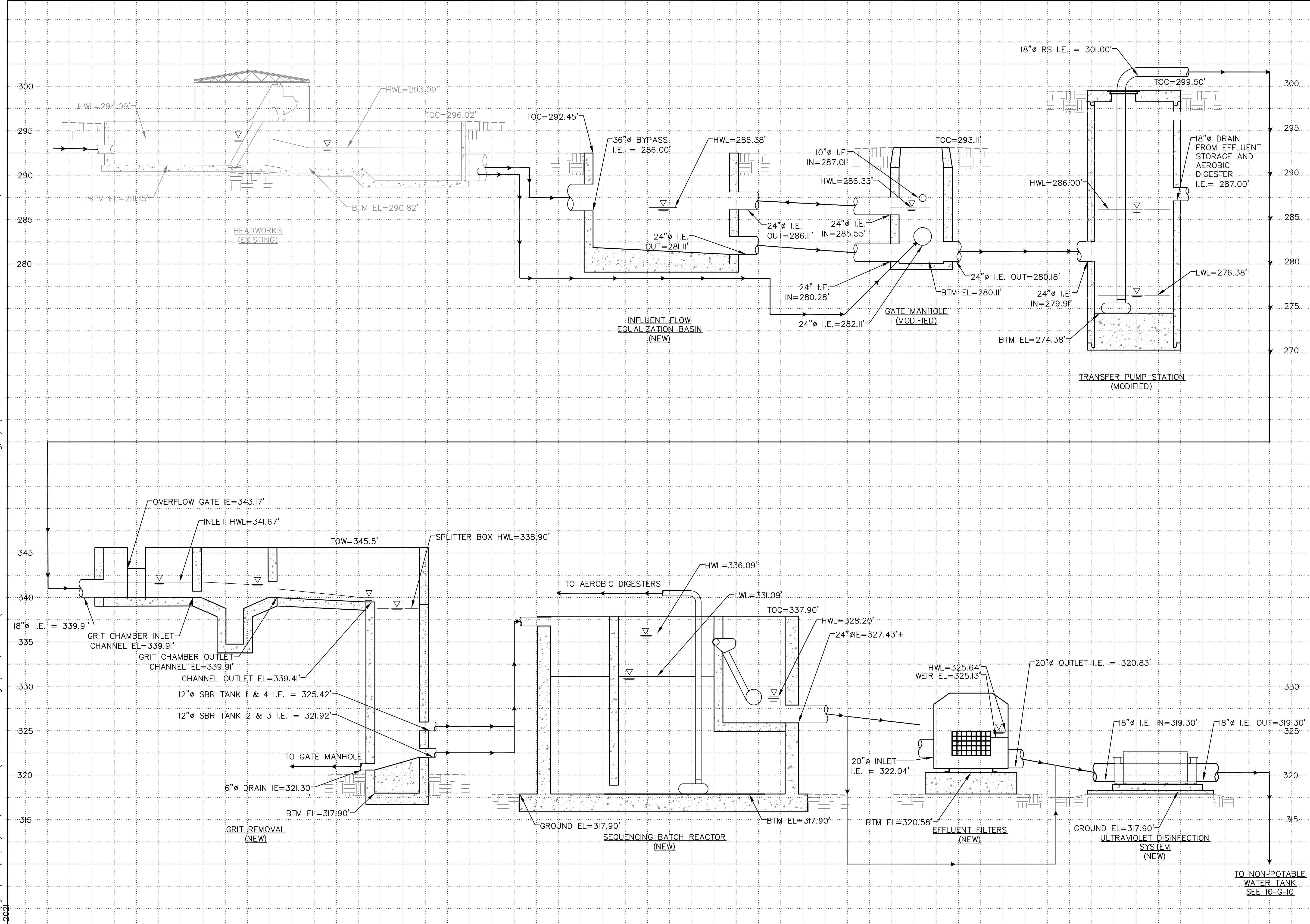

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

GENERAL
HYDRAULIC PROFILE

DESIGNED: DRAWN:

APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

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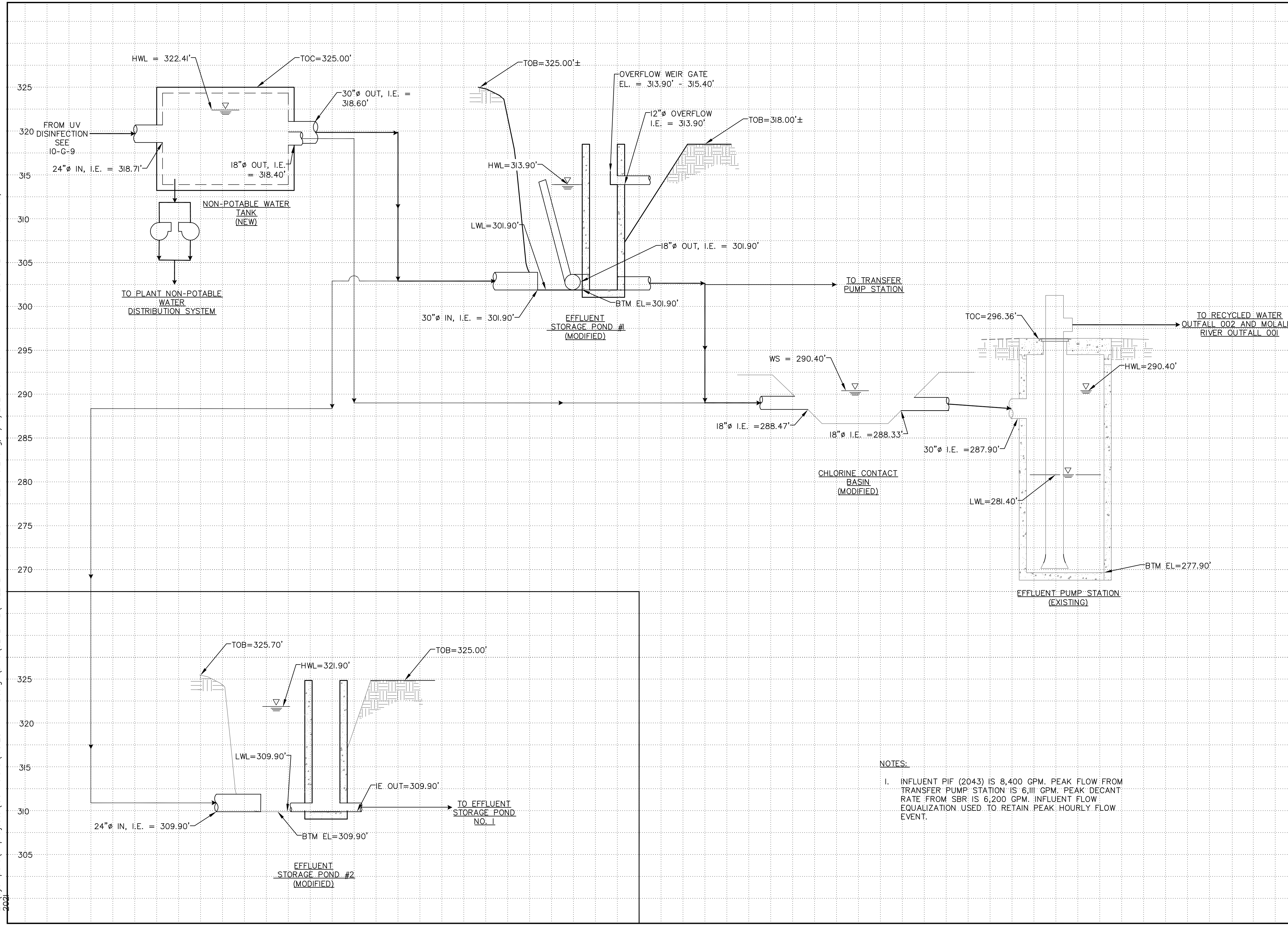
PROJECT NO.	DRAWING NO.
198.28	10-G-9
DATE	SHEET NO.
NOV. 2021	9 OF 97



NOTES:

1. INFLUENT PIF (2043) IS 8,400 GPM. PEAK FLOW FROM TRANSFER PUMP STATION IS 6,111 GPM. PEAK DECANT RATE FROM SBR IS 6,200 GPM. INFLUENT FLOW EQUALIZATION USED TO RETAIN PEAK HOURLY FLOW EVENT.

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

GENERAL
HYDRAULIC PROFILE CONTINUED

DESIGNED:	DRAWN:
—	—

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REVISED	DESCRIPTION	APPR'D.	DATE

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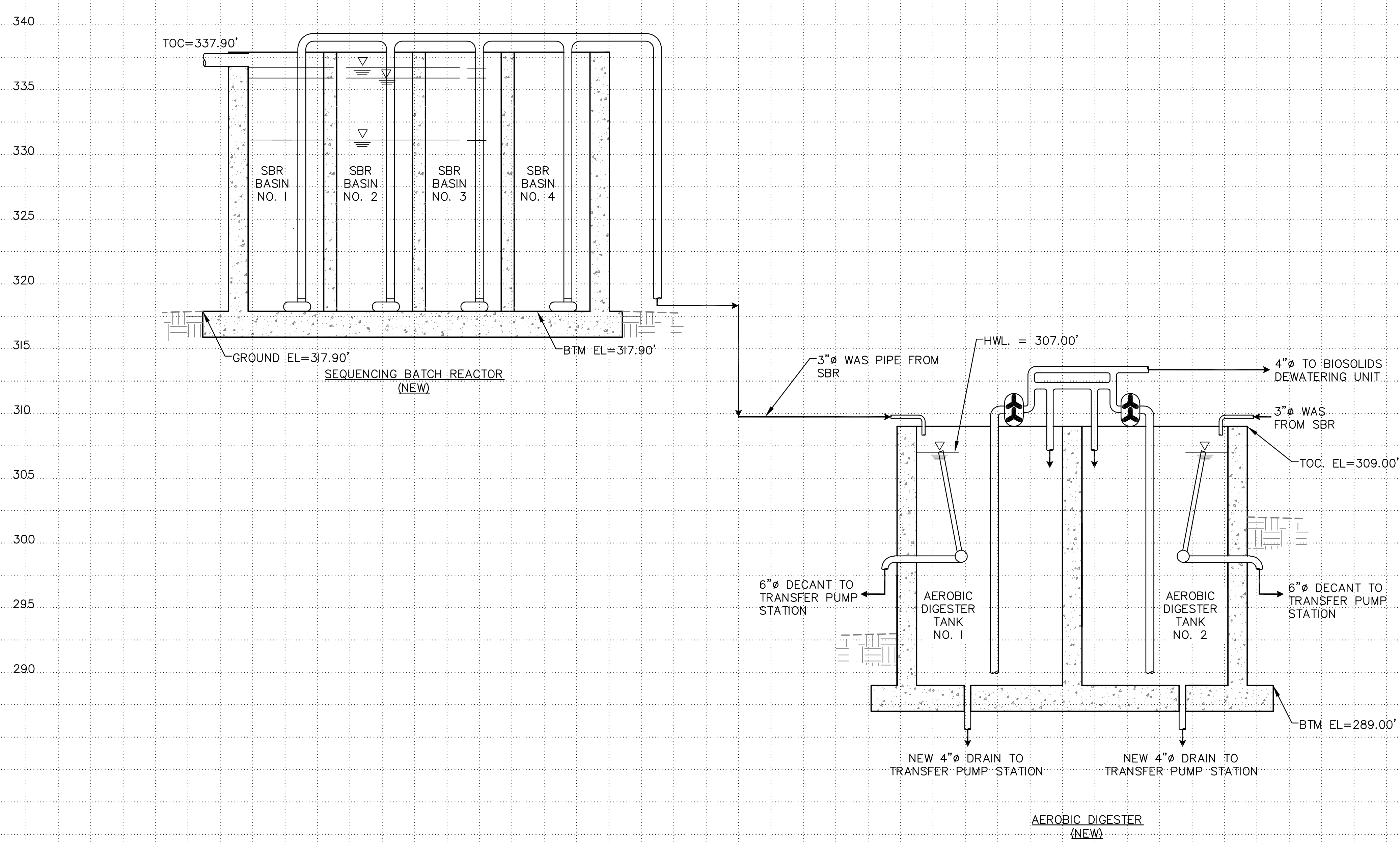
PROJECT NO.	DRAWING NO.
198.28	10-G-10
DATE	SHEET NO.
NOV. 2021	10 OF 97



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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

GENERAL
SOLIDS STREAM HYDRAULIC PROFILE

DESIGNED: —
DRAWN: CAT
APPROVED BY:
DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
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PROJECT NO.	DRAWING NO.
198.28	10-G-11
DATE	SHEET NO.
NOV. 2021	11 OF 97

MECHANICAL EQUIPMENT SYMBOLS

- BLOWER OR COMPRESSOR, ROTARY LOBE
- COMPRESSOR, PISTON
- AIR BUBBLE DIFFUSER
- SILENCER
- FILTER OR FILTER-SILENCER, INLET AIR
- RECEIVER OR PRESSURE VESSEL
- REDUCED PRESSURE BACKFLOW PREVENTER
- UTILITY STATION/HOSEBIB
- DECANT ARM/DECANTER
- GENERATOR
- MIXER
- EFFLUENT FILTER
- MECHANICAL SCREEN
- SCREENING CONTAINER
- POND CIRCULATOR

PUMP SYMBOLS

- PUMP, CENTRIFUGAL
- PUMP, ROTARY LOBE POSITIVE DISPLACEMENT
- PUMP, SUBMERSIBLE
- PUMP, VERTICAL TURBINE
- METERING PUMP
- MOTOR

VALVE SYMBOLS

- THREE WAY VALVE
- AIR RELIEF VALVE
- GATE VALVE (NORMALLY OPEN)
- GATE VALVE (NORMALLY CLOSED)
- PLUG VALVE (NORMALLY OPEN)
- PLUG VALVE (NORMALLY CLOSED)
- BALL VALVE (NORMALLY OPEN)
- BALL VALVE (NORMALLY CLOSED)
- BUTTERFLY VALVE
- GLOBE VALVE (NORMALLY OPEN)
- GLOBE VALVE (NORMALLY CLOSED)
- DIAPHRAGM VALVE
- NEEDLE VALVE
- DOUBLE LEAF CHECK VALVE
- CHECK VALVE
- BALL CHECK VALVE
- MUD VALVE
- SOLENOID
- MOTOR ACTUATOR
- DECANT ARM / SWIVEL ARM
- REDUCER
- FOOT VALVE

PIPING LEGEND

A	AERATION AIR
B/E	BYPASS/EMEREGENCY
BW	BACKWASH WATER
CL	CHLORINE
D	DRAIN
DB	DIGESTED BIOSOLIDS
FE	FINAL EFFLUENT
FM	FORCE MAIN
G	GRIT SLURRY
NPW	NON-POTABLE WATER
OF	OVERFLOW
POL	POLYMER
PST	PRESSATE
RS	RAW SEWAGE
RW	RECYLCED WATER
SS	SANITARY SEWER
SE	SECONDARY EFFLUENT
SA	SERVICE AIR
SD	STORM DRAIN
SN	SUPERNATANT
TD	TANK DRAIN
TE	FILTER EFFLUENT
TS	TRANSFER SLUDGE
V	VENT
W	POTABLE WATER
WAS	WASTE ACTIVATED SLUDGE

MEASUREMENT AND CONTROL SYMBOLS

FLOW (LIQUID, GAS)

- M — GENERAL FLOW METER
- A — AIR FLOW METER

LEVEL

- ULTRASONIC
- FLOAT
- STAFF GAUGE
- PRESSURE TRANSDUCER
- LEVEL SENSOR

PRESSURE

- GAUGE WITH DIAPHRAGM CHEMICAL SEAL
- V — VACUUM INDICATOR
- P — PRESSURE SENSOR

TEMPERATURE SENSOR

- TS — TEMPERATURE SENSOR
- MS — MOISTURE SENSOR

ANALYZER

- CL — CHLORINE RESIDUAL
- TB — TURBIDITY METER
- DO — DISSOLVED OXYGEN
- TSS — TOTAL SUSPENDED SOLIDS
- ORP — OXIDATION REDUCTION POTENTIAL

GENERAL SYMBOLS

- PNL NORTH — INSTRUMENT OR ELECTRICAL PANEL (PNL)
- FLUME
- WEIR
- S — AUTOMATIC SAMPLER
- W — WASHDOWN STATION
- SS — MANHOLE
- VFD — VARIABLE FREQUENCY DRIVE
- AIR BLOWOFF
- PROPELLER/TURBINE METER
- A — AIR FLOW SWITCH
- P — PRESSURE SWITCH
- L — DIAPHRAGM CHEMICAL SEAL LIMIT SWITCH
- S — SOLENOID VALVE
- T — TRANSMITTER
- REDUCING FLEXIBLE JOINT
- FLEXIBLE JOINT
- QUICK CONNECT COUPLING

GATE SYMBOLS

- SLIDE GATE (NORMALLY CLOSED)
- SLIDE GATE (NORMALLY OPEN)
- SLUICE GATE, CANAL GATE (NORMALLY CLOSED)
- SLUICE GATE, CANAL GATE (NORMALLY OPEN)

PROCESS LINES

- PRIMARY PROCESS FLOW
- SECONDARY PROCESS FLOW
- EXISTING
- VENDOR PACKAGE BOUNDARY
- ENCLOSURE BOUNDARY
- ELECTRICAL SIGNAL
- BYPASS/EMERGENCY FLOW

CROSS REFERENCE SYSTEM

ON DRAWING 20-P-400 CONTINUATION IS SHOWN AS:

20-P-400

ON DRAWING 20-P-500THIS CONTINUATION IS SHOWN AS:

20-P-500

SYSTEM NOT DESCRIBED BY PROCESS AND INSTRUMENTATION DRAWING:

CONTINUATION SHOWING DATA INTERCHANGE:

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THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
SYMBOLS, LEGEND

DESIGNED: DRAWN:
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
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PROJECT NO.	DRAWING NO.
198.28	20-P-1
DATE	SHEET NO.
NOV. 2021	12 OF 97

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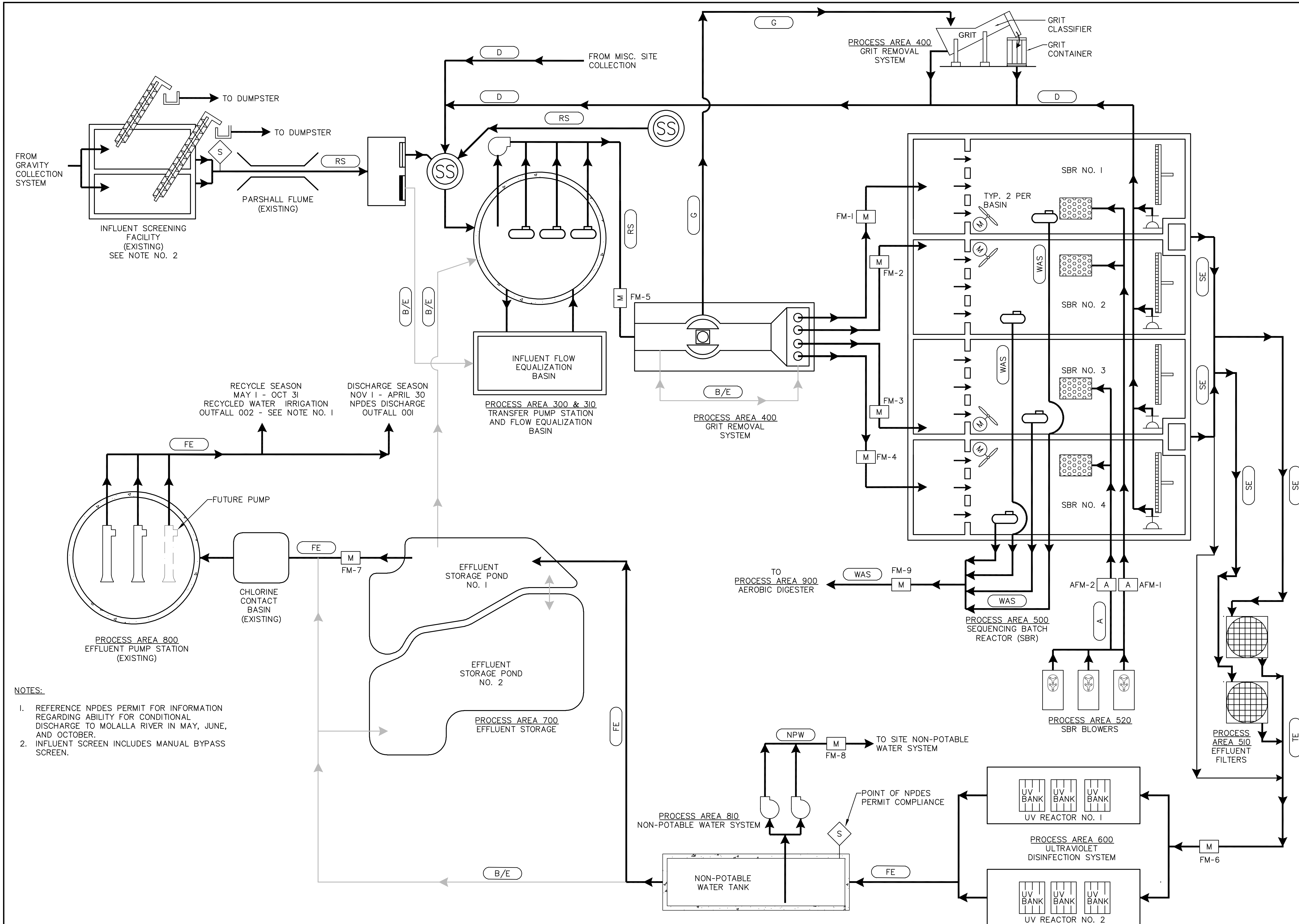

NOTES:

1. REFERENCE NPDES PERMIT FOR INFORMATION REGARDING ABILITY FOR CONDITIONAL DISCHARGE TO MOLALLA RIVER IN MAY, JUNE, AND OCTOBER.
2. INFLUENT SCREEN INCLUDES MANUAL BYPASS SCREEN.

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
GENERAL PROCESS DIAGRAM - LIQUID STREAM

DESIGNED: — DRAWN: CGP
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
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PROJECT NO.	DRAWING NO.
198.28	20-P-2
DATE	SHEET NO.
NOV. 2021	13 OF 97

PLOT DATE November 30, 2021
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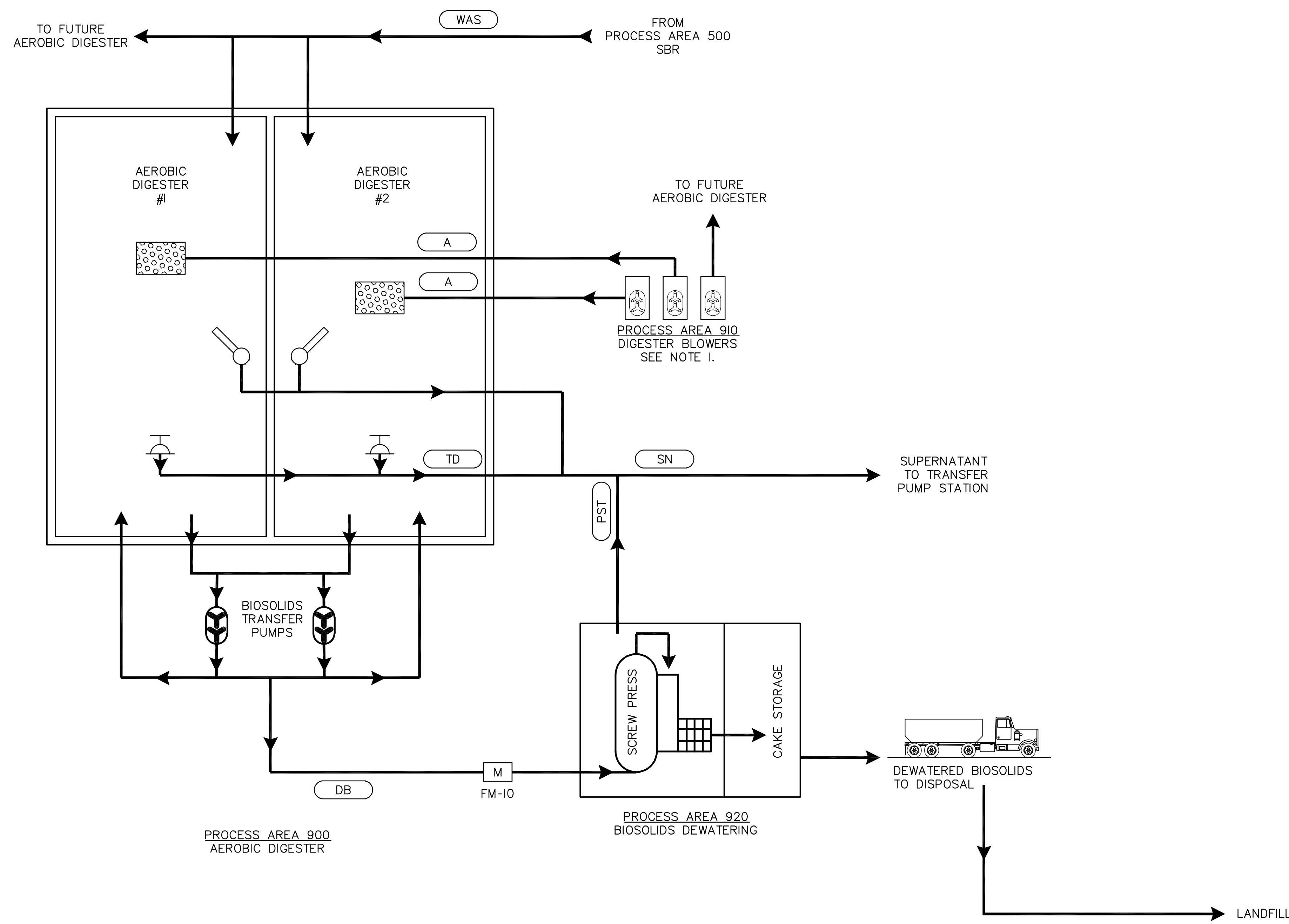

NOTES:
1. ONLY TWO BLOWERS WILL BE INSTALLED UPFRONT. THIRD BLOWER WILL BE ADDED IN THE FUTURE.

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
GENERAL PROCESS DIAGRAM - SOLIDS STREAM

DESIGNED: --
DRAWN: --
APPROVED BY: ____ DATE: ____

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

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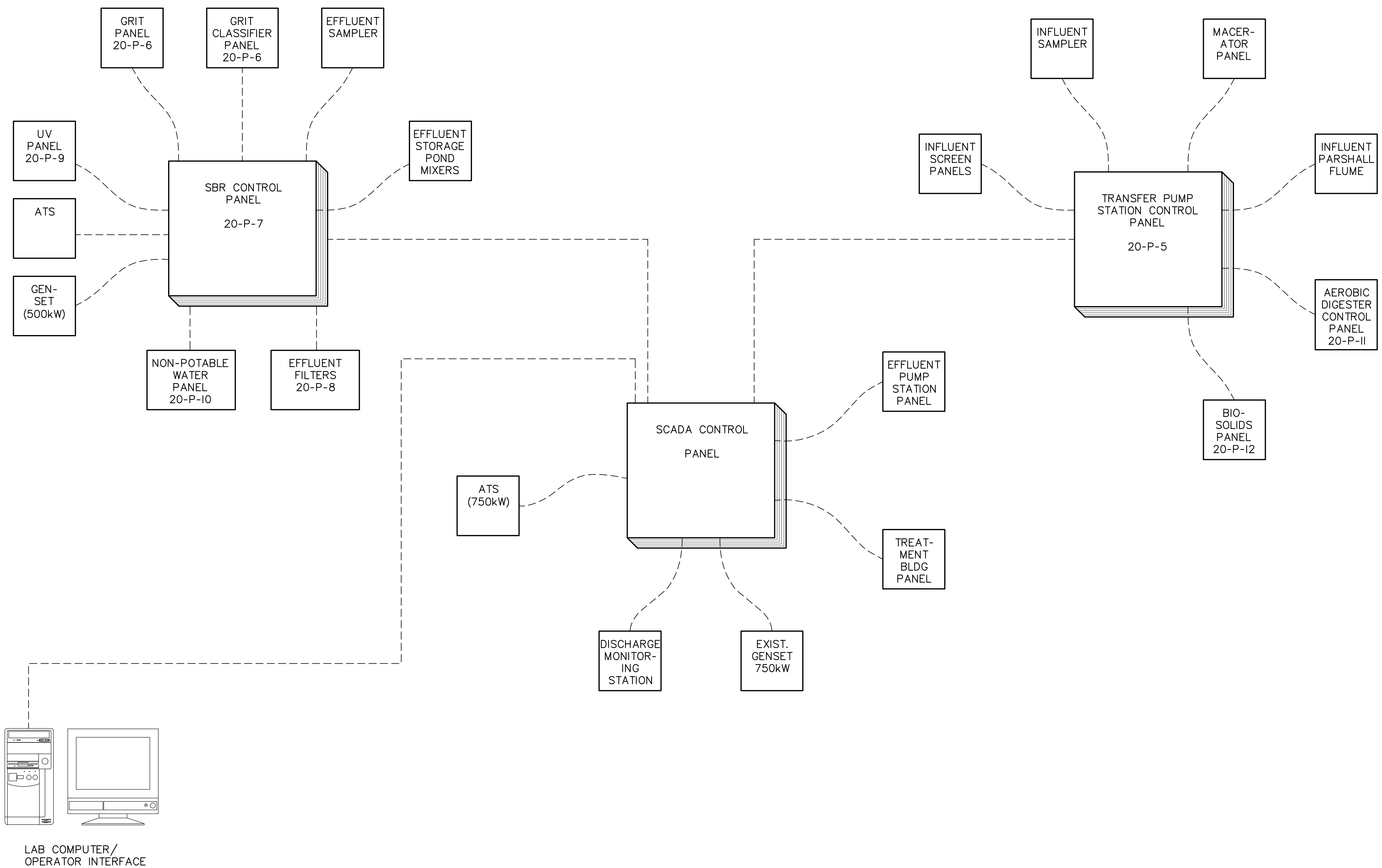
PROJECT NO.	DRAWING NO.
198.28	20-P-3
DATE	SHEET NO.
NOV. 2021	14 OF 97



NOTE:

AUTO-DIALER, FLOW METER CONVERTERS, AND OTHER DEVICES MAY BE LOCATED IN SEPARATE PANELS, BUT WILL ALL TRANSMIT INFORMATION, ALARMS AND OPERATIONAL STATUS TO SBR AND SCADA PANELS.

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
PLANT PANEL - SCHEMATIC

DESIGNED: TJM	DRAWN: CGP
APPROVED BY:	DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

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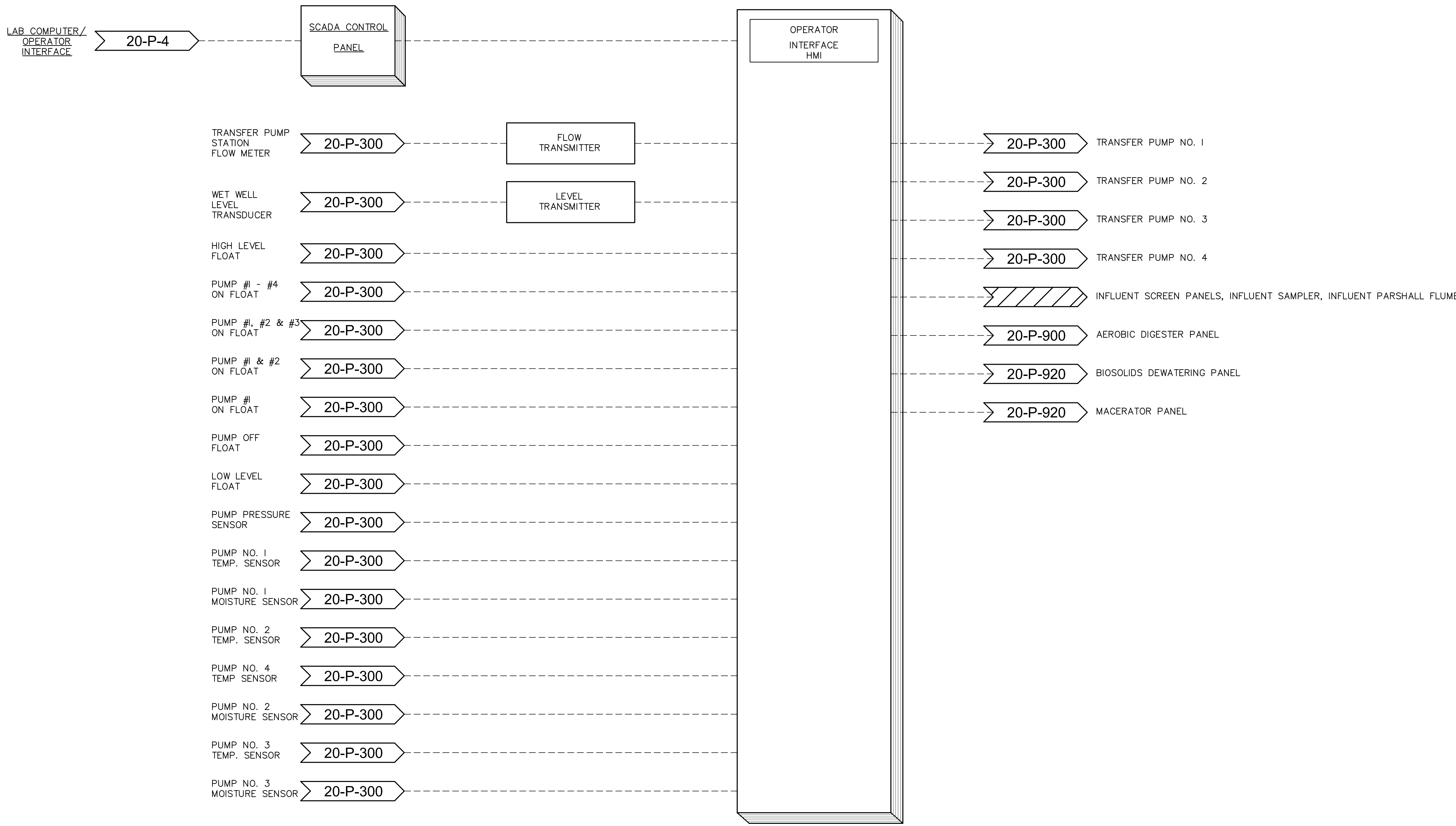
PROJECT NO.	DRAWING NO.
198.28	20-P-4
DATE	SHEET NO.
NOV. 2021	15 OF 97



TRANSFER PUMP STATION CONTROL PANEL

NOTE:

AUTO-DIALER, FLOW METER CONVERTERS, AND OTHER DEVICES MAY BE LOCATED IN SEPARATE PANELS, BUT WILL ALL TRANSMIT INFORMATION, ALARMS AND OPERATIONAL STATUS TO SBR AND SCADA PANELS.

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
TRANSFER PUMP STATION CONTROL PANEL

DESIGNED: TJM
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DATE:

REVISIONS

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LINE IS 1 INCH AT FULL SCALE
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PROJECT NO.	DRAWING NO.
198.28	20-P-5
DATE	SHEET NO.
NOV. 2021	16 OF 97

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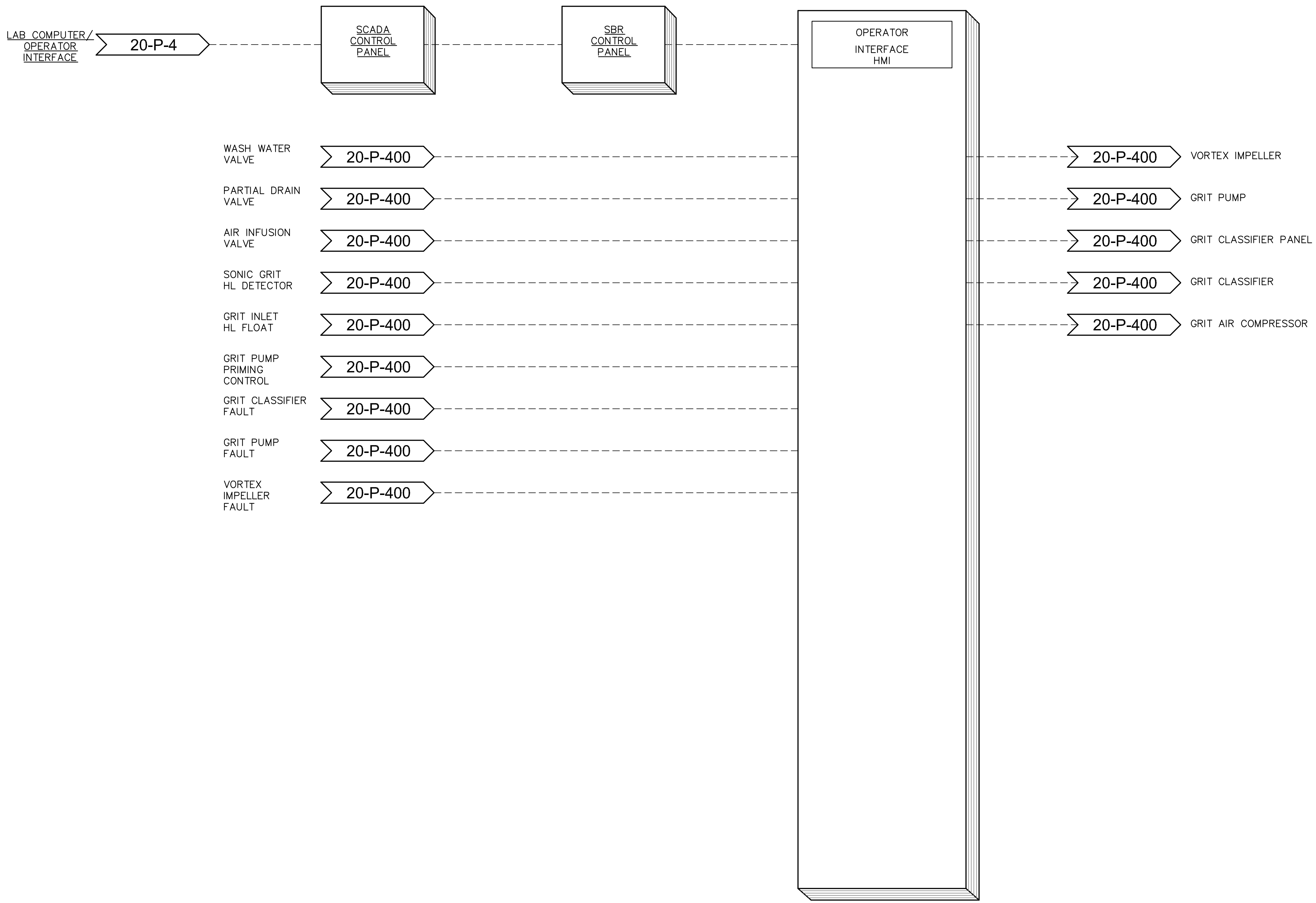

GRIT SYSTEM CONTROL PANEL

NOTE:

AUTO-DIALER, FLOW METER CONVERTERS, AND OTHER DEVICES MAY BE LOCATED IN SEPARATE PANELS, BUT WILL ALL TRANSMIT INFORMATION, ALARMS AND OPERATIONAL STATUS TO SBR AND SCADA PANELS.

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
GRIT SYSTEM CONTROL PANEL

DESIGNED: — DRAWN: —

APPROVED BY: DATE:

REVISIONS

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LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-6
DATE	SHEET NO.
NOV. 2021	17 OF 97

PLOT DATE November 30, 2021

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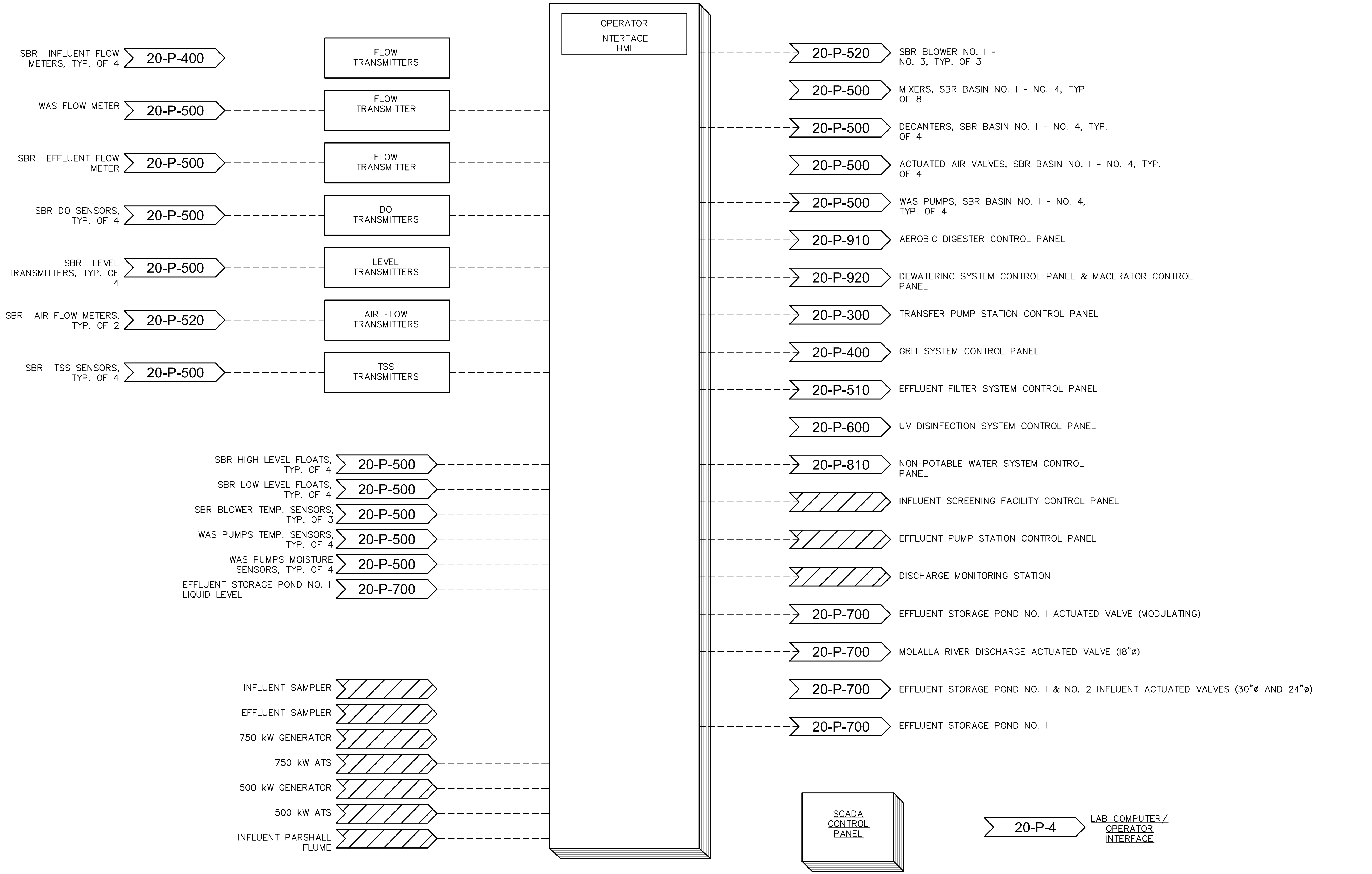

SBR CONTROL PANEL

NOTE:

AUTO-DIALER, FLOW METER CONVERTERS, AND OTHER DEVICES MAY BE LOCATED IN SEPARATE PANELS, BUT WILL ALL TRANSMIT INFORMATION, ALARMS AND OPERATIONAL STATUS TO SBR AND SCADA PANELS.

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
SEQUENCING BATCH REACTOR CONTROL PANEL

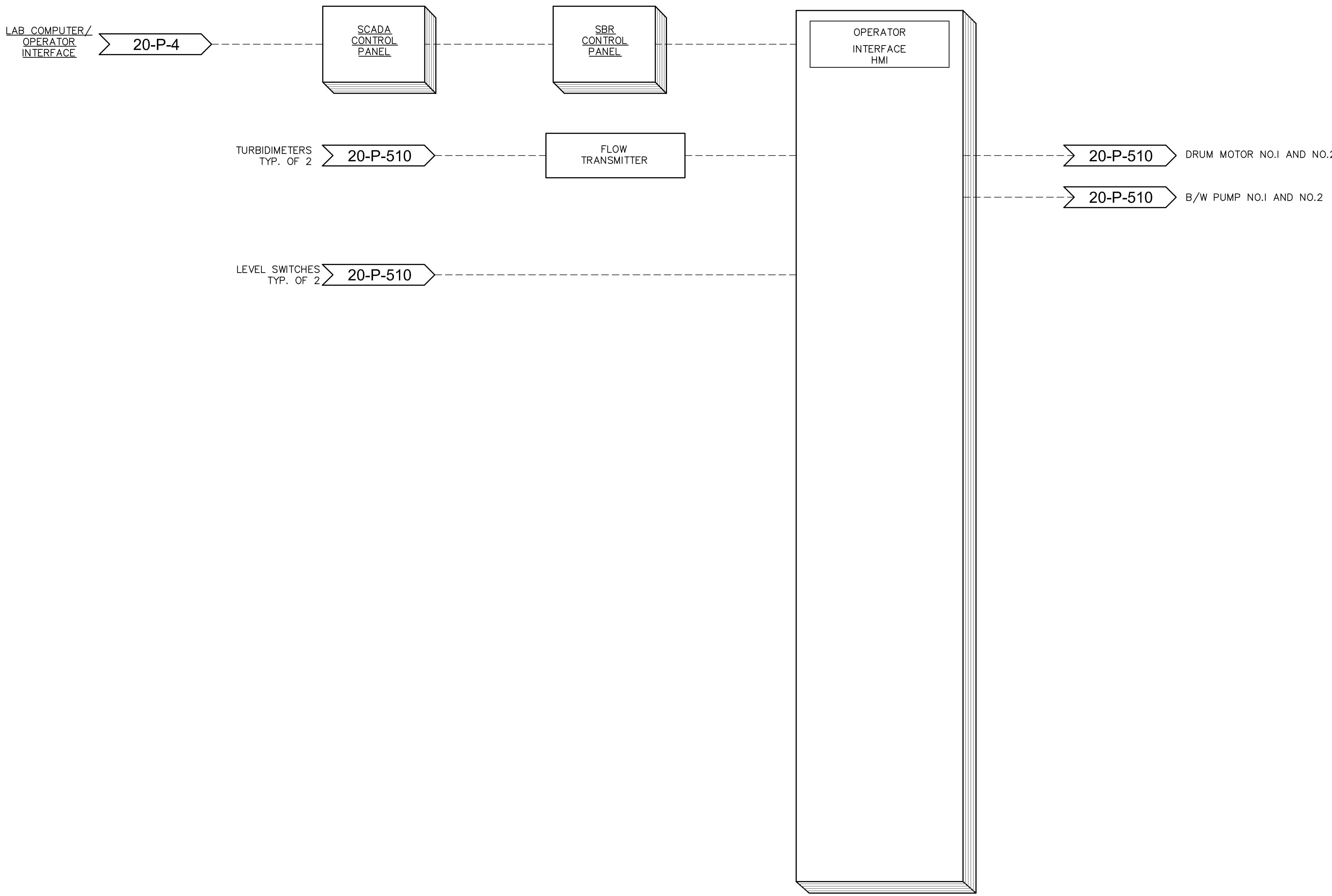
DESIGNED: TJM
DRAWN: CGP
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-7
DATE	SHEET NO.
NOV. 2021	18 OF 97



EFFLUENT FILTER CONTROL PANEL

NOTE:

AUTO-DIALER, FLOW METER CONVERTERS, AND OTHER DEVICES MAY BE LOCATED IN SEPARATE PANELS, BUT WILL ALL TRANSMIT INFORMATION, ALARMS AND OPERATIONAL STATUS TO SBR AND SCADA PANELS.

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
EFFLUENT FILTERS CONTROL PANEL

DESIGNED: — DRAWN: —
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REVISIONS

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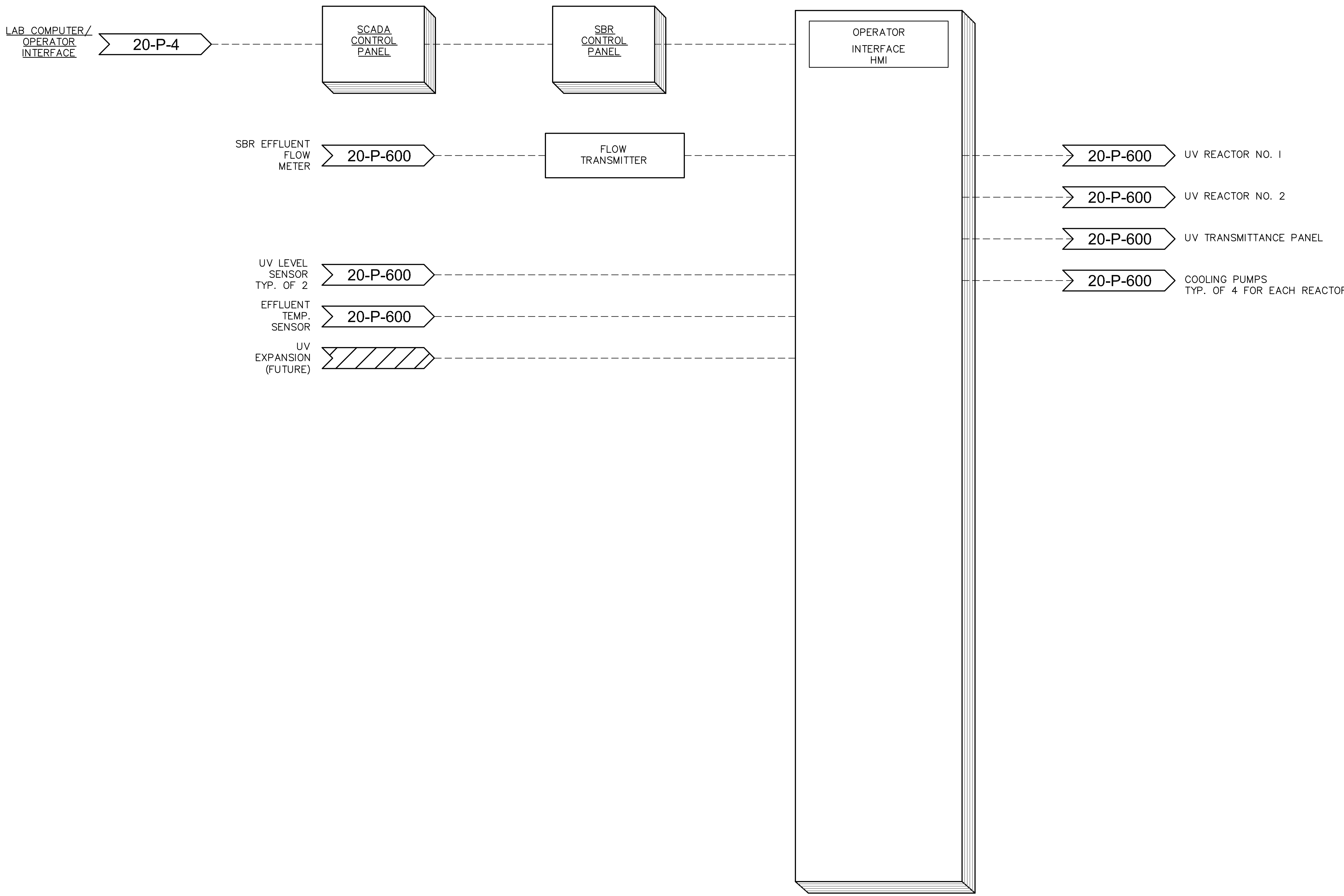
PROJECT NO.	DRAWING NO.
198.28	20-P-8
DATE	SHEET NO.
NOV. 2021	19 OF 97



UV DISINFECTION SYSTEM CONTROL PANEL

NOTE:

AUTO-DIALER, FLOW METER CONVERTERS, AND OTHER DEVICES MAY BE LOCATED IN SEPARATE PANELS, BUT WILL ALL TRANSMIT INFORMATION, ALARMS AND OPERATIONAL STATUS TO SBR AND SCADA PANELS.

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CITY OF MOLALLA

PROCESS
UV DISINFECTION SYSTEM CONTROL PANEL

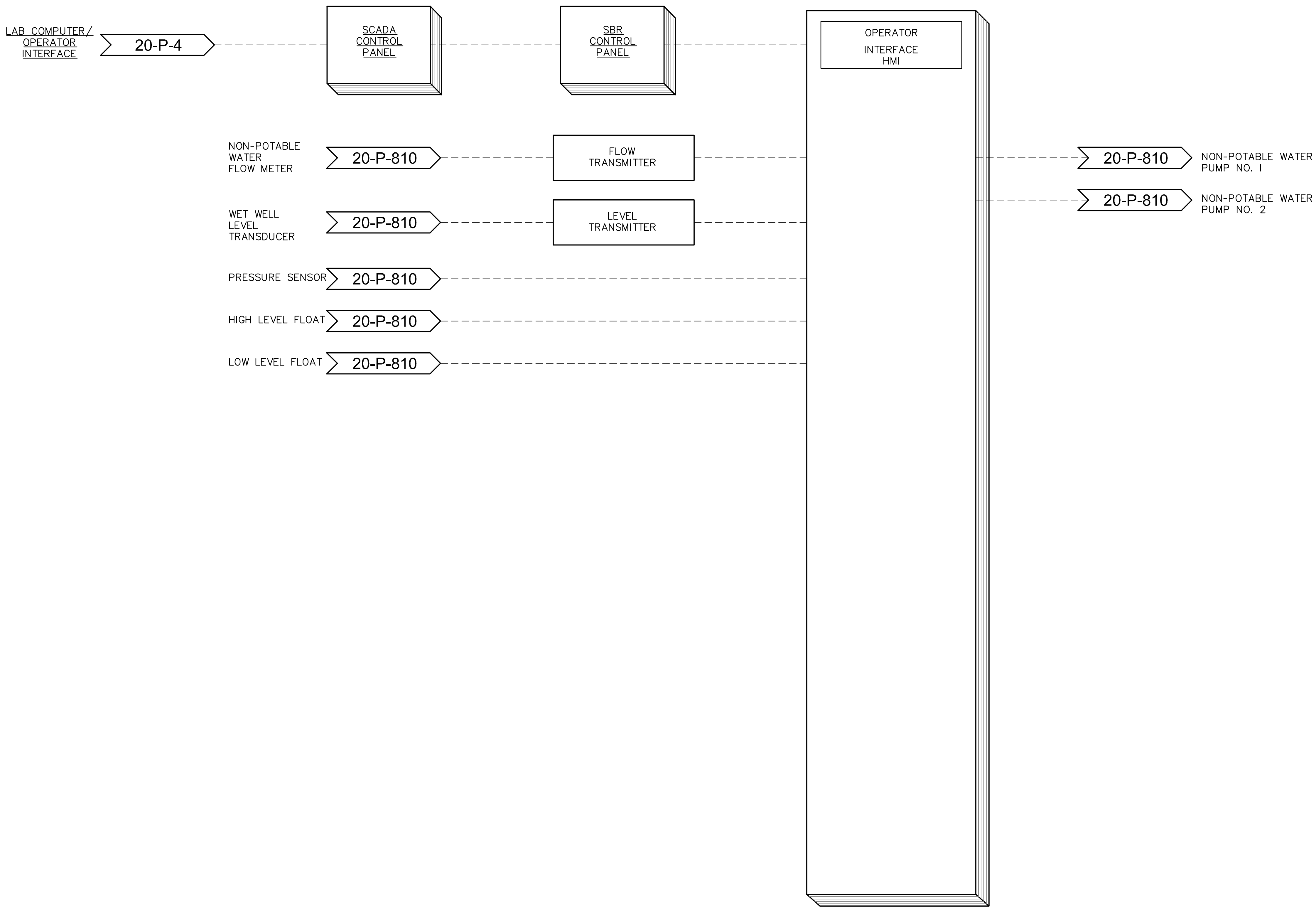
DESIGNED: TJM
DRAWN: CGP
APPROVED BY: ____ DATE: ____

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-9
DATE	SHEET NO.
NOV. 2021	20 OF 97



NON-POTABLE WATER CONTROL PANEL

NOTE:

AUTO-DIALER, FLOW METER CONVERTERS, AND OTHER DEVICES MAY BE LOCATED IN SEPARATE PANELS, BUT WILL ALL TRANSMIT INFORMATION, ALARMS AND OPERATIONAL STATUS TO SBR AND SCADA PANELS.

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY
NOT FOR
CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
NON-POTABLE WATER CONTROL PANEL

DESIGNED: TJM
DRAWN: CGP
APPROVED BY:
DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO. 198.28
DRAWING NO. 20-P-10
DATE NOV. 2021
SHEET NO. 21 OF 97

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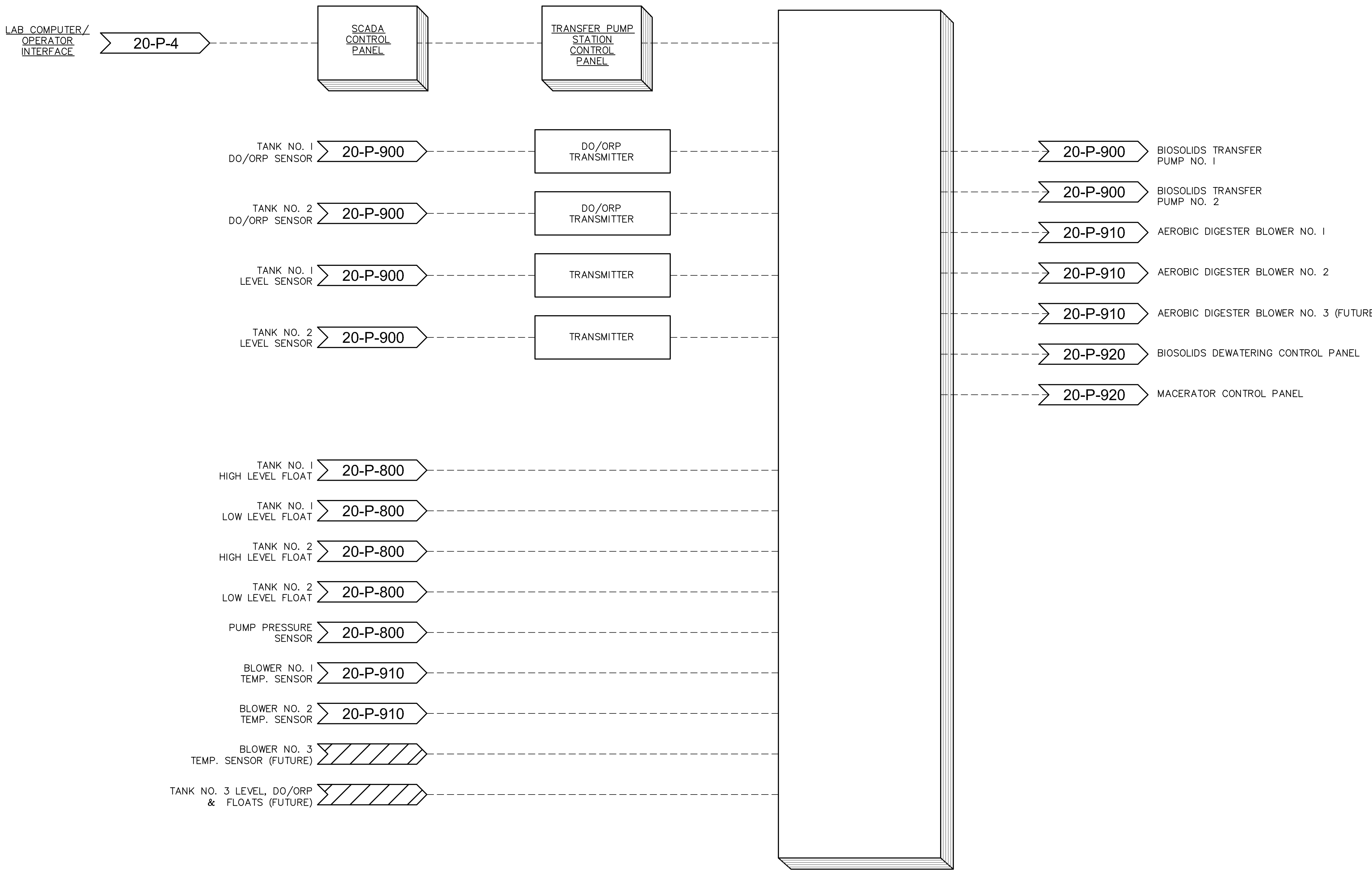
PLOT DATE November 30, 2021



AEROBIC DIGESTER CONTROL PANEL

NOTE:

AUTO-DIALER, FLOW METER CONVERTERS, AND OTHER DEVICES MAY BE LOCATED IN SEPARATE PANELS, BUT WILL ALL TRANSMIT INFORMATION, ALARMS AND OPERATIONAL STATUS TO SBR AND SCADA PANELS.

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THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY
NOT FOR
CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
AEROBIC DIGESTER CONTROL PANEL

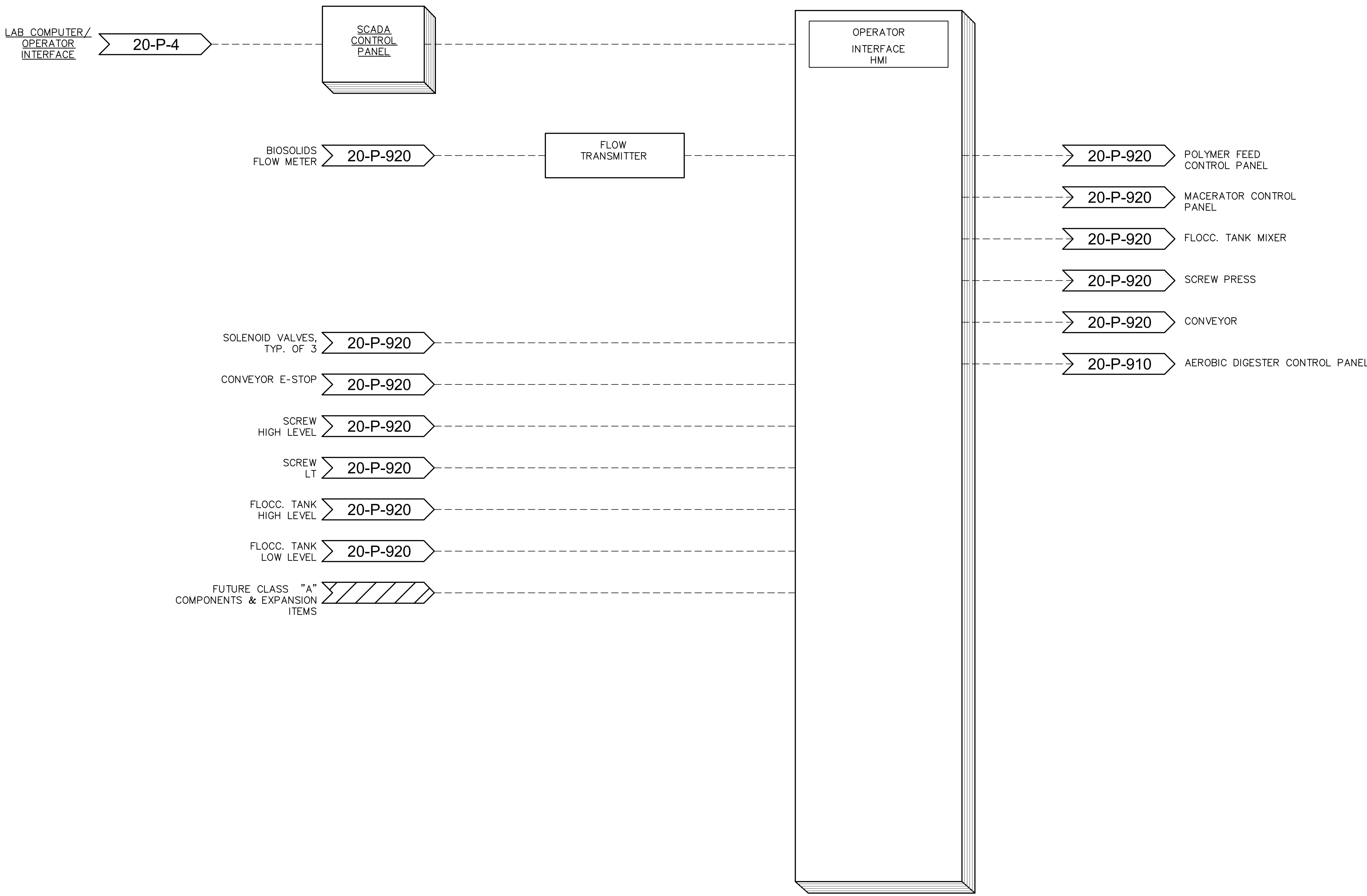
DESIGNED: TJM
DRAWN: CGP
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-11
DATE	SHEET NO.
NOV. 2021	22 OF 97



BIOSOLIDS CONTROL PANEL

NOTE:

AUTO-DIALER, FLOW METER CONVERTERS, AND OTHER DEVICES MAY BE LOCATED IN SEPARATE PANELS, BUT WILL ALL TRANSMIT INFORMATION, ALARMS AND OPERATIONAL STATUS TO SBR AND SCADA PANELS.

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
BIOSOLIDS CONTROL PANEL

DESIGNED: TJM
DRAWN: CGP
APPROVED BY:
DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-12
DATE	SHEET NO.
NOV. 2021	23 OF 97

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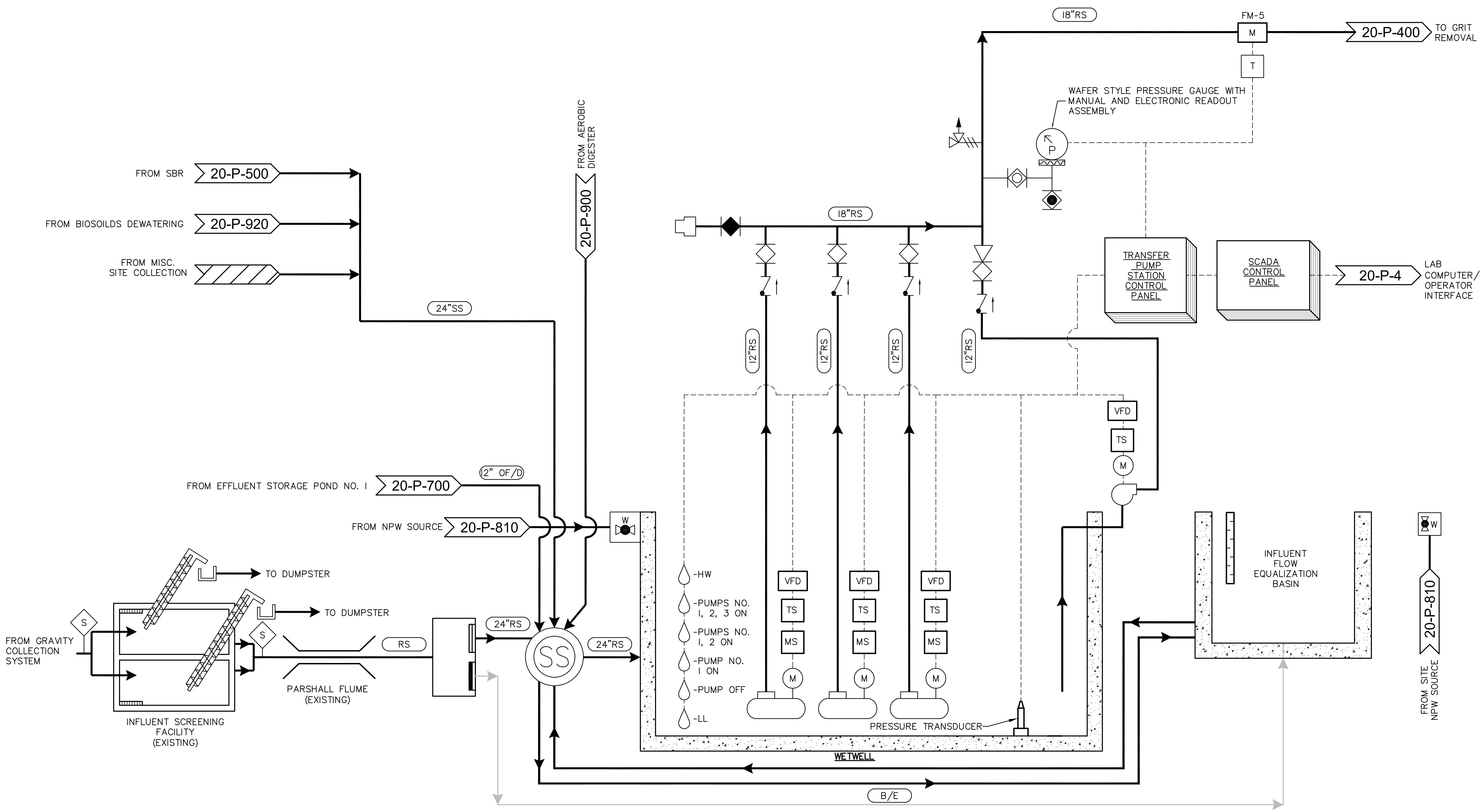


TRANSFER PUMP STATION

Z:\dyer-part\AAprojects\98 Molalla\98.28 WWTF Design\DWG\PROCESS AREA 300 - TRANSFER PUMP STA\20-P-300.dwg, 11/11/2021 1:23:12 PM PLOT DATE November 30, 2021

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
TRANSFER PUMP STATION

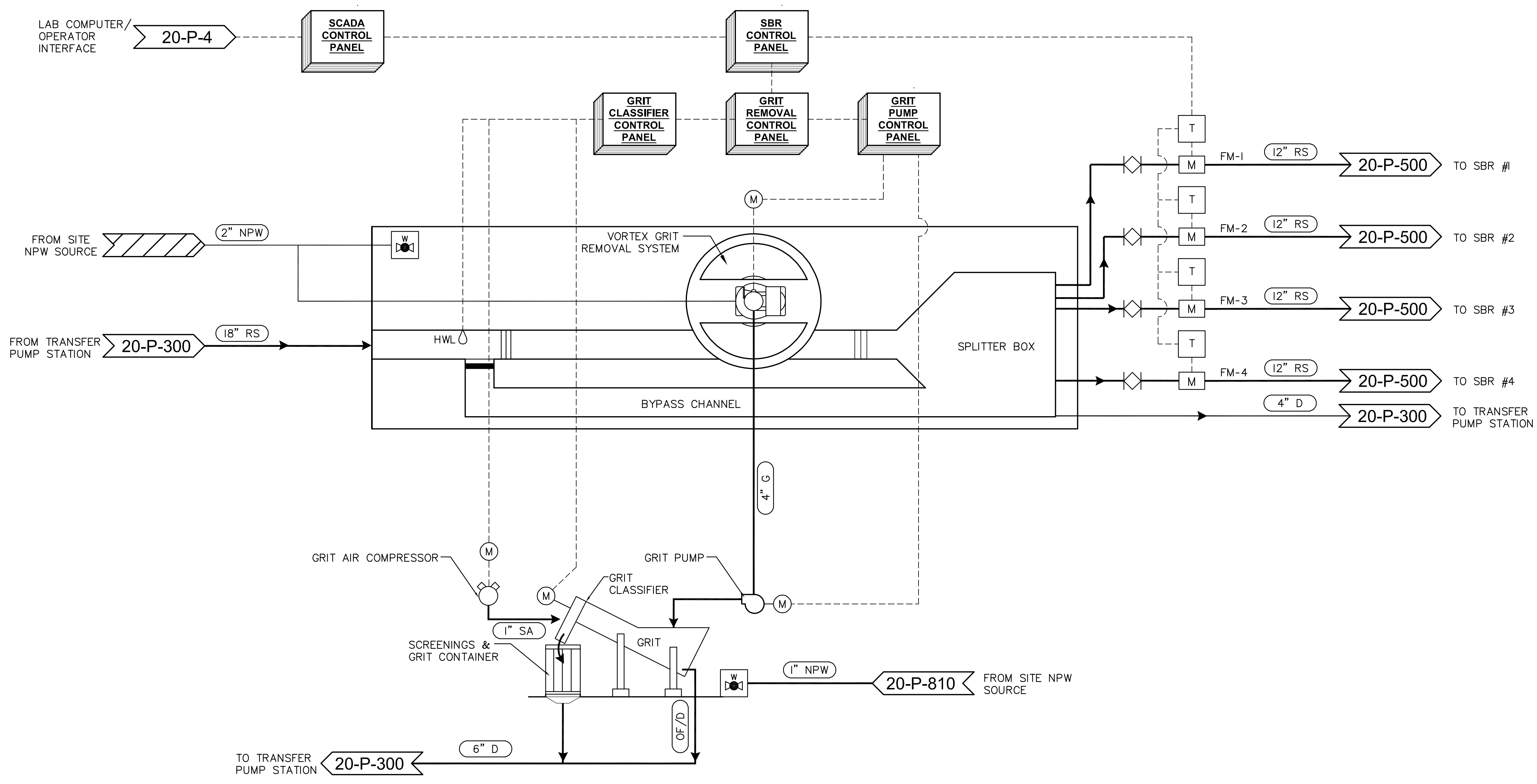
DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-300
DATE	SHEET NO.
NOV. 2021	24 OF 97



HEADWORKS

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
HEADWORKS

DESIGNED: — DRAWN: —
APPROVED BY: DATE:

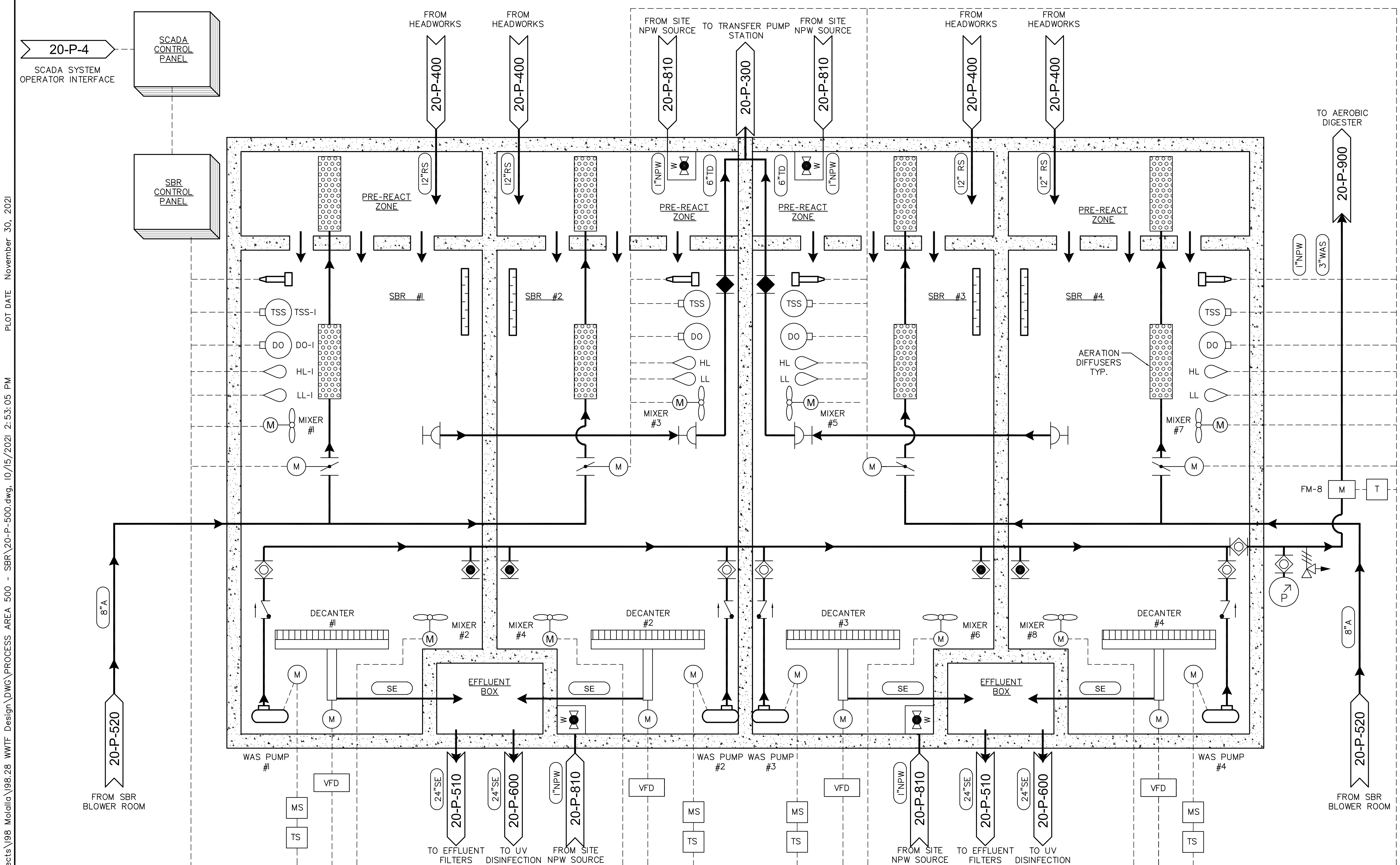
REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-400
DATE	SHEET NO.
NOV. 2021	25 OF 97

Z:\dyer-part\AAprojects\198 Molalla\198.28 WWTF Design\DWG\PROCESS AREA 400 - GRIT REMOVAL\20-P-400.dwg, 10/15/2021 2:52:57 PM PLOT DATE November 30, 2021



SEQUENCING BATCH REACTOR (SBR)

Z:\dyer-part\AAprojects\98 Molalla\98.28 WWTF Design\DWG\PROCESS AREA 500 - SBR\20-P-500.dwg, 10/15/2021 2:53:05 PM PLOT DATE November 30, 2021

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
SEQUENCING BATCH REACTOR

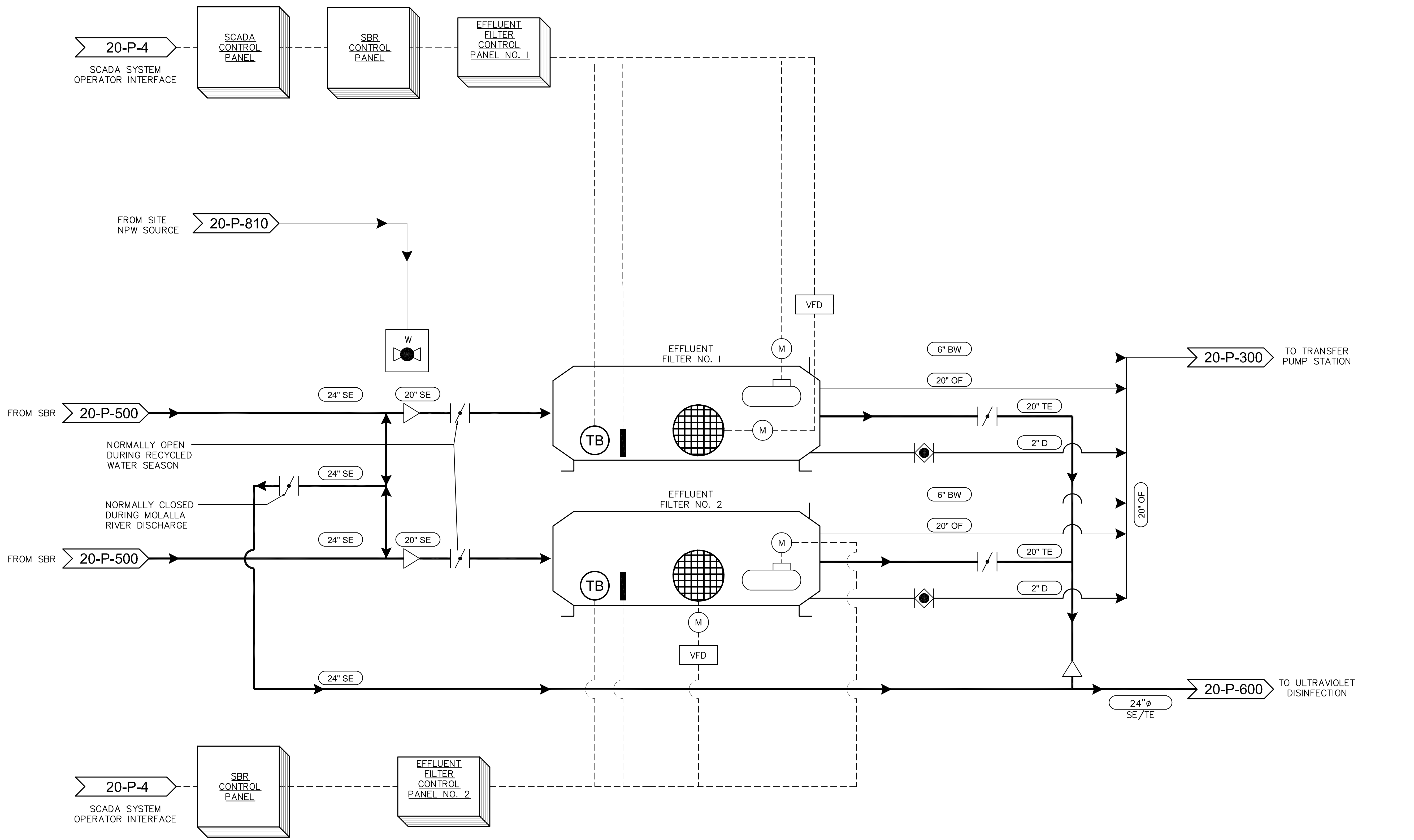
DESIGNED: DRAWN:
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-500
DATE	SHEET NO.
NOV. 2021	26 OF 97



EFFLUENT FILTERS

PRELIMINARY NOT FOR CONSTRUCTION

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

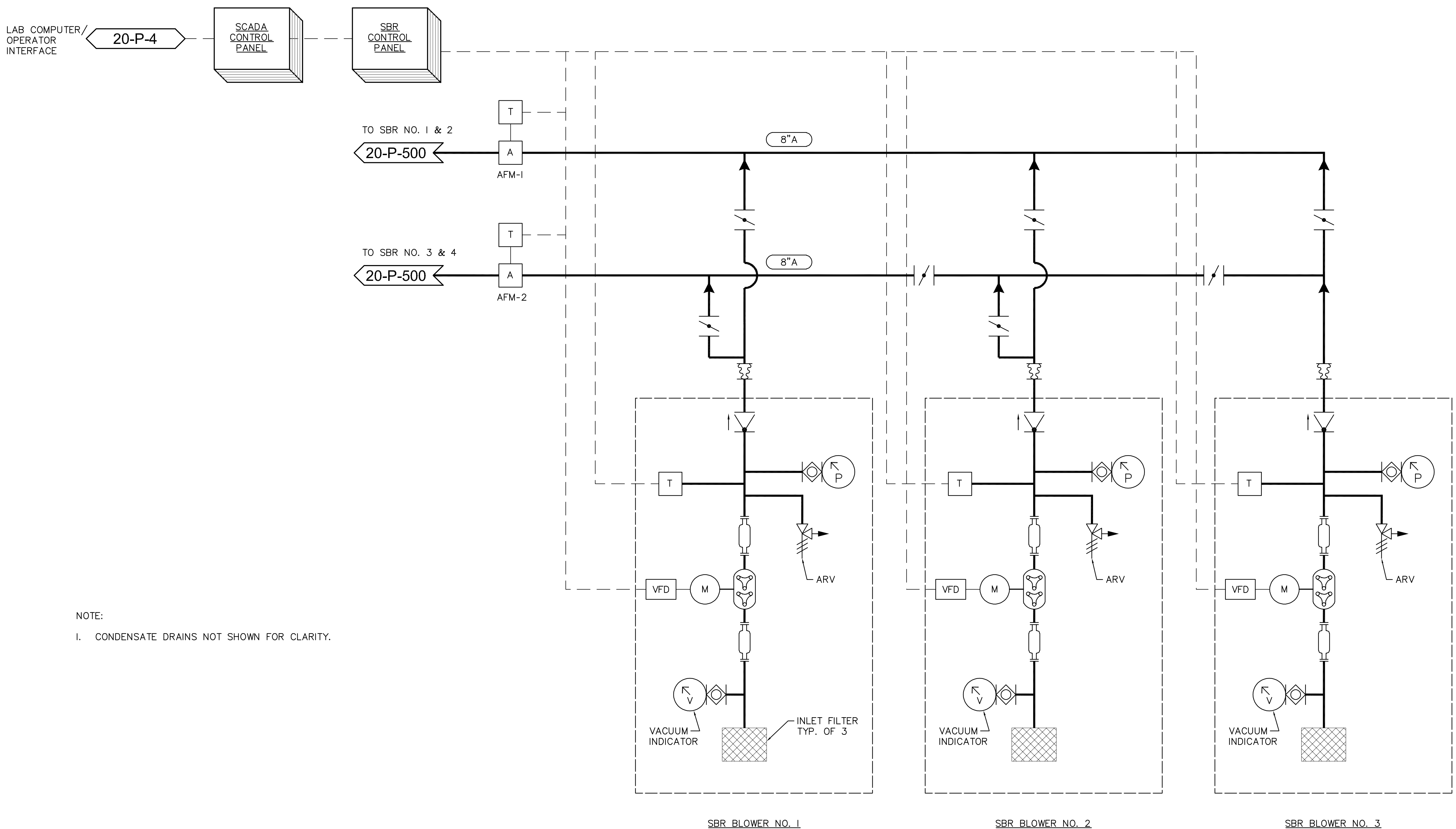
PROCESS
EFFLUENT FILTERS

DESIGNED: — DRAWN: —
APPROVED BY: ______ DATE: ______

REVISIONS			
REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-510
DATE	SHEET NO.
NOV. 2021	27 OF 97



NOTE:

1. CONDENSATE DRAINS NOT SHOWN FOR CLARITY.

SBR BLOWERS

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY
NOT FOR
CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
SBR BLOWER SYSTEM

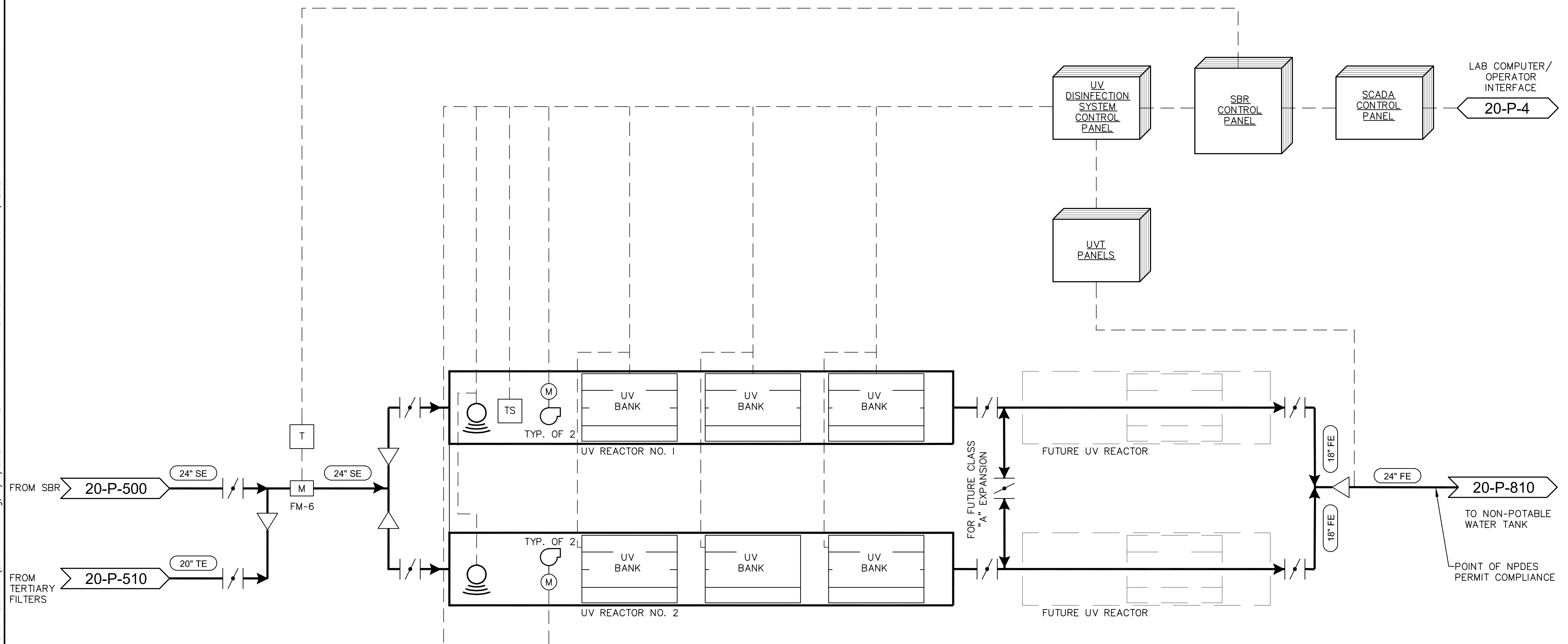
DESIGNED: --
DRAWN: --
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-520
DATE	SHEET NO.
NOV. 2021	28 OF 97



ULTRAVIOLET DISINFECTION SYSTEM

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY
NOT FOR
CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
UV DISINFECTION SYSTEM

DESIGNED: --
DRAWN: --
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-600
DATE	SHEET NO.
NOV. 2021	29 OF 97

PLOT DATE November 30, 2021

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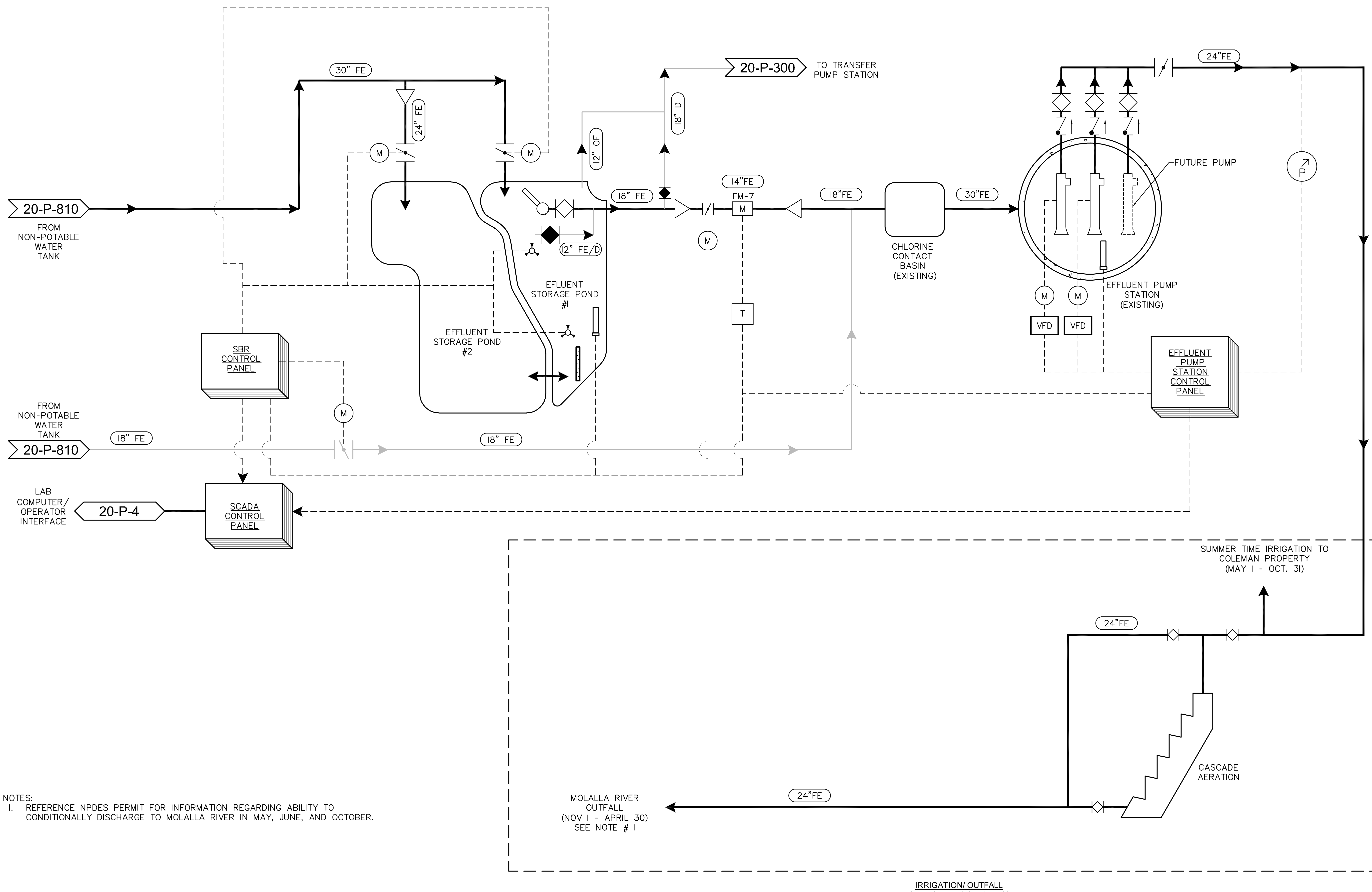


NOTES:
1. REFERENCE NPDES PERMIT FOR INFORMATION REGARDING ABILITY TO CONDITIONALLY DISCHARGE TO MOLALLA RIVER IN MAY, JUNE, AND OCTOBER.

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
EFFLUENT WATER STORAGE/DISCHARGE

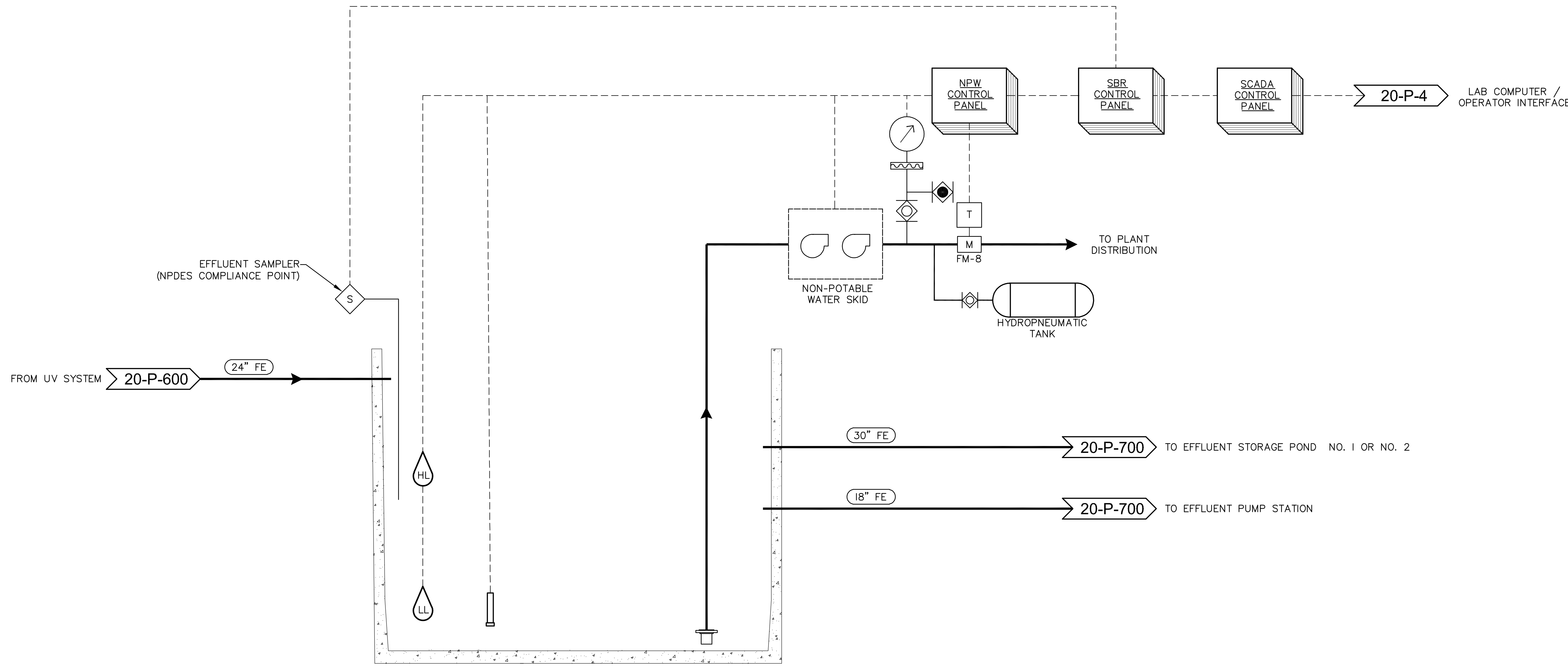
DESIGNED: —
DRAWN: —
APPROVED BY:
DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-700
DATE	SHEET NO.
NOV. 2021	30 OF 97



NON - POTABLE WATER SYSTEM

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
NON-POTABLE WATER SYSTEM

DESIGNED: CGP
DRAWN: CGP
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-810
DATE	SHEET NO.
NOV. 2021	31 OF 97

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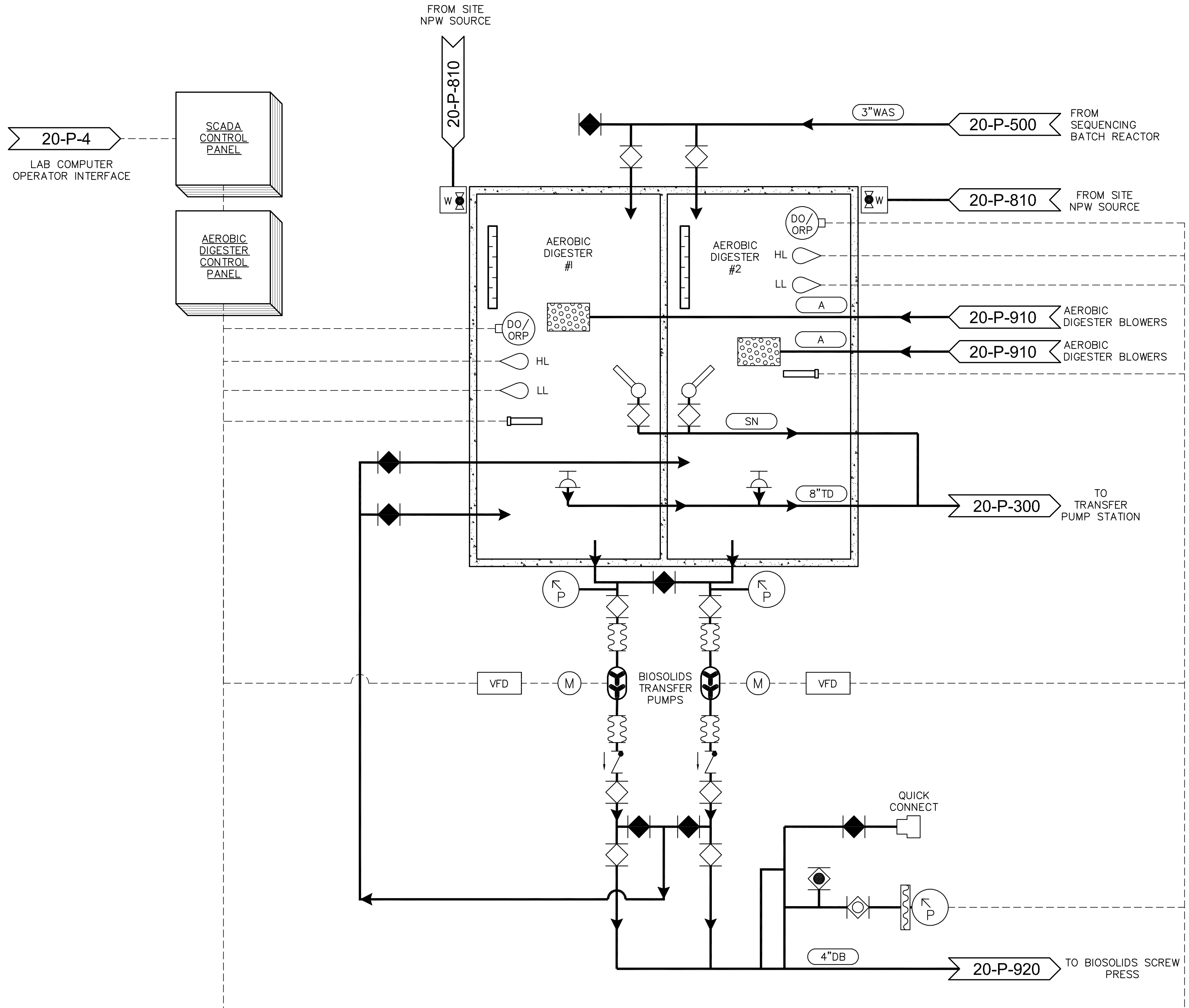


PROCESS AREA 900
AEROBIC DIGESTER

Z:\dyer-part\AAprojects\198 Molalla\198.28 WWTF Design\DWG\PROCESS AREA 900 - AEROBIC DIGESTER\P900.dwg, 11/5/2021 8:39:18 AM PLOT DATE November 30, 2021

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
AEROBIC DIGESTER

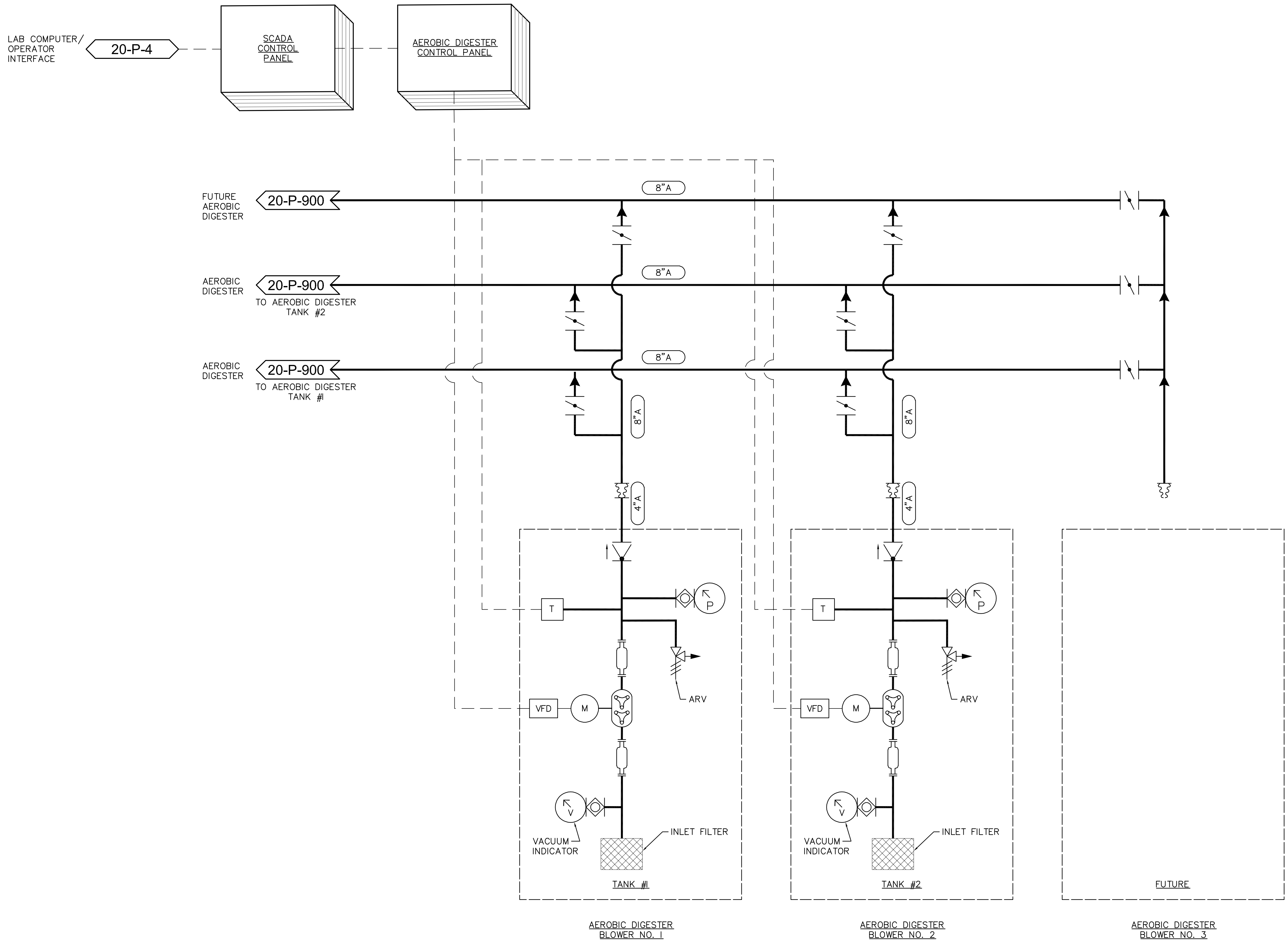
DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-900
DATE	SHEET NO.
OCT. 2021	32 OF 90



AEROBIC DIGESTER BLOWERS

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
AEROBIC DIGESTER BLOWERS

DESIGNED: —
DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-910
DATE	SHEET NO.
NOV. 2021	33 OF 97

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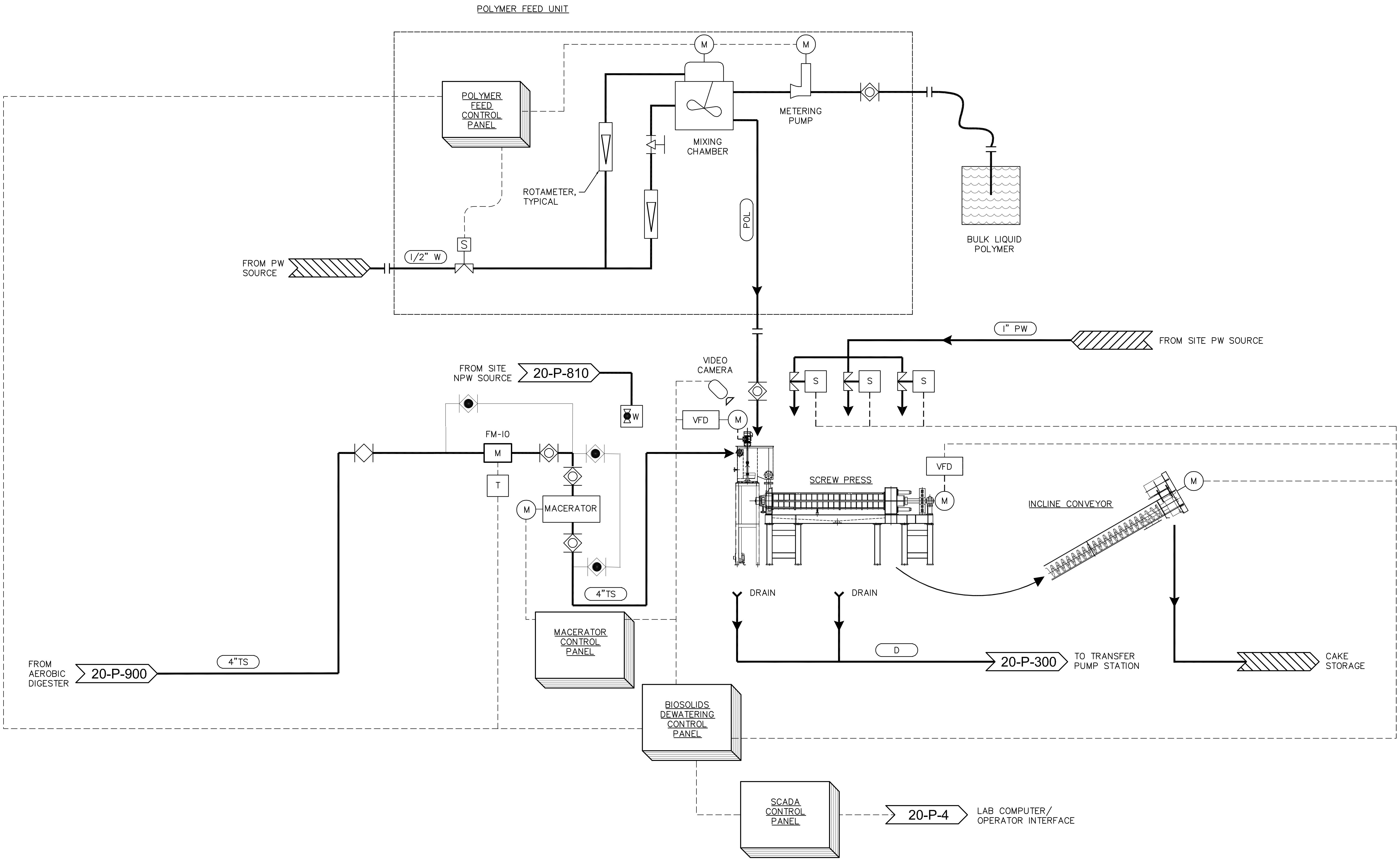


BIOSOLIDS DEWATERING

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

PROCESS
BIOSOLIDS DEWATERING

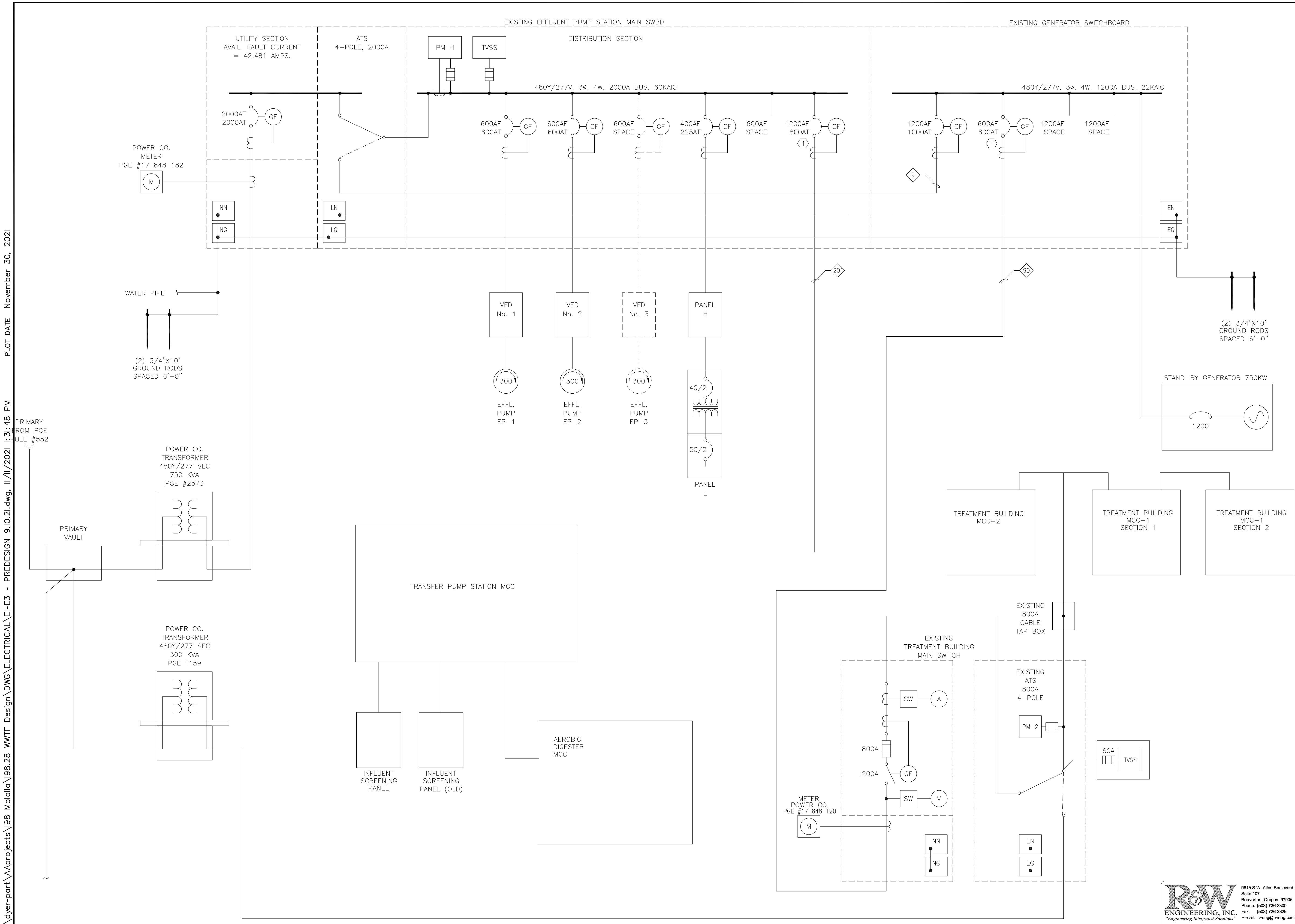
DESIGNED: —
DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	20-P-920
DATE	SHEET NO.
NOV. 2021	34 OF 97



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THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY
NOT FOR
CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

ELECTRICAL
ONE-LINE DIAGRAM

DESIGNED: — DRAWN: —
APPROVED BY: DATE:

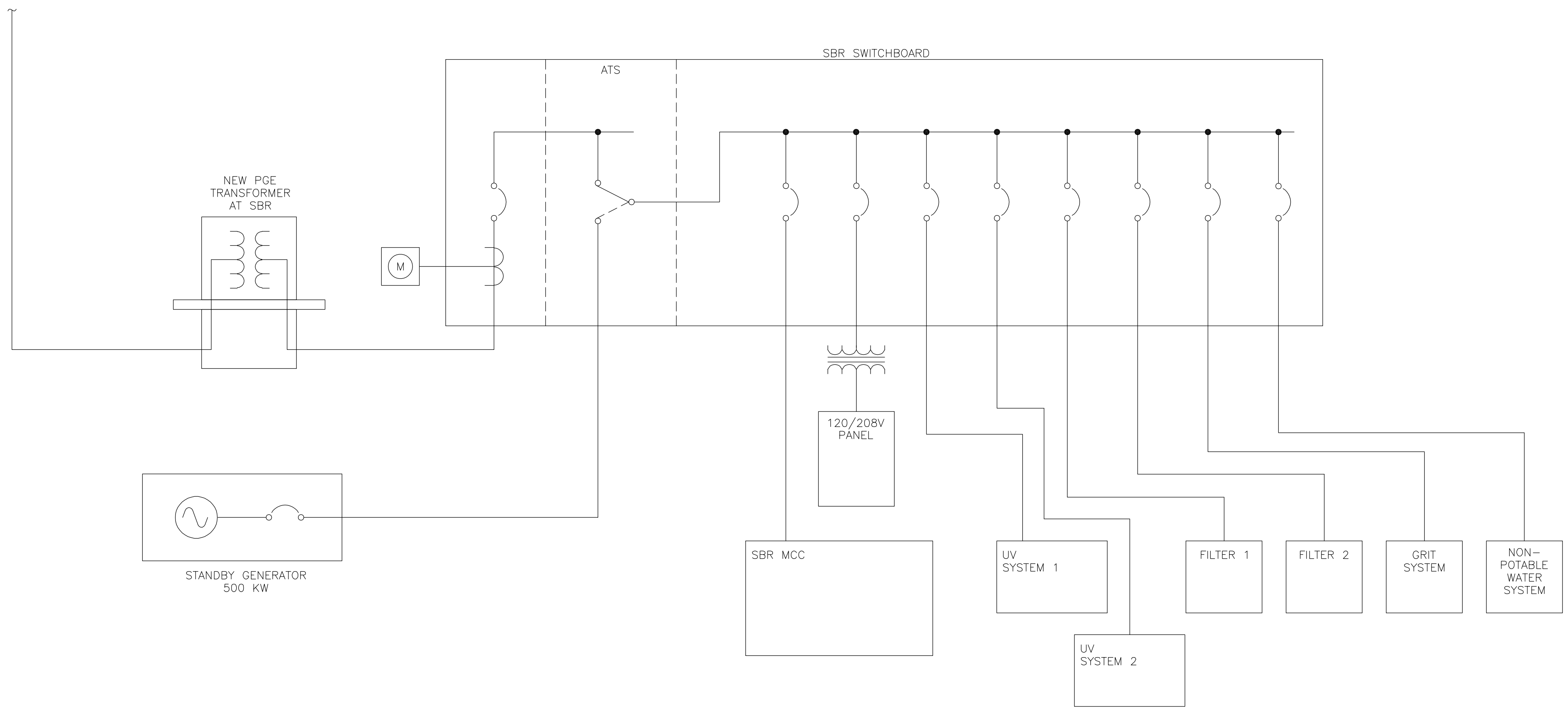
REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

R&W ENGINEERING, INC.
"Engineering Integrated Solutions"
9615 S.W. Allen Boulevard
Suite 107
Beaverton, Oregon 97005
Phone: (503) 726-3300
Fax: (503) 726-3326
E-mail: rweng@rweng.com
Project No.: 1384.011.001 Contact: GREGG SCHOLZ

PROJECT NO.	DRAWING NO.
198.28	70-E-2
DATE	SHEET NO.
NOV. 2021	35 OF 97



PRELIMINARY
NOT FOR
CONSTRUCTION

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

MOLALLA OREGON

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

ELECTRICAL
ONE-LINE DIAGRAM

DESIGNED: —
DRAWN: —
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	70-E-3
DATE	SHEET NO.
NOV. 2021	36 OF 97

R&W ENGINEERING, INC.
"Engineering Integrated Solutions"
9615 S.W. Allen Boulevard
Suite 107
Beaverton, Oregon 97005
Phone: (503) 726-3300
Fax: (503) 726-3326
E-mail: rweng@rweng.com
Project No.: 1384.011.001 Contact: GREGG SCHOLZ

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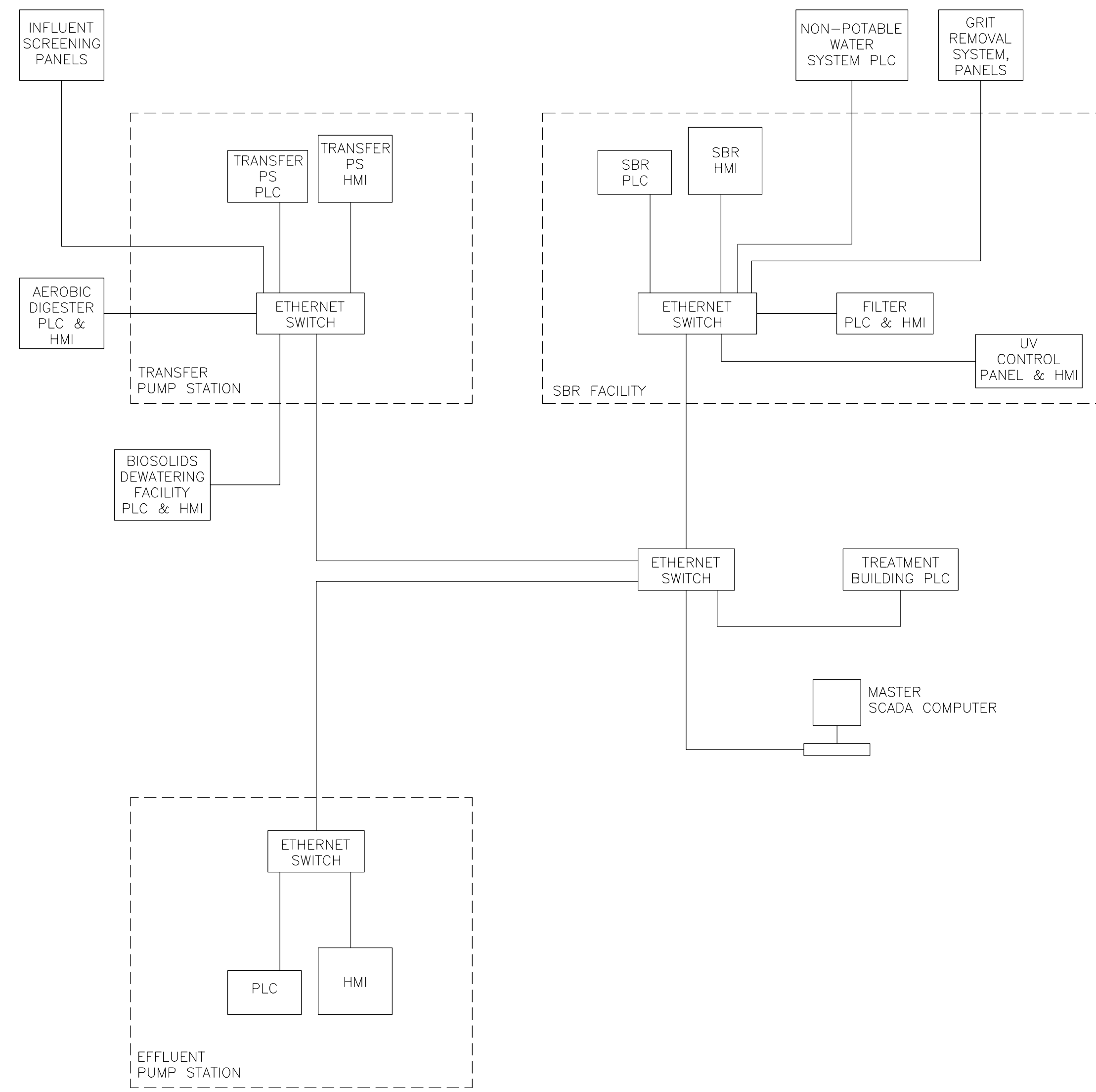


THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

ELECTRICAL PLANT SCHEMATIC

DESIGNED: —
DRAWN: —
APPROVED BY: DATE:

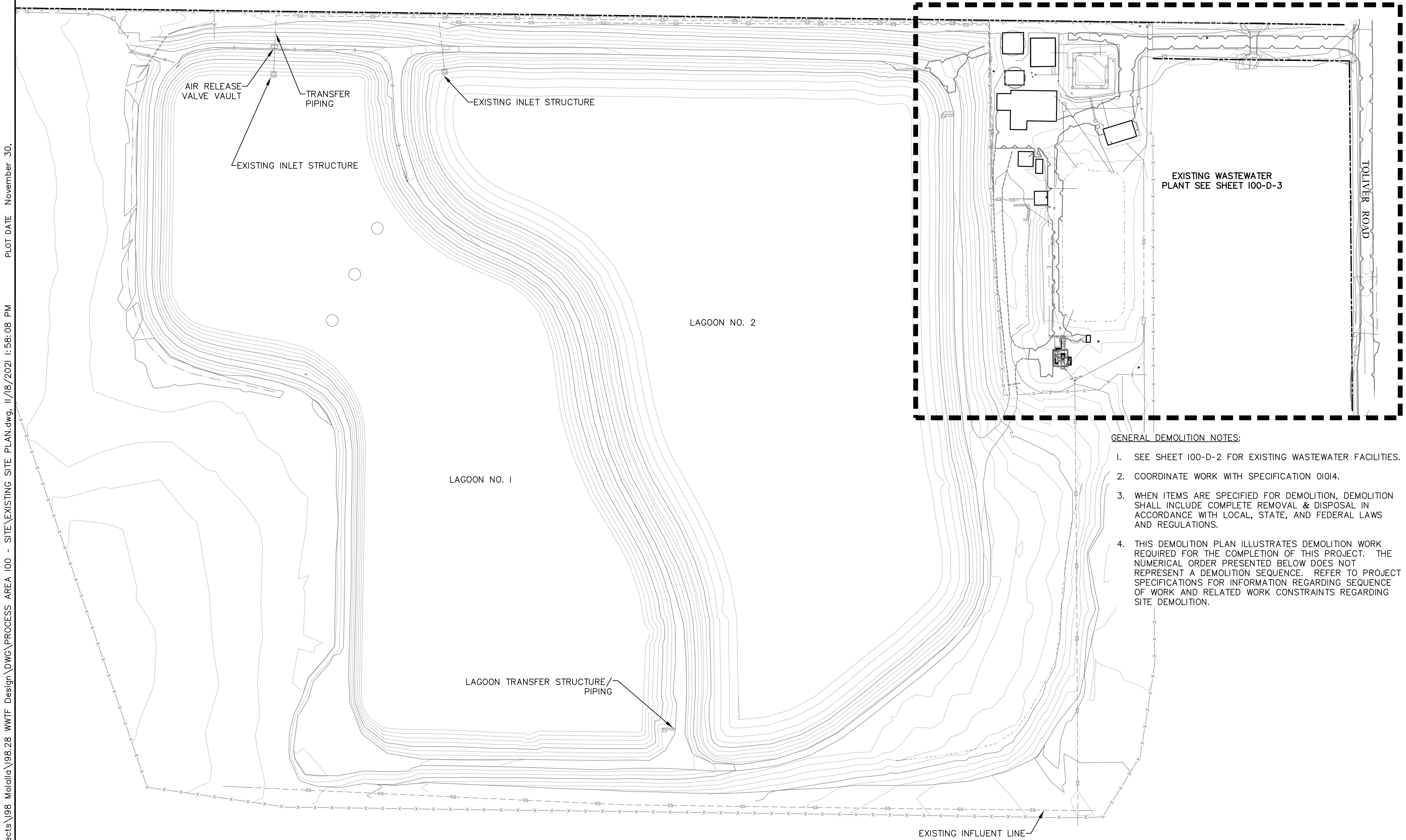
REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	70-E-4
DATE	SHEET NO.
NOV. 2021	37 OF 97

R&W ENGINEERING, INC.
"Engineering Integrated Solutions"
9615 S.W. Allen Boulevard
Suite 107
Beaverton, Oregon 97005
Phone: (503) 726-3300
Fax: (503) 726-3326
E-mail: rweng@rweng.com
Project No.: 1384.011.001 Contact: GREGG SCHOLZ



GENERAL DEMOLITION NOTES:

1. SEE SHEET 100-D-2 FOR EXISTING WASTEWATER FACILITIES.
2. COORDINATE WORK WITH SPECIFICATION 01014.
3. WHEN ITEMS ARE SPECIFIED FOR DEMOLITION, DEMOLITION SHALL INCLUDE COMPLETE REMOVAL & DISPOSAL IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS.
4. THIS DEMOLITION PLAN ILLUSTRATES DEMOLITION WORK REQUIRED FOR THE COMPLETION OF THIS PROJECT. THE NUMERICAL ORDER PRESENTED BELOW DOES NOT REPRESENT A DEMOLITION SEQUENCE. REFER TO PROJECT SPECIFICATIONS FOR INFORMATION REGARDING SEQUENCE OF WORK AND RELATED WORK CONSTRAINTS REGARDING SITE DEMOLITION.

PLAN SCALE
40 0 20 40 80

EXISTING SITE PLAN (1) 100-D-1

Z:\dyer-part\AAprojects\98 Molalla\98.28 WWTF Design\DWG\PROCESS AREA 100 - SITE\EXISTING SITE PLAN.dwg, 11/18/2021 1:58:08 PM PLOT DATE November 30, 2021

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING SITE
EXISTING SITE - PLAN VIEW

DESIGNED: — DRAWN: —

APPROVED BY: ____ DATE: ____

REVISIONS

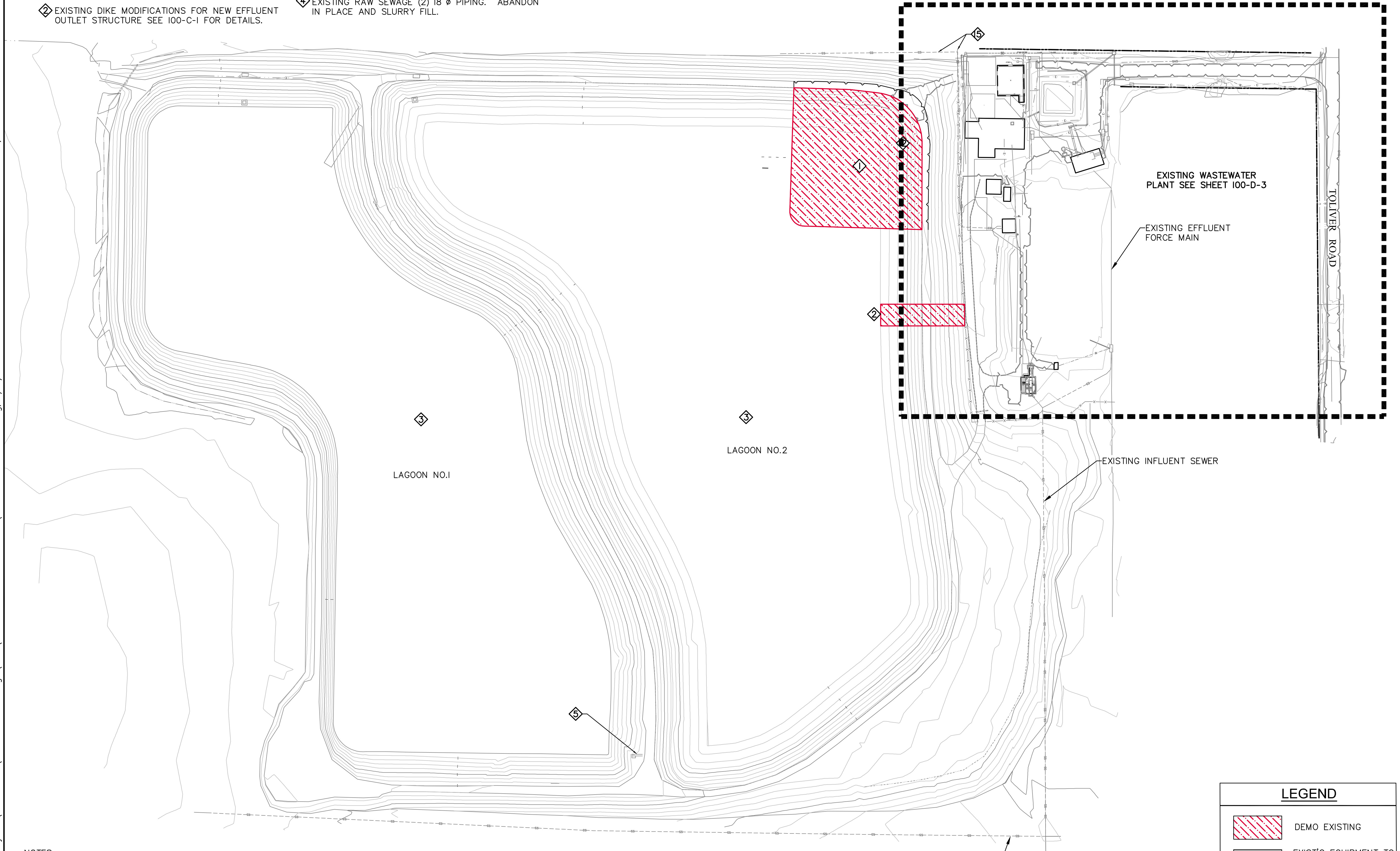
REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-D-1
DATE	SHEET NO.
NOV. 2021	38 OF 97

DEMOLITION NOTES:

1. MODIFICATIONS TO THE EXISTING LAGOON & ABANDONMENT OF EXISTING OUTLET STRUCTURE FOR NEW SBR, BUILDING, UV DISINFECTION. SEE 700-D-1 AND 700-D-2 FOR DETAILS. SEE ALSO PROCESS AREAS 500, 510, 520, 600, 700 AND 810.
2. EXISTING DIKE MODIFICATIONS FOR NEW EFFLUENT OUTLET STRUCTURE SEE 100-C-1 FOR DETAILS.
3. EXISTING LAGOON NO. 1 AND NO. 2 SEE DRAWING 700-D-1 AND 100-D-2 FOR DETAILS.
4. EXISTING RAW SEWAGE (2) 18"ø PIPING. ABANDON IN PLACE AND SLURRY FILL.
5. EXISTING LAGOON TRANSFER STRUCTURE. SEE DRAWING 700-D-1 AND 700-D-2 FOR DETAILS.



NOTES:
1. WHEN ITEMS ARE SPECIFIED FOR DEMOLITION, DEMOLITION SHALL INCLUDE COMPLETE REMOVAL & DISPOSAL IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS.
2. COORDINATE WORK WITH SPECIFICATION 01014.

DEMOLITION PLAN 1 100-D-2

LEGEND

- DEMO EXISTING
- EXIST'G EQUIPMENT TO BE PROTECTED IN PLACE
- EXISTING PIPING TO BE ABANDONED

PLOT DATE November 30, 2021

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MOLALLA OREGON

THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING SITE DEMOLITION PLAN

DESIGNED: CGP | DRAWN: CGP

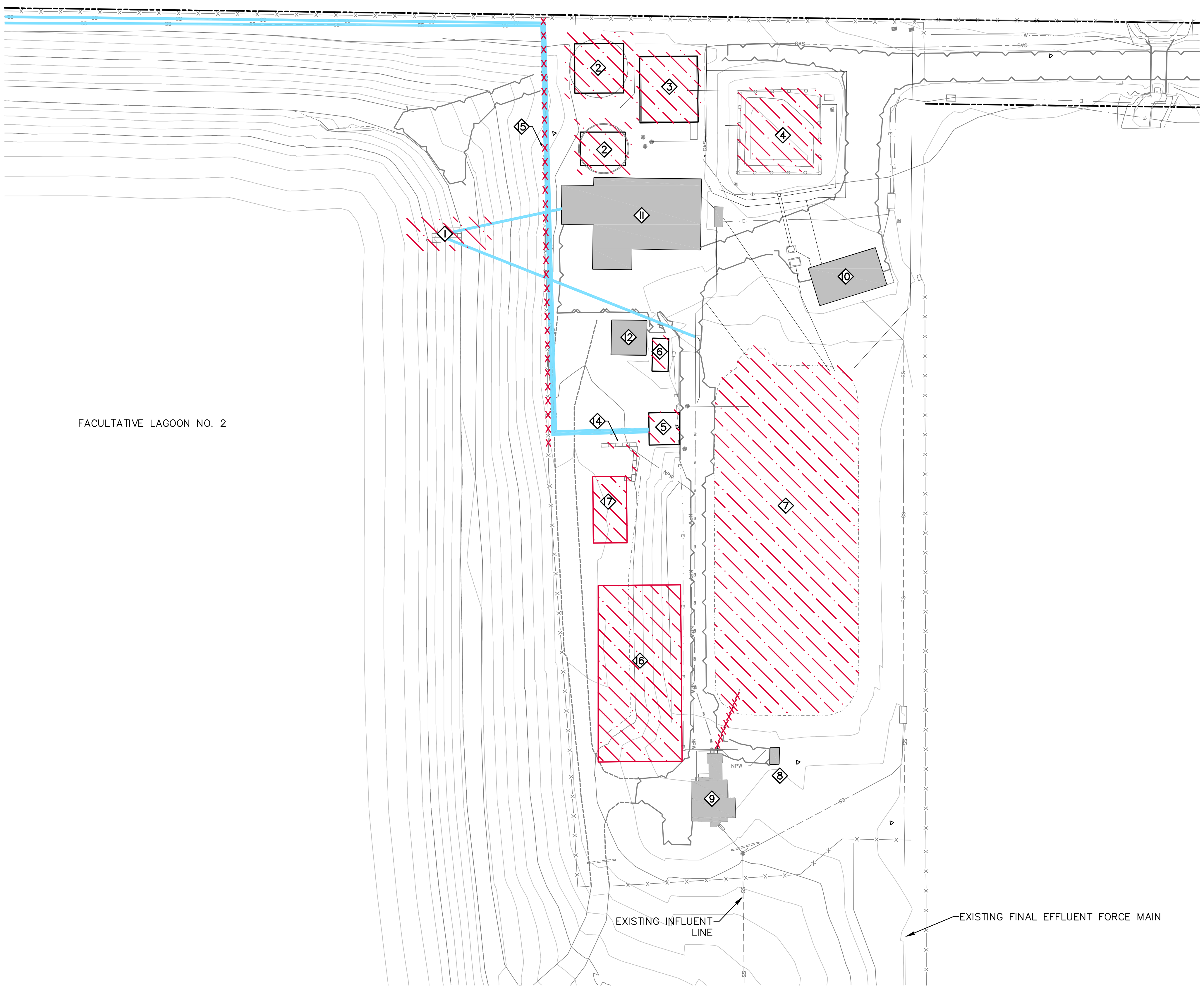
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-D-2
DATE	SHEET NO.
NOV. 2021	39 OF 97



PLAN SCALE
20 0 10 20 40

EXISTING SITE PLAN
1
100-D-3

GENERAL DEMOLITION NOTES:

1. SEE SHEET 100-D-2 FOR EXISTING WASTEWATER FACILITIES.
2. COORDINATE WORK WITH SPECIFICATION 01014.
3. WHEN ITEMS ARE SPECIFIED FOR DEMOLITION, DEMOLITION SHALL INCLUDE COMPLETE REMOVAL & DISPOSAL IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS.
4. THIS DEMOLITION PLAN ILLUSTRATES DEMOLITION WORK REQUIRED FOR THE COMPLETION OF THIS PROJECT. THE NUMERICAL ORDER PRESENTED BELOW DOES NOT REPRESENT A DEMOLITION SEQUENCE. REFER TO PROJECT SPECIFICATIONS FOR INFORMATION REGARDING SEQUENCE OF WORK AND RELATED WORK CONSTRAINTS REGARDING SITE DEMOLITION.

NO.	DEMOLITION NOTES
1	EXISTING LAGOON OUTFALL STRUCTURE: PROTECT IN PLACE UNTIL TEMPORARY OR NEW OUTLET STRUCTURE IS BUILT. REFERENCE PROJECT SEQUENCING FOR FURTHER INFORMATION.
2	EXISTING DAF UNITS: TO BE DEMOLISHED AND REMOVED, SEE EXISTING SITE PIPING PLAN FOR SITE PIPING & STRUCTURE THAT ARE TO BE DEMOLISHED AND REMOVED. SEE DRAWING 100-D-6 AND 100-D-7.
3	EXISTING GRAVITY FILTER SYSTEM: TO BE REMOVED. SEE DRAWING 100-D-4 AND 100-D-5.
4	EXISTING CHLORINE CONTACT BASIN: TO BE MODIFIED. SEE PROCESS AREA 100
5	EXISTING TRANSFER SYSTEM: MODIFY EXISTING SYSTEM, SEE PROCESS AREA 300 FOR DETAILS.
6	EXISTING TRANSFER PUMP CONTROL BUILDING: MODIFY EXISTING BUILDING, SEE PROCESS AREA 300 FOR DETAILS.
7	EXISTING AERATION BASIN: MODIFY FOR NEW INFLUENT FLOW EQUALIZATION BASIN. SEE PROCESS AREA 310 AND DRAWING 100-D-10 AND 100-D-11.
8	EXISTING NPW PRESSURE TANK/ BUILDING: PROTECT IN PLACE.
9	EXISTING INFLUENT SCREENING FACILITY: PROTECT IN PLACE.
10	EXISTING EFFLUENT PUMP STATION AND 750kW STANDBY GENERATOR: PROTECT IN PLACE.
11	EXISTING WWTF PLANT OFFICE/ TREATMENT BUILDING: MODIFY IN ACCORDANCE WITH PROCESS AREA 100.
12	EXISTING STORAGE BUILDING: PROTECT IN PLACE.
13	EXISTING STORAGE BUILDING: PROTECT IN PLACE.
14	EXISTING PRECAST CONC. BLOCK RETAINING WALL: DEMOLISH AND REMOVE.
15	EXISTING FENCE: REMOVE TO LIMITS SHOWN ON PLANS.
16	NEW AEROBIC DIGESTER & BIOSOLIDS FACILITY: SEE PROCESS AREA 900 FOR DETAILS
17	NEW AEROBIC DIGESTER BUILDING: SEE PROCESS AREA 900 FOR DETAILS

LEGEND

	STRUCTURE DEMOLITION
	EXIST'G EQUIPMENT TO BE PROTECTED IN PLACE
	SLURRY FILL EXISTING PIPING

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING SITE
EXISTING WASTEWATER PLANT - PLAN VIEW

DESIGNED: —
DRAWN: —
APPROVED BY: DATE:

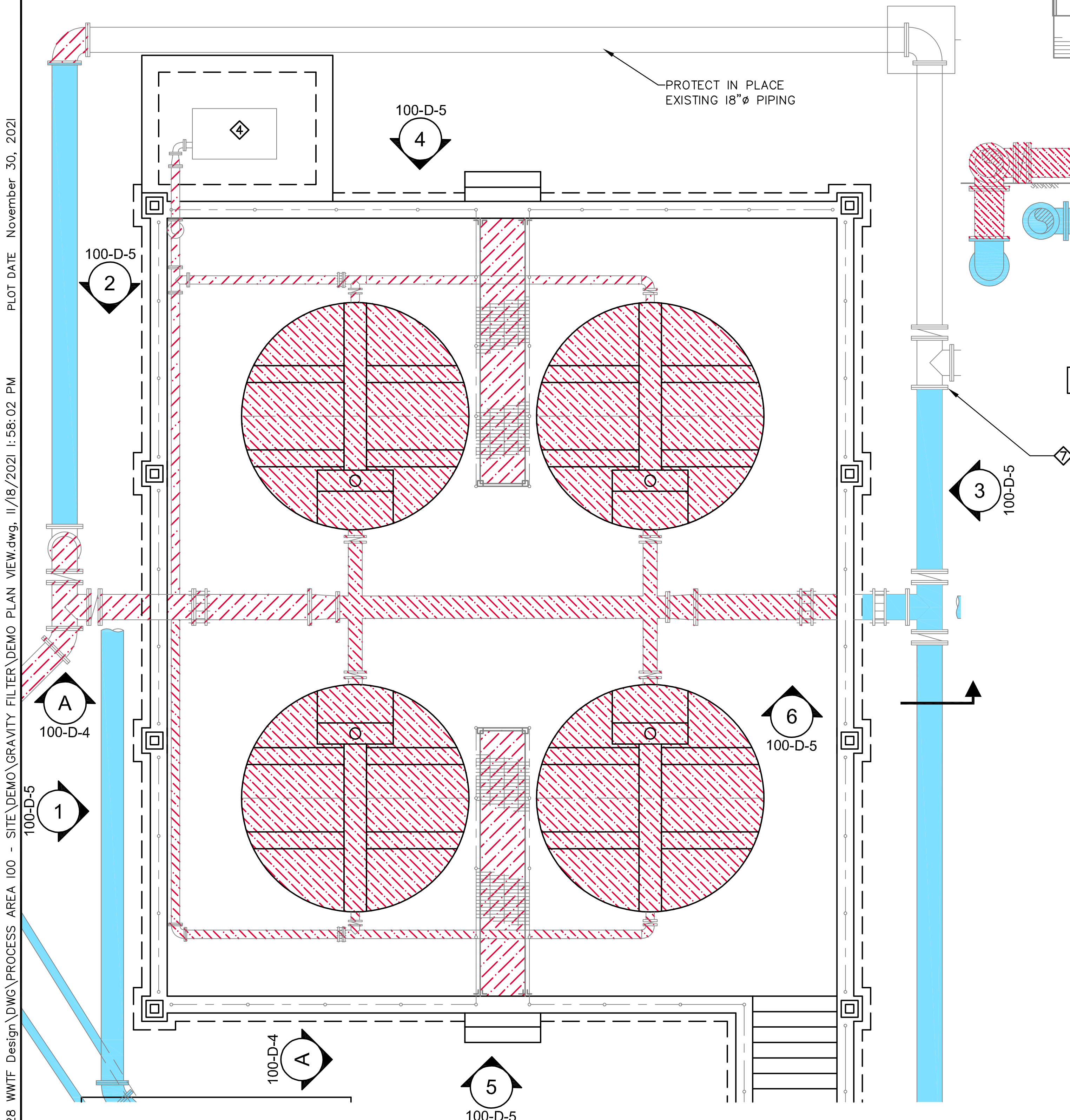
REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-D-3
DATE	SHEET NO.
NOV. 2021	40 OF 97

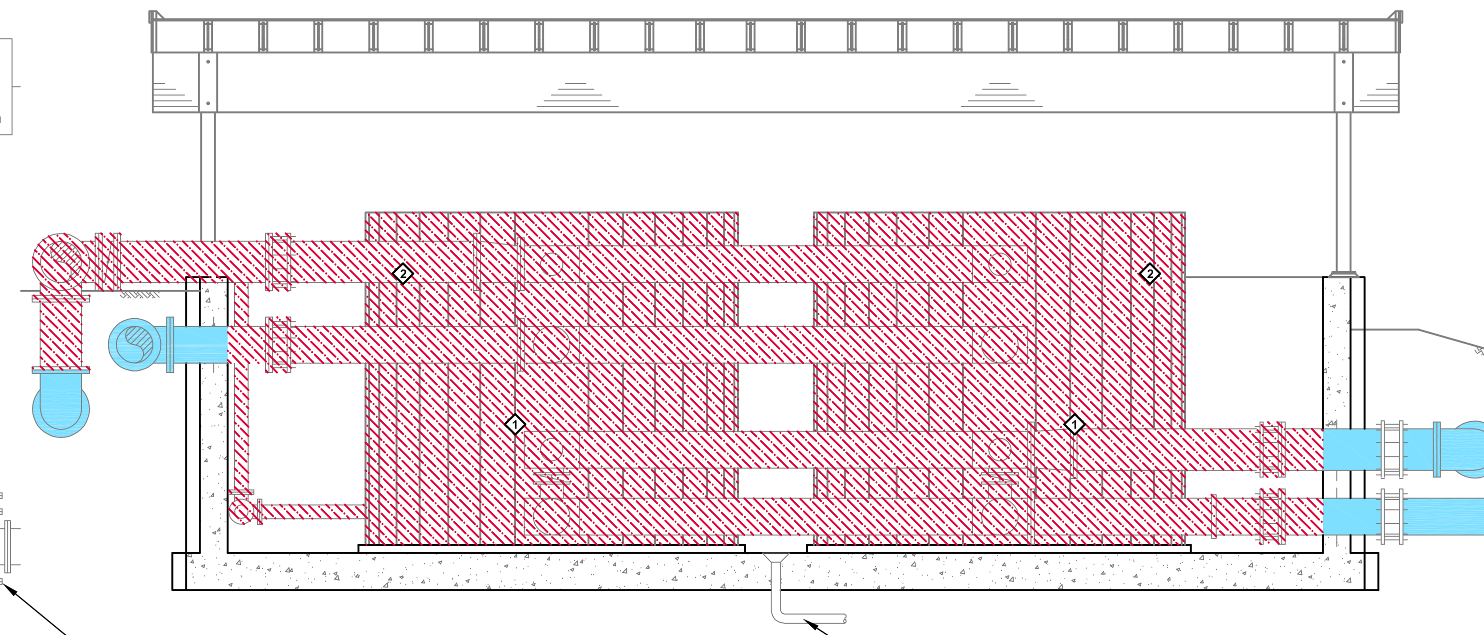
Z:\dyer-part\AAprojects\98 Molalla\98.28 WWTF Design\DWG\PROCESS AREA 100 - SITE\EXISTING SITE PLAN.dwg, 11/18/2021 1:58:08 PM PLOT DATE November 30, 2021



DEMOLITION PLAN 1

SCALE: 1" - 4'-0"

100-D-4



SECTION A

SCALE: 1" -4'-0"

100-D-4

DEMOLITION NOTES:

1. REMOVE EXISTING EQUIPMENT, PIPING, AND APPURTENANCES ASSOCIATED WITH THE EXISTING GRAVITY FILTERS FOR COMPLETE DEMOLITION.
2. REMOVE EXISTING STRUCTURE, AND HANDRAIL ASSOCIATED WITH THE EXISTING WALKWAY FOR COMPLETE DEMOLITION..
3. AFTER REMOVAL OF ALL PIPING AND EQUIPMENT, PLUG AND ABANDON ALL PIPE PENETRATIONS.
4. REMOVE EXISTING EQUIPMENT, PIPING, AND APPURTENANCES ASSOCIATED WITH THE EXISTING BLOWER PAD FOR COMPLETE DEMOLITION.
5. COORDINATE DEMOLITION WITH ENGINEER AND OWNER. SEE SECTION 01014 FOR WORK SEQUENCING.
6. PROTECT EXISTING CONCRETE STRUCTURE AND CANOPY IN PLACE.
7. PROVIDE BLIND FLANGE TO CAP END OF TEE.

LEGEND

- DEMO EXISTING
- EXIST'G EQUIPMENT TO BE PROTECTED IN PLACE
- EXISTING PIPING TO BE ABANDONED

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING GRAVITY FILTERS
DEMOLITION PLAN

DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-D-4
DATE	SHEET NO.
NOV. 2021	41 OF 97

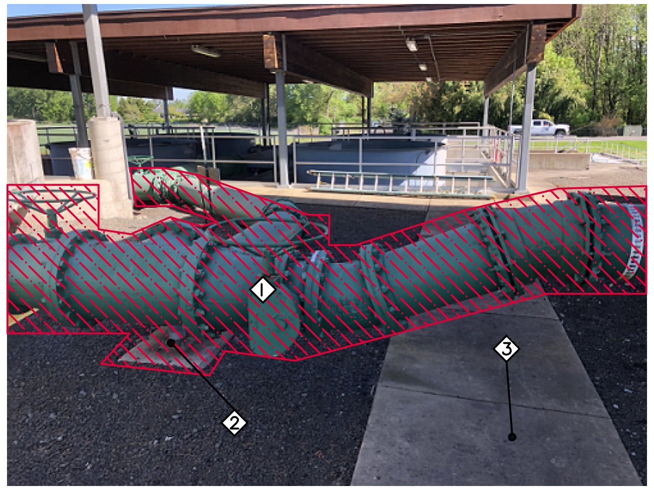

PHOTO: EXISTING DAF & GRAVITY FILTER PIPING
1 — 100-D-5

DEMOLITION NOTES:

1. REMOVE EXISTING PIPING, TYP. ALL PIPING ASSOCIATED WITH DAF UNITS
2. REMOVE EXIST'G PIPE FOOTINGS.
3. PROTECT EXIST'G CONCRETE PATHWAY IN PLACE.

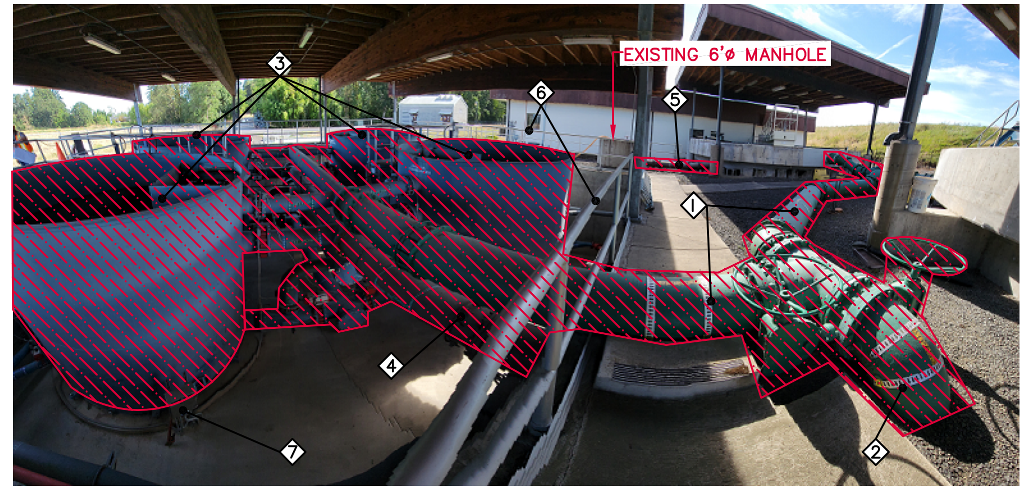

PHOTO: EXISTING GRAVITY FILTERS AND PIPING
2 — 100-D-5

DEMOLITION NOTES:

1. REMOVE EXISTING PIPING.
2. REMOVE EXIST'G BYPASS PIPING AND SLURRY FILL.
3. REMOVE EXIST'G MIXED MEDIA GRAVITY FILTERS AND ALL ATTACHED PIPING.
4. REMOVE EXIST'G BACKWASH PIPING & APPURTENANCES. CAP AT WALL. CAP/PLUG AT MANHOLE.
5. REMOVE AND REPLACE EXIST'G DAF #1 MANHOLE PIPING.
6. PROTECT IN PLACE EXIST'G HANDRAIL.
7. REMOVE ALL ELECTRICAL CONDUITS, PANELS AND ASSOCIATED APPURTENANCES.

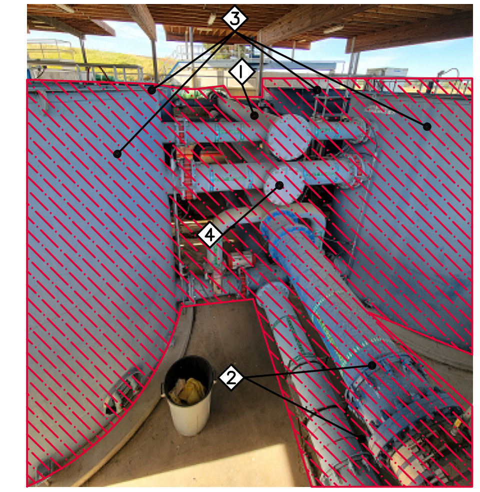

PHOTO: EXISTING GRAVITY FILTER PIPING
3 — 100-D-5

DEMOLITION NOTES:

1. REMOVE EXIST'G FILTER PIPING.
2. REMOVE EXIST'G FILTERED WATER AND BACKWASH WATER PIPING. CAP FLUSH TO WALL.
3. REMOVE EXIST'G MIXED MEDIA GRAVITY FILTERS AND ALL ATTACHED PIPING.
4. REMOVE EXIST'G SPENT BACKWASH PIPING. CAP AT WALL. CAP/PLUG AT MANHOLE.

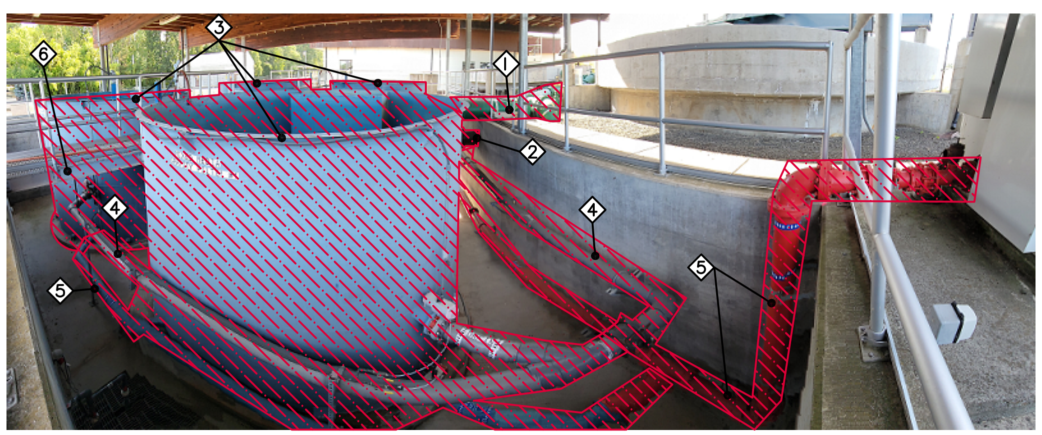

PHOTO: EXISTING GRAVITY FILTER AIR AND DRAIN PIPING
4 — 100-D-5

DEMOLITION NOTES:

1. REMOVE EXIST'G DAF UNIT TO GRAVITY FILTER PIPING AND FOOTINGS, PIPE SUPPORTS AND ALL APPURTENANCES ASSOCIATED.
2. REMOVE EXIST'G BACKWASH PIPING. CAP AT WALL. CAP/PLUG AT MANHOLE.
3. REMOVE EXIST'G MIXED MEDIA GRAVITY FILTERS AND ALL ATTACHED PIPING.
4. REMOVE EXIST'G DRAIN PIPING.
5. REMOVE EXIST'G AIR PIPING.
6. SALVAGE EXIST'G CATWALK TO OWNER AT OWNERS DISCRETION.

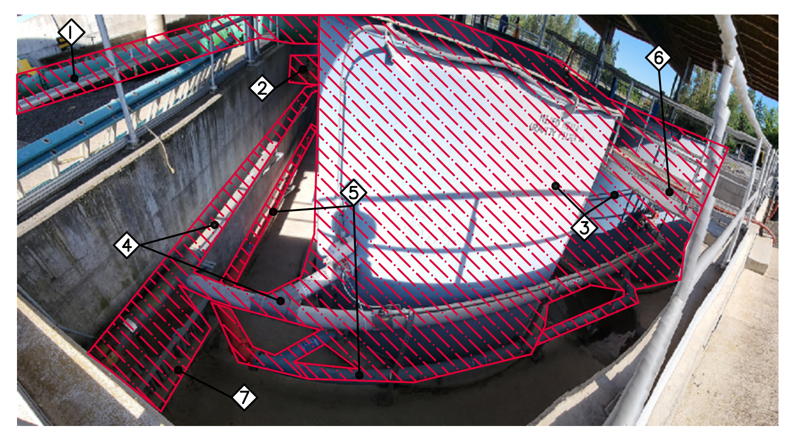

PHOTO: EXISTING GRAVITY FILTER AIR AND DRAIN PIPING
5 — 100-D-5

DEMOLITION NOTES:

1. REMOVE EXIST'G PIPING.
2. REMOVE EXIST'G SPENT BACKWASH PIPING. CAP AT WALL. CAP/PLUG AT MANHOLE.
3. REMOVE EXIST'G MIXED MEDIA GRAVITY FILTERS AND ALL ATTACHED PIPING.
4. REMOVE EXIST'G DRAIN PIPING.
5. REMOVE EXIST'G AIR PIPING.
6. SALVAGE EXIST'G CATWALK TO OWNER AT OWNERS DISCRETION.
7. REMOVE/TERMINATE EXIST'G ELECTRICAL WIRING.

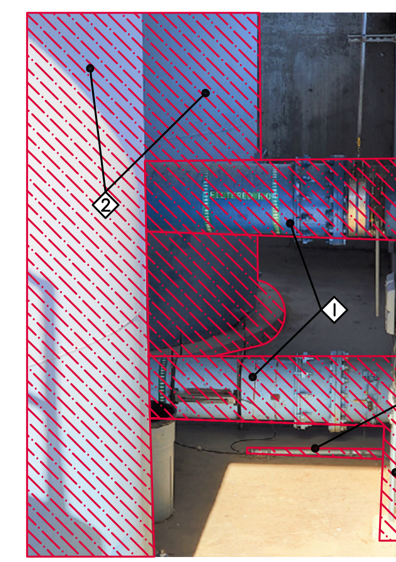

PHOTO: EXISTING GRAVITY FILTER PIPING
6 — 100-D-5

DEMOLITION NOTES:

1. REMOVE EXIST'G FILTERED WATER AND BACKWASH WATER PIPING. GRIND ALL PIPING FLUSH TO WALL AND PLUG WITH NON-SHRINK GROUT. TYPICAL ALL PIPE PENETRATIONS.
2. REMOVE EXIST'G MIXED MEDIA GRAVITY FILTERS AND ALL ATTACHED PIPING AND APPURTENANCES.
3. REMOVE ALL ELECTRICAL CONDUITS, PANELS AND ASSOCIATED APPURTENANCES. PROTECT IN PLACE LIGHTING AND ASSOCIATED APPURTENANCES.

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ENGINEERS & PLANNERS, INC.

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING GRAVITY FILTERS
DEMOLITION PICTURES

DESIGNED: | DRAWN:
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-D-5
DATE	SHEET NO.
NOV. 2021	42 OF 97

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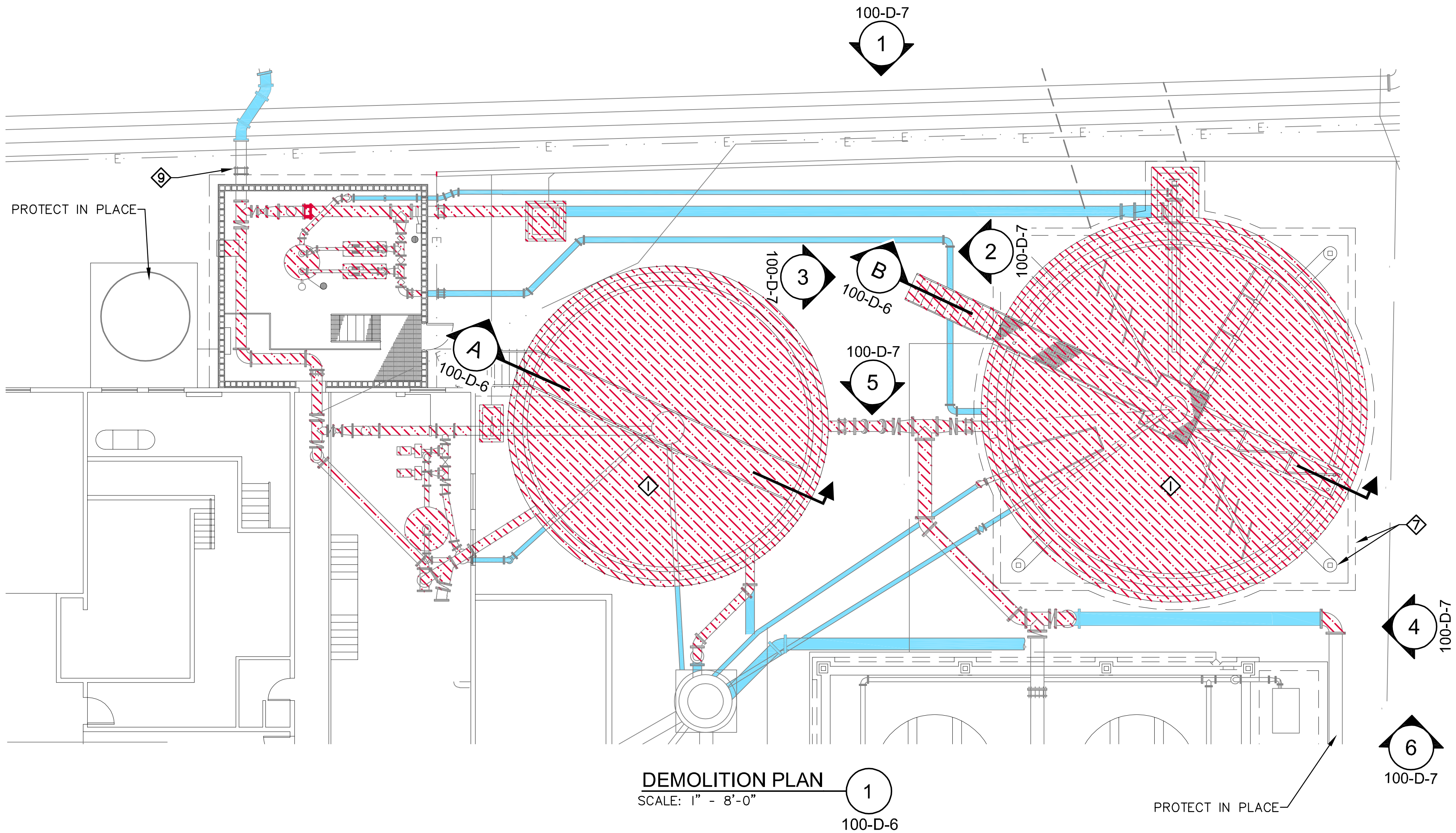


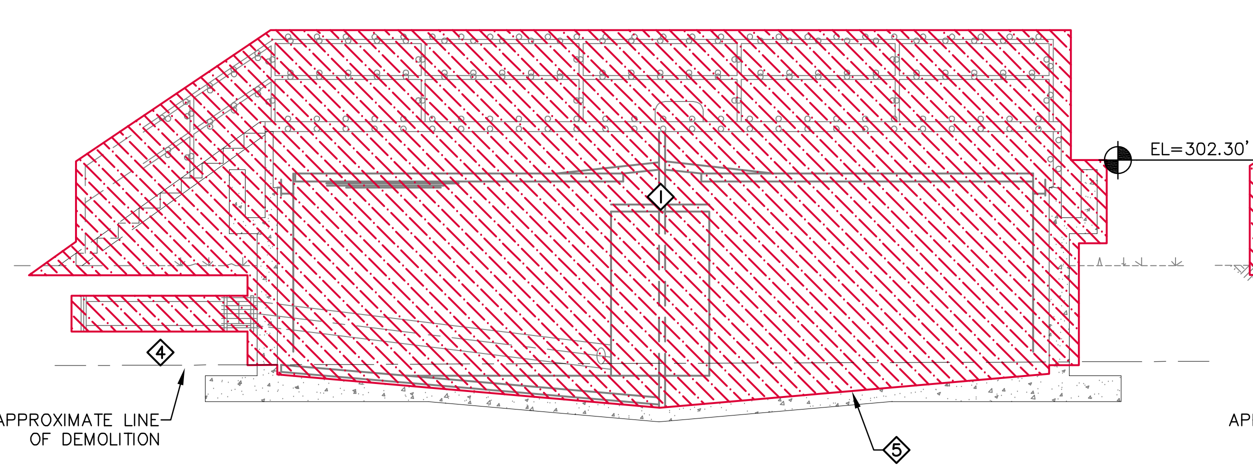
DEMOLITION PLAN
SCALE: 1" - 8'-0"
100-D-6

DEMOLITION NOTES:

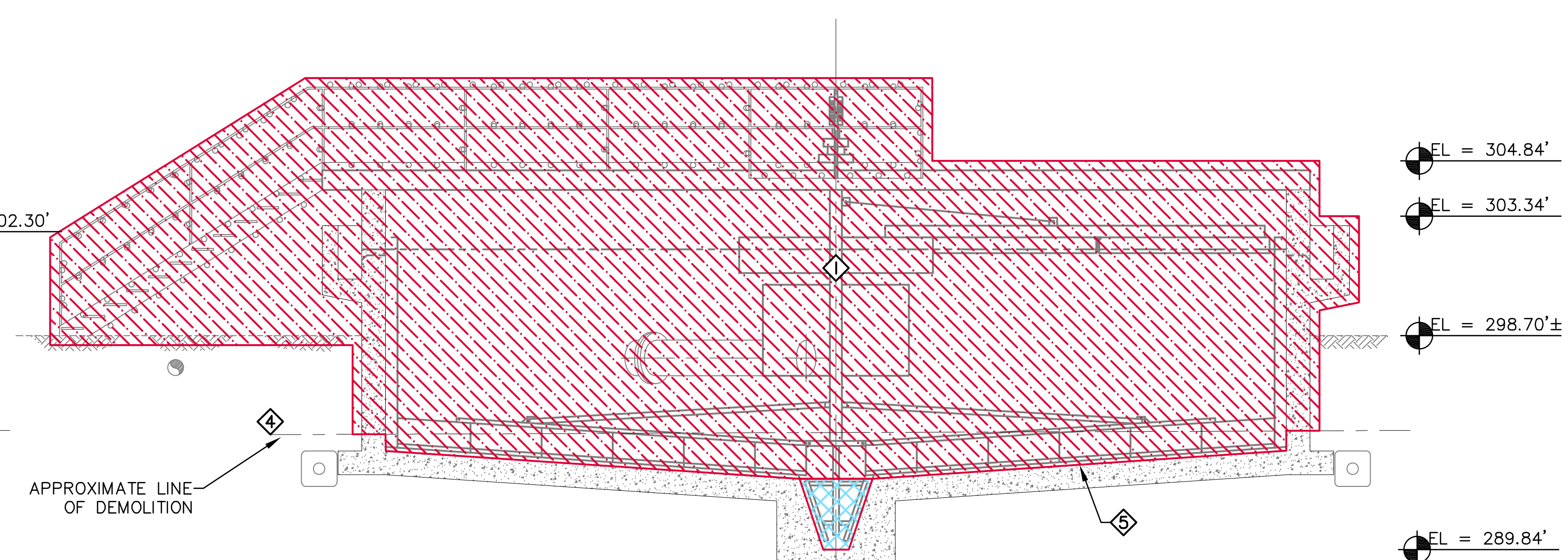
1. REMOVE EXISTING STRUCTURES, ALL EQUIPMENT, PIPING, AND APPURTENANCES ASSOCIATED WITH THE EXISTING DAF FILTERS FOR COMPLETE DEMOLITION. REMOVAL OF THE EXISTING CONCRETE TANKS SHALL BE REMOVED TO 4 FEET BELOW FINISHED. ONCE DRAINAGE HOLES HAVE BEEN ESTABLISHED (SEE NOTE 5) BACKFILL TO EXISTING FINISH GRADE PER SPECIFICATIONS.
2. FOR CONTINUATION OF DEMOLITION REFER TO DRAWING 100-D-3 FOR YARD PIPING DEMOLITION NOTES.
3. AFTER REMOVAL OF ALL PIPING AND EQUIPMENT, PLUG AND ABANDON ALL PIPE PENETRATIONS.
4. DEMOLITION OF EXISTING CONCRETE AND PIPES MAY BE TERMINATED AT A DEPTH OF FOUR FEET BELOW THE EXISTING FINISH GRADE, UNLESS NOTED OR SPECIFIED OTHERWISE. ALL PIPES TO BE ABANDONED BELOW THE 4 FEET SHALL BE CONCRETE SLURRY FILLED.
5. PROVIDE 6" HOLES AT 8FT ON CENTER IN BOTTOM OF TANK SLAB FOR DRAINAGE PRIOR TO BACKFILLING. HOLES MAY BE CORE-DRILLED OR JACKHAMMERED IN THE CONCRETE.
6. COORDINATE DEMOLITION WITH ENGINEER AND OWNER. SEE SECTION 01014 FOR WORK SEQUENCING.
7. PROTECT EXISTING CANOPY IN PLACE. CANOPY FOR DAF UNIT NO. 1 NOT SHOWN FOR CLARITY.
8. REMOVE EXISTING METER VAULT FOR COMPLETE DEMOLITION.
9. TEMPORARY EFFLUENT CONNECTION, SEE DRAWING 700-M-3

LEGEND

(red hatch)	DEMO EXISTING
(grey)	EXIST'G EQUIPMENT TO BE PROTECTED IN PLACE
(blue)	EXISTING PIPING TO BE ABANDONED



DAF #1 SECTION
1/4"=1'-0"
100-D-6



DAF #2 SECTION
1/4"=1'-0"
100-D-6

MOLALLA OREGON

THE DYER PARTNERSHIP
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PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING DAF UNITS
DEMOLITION PLAN

DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-D-6
DATE	SHEET NO.
NOV. 2021	43 OF 97

PLOT
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DATE November 30, 2021

PHOTO: EXISTING DAF UNITS 1
100-D-7

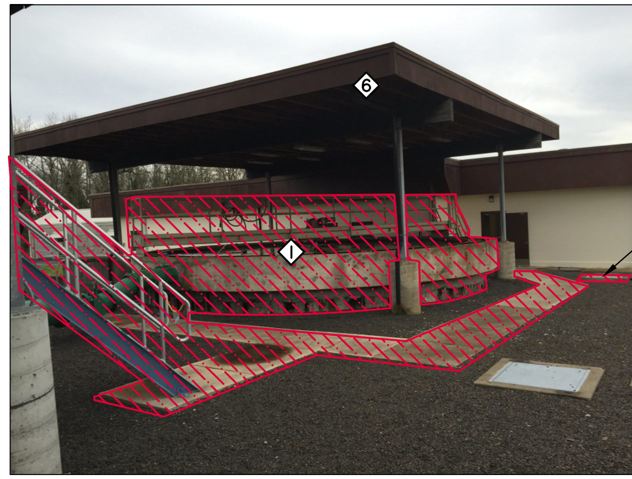


PHOTO: EXISTING DAF UNIT #1 2
100-D-7

PHOTO: EXISTING DAF UNIT #2 3
100-D-7

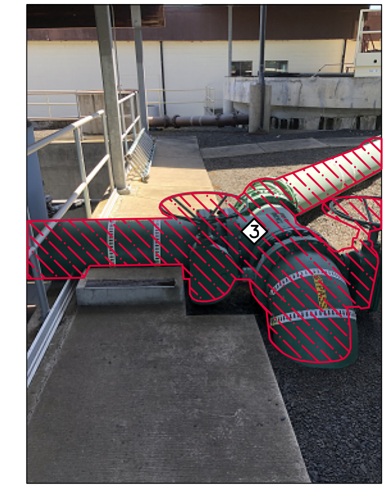


PHOTO: EXISTING DAF UNIT PIPING 4
100-D-7

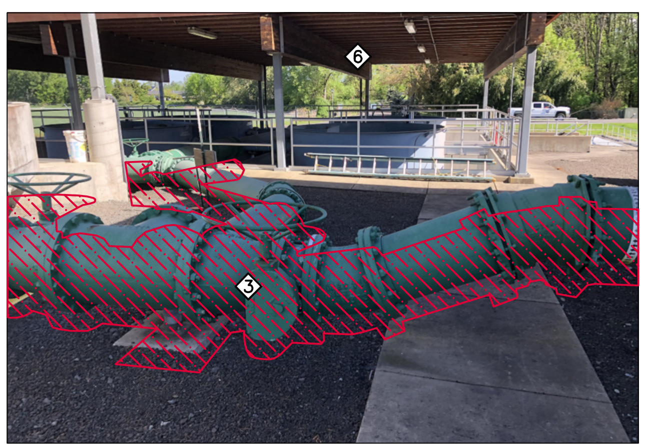


PHOTO: EXISTING DAF PIPING 5
100-D-7

PHOTO: EXISTING DAF PIPING 6
100-D-7

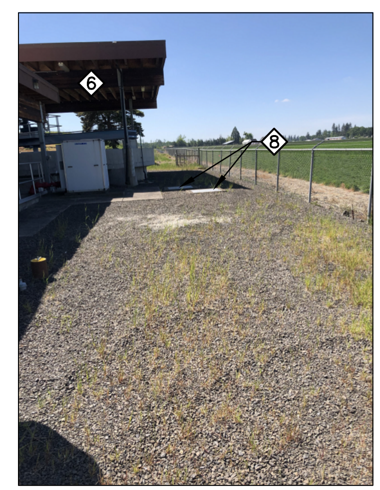


PHOTO: EXISTING DAF UNIT #2 7
100-D-7

DEMOLITION NOTES:

1. REMOVE EXISTING STRUCTURES, ALL EQUIPMENT, PIPING, AND APPURTENANCES ASSOCIATED WITH THE EXISTING DAF FILTERS FOR COMPLETE DEMOLITION.
2. FOR CONTINUATION OF DEMOLITION REFER TO DRAWING 100-D-3 FOR YARD PIPING DEMOLITION NOTES.
3. AFTER REMOVAL OF ALL PIPING AND EQUIPMENT, PLUG AND ABANDON ALL PIPE PENETRATIONS.
4. DEMOLITION OF EXISTING CONCRETE AND PIPES MAY BE TERMINATED AT A DEPTH OF FOUR FEET BELOW THE BOTTOM OF ANY NEW STRUCTURE ELEVATION UNLESS NOTED OR SPECIFIED OTHERWISE. ALL PIPES TO BE ABANDONED BELOW NEW STRUCTURES SHALL BE CONCRETE SLURRY FILLED.
5. COORDINATE DEMOLITION WITH ENGINEER AND OWNER. SEE SECTION 01014 FOR WORK SEQUENCING.
6. PROTECT EXISTING CANOPY IN PLACE.
7. REMOVE EXISTING METER VAULT FOR COMPLETE DEMOLITION.
8. PROTECT EXISTING ELECTRICAL VAULTS IN PLACE.

LEGEND

(red hatch)	DEMO EXISTING
(grey)	EXIST'G EQUIPMENT TO BE PROTECTED IN PLACE
(blue)	EXISTING PIPING TO BE ABANDONED

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

RECORD DRAWING
MARCH 2020

PRELIMINARY NOT FOR CONSTRUCTION

CONTRACTOR'S FIELD MARKUPS TRANSFERRED TO RECORD DRAWINGS MAR. 2020 ACCURACY OF CONTRACTOR'S MARKUPS NOT FIELD VERIFIED.

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING DAF UNITS
EXISTING DAF UNITS - DEMOLITION PLAN

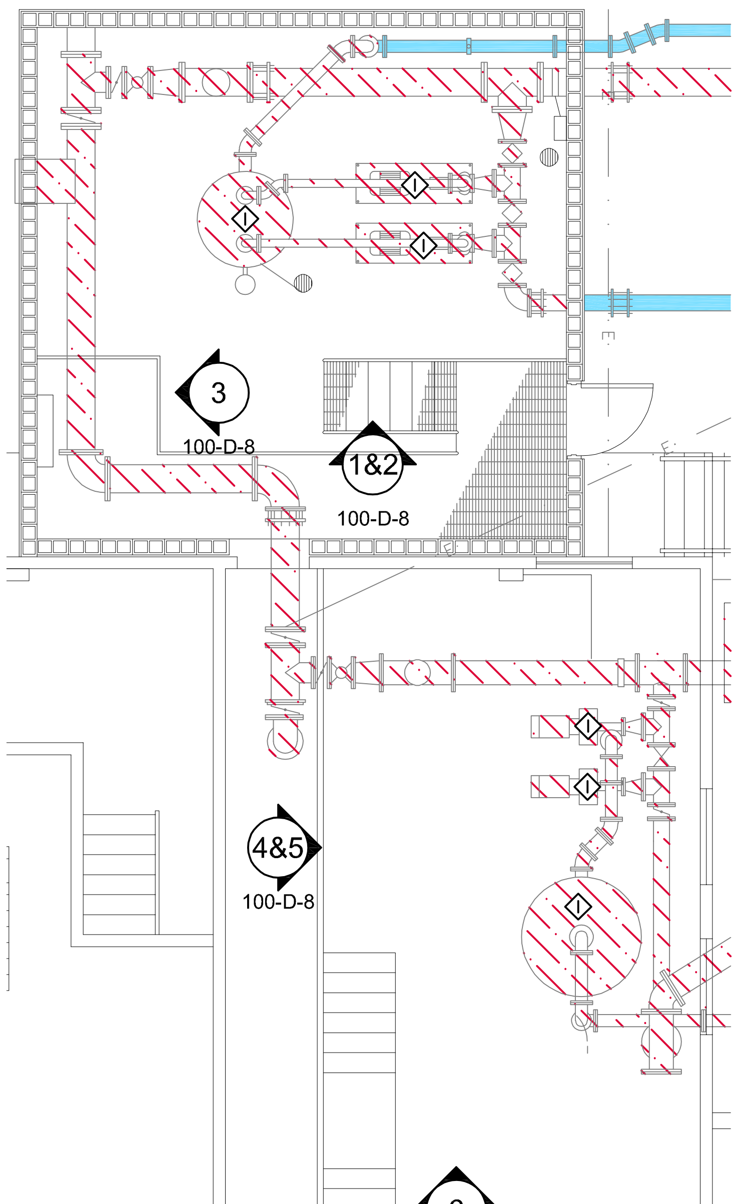
DESIGNED: —
DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-D-7
DATE	SHEET NO.
NOV. 2021	44 OF 97



DEMOLITION PLAN 1
SCALE: 1" - 4'-0"
100-D-8

DEMOLITION NOTES:

1. REMOVE EXISTING EQUIPMENT, PIPING, AND APPURTENANCES ASSOCIATED WITH THE EXISTING DAF FILTERS FOR COMPLETE DEMOLITION.
2. FOR CONTINUATION OF DEMOLITION REFER TO DRAWING 100-D-6 FOR EXTERIOR DAF UNITS DEMOLITION NOTES.
3. AFTER REMOVAL OF ALL PIPING AND EQUIPMENT, PLUG AND ABANDON ALL PIPE PENETRATIONS.
4. COORDINATE DEMOLITION WITH ENGINEER AND OWNER. SEE SECTION 01014 FOR WORK SEQUENCING.
5. PROTECT EXISTING BUILDING IN PLACE.

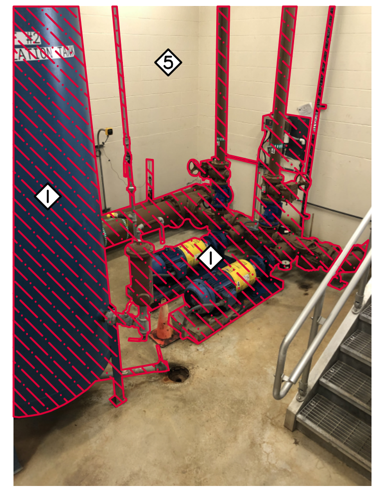


PHOTO: EXISTING DAF UNITS 1
100-D-8

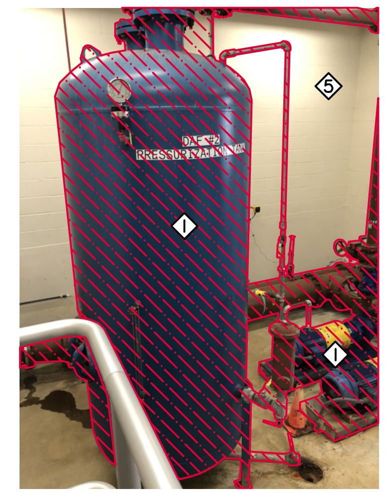


PHOTO: EXISTING DAF UNITS 2
100-D-8

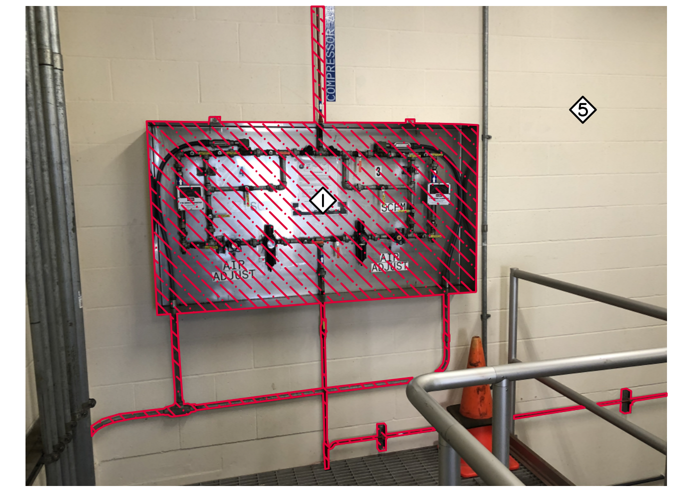


PHOTO: EXISTING DAF UNITS 3
100-D-8

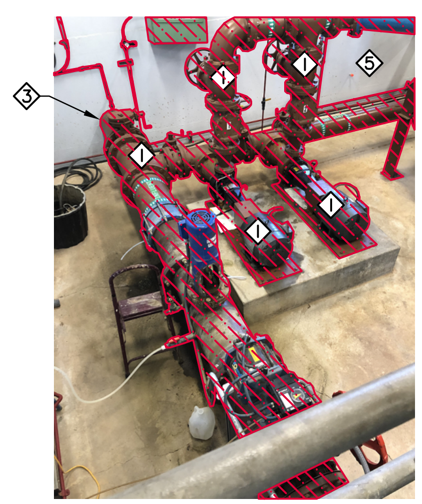


PHOTO: EXISTING DAF UNITS 4
100-D-8

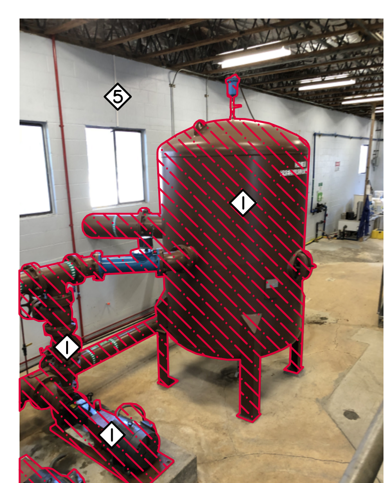


PHOTO: EXISTING DAF UNITS 5
100-D-8

PHOTO: EXISTING DAF UNITS 6
100-D-8

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING DAF UNITS
INTERIOR EQUIPMENT AND PIPING DEMOLITION PLAN

DESIGNED: —
DRAWN: —
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-D-8
DATE	SHEET NO.
NOV. 2021	45 OF 97

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PLOT DATE
November 30, 2021

PHOTO: CHLORINE CONTACT BASIN - DEMO COMPONENTS (A, 100-D-9)

DEMOLITION NOTES:

1. REMOVE EXIST'G BACKWASH PUMP LOCATED IN CHLORINE CONTACT BASIN. PROVIDE A WATERTIGHT PLUG ON THE EXISTING PIPING.
2. PROTECT IN PLACE YARD IRRIGATION PUMP.
3. PROTECT IN PLACE LIFE RING.

PHOTO: FINAL EFFLUENT FLOWMETER VAULT (B, 100-D-9)

DEMOLITION NOTES:

1. REMOVE AND SALVAGE FLOW METER TO OWNER.

PHOTO: CHLORINE INJECTION VAULT (C, 100-D-9)

DEMOLITION NOTES:

1. SALVAGE INLINE MIXER TO OWNER.
2. REMOVE COMPONENTS, INSTALL NEW PIPE.

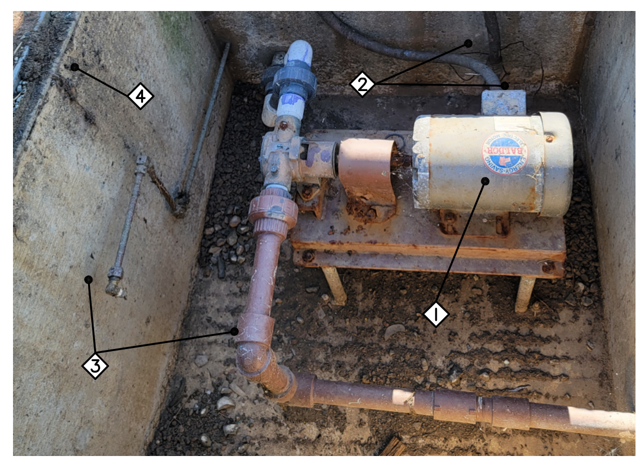


PHOTO: EXISTING EFFLUENT SAMPLE PUMP (D, 100-D-9)

DEMOLITION NOTES:

1. REMOVE EXIST'G ELECTRIC MOTOR.
2. REMOVE/TERMINATE EXIST'G ELECTRICAL WIRING .
3. REMOVE EXIST'G PIPING AND SLURRY FILL???
3. REMOVE EXIST'G VAULT STRUCTURE.

GENERAL NOTES:

1. THIS DEMOLITION PLAN CONTAINS ITEMS WITH ESTIMATED LOCATIONS BASED OFF OF EXISTING DRAWINGS. VERIFY LENGTHS, QUANTITIES, AND LOCATIONS PRIOR TO COMMENCING DEMOLITION WORK.
2. DEMOLITION OF EXISTING CHLORINE CONTACT COMPONENTS SHALL NOT COMMENCE UNTIL THE NEW WASTEWATER FACILITY IF FULLY OPERATIONAL AND THE EXISTING LAGOONS ARE DRAINED.

Z:\dyer-part\AAprojects\98 Molalla\98.28 WWTF Design\DWG\PROCESS AREA 100 - SITE\DEMO\ACAD-EXISTING CHLORINE CONTACT BASIN-Model.dwg, 11/11/2021 2:58:18 PM
PLOT DATE November 30, 2021

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING CHLORINE CONTACT BASIN
DEMOLITION PLAN

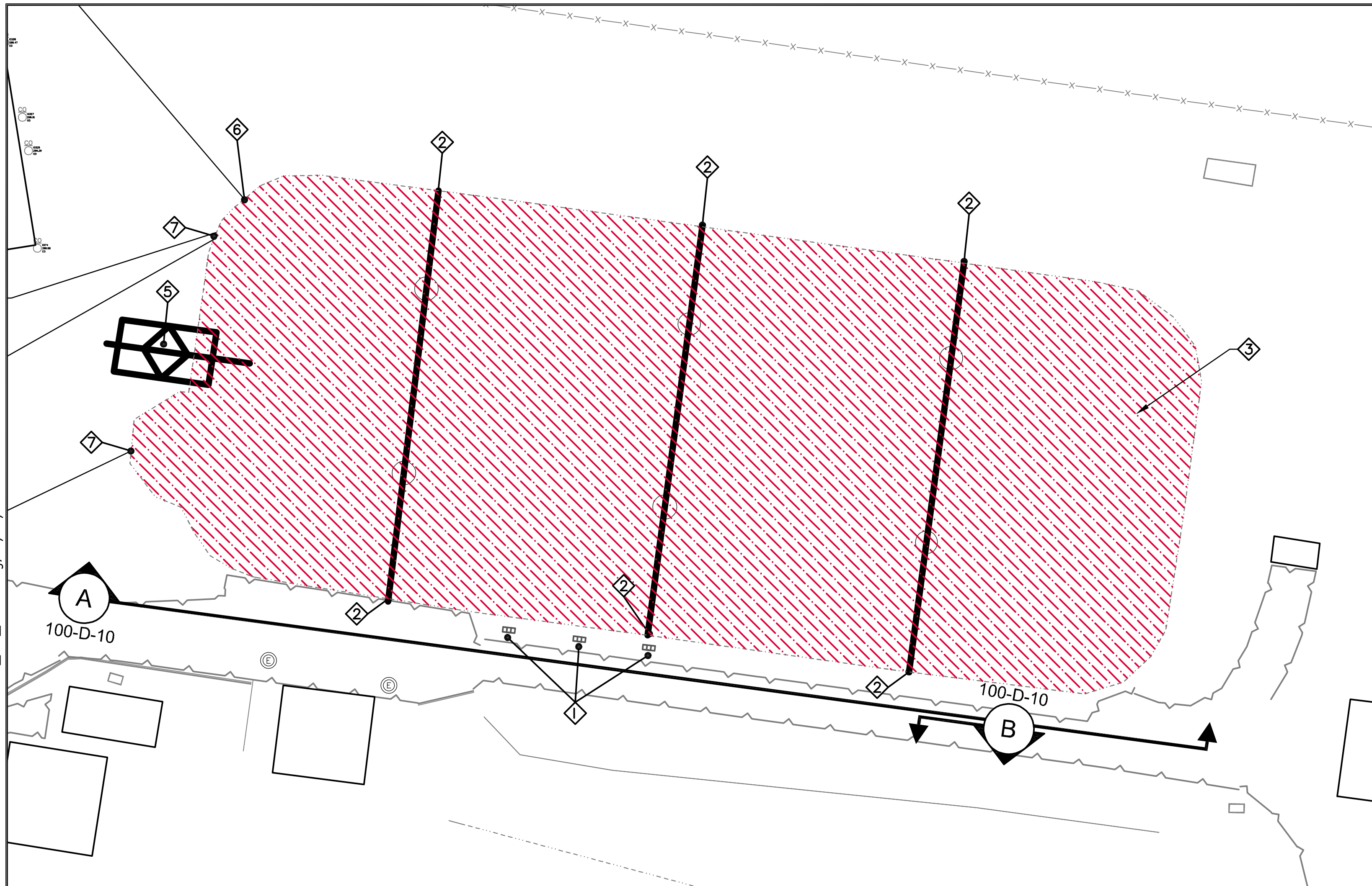
DESIGNED: —
DRAWN: JNM
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-D-9
DATE	SHEET NO.
NOV. 2021	46 OF 97



GENERAL NOTES:

1. THIS DEMOLITION PLAN CONTAINS ITEMS WITH ESTIMATED LOCATIONS BASED OFF OF EXISTING DRAWINGS. VERIFY LENGTHS, QUANTITIES, AND LOCATIONS PRIOR TO COMMENCING DEMOLITION WORK.
2. DEMOLITION OF EXISTING AERATION BASIN AND RELATED COMPONENTS SHALL NOT COMMENCE UNTIL THE NEW WASTEWATER FACILITY IF FULLY OPERATIONAL AND EXISTING LAGOONS ARE COMPLETELY DRAINED.
3. REMOVAL SHALL MEAN COMPLETE REMOVAL AND DISPOSAL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL LAWS.

DEMOLITION PLAN - EXISTING AERATION BASIN (1, 100-D-10)

DEMOLITION NOTES:

1. REMOVE/TERMINATE EXIST'G ELECTRICAL WIRING FOR AERATOR CONTROL PANELS. SALVAGE ELECTRICAL EQUIPMENT TO OWNER AT OWNER'S DISCRETION.
2. REMOVE EXIST'G AERATOR FLOATS, ANCHOR LINES, AND MOORING ANCHOR FOOTINGS.
3. REMOVE EXIST'G AERATION BASIN STRUCTURE. REFER TO 1977 SEWAGE TREATMENT PLANT DRAWINGS FOR ADDITIONAL INFORMATION.
4. SALVAGE LIFE RINGS TO OWNER.
5. REMOVE EXIST'G AERATOR HOIST STRUCTURE AND FOOTINGS.
6. REMOVE EXISTING AERATION BASIN OVERFLOW PIPING AND STRUCTURES.
7. REMOVE EXISTING PLANT DRAIN, AREA DRAIN, AND DIVERSION PIPING TO AERATION BASIN.

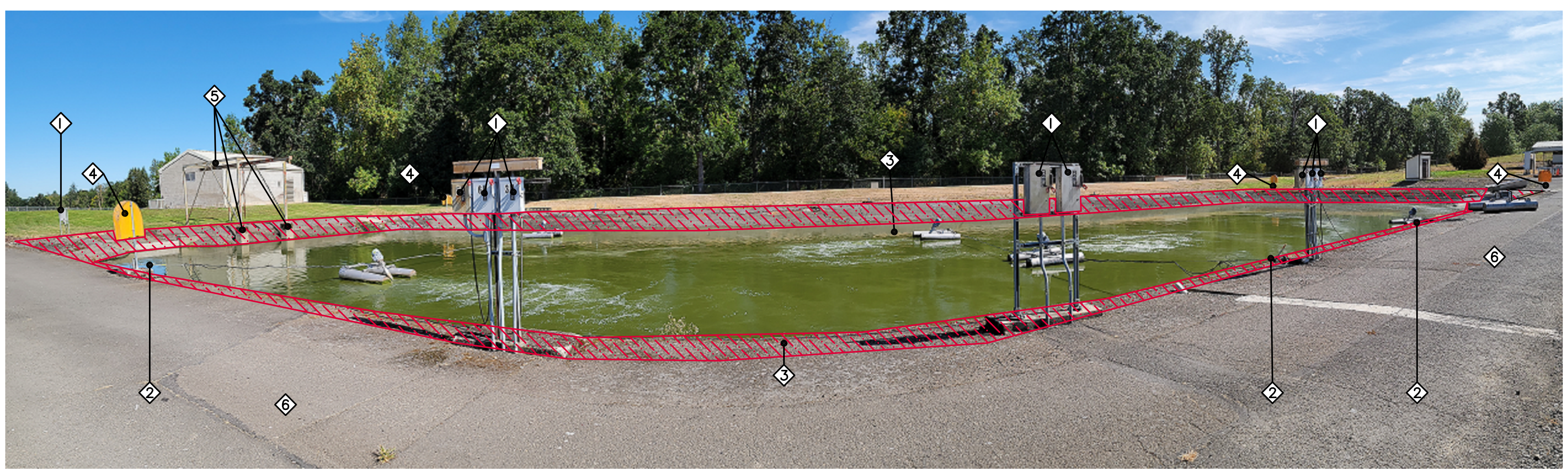


PHOTO: AERATION BASIN - DEMO COMPONENTS (A, 100-D-10)

DEMOLITION NOTES:

1. REMOVE/TERMINATE EXIST'G ELECTRICAL WIRING, BASES AND CONDUIT FOR AERATOR CONTROL PANELS. SALVAGE ELECTRICAL EQUIPMENT TO OWNER AT OWNER'S DISCRETION.
2. REMOVE EXIST'G AERATOR FLOATS, ANCHOR LINES, AND MOORING ANCHOR FOOTINGS.
3. REMOVE EXIST'G AERATION BASIN STRUCTURE FOR COMPLETE REMOVAL & DISPOSAL.
4. SALVAGE LIFE RINGS TO OWNER.
5. REMOVE EXIST'G AERATOR HOIST STRUCTURE AND FOOTINGS.
6. AC PAVEMENT ALONG AERATION BASIN SHALL BE REMOVED AND REPLACE. SEE DRAWING 100-C-8.

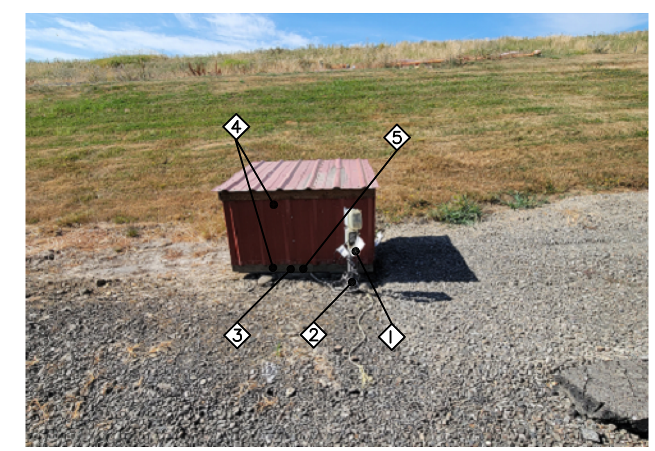


PHOTO: AREA DRAIN SUMP PUMP (B, 100-D-10)

DEMOLITION NOTES:

1. REMOVE EXIST'G ELECTRICAL OUTLET.
2. REMOVE/TERMINATE EXIST'G ELECTRICAL WIRING .
3. REMOVE EXIST'G PIPING AND SLURRY FILL.
4. REMOVE EXIST'G CONCRETE VAULT STRUCTURE AND METAL ENCLOSURE.
5. REMOVE EXIST'G SUMP PUMP AND SALVAGE TO OWNER.

MOLALLA OREGON

THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING AERATION BASIN
DEMOLITION PLAN

DESIGNED: — DRAWN: JNM
APPROVED BY: DATE:

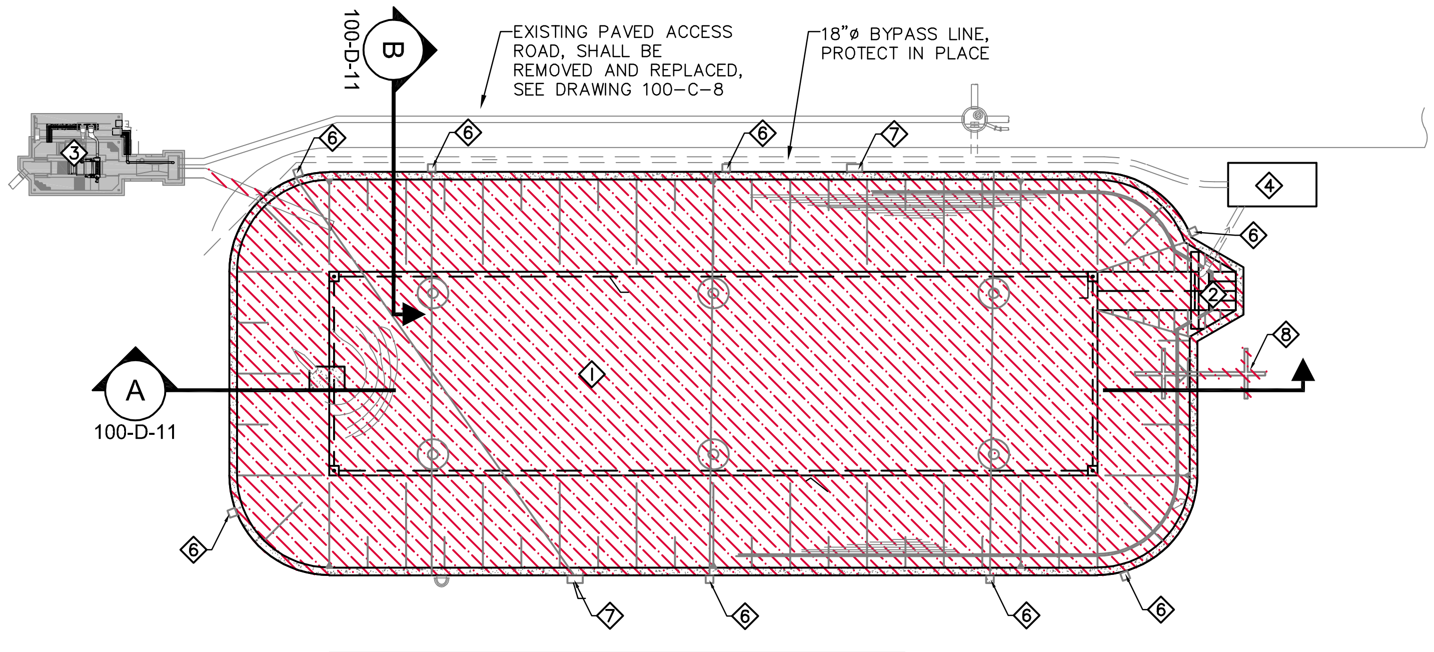
REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-D-10
DATE	SHEET NO.
NOV. 2021	47 OF 97

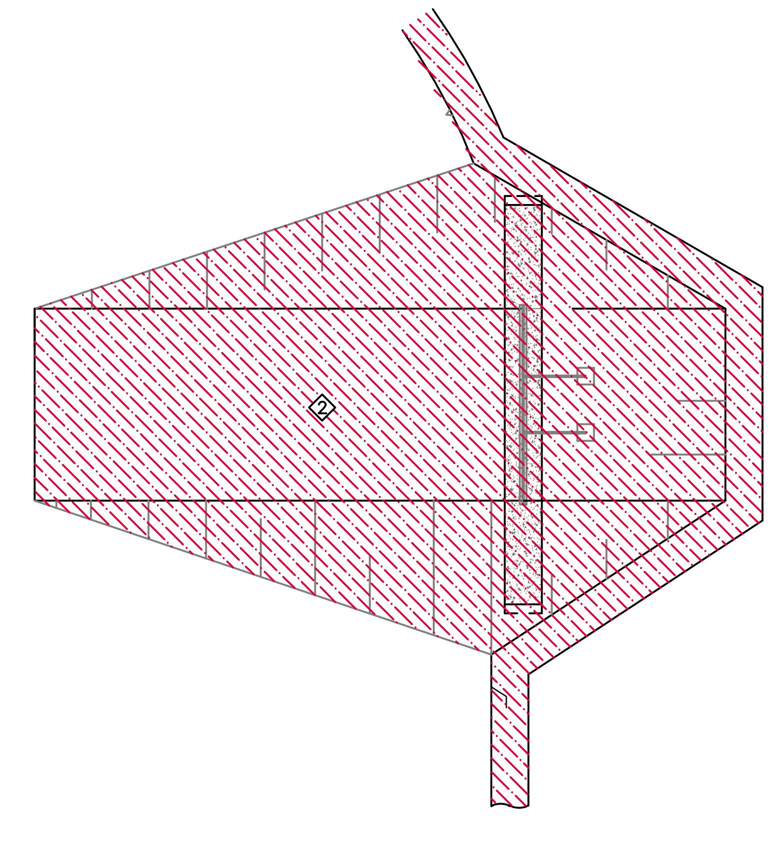
Z:\dyer-part\AAprojects\98 Molalla\198.28 WWTF Design\DWG\PROCESS AREA 100 - SITE\DEMO\ACAD-AERATION BASIN-ModelBASIN 08_04_2021.dwg. 11/18/2021 2:01:01 PM
PLOT DATE November 30, 2021



EXISTING AERATION BASIN PLAN VIEW (1)

SCALE: 1" = 30'-0"

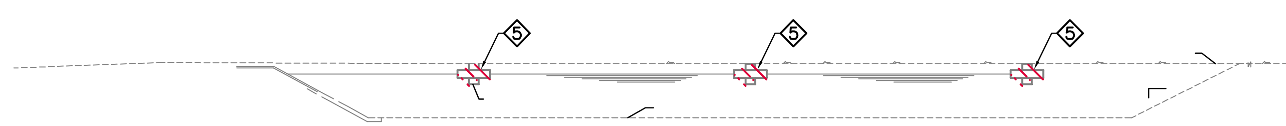
100-D-11



EXISTING ACCESS RAMP OVERFLOW WEIR (2)

SCALE: 1" = 4'-0"

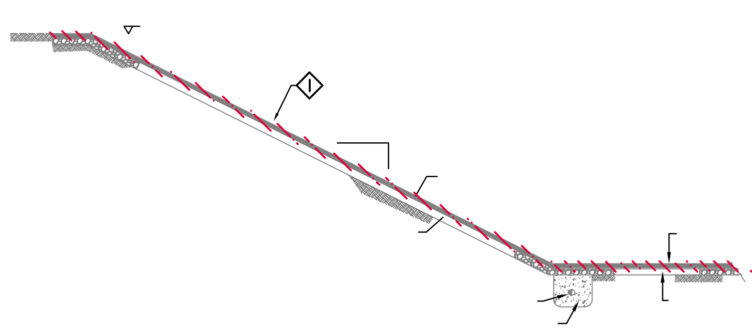
100-D-11



SECTION (A)

SCALE: 1" = 30'-0"

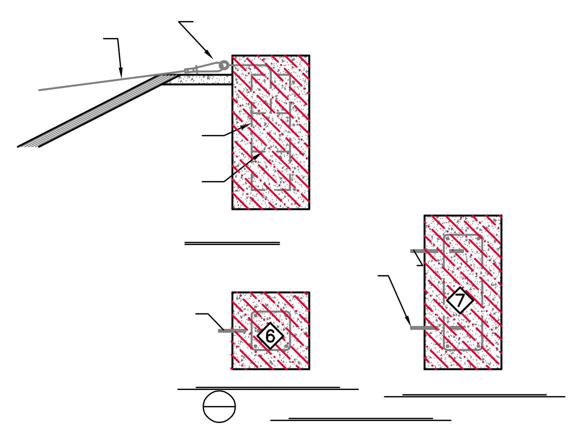
100-D-11



SECTION (B)

SCALE: 1" = 4'-0"

100-D-11



EXISTING MOORING ANCHORS (3)

SCALE: 1" = 2'-0"

100-D-11

NO.	DEMOLITION NOTES
1	EXISTING AERATEDLAGOON STRUCTURE: TO BE DEMOLISHED TO LIMITS SHOWN AND BACKFILLED. BREAK UP EXISTING 3" AC LINING THE LAGOON PRIOR TO BACKFILLING.
2	EXISTING ACCESS RAMP/ OVER FLOW WEIR: TO BE DEMOLISHED AND REMOVED.
3	EXISTING INFLUENT SCREENING FACILITY: PROTECT IN PLACE.
4	EXISTING OLD TRANSFER PUMP STATION: (PREVIOUSLY DEMOLISHED BUT TO UNKNOWN LIMITS).
5	EXISTING FLOATING AERATORS: SALVAGE TO OWNER.
6	EXISTING SINGLE MOORING ANCHORS: TO BE DEMOLISHED AND REMOVED.
7	EXISTING DOUBLE MOORING ANCHORS: TO BE DEMOLISHED AND REMOVED.
8	EXISTING AERATOR HOIST: TO BE DEMOLISHED AND REMOVED.

LEGEND

- STRUCTURE DEMOLITION
- EXIST'G EQUIPMENT TO BE PROTECTED IN PLACE
- SLURRY FILL EXISTING PIPING

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING AERATION BASIN
DEMOLITION DETAILS

DESIGNED: — DRAWN: —

APPROVED BY: DATE:

REVISIONS			
REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-D-11
DATE	SHEET NO.
NOV. 2021	48 OF 97

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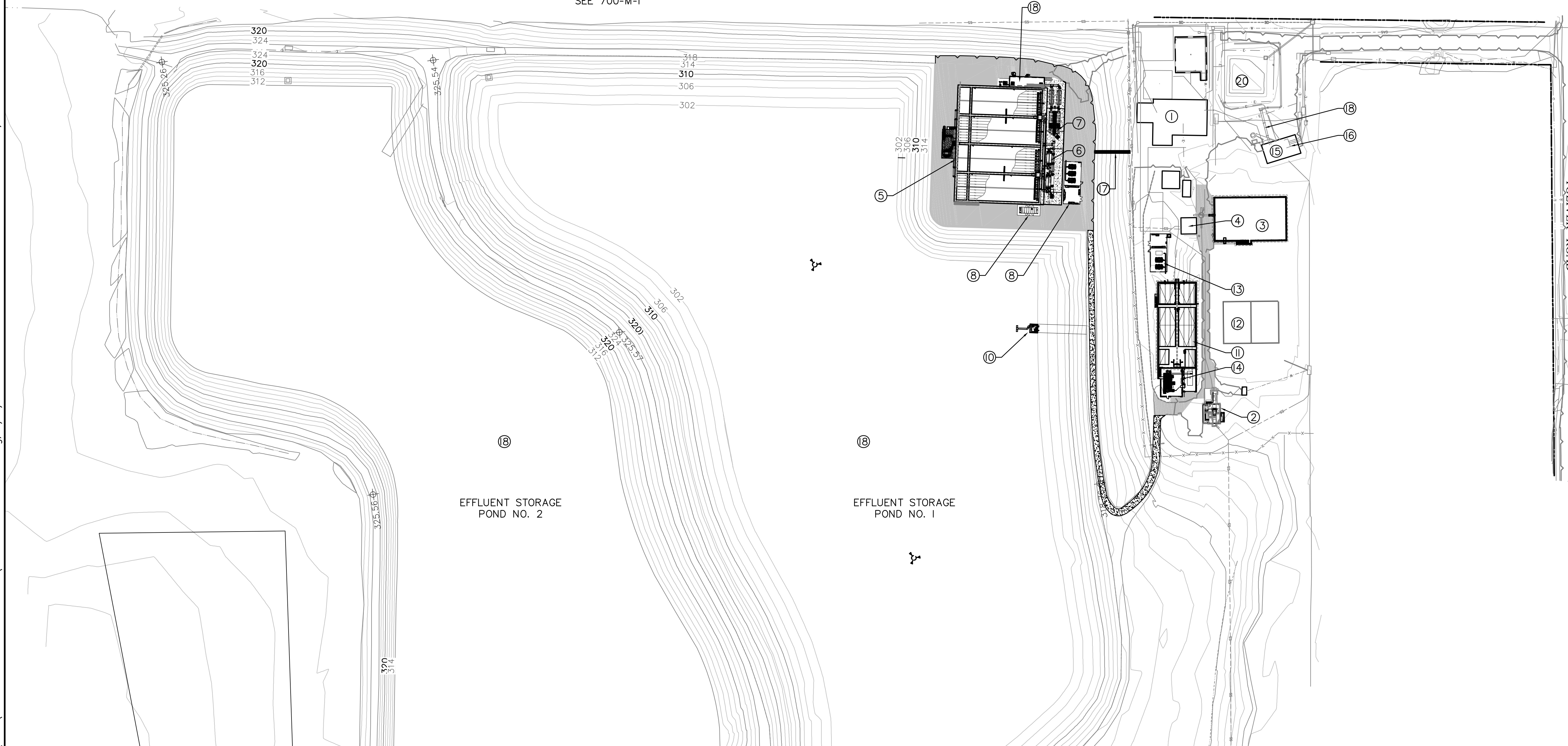
PLOT DATE November 30, 2021

KEY NOTES

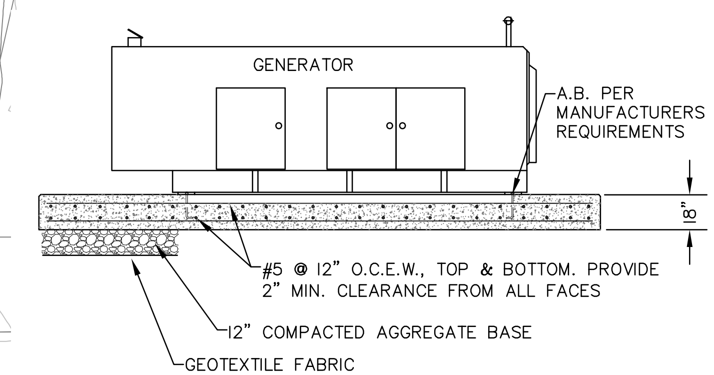
1. EXISTING WASTEWATER PLANT OPERATIONS/LAB BUILDING
2. EXISTING INFLUENT SCREENING FACILITY
3. NEW INFLUENT FLOW EQUALIZATION BASIN, SEE 310-C-1.
4. EXISTING TRANSFER PUMP STATION
5. NEW HEADWORKS/SEQUENCING BATCH REACTOR
6. NEW EFFLUENT FILTERS
7. NEW UV DISINFECTION SYSTEM
8. NEW SBR/BLOWER BUILDING
9. NEW SBR STANDBY GENERATOR W/16' X 32' CONCRETE PAD
10. NEW EFFLUENT OUTLET STRUCTURE SEE 700-M-1
11. NEW AEROBIC DIGESTER, SEE 900-M-1
12. FUTURE AEROBIC DIGESTER
13. NEW AEROBIC DIGESTER/BLOWER BUILDING SEE 910-A-1
14. NEW BIOSOLIDS DEWATERING AREA SEE 920-A-1
15. EXISTING EFFLUENT PUMP STATION
16. EXISTING 750KW STANDBY GENERATOR
17. NEW STAIRS
18. EFFLUENT STORAGE POND NO. 1 & NO. 2, SEE 700-M-1
19. PROPOSED STAGING AREA
20. CHLORINE CONTACT BASIN SEE 100-C-9

NOTES:

1. SITE PIPING NOT SHOWN CLARITY.



NEW SITE PLAN 1
100-C-1



STANDBY DIESEL GENERATOR 2
N.T.S.
100-C-1

MOLALLA OREGON

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PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SITE
OVERALL PLAN VIEW

DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-C-1
DATE	SHEET NO.
NOV. 2021	49 OF 97

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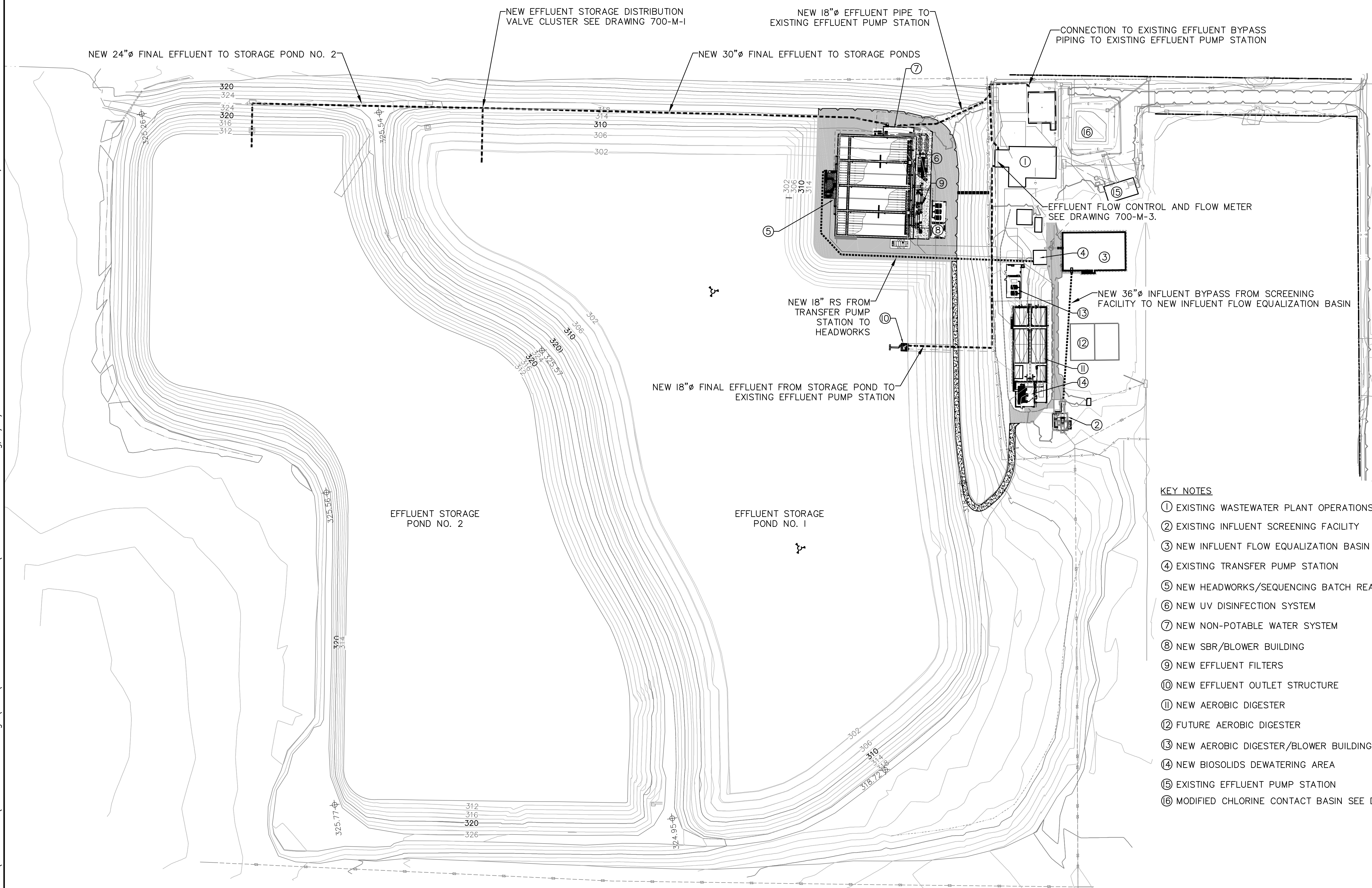

KEY NOTES

1. EXISTING WASTEWATER PLANT OPERATIONS/LAB BUILDING
2. EXISTING INFLUENT SCREENING FACILITY
3. NEW INFLUENT FLOW EQUALIZATION BASIN
4. EXISTING TRANSFER PUMP STATION
5. NEW HEADWORKS/SEQUENCING BATCH REACTOR
6. NEW UV DISINFECTION SYSTEM
7. NEW NON-POTABLE WATER SYSTEM
8. NEW SBR/BLOWER BUILDING
9. NEW EFFLUENT FILTERS
10. NEW EFFLUENT OUTLET STRUCTURE
11. NEW AEROBIC DIGESTER
12. FUTURE AEROBIC DIGESTER
13. NEW AEROBIC DIGESTER/BLOWER BUILDING
14. NEW BIOSOLIDS DEWATERING AREA
15. EXISTING EFFLUENT PUMP STATION
16. MODIFIED CHLORINE CONTACT BASIN SEE DRAWING 100-C-9

PLAN SCALE
40 0 20 40 80

NEW SITE PLAN 1
100-C-2

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THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLLALA

NEW SITE
SITE PIPING - INFLUENT & EFFLUENT

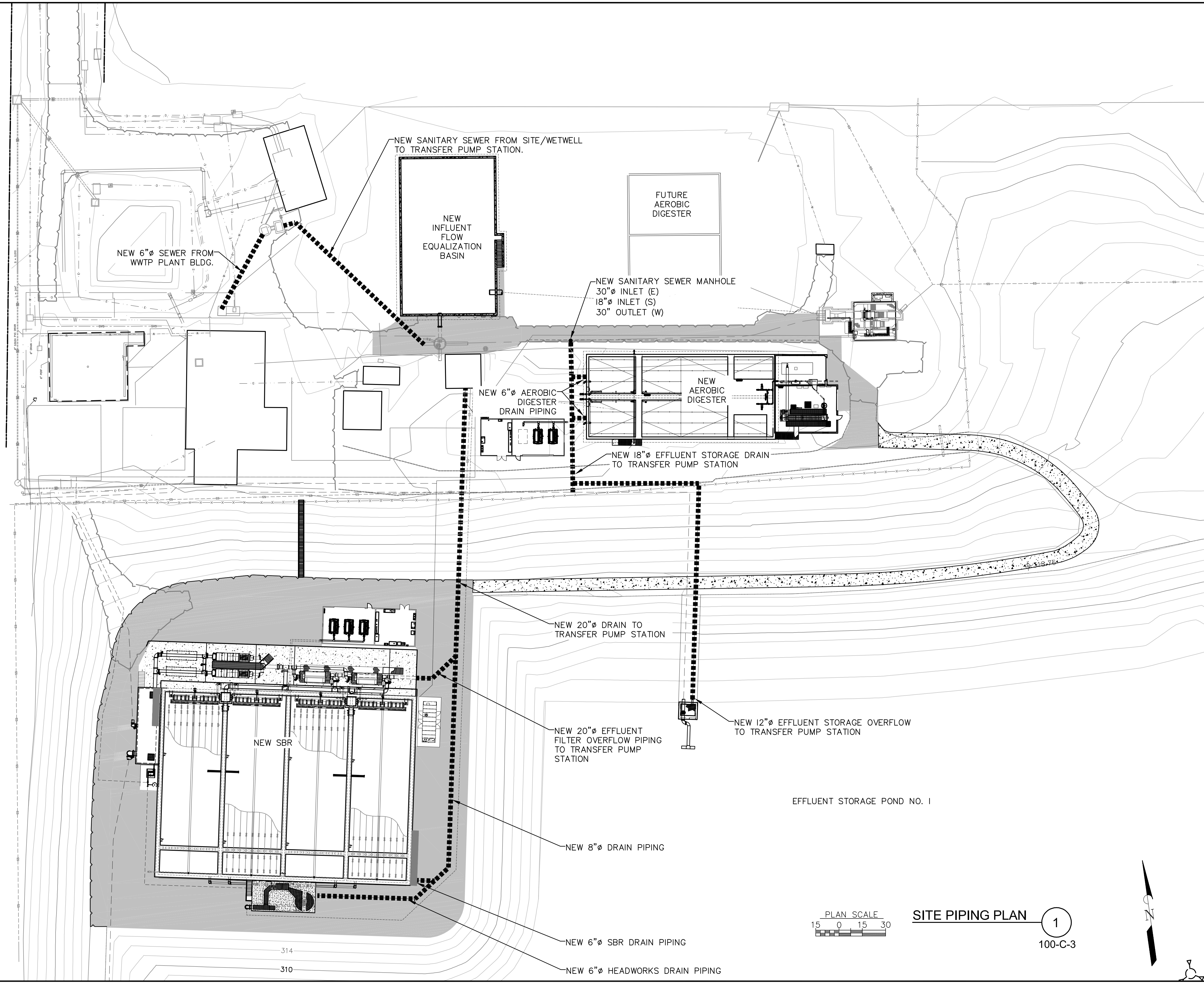
DESIGNED: —
DRAWN: —
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-C-2
DATE	SHEET NO.
NOV. 2021	50 OF 97



SITE PIPING PLAN 1
100-C-3

MOLALLA OREGON

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ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SITE
SITE PIPING - SEWER

DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-C-3
DATE	SHEET NO.
NOV. 2021	51 OF 97

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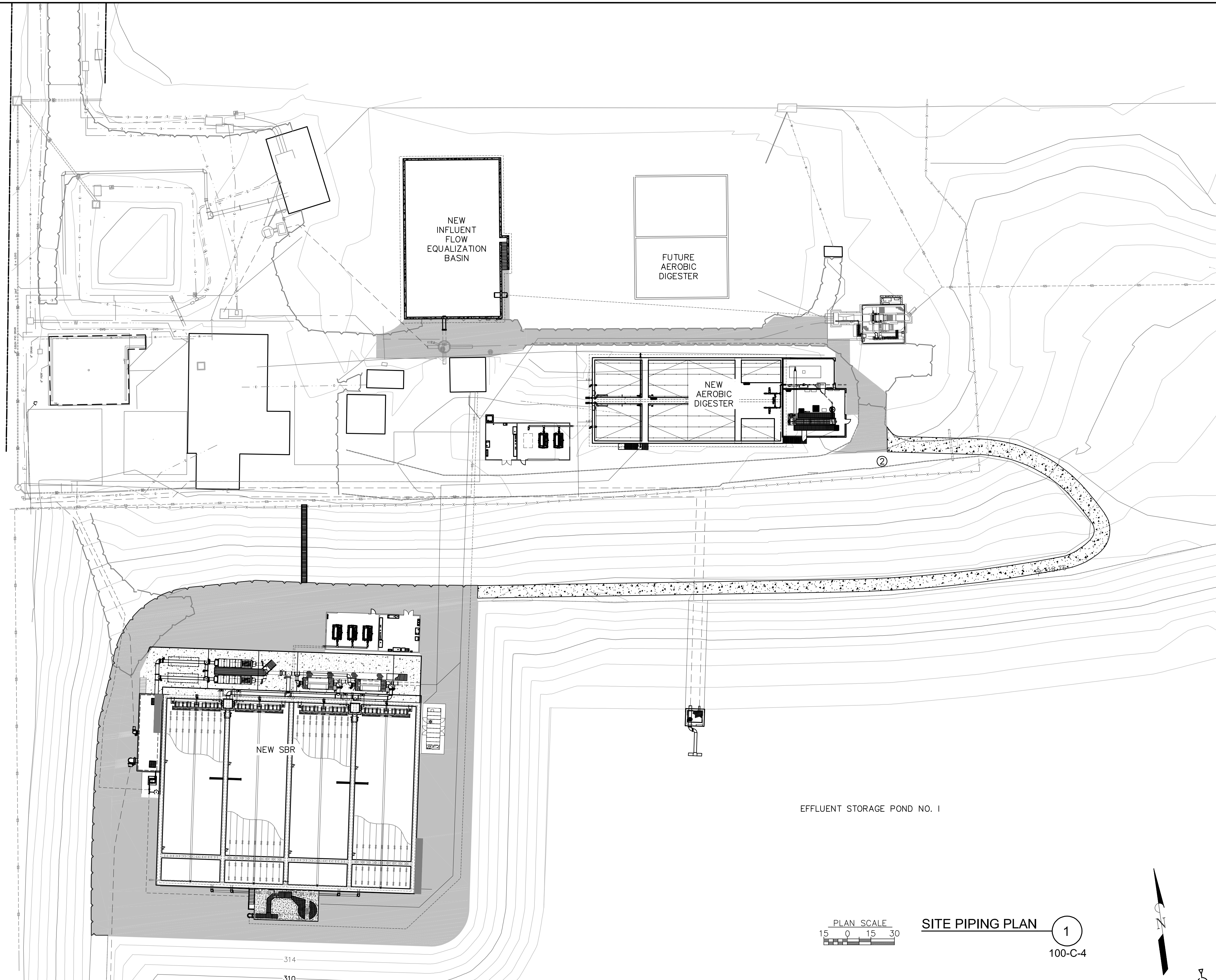

PLAN SCALE 15 0 15 30

SITE PIPING PLAN

1
100-C-4

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SITE
SITE PIPING - STORM

DESIGNED:	DRAWN:
_	_

APPROVED BY: ____ DATE: ____

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-C-4
DATE	SHEET NO.
NOV. 2021	52 OF 97

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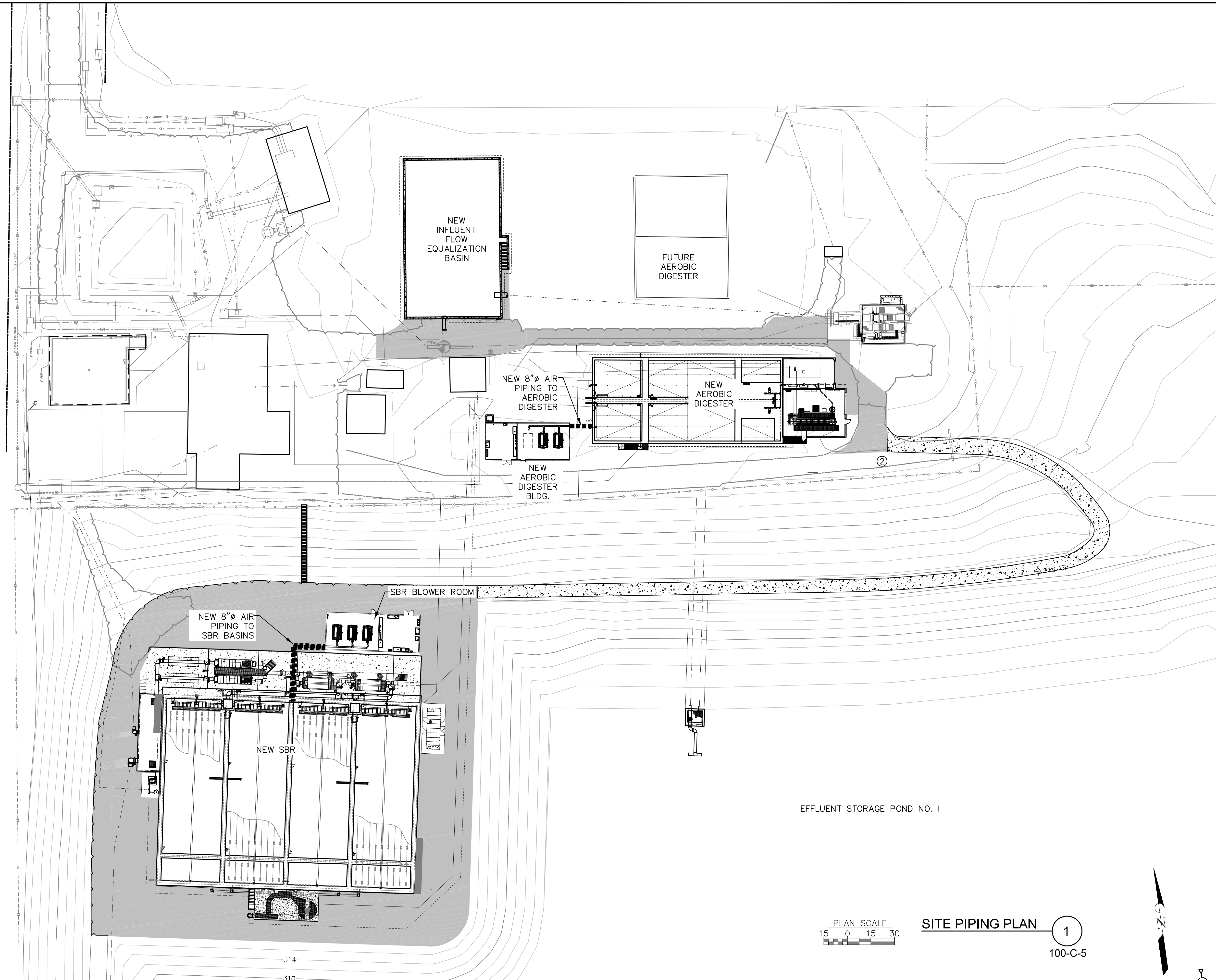

PLAN SCALE
15 0 15 30

SITE PIPING PLAN 1 100-C-5

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SITE
SITE PIPING - AIR

DESIGNED: —
DRAWN: —
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-C-5
DATE	SHEET NO.
NOV. 2021	53 OF 97

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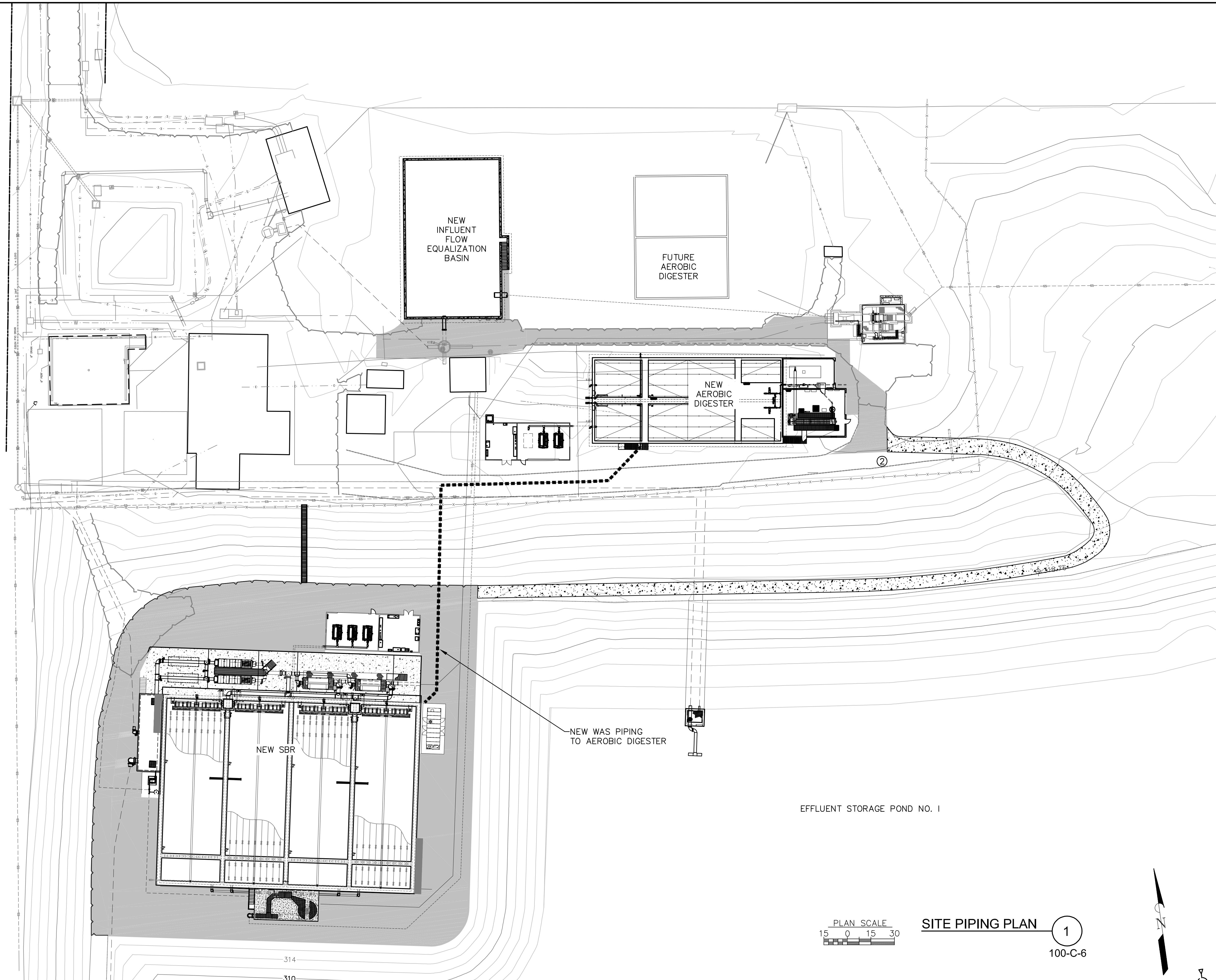


SITE PIPING PLAN 1
100-C-6

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLLALLA

NEW SITE
SITE PIPING - WAS

DESIGNED:

DRAWN:

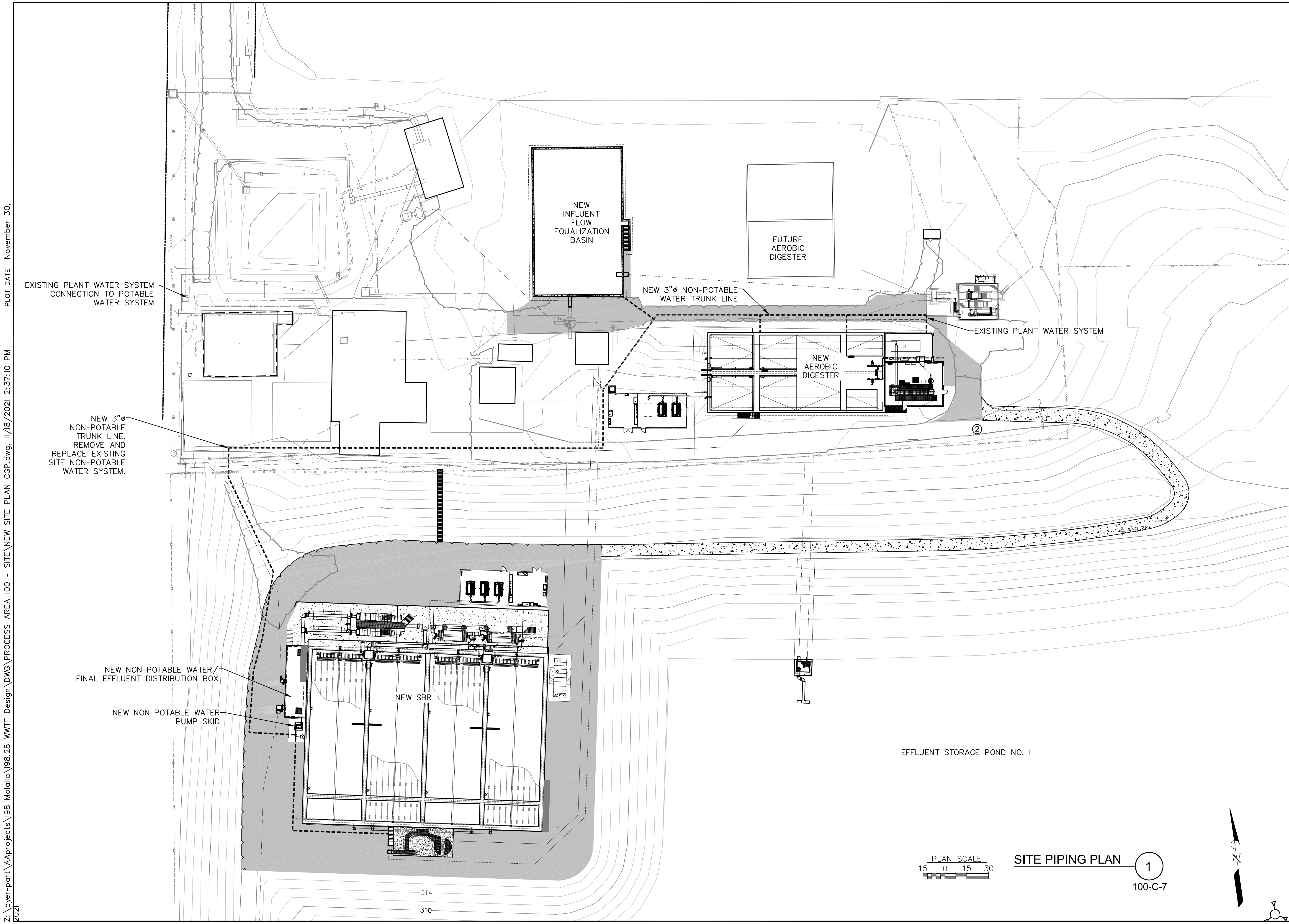
APPROVED BY:

DATE:

REVISIONS			
REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-C-6
DATE	SHEET NO.
NOV. 2021	54 OF 97



SITE PIPING PLAN 1 100-C-7

PLOT DATE November 30, 2021

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MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SITE
SITE PIPING - POTABLE & NON-POTABLE WATER

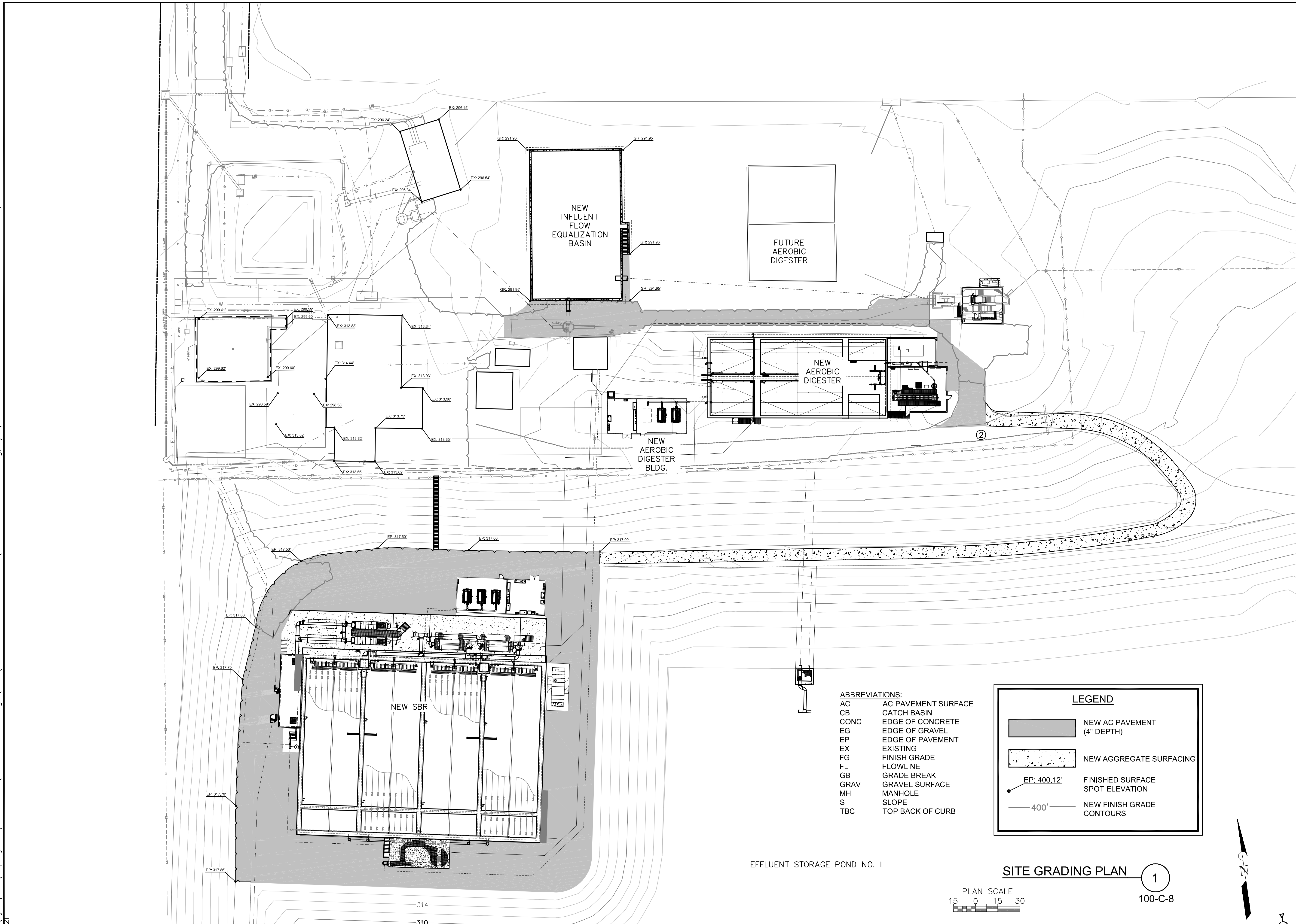
DESIGNED: —
DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-C-7
DATE	SHEET NO.
NOV. 2021	55 OF 97



ABBREVIATIONS:

AC	AC PAVEMENT SURFACE
CB	CATCH BASIN
CONC	EDGE OF CONCRETE
EG	EDGE OF GRAVEL
EP	EDGE OF PAVEMENT
EX	EXISTING
FG	FINISH GRADE
FL	FLOWLINE
GB	GRADE BREAK
GRAV	GRAVEL SURFACE
MH	MANHOLE
S	SLOPE
TBC	TOP BACK OF CURB

LEGEND

	NEW AC PAVEMENT (4" DEPTH)
	NEW AGGREGATE SURFACING
EP: 400.12'	FINISHED SURFACE SPOT ELEVATION
400'	NEW FINISH GRADE CONTOURS

SITE GRADING PLAN 1 100-C-8

PLAN SCALE 15 0 15 30

N

MOLALLA OREGON

THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLLALA

NEW SITE
SITE GRADING PLAN

DESIGNED: DRAWN:

APPROVED BY: DATE:

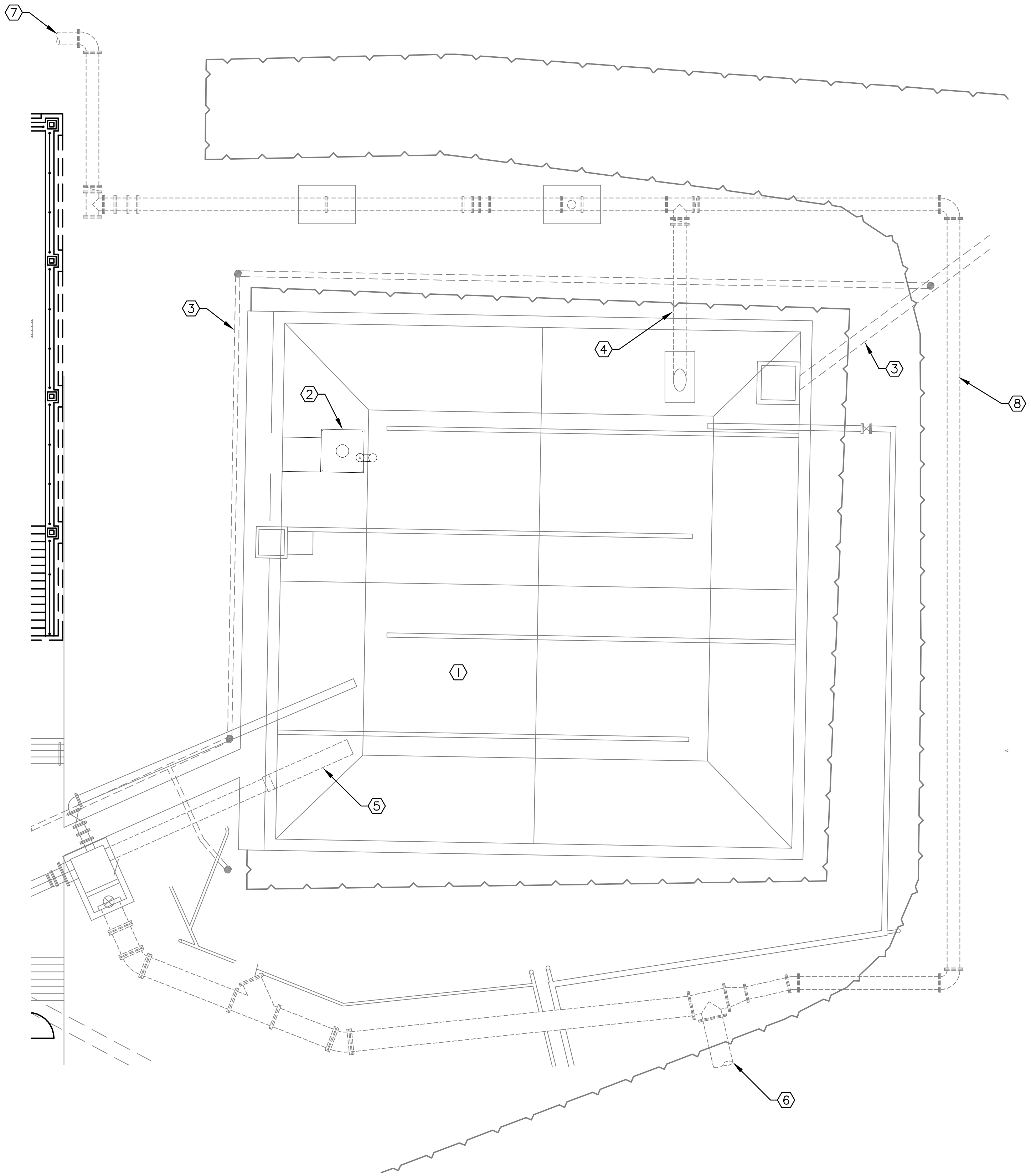
REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-C-8
DATE	SHEET NO.
NOV. 2021	56 OF 97

Z:\dyer-part\AAprojects\98 Molalla\98.28 WWTF Design\DWG\PROCESS AREA 100 - SITE\NEW SITE PLAN CGP.dwg, 11/18/2021 2:37:10 PM PLOT DATE November 30, 2021



KEY NOTES

1. EXISTING CHLORINE CONTACT BASIN, SEAL CRACKS, THEN PROVIDE NEW WATERPROOF COATING.
2. PROTECT IN PLACE EXISTING PLANT YARD IRRIGATION EQUIPMENT
3. PROTECT IN PLACE EXISTING SITE DRAIN/STORM SYSTEM
4. EXISTING 18"ø INLET PIPING
5. EXISTING 18"ø OUTLET PIPING
6. EXISTING 30"ø FINAL EFFLUENT PIPING TO TRANSFER PUMP STATION, SEE 100-C-2 FOR CONTINUATION
7. EXISTING 18"ø EFFLUENT LINE. SEE DRAWING 100-C-2 FOR CONNECTION TO NEW EFFLUENT LINES.
8. EXISTING 18"ø CONTACT BASIN BYPASS LINE

EXISTING CHLORINE CONTACT BASIN (1, 100-C-9)
SCALE: 1" = 8'-0"

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SITE
EXISTING CHLORINE CONTACT BASIN - MODIFIED

DESIGNED:	DRAWN:
APPROVED BY: DATE:	

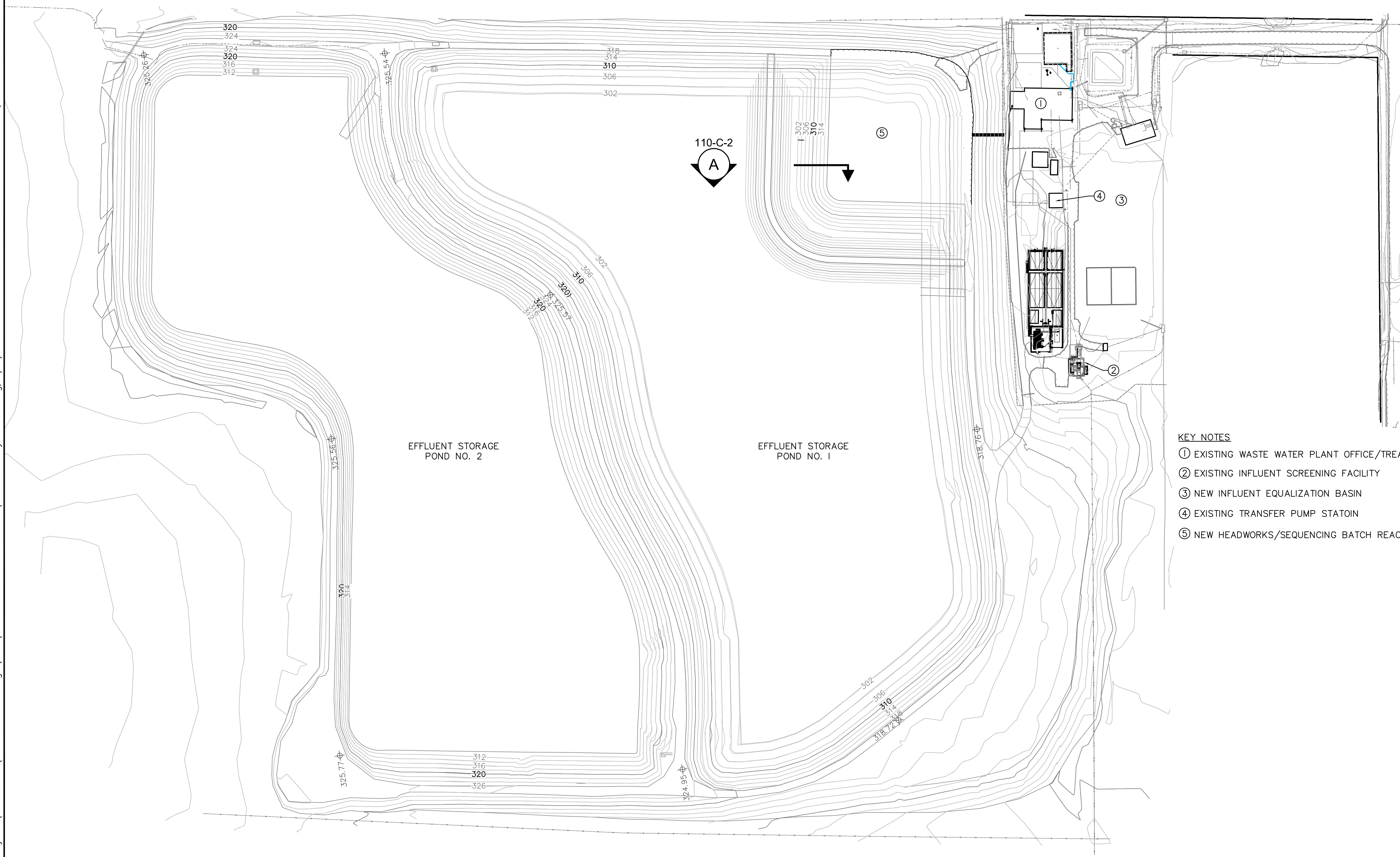
REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	100-C-9
DATE	SHEET NO.
NOV. 2021	57 OF 97

Z:\dyer-part\AAprojects\98 Molalla\98.28 WWTF Design\DWG\PROCESS AREA 700 - RECYCLED WATER\MODIFIED CCB.dwg, 11/12/2021 11:58:21 AM PLOT DATE November 30, 2021



KEY NOTES

1. EXISTING WASTE WATER PLANT OFFICE/TREATMENT BUILDING
2. EXISTING INFLUENT SCREENING FACILITY
3. NEW INFLUENT EQUALIZATION BASIN
4. EXISTING TRANSFER PUMP STATOIN
5. NEW HEADWORKS/SEQUENCING BATCH REACTOR

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY
NOT FOR
CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SITE
TEMPORARY COFFER DAM - SITE PLAN

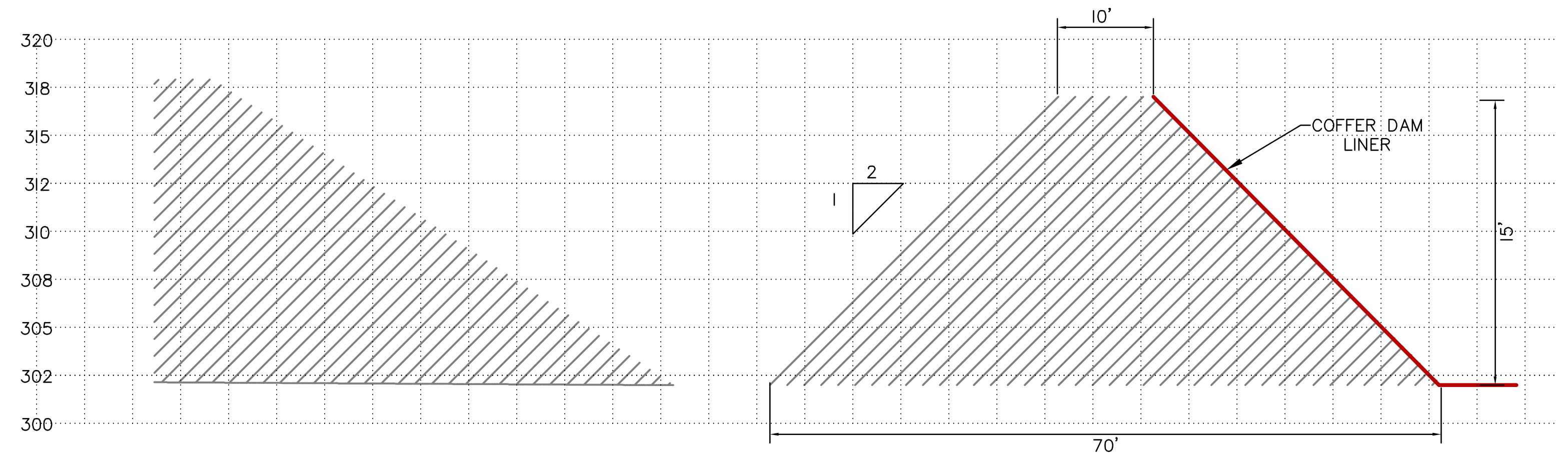
DESIGNED: ___ DRAWN: ___
APPROVED BY: ___ DATE: ___

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	110-C-1
DATE	SHEET NO.
NOV. 2021	58 OF 97



PLAN SCALE
5 0 5 10

COFFER DAM PROFILE 1
110-C-2

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY
NOT FOR
CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SITE
TEMPORARY COFFER DAM - PROFILES

DESIGNED: —
DRAWN: CAT
APPROVED BY:
DATE:

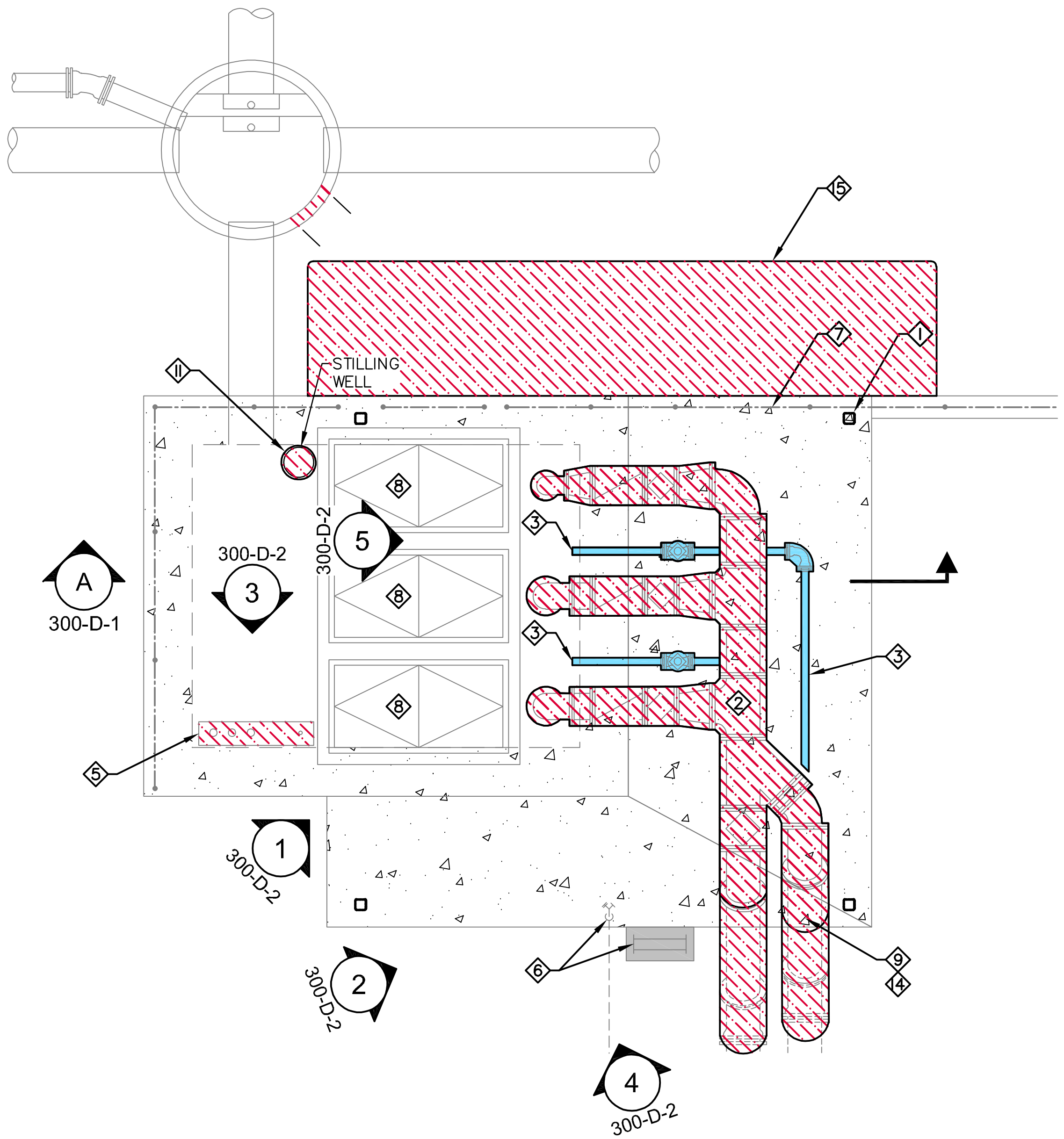
REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

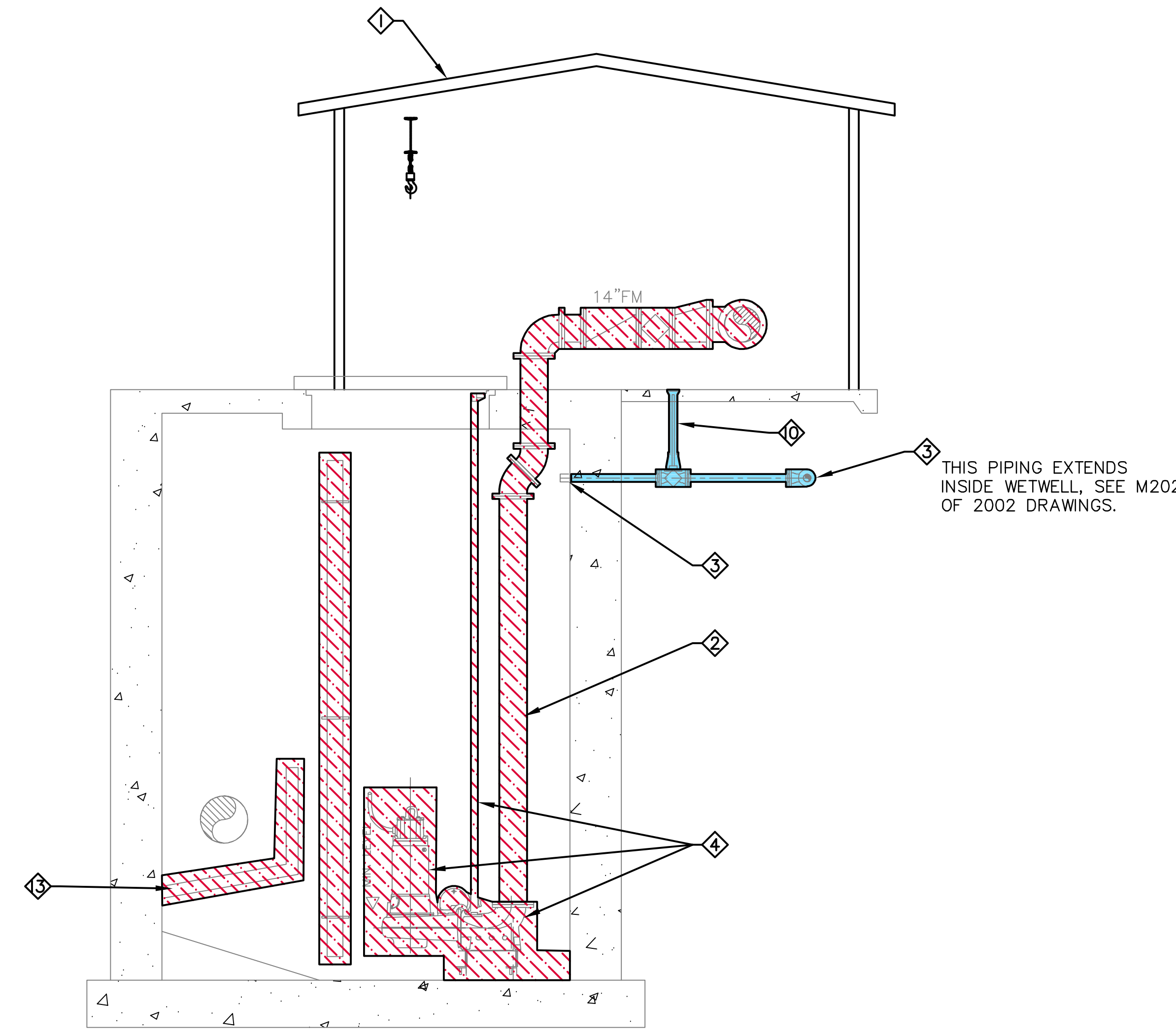
LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	110-C-2
DATE	SHEET NO.
NOV. 2021	59 OF 97

Z:\dyer-part\AAprojects\198 Molalla\198.28 WWTF Design\DWG\PROCESS AREA 100 - SITE\CofferDamLayoutRev4.dwg, 11/12/2021 11:49:37 AM PLOT DATE November 30, 2021



EXIST'G TRANSFER PUMP STATION 1
SCALE: 1" - 4'-0"
300-D-1



SECTION A
SCALE: 1" - 4'-0"
300-D-1

DEMOLITION NOTES:

1. EXISTING CANOPY STRUCTURE, PROTECT IN PLACE.
2. REMOVE AND DISPOSE OF EXISTING PIPING HEADER AND ASSOCIATED APPURTENANCES.
3. EXISTING PRESSURE FORCE MAIN RETURN PIPING SHALL BE ABANDONED IN PLACE. EXISTING PIPE PENETRATIONS INTO WETWELL SHALL BE GROUND 1/2" BELOW FACE OF CONCRETE WALL AND PROVIDE A WATER TIGHT PLUG.
4. REMOVE AND DISPOSE OF EXISTING PUMPS, PUMP BASES AND ASSOCIATED APPURTENANCES.
5. REMOVE AND DISPOSE OF PUMP CABLE TERMINAL PANEL AND TRANSFER PUMP STATION JUNCTION BOX.
6. EXISTING NON-POTABLE UTILITY STATION, PROTECT IN PLACE.
7. EXISTING HANDRAILS, PROTECT IN PLACE.
8. EXISTING WET WELL HATCHES, PROTECT IN PLACE.
9. REMOVE EXISTING FLOW METER AND ASSOCIATED APPURTENANCES. SALVAGE FLOW METER TO OWNER, DISPOSE OF ASSOCIATED APPURTENANCES.
10. SLURRY FILL ABANDONED DRAIN VALVE.
11. REMOVE AND DISPOSE OF EXISTING STILLING WELL..
12. EXISTING NON-POTABLE UTILITY STATION, PROTECT IN PLACE.
13. REMOVE AND DISPOSE OF EXISTING INFLUENT WASTEWATER TROUGH
14. REMOVE ABOVE GRADE COMPONENTS OF SECONDARY FORCE MAIN, ABANDON BELOW GRADE COMPONENTS. ABANDONED FORCE MAIN SHALL BE SLURRY FILLED.
15. REMOVE AND DISPOSE OF EXISTING ASPHALT AS REQ'D FOR INSTALLATION OF NEW SKID PUMP.

NOTES:

1. THIS DEMOLITION PLAN IS BASED ON SHEET M201 OF THE EXISTING CITY OF MOLALLA WASTEWATER TREATMENT PLANT IMPROVEMENTS AS-BUILT DRAWINGS DATED APRIL 2002. REFER TO ORIGINAL DESIGN DRAWINGS FOR MORE INFORMATION AND ADDITIONAL DETAILS.
2. ALL ANCHORS ASSOCIATED WITH DEMOLITION ITEMS, SHALL BE REMOVED TO 1/2" BELOW FACE OF CONCRETE AND GROUT FILLED WITH NON SHRINK GROUT.
3.

LEGEND

- DEMO EXISTING
- EXIST'G EQUIPMENT TO BE PROTECTED IN PLACE
- SLURRY FILL EXISTING PIPING

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING TRANSFER PUMP STATION
DEMOLITION PLAN AND SECTION VIEW

DESIGNED: CGP
DRAWN: CGP
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	300-D-1
DATE	SHEET NO.
NOV. 2021	60 OF 97

Z:\dyer-part\AAprojects\198 Molalla\198.28 WWTF Design\DWG\PROCESS AREA 300 - TRANSFER PUMP STA\EXISTING TRANSFER PS DRAWINGS.dwg, 11/12/2021 11:55:01 AM
PLOT DATE November 30, 2021

PHOTO: PUMP DISCHARGE PIPING (1) 300-D-2

PHOTO: PUMP DISCHARGE PIPING (2) 300-D-2

PHOTO: PUMP CONTROLS (3) 300-D-2

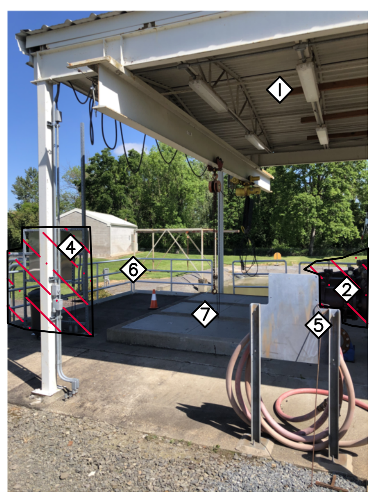


PHOTO: PUMP ACCESS HATCHES (4) 300-D-2

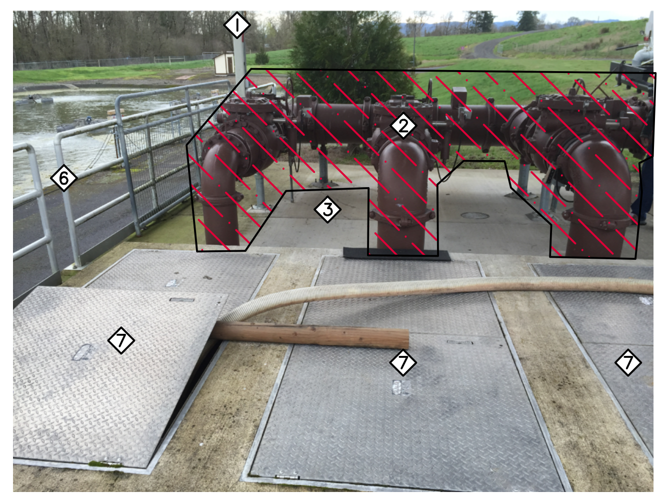


PHOTO: PUMP HATCHES AND DISCHARGE PIPING (5) 300-D-2

DEMOLITION NOTES:

1. EXISTING CANOPY STRUCTURE, PROTECT IN PLACE.
2. REMOVE AND DISPOSE OF EXISTING PIPING HEADER AND ASSOCIATED APPURTENANCES.
3. EXISTING PRESSURE FORCE MAIN RETURN PIPING SHALL BE ABANDONED IN PLACE. EXISTING PIPE PENETRATIONS INTO WETWELL SHALL BE GROUND 1/2" BELOW FACE OF CONCRETE WALL AND PROVIDE A WATER TIGHT PLUG.
4. REMOVE AND DISPOSE OF PUMP CABLE TERMINAL PANEL AND TRANSFER PUMP STATION JUNCTION BOX.
5. EXISTING NON-POTABLE UTILITY STATION, PROTECT IN PLACE.
6. EXISTING HANDRAILS, PROTECT IN PLACE.
7. EXISTING WET WELL HATCHES, PROTECT IN PLACE.
8. REMOVE AND DISPOSE OF EXISTING FLOW METER AND ASSOCIATED APPURTENANCES.
9. REMOVE ABOVE GRADE COMPONENTS OF SECONDARY FORCE MAIN, ABANDON BELOW GRADE COMPONENTS. ABANDONED FORCE MAIN SHALL BE SLURRY FILLED.
10. REMOVE AND DISPOSE OF EXISTING ASPHALT AS REQ'D FOR INSTALLATION OF NEW SKID PUMP.

NOTES:

1. THIS DEMOLITION PLAN IS BASED ON SHEET M201 OF THE EXISTING CITY OF MOLALLA WASTEWATER TREATMENT PLANT IMPROVEMENTS AS-BUILT DRAWINGS DATED APRIL 2002. REFER TO ORIGINAL DESIGN DRAWINGS FOR MORE INFORMATION AND ADDITIONAL DETAILS.
2. ALL ANCHORS ASSOCIATED WITH DEMOLITION ITEMS, SHALL BE REMOVED TO 1/2" BELOW FACE OF CONCRETE AND GROUT FILLED WITH NON SHRINK GROUT.

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MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING TRANSFER PUMP STATION
DEMOLITION PICTURES

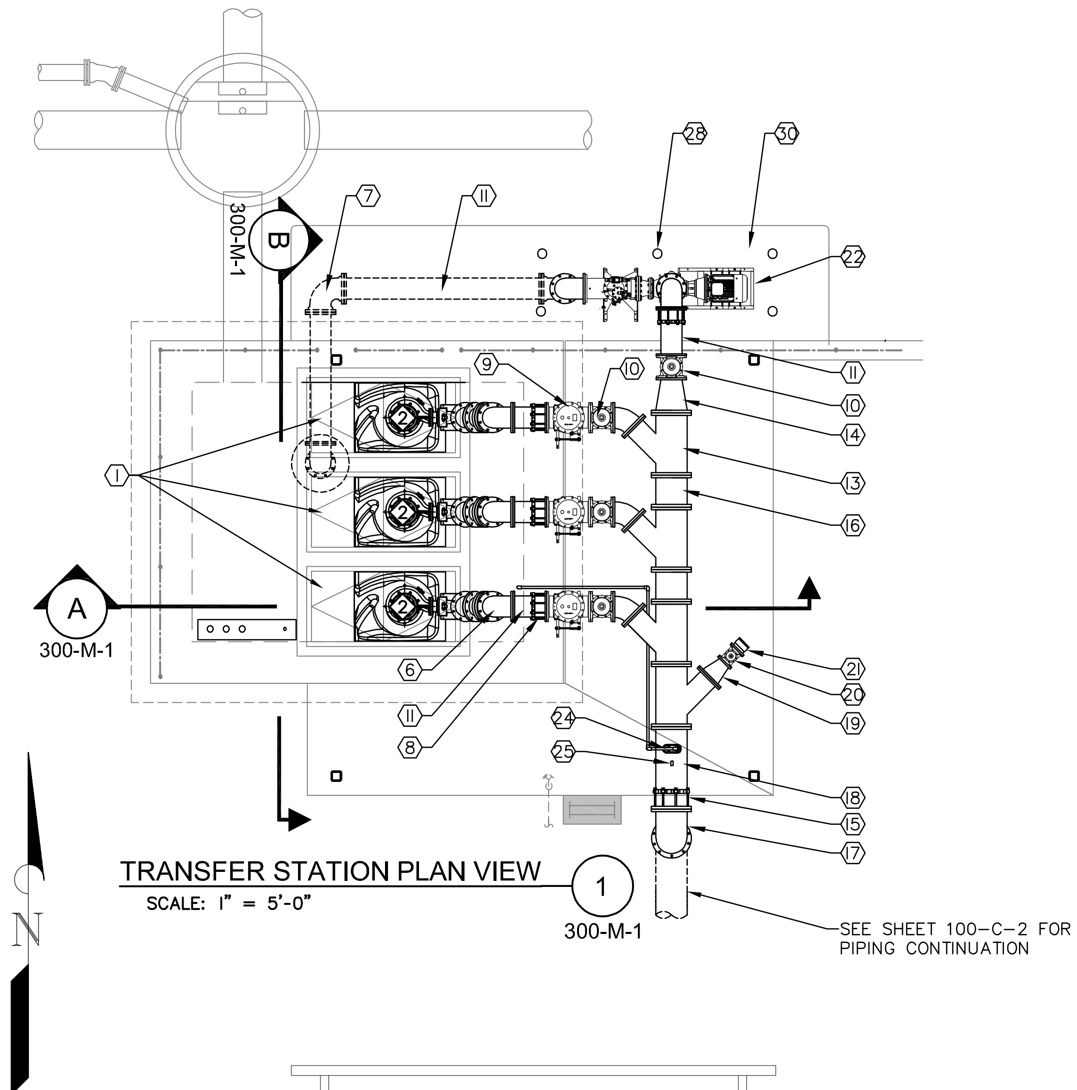
DESIGNED: CGP
DRAWN: CGP
APPROVED BY: DATE:

REVISIONS

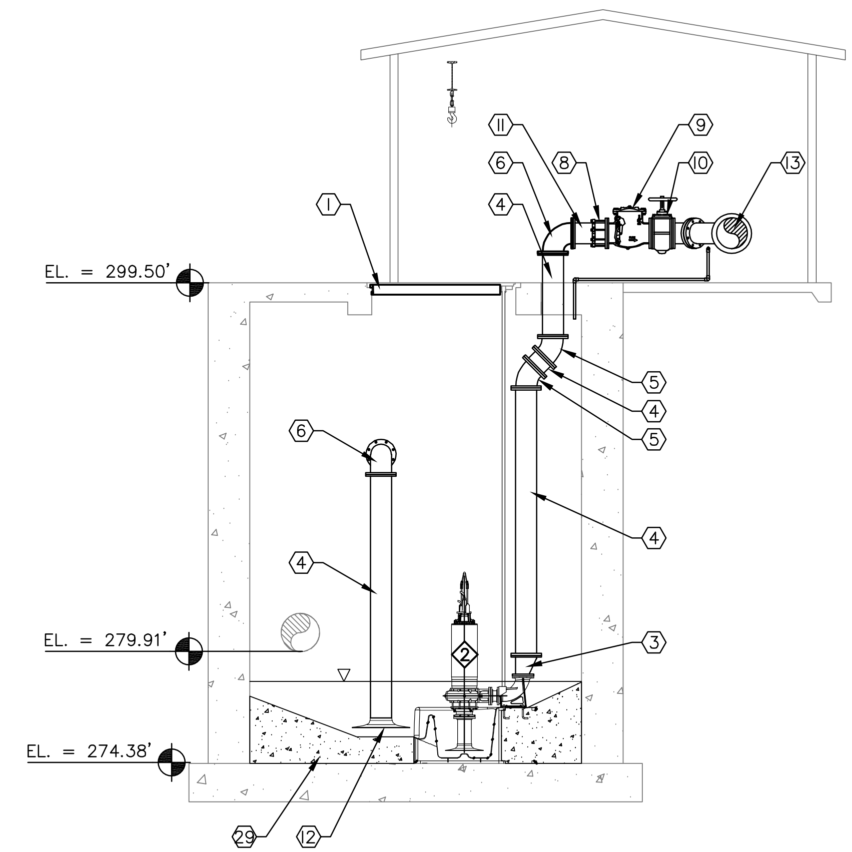
REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

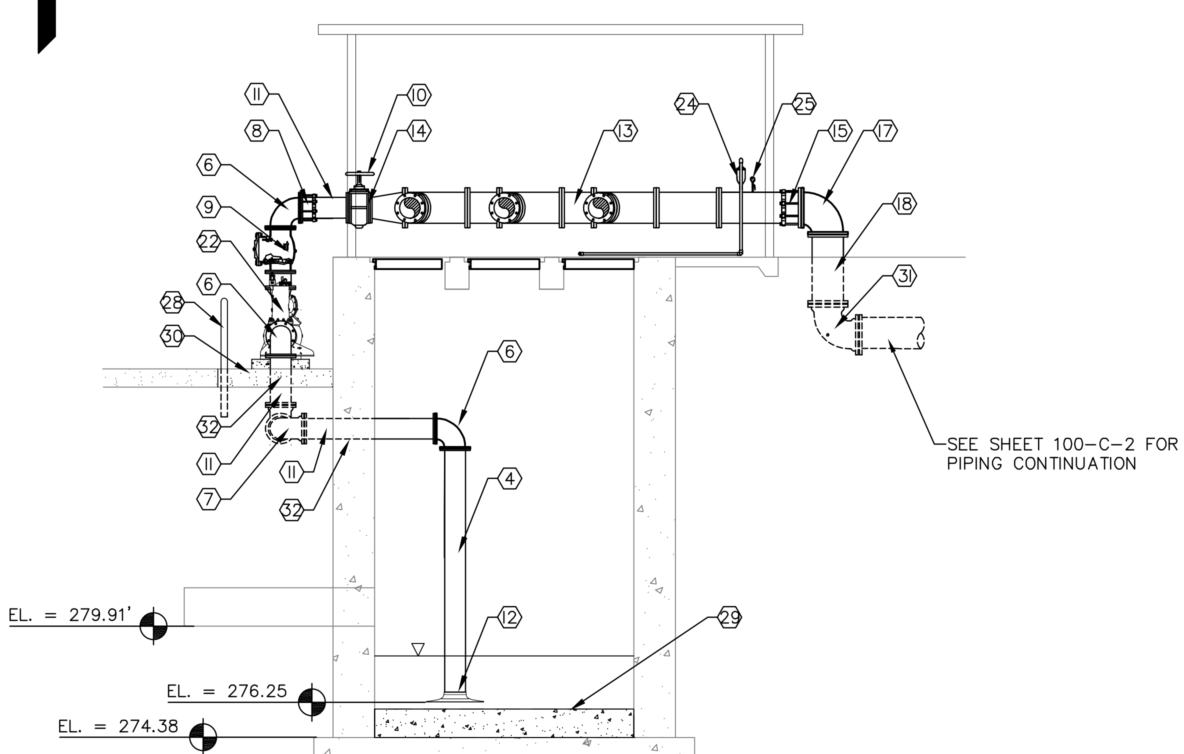
PROJECT NO.	DRAWING NO.
198.28	300-D-2
DATE	SHEET NO.
NOV. 2021	61 OF 97



TRANSFER STATION PLAN VIEW
SCALE: 1" = 5'-0"
1
300-M-1



SECTION A
SCALE: 1" = 5'-0"
300-M-1



SECTION B
SCALE: 1" = 5'-0"
300-M-1

KEY NOTES

1. SAFETY GRATES
2. SUBMERSIBLE PUMP
3. 8"ø X 12"ø FLG ECCENTRIC REDUCER
4. 12"ø FLG PIPE SPOOL, L AS REQ'D
5. 12"ø FLG 45° ELBOW
6. 12"ø FLG 90° ELBOW
7. 12"ø MJ 90° ELBOW
8. 12"ø RESTRAINED FLANGE COUPLING ADAPTER
9. 12"ø FLG CHECK VALVE
10. 12"ø FLG PLUG VALVE
11. 12"ø FLG X PE PIPE SPOOL, L AS REQ'D
12. 12"ø SUCTION INLET
13. 12"ø X 18"ø FLG WYE
14. 12"ø X 18"ø REDUCER
15. 18"ø RESTRAINED FLANGE COUPLING ADAPTER
16. 18"ø FLG PIPE SPOOL, L AS REQ'D
18. 18"ø FLG X PE PIPE SPOOL, L AS REQ'D
17. 18"ø FLG 90° ELBOW
19. 6"ø X 12"ø REDUCER
20. 6"ø FLG PLUG VALVE

KEY NOTES

21. 6"ø QUICK DISCONNECT
22. PEDESTAL MOUNTED STAND-BY PUMP
23. EQUIPMENT PAD, SEE ?/M?
24. AIR RELEASE VALVE, SEE ?/M?
25. PRESSURE GAUGE AND TRANSMITTER, SEE ?/M?
26. 18"ø RESTRAINED FLANGE COUPLING ADAPTER
27. 18"ø MJ 90° ELBOW
28. REMOVABLE BOLLARDS, SEE ?/M?
29. NEW CONCRETE FILLET
30. NEW ASPHALT
31. 18"ø MJ 90° ELBOW
32. PIPE PENETRATION, SEE ?/M?

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

TRANSFER PUMP STATION IMPROVEMENTS
PLAN AND SECTION VIEWS

DESIGNED: | DRAWN:
APPROVED BY: DATE:

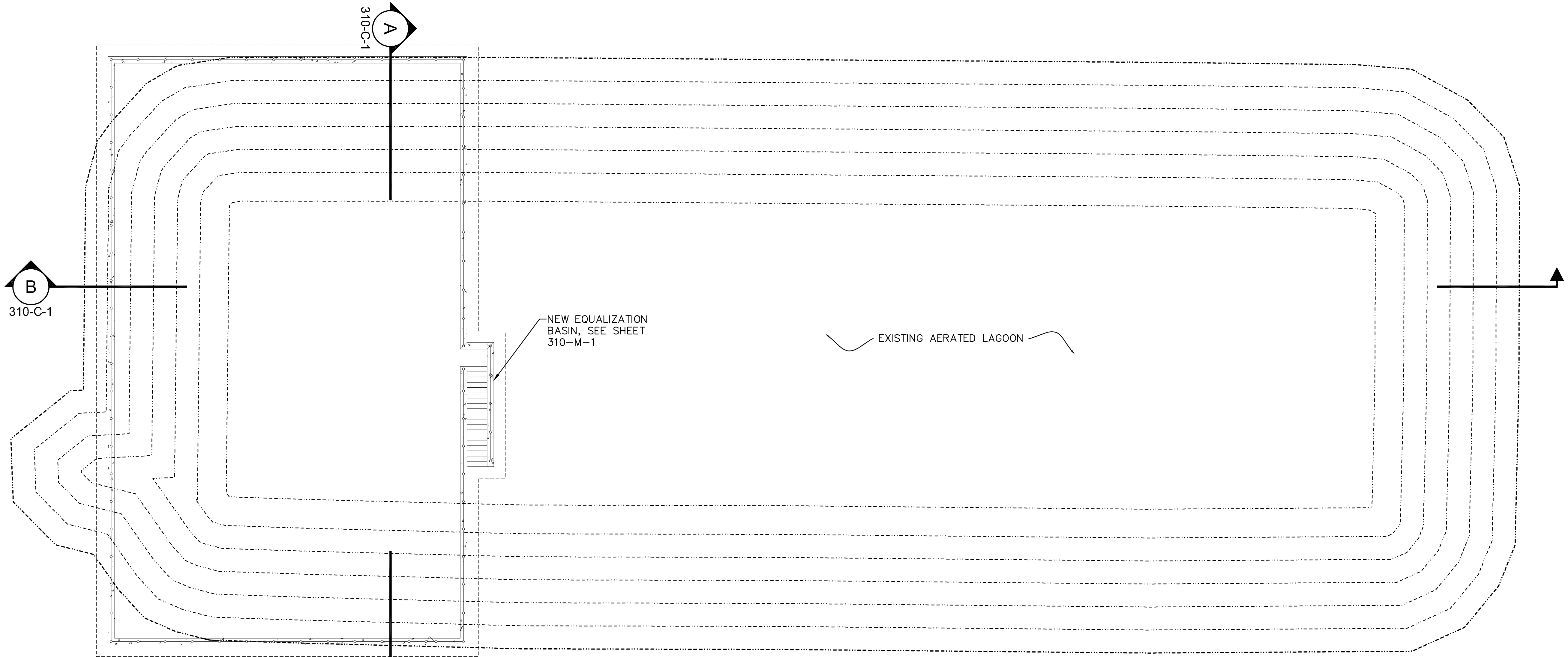
REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

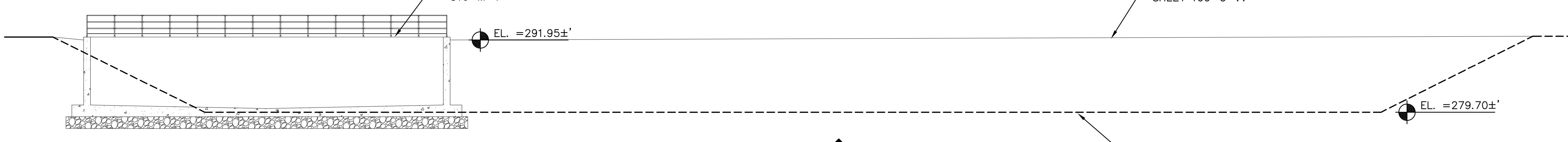
PROJECT NO.	DRAWING NO.
198.28	300-M-1
DATE	SHEET NO.
NOV. 2021	62 OF 97

PLOT
Z:\dyer-part\AAprojects\198 Molalla\198.28 WWTF Design\DWG\PROCESS AREA 300 - TRANSFER PUMP STA\MECHANICAL PLAN VIEW.dwg, 11/11/2021 11:24:55 AM
DATE November 30, 2021



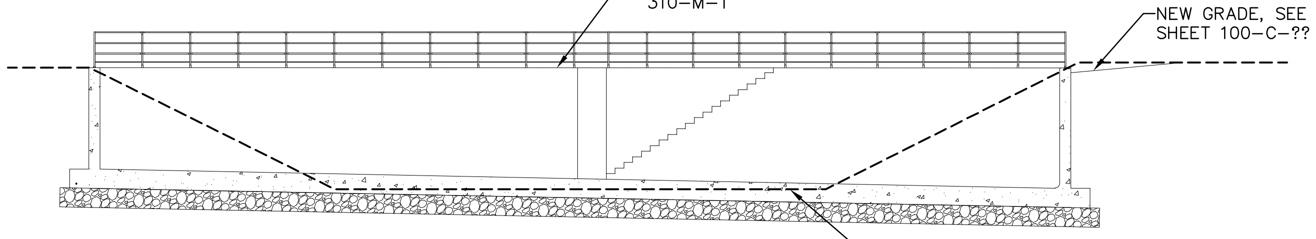
EQUALIZATION BASIN PLAN VIEW X 310-C-1

SCALE: 1" = 10'-0"



SECTION A 310-C-1

SCALE: 1" = 10'-0"



SECTION B 310-C-1

SCALE: 1" = 10'-0"

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW INFLUENT FLOW EQUALIZATION BASIN
PLAN AND PROFILE VIEWS

DESIGNED: —
DRAWN: —
APPROVED BY: ______ DATE: ______

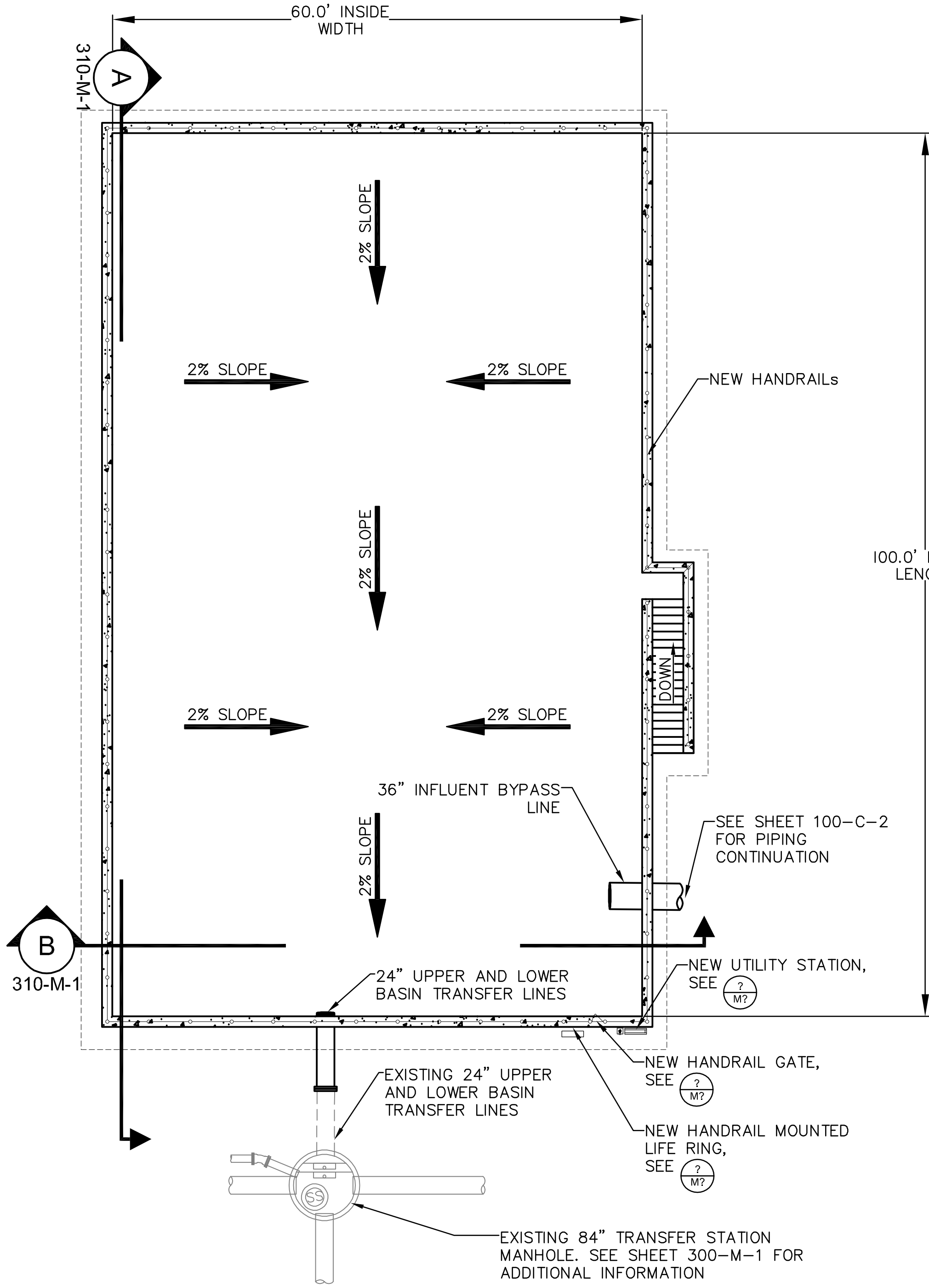
REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

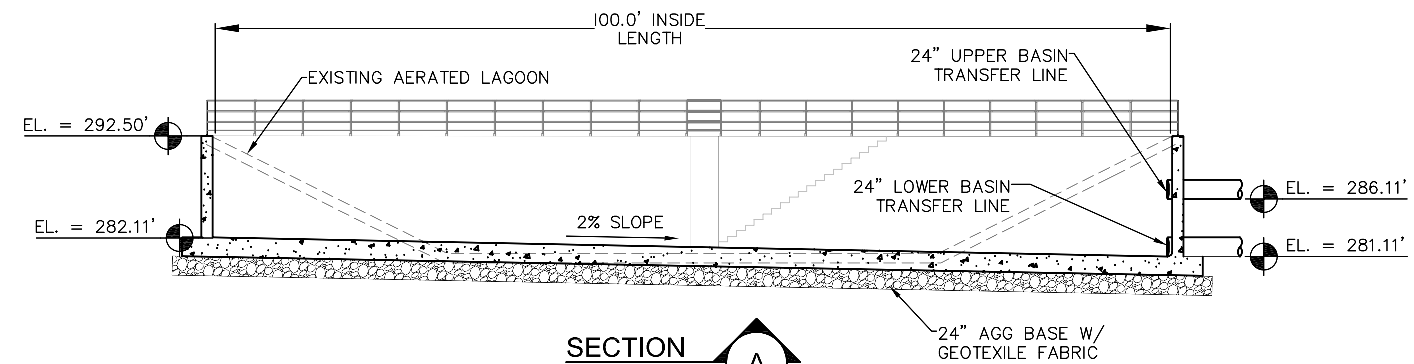
LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	310-C-1
DATE	SHEET NO.
NOV. 2021	63 OF 97

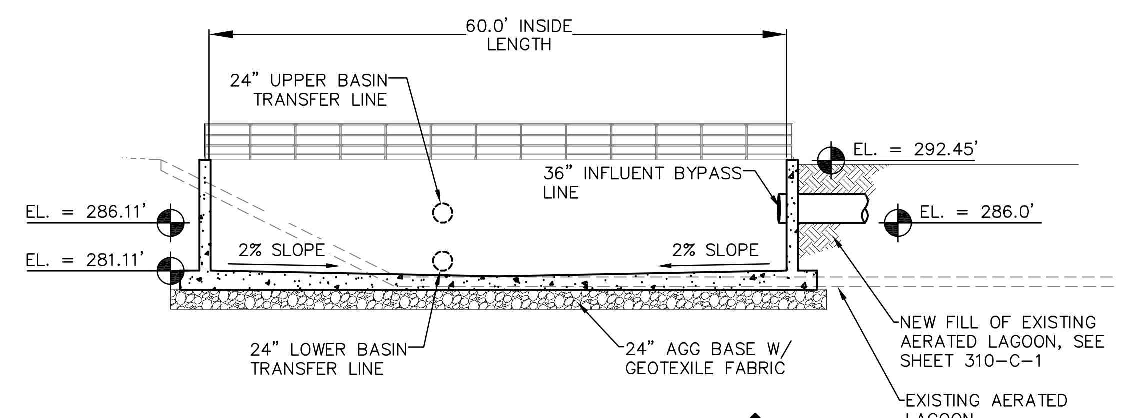
Z:\dyer-part\AAprojects\98 Molalla\98.28 WWTF Design\DWG\PROCESS AREA 310 - EQ BASIN\EQ BASIN CIVIL-MECH.dwg, 11/15/2021 11:42:44 AM PLOT DATE November 30, 2021



EQUALIZATION BASIN PLAN VIEW (A, 310-M-1)
SCALE: 1" = 10'-0"



SECTION (A, 310-M-1)
SCALE: 1" = 10'-0"



SECTION (B, 310-M-1)
SCALE: 1" = 10'-0"

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW INFLUENT FLOW EQUALIZATION BASIN
PLAN AND SECTION VIEWS

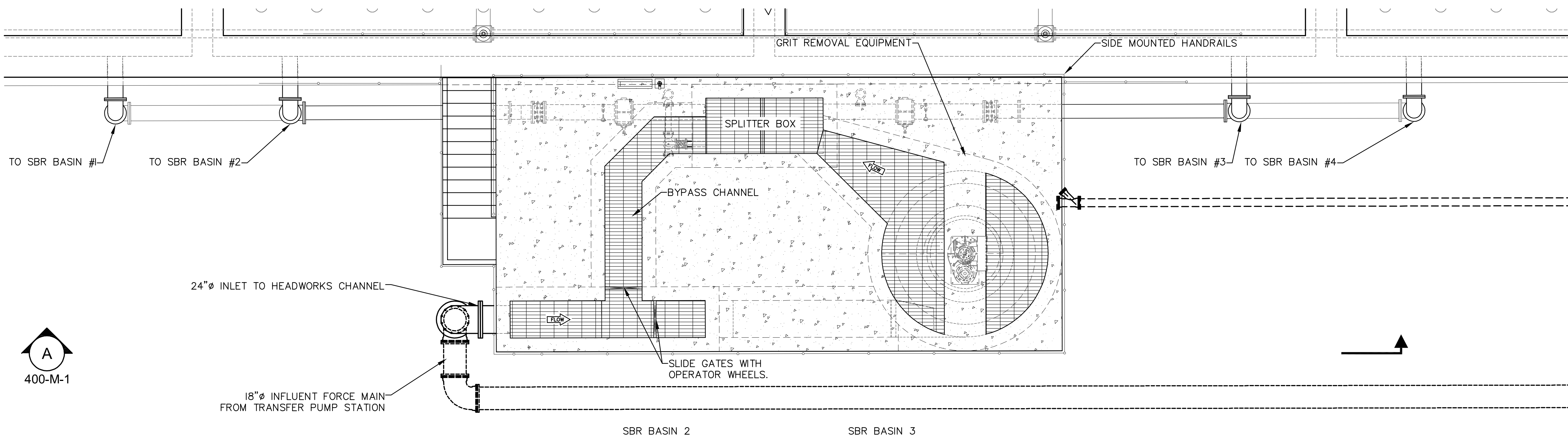
DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

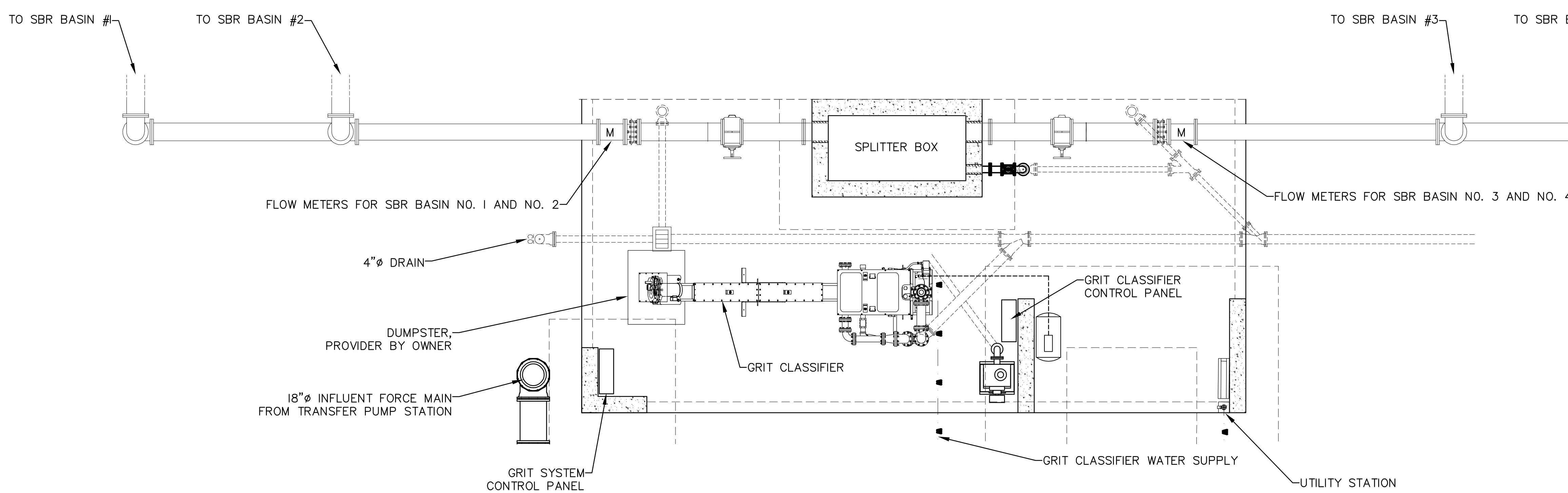
PROJECT NO.	DRAWING NO.
198.28	310-M-1
DATE	SHEET NO.
NOV. 2021	64 OF 97



GRIT REMOVAL - UPPER PLAN VIEW (1)

SCALE: 1" - 4'-0"

400-M-1



GRIT REMOVAL - LOWER PLAN VIEW (2)

SCALE: 1" - 4'-0"

400-M-1

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW HEADWORKS
UPPER & LOWER PLAN VIEWS

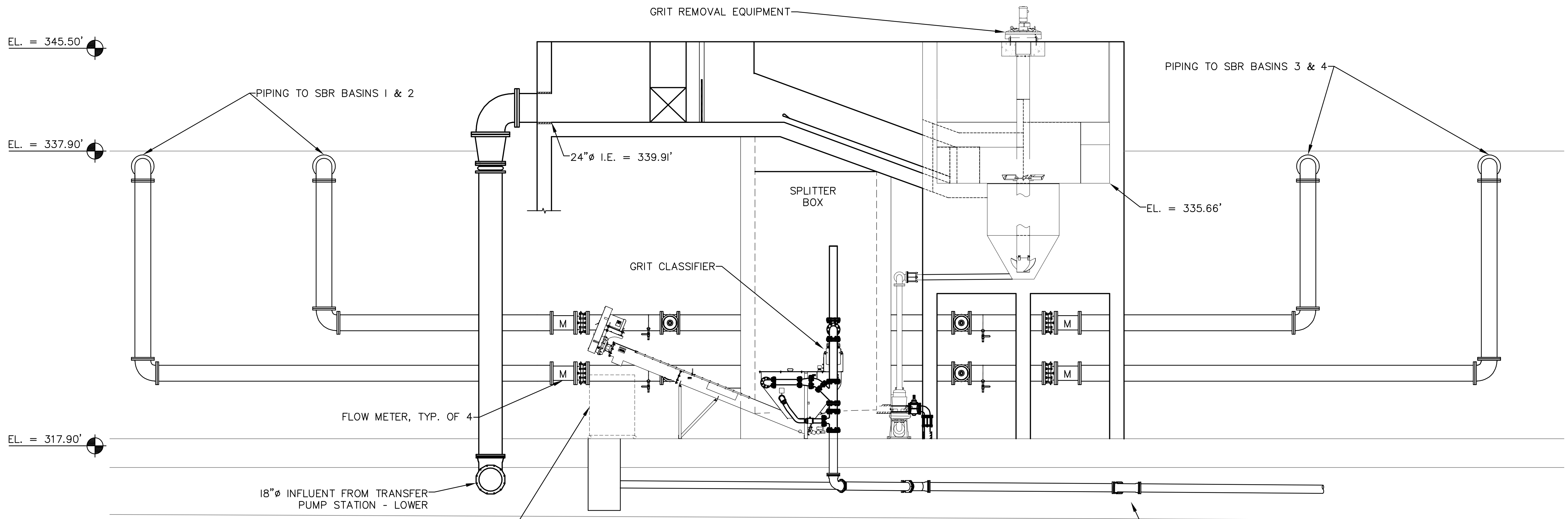
DESIGNED: CGP
DRAWN: CGP
APPROVED BY: ______ DATE: ______

REVISIONS			
REVISED	DESCRIPTION	APPR'D.	DATE

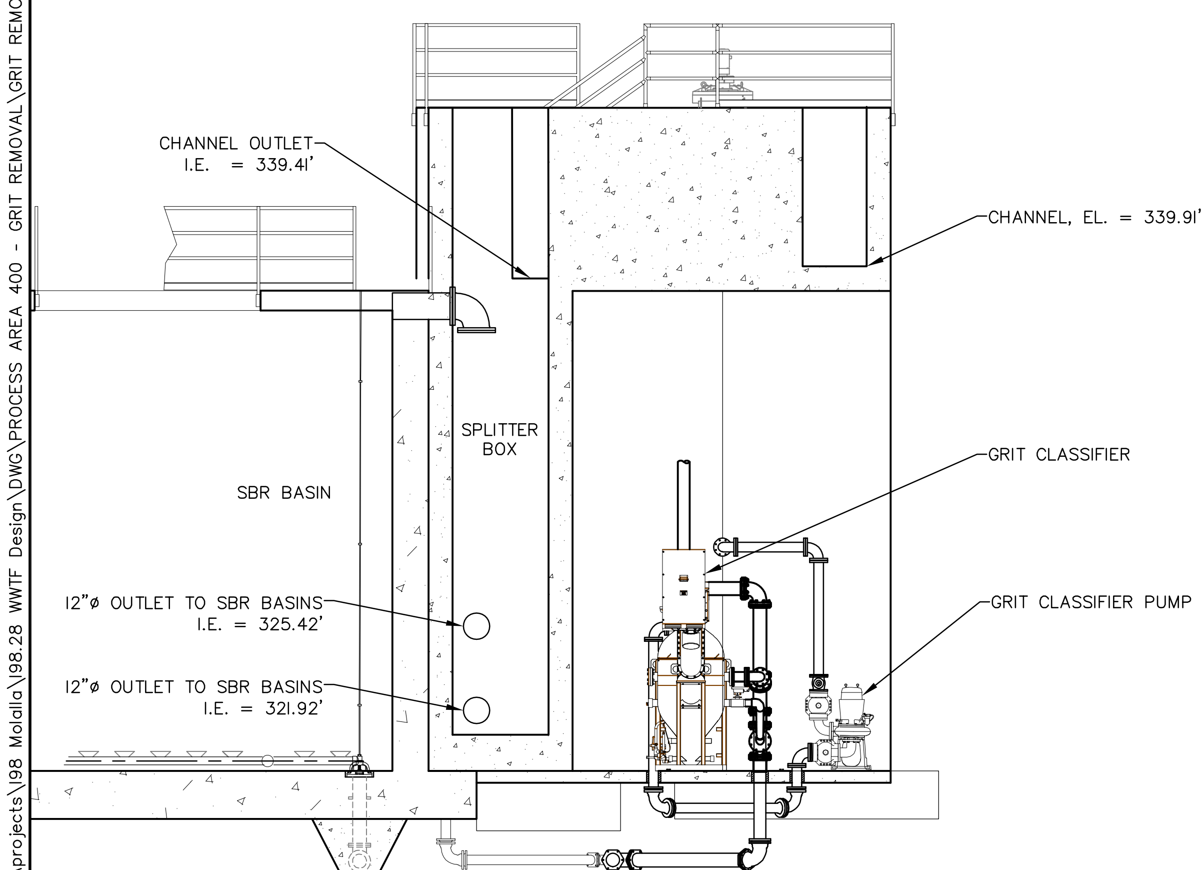
LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	400-M-1
DATE	SHEET NO.
NOV. 2021	65 OF 97

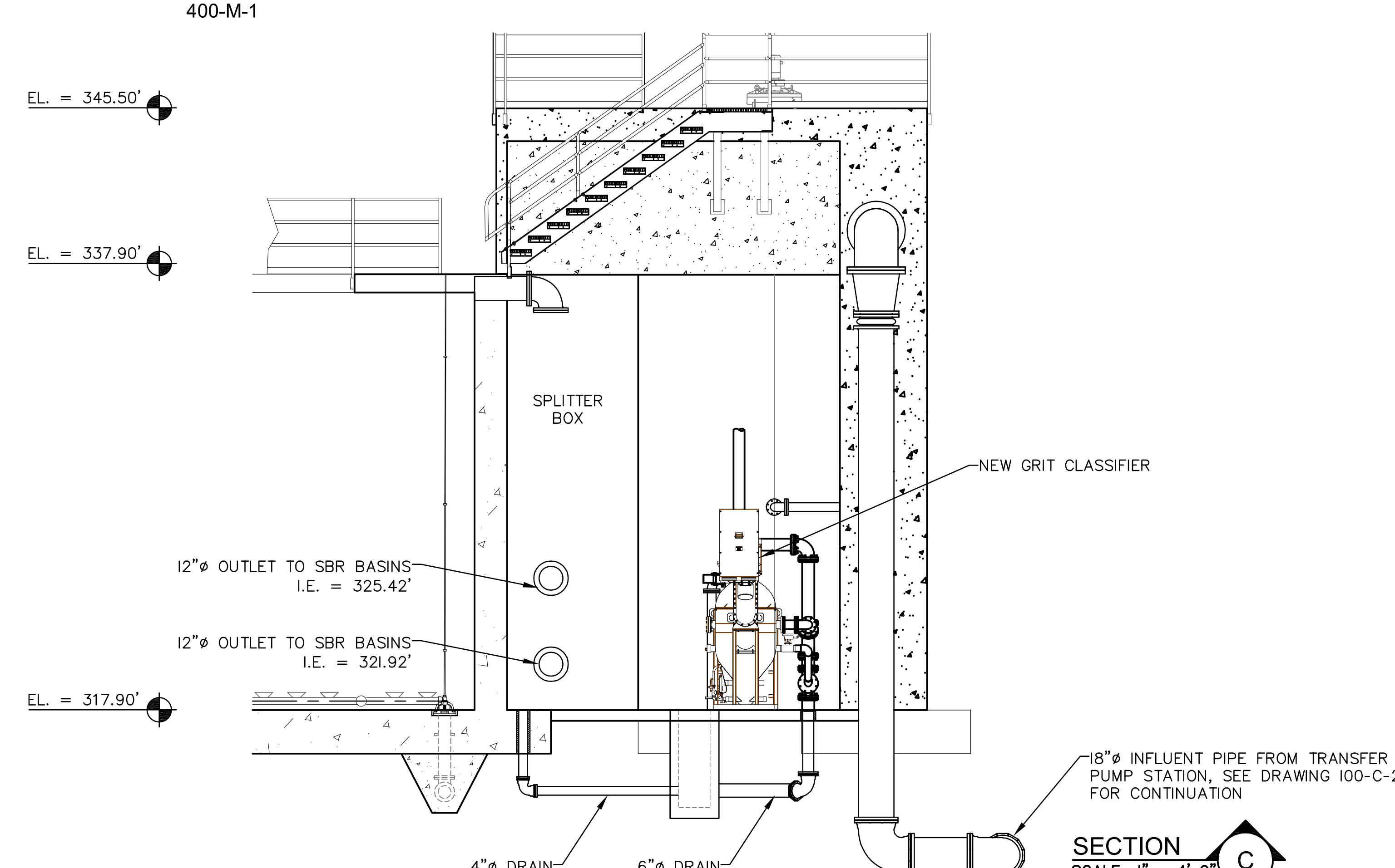
PLOT DATE
Z:\dyer-part\AAprojects\198 Molalla\198.28 WWTF Design\DWG\PROCESS AREA 400 - GRIT REMOVAL\GRIT REMOVAL PLAN VIEW.dwg, 11/12/2021 11:55:30 AM
November 30, 2021



SECTION A
SCALE: 1" - 4'-0"
400-M-1



SECTION B
SCALE: 1" - 4'-0"
400-M-1



SECTION C
SCALE: 1" - 4'-0"
400-M-1

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MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW HEADWORKS
SECTION VIEWS

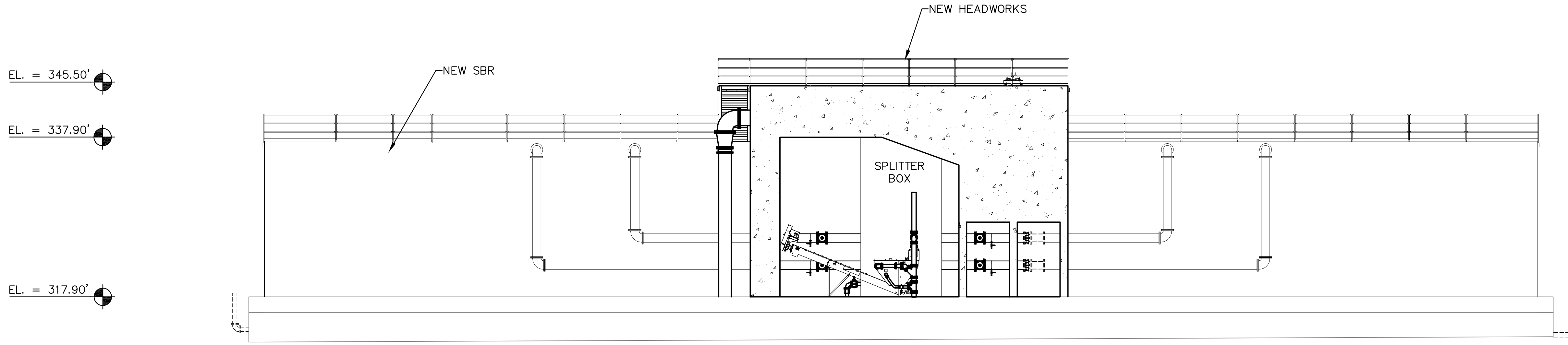
DESIGNED: CGP
DRAWN: CGP
APPROVED BY:
DATE:

REVISIONS

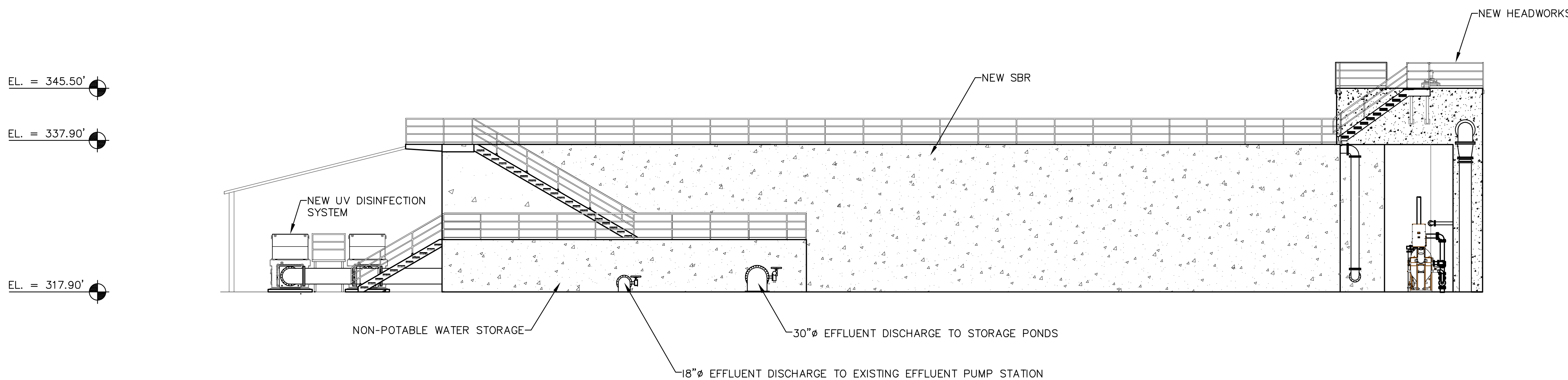
REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	400-M-2
DATE	SHEET NO.
NOV. 2021	66 OF 97



NORTH ELEVATION
SCALE: 1" - 8'-0"
A
500-A-1



WEST ELEVATION
SCALE: 1" - 8'-0"
A
500-A-1

PLOT DATE November 30, 2021

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MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SEQUENCING BATCH REACTOR
ELEVATIONS VIEWS

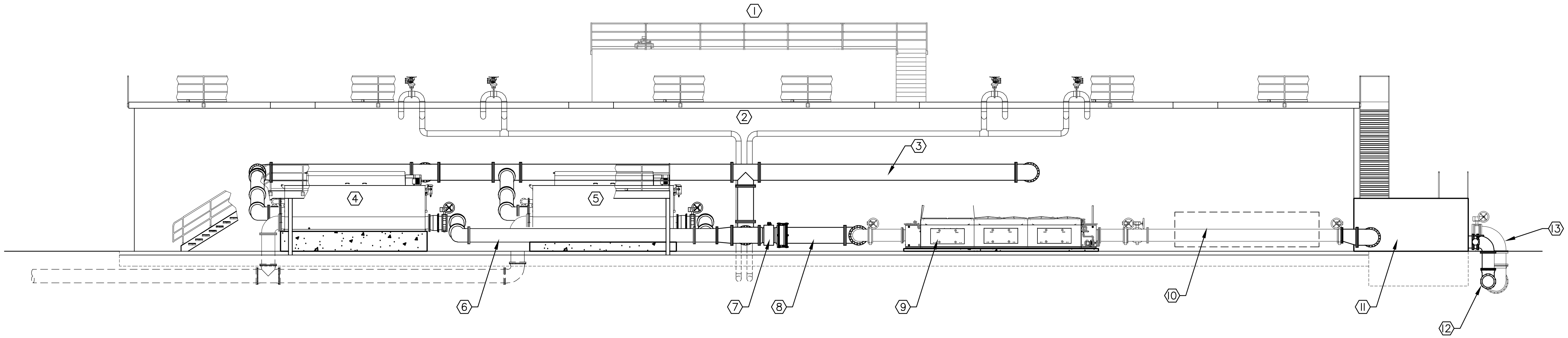
DESIGNED: —
DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

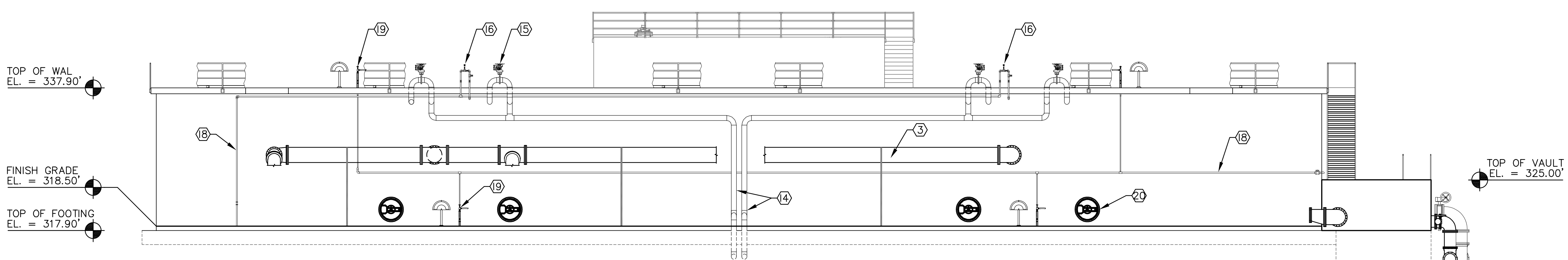
PROJECT NO.	DRAWING NO.
198.28	500-A-1
DATE	SHEET NO.
NOV. 2021	67 OF 97



NORTH ELEVATION
SCALE: 1" - 8'-0"
A
500-A-2

KEY NOTES

1. HEADWORKS BEYOND
2. SBR
3. 24"ø SBR EFFLUENT HEADER
4. EFFLUENT FILTER NO. 1
5. EFFLUENT FILTER NO. 2
6. 20"ø FILTERED EFFLUENT PIPE
7. EFFLUENT FLOW METER
8. 24"ø EFFLUENT PIPING TO UV DISINFECTION
9. UV DISINFECTION SYSTEM
10. FUTURE UV DISINFECTION SYSTEM LOCATION
11. NON-POTABLE WATER STORAGE TANK
12. 18"ø EFFLUENT PIPE TO EFFLUENT PUMP STATION
13. 30"ø EFFLUENT PIPE TO EFFLUENT STORAGE PONDS
14. 8"ø AIR PIPING
15. 8"ø ACTUATED AIR VALVE, TYP. OF 4
16. WAS PIPING ASSEMBLY
17. 2"ø WAS PIPING TO AEROBIC DIGESTER
18. 2"ø NON-POTABLE WATER PIPING
19. NON-POTABLE WATER UTILITY STATION
20. SBR ACCESS HATCH, TYP. OF 4



SBR NORTH ELEVATION
SCALE: 1" - 8'-0"
B
500-A-2

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SEQUENCING BATCH REACTOR
NORTH ELEVATION VIEWS

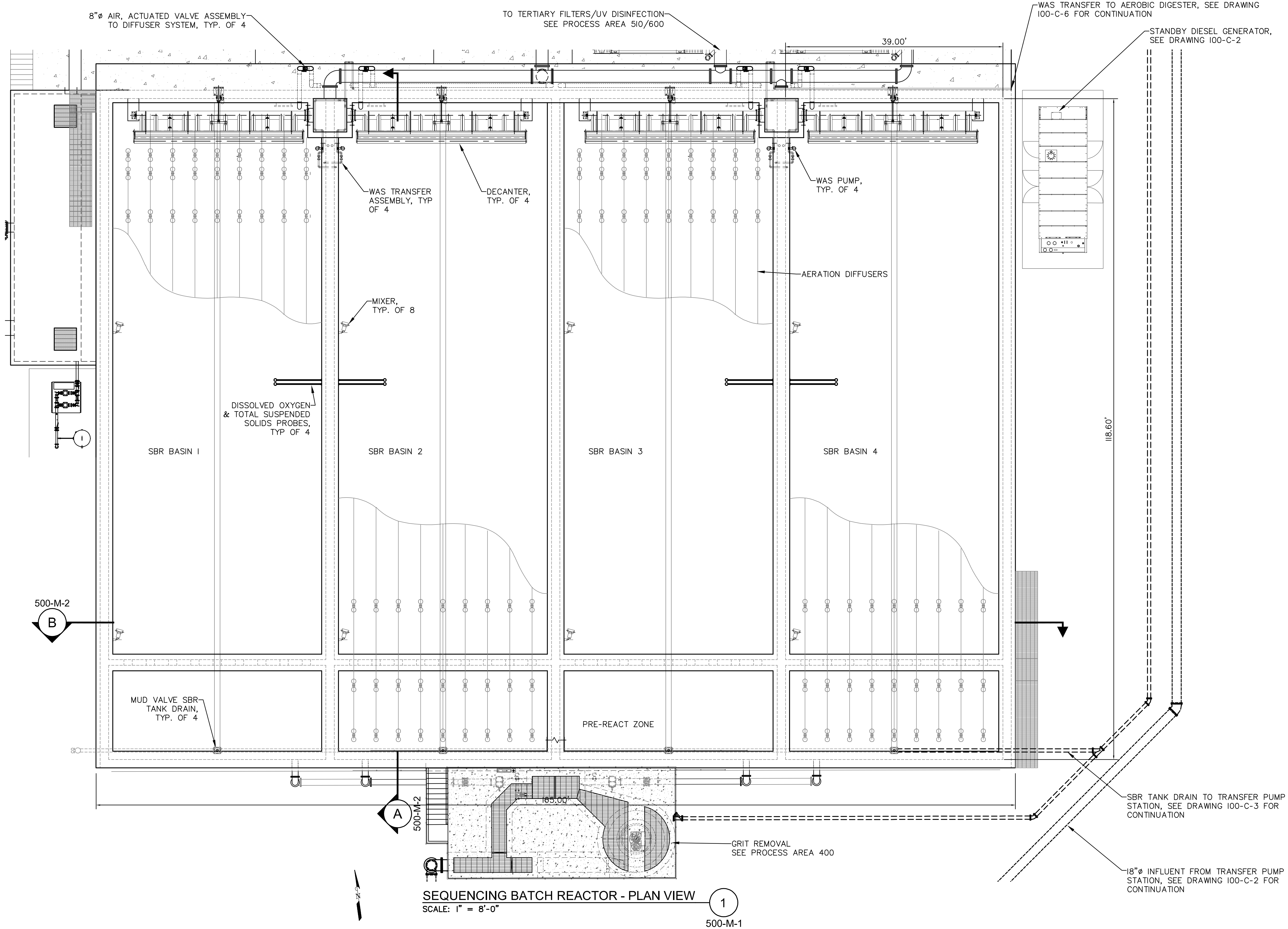
DESIGNED: —
DRAWN: —
APPROVED BY:
DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	500-A-2
DATE	SHEET NO.
NOV. 2021	68 OF 97



SEQUENCING BATCH REACTOR - PLAN VIEW

SCALE: 1" = 8'-0"

1

500-M-1

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PLOT DATE November 30, 2021

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SEQUENCING BATCH REACTOR
SEQUENCING BATCH REACTOR - PLAN VIEW

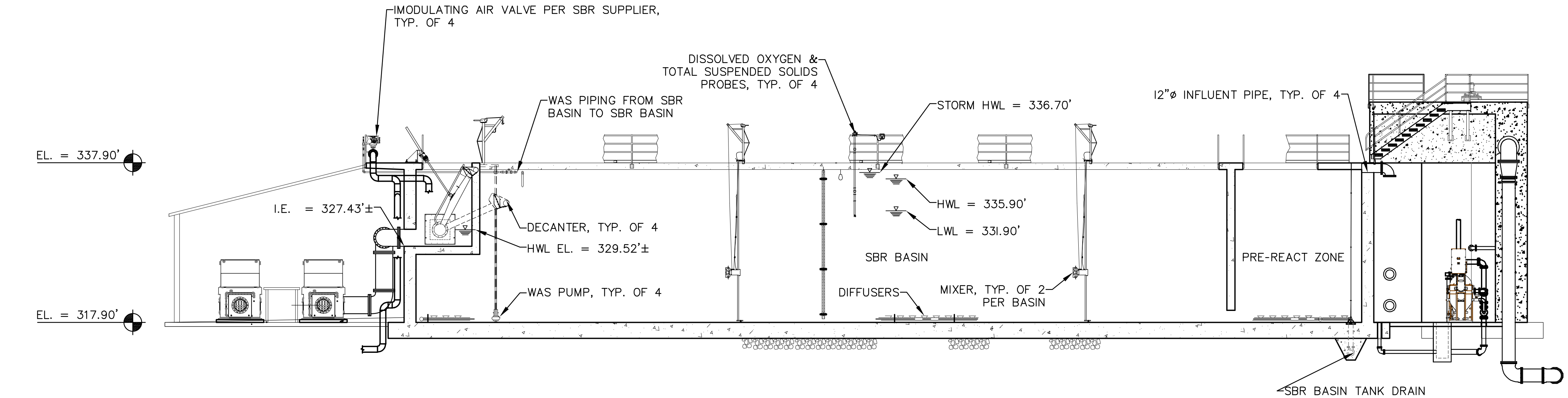
DESIGNED: —
DRAWN: CGP
APPROVED BY:
DATE:

REVISIONS

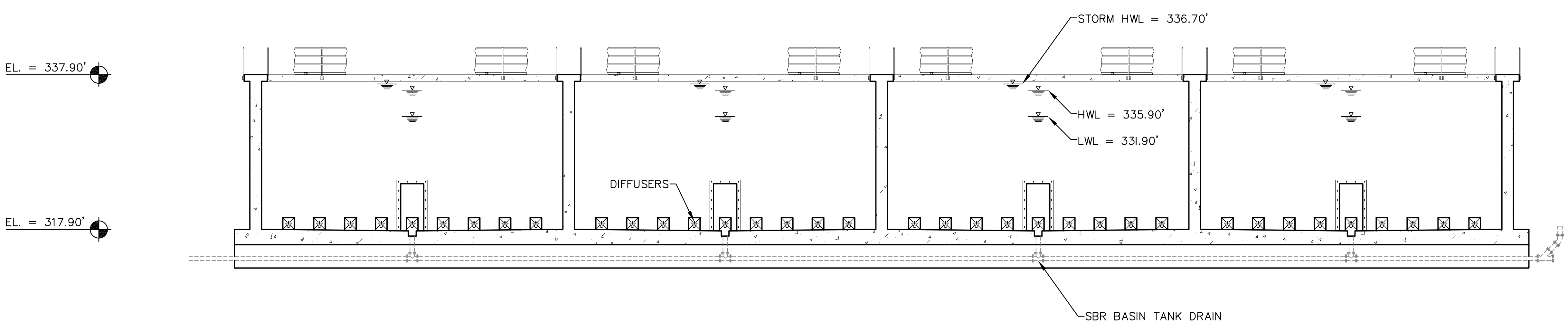
REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	500-M-1
DATE	SHEET NO.
NOV. 2021	69 OF 97



SECTION A
SCALE: 1" = 8'-0"
500-M-1



SECTION B
SCALE: 1" = 8'-0"
500-M-1

PLOT DATE November 30, 2021

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MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SEQUENCING BATCH REACTOR
SBR - SECTION VIEWS

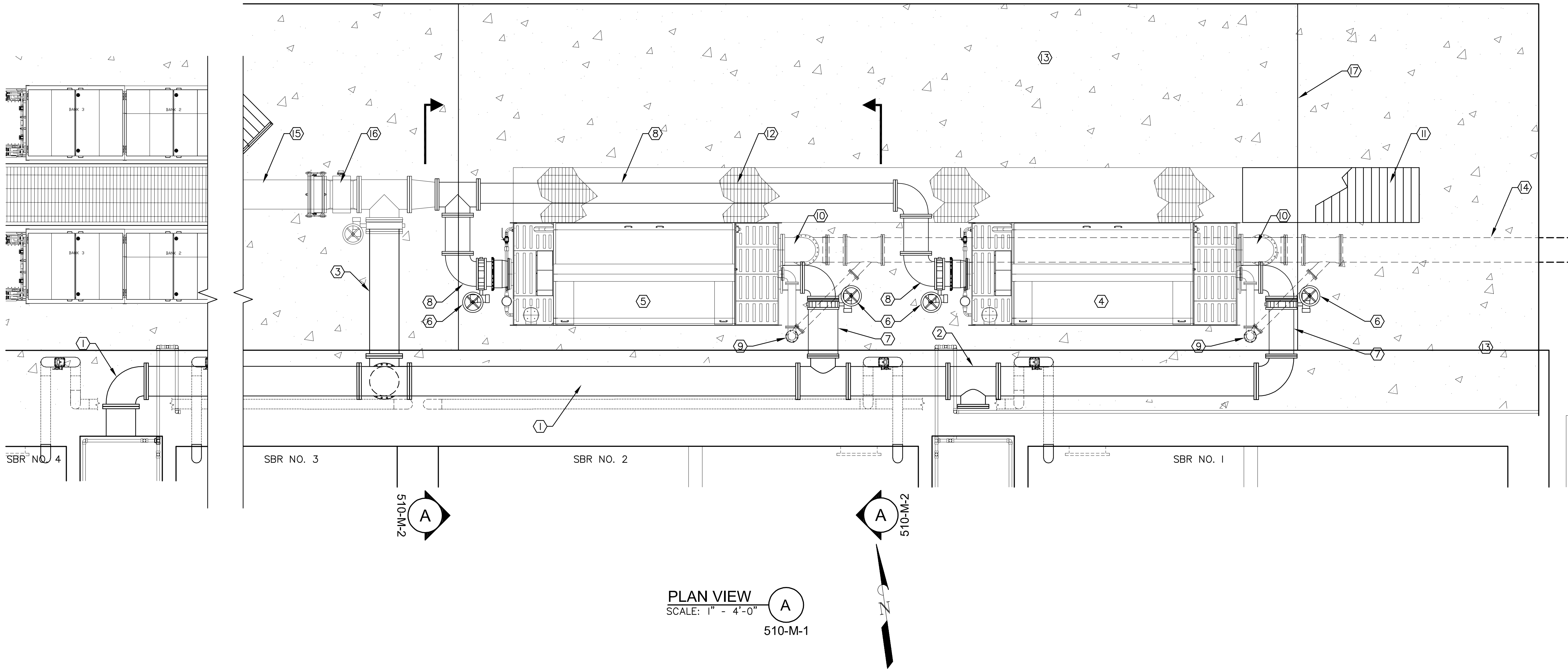
DESIGNED: — DRAWN: CGP
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	500-M-2
DATE	SHEET NO.
NOV. 2021	70 OF 97



PLAN VIEW (A)
SCALE: 1" - 4'-0"
510-M-1

KEY NOTES

1. 24ø SBR EFFLUENT DISCHARGE HEADER FROM SBR BASIN NO. 3 & NO. 4, I.E. = 327.43'
2. 24ø SBR EFFLUENT DISCHARGE HEADER FROM SBR BASIN NO. 1 & NO. 2, I.E. = 327.43'
3. 24ø SBR EFFLUENT DISCHARGE TO UV DISINFECTION
4. EGGLUENT FILTER NO. 1
5. EFFLUENT FILTER NO. 2
6. 20"ø WAFER STYLE ISOLATION BUTTERFLY VALVE
7. 20ø EFFLUENT FILTER INLET PIPING
8. 20ø EFFLUENT FILTER OUTLET PIPING
9. 6ø EFFLUENT FILTER BACKWASH PIPING
10. 20ø EFFLUENT FILTER BYPASS PIPING
11. STAIRS, SEE DETAIL
12. ELEVATED PLATFORM, SEE DETAIL
13. CONCRETE SIDEWALK, SEE DETAIL
14. EFFLUENT FILTER OVERFLOW/BACKWASH PIPE TO TRANSFER PUMP STATION, SEE DRAWING 100-C-3 FOR CONTINUATION.
15. 24"ø EFFLUENT PIPING TO UV DISINFECTION, SEE DRAWING 600-M-1 FOR CONTINUATION.
16. EFFLUENT FLOW METER
17. CANOPY STRUCTURE

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW EFFLUENT FILTERS
PLAN VIEW

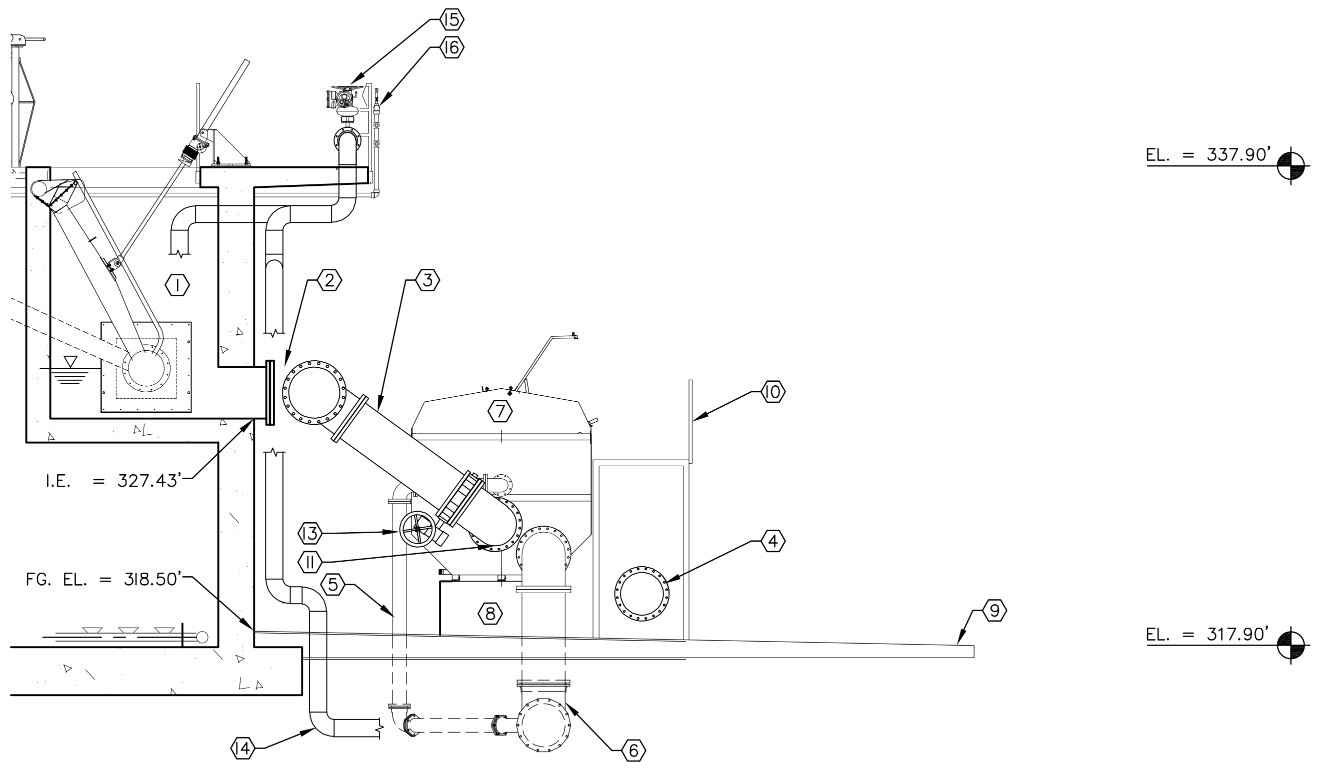
DESIGNED: —
DRAWN: —
APPROVED BY: ______ DATE: ______

REVISIONS

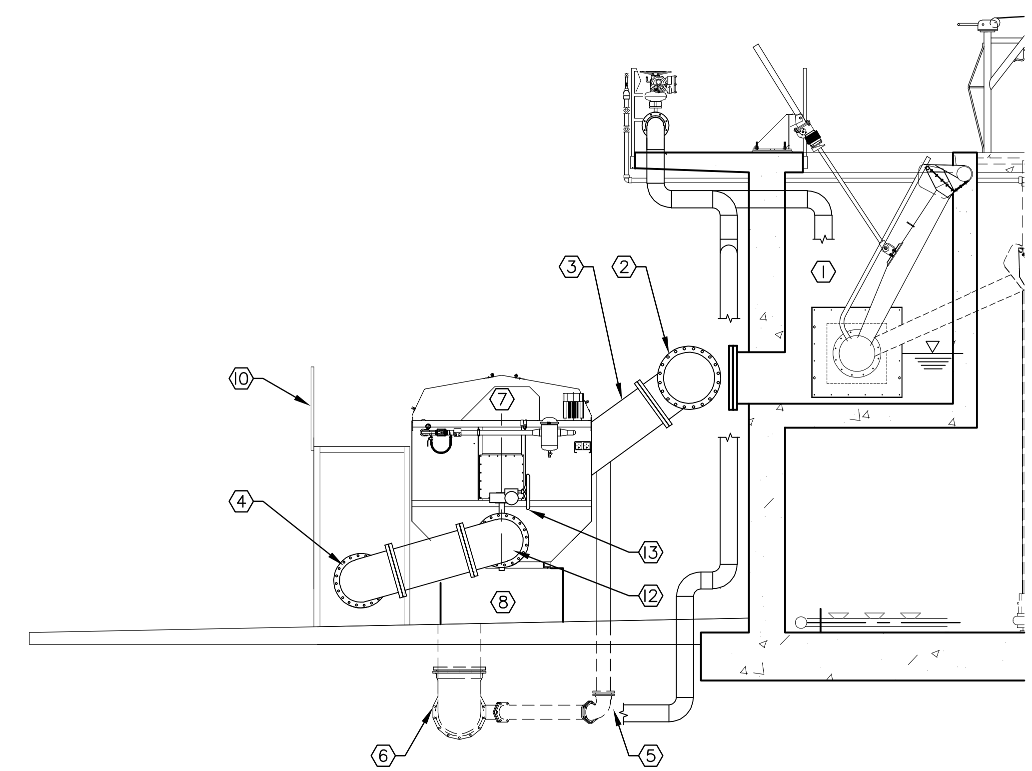
REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	510-M-1
DATE	SHEET NO.
NOV. 2021	71 OF 97



FILTER INLET SECTION
SCALE: 1" - 4'-0"
A
510-M-1



FILTER OUTLET SECTION
SCALE: 1" - 4'-0"
B
510-M-1

KEY NOTES

1. SBR EFFLUENT DISCHARGE BOX
2. 24ø SBR EFFLUENT DISCHARGER HEADER
3. 20ø EFFLUENT FILTER INLET PIPING
4. 20ø EFFLUENT FILTER OUTLET PIPING, EL. = 321.32'
5. 6ø EFFLUENT FILTER BACKWASH PIPING
6. 20ø EFFLUENT FILTER BYPASS PIPING
7. EFFLUENT FILTER
8. TERTIARY EFFLUENT CONCRETE BASE
9. CONCRETE SIDEWALK, SEE DETAIL
10. ELEVATED PLATFORM, SEE DETAIL
11. 20"ø INLET. I.E. = 322.04'
12. 20"ø OUTLET. I.E. = 320.83'
13. 20"ø WAFER STYLE ISOLATION BUTTERFLY VALVE
14. 8"ø AIR PIPING
15. 8"ø ACTUATED AIR VALVE
16. WAS PIPING ASSEMBLY

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PLOT DATE
November 30, 2021

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW EFFLUENT FILTERS
SECTION VIEWS

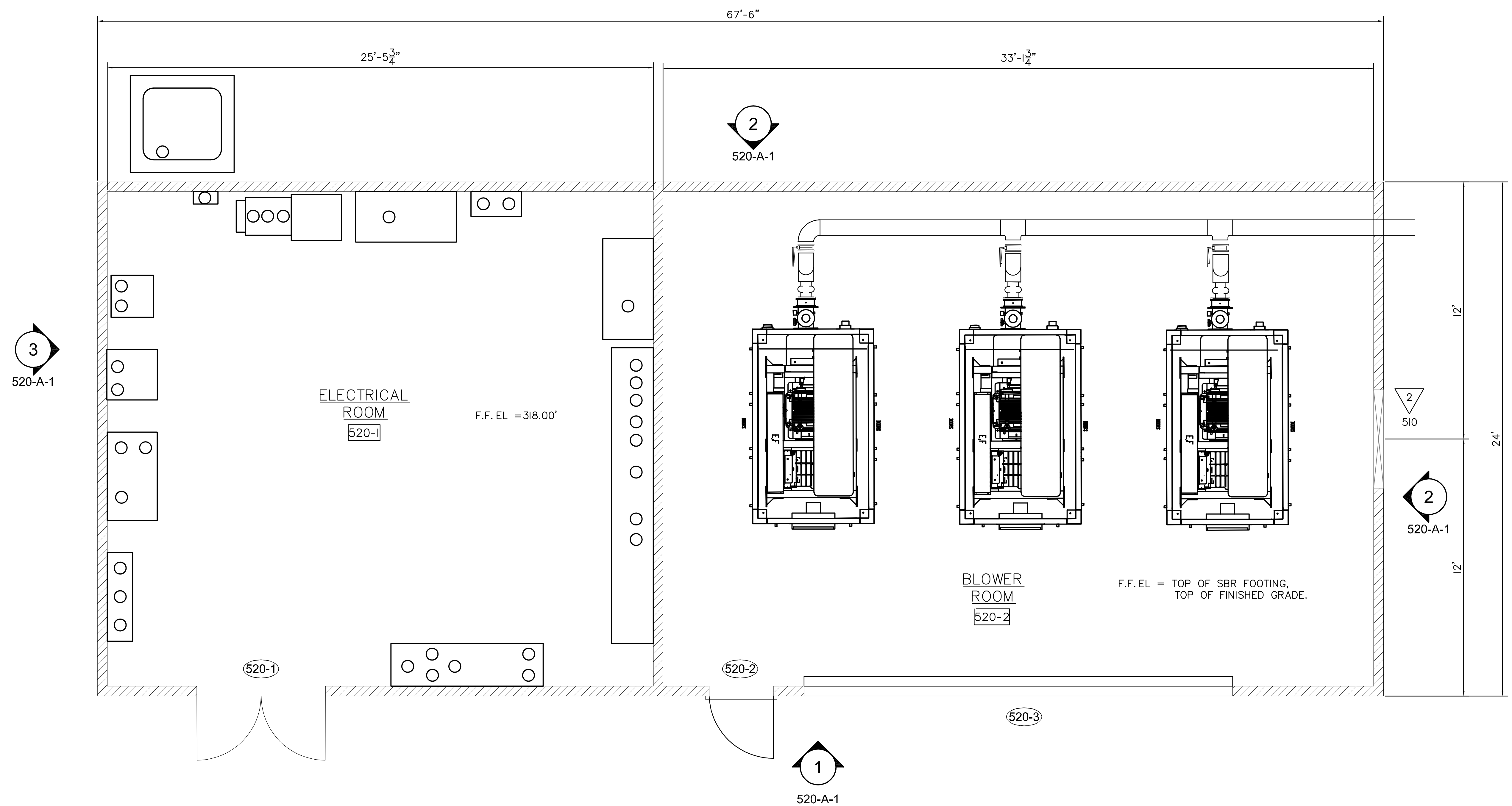
DESIGNED: —
DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	510-M-2
DATE	SHEET NO.
NOV. 2021	72 OF 97



FLOOR PLAN (A, 520-A-1)
SCALE: 3/8" = 1'-0"

WALL LEGEND

(hatched)	2x6 @ 16"O.C.
(hatched)	2x4 @ 16"O.C.

BUILDING INFORMATION

OCCUPANCY: B

TYPE OF CONSTRUCTION: TYPE V FRAMING/ SLAB ON GRADE

BUILDING AREA:

ELECTRIC:	588 SQ. FT.
BLOWER:	765 SQ. FT.
TOTAL:	1440 SQ. FT.

INSULATION TYPE:
ELECTRICAL ROOM:
WALL: R21
CEILING: R38

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SBR BUILDING
PLAN VIEW

DESIGNED: — DRAWN: —
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	520-A-1
DATE	SHEET NO.
NOV. 2021	73 OF 97

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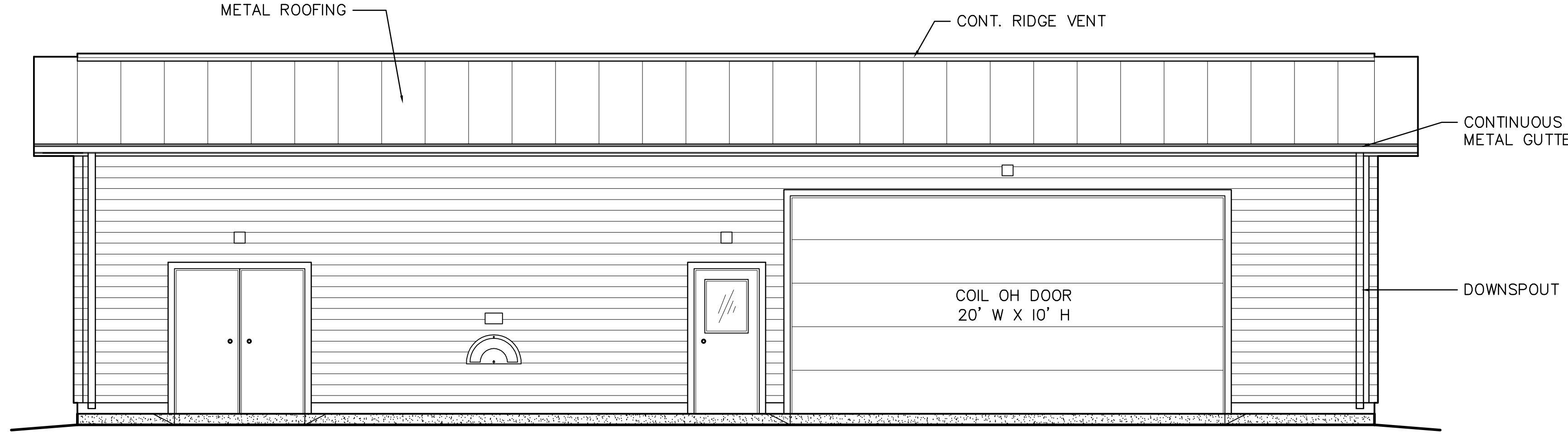
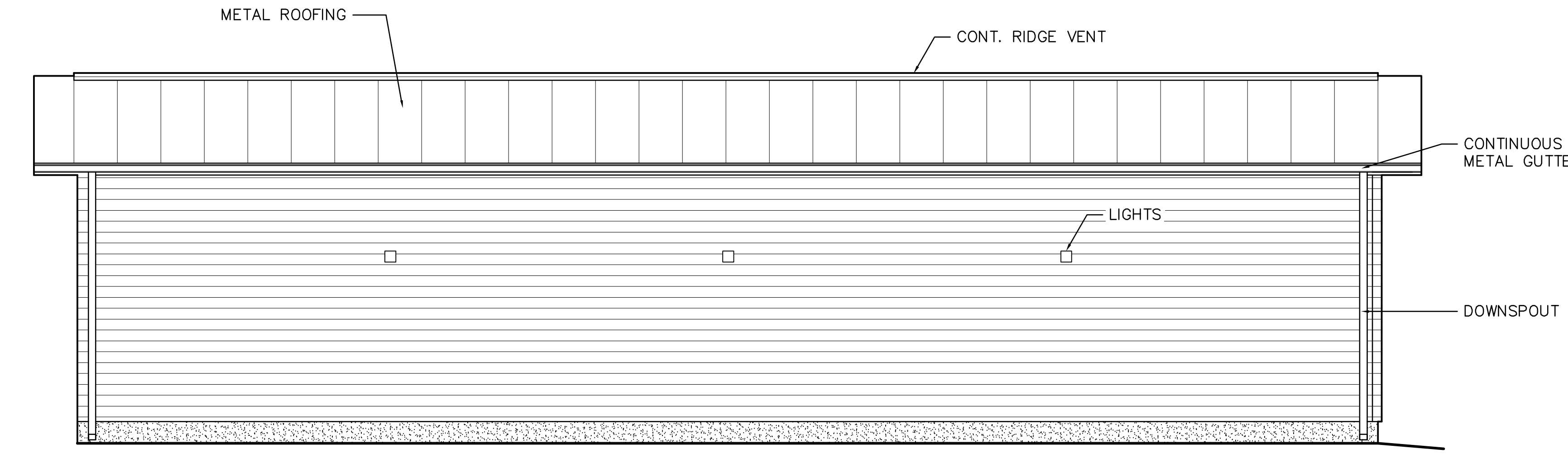
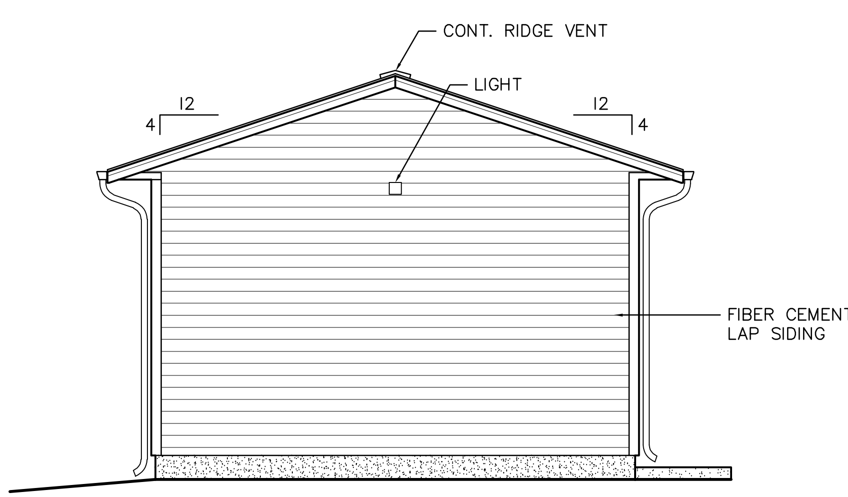


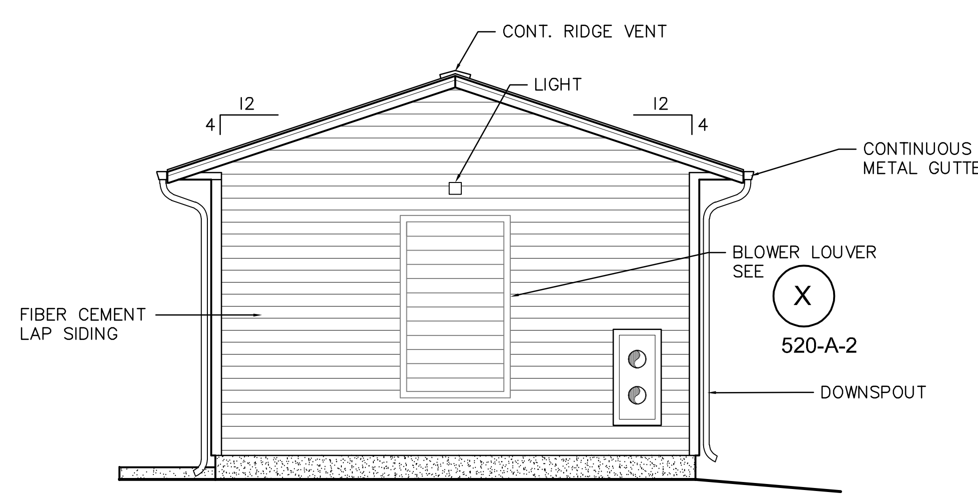
NORTH ELEVATION
SCALE: 1/4" = 1'-0"
1
510



SOUTH ELEVATION
SCALE: 1/4" = 1'-0"
2
510



WEST ELEVATION
SCALE: 1/4" = 1'-0"
3
510



EAST ELEVATION
SCALE: 1/4" = 1'-0"
4
510

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SBR BUILDING
ELEVATION VIEWS

DESIGNED:	DRAWN:
—	—

APPROVED BY: ________ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	520-A-2
DATE	SHEET NO.
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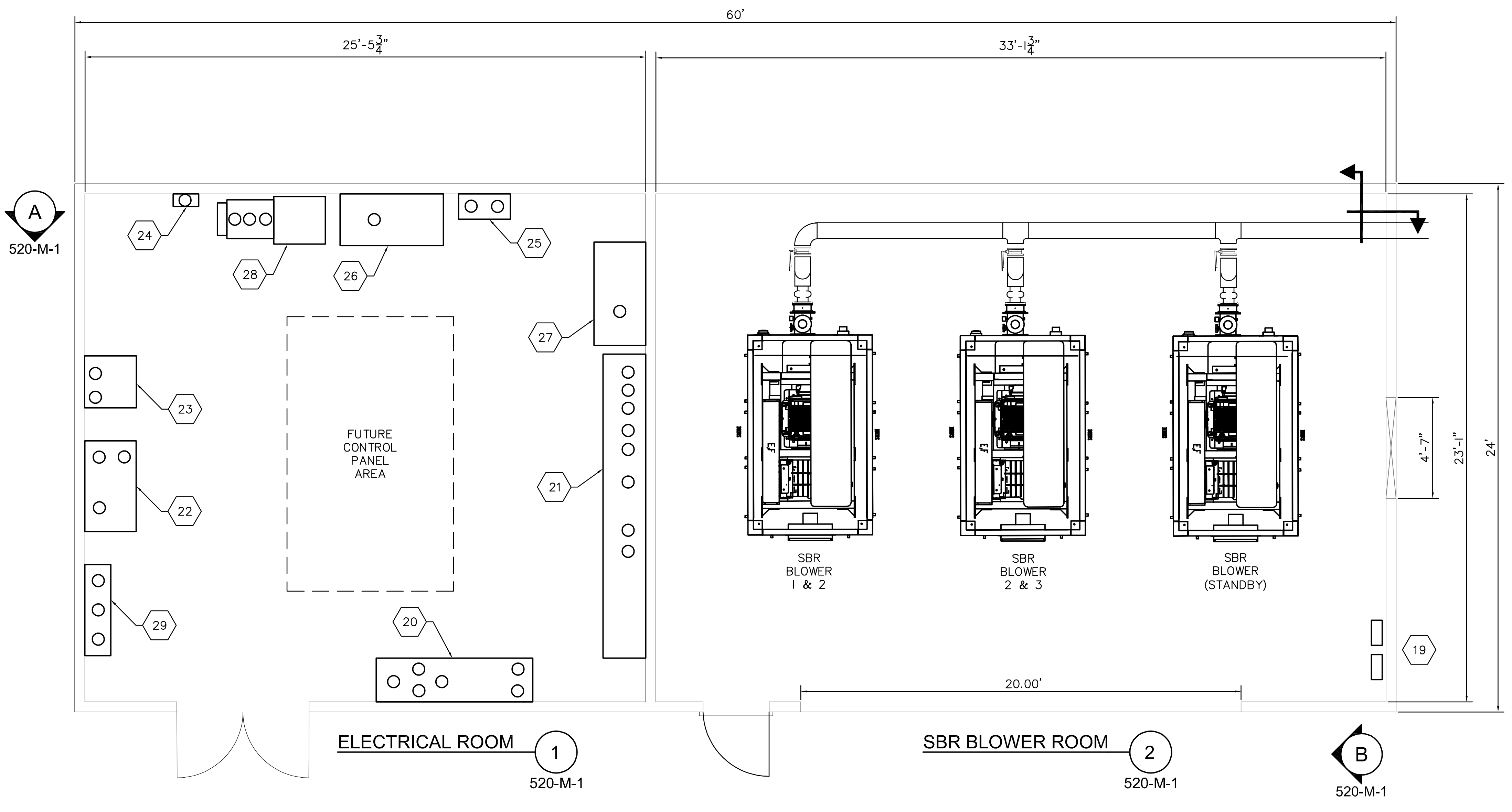

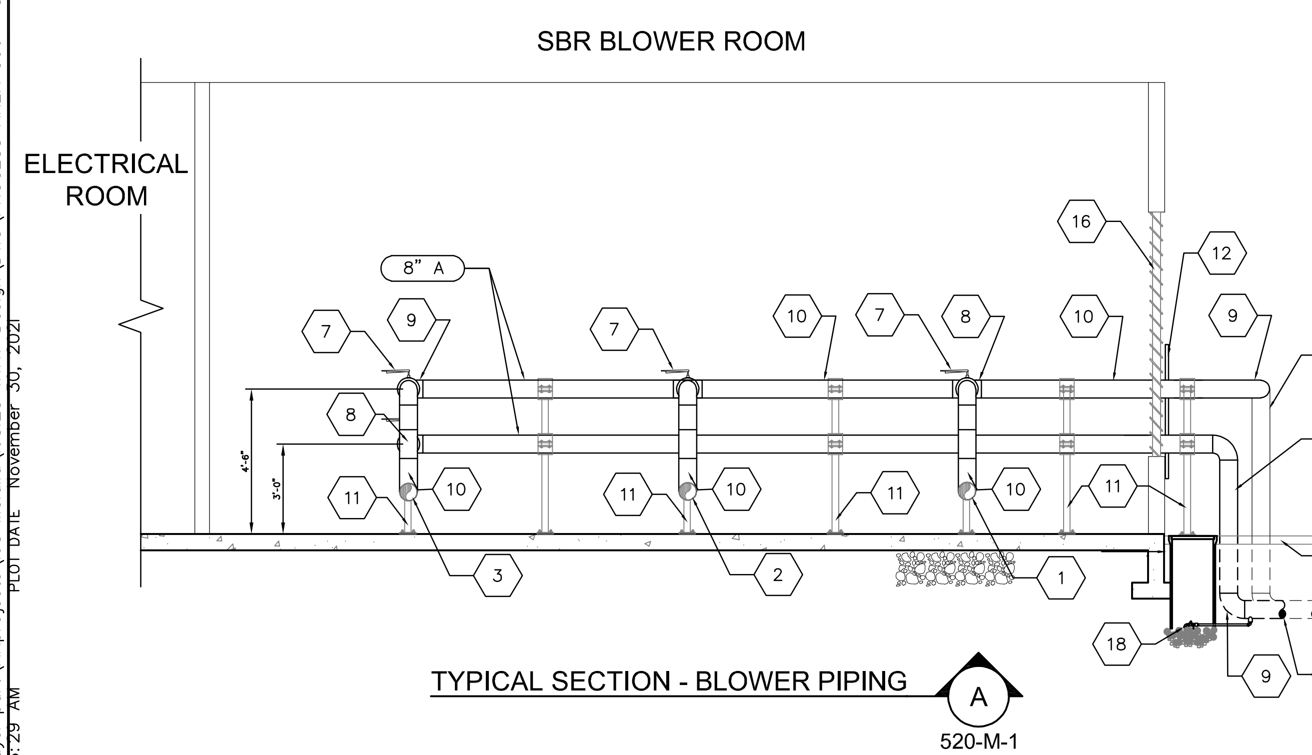

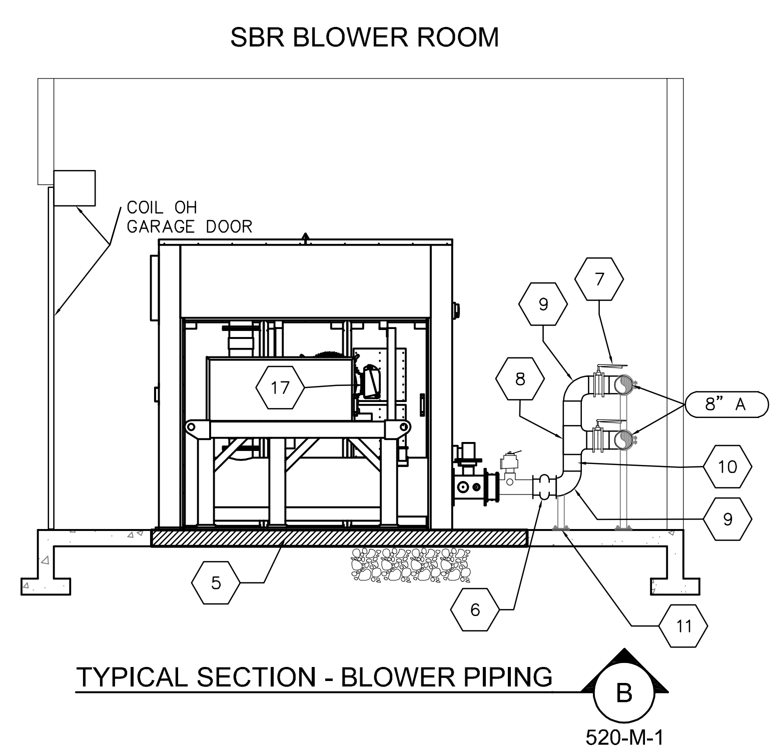

KEY NOTES:

1. CONNECTION TO SBR BLOWER #1
2. CONNECTION TO SBR BLOWER #2
3. CONNECTION TO SBR BLOWER #3
4. 8" AIR TO SBR
5. EQUIPMENT PAD, SEE DETAIL 2 60-M-6
6. 8" X 6" FLEXIBLE COUPLING REDUCER
7. 8" BUTTERFLY VALVE, TYPICAL
8. 8" TEE, TYPICAL
9. 8" 90° ELBOW, TYPICAL
10. PIPE SPOOL, LENGTH AS REQUIRED
11. PIPE SUPPORTS, SEE NOTE 2
12. WALL PENETRATION, SEE DETAIL 1 220-M-11 SIMILAR
13. TO SBR BASINS #1 & #2
14. TO SBR BASINS #3 & #4
15. PIPE PENETRATION TYPICAL OF 2, SEE DETAIL 7 60-M-1
16. LOUVER, SEE SHEET 510-A-3
17. SBR BLOWER IN AN ENCLOSURE, SEE NOTE 1
18. AIR CONDENSATE DRAIN, SEE 2 60-M-8
19. AIR FLOW TRANSMITTER, TYP. 2.
20. SBR CONTROL PANEL.
21. SBR PACKAGE SYSTEM MCC. DIMENSIONS SHOWN ARE BASED ON DESIGN REFERENCE INFORMATION PROVIDED BY PACKAGE SYSTEM SUPPLIER. CONFIRM EQUIPMENT DIMENSIONS WITH PACKAGE SYSTEM SUPPLIER PRIOR TO INSTALLATION.
22. MAIN SERVICE DISCONNECT CIRCUIT BREAKER, SERVICE ENTRANCE RATED. SEE NEW SERVICE ONE-LINE DIAGRAM. AUTOMATIC TRANSFER SWITCH. SEE ONE-LINE DIAGRAM.
23. STEP-DOWN TRANSFORMER XCBLP-1. SEE ONE-LINE DIAGRAM.
24. FIBER OPTIC PANEL. SEE SCHEMATIC DETAIL ON SHEET ____.
25. LIGHTING CONTROL PANEL. SEE SCHEMATIC DETAIL ON SHEET ____.
26. ACTIVE HARMONIC FILTER.
27. UV SYSTEM CONTROL PANEL.
28. FAN COIL UNIT FC-220-1.
29. PANELBOARD

NOTES:

1. NEW BLOWERS, ENCLOSURES, AND ASSOCIATED HARDWARE SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL VERIFY DIMENSIONS OF BLOWERS AND ENCLOSURES PRIOR TO INSTALLATION.
2. PIPE SUPPORTS SHOWN ARE SCHEMATIC ONLY. REFER TO 'TABLE A' ON SHEET 60-M-2.

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW SBR BUILDING
BLOWER ROOM - PLAN VIEW

DESIGNED: CGP	DRAWN: CGP
APPROVED BY:	DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	520-M-1
DATE	SHEET NO.
NOV. 2021	75 OF 97

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PLOT DATE November 30, 2021
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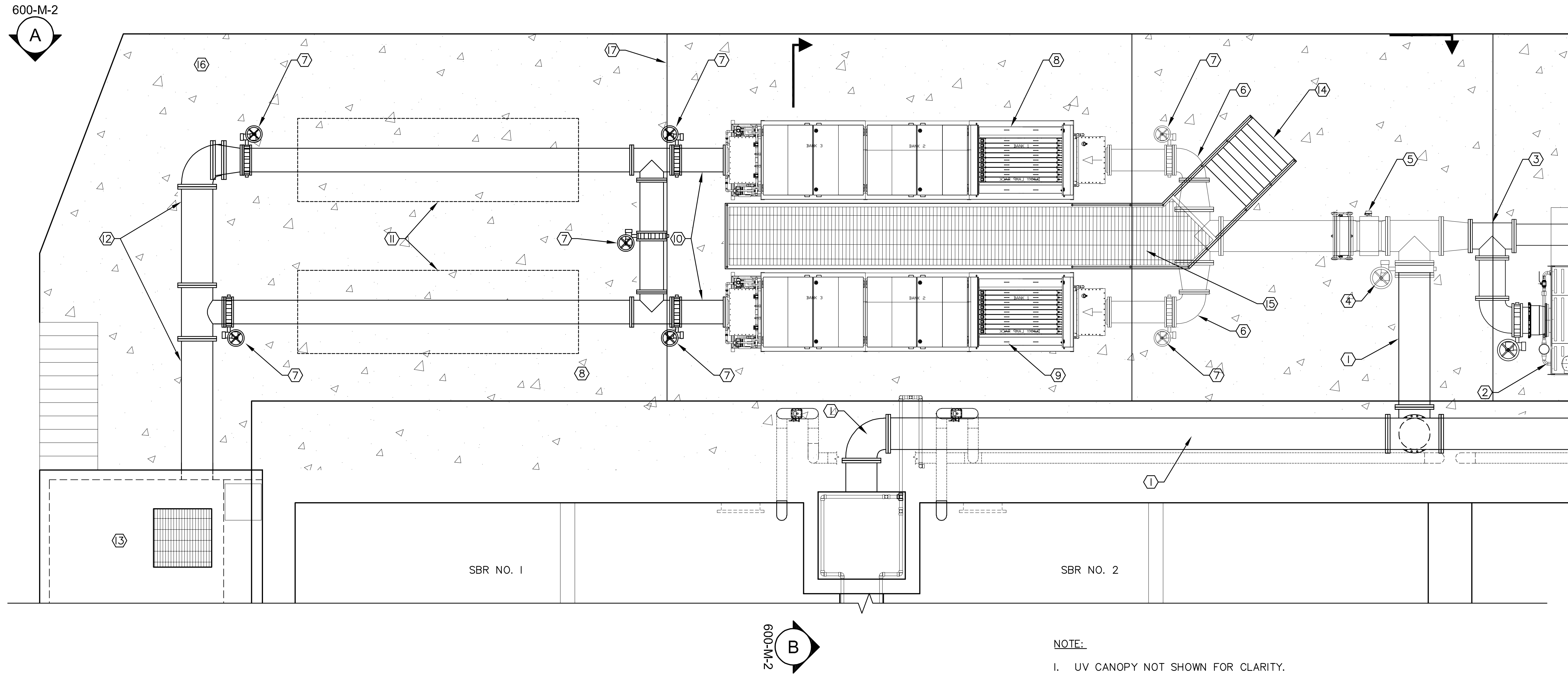


NOTE:

1. UV CANOPY NOT SHOWN FOR CLARITY.
2. UTILITY STATION NOT SHOWN AS THEY ARE LOCATED BELOW THE SBR EFFLUENT HEADER, REFER TO DRAWING 500-A-2 FOR LOCATIONS.

PLAN VIEW

SCALE: 1" - 4'-0"

A 600-M-1

KEY NOTES

1. 24ø SBR EFFLUENT DISCHARGER HEADER
2. EFFLUENT FILTERS, SEE DRAWING 510-M-1 FOR CONTINUATION
3. 20"ø PIPING FROM EFFLUENT FILTERS
4. 24"ø WAFER STYLE BUTTERFLY VALVE
5. EFFLUENT FLOW METER (UNRESTRICTED)
6. 18"ø UV INLET HEADER
7. 18"ø WAFER STYLE ISOLATION BUTTERFLY VALVE
8. UV DISINFECTION REACTOR NO. 1
9. UV DISINFECTION REACTOR NO. 2
10. 18"ø UV OUTLET
11. FUTURE UV BANK LOCATIONS
12. 24"ø OUTLET HEADER TO NON-POTABLE WATER TANK
13. NON-POTABLE WATER TANK, SEE DRAWING 810-M-1
14. STAIRS W/HANDRAILS
15. ELEVATED PLATFORM
16. CONCRETE SIDEWALK
17. CANOPY STRUCTURE

MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW UV DISINFECTION
PLAN VIEW

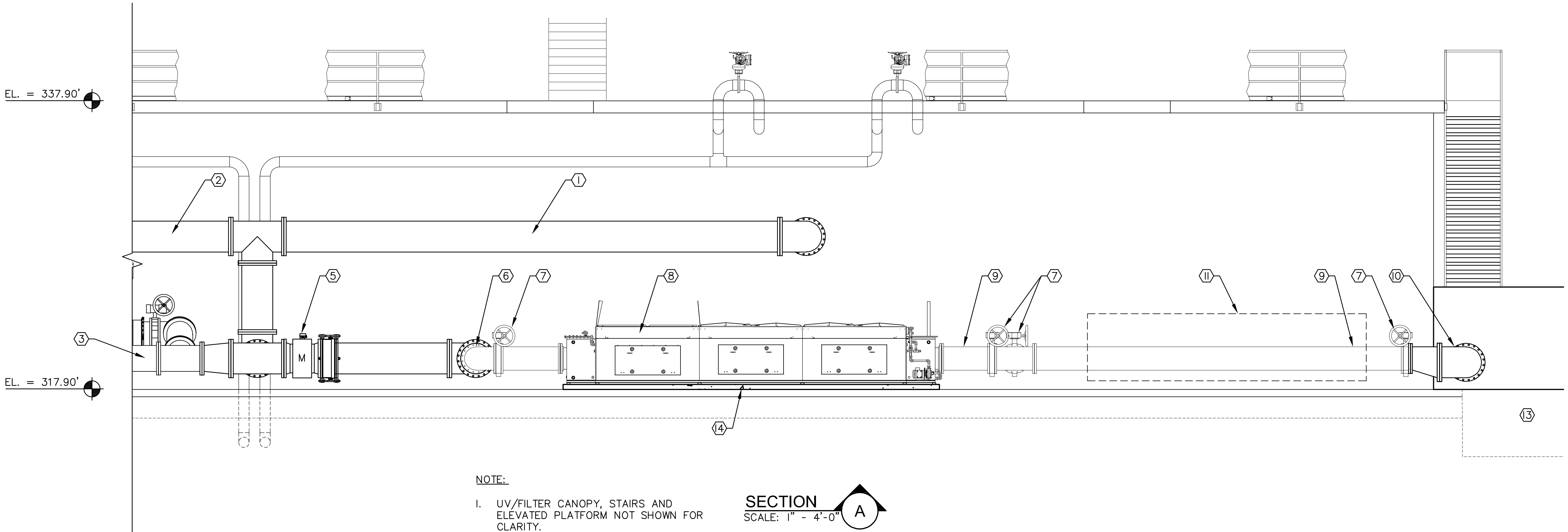
DESIGNED: — DRAWN: —
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	600-M-1
DATE	SHEET NO.
NOV. 2021	76 OF 97



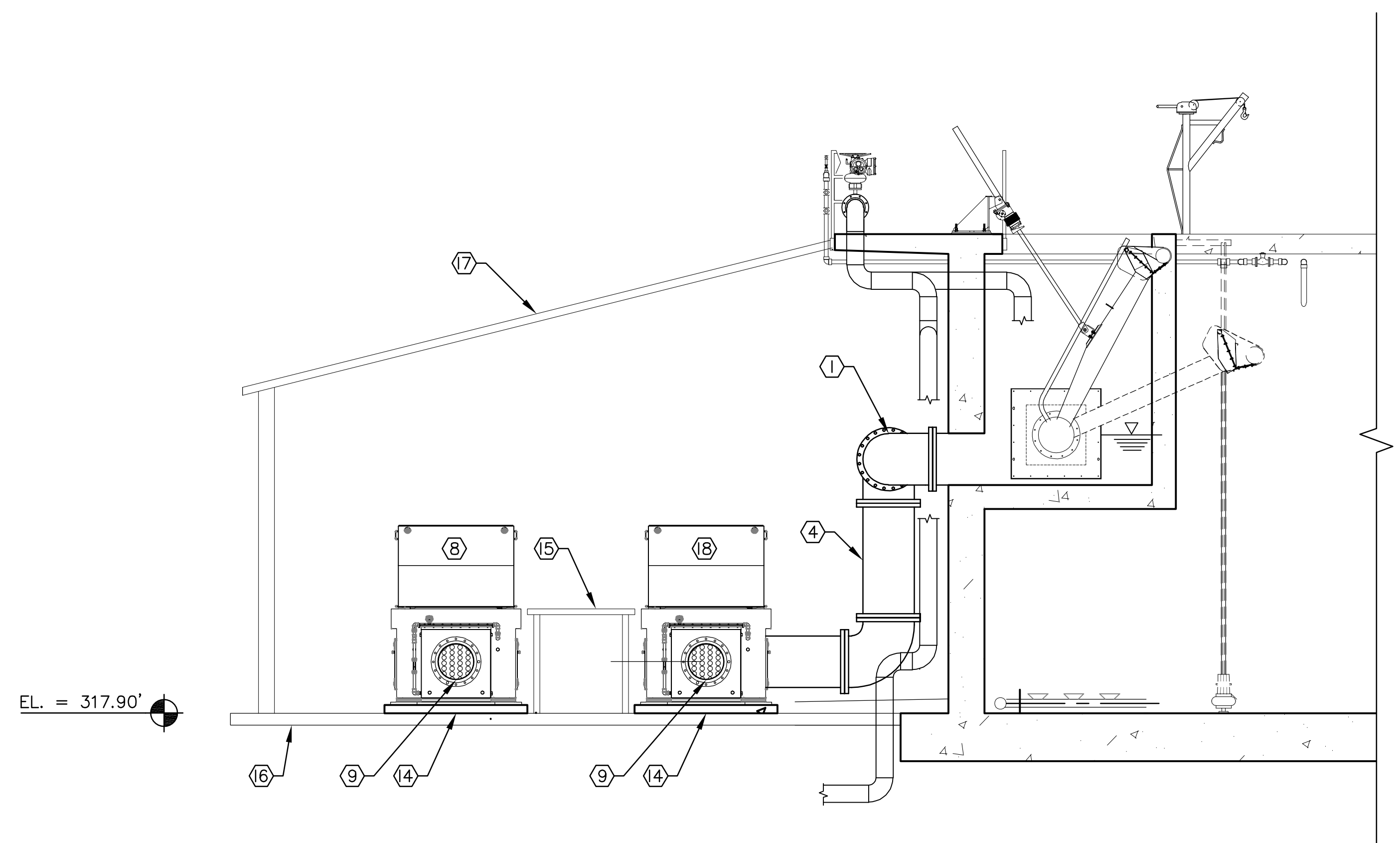
NOTE:

1. UV/FILTER CANOPY, STAIRS AND ELEVATED PLATFORM NOT SHOWN FOR CLARITY.

SECTION A
SCALE: 1" - 4'-0"
600-M-1

KEY NOTES

1. 24ø SBR EFFLUENT DISCHARGE HEADER FROM SBR BASIN NO.3 & NO. 4, I.E. = 327.43'
2. 24ø SBR EFFLUENT DISCHARGE HEADER FROM SBR BASIN NO .1 & NO. 2 AND TO TERTIARY FILTERS
3. 20ø EFFLUENT PIPE FROM TERTIARY FILTERS
4. 24ø SBR EFFLUENT DISCHARGE HEADER
5. EFFLUENT FLOW METER
6. 18"ø UV INLET HEADER
7. 18"ø WAFER STYLE ISOLATION BUTTERFLY VALVE
8. UV DISINFECTION UNIT NO. 1, I.E = 319.30'
9. 18"ø UV OUTLET I.E. = 319.30'
10. 24"ø OUTLET HEADER, I.E. = 318.78'
11. FUTURE UV BANK
12. 18"ø UV INLET HEADER
13. NON-POTABLE WATER PUMP STATION/EFFLUENT VAULT, SEE DRAWING 800-M-1
14. CONCRETE EQUIPMENT BASE
15. ELEVATED PLATFORM, SEE DETAIL
16. CONCRETE SIDEWALK, SEE DETAIL
17. UV/FILTER CANOPY
18. UV DISINFECTION UNIT NO. 2, I.E = 319.30'



SECTION B
SCALE: 1" - 4'-0"
600-M-1

PLOT DATE November 30, 2021

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MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW UV DISINFECTION
SECTION VIEWS

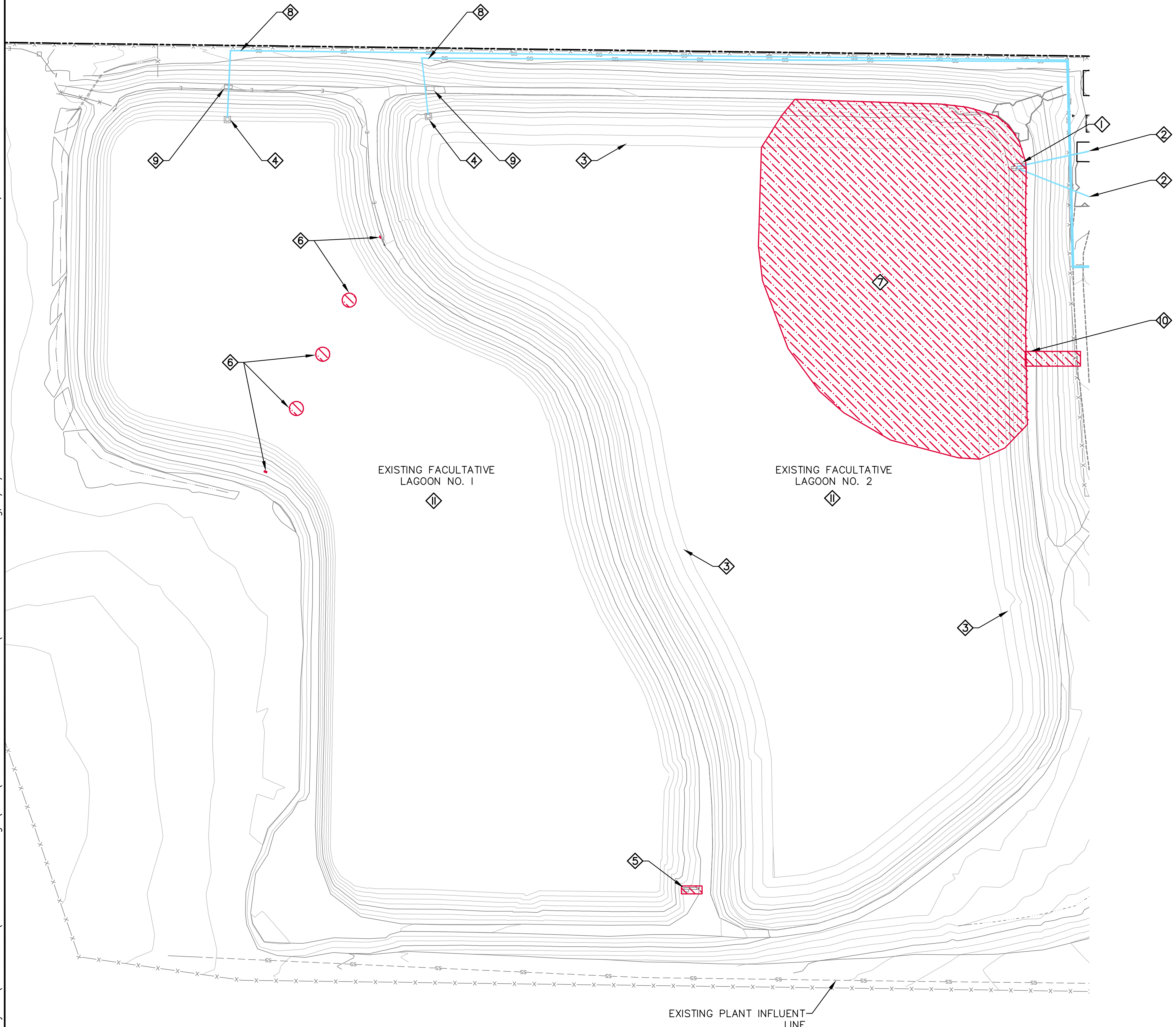
DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	600-M-2
DATE	SHEET NO.
NOV. 2021	77 OF 97



PLAN SCALE
40 0 20 40 80

EXISTING SITE PLAN 1 700-D-1

GENERAL DEMOLITION NOTES:

1. SEE SHEET 100-D-2 FOR EXISTING WASTEWATER FACILITIES.
2. COORDINATE WORK WITH SPECIFICATION 01014.
3. WHEN ITEMS ARE SPECIFIED FOR DEMOLITION, DEMOLITION SHALL INCLUDE COMPLETE REMOVAL & DISPOSAL IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS.
4. THIS DEMOLITION PLAN ILLUSTRATES DEMOLITION WORK REQUIRED FOR THE COMPLETION OF THIS PROJECT. THE NUMERICAL ORDER PRESENTED BELOW DOES NOT REPRESENT A DEMOLITION SEQUENCE. REFER TO PROJECT SPECIFICATIONS FOR INFORMATION REGARDING SEQUENCE OF WORK AND RELATED WORK CONSTRAINTS REGARDING SITE DEMOLITION.

NO.	DEMOLITION NOTES
1	EXISTING LAGOON NO. 2 OUTFALL STRUCTURE: PROTECT IN PLACE UNTIL NEW OUTFALL STRUCTURE IS IN PLACED AND OPERATIONAL. SEE 700-D-2 FOR DEMOLITION DETAILS.
2	EXISTING LAGOON OUTLET PIPING: PROTECT IN PLACE UNTIL NEW OUTLET IS OPERATIONAL. CAP AND SLURRY FILL EXISTING 10"ø & 14"ø ONCE PIPING IS NOT IN USED AND ABANDONED.
3	EXISTING LAGOON NO. 2 BANK PROTECTION: EXISTING RIP RAP ON THE INTERIOR SLOPES SHALL BE REMOVED AND DISPOSED OF, PRIOR TO PREPARING SLOPES FOR NEW LINER SYSTEM INSTALLATION.
4	EXISTING LAGOON INLET STRUCTURES: REMOVE AND DISPOSE OF EXISTING LAGOON INLETS FOR NO. 1 AND NO. 2.
5	EXISTING LAGOON INTERCONNECTION STRUCTURE: MODIFY EXISTING STRUCTURE, SEE DRAWING 700-D-2 FOR DETAILS
6	EXISTING LAGOON NO. 1 AERATION/MIXING EQUIPMENT: REMOVE AND DISPOSE OF EXISTING AERATION/MIXING SYSTEM AND ASSOCIATED APPURTENANCES, SUCH AS TETHER, POWER LINES, PANELS, ETC.
7	NEW SBR AREA (LAGOON 2 STRUCTURAL FILL AREA): A COFFER DAM WILL BE USED TO DEWATER THIS AREA WHILE THE REST OF THE LAGOON REMAINS IN SERVICE. SEE DRAWING 110-C-1 AND 100-C-2 FOR LIMITS OF NEW CONSTRUCTION AND TEMPORARY COFFER DAM FOR LIMITS DURING CONSTRUCTION.
8	EXISTING INLET PIPING: ABANDON EXISTING (2) 18"ø PIPING IN PLACE, CAP AND SLURRY FILL, PIPING THAT IS NOT USED. SEE 100-C-2 FOR NEW PIPING PLAN.
9	EXISTING AIR RELIEF VALVE VAULT: REMOVE AND DISPOSE OF VAULT, VALVE PIPING AND ASSOCIATED APPURTENANCES.
10	DIKE MODIFICATIONS: MODIFY DIKE TO ACCOMMODATE CONSTRUCTION OF NEW EFFLUENT STORAGE POND NO. 1 OUTLET STRUCTURE AND ASSOCIATED PIPING.
11	EXISTING LAGOONS SHALL BE DRAINED AND CLEANED OF ACCUMULATION OF SOLIDS.

LEGEND

- DEMOLITION AREA SEE KEY NOTES
- EXIST'G RIP-RAP TO BE REMOVED
- SLURRY FILL EXISTING PIPING

MOLALLA OREGON

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PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING FACULTATIVE LAGOONS
DEMOLITION PLAN

DESIGNED: — DRAWN: —

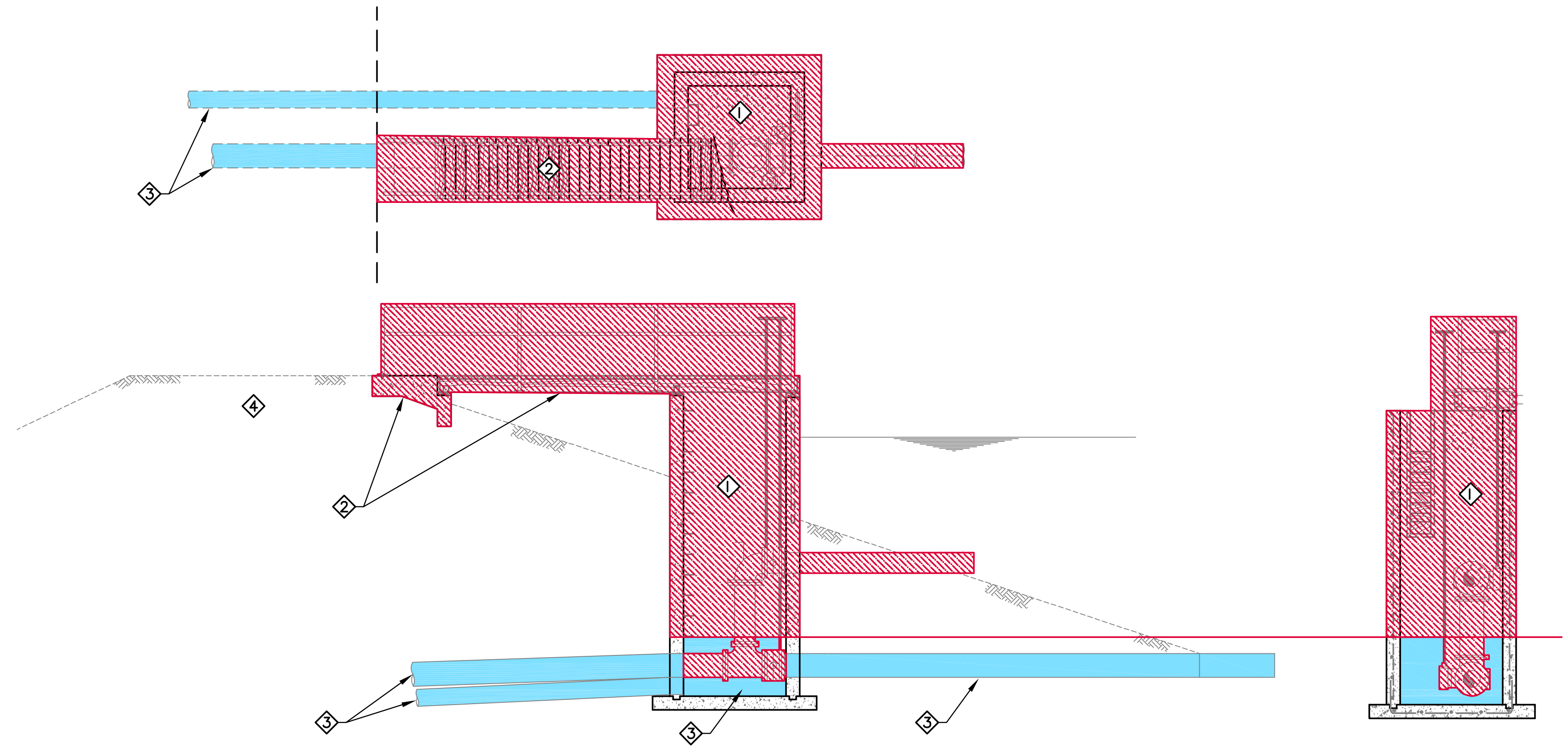
APPROVED BY: DATE:

REVISIONS

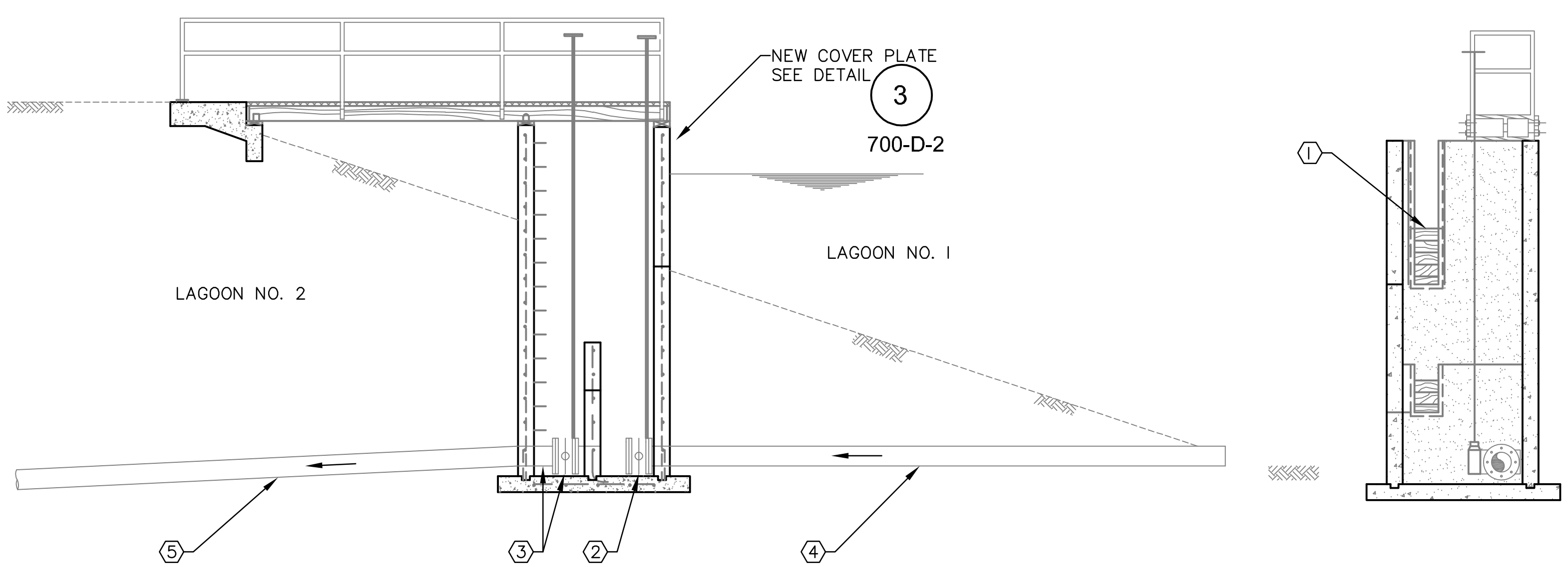
REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	700-D-1
DATE	SHEET NO.
NOV. 2021	78 OF 97



LAGOON NO. 2 - OUTLET STRUCTURE DEMOLITION
SCALE: 1" - 4'-0"
1
700-D-2



INTER LAGOON TRANSFER STRUCTURE (EXISTING)
SCALE: 1" - 4'-0"
2
700-D-2

DEMOLITION NOTES:

1. REMOVE CONCRETE OUTLET STRUCTURE TO LIMITS SHOWN AND VERIFY IN FIELD WITH ENGINEER. REMOVE ALL APPURTENANCES ASSOCIATED WITH THE OUTFALL STRUCTURE.
2. REMOVE EXISTING BRIDGE STRUCTURE AND ABUTMENT.
3. PROVIDE PLUG AND SLURRY FILL THE EXISTING 10"ø AND 14"ø PIPING AND BOTTOM OF CONCRETE STRUCTURE, SEE 100-D-1 FOR CONTINUATION.
4. EXISTING DIKE, PROTECT IN PLACE

LEGEND

- DEMO EXISTING
- EXIST'G EQUIPMENT TO BE PROTECTED IN PLACE
- EXISTING PIPING TO BE ABANDONED & SLURRY FILLED

GENERAL NOTES:

1. THIS DEMOLITION PLAN CONTAINS ITEMS WITH ESTIMATED LOCATIONS BASED OFF OF EXISTING DRAWINGS. VERIFY LENGTHS, QUANTITIES, AND LOCATIONS PRIOR TO COMMENCING DEMOLITION WORK.
2. REFER TO CONSTRUCTION SEQUENCING SPECIFICATIONS FOR REQUIREMENTS.

KEY NOTES

1. ADJUSTABLE OVERFLOW WEIR, STOP LOG TYPE
2. REMOVE AND REPLACE 10"ø BUTTERFLY VALVE ON LINE FROM LAGOON NO. 1. COMPLETE ASSEMBLY WITH OPERATOR, STEM, HANDWHEEL, ETC.
3. REMOVE EXISTING 10"ø BUTTERFLY VALVE AND PIPING IN OUTLET CHAMBER FRO INSTALLATION OF NEW SLIDE GATE.
4. 10"ø DRAIN LINE FROM LAGOON NO. 1
5. 10"ø TRANSFER LINE FROM LAGOON NO. 2

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ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EXISTING FACULTATIVE LAGOONS
STRUCTURE DEMOLITION

DESIGNED: — DRAWN: —
APPROVED BY: ____ DATE: ____

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO. 198.28
DRAWING NO. 700-D-2
DATE NOV. 2021
SHEET NO. 79 OF 97

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PLOT DATE November 30, 2021

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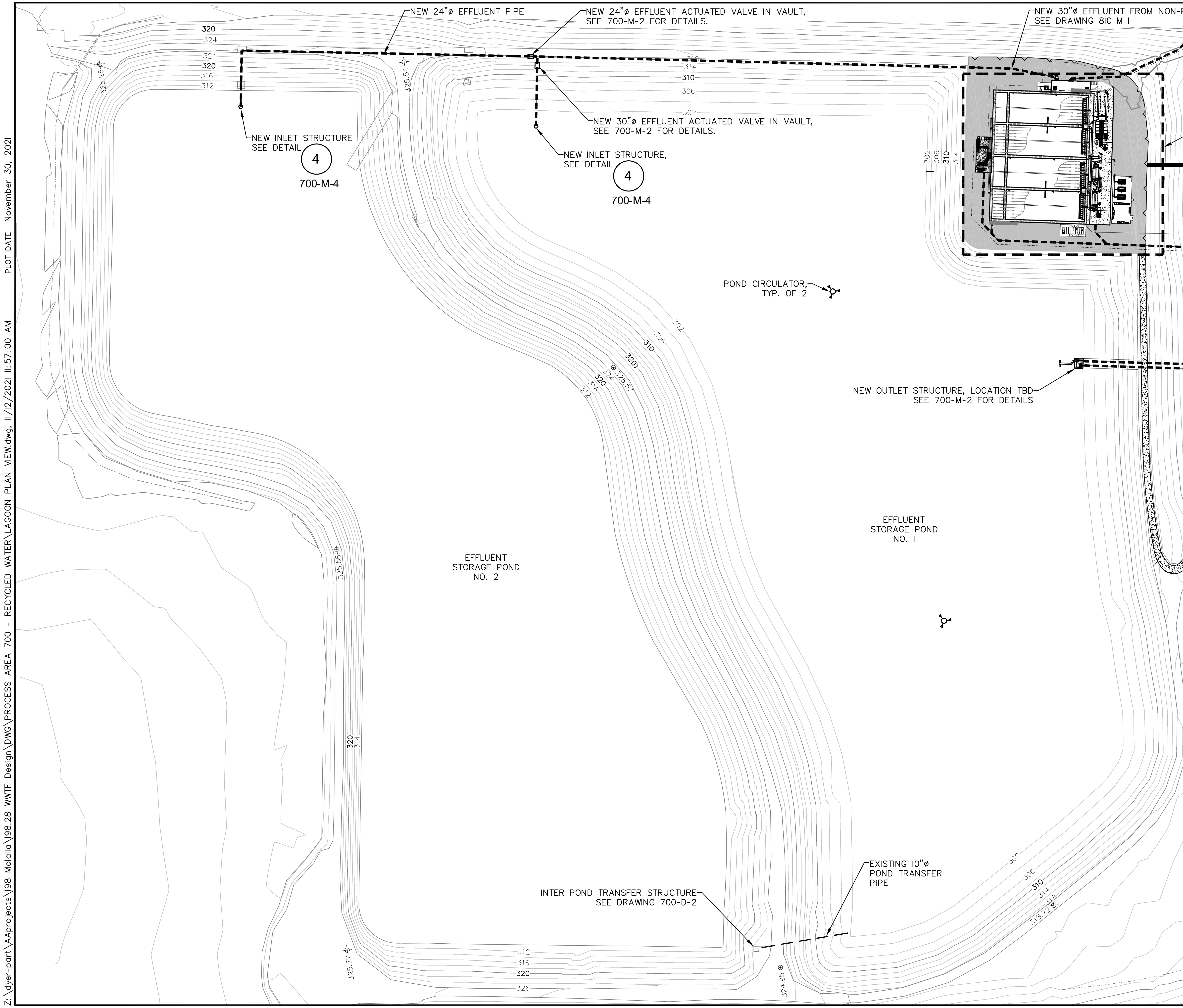
PLOT DATE November 30, 2021



GENERAL NOTES:

1. EFFLUENT STORAGE POND NO. 1 TO BE EQUIPPED WITH AN ELASTOMERIC MEMBRANE LINER SYSTEM.

PLAN VIEW 1
700-M-1

PLAN SCALE
30 0 15 30 60

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ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EFFLUENT STORAGE
PLAN VIEW

DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	700-M-1
DATE	SHEET NO.
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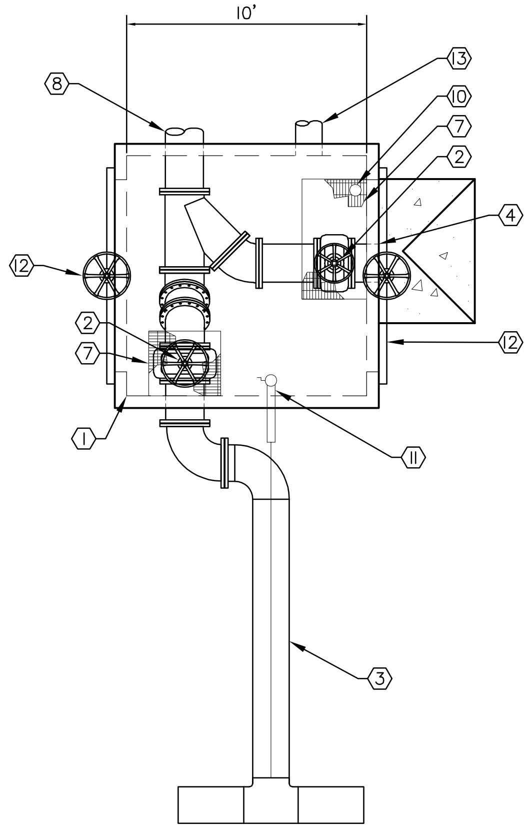
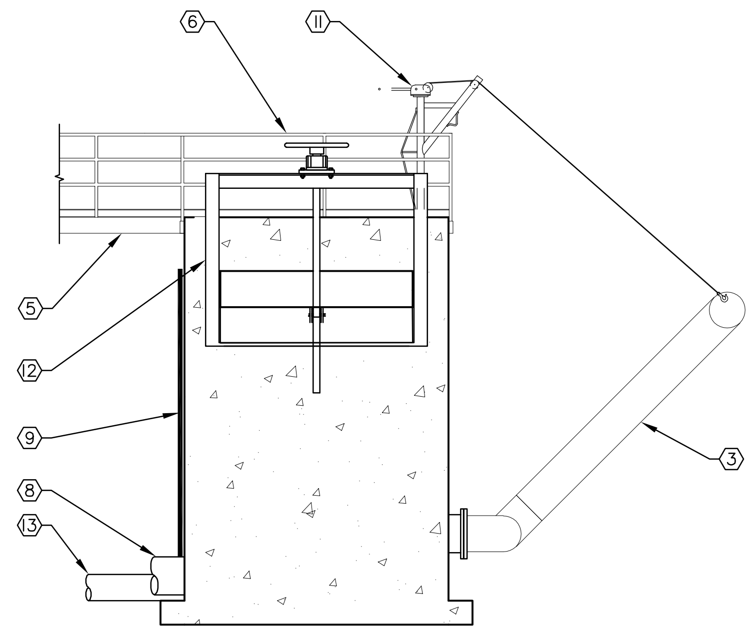


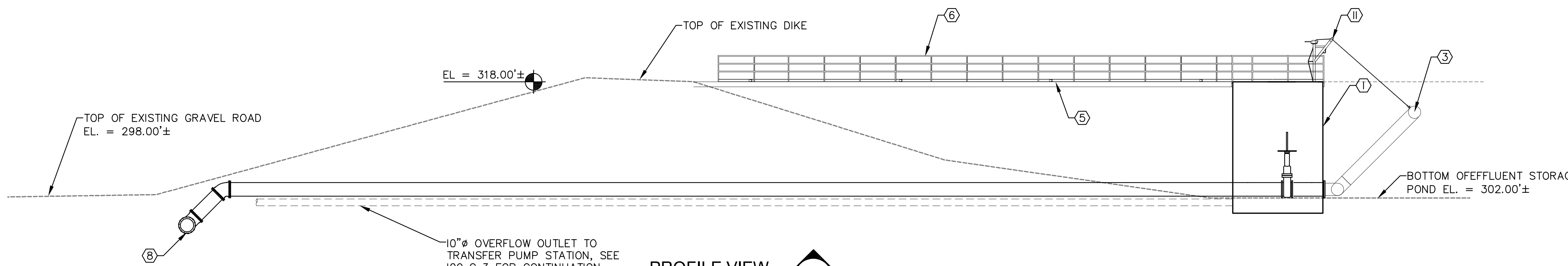
OUTLET STRUCTURE PLAN VIEW (2)
SCALE: 1" - 4'-0"
700-M-2



SECTION VIEW (A)
SCALE: 1" - 4'-0"
700-M-2

KEY NOTES

1. 10' X 10' (INTERIOR DIMENSION) CONCRETE VAULT
2. 18"ø FLG PLUG VALVE
3. 18"ø DECANTER MECHANISM
4. 18"ø DRAIN OUTLET, I.E. = 301.5'
5. ELEVATED WALKWAY & HANDRAIL
6. HANDRAILS
7. GRATING
8. 18"ø DISCHARGE OUTLET TO EFFLUENT PUMP STATION I.E. =301.90', SEE DRAWING 100-C-2 FOR CONTINUATION.
9. NEW STAFF GAUGE
10. NEW LIQUID LEVEL TRANSDUCER W/ STILLING WELL
11. NEW DAVIT CRANE
12. 8' WIDE X 1'-6" TALL DOWNWARD ACTION SLIDE GATE
13. 12"ø OVERFLOW OUTLET TO TRANSFER PUMP STATION. SEE DRAWING 100-C-3 FOR CONTINUATION



PROFILE VIEW (B)
SCALE: 1" - 8'-0"
700-M-2

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NOT FOR
CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EFFLUENT STORAGE
OUTLET STRUCTURE - PLAN & SECTION VIEWS

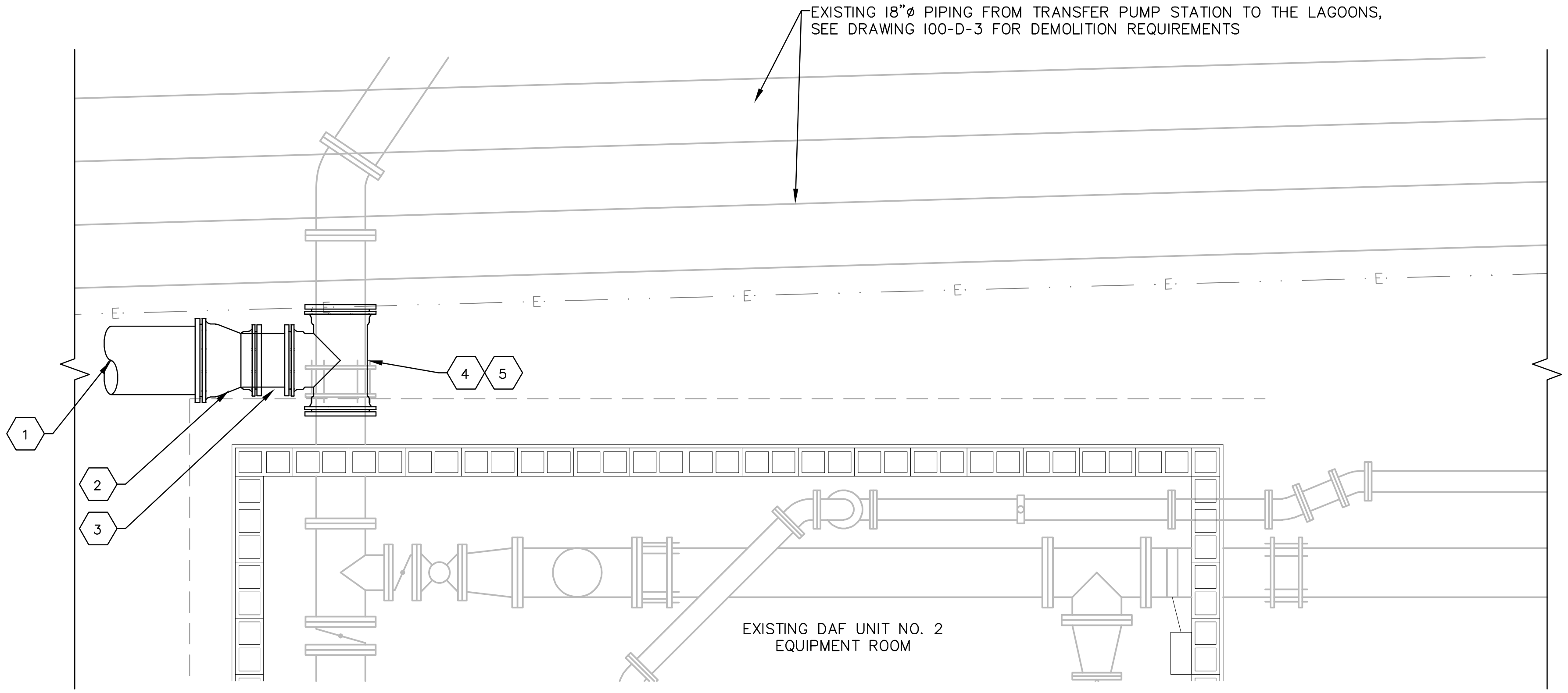
DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

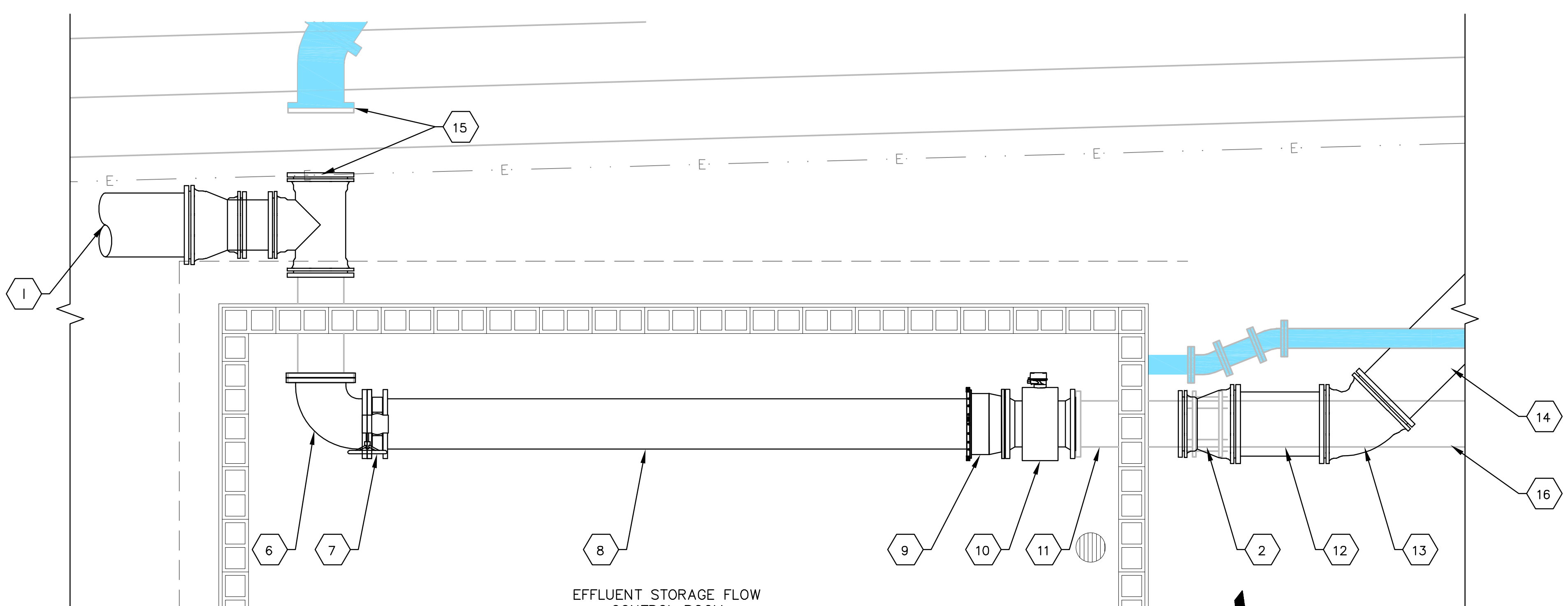
PROJECT NO.	DRAWING NO.
198.28	700-M-2
DATE	SHEET NO.
NOV. 2021	81 OF 97



TEMPORARY EFFLUENT POND CONNECTION

SCALE: 1" = 2'-0"

2
700-M-3



EFFLUENT FLOW CONTROL CONNECTION

SCALE: 1" - 2'-0"

2
700-M-3

KEY NOTES:

1. NEW 18"ø EFFLUENT PIPE FROM EFFLUENT STORAGE NO. 1, SEE DRAWING 100-C-2 FOR CONTINUATION.
2. NEW 18"ø X 14"ø MJ REDUCER
3. NEW 14"ø PIPE SPOOL, LENGTH AS REQUIRED
4. NEW 14"ø MJ TEE
5. CONNECTION TO EXISTING LAGOON OUTLET PIPING, POTHOLE TO CONFIRM LOCATION
6. NEW 14"ø FLG 90° ELBOW
7. NEW 14"ø ACTUATED WAFER STYLE BUTTERFLY, FLOW MODULATING CONTROL VALVE
8. NEW 14"ø FLG X PE PIPE SPOOL, LENGTH AS REQUIRED
9. NEW 14"ø 2-BOLT FLANGED ADAPTOR
10. NEW 14"ø FLOW METER W/TRANMITTER (UNRESTRICTED)
11. EXISTING 14"ø FLG PIPE PENETRATION
12. NEW 18"ø PIPE SPOOL, LENGTH AS REQUIRED
13. NEW 18"ø MJ 45° ELBOW
14. NEW 18"ø EFFLUENT PIPE TO EFFLUENT PUMP STATION, SEE DRAWING 100-C-2 FOR CONTINUATION.
15. PROVIDE PLUGS TO CAP CONNECTION TO EXISTING LAGOON OUTLET PIPE. EXISTING PIPING FROM LAGOON SHALL BE ABANDONED AND SLURRY FILLED
16. EXISTING 14"ø DAF SUPPLY LINE, REMOVE AS REQUIRED FOR NEW EFFLUENT PIPING. REMAINING PIPE SHALL BE CAPPED AND SLURRY FILLED.

LEGEND

- DEMO EXISTING
- EXIST'G EQUIPMENT TO BE PROTECTED IN PLACE
- EXISTING PIPING TO BE ABANDONED

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EFFLUENT STORAGE
EFFLUENT PIPING CONNECTION AND FLOW CONTROL

DESIGNED: CGP
DRAWN: CGP
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
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PROJECT NO.	DRAWING NO.
198.28	700-M-3
DATE	SHEET NO.
NOV. 2021	82 OF 97

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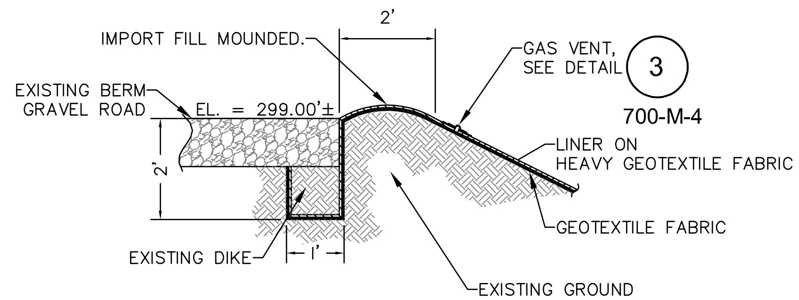
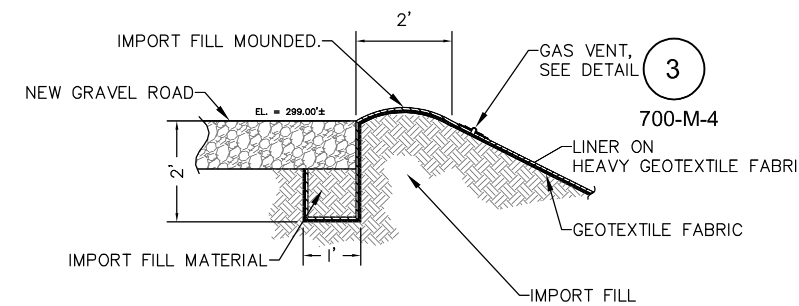
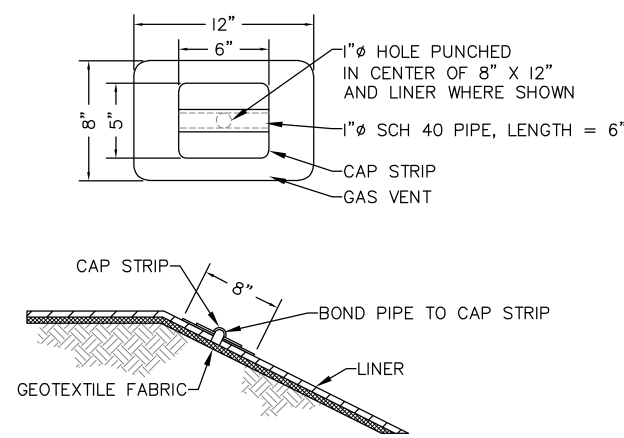
DATE November 30, 2021



LINER ANCHOR DETAIL (1)
N.T.S.
700-M-4

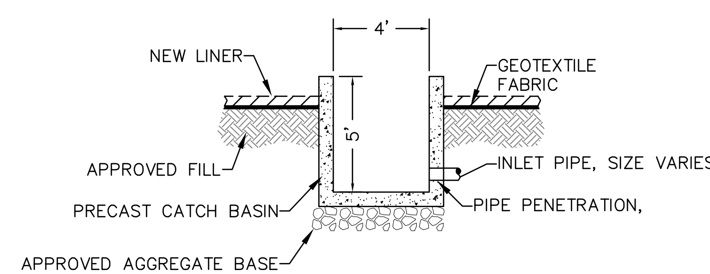


LINER ANCHOR DETAIL FOR NEW DIKE (2)
N.T.S.
700-M-4

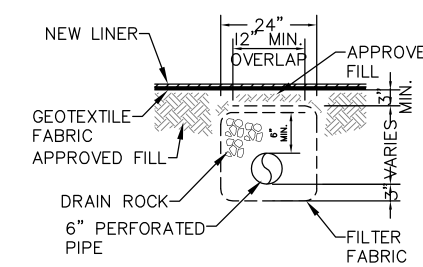


GAS VENT DETAIL (3)
N.T.S.
700-M-4

NOTE:
GAS VENTS SHALL BE PLACED ON 25 FOOT CENTERS AROUND THE PERIMETER OF THE LAGOON.



INLET DETAIL (4)
N.T.S.
700-M-4



UNDERDRAIN DETAIL (3)
N.T.S.
700-M-4

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

EFFLUENT STORAGE
LINER DETAILS

DESIGNED: — DRAWN: —
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

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IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	700-M-4
DATE	SHEET NO.
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PLOT DATE November 30, 2021

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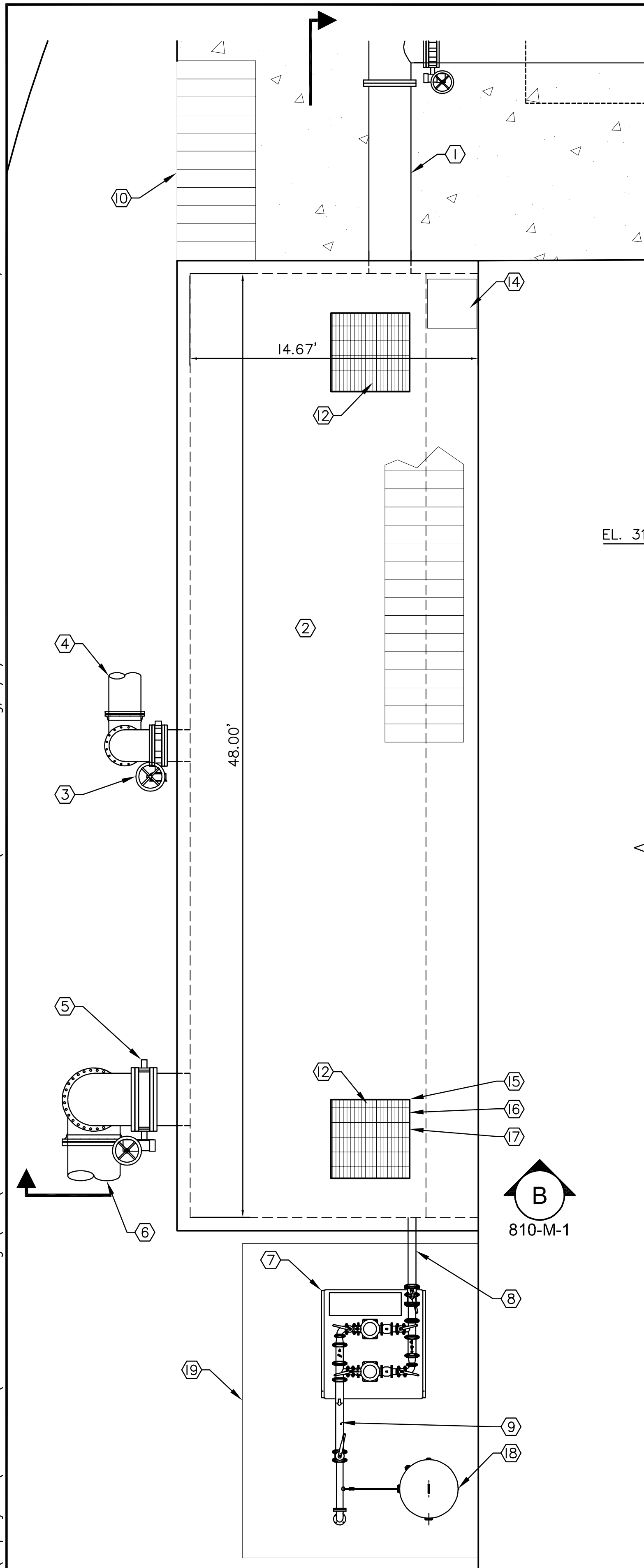
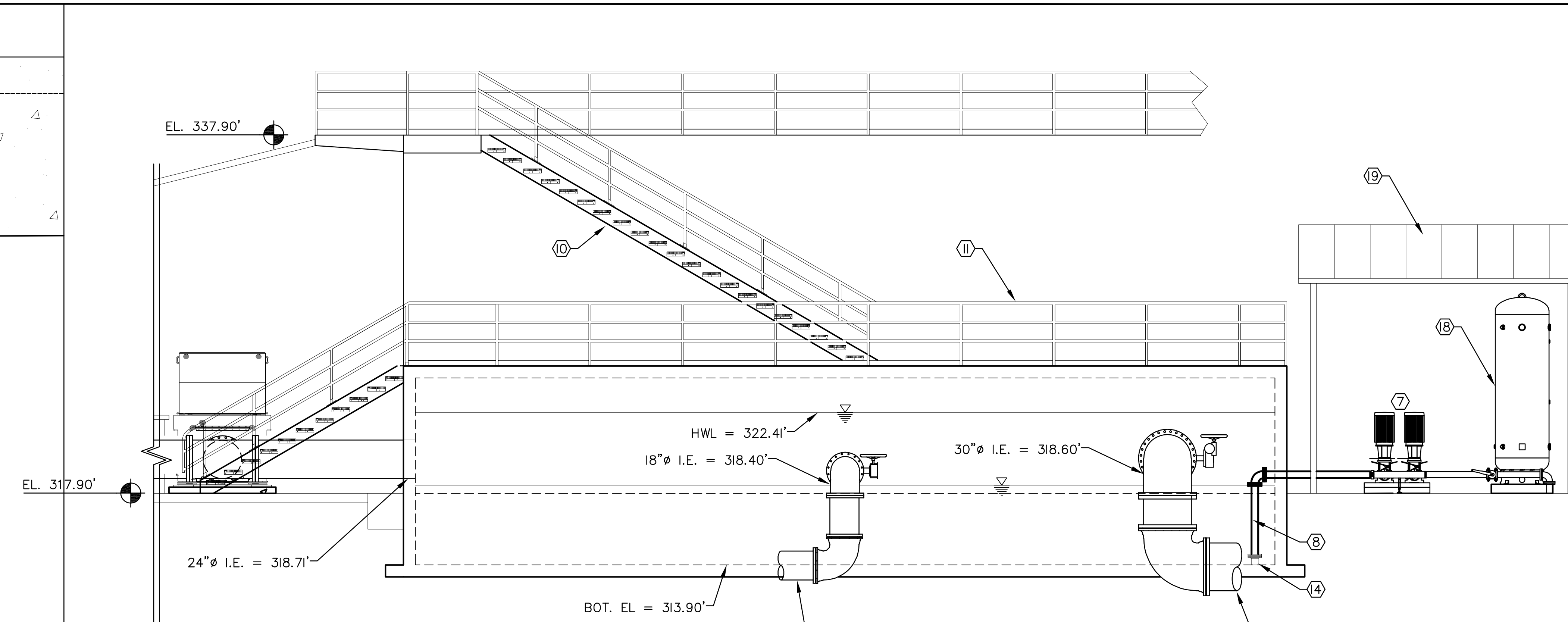
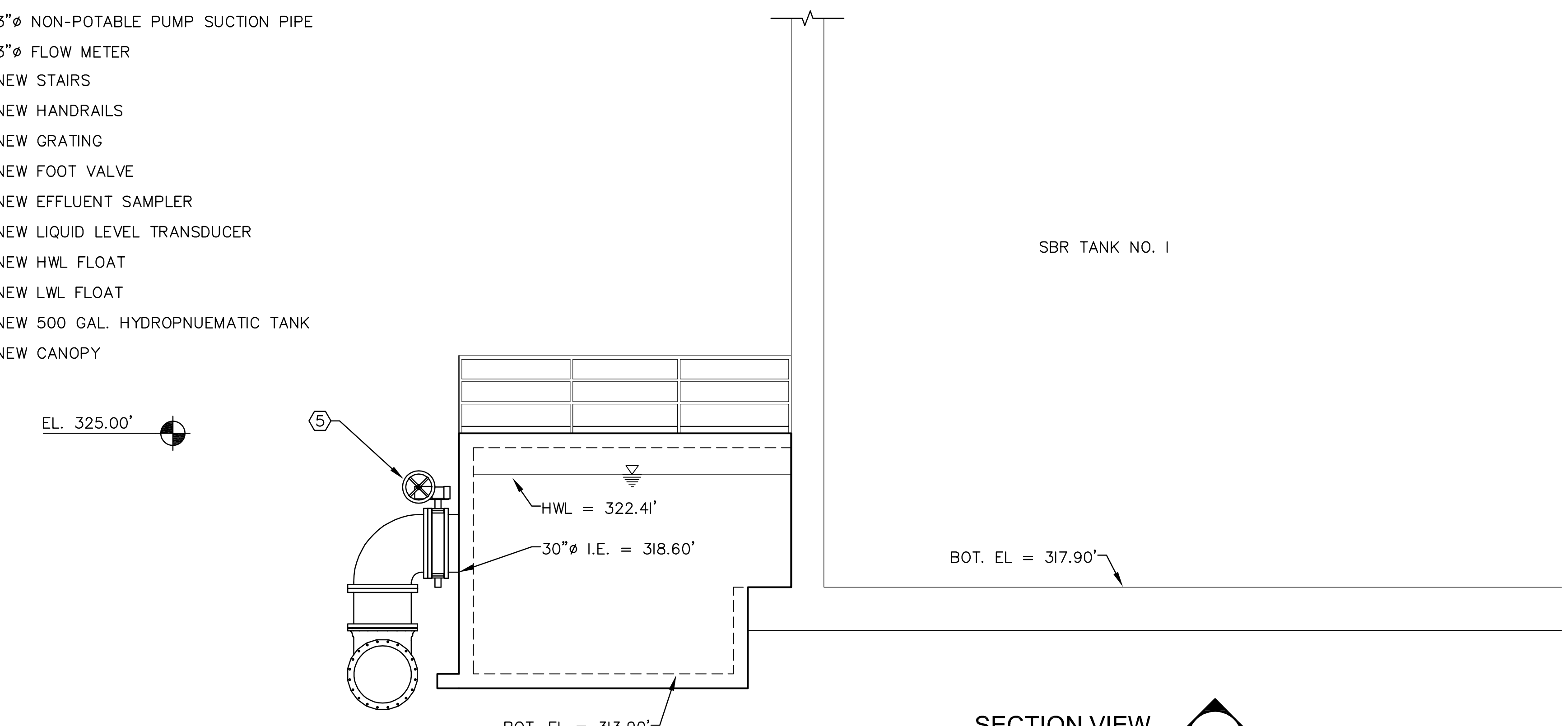


PLAN VIEW (1)
SCALE: 1" = 4'-0"
810-M-1



NPW PUMP SECTION (A)
SCALE: 1" = 4'-0"
810-M-1

KEY NOTES
1. 24ø EFFLUENT FROM UV DISINFECTION
2. NON-POTABLE WATER 20,000 GALLON STORAGE TANK
3. 18"ø ACTUATED BUTTERFLY VALVE
4. 18"ø OUTLET TO EFFLUENT PUMP STATION, SEE DRAWING 100-C-2
5. 30"ø BUTTERFLY VALVE
6. 30"ø OUTLET TO EFFLUENT STORAGE, SEE PROCESS AREA 700.
7. NON-POTABLE PUMP SKID ON CONCRETE EQUIPMENT PAD
8. 3"ø NON-POTABLE PUMP SUCTION PIPE
9. 3"ø FLOW METER
10. NEW STAIRS
11. NEW HANDRAILS
12. NEW GRATING
13. NEW FOOT VALVE
14. NEW EFFLUENT SAMPLER
15. NEW LIQUID LEVEL TRANSDUCER
16. NEW HWL FLOAT
17. NEW LWL FLOAT
18. NEW 500 GAL. HYDROPNUEMATIC TANK
19. NEW CANOPY



SECTION VIEW (B)
SCALE: 1" = 4'-0"
810-M-1

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW NON-POTABLE WATER SYSTEM
PLAN, SECTION AND ELEVATION VIEWS

DESIGNED: —
DRAWN: —
APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	810-M-1
DATE	SHEET NO.
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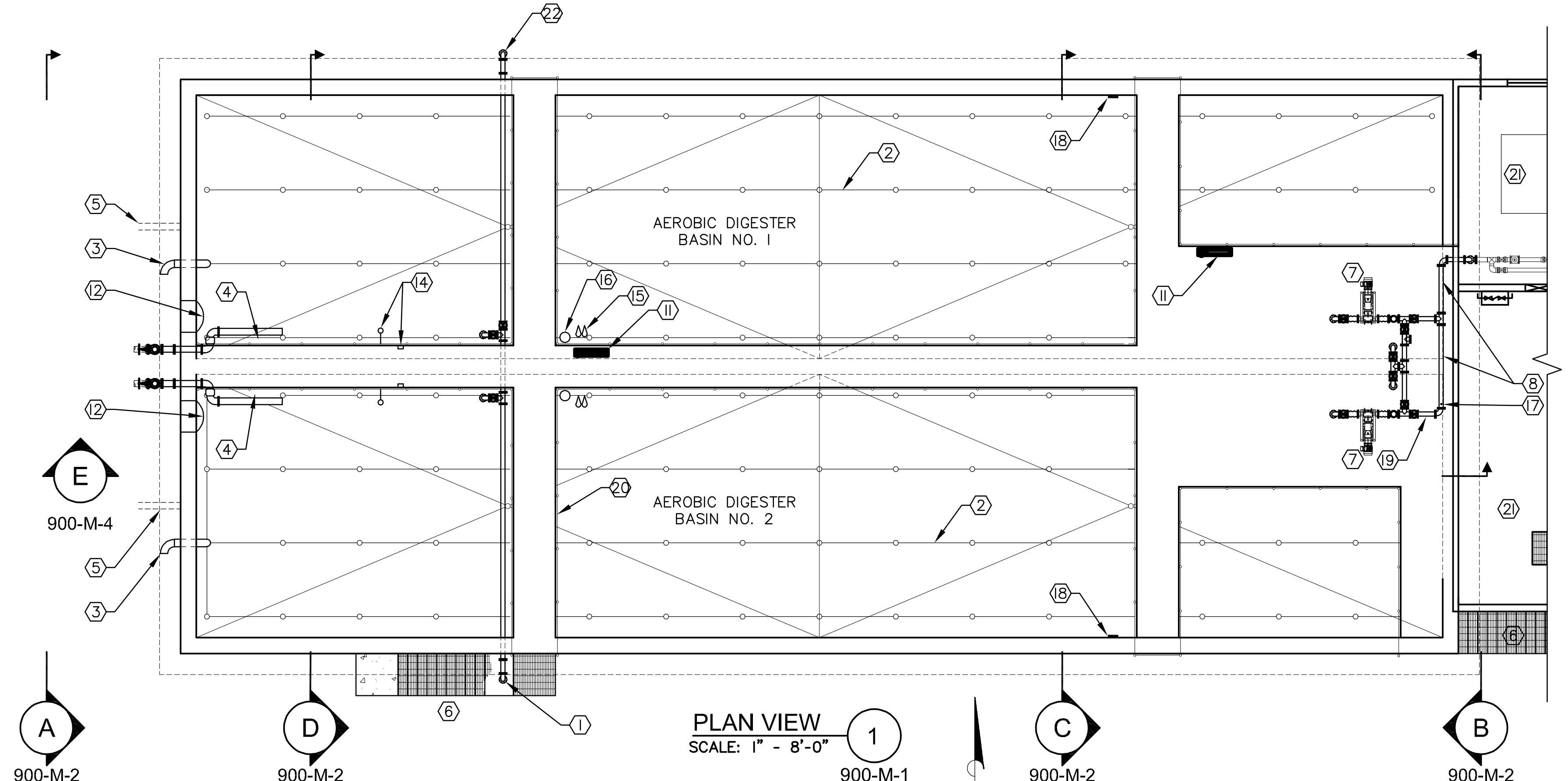
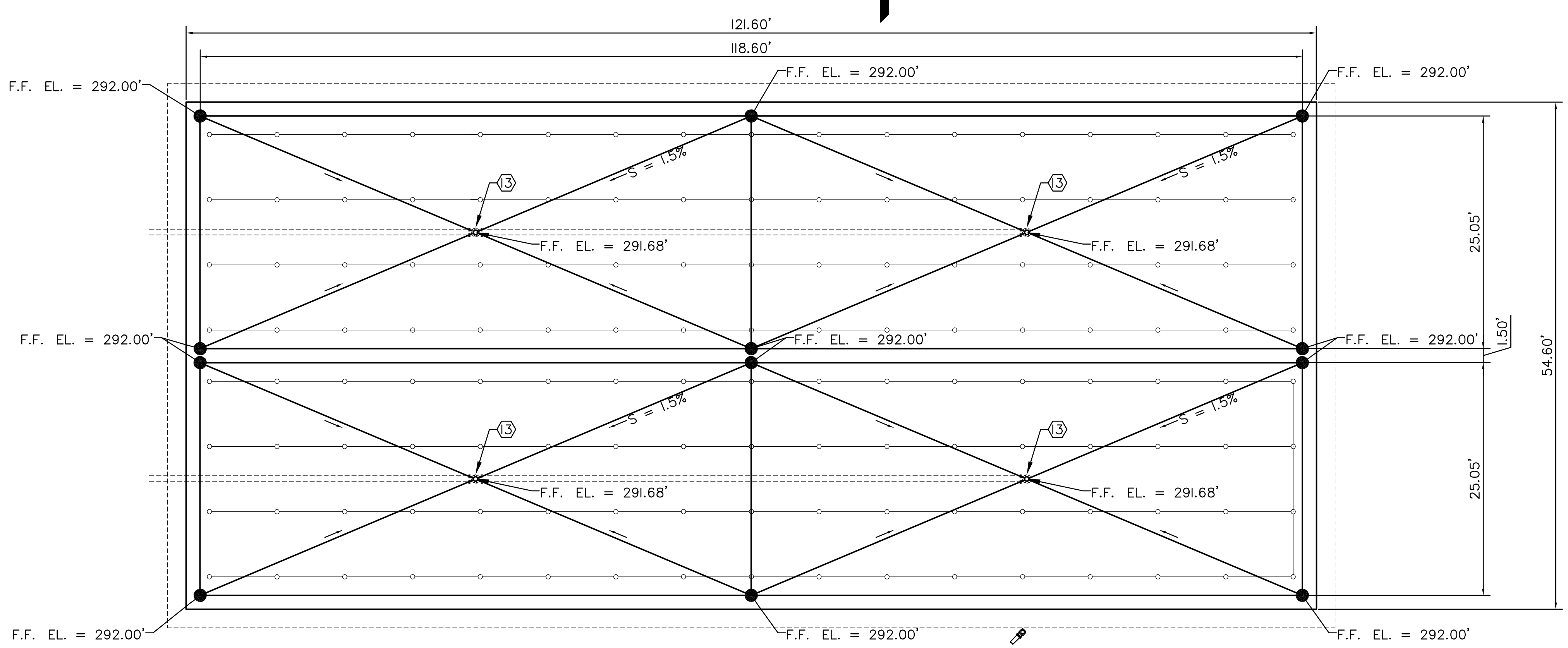


PLAN VIEW 1
SCALE: 1" - 8'-0"
900-M-1



FLOOR PLAN VIEW 2
SCALE: 1" - 8'-0"
900-M-1

KEY NOTES

1. NEW 3"ø WAS PIPING FROM SBR, SEE NEW SITE PLAN FOR CONTINUATION
2. NEW COARSE BUBBLE DIFFUSER SYSTEM
3. NEW 8"ø AIR PIPING
4. NEW 6"ø SWIVEL ARM DECANT.
5. NEW 6"ø TANK DRAIN
6. NEW STAIRS
7. NEW (2) SLUDGE TRANSFER PUMPS
8. NEW 4"ø SLUDGE TRANSFER PIPING HEADER
9. NEW SLUDGE TRANSFER PIPING TO BIOSOLIDS DEWATERING PROCESS.
10. NEW 4"ø DECANT PIPING TO TRANSFER PUMP STATION
11. NEW UTILITY STATION, SEE DETAIL
12. NEW TANK ACCESS HATCH, TYP. OF 2
13. TANK DRAIN MUD VALVES, SEE DETAIL
14. DO/ORP PROBE, TYPICAL PER TANK
15. HL/LL FLOATS, TYPICAL PER BASIN
16. LIQUID LEVEL TRANSDUCER IN STILLING WELL, TYPICAL PER BASIN
17. TRANSFER PUMP PRESSURE SENSOR
18. STAFF GAUGE, TYPICAL PER BASIN
19. QUICK CONNECTION FOR BIOSOLIDS LOADING
20. NEW HANDRAILS
21. BIOSOLIDS DEWATERING BLDG, SEE DRAWING 920-M-1
22. 3"ø WAS TRANSFER PIPING CONNECTION FOR FUTURE AEROBIC DIGESTER

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW AEROBIC DIGESTERS
PLAN VIEW

DESIGNED: CGP
DRAWN: CGP
APPROVED BY:
DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
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PROJECT NO.	DRAWING NO.
198.28	900-M-1
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NOV. 2021	85 OF 97

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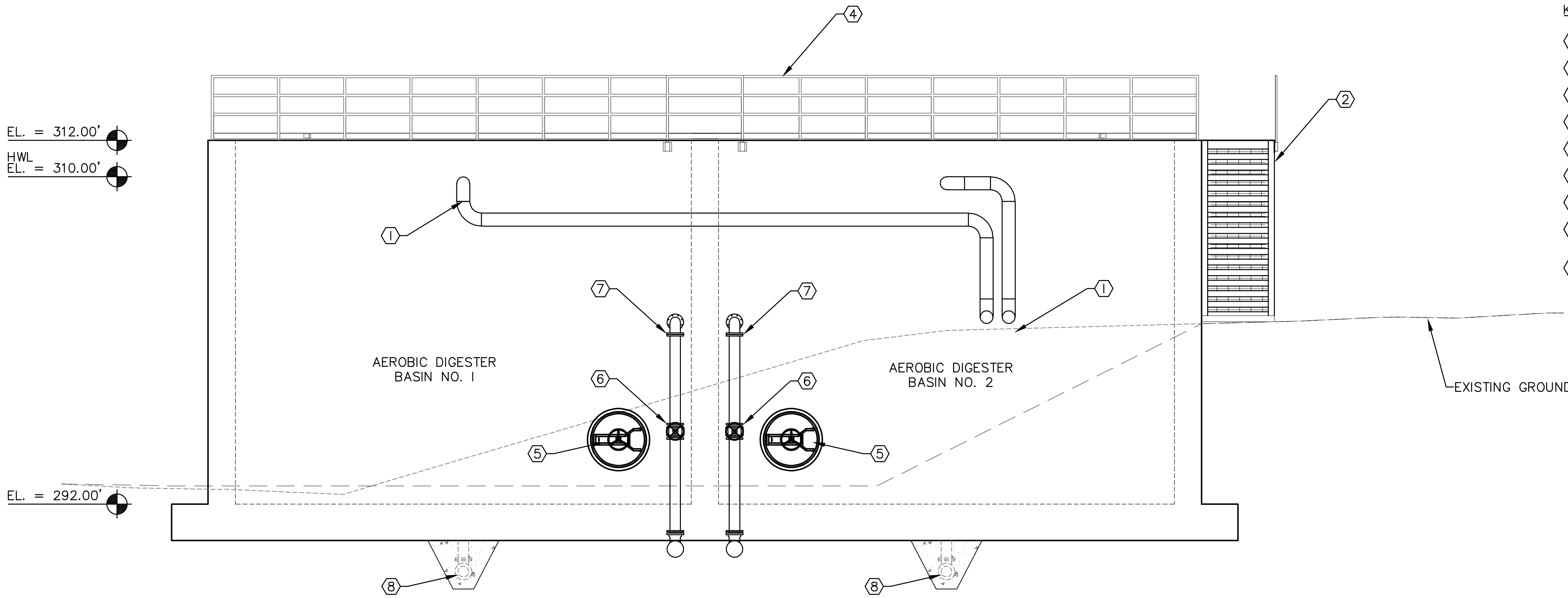
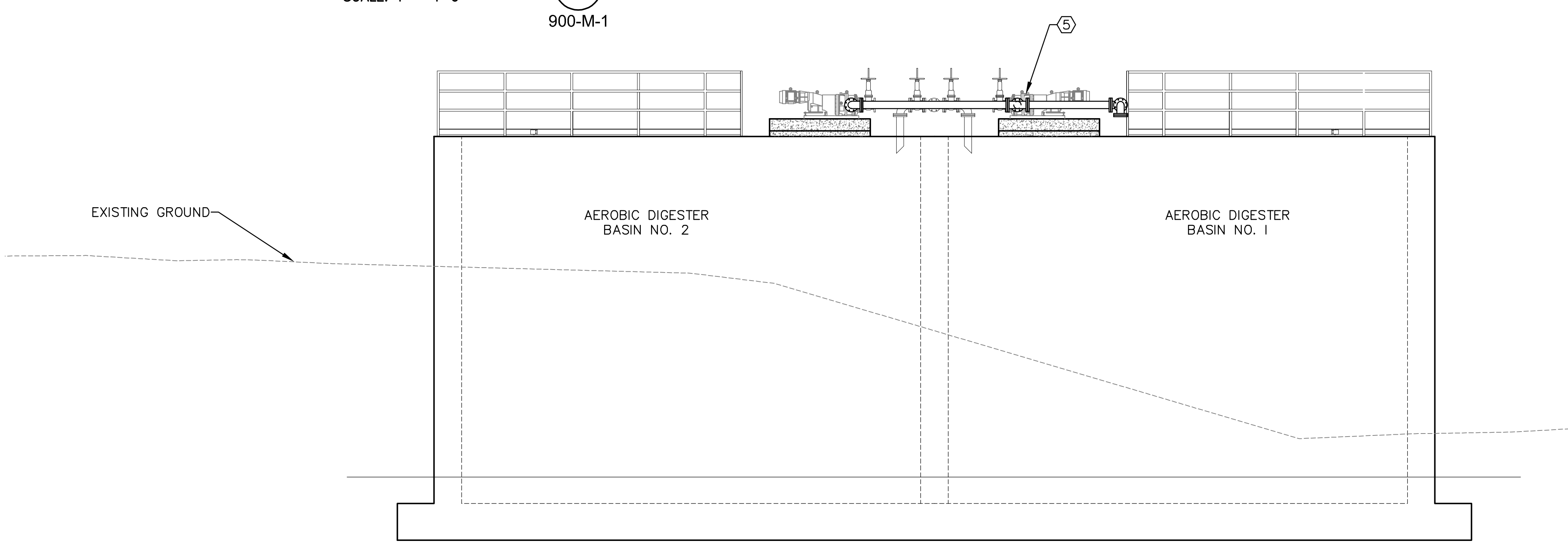


WEST ELEVATION
SCALE: 1" - 4'-0"
A
900-M-1

KEY NOTES

1. NEW AIR PIPING FOR BUBBLE DIFFUSER SYSTEM
2. NEW STAIRS
3. NEW SLUDGE TRANSFER DISCHARGE PIPING
4. NEW HANDRAILS
5. NEW TANK ACCESS HATCH
6. NEW PLUG VAVLE
7. NEW 6"ø AEROBIC DIGESTER DECANT LINE
8. NEW 4"ø AEROBIC DIGESTER DRAIN LINE TO TRANSFER PUMP STATION
9. NEW SLUDGE TRANSFER PUMP AND HEADER



EAST ELEVATON
SCALE: 1" - 4'-0"
B
900-M-1

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW AEROBIC DIGESTERS
ELEVATION AND SECTION VIEWS

DESIGNED: CGP
DRAWN: CGP
APPROVED BY:
DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
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PROJECT NO. 198.28
DRAWING NO. 900-M-2
DATE NOV. 2021
SHEET NO. 86 OF 97

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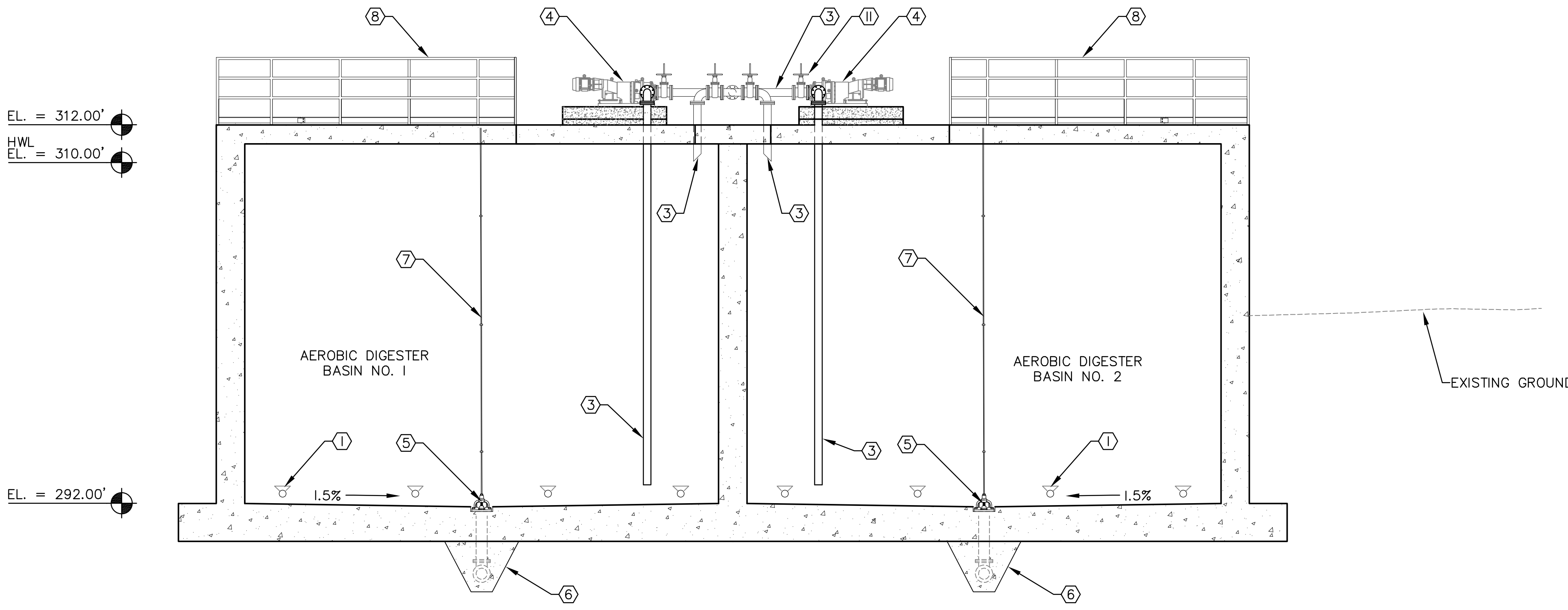
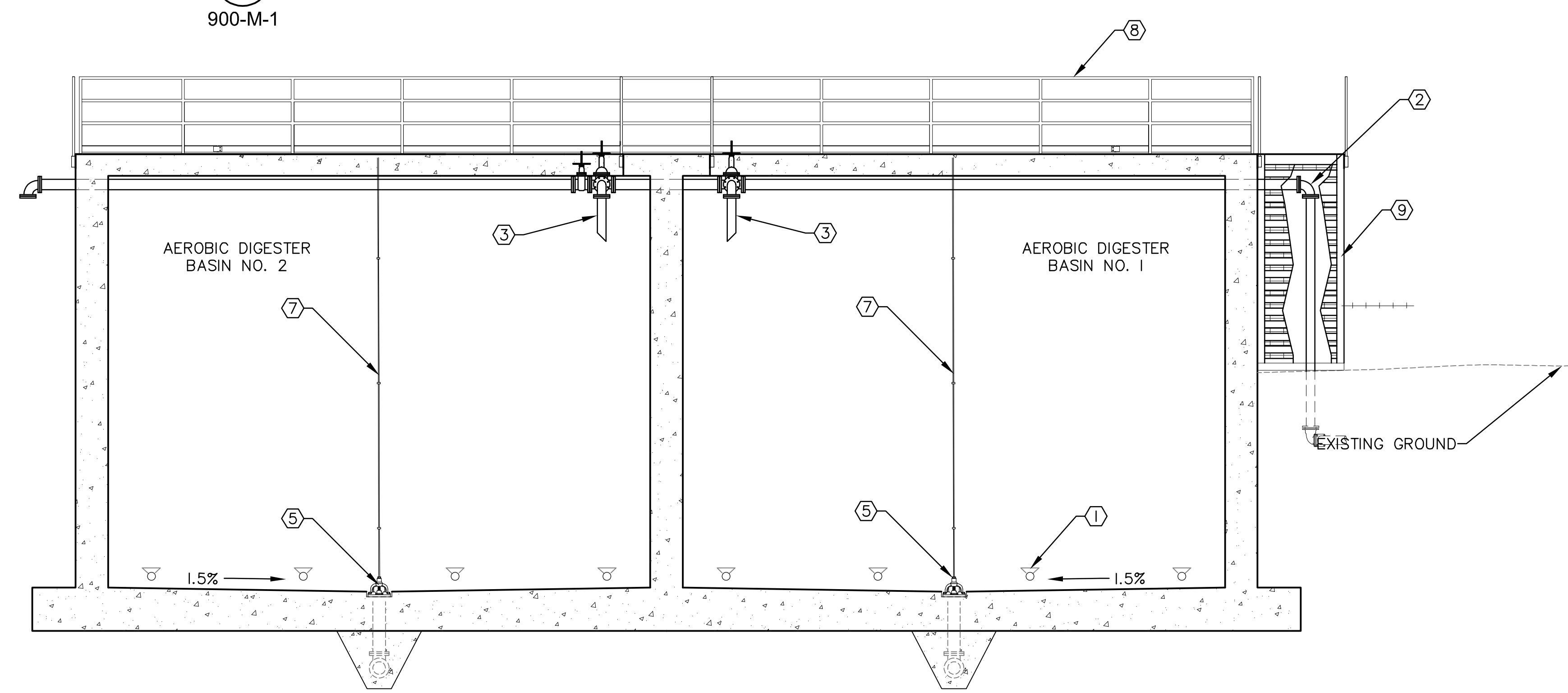


DIGESTER SECTION
SCALE: 1" - 4'-0"
C
900-M-1

KEY NOTES

1. NEW AIR BUBBLE DIFFUSER SYSTEM
2. NEW 3"ø WAS TRANSFER PIPING FROM SBR
3. NEW 4"ø SLUDGE TRANSFER PIPING
4. NEW SLUDGE TRANSFER PUMPS
5. NEW MUD VALVE
6. 6"ø DIGESTER DRAIN PIPING ENCASED IN CONCRETE
7. VALVE STEM WITH GUIDE RAILS FOR MUD VALVE, INSTALL PER MANUFACTURER RECOMMENDATION
8. NEW HANDRAIL
9. NEW STAIRS
10. 3"ø WAS TRANSFER PIPING CONNECTION FOR FUTURE AEROBIC DIGESTER
11. NEW 4"ø PLUG VALVE, TYPICAL



DIGESTER SECTION
SCALE: 1" - 4'-0"
D
900-M-1

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PRELIMINARY
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CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW AEROBIC DIGESTERS
SECTION VIEWS

DESIGNED: —
DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
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PROJECT NO.	DRAWING NO.
198.28	900-M-3
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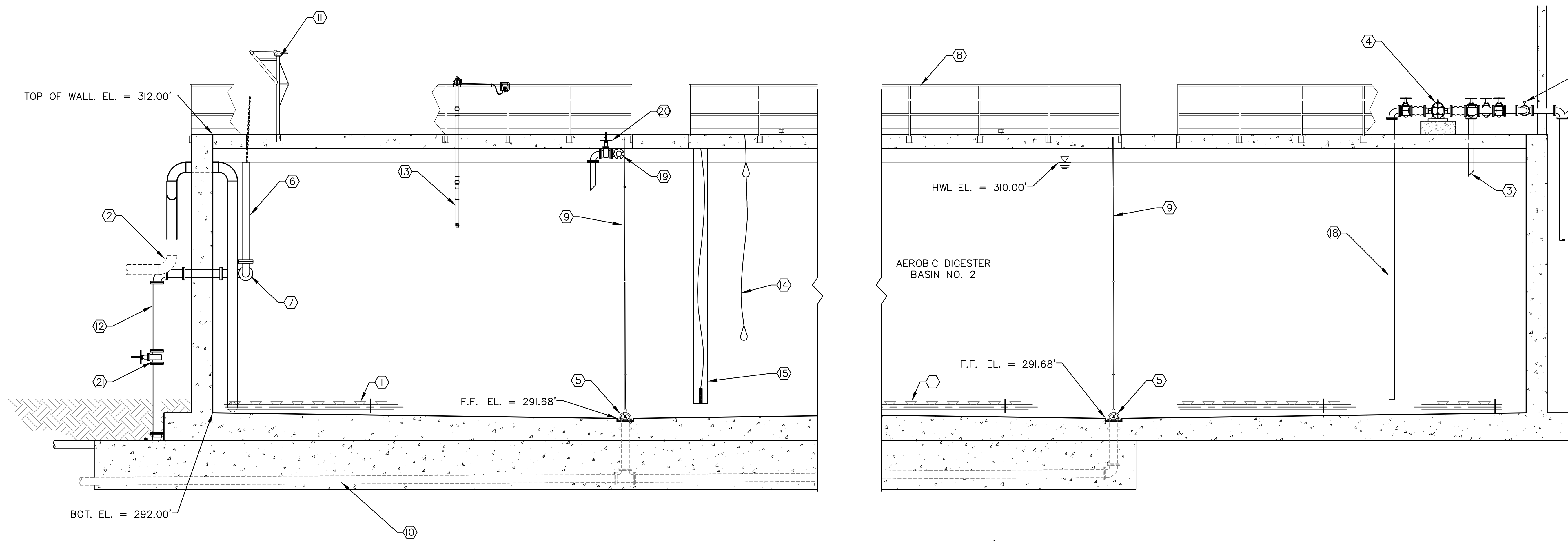

DIGESTER SECTION

SCALE: 1" - 4'-0"

E

900-M-1

KEY NOTES

1. NEW AIR BUBBLE DIFFUSER SYSTEM
2. NEW 8"ø AIR PIPING
3. NEW 4"ø SLUDGE TRANSFER DISCHARGE PIPING
4. NEW SLUDGE TRANSFER PUMPS
5. NEW 4"ø MUD VALVE
6. NEW 6"ø DECANT ARM WITH CHAIN
7. NEW SWIVEL JOINT FOR DECANT ARM
8. NEW HANDRAIL
9. VALVE STEM WITH GUIDE RAILS FOR MUD VALVE, INSTALL PER MANUFACTURER RECOMMENDATION
10. 4"ø DIGESTER DRAIN PIPING ENCASED IN CONCRETE
11. PORTABLE HOIST,
12. 6"ø SUPERNATE PIPING TO TRANSFER PUMP STATION
13. DO/ORP PROBE, TYPICAL PER TANK
14. HL/LL FLOATS, TYPICAL PER BASIN
15. LIQUID LEVEL TRANSDUCER IN STILLING WELL, TYPICAL PER BASIN
16. TRANSFER PUMP PRESSURE SENSOR
17. QUICK CONNECTION FOR BIOSOLIDS LOADING
18. NEW 4"ø SUCTION LINE
19. NEW 3"ø WAS TRANSFER PIPE
20. NEW 3"ø PLUG VALVE
21. NEW 6"ø PLUG VALVE
22.

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ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW AEROBIC DIGESTERS
SECTION VIEW

DESIGNED: —
DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	900-M-4
DATE	SHEET NO.
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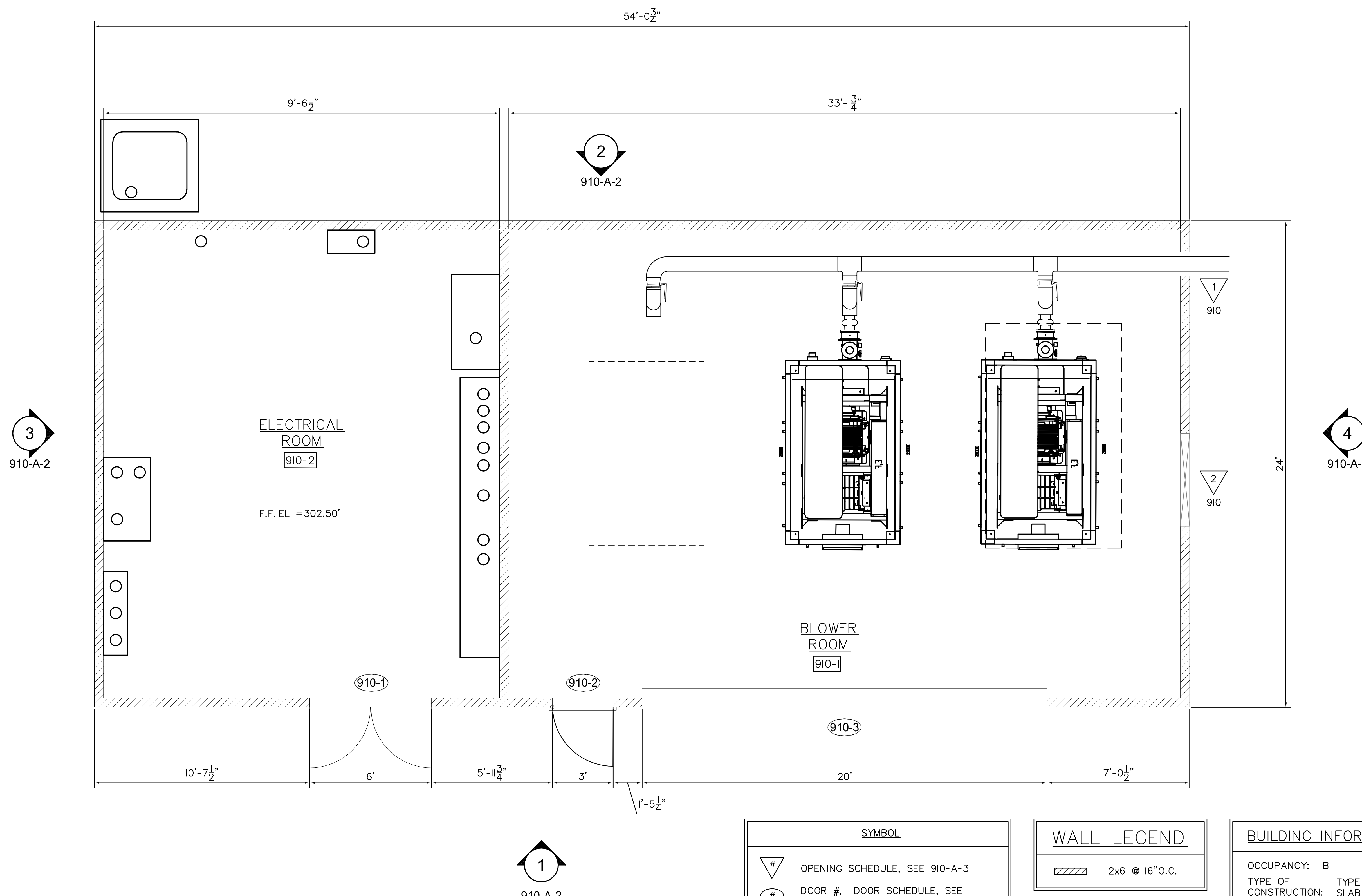

FLOOR PLAN (A)
SCALE: 3/8" = 1'-0"
910-A-1

N

SYMBOL	
▽ #	OPENING SCHEDULE, SEE 910-A-3
(#)	DOOR #, DOOR SCHEDULE, SEE 910-A-3
[#]	ROOM NUMBER, SEE FINISH SCHEDULE ON SHEET 910-A-3

WALL LEGEND

2x6 @ 16" O.C.

BUILDING INFORMATION

OCCUPANCY: B

TYPE OF CONSTRUCTION: TYPE V FRAMING/ SLAB ON GRADE

BUILDING AREA:

ELECTRIC:	451 SQ. FT.
BLOWER:	765 SQ. FT.
TOTAL:	1216 SQ. FT.

INSULATION TYPE:

ELECTRICAL ROOM:

WALL: R21
CEILING: R38

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW AEROBIC DIGESTER BUILDING
PLAN VIEW

DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS			
REVISED	DESCRIPTION	APPR'D.	DATE

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PROJECT NO.	DRAWING NO.
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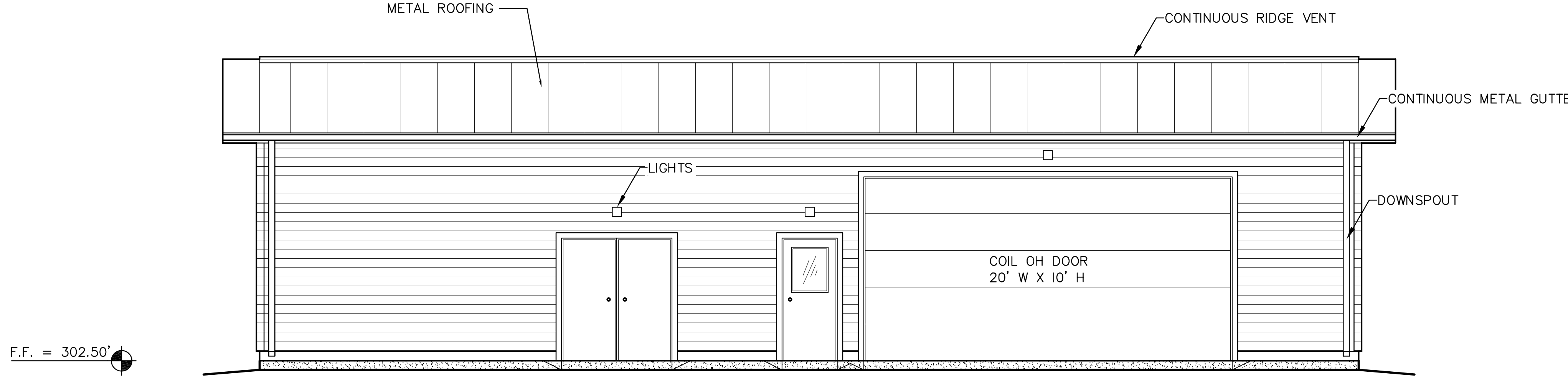
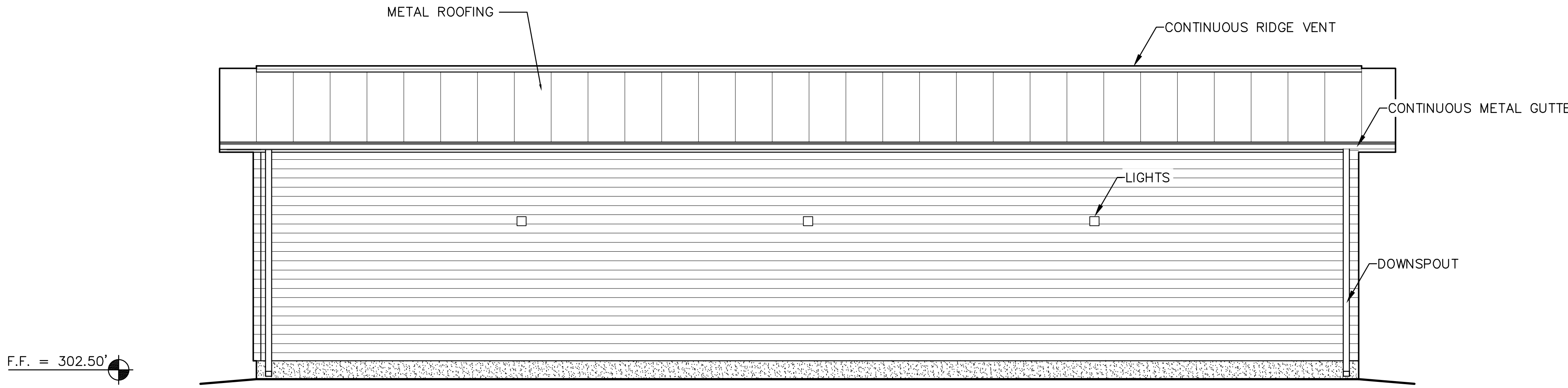
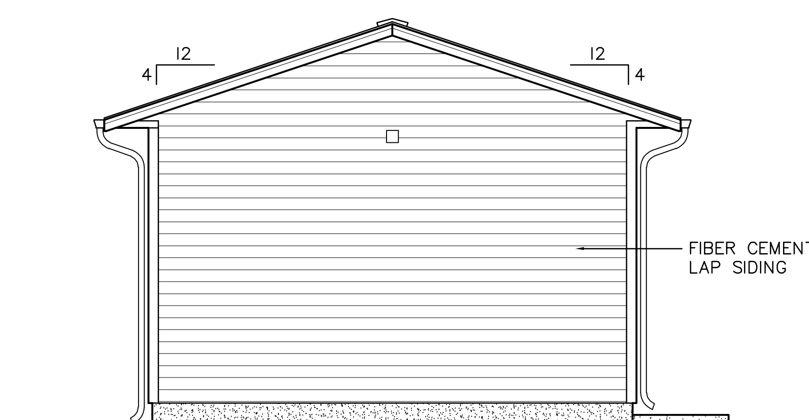
November 30, 2021



SOUTH ELEVATION 1
SCALE: 1/4" = 1'-0"
910-A-2

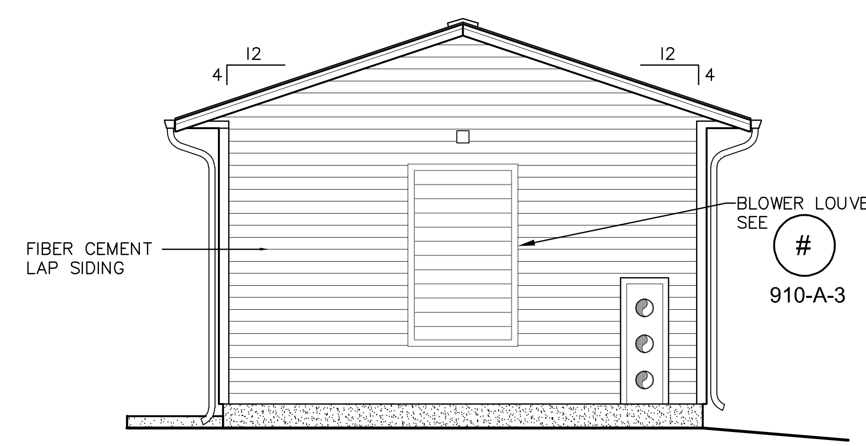


NORTH ELEVATION 2
SCALE: 1/4" = 1'-0"
910-A-2



F.F. = 314.50'

F.F. = 302.50'



WEST ELEVATION 3
SCALE: 1/4" = 1'-0"
910-A-2

EAST ELEVATION 4
SCALE: 1/4" = 1'-0"
910-A-2

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MOLALLA OREGON

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW AEROBIC DIGESTER BUILDING
ELEVATIONS VIEWS

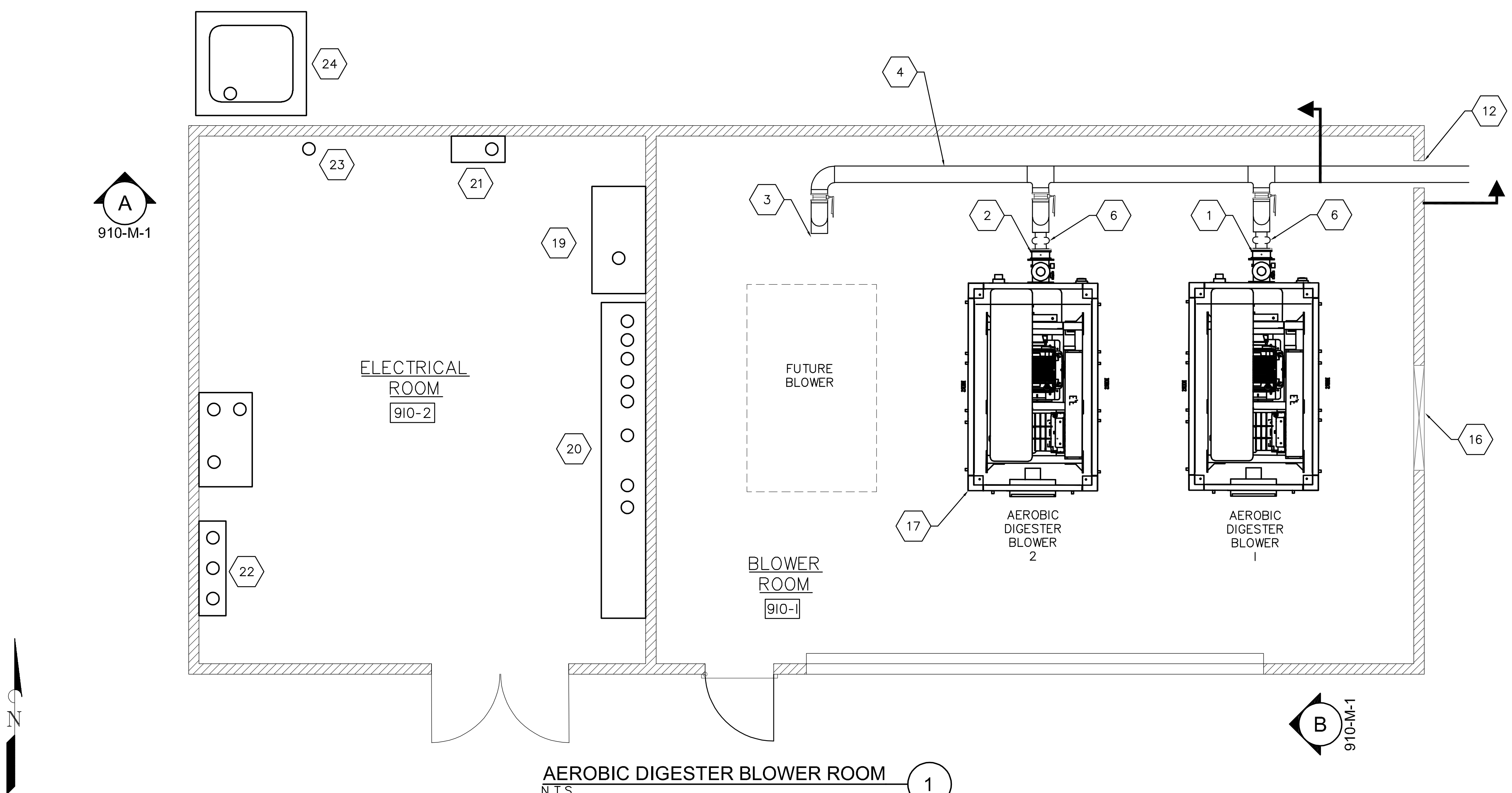
DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

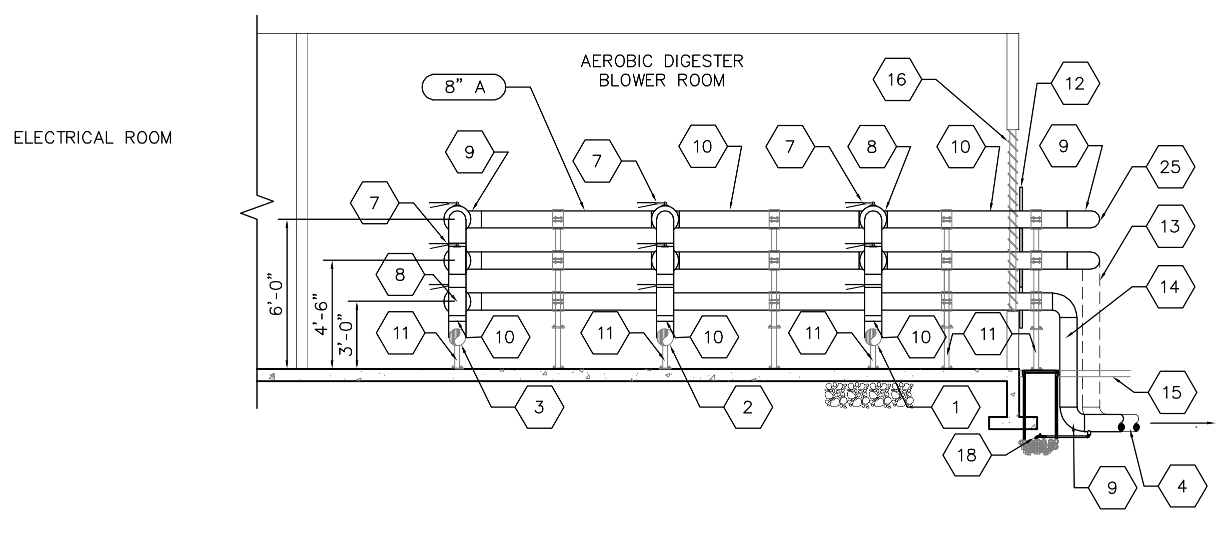
REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

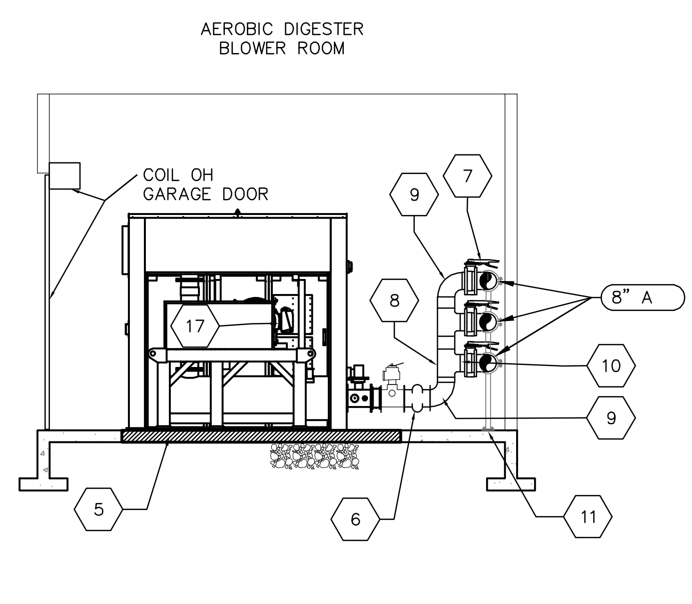
PROJECT NO.	DRAWING NO.
198.28	910-A-2
DATE	SHEET NO.
NOV. 2021	90 OF 97



AEROBIC DIGESTER BLOWER ROOM
N.T.S
1
910-M-1



TYPICAL SECTION - BLOWER PIPING
SCALE: 1" = 4'-0"
A
910-M-1



TYPICAL SECTION - BLOWER PIPING
SCALE: 1" = 4'-0"
B
910-M-1

KEY NOTES:

1. CONNECTION TO AEROBIC DIGESTER BLOWER #1
2. CONNECTION TO AEROBIC DIGESTER BLOWER #2
3. FUTURE CONNECTION TO AEROBIC DIGESTER BLOWER #3
4. 8" AIR TO AEROBIC DIGESTER
5. EQUIPMENT PAD, SEE DETAIL 2 / 60-M-X
6. 8" X 6" FLEXIBLE COUPLING REDUCER
7. 8" BUTTERFLY VALVE, TYPICAL
8. 8" TEE, TYPICAL
9. 8" 90° ELBOW, TYPICAL
10. PIPE SPOOL, LENGTH AS REQUIRED
11. PIPE SUPPORTS, SEE NOTE 2
12. WALL PENETRATION, SEE DETAIL 1 / 60-M-X SIMILAR
13. TO AEROBIC DIGESTER BASINS #1
14. TO AEROBIC DIGESTER BASINS #2
15. PIPE PENETRATION TYPICAL OF 2, SEE DETAIL 7 / 60-M-X
16. LOUVER, SEE SHEET 910-A-3
17. AEROBIC DIGESTER BLOWER IN AN ENCLOSURE, SEE NOTE 1
18. AIR CONDENSATE DRAIN, SEE 2 / 60-M-X
19. AEROBIC DIGESTER PACKAGE SYSTEM MASTER CONTROL PANEL.
20. AEROBIC DIGESTER MCC
21. STEP-DOWN TRANSFORMER XCBLP-1. SEE NEW SERVICE ONE-LINE DIAGRAM.
22. LIGHTING CONTROL PANEL. SEE SCHEMATIC DETAIL ON SHEET ____.
23. FAN COIL UNIT FC-910-1.
24. HEAT PUMP HP-910-1.
25. AIR PIPING FOR FUTURE AEROBIC DIGESTER NO. 3

NOTES:

1. NEW BLOWERS, ENCLOSURES, AND ASSOCIATED HARDWARE SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL VERIFY DIMENSIONS OF BLOWERS AND ENCLOSURES PRIOR TO INSTALLATION.
2. PIPE SUPPORTS SHOWN ARE SCHEMATIC ONLY. REFER TO 'TABLE A' ON SHEET 60-M-2.

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

NEW AEROBIC DIGESTER BUILDING
BLOWER ROOM - MECHANICAL VIEWS

DESIGNED: | DRAWN:
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REVISIONS

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IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
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DATE	SHEET NO.
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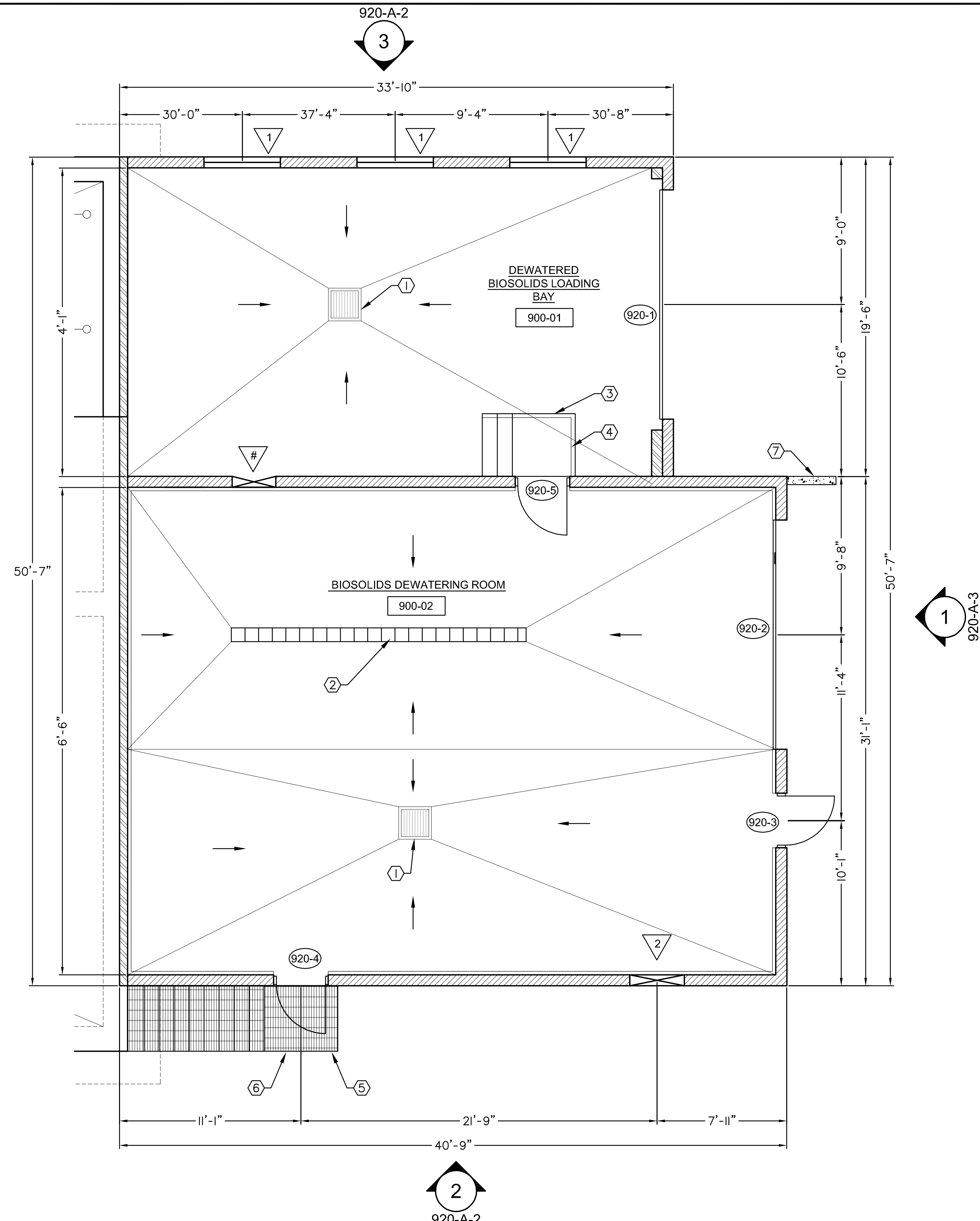

BIOSOLIDS DEWATERING FACILITY- PLAN VIEW

SCALE: 1" - 4'-0"

1
920-A-1

N

KEY NOTES

1. CATCH BASIN, SEE
2. 10" TRENCH DRAIN, SEE
3. CONCRETE STAIR
4. HANDRAIL, SEE
5. LANDING, SEE
6. STAIR & HANDRAIL, SEE
7. RETAINING WALL, SEE

WALL LEGEND	
	CONCRETE WALL
	2x6 WOOD FRAMING @ 16"O.C.

SYMBOL	
	UTILITY STATION, SEE DETAIL 1 / 60-M-4
#	WINDOW #, SEE 230-A-5FOR WINDOW SCHEDULE
#	DOOR NUMBER, SEE DOOR SCHEDULE ON SHEET 230-A-5
#	ROOM NUMBER, SEE FINISH SCHEDULE ON SHEET 230-A-5

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CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

BIOSOLIDS DEWATERING
PLAN VIEW

DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS			
REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	920-A-1
DATE	SHEET NO.
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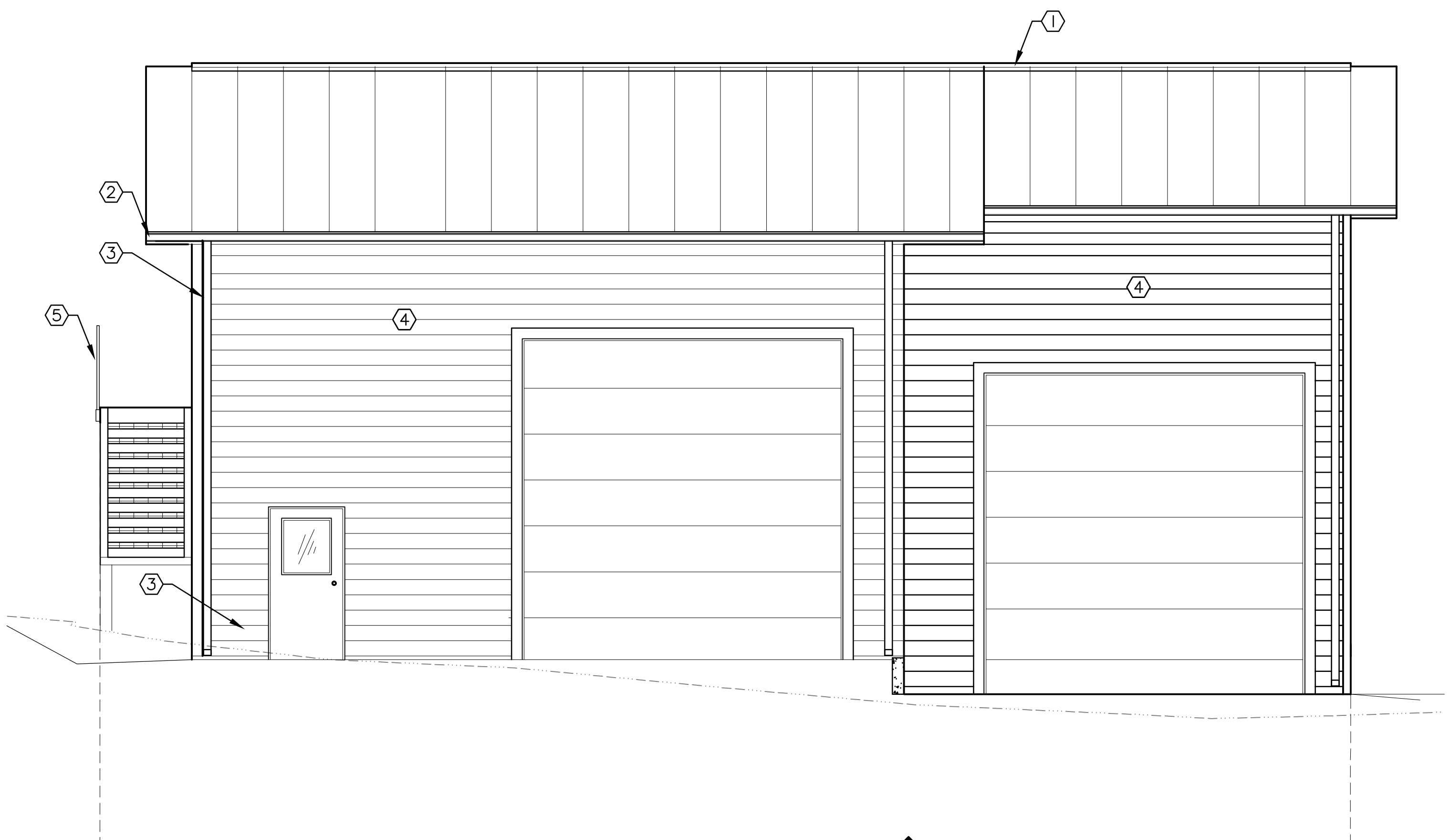
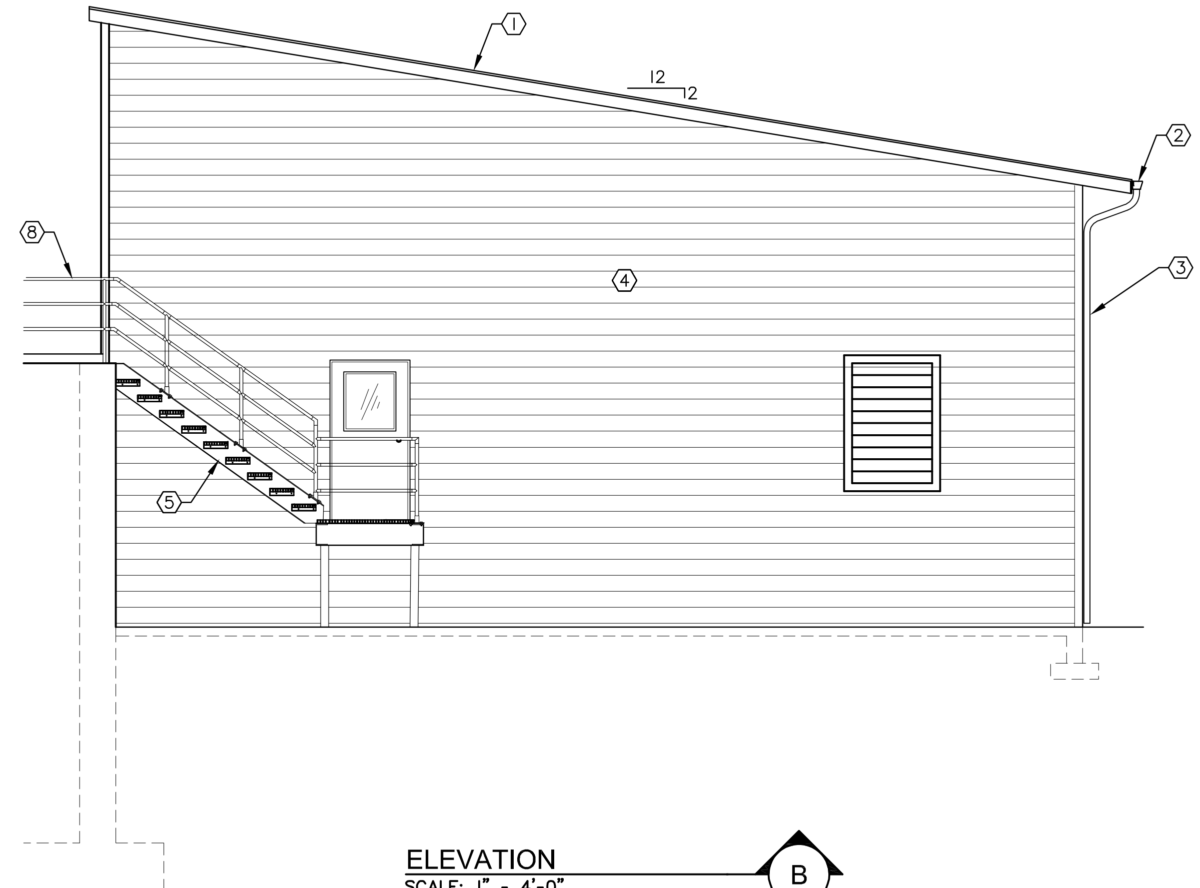
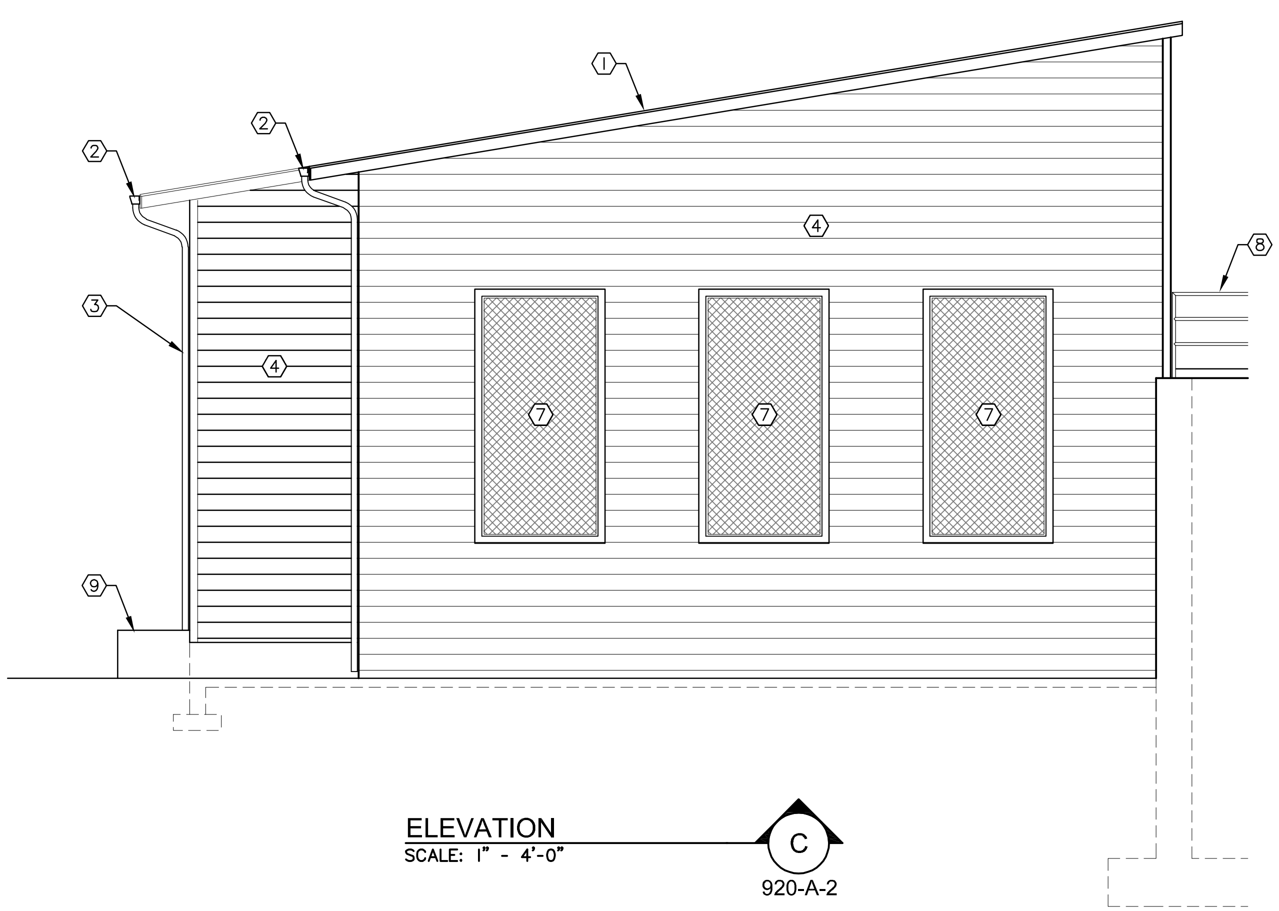


ELEVATION A
SCALE: 1" - 4'-0"
920-A-2



ELEVATION B
SCALE: 1" - 4'-0"
920-A-2



ELEVATION C
SCALE: 1" - 4'-0"
920-A-2

KEY NOTES

1. METAL ROOFING
2. METAL GUTTER
3. METAL DOWNSPOUT
4. COMPOSITE SIDING
5. STAIR & HANDRAIL, SEE
6. LOUVER
7. SCREENED OPENING, SEE DETAIL
8. HANDRAIL, SEE DETAIL
9. RETAINING WALL, SEE

NOTE:

1. PLUMBING AND MECHANICAL ROOF PENETRATIONS NOT SHOWN, PROVIDE WATER PROOF ASSEMBLY, INSTALL PER CODE REQUIREMENTS, & VERIFY LOCATION IN FIELD WITH ENGINEER, TYP.

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PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

BIOSOLIDS DEWATERING
ELEVATION VIEWS

DESIGNED: —
DRAWN: —
APPROVED BY: DATE:

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

PROJECT NO.	DRAWING NO.
198.28	920-A-2
DATE	SHEET NO.
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FINISH SCHEDULE

NO.	ROOM	FLOOR	BASE MAT.	BASE FIN.	WALLS MAT.	WALLS FIN.	CEILING MAT.	CEILING FIN.	HEIGHT	REMARKS
920-01	DEWATERED BIOSOLIDS LOADING BAY	SC	---	---	GB & FRP	FAC	GB	T & PT	VARIES	
920-02	BIOSOLIDS DEWATERING ROOM	SC	---	---	GB & FRP	FAC	GB	T & PT	16'-0" ±	

DOOR SCHEDULE

SYM.	SIZE WIDTH X HEIGHT	DOOR THICK	DOOR TYPE	DOOR MAT.	DOOR FIN.	FRAME MAT.	FRAME FIN.	FIRE RATING	REMARKS
920-1	14'-0" x 12'-0"	1"	C	AL	FAC	STL	FAC	---	COIL OH DOOR
920-2	14'-0" x 12'-0"	1"	C	AL	FAC	STL	FAC	---	COIL OH DOOR
920-3	3'-0" x 6'-8"	1-3/4"	A	STL	PT	STL	PT	---	
920-4	3'-0" x 6'-8"	1-3/4"	A	STL	PT	STL	PT	---	
920-5	3'-0" x 6'-8"	1-3/4"	A	STL	PT	STL	PT	---	
--	---	---	---	---	---	---	---	---	

NOTE:
1. SEE NEW BIOSOLIDS DEWATERING BUILDING FLOOR PLAN SHEET 920-A-1 FOR DOOR SWING
2. VERIFY ROUGH FRAMING DIMENSIONS PRIOR TO CONSTRUCTION

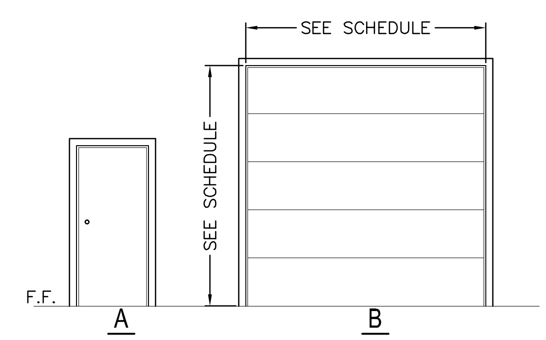
OPENING SCHEDULE

SYM.	SIZE WIDTH X HEIGHT	TYPE	STYLE	MAT.	REMARKS
1 920	4'-8" X 10'-0"	1	---	---	TOP OF SCREENED OPENING @ 16'-0"
2 920	2'-6" X 3'-4"	2	---	---	TOP OF LOUVER @ 6'-8"

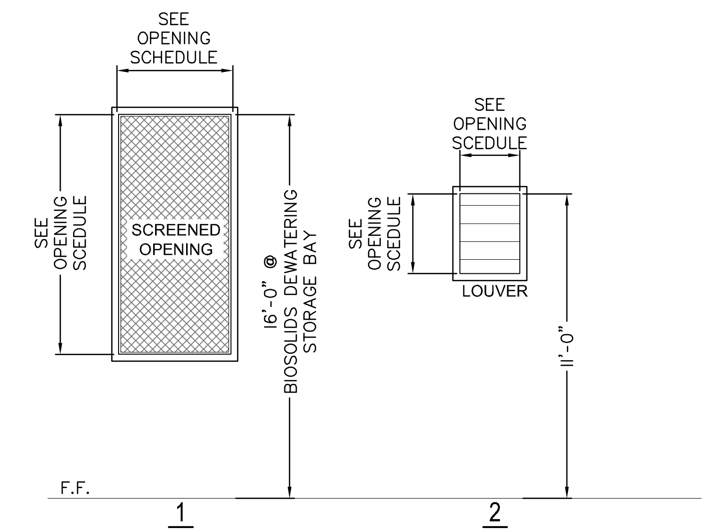
NOTE:
1. SEE NEW BIOSOLIDS DEWATERING BUILDING FLOOR PLAN SHEET 230-A-1
2. VERIFY ROUGH FRAMING DIMENSIONS PRIOR TO CONSTRUCTION

ABBREVIATIONS

MAT.	MATERIAL
FIN.	FINISH
TEMP	TEMPERED
UF	URETHANE FOAM
AL	ALUMINUM
STL	STEEL
GB	GYPSUM BOARD
PT	PAINT
FAC	FACTORY FINISH
WD	WOOD
RBR	RUBBER
T	TEXTURE - (ORANGE PEEL)
FRP	FIREGLASS REINFORCED PLASTIC



DOOR TYPES
SCALE: 1/4" = 1'-0"
1
920-A-3



OPENING TYPES
SCALE: 1/4" = 1'-0"
2
920-A-3

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

BIOSOLIDS DEWATERING
DOOR AND OPENING SCHEDULES

DESIGNED: — DRAWN: —
APPROVED BY: DATE:

REVISIONS

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LINE IS 1 INCH AT FULL SCALE
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PROJECT NO.	DRAWING NO.
198.28	920-A-3
DATE	SHEET NO.
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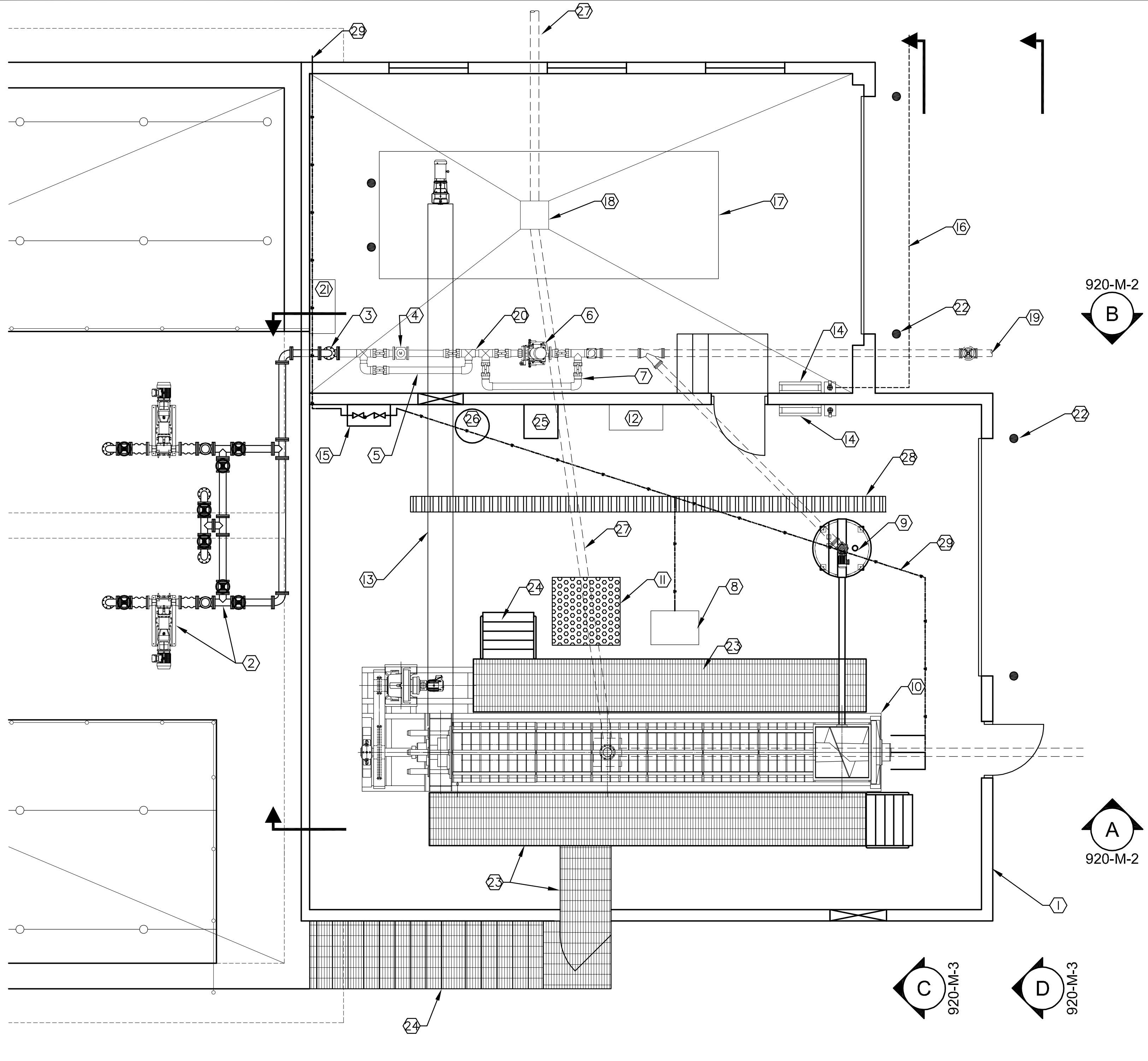
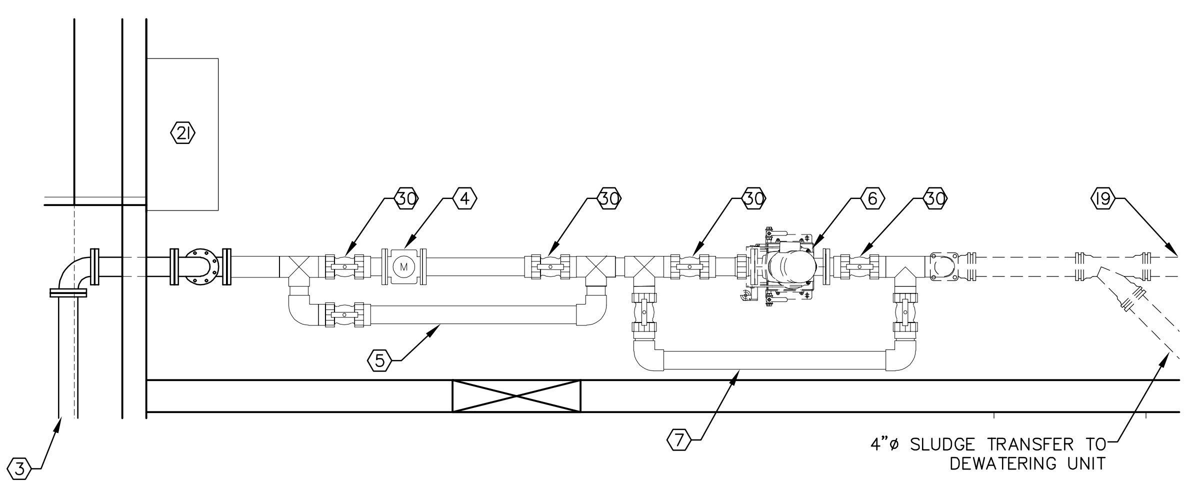


PLAN VIEW (1)
SCALE: 1" - 4'-0"
920-M-1

KEY NOTES

1. NEW BIOSOLIDS DEWATERING BUILDING, SEE DRAWING 920-A-1
2. NEW BIOSOLIDS TRANSFER PUMPS AND PIPING HEADER SEE DRAWING 900-M-1.
3. NEW 4"ø SLUDGE TRANSFER PIPING
4. NEW 4"ø FLOW METER
5. NEW 4"ø FLOW METER BYPASS
6. NEW MACERATOR
7. NEW 4"ø MACERATOR BYPASS
8. NEW SCREWPRESS PUMP SKID
9. NEW SCREWPRESS FLOCCULATION TANK
10. NEW SCREWPRESS AND ELEVATED WALKWAYS
11. NEW POLYMER STORAGE AREA
12. NEW SCREWPRESS CONTROL PANEL
13. NEW INCLINE SCREW CONVEYOR
14. NEW UTILITY STATION, SEE DETAIL
15. NEW POTABLE WATER SUPPLY W/BACKFLOW PREVENTER
16. NEW NON-POTABLE WATER SUPPLY
17. 30 YARD DROP BOX SHOWN (7'-6" X 20'-0")
18. NEW CATCH BASIN
19. NEW 4"ø SLUDGE TRANSFER PIPING TO FUTURE CLASS EQUIPMENT LOCATION
20. NEW 4"ø MACERATOR/FLOW METER ASSEMBLY, SEE DETAIL (2) 920-M-1
21. NEW MACERATOR CONTROL PANEL
22. NEW BOLLARDS, TYPICAL OF 4
23. NEW ELEVATED WALKWAY
24. NEW STAIRS
25. NEW SINK/EYEWASH STATION
26. NEW HOT WATER HEATER
27. NEW 6"ø DRAIN
28. NEW 10" TRENCH DRAIN
29. NEW 2"ø POTABLE WATER
30. NEW 4"ø ISOLATION BALL VALVE, TYPICAL



MACERATOR/FLOW METER ASSEMBLY (2)
SCALE: 1" - 2'-0"
920-M-1

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

BIOSOLIDS DEWATERING
MECHANICAL PLAN VIEW

DESIGNED: CGP	DRAWN: CGP

APPROVED BY: ______ DATE: ______

REVISIONS

REVISED	DESCRIPTION	APPR'D.	DATE

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PROJECT NO.	DRAWING NO.
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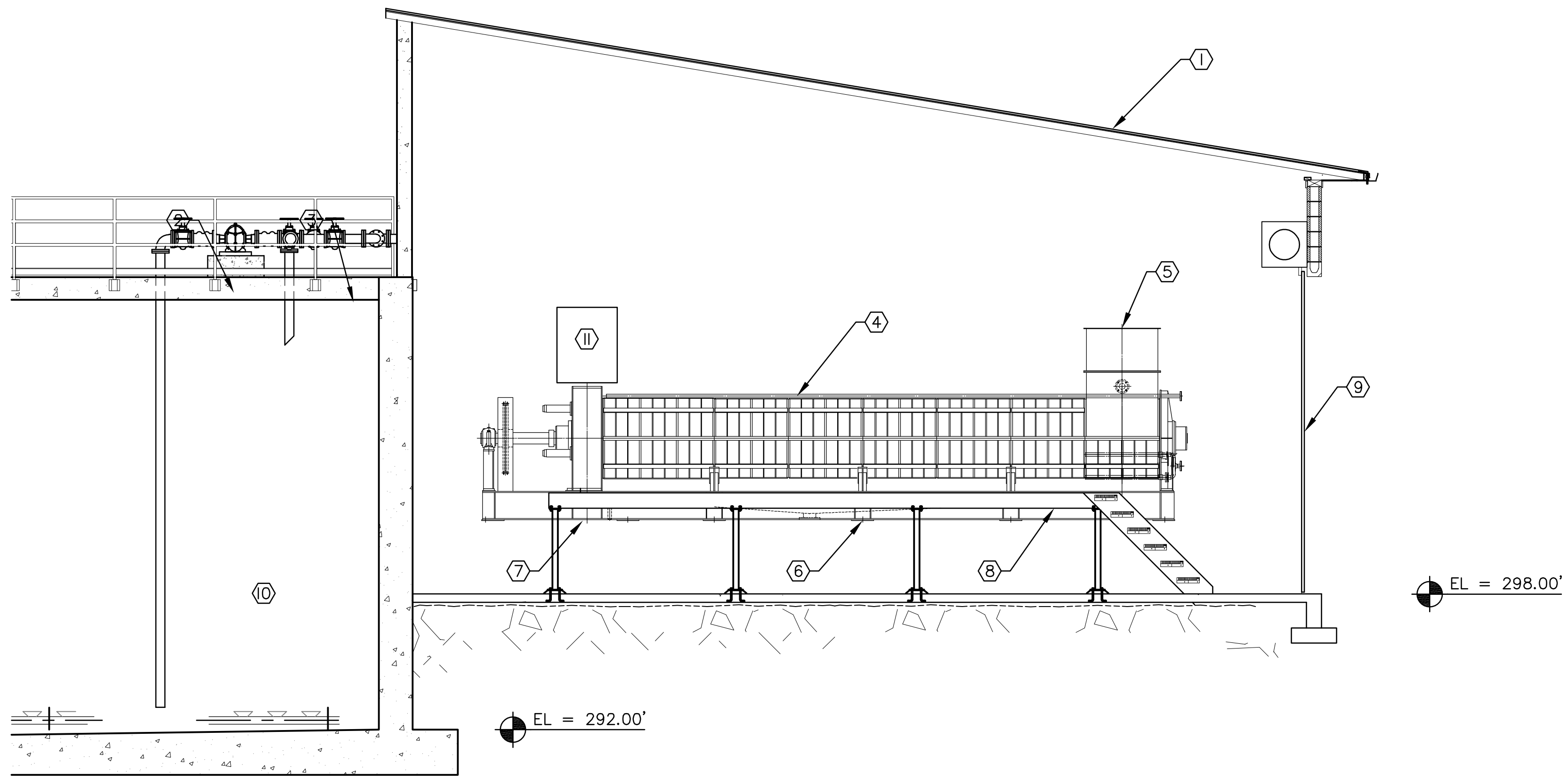
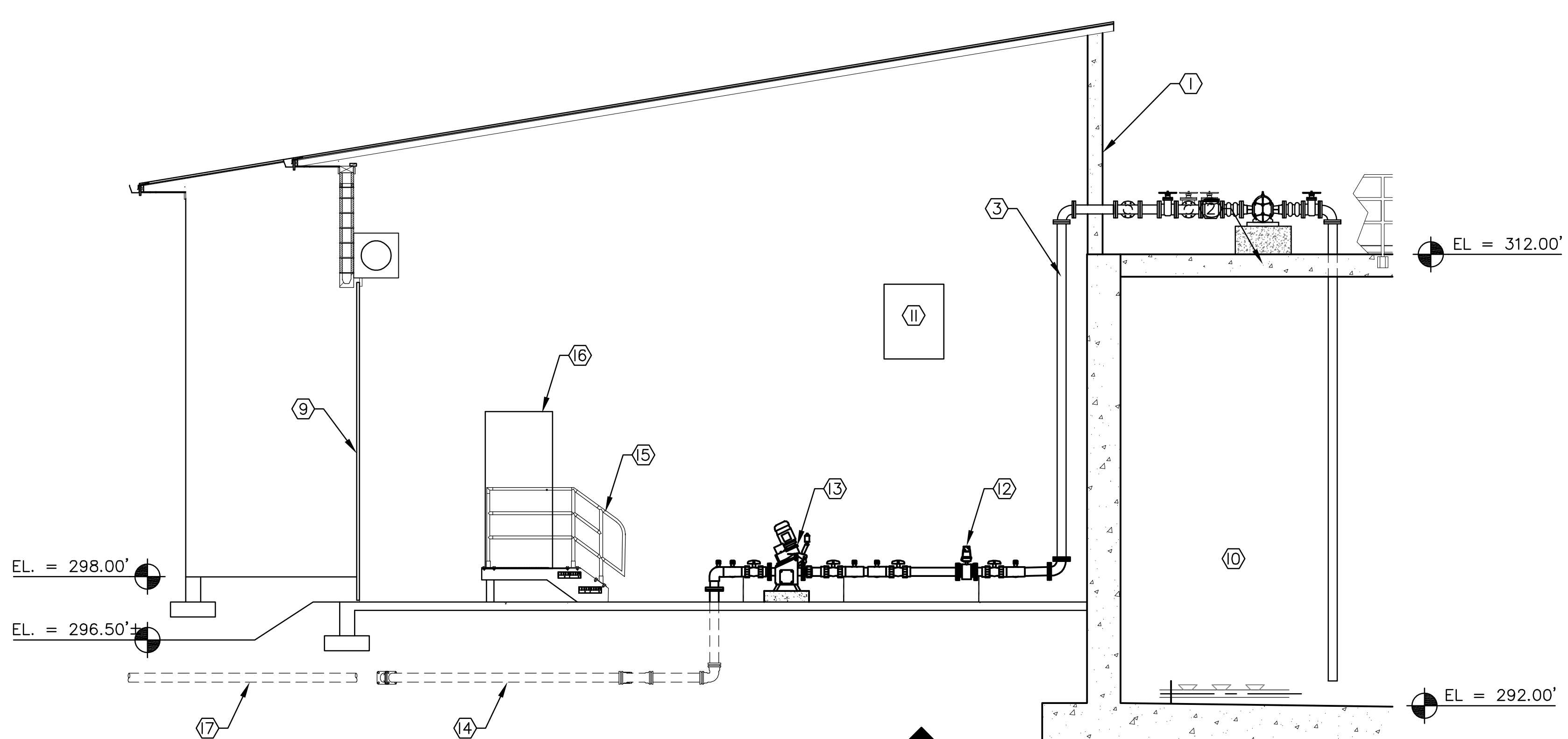


SECTION A
SCALE: 1" - 4'-0"
920-M-1



SECTION B
SCALE: 1" - 4'-0"
920-M-1

KEY NOTES

1. NEW BIOSOLIDS DEWATERING BUILDING, SEE DRAWING 920-A-1
2. NEW BIOSOLIDS TRANSFER PUMPS AND PIPING HEADER SEE DRAWING 900-M-1.
3. NEW 4"ø SLUDGE TRANSFER PIPING
4. NEW SCREWPRESS PUMP SKID
5. NEW SCREWPRESS FLOCCULATION TANK
6. FILTRATE DISCHARGE
7. CAKE DISHCHARGE
8. NEW ELEVATED WALKWAYS AND STAIRS, HANDRAILS NOT SHOWN FOR CLARITY
9. NEW 14' TALL OVERHEAD DOOR
10. AEROBIC DIGESTER, SEE DRAWING 900-M-1
11. INCLINE SCREW CONVEYOR OPENING
12. NEW 4"ø FLOW METER.
13. NEW MACERATOR
14. NEW 4" TRANSFER SLUDGE FEED LINE TO FLOCCULATION TANK
15. NEW STAIRS AND LANDING
16. NEW MAN DOOR
17. NEW 4" SLUDGE TRANSFER LINE TO FUTURE CLASS "A" EQUIPMENT LOCATION

MOLALLA OREGON

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WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

BIOSOLIDS DEWATERING
SECTION VIEWS

DESIGNED: CGP
DRAWN: CGP
APPROVED BY: DATE:

REVISIONS

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PROJECT NO.	DRAWING NO.
198.28	920-M-2
DATE	SHEET NO.
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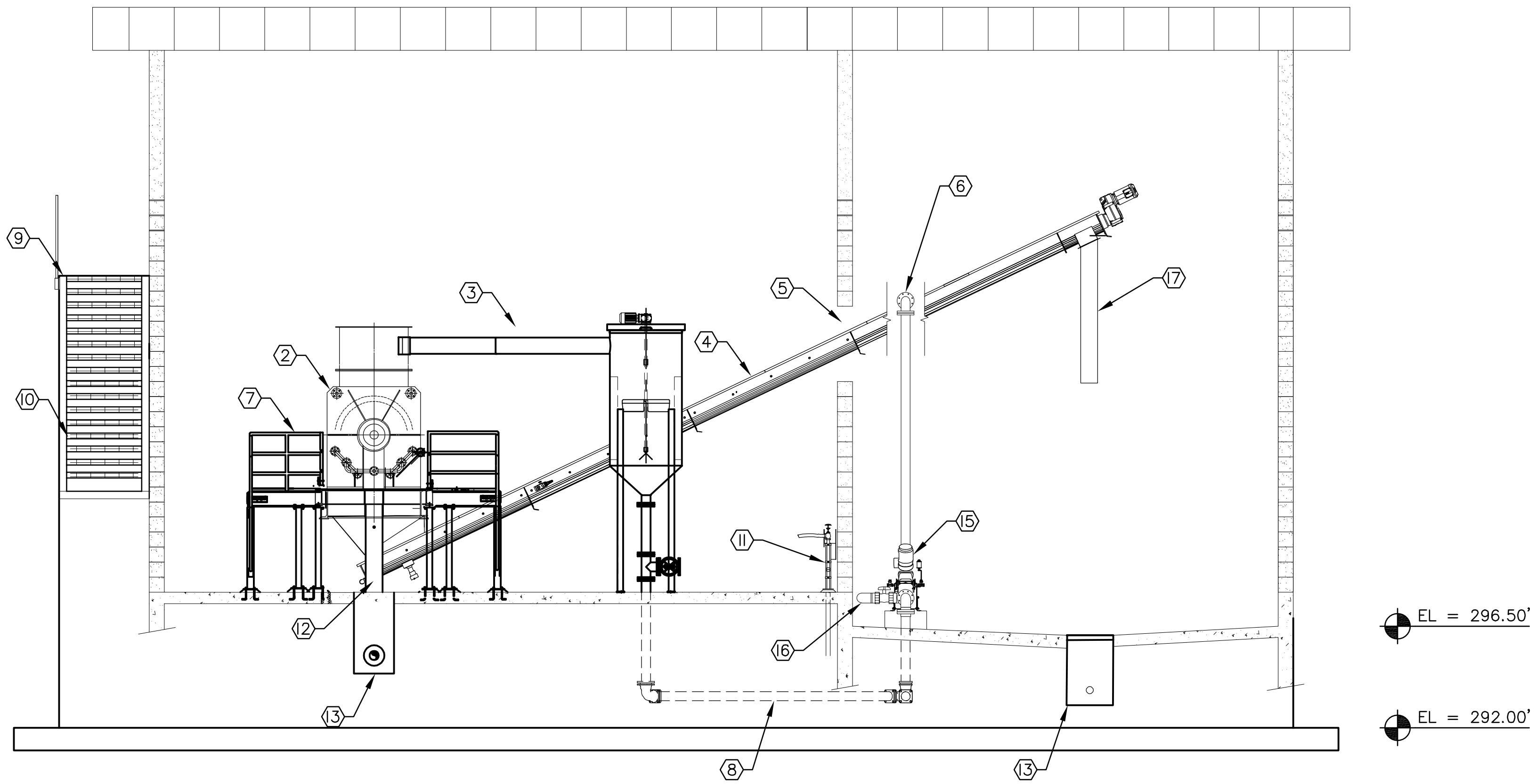

SECTION C
SCALE: 1" - 4'-0"
920-M-1

KEY NOTES

1. NEW BIOSOLIDS DEWATERING BUILDING, SEE DRAWING 920-A-1
2. NEW SCREWPRESS ELEVATED WALKWAYS
3. NEW SCREWPRESS FLOCCULATION TANK
4. NEW INCLINE SCREW CONVEYOR
5. INCLINE SCREW CONVEYOR OPENING
6. NEW 4"ø SLUDGE TRANSFER PIPING
7. NEW ELEVATED WALKWAYS
8. NEW 4" TRANSFER SLUDGE FEED LINE TO FLOCCULATION TANK
9. AEROBIC DIGESTER, SEE DRAWING 900-M-1
10. NEW STAIRS
11. NEW UTILITY STATION, SEE DETAIL
12. FILTRATE DISCHARGE
13. NEW CATCH BASIN
14. NEW 14' TALL OVERHEAD DOOR
15. NEW MACERATOR
16. NEW 4" MACERATOR BYPASS PIPING
17. CONVEYOR DROP CHUTE

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PRELIMINARY NOT FOR CONSTRUCTION

WASTEWATER TREATMENT PLANT UPGRADES
CITY OF MOLALLA

BIOSOLIDS DEWATERING
SECTION & ELEVATION VIEWS

DESIGNED: CGP
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