



**ENGINEERING REPORT**  
**for**  
**FINE BUBBLE DIFFUSER AERATION SYSTEM UPGRADE**

**NPDES PERMIT WA-0000825 ITEM S4**

**DECEMBER 2024**



*Water, Industrial and Domestic Wastewater, Reclaimed Water, Biosolids, Odors and Air Emissions:  
Treatment - Design, Planning, Funding, Studies, Modeling, Operation, Permitting, Management*

**ESVELT ENVIRONMENTAL ENGINEERING LLC**

*Spokane, WA Phone: (509) 926-3049*

THIS PAGE INTENTIONALLY LEFT BLANK

## CERTIFICATE OF ENGINEER

The technical material and data contained in this report were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.



12-26-2024

---

Allison Esvelt, MSCE, PE, BCEE, Principal  
Esvelt Environmental Engineering, LLC

THIS PAGE INTENTIONALLY LEFT BLANK

## TABLE OF CONTENTS

TABLE OF CONTENTS.....	V
LIST OF FIGURES.....	VI
LIST OF TABLES.....	VI
1.0 TYPE OF INDUSTRY AND BACKGROUND (WAC 173-240-130(2)(A)) .....	1
2.0 KIND AND QUANTITY OF FINISHED PRODUCT (WAC 173-240-130(2)(B)) .....	1
3.0 WATER USED AND WASTEWATER SOURCES (WAC 173-240-130(2)(C)) .....	1
3.1 Domestic and Non-Contact Cooling Water .....	1
3.2 Process Wastewater .....	2
3.3 Stormwater.....	2
4.0 CHEMICALS USED IN THE TREATMENT PROCESS (WAC 173-240-130(2)(D)) .....	4
5.0 TREATMENT PROCESSES AND DESIGN CRITERIA (WAC 173-240-130(2)(E, F, G, H)).....	4
5.1 Influent Screen and Pumping .....	4
5.2 Speece Cone Oxygenation.....	4
5.3 Primary Clarifier.....	5
5.4 Conustrenner.....	5
5.5 Equalization Tanks .....	5
5.6 Moving Bed Biofilm Reactors (MBBRs).....	6
5.7 Aeration Basin (Orbal) .....	7
5.8 Secondary Clarifier .....	8
5.9 Sludge Pumping .....	9
5.10 Sludge Processing .....	9
5.11 Tertiary Ultrafiltration (UF) Membranes.....	10
5.12 Implementation of Best Management Practices and Delta Elimination Tools .....	12
6.0 TREATMENT SYSTEM BYPASS (WAC 173-240-130(2)(I)).....	13
7.0 OIL AND HAZARDOUS MATERIAL SPILL CONTAINMENT (WAC 173-240-130(2)(J)).....	14
8.0 TREATMENT SYSTEM EFFLUENT QUALITY (WAC 173-240-130(2)(K)) .....	14
9.0 RECEIVING WATER [WAC 173-240-130(2)(L)].....	16
10.0 OUTFALL [WAC 173-240-130(2)(M)].....	16
11.0 POTW WASTEWATER FACILITIES (WAC 173-240-130(2)(N)(O)) .....	17
12.0 LAND APPLICATION AND LEACHATE SYSTEM DISPOSAL [WAC 173-240-130(2)(P)(Y)] .....	17
13.0 ENGINEERING JUSTIFICATION OF COMPLIANCE (WAC 173-240-130(2)(Q)) .....	17
14.0 METHOD OF FINAL SLUDGE DISPOSAL (WAC 173-240-130(2)(R)) .....	17
15.0 SYSTEM OWNERSHIP, OPERATION, MAINTENANCE (WAC 173-240-130(2)(S)) .....	17
16.0 REGULATORY COMPLIANCE STATEMENTS [WAC 173-240-130(2)(T,X)].....	17
17.0 FUTURE PLANS AND ALTERNATIVES (WAC 173-240-130(2)(U)(V)) .....	18
18.0 SCHEDULE FOR COMPLIANCE (WAC 173-240-130(2)(W)).....	19
19.0 REFERENCES.....	20

APPENDIX A: SITE PLAN AND PROCESS FLOW DIAGRAM

APPENDIX B: AERATION SYSTEM SPECIFICATIONS AND DRAWINGS

## LIST OF FIGURES

Figure 3.1 Flow to Outfall.....	3
Figure 3.2 BOD5 Loading and Temperature to WWTS .....	3

## LIST OF TABLES

Table 4.1: Chemicals Used for Wastewater Treatment.....	4
Table 5.1: Design Criteria and Operation of Primary Clarifier .....	5
Table 5.2: Design Criteria and Operation of MBBRs .....	6
Table 5.3: Design Criteria and Operation of MBBR Clarifier .....	7
Table 5.4: Design Criteria and Operation of Orbal Aeration Basin .....	8
Table 5.5: Design Criteria and Operation of Secondary Clarifier .....	9
Table 5.6: Design Criteria for UF Membrane Filtration System .....	11
Table 5.7: Summary of Tasks Implemented to Improve WWTS Effluent Water Quality .....	12
Table 8.1: NPDES Permit Interim and Final Effluent Limits .....	14
Table 8.2: Effluent Water Quality for Year 2023 Compared to Permit Limits .....	15
Table 17.1: Design Criteria for Proposed Fine Bubble Diffuser Aeration System .....	19
Table 18.1: Schedule for Compliance .....	19

## **1.0 TYPE OF INDUSTRY AND BACKGROUND (WAC 173-240-130(2)(a))**

Inland Empire Paper Company (IEP) produces newsprint and specialty paper products at its Millwood, Washington, pulp and paper mill. The North American Industry Classification System (NAICS) for IEP is 322122.

IEP is authorized to discharge treated process wastewater to the Spokane River under the National Pollutant Discharge and Elimination System (NPDES) Permit WA-0000825 (Ecology, 2022). The NPDES permit includes effluent limitations based on waste load allocations for nutrients required by the *Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load Water Quality Improvement Report* (DO TMDL Report) (Ecology, 2010). IEP is obligated per the terms of its NPDES permit to follow a compliance schedule and complete tasks that will result in IEP's wastewater treatment system (WWTS) meeting the final effluent limits in its permit. The previous version of this report was submitted to Ecology in October 2016 as one of the required tasks per the compliance schedule in IEP's previous NPDES permit, and then updated in January 2019 to include the final tertiary treatment technology selected for implementation.

Due to recent changes in feedstock outside of IEP's control, the mill has undertaken process changes that have resulted in increased pollutant loading and temperature to its WWTS. As a result, IEP is intending to upgrade the aeration system in its secondary biological treatment system. The purpose of this Engineering Report is to include the proposed aeration system upgrade for Ecology approval as required under Section S4 of IEP's current NPDES permit by December 31, 2024. This report is also intended to comply with Chapter 173-240 WAC Submission of Plans and Reports for Construction of Wastewater Facilities.

## **2.0 KIND AND QUANTITY OF FINISHED PRODUCT (WAC 173-240-130(2)(b))**

The pulp mill can produce up to 775 dry tons of pulp per day from its Thermo-Mechanical Pulping (TMP) systems and 260 dry tons of recycled deinked pulp per day from recycled old newsprint (ONP), magazines, sorted office paper (SOP) and Old Corrugated Cardboard (OCC). IEP installed a new state-of-the-art paper machine in 2001. The paper machine has a maximum capacity of 675 dry tons per day, producing newsprint and many other specialty paper products. Monthly average production in the years 2022 and 2023 ranged from 330 to 510 dry tons per day of finished product, of which 10 to 20% was from recycled pulp and 80 to 90% was from TMP.

## **3.0 WATER USED AND WASTEWATER SOURCES (WAC 173-240-130(2)(c))**

### **3.1 Domestic and Non-Contact Cooling Water**

Domestic water is sourced from the City of Millwood potable water system and domestic wastewater is discharged to the City's sewer collection system for eventual treatment at the Spokane County Regional Water Reclamation Facility (SCRWRF). The entire water flow for mill production and non-contact cooling water (NCCW) is withdrawn from a groundwater well at the mill site. An average of 5.0 to 7.5 million gallons per day (MGD) of water is withdrawn from this well. Non-contact cooling water (NCCW) does not undergo treatment in the WWTS and is routed to the launder ring of the secondary clarifier before being discharged through the outfall to the Spokane River. An average of 2.5 to 4.5 MGD of non-contact cooling water is utilized by the mill for equipment cooling.

### 3.2 Process Wastewater

Wastewater from the pulp mill and paper machine is treated by the mill's WWTS then combined with the NCCW and discharged through the outfall to the Spokane River. IEP has implemented numerous water conservation and recycling projects over the past twenty (20) years, resulting in average process wastewater flows of approximately 2.5 to 3.0 MGD.

Sources of the wastewater include the pulping processes and paper machine. Pulp mill wastewater includes filtrate from the stock thickeners, wash water from chip drainers, screening wash water, cleaner water, and pump and agitator seal water. The paper machine wastewater includes cleaning and screening rejects, shower water from the paper machine and press, pump and agitator seal water, and excess white water.

The collection system conveys mill wastewater to the pump station. The pump house (with the associated screens) is considered, for practical purposes, to be the beginning of the wastewater treatment process. The primary elements of the WWTS include the influent screen and pumping, speece cone, primary clarifier, equalization basins, moving bed biofilm reactors (MBBRs), MBBR clarifier, Orbal aeration basin, secondary clarifier, dewatering equipment, and ultrafiltration (UF) membrane system. Other elements within the mill prior to the influent pump house include the pulping processes, the deink plant, dissolved air floatation (DAF) system, the paper machine, heat exchangers, and internally recycled primary clarifier effluent. The process flow diagram and water balance for the entire mill is shown in Appendix A.

Flow data from the WWTS and NCCW to the outfall for years 2022 and 2023 is presented in Figure 3.1. Extensive efforts towards water conservation have resulted in the median WWTS effluent flow (~2.7 MGD) being consistently lower than the design flow of the secondary and tertiary treatment systems (4.0 MGD). The median non-contact cooling water flow (3.2 MGD) is slightly higher than the secondary effluent and comprises a significant fraction of the total flow to the outfall reported to Ecology.

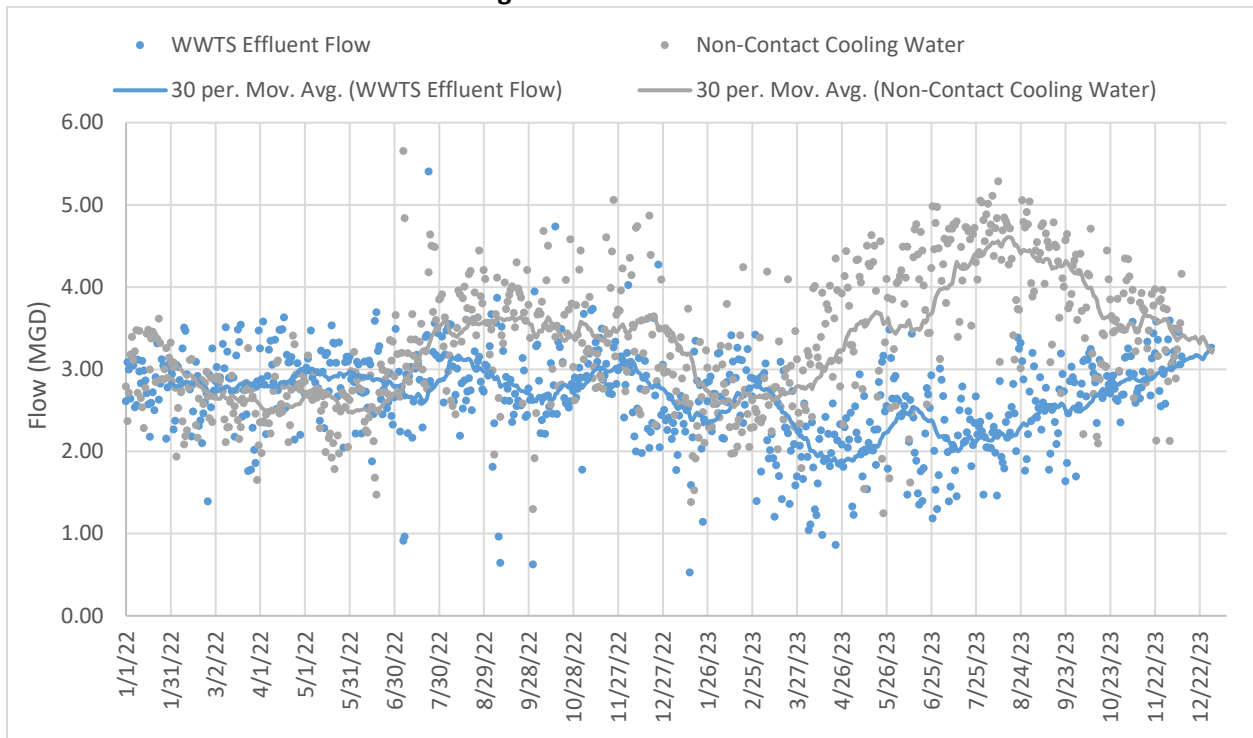
The flows and loading to the WWTS are proportional to the production rate and relative contribution of each pulping method. Since 2019, deink pulp production has been reduced by up to 75%. IEP has shifted away from recycled deinked pulp due to the reduction in the quality of recycled paper suitable for production and the potential of trace toxic compounds such as polychlorinated biphenyls (PCBs) in the ink of the recycled paper. In addition, due to reduced availability, IEP has reluctantly been forced away from white wood residuals (grand fir and hemlock) and spruce, pine, and fir residuals (primarily lodgepole pine with some subalpine fir) towards more use of red fir residuals and ponderosa pine residuals. The combination of these changes in feedstock has increased the bleaching required for production and increased organic loadings and wastewater temperatures to the WWTS, resulting in the need to improve aeration in the downstream biological treatment system. The influent temperature and 5-day biochemical oxygen demand (BOD) loading data to the WWTS is presented in Figure 3.2. The data shows a correlation between increasing temperature and BOD loading to the primary clarifier.

### 3.3 Stormwater

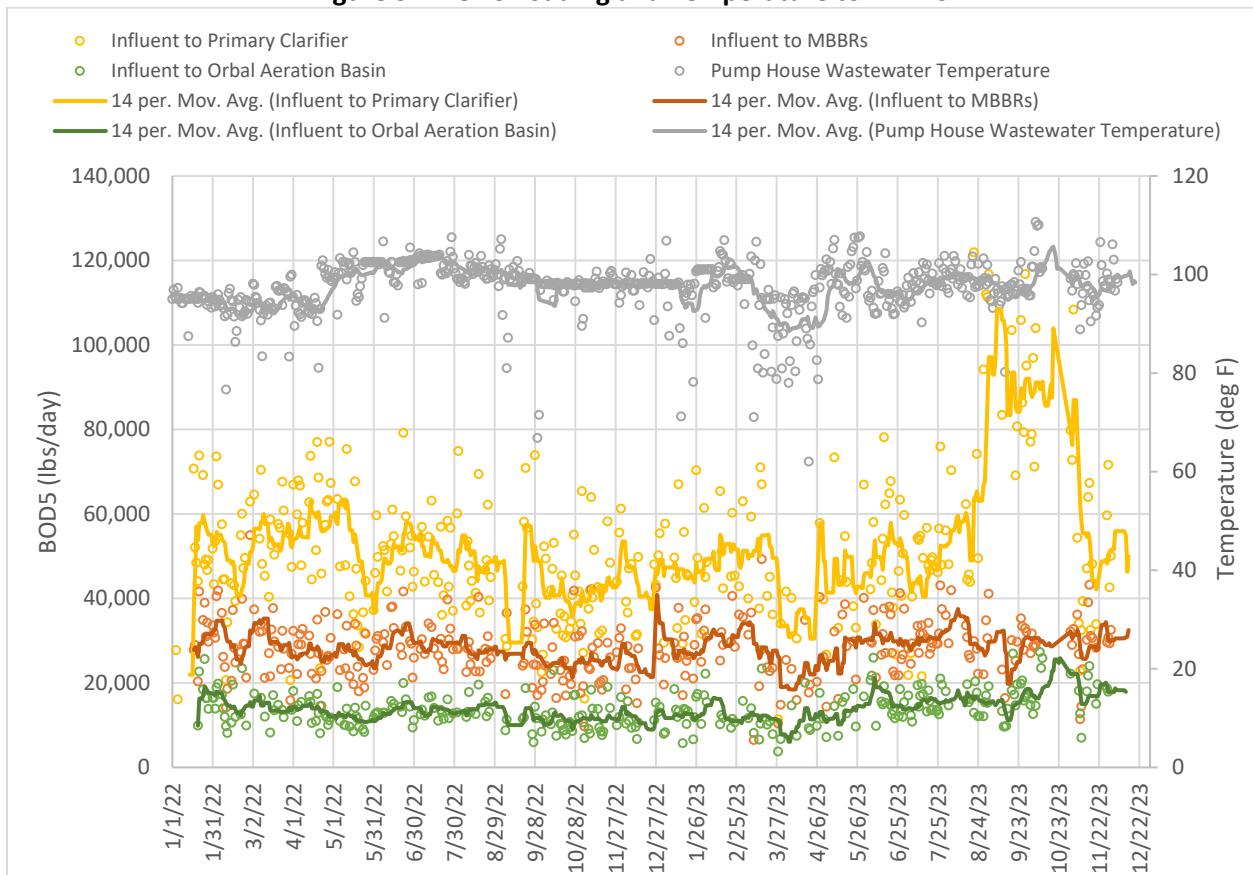
Stormwater and runoff from the property, primarily from paved areas, is conveyed via a series of trenches to the pump house within the mill. Stormwater is combined and treated with the other process streams before being discharged through the outfall to the Spokane River.



**Figure 3.1 Flow to Outfall**



**Figure 3.2 BOD5 Loading and Temperature to WWTS**



#### 4.0 CHEMICALS USED IN THE TREATMENT PROCESS (WAC 173-240-130(2)(d))

Table 4.1 lists the chemicals used and purpose for wastewater treatment. Pulp mill and deink plant wastewater routed to the DAF unit is conditioned with a coagulant and an anionic polymer to improve DAF performance. Sludge recovered from the DAF and wasted from the treatment system is also injected with polymer prior to the screw presses to aid in dewatering. A flocculant is added to the primary clarifier influent wastewater to improve sedimentation. The process wastewater is deficient in nitrogen and phosphorus to support biological treatment, so aqua ammonia and urea (nitrogen sources) and phosphoric acid (phosphorus source) are added ahead of the biological treatment processes to promote the growth of microorganisms. The nutrients are added at the minimum quantities needed for biological treatment and limited to comply with effluent limits. Defoamer is applied at the discharge from the Orbal to the secondary clarifier and recirculated with the RAS to reduce foaming in the Orbal. Chemicals are also used for cleaning the tertiary filtration membranes.

**Table 4.1: Chemicals Used for Wastewater Treatment**

Chemical Name	Form	Specific Gravity	Concentration by Weight	Purpose
Aqua Ammonia (Ammonium Hydroxide)	Liquid	0.91	20%	Nitrogen source for Orbal activated sludge
Citric Acid	Liquid	1.24	50%	Membrane cleaning
Percol 3320	Polymer - Dry	N/A	100%	Sludge press flocculation
Perform PK2320	Liquid	1.1	Trade secret	Secondary biosolids coagulation
Perform 8181	Liquid	1.2	Trade secret	Primary clarifier sedimentation
Phosphoric Acid	Liquid	1.58	75%	Phosphorus source for MBBRs and Orbal
Polyaluminum Chloride (PAX-18)	Liquid	1.36	30-40%	DAF coagulation
Zetag 4145	Polymer – Dry	N/A	100%	DAF flocculation
Sodium Hypochlorite	Liquid	1.20	10-16%	Membrane cleaning
Urea	Liquid	1.1	32% as N	Nitrogen source for MBBRs

#### 5.0 TREATMENT PROCESSES AND DESIGN CRITERIA (WAC 173-240-130(2)(e, f, g, h))

The individual unit processes and applicable design criteria for the WWTS are described in this section. The process flow diagram for the WWTS and site plan showing the locations of the unit processes are provided in Appendix A.

##### 5.1 Influent Screen and Pumping

Before entering the influent wastewater pumping station, large chips and debris in the wastewater are removed with a mechanically cleaned bar rack which serves as a coarse screen. The wastewater pump station includes three (3) pumps, each capable of providing a flow capacity of up to 4,500 gallons per minute (GPM). One pump is powered by the mill's 63-kV power supply; another by the mill's 110-kV power supply; and the third is diesel-powered for standby in the event of a total electrical power failure. The pumping system is operated so that one pump is the lead pump and the other two are standby backups.

##### 5.2 Speece Cone Oxygenation

A speece cone in-line super-oxygenation system is installed prior to the primary clarifier. Wastewater passes through the cone and is mixed with high-purity oxygen, resulting in very high oxygen saturation

levels due to the high pressure. The purpose of this unit is to increase dissolved oxygen in the water and offset septic conditions that may develop due to extended retention times in the primary clarifier.

### 5.3 Primary Clarifier

The 100-foot diameter primary clarifier has historically operated in many modes, including as a secondary clarifier in 1989 before being reconverted back to primary clarification in 2000. The tank has a 24-inch inlet pipe and two 8-inch diameter sludge withdrawal pipes. The clarifier mechanism rakes sludge to a center draw-off. The mechanical rake arms include a surface skimmer to remove floatable materials for return to the bar racks at the pumping station. Table 5.1 lists the design criteria for the primary clarifier. This clarifier operates at a typical hydraulic retention time of about 3 hours. This retention time is long enough to achieve acceptable suspended solids removal, but short enough to minimize the potential for odors.

**Table 5.1: Design Criteria and Operation of Primary Clarifier**

Parameter	Units	Value	
Diameter	ft	100	
Surface water depth	ft	12	
Planar surface area	ft <sup>2</sup>	7,854	
Volume	gal	705,000	
Parameter	Units	Average	Maximum Day
Overflow rate per design	gpd/sqft	700	800
Overflow rate actual operation <sup>1</sup>	gpd/sqft	610	840
Hydraulic retention time per design	hr	3.1	2.7
Hydraulic retention time actual operation <sup>1</sup>	hr	3.5	2.6
Influent flow per design <sup>2</sup>	MGD	5.5	6.3
Influent flow actual operation <sup>1</sup>	MGD	4.8	6.6

Notes: Units: ft = feet, gal = gallon, gpd = gallons per day, sqft = square foot, hr = hour, MGD = million gallons per day

1 Based on 2022 to 2023 operating data.

2 Flow rate design criteria calculated from overflow rate.

### 5.4 Conustrenner

The Conustrenner is a mechanical screen solids separation device used to reclaim primary clarifier effluent for recycling in the pulp mill. Up to 1.5 MGD of effluent from the primary clarifier may be diverted to the Conustrenner. The Conustrenner produces approximately 35% clean filtrate. This practice reduces water use by taking advantage of an available water stream with satisfactory quality for some uses within the plant. The average flow to the primary clarifier is approximately 5.0 to 5.5 MGD. After diverting the maximum flow of 1.5 MGD to the Conustrenner, the flow that is diverted to the secondary system is approximately 4.0 MGD.

### 5.5 Equalization Tanks

From the primary clarifier, wastewater flow can be pumped to the equalization tanks during high flow or high-BOD strength conditions with the balance of wastewater pumped to the secondary process. The purpose of the tanks is to equalize the mill's wastewater flow and BOD loading to the WWTS and also to improve the treatment efficiency of downstream processes. Wastewater pumped to the equalization tanks is returned to the primary clarifier effluent pump clear well and then pumped to the MBBRs. The two (2) equalization tanks are 100-foot diameter, 20-feet deep, and contain roughly 1.2 million gallon (MG) each. The tanks each have three (3) 15-horsepower (HP) floating mixers and one (1) 50-HP floating aerator to keep the tank contents well-mixed and aerated.

## 5.6 Moving Bed Biofilm Reactors (MBBRs)

Pilot testing of a MBBR system to reduce 5-day BOD concentrations began in 2006, followed by a larger demonstration-scale unit in a converted stock storage chest (116,000 gallons) in 2007. The 2007 MBBR system was designed to handle a maximum day flow of 2.0 MGD. Following relatively good success with the larger demonstration-scale system, two additional MBBRs, each at 250,000 gallons were installed and put into operation in 2009. The 2.0 MGD pilot was renamed to MBBR #1, and the two new units were named MBBRs #2 and #3. Nutrients (nitrogen and phosphorus) are added upstream of the MBBRs to promote healthy growth of the microorganisms – excess nutrients leaving the MBBRs are carried over for utilization in the Orbal aeration basin. The design criteria for the full-scale MBBR system were developed from manufacturer proposals and the *Engineering Report for Mill Modernization Wastewater Plans* (Esvelt Environmental Engineering, 2008) and are summarized in Table 5.2. Based on periodic grab samples collected on the discharge of the MBBRs during the years 2022 and 2023, the 50th percentile removal efficiency of 5-day BOD loading through the MBBRs is ~50 percent, which is close to the design removal efficiency.

**Table 5.2: Design Criteria and Operation of MBBRs**

Parameter	Units	Value	
		MBBR#1	MBBR#2/#3
System type	-	Hydroxyl	Siemens Agar®
Media type	-	AC 450	ABC5
Media effective surface area	m <sup>2</sup> /m <sup>3</sup>	402	660
Media fill amount	m <sup>3</sup>	330	429 (each)
Tank media fill fraction	%	75%	44%
Tank number	-	1	2
Tank liquid volume	gal	116,000	263,000 (each)
Tank diameter	feet	25	40
Tank height	feet	38.5	32
Air flow	scfm	2,000	10,700
Diffuser type	-	Coarse bubble	Coarse bubble
DO concentration	mg/L	2.5 – 5.0	2.5 – 5.0
5-Day BOD removal per design <sup>1,2</sup>	%	45%	55%
5-Day BOD removal median actual operating <sup>3</sup>	%	48%	50%
5-Day BOD removal range actual operating range <sup>3</sup>	%	6 – 74%	20 – 76%
5-Day BOD influent loading, maximum <sup>1,2</sup>	lbs/day	11,500	39,700 (both)
5-Day BOD removal, maximum <sup>1,2</sup>	kg BOD/m <sup>3</sup>	7.15	11.45
5-Day BOD removal, maximum <sup>1,2</sup>	lb BOD/m <sup>3</sup>	15.8	25.2
5-Day BOD removal, maximum <sup>1,2</sup>	lbs/day	5,210	21,655
5-Day BOD effluent loading, maximum <sup>1,2</sup>	lbs/day	6,290	18,040 (both)
5-Day BOD influent loading, maximum all	lbs/day	51,200	
5-Day BOD influent loading actual operating range <sup>3</sup>	lbs/day	6,490 – 54,940	
Flow, maximum all MBBRs per design	MGD	3.0 to 4.0	
Flow, all MBBRs actual operating range <sup>3</sup>	MGD	0.1 to 4.7	
5-Day BOD influent conc., maximum all MBBRs per design	mg/L	1,540 – 2,050	
5-Day BOD influent conc. all MBBRs actual operating range <sup>3</sup>	mg/L	270 – 1,760	
Influent temperature per design	deg C/ deg F	15 – 35 / 59 - 95	
Influent pump house temperature actual operating range <sup>3</sup>	deg C/ deg F	17 – 44 / 62 - 111	

Notes: Units: m = meter, lb = pound, mg = milligram, kg = kilogram, L = liter, MGD = million gallons per day, scfm = standard cubic feet per minute

1 Hydroxyl MBBR design parameters are from Hydroxyl Systems Inc. Proposal dated October 17, 2008 which derived design parameters from MBBR #1 pilot and initial full-scale MBBR#1 operating data.

2 Siemens Agar® MBBR design parameters from Siemens Agar® Proposal dated January 23, 2009.

3 Based on 2022 to 2023 operating data.

A 75-foot diameter clarifier, previously used for internal recycle within the mill, has been placed into service downstream of the MBBRs to remove some of the biological solids upstream of the aeration basin. The design criteria for the MBBR clarifier are listed in Table 5.3.

**Table 5.3: Design Criteria and Operation of MBBR Clarifier**

Parameter	Units	Value	
Diameter	ft	75	
Surface water depth	ft	14	
Planar surface area	ft <sup>2</sup>	4,418	
Volume	gal	462,670	
Parameter	Units	Average	Maximum Day
Overflow rate per design	gpd/sqft	700	900
Overflow rate actual operation <sup>1</sup>	gpd/sqft	610	1,060
Hydraulic retention time per design	hr	5.6	2.8
Hydraulic retention time actual operation <sup>1</sup>	hr	6.3	3.6
Influent flow per design	MGD	3.0	4.0
Influent flow actual operation <sup>1</sup>	MGD	2.7	4.7

Notes: Units: ft = feet, gal = gallon, gpd = gallons per day, sqft = square foot, hr = hour, MGD = million gallons per day

<sup>1</sup> Based on 2022 to 2023 operating data.

## 5.7 Aeration Basin (Orbal)

The aeration basin system consists of a 2.16 MG tank, divided into three concentric oxidation ditch channels ("Orbal" configuration). Each oxidation ditch channel is 20-feet wide with a 14-foot normal water depth. The volume of the outside, middle, and inside channels are 0.98 MG, 0.72 MG, and 0.46 MG, respectively. Aeration of the tank sections is by disk aerators manufactured by Envirex Corporation (now owned by Evoqua Water Technologies). The discs aerate the tank and provide mixing by rotating on horizontal shafts. The outer two (2) Orbal channels have six (6) shafts and the inner Orbal channel has four (4) shafts. The shafts are driven by two (2) 60-HP, four (4) 50-HP motors and four (4) 30-HP motors. There are a total of 564 aeration disks installed on the aeration shafts in the Orbal channels. The drive system has been optimized to turn the rotors at a speed that imparts the maximum amount of aeration possible for this type of aerator according to manufacturer recommendations.

Under normal operations, the return activated sludge (RAS) and the MBBR effluent are fed into the outer channel. The MBBR effluent may also be fed into the middle channel, but this is not the current method of operation. From the outer channel, mixed liquor flow progresses through ports successively into the middle and inner channels. The inner channel discharges over a manually adjustable overflow weir to the secondary clarifier.

The aeration basin is operated with an average low dissolved oxygen (DO) concentration in the outer channel of about 0.5 mg/L. The middle channel is operated at an average DO of 2.0 mg/L, and the inner channel is operated at an average DO of 2.0 to 3.0 mg/L. Improvements to the aeration basin in the past have included increasing the aeration capacity by adding aeration disks and increasing aerator shaft rotational speed up to the maximum speed that can be handled by the drive motors. Originally, the outer channel was designed to operate in anoxic or semi-anoxic conditions with zero DO. The additional aerators in the outer channel improve BOD removal. The modifications have effectively maximized the amount of aeration possible for the existing aeration system.

Table 5.4 provides the existing design criteria and operating ranges for the Orbal aeration basin. The target effluent 5-day carbonaceous biochemical oxygen demand (CBOD) is based on the expected treatment needed to meet the permitted effluent limit (refer to Section 8.0). The maximum amount of BOD that can currently be removed in the aeration basin is limited by the capacity of the aerators.

**Table 5.4: Design Criteria and Operation of Orbal Aeration Basin**

Parameter	Units	Value
Mixed Liquor Suspended Solids (MLSS) concentration, max. <sup>1</sup>	mg/L	5,500
MLSS concentration actual operating range <sup>2</sup>	mg/L	1,800 – 8,600
Solids retention time (SRT), aerobic	day	5 – 8
SRT aerobic median actual operating <sup>2</sup>	day	7.5
Effluent 5-day CBOD seasonal limit	lbs/day	123.2
Effluent 5-day CBOD seasonal median actual operating <sup>2</sup>	lbs/day	338
Volume of basin	gal	2,160,000
DO concentration	mg/L	0.5 (outer ring) – 3.0 (inner ring)
Ratio of MLVSS to MLSS <sup>2</sup>	lb/lb	0.88
Food/Microorganism Ratio, CBOD5/MLVSS	lb/lb/day	0.1 – 0.3
Aeration system capacity at 20 deg C	lbs/day	16,200
5-Day BOD removal rate at 20 deg C <sup>3</sup>	lbs/day	12,500
5-Day BOD influent loading actual operating range <sup>2</sup>	lbs/day	3,700 – 27,300
Influent Flow	MGD	3.0 – 4.0
Influent Flow actual operating range <sup>2</sup>	MGD	0.5 – 5.4
RAS flow, % of flow to basin, operating range	%	75-125%
RAS flow median actual operating <sup>2</sup>	%	100%
RAS flow actual operating range <sup>2</sup>	MGD	0.9 - 5.0
Mixed liquor temperature	deg C/ deg F	15 – 35 / 59 - 95
Effluent temperature actual operating range <sup>2</sup>	deg C/ deg F	19 – 34 / 66 - 93

Notes: Units: lb = pound, gal = gallon, mg = milligram, L = liter, MGD = million gallons per day  
 1 The maximum recommended MLSS is 5,500 mg/L to optimize aeration and secondary clarification.  
 2 Based on 2022 to 2023 operating data.  
 3 Based on limitations of existing aerators at operating temperatures.

## 5.8 Secondary Clarifier

The aeration basin effluent is discharged to the secondary clarifier for removal of biological solids. The secondary clarifier was constructed in 2000, replacing the 100-foot diameter clarifier that had previously been used in the secondary process. The mixed liquor from the aeration basin enters the tank through the center, with clarified effluent overflowing the peripheral weir to the launder ring. The settled solids are removed with the rotating mechanisms, using hydraulic head differential to pull sludge through full-radius suction hoods rotating with the mechanisms around the floor of the tank. The launder ring is divided by walls into two sections. The largest section receives all the water over the secondary clarifier weir and acts as a feed tank for the UF membrane system. A much smaller section located at the head of the Parshall flume receives the UF membrane system permeate and combines it with NCCW flow.

The clarifier was designed with an increased vertical drop over the weir to elevate the dissolved oxygen concentration in the effluent prior to discharge. The effluent is measured with a Parshall flume as the water enters the effluent wet well. An automatic sampler collects composite samples from the effluent for permit compliance testing.

Table 5.5 lists the design criteria for the secondary clarifier. The limiting characteristic for most secondary clarifiers is the solids loading rate, defined as the mass of solids entering the clarifier per surface area per day. IEP has experienced difficulty in the past with sludge settleability. The clarifier effluent flow rate is the flow entering the clarifier minus the underflow (the RAS and WAS (Waste Activated Sludge)). Operationally, this is the same flow as the aeration basin influent.

**Table 5.5: Design Criteria and Operation of Secondary Clarifier**

Parameter	Units	Value	
Diameter	ft	120	
Side Water Depth	ft	16	
Planar surface area	ft <sup>2</sup>	11,300	
Parameter	Units	Average	Maximum Day
RAS actual operation <sup>2</sup>	mg/L	10,500	15,000
Overflow rate per design	gpd/sqft	400	600
Overflow rate actual operation <sup>2</sup>	gpd/sqft	240	420
Solids loading rate <sup>1</sup>	lb/(ft <sup>2</sup> -day)	24	44
Solids loading rate actual operation <sup>2</sup>	lb/(ft <sup>2</sup> -day)	22	44
Effluent flow <sup>3</sup>	MGD	3.0	5.4
Effluent flow actual operation <sup>2</sup>	MGD	2.7	5.4

Notes: Units: ft = feet, mg = milligram, L = liter, gpd = gallons per day, sqft = square foot, lb = pound, MGD = million gallons per day  
 1 Solids loading rates assume 100% RAS at the design effluent flow and maximum MLSS concentration.  
 2 Based on 2022 to 2023 operating data.  
 3 Clarifier effluent flow rate is the total flow into the clarifier minus the underflow (RAS + WAS).

## 5.9 Sludge Pumping

The sludge pumping system for the secondary treatment process consists of a RAS and WAS pump, with flow control valves on the pump discharge manifold to direct the desired amount of sludge to return to the aeration basin or be wasted. The flow control valves maintain flow set-points through feed-back control loops. The WAS is pumped to the sludge mixing tank where it combines with other sludge streams within the plant prior to solids thickening. Primary sludge collected from the primary clarifier is pumped to the sludge mixing tank utilizing two pumps, a primary and a standby. Sludge withdrawal is used to control the sludge blanket depth.

## 5.10 Sludge Processing

The combined effluent from the TMP and deinking processes are treated with dissolved air floatation (DAF) prior to a heat exchanger and the wastewater treatment plant pump house. The UF membrane system reject stream is also routed to the DAF system. Solids skimmed from the DAF are treated with a polymer and dewatered with an Andritz gravity table prior to being pumped to an Andritz screw press. The gravity table thickens the solids from approximately 2% to 3% to a solids content of 8% to 9%, and the Andritz screw press dewateres the solids to approximately 40% to 50% dry solids.

The solids collected in the sludge mix tank from the primary, MBBR, and secondary clarifiers are pumped to the Andritz gravity table or to the FKC rotary drum thickener and then to a screw press. The rotary drum thickener thickens the solids from approximately 3% to a solids content of 10 to 11%, and the screw press dewateres the solids to approximately 35% to 45% dry solids. The pressate is returned upstream of the DAF. The solids are then either stored in the sludge storage system or sent to the fluidized bed combustor (FBC).



### 5.11 Tertiary Ultrafiltration (UF) Membranes

IEP began investigating technologies capable of low-level phosphorus removal in 2004 upon issuance of the first draft DO TMDL Report. Very little data was available for tertiary treatment applications in the pulp and paper industry. As a result, IEP proactively pilot tested six (6) different tertiary filtration systems:

- Blue Water Technologies upflow sand filtration
- Parkson Corporations DynaSand® filtration
- US Filter Trident® multi-media filtration
- Zenon Environmental Inc. ZeeWeed® immersed membrane
- US Filter Trident® high solids multi-media filtration
- Kruger Inc. ACTIFLO® ballasted sand filtration

After the initial investigation, the Trident high solids (HS) pilot demonstrated the most reliable TP removal with minimal operational requirements. IEP purchased a 1.0 MGD unit in 2007 to begin optimization but quickly encountered solids overloading. The Trident HS system was then run in series with two other pilots, Cambridge Water Technology CoMag™ and Siemens Water Technology CONTRAFAST-E, to improve results. However, the treatment system still did not perform well and experienced several costly breakdowns. After eight years of failed optimization trials, the project was abandoned in 2015.

IEP partnered with Clearas Water Recovery Inc. (formerly AlgEvolve) in 2007 to investigate tertiary nutrient removal using algae in a photobioreactor (PBR). A demonstration-scale system was installed in 2012 after initial pilot success. The system was coupled with four different pilot membrane separation systems to separate the algae from the treated effluent:

- Ovivo/Microdyn-Nadir®/: submerged flat sheet
- Koch Puron®: submerged hollow fiber
- WesTech/Toray®: pressurized outside-in hollow fiber
- Membrane Specialists LLC: pressurized inside-out hollow fiber

The Koch Puron® submerged membrane system was chosen for full integration with the Clearas algae-based treatment system. Pilot testing also revealed that TSS from the secondary clarifier was building up in the algal solids, diluting its effectiveness. Therefore, the WesTech/Toray® pressurized membranes were retrofitted for direct pre-filtration prior to feeding the Clearas system. Initial results suggested that the pre-filtration was not only effective at removing the TSS, but was also capable of removing phosphorus and nitrogen with additional optimization. The series arrangement of WesTech/Toray pre-filtration followed by Clearas algal treatment and Koch post-filtration was selected for further demonstration-scale testing in 2016 with an emphasis on comparing the membrane-only treatment against the algae-membrane treatment train. The results from the 2016 pilot testing of the Clearas/Koch algae system and the WesTech/Toray® membrane-only system indicated that neither process train could fully meet all the final NPDES permit effluent limits without implementing some of the mitigation strategies outlined in IEP's Delta Elimination Plan or further tertiary treatment.

In 2017, IEP initiated the pilot testing of a new tertiary treatment system. A summary of the pilot testing and the associated results are in the pilot study report (Inland Empire Paper Company, 2017). The pilot system consisted of two (2) MBBR tanks in series, then an inductor tank, followed by the WesTech/Toray® membrane ultrafiltration system. The results of the pilot study predicted that the tertiary treatment process would comply with the final NPDES permit effluent limits.



In 2020, IEP commissioned the WesTech/Toray® membrane ultrafiltration system without the tertiary MBBRs and has since been optimizing the system. Currently, the secondary clarifier effluent is pumped by two (2) variable speed feed pumps to the UF process, controlled by the level in the secondary clarifier launder ring. The flow is routed through two (2) pre-filters before entering the four (4) membrane trains. Table 5.6. lists the design criteria for the system. The system is designed to filter the peak flow with one train out of service. Filtration through the membrane modules is a pressure-driven, outside-in flow with regular back washes and chemical cleaning to maintain membrane capacity. Permeate is directed to a holding tank that supplies the water for back washes with the overflow routed back to the secondary clarifier launder ring by two (2) return pumps.

In regular intervals, two back-wash supply pumps use permeate water in reverse flow through the membrane modules for cleaning with the assistance of air scour supplied by two blowers. More aggressive membrane cleaning is achieved by daily maintenance cleans utilizing sodium hypochlorite and monthly cleans-in-place (CIP) which can use either sodium hypochlorite to remove organic fouling or citric acid to remove inorganic scaling. Backwash and chemical clean reject water is routed to the DAF system for treatment.

**Table 5.6: Design Criteria for UF Membrane Filtration System**

Parameter	Units	Value	
Number of feed pumps	-	2	
Number of feed water screens	-	2	
Feed water screen opening size	µm	200	
Membrane model	--	Toray HFU-2020AN	
Membrane type	-	Hollow Fiber	
Membrane flow configuration	-	Pressurized, Outside-In	
Membrane material	--	PVDF	
Membrane nominal pore size	µm	0.01	
Maximum feed pressure	PSI	43.5	
Operating temperature range	deg C/deg F	1-40/34-104	
pH range during filtration	S.U.	1-10	
pH range during cleaning	S.U.	0-12	
Number of membrane module skids	#	4 total (3 required, 1 redundant)	
Installed modules	#	272 (68 per skid)	
Membrane surface area	ft <sup>2</sup>	158,100 (775 per module)	
Design system recovery	%	>91%	
Membrane cleaning chemicals	-	Sodium Hypochlorite, Citric Acid	
Parameter	Units	Average	Maximum Day
Design Flow with N+1 redundancy	MGD	3.5	4.0
Design Temperature	°C	30	10 (minimum)
Design Flux @ 10°C	gfd	25.9	29.7
Design Flux @ 20°C (1)	gfd	33.9	38.9
Feed Water TSS	mg/L	10	25
Feed Water Turbidity	NTU	15	30
Treated Water TSS	mg/L	<1	<1
Treated Water Turbidity	NTU	<0.1 @ 95% of time	0.3 NTU

Notes: Units: µm = micrometer, PSI = pound per square inch, S.U. = standard unit, MGD = million gallons per day, gfd = gallons per square foot per day, ft = feet, mg = milligram, L = liter, NTU = nephelometric turbidity unit

(1) Maximum design flux was not demonstrated by 2017 pilot test and is not recommended by this report. Design flux should be limited to 30 GFD or below at all operating conditions.

## 5.12 Implementation of Best Management Practices and Delta Elimination Tools

IEP has developed and implemented a Best Management Practices (BMP) Plan and Delta Elimination Tools in compliance with its previous NPDES permit and continues to identify operating practices and technologies to decrease the discharge of pollutants from its WWTS and ultimately achieve compliance with the final NPDES permit effluent limits. This process was initiated voluntarily by IEP in 2001 with the installation of a new, more efficient, higher capacity paper machine. Table 5.7 provides a list of the most significant improvements performed by IEP to date. A more detailed description of these improvements is included in the Schedule for Compliance and 2024 Annual Status Report (Inland Empire Paper Company, 2024) submitted per section S4 of IEP's NPDES permit.

**Table 5.7: Summary of Tasks Implemented to Improve WWTS Effluent Water Quality**

Name	Year	Description
Paper machine #5	2001	Installation of a modern state-of-the-art paper making machine. Utilizes heat recovery and water reuse to minimize waste.
Water conservation	2004 – present	Projects implemented to optimize water reuse and reduce flow to the WWTS, including isolation of deinking pump system and water control devices.
Conustrenner	2004	A compact fractionation filter capable of processing up to 1.5 MGD of primary effluent for reuse within the plant. Reduced overall water use.
Initial tertiary filtration pilot testing	2004 - 2007	Evaluated and pilot tested six (6) different tertiary filtration systems.
Pump seals	2005 – 2007	Flow limiting devices installed on numerous pumps to reduce freshwater consumption.
MBBR #1	2006	Initial pilot testing to enhance 5-day BOD and nutrient removal prior to the in-place aeration basin. Converted to full scale after successful testing.
Trident high solids (HS) pilot testing	2007- 2015	Pilot testing of Trident high-solids multi-media filtration.
MBBR #2 and #3	2009	Additional biological capacity added with additional MBBRs. In combination with the Orbal aeration basin, maximum secondary treatment has been achieved.
Mill modernization	2009	Replacement of aging equipment units with energy and water efficient versions. Improved productivity without negatively impacting wastewater treatment.
Surge control	2009	Converted 75-foot primary clarifier to a surge control basin to equalize hydraulic flow to secondary system resulting in improved process stability.
TMP plant #5	2010	Upgraded chemical mechanical pulping (CMP) system to thermo-mechanical pulping (TMP). The process is more energy and water efficient while reducing chemical consumption, thus lowering 5-day BOD loading to treatment system.
Chip segregation	2011	Separating different chip species for specific paper types reduced bleaching requirements, a large contributor of 5-day BOD and TP to the treatment system.
TP Extended Season Limit	2011	IEP requested and Ecology approved increasing its effluent TP limit by extending the treatment season from March through October to February through Oct.
Retention aid carrier water	2012	Switched retention aid carrier water from fresh water to reclaimed water, reducing effluent flow by 100 gallons per minute.
AlgEvolve pilot testing	2012 - 2016	Pilot testing of AlgEvolve algae nutrient removal in photobioreactor and side-by-side testing of algae system and membrane-only system.
Stock blending	2013	Targeting specific pulp blends improved bleaching efficiency and reduced the amount of 5-day BOD and TP created in the reaction.
Disc filter shower water	2014	Disc filter switched from fresh water to reclaimed water. This reduced flow to treatment system by 200 gallons per minute.
PM5 Vacuum roll seal	2015	New lubrication strip installed on paper machine #5 that reduced water consumption by 10 million gallons per year.
Static Pollutant Equivalency Trade	2015	IEP requested trading of an oxygen demand reduction from ammonia for an equivalent increase from CBOD based on river water quality modeling.
Phosphoric acid	2016	Switched phosphorus nutrient source from ammonium ortho-polyphosphate to phosphoric acid. Phosphoric acid is more readily taken up by microbes.
Urea	2016 - 2018	Switched to urea from aqua ammonia as the primary nitrogen source for biological treatment.

Name	Year	Description
Speece cone	2016	Speece cone installed that super-oxygenates the flow leaving the pump house on route to the first primary clarifier to prevent septic conditions downstream.
NCCW Credit	2016	IEP requested discharge quantities include a TP credit in the non-contact cooling water for compliance with effluent limits. Ecology included in NPDES permit.
Bubble Permit with Kaiser	2016	IEP requested and Ecology approved that its NPDES permit effluent limits allow for the use of a bubble limit with Kaiser towards meeting the final effluent limits. This was ultimately included as a condition of IEP's 2022 NPDES permit renewal.
Surge Control	2017	IEP installed valves and controls on the 75-foot clarifier that is used for flow and BOD surge control to IEP's secondary treatment system.
Effluent Temperature Reduction	2017	The valves in the DAF heat exchanger were increased to allow for more non-contact cooling water flow, reducing influent temperatures to the WWTS.
Tertiary MBBR and UF membrane pilot study	2017	Pilot testing of tertiary MBBR and UF membrane system.
Chemical Enhanced Primary Treatment	2018	A new flocculation aid was selected to improve solids and BOD removal in the primary clarifier.
Equalization Tanks	2018	Two (2), one million-gallon tanks were installed to equalize flow and BOD loading to the secondary biological treatment system.
Sheet Ash Retention	2019	IEP tested a new chemistry to retain more fiber and ash in the paper sheet, thus reducing the amount of material and CBOD discharged to the WWTS.
Effluent CBOD Analyzer	2020	New effluent CBOD analyzer was installed on the feed and filtrate from the tertiary UF membrane system.
Improved Aeration	2019-2020	A total of five surface aerators were added to enhance oxygen availability and CBOD removal in the Orbal aeration basin.
Full-Scale Tertiary UF Membranes	2020	Full scale tertiary UF membrane filtration system was installed downstream of the secondary clarifiers.
Online Nutrient Analyzers	2020-2021	Online nutrient analyzers for both ammonia and phosphorus were installed in the outer and inner Orbal channels in September 2020 for better dosing control.
Influent CBOD Analyzer	2021	CBOD analyzer was installed on WWTS influent to monitor CBOD fluctuations as a function of paper machine grade production and to control nutrient dosing.
MBBR Nutrient Dosing Control	2019-2022	Nutrient dosing system to MBBRs controlled based on measurements from the CBOD analyzer installed on the WWTS influent.
Secondary Clarifier Seal Replacement	2022	Seal within the secondary clarifier failed and was repaired.
MBBR Clarifier	2022	The original 75-foot diameter primary clarifier was repurposed to operate as a clarifier for solids removal from the MBBRs ahead of the Orbal.
MBBR CBOD Analyzer	2023	Intermediate CBOD analyzer was installed between the MBBRs and the activated sludge process.
Side Stream Treatment of Ultrafiltration Rejects	2023	The UF membrane reject stream was routed to the DAF system for removal of extracellular polymeric substances (EPS) from the WWTS to solids processing.
Fine Bubble Diffuser Aeration Pilot Test	2023	IEP pilot tested a fine bubble diffuser system in its Orbal aeration basin to determine process design parameters.
Static Pollutant Equivalency Trade	2024	IEP requested trading of an oxygen demand reduction from ammonia for an equivalent increase from TP based on river water quality modeling. This results in a 75% decrease in effluent ammonia-N and 200% increase in effluent TP.

Source: (Inland Empire Paper Company, 2024)

## 6.0 TREATMENT SYSTEM BYPASS (WAC 173-240-130(2)(i))

There are no provisions for intentional bypass of the WWTS. The original emergency outfall has been filled with concrete to eliminate the potential for emergency overflows. Standby diesel pumps, capable of operation even if there is a complete loss of electrical service, are in place to prevent an overflow of the main wetwell or the primary clarifier clearwell. The facility has procedures in place to prevent any under-treated discharge or overflows, including the capability to completely shut down production at the mill if necessary.

## 7.0 OIL AND HAZARDOUS MATERIAL SPILL CONTAINMENT (WAC 173-240-130(2)(j))

IEP's Spill Prevention, Control, and Countermeasure (SPCC) Plan (Inland Empire Paper Company, 2023) was submitted to Ecology in January 2023 accordance with Section S10 of the NPDES Permit. The SPCC Plan describes the general operating design and procedures that affect the potential for the discharge of oil products and hazardous materials from the mill. Facilities to contain spills in the mill and in storage areas are added with the installation of new mill components or modifications. For example, containment for nutrient (nitrogen and phosphorus) storage tanks was constructed at the same time as the construction of the secondary treatment facilities in 1989.

## 8.0 TREATMENT SYSTEM EFFLUENT QUALITY (WAC 173-240-130(2)(k))

IEP discharges wastewater to the Spokane River under NPDES Permit WA-0000825. Table 8.1 lists the current interim and final effluent limitations in the NPDES Permit.

**Table 8.1: NPDES Permit Interim and Final Effluent Limits**

NPDES Permit Final Effluent Limits for January – December		
Parameter	Average Monthly	Maximum Daily
Total Suspended Solids (TSS)	1,149 lbs/day	2,367 lbs/day
Zinc (Total)	126.5 µg/L	145.4 µg/L
Lead (Total)	3.18 µg/L	4.58 µg/L
Cadmium (Total)	1.5 µg/L	2.3 µg/L
Total PCBs	170 pg/L	248 pg/L
Total PCBs	0.00017 µg/L	0.000248 µg/L
Parameter	Minimum	Maximum
pH	6.6 S.U.	9.0 S.U.
NPDES Permit Final Effluent Limits for November – February		
Parameter	Average Monthly	Maximum Daily
Biochemical Oxygen Demand (5-day) (BOD5)	1,138 lbs/day	1,872 lbs/day
NPDES Permit Interim Effluent Limits through October 2027		
Parameter	Average Monthly	Maximum Daily
Total Phosphorus (as P) (February through October)	16.3 lbs/day	35.7 lbs/day
Carbonaceous Biochemical Oxygen Demand (5-day) (CBOD5) (March through October)	1,024 lbs/day	1,685 lbs/day
NPDES Permit Final Effluent Limits for March – October		
Parameter	Season Average	
Total Ammonia (as N)	24.29 lbs/day	
NPDES Permit Final Effluent Limits Effective Year 2028		
Parameter	Seasonal Average	
Total Phosphorus (as P) (1) (February through October)	2.39 lbs/day	
Carbonaceous Biochemical Oxygen Demand (5-day) (CBOD5)(1) (March through October)	123.2 lbs/day	

Notes: Units: lbs = pounds, µg = micrograms, L = liter, S.U. = standard unit

(1) Excludes bubble permit allowance from Kaiser Aluminum per Section S1, Pages 10 and 11 of the NPDES permit.

The WWTS effluent water quality for year 2023 is compared to the effluent NPDES permit limits in Table 8.2. The WWTS has been unable to achieve the final effluent limits for total phosphorus and CBOD<sub>5</sub>.

**Table 8.2: Effluent Water Quality for Year 2023 Compared to Permit Limits**

Parameter	Average Monthly		Maximum Daily	
	Maximum Measurement	Permit Limit	Maximum Measurement	Permit Limit
TSS, lbs/day	694	1,149	4,233(3)	2,367
Zinc (Total), µg/L	118.7	126.5	142	145.4
Lead (Total), µg/L	3.04	3.18	3.36	4.58
Cadmium (Total), µg/L	<1.0	1.5	<1.0	2.3
Total PCBs, pg/L	Non-Detect	170	Non-Detect	248
BOD <sub>5</sub> (November–February), lbs/day	713	1,138	2243(3)	1,872
TP (Interim, February–October), lbs/day	17.7	16.3	38.5	35.7
CBOD <sub>5</sub> (Interim, March–October), lbs/day	749	1,024	1707	1,685
	Minimum Measurement	Permit Limit	Maximum Measurement	Permit Limit
pH, S.U.	6.6	6.6	8.5	9.0
	Measurement		Seasonal Permit Limit(1)	
Total Ammonia-N (March–October), lbs/day	6.9		24.29	
TP (February–October), lbs/day (2)	10.3		2.39	
CBOD <sub>5</sub> (March–October), lbs/day (2)	413		123.2	

Notes: Units: lbs = pounds, µg = micrograms, L = liter, S.U. = standard unit

(1) Excludes bubble permit allowance from Kaiser Aluminum per Section S1, Pages 10 and 11 of the permit.

(2) Final Permit Limits effective 2028.

(3) Exceedance of permit limits due to filamentous sludge bulking in secondary clarifier.

The WWTS has experienced a reduction in performance in the last few years due to various issues such as:

- Premature fouling of UF membranes due to high feed turbidity from the generation of dispersed bacteria and extracellular polysaccharides (EPS) in the MBBRs.
- High operating temperature resulting in decreased biological activity and BOD treatment efficiency.
- High BOD loading contributing to the generation of EPS in the MBBRs and overloading of the biological treatment aeration systems.
- Low food to microorganism (F:M) ratio, nutrient, and DO concentrations and high solids residence time (SRT) in the Orbal activated sludge system contributing to filamentous sludge bulking and release of nutrients in the secondary clarifier.

As a result of these issues, IEP has implemented the following to improve performance in the reduction of CBOD<sub>5</sub> and TP, prevention of fouling of the UF membranes, and reduce filamentous sludge bulking:

- The 75-foot clarifier previously used for internal recycle within the mill has been placed downstream of the MBBRs to remove a portion of the biological solids ahead of the Orbal activated sludge system and to divert the solids and EPS directly to the sludge processing system.
- The SRT and mixed liquor suspended solids concentration in the Orbal activated sludge system has been reduced to design values by increasing sludge wasting to the sludge processing system.

- The UF membrane reject stream has been routed to the DAF system to remove EPS from the WWTS.
- The activated sludge is chlorinated when necessary to reduce filamentous bacteria.
- An online CBOD analyzer has been installed at the Orbal inlet to enable improved nutrient dosing to the activated sludge process.
- Online nutrient analyzers for both ammonia and phosphorus were installed in the outer and inner Orbal channels for better nutrient dosing control.
- The operation of the existing heat exchanger system has been adjusted to maximize heat reduction of the process wastewater.

Further upgrades that are planned to improve performance of the WWTS are described in Section 17.0.

## **9.0 RECEIVING WATER [WAC 173-240-130(2)(I)]**

The applicable water quality standards for the section of the Spokane River into which IEP discharges are described in the NPDES Permit Fact Sheet (Ecology, 2022). The applicable designated uses and associated surface water quality criteria as defined in Chapter 173-201A WAC are: (1) salmonid spawning, rearing, and migration and (2) primary contact recreation. An additional special condition limits temperature to not exceed a one day maximum of 20.0°C due to human activities. Chapter 173-201A WAC also includes human health-based criteria for priority pollutants. Ecology has determined that all point source discharges to the Spokane River have a reasonable potential to exceed water quality standards for PCBs based on the presence of PCBs in effluent and in fish tissue in the Spokane River. IEP's current NPDES Permit contains an end of pipe limit based on the human health criterion for PCBs.

This section of the Spokane River is also impaired for metals and dissolved oxygen, and PCBs, methylmercury, and PBDEs in fish tissue. There are three total maximum daily load (TMDL) implementation plans in place: (1) Spokane River Dissolved Metals TMDL addressing cadmium, lead, and zinc (Ecology, 1999); (2) Spokane River and Lake Spokane Dissolved Oxygen TMDL (Ecology, 2010)); and (3) Spokane and Little Spokane Rivers Polychlorinated Biphenyls TMDLs (EPA, 2024)). Applicable waste load allocations (WLAs) have been incorporated into IEP's NPDES permit for the first two TMDLs.

## **10.0 OUTFALL [WAC 173-240-130(2)(m)]**

Treated effluent is discharged through an outfall to the Spokane River at River Mile 82.6. The outfall pipe consists of a 24-inch line extending from the clear well to the Spokane River. At the river, the outfall decreases in diameter to 18 inches. The 18-inch outfall line extends approximately halfway across the Spokane River (70-feet) and has a 32-foot attached diffuser with multiple outlet ports for dispersion of the treated effluent into the Spokane River. The diffuser has nine openings consisting of eight ports, four feet apart, on 90-degree risers facing downstream with an open ended pipe at the end of the diffuser. The effluent line is oriented about 10 degrees downstream as measured from perpendicular to the shoreline. The outfall was modified slightly in 2001 to eliminate restrictions caused by holdup from Spokane's Upriver Dam (a few miles downstream of IEP). The modification, along with the installation of new effluent metering and a manhole, resulted in an estimated capacity of 11.4 MGD.

#### **11.0 POTW WASTEWATER FACILITIES (WAC 173-240-130(2)(n)(o))**

Domestic wastewater from the mill is discharged to the City of Millwood sewer collection system for eventual treatment at the Spokane County Regional Water Reclamation Facility (SCRWRF). No process wastewater is discharged to this facility.

#### **12.0 LAND APPLICATION AND LEACHATE SYSTEM DISPOSAL [WAC 173-240-130(2)(p)(y)]**

The effluent from the WWTS is not discharged through land application (i.e. seepage lagoons, irrigation, and subsurface disposal) or to a leachate system. If IEP elects to evaluate these discharge alternatives in the future, the applicable engineering reports and plans will be submitted to Ecology for approval.

#### **13.0 ENGINEERING JUSTIFICATION OF COMPLIANCE (WAC 173-240-130(2)(q))**

Based on the existing process wastewater discharge monitoring data presented in this report, the proposed WWTS upgrades presented in Section 17.0 is expected to reduce the seasonal average of CBOD<sub>5</sub> to the final effluent limit in the NPDES Permit in combination with allowable DO TMDL implementation tools. Further optimization of the WWTS for total phosphorus removal may be required after commissioning of the proposed upgrades to comply with the final effluent limit for total phosphorus.

#### **14.0 METHOD OF FINAL SLUDGE DISPOSAL (WAC 173-240-130(2)(r))**

Sludge generated by the WWTS is burned in a fluidized bed combustor (FBC) which generates steam utilized within the mill. The ash from the FBC is taken to a landfill or converted to pellets for agricultural application as a soil amendment. The solids feed to the FBC is limited to 50 dry tons per day in compliance with the air quality permit for the system.

#### **15.0 SYSTEM OWNERSHIP, OPERATION, MAINTENANCE (WAC 173-240-130(2)(s))**

The WWTS is owned and operated by IEP, and its staff are responsible for operating and maintaining the system and for compliance with applicable federal, state, and local regulations. The WWTS is operated and maintained according to the latest version of its Operation and Maintenance Manual (Inland Empire Paper Company, 2023), which has been submitted to Ecology in compliance with NPDES permit section S5. Monitoring, recording, and reporting follow the requirements in Sections S2 and S3 of the NPDES permit.

#### **16.0 REGULATORY COMPLIANCE STATEMENTS [WAC 173-240-130(2)(t,x)]**

The mill continues to strive for full compliance with all applicable state and federal water quality standards and any local water quality management plan or any plan adopted under the Federal Water Pollution Control Act as amended such as the TMDL water quality improvement plans listed in Section 9.0. Upgrades and optimization of the mill's WWTS to bring the system into full compliance are ongoing.

The construction and operation of the facility is privately funded and on private property, therefore State Environmental Policy Act (SEPA) and National Environmental Policy Act (NEPA) requirements do not apply to this report.

## 17.0 FUTURE PLANS AND ALTERNATIVES (WAC 173-240-130(2)(u)(v))

IEP is currently in the process of implementing the following to improve performance in the reduction of CBOD<sub>5</sub>, TP, prevent fouling of the UF membranes, and to reduce filamentous sludge bulking:

- A more efficient aeration system will be installed to increase the DO in the Orbal activated sludge system to minimize low DO filamentous microorganisms and enhance CBOD<sub>5</sub> removal.
- The Orbal aeration basin will be modified by bringing influent and RAS into the Orbal at the same location and converting the outer channel from complete mix to plug flow to increase the F:M at the basin inlet and promote the selection of non-filamentous microorganisms. This modification will be accomplished by installing a new wall in the outer channel of the Orbal that isolates the outer channel inlet gate from the outlet gate. RAS discharge piping will also be rerouted to the inlet.
- A secondary project being considered is supplementing the existing heat exchanger system with a new heat recovery system to significantly reduce the temperature of the influent to the WWTS.

As discussed in Section 5.7, the existing Orbal aeration basin was originally designed in 1989 to operate with anoxic or semi-anoxic conditions in the outer channel to promote denitrification and energy recovery. However, the recent increase in organic loadings and wastewater temperatures to the WWTS combined with ultralow effluent limits has resulted in the need to improve aeration in the Orbal.

Table 17.1 provides the design criteria for the proposed new fine bubble diffuser aeration system to be installed in the Orbal aeration basin. The design capacity is based on providing the amount of oxygen at peak BOD<sub>5</sub> loading to the aeration basin to maintain a minimum dissolved oxygen of 2.0 mg/L. This will allow the full volume to be used for BOD removal and will also minimize the growth of low DO filamentous microorganisms in the basin. The system will consist of removable grids with disc diffusers, ballasted to the floor of each channel to prevent flotation.

Because DO in the middle and inner channels of the Orbal aeration basin has averaged 2.0 mg/L and above, initially only one-half of the grids will be installed in the outer channel and all of the existing disc aerators will remain in place with the exception of the disc aerators at the two ends of the Orbal channels. The performance of the system will be monitored with this configuration to determine if additional diffuser grids need to be installed in the middle and inner channels. The system will also include the construction of a new blower building to house the new positive displacement blowers that will provide air to the system.



**Table 17.1: Design Criteria for Proposed Fine Bubble Diffuser Aeration System**

Parameter	Units	Value
5-Day BOD aeration basin loading field conditions, all channels	lbs/day	27,300
5-Day BOD aeration basin loading field conditions, outer channel	lbs/day	13,650
Mixed liquor temperature, maximum	deg C/ deg F	34 / 93
Site elevation, mean sea level (MSL)	ft	1955
DO concentration in mixed liquor, minimum	mg/L	2.0
Diffuser submergence	ft	13.0
Diffuser height above floor, maximum	ft	1.0
Number of grids in all channels	-	32
Number of grids in outer channel	-	16
Standard oxygen transfer rate (SOTR), min., all channels	lbs/hr	5,020
SOTR, minimum, outer channel	lbs/hr	2,510
Volumetric air flow, all channels, maximum	SCFM	21,120
Volumetric air flow, outer channel, maximum	SCFM	10,560
Standard Oxygen Transfer Efficiency (SOTE), minimum	%	22.75
Volumetric air rate per effective membrane surface area, max.	SCFM/SQFT	6.7
Volumetric air rate per diffuser, maximum	SCFM	2.75
Diffuser material	-	PTFE-coated EPDM
Diffuser type	-	disc
Diffuser diameter	inches	9
Diffuser number per grid, minimum	-	242
Dynamic Wet Pressure (DWP) at design air rate, maximum	inches w.c.	20
Pressure loss at top of drop leg, maximum	psig	6.55
Number of blowers, duty + 1 standby, all channels	-	5
Number of blowers, duty + 1 standby, outer channel	-	3
Blower air flow capacity at 14.7 PSIA, 68 deg F, 36%RH, minimum	SCFM	5,280
Blower differential pressure, maximum	PSI	9

Notes: Units: lb = pound, gal = gallon, mg = milligram, L = liter, SCFM = Standard Cubic Feet per Minute, SQFT = square foot, RH = relative humidity

## 18.0 SCHEDULE FOR COMPLIANCE (WAC 173-240-130(2)(w))

Table 18.1 provides the schedule for compliance that IEP intends to follow in order to continue to make progress towards complying with the NPDES permit final effluent limits.

**Table 18.1: Schedule for Compliance**

Milestone - Fine Bubble Aeration System	Initiation Date	Completion Date
Pilot Testing	November 2023	November 2023
Process Design and Equipment Selection	December 2023	January 2024
Funding Acquisition	February 2024	April 2024
Initiation of Equipment Procurement and Design	May 2024	May 2024
Equipment Submittals	July 2024	August 2024
Construction	September 2024	January 2025
Start Up and Commissioning	April 2025	June 2025
Optimization	July 2025	December 2025
Additional Studies and Process Modeling	January 2026	December 2026
Additional Upgrades as Required for Compliance	January 2026	December 2027

## 19.0 REFERENCES

- Ecology. (1999). *Spokane River Dissolved Metals Total Maximum Daily Load, Publication No. 99-49-WQ*. Olympia, WA: Washington State Department of Ecology.
- Ecology. (2010). *Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load, Water Quality Improvement Report, Publication No. 07-10-073*. Spokane, WA: Washington State Department of Ecology, Environmental Assessment Program.
- Ecology. (2022). *Fact Sheet for NPDES Permit WA0000825*. Spokane, WA: Washington State Department of Ecology.
- Ecology. (2022). *National Pollutant Discharge Elimination System Waste Discharge Permit No. WA-0000825*. Spokane, WA: Washington State Department of Ecology.
- EPA. (2024). *Spokane and Little Spokane Rivers Polychlorinated Biphenyls Total Maximum Daily Loads*. Seattle, WA: U.S. Environmental Protection Agency, Region 10.
- Esvelt Environmental Engineering. (2008). *Engineering Report: Mill Modernization Wastewater Plan*. Spokane, WA: Esvelt Environmental Engineering.
- Inland Empire Paper Company. (2017). *Moving Bed Biofilm Reactor with Ultrafiltration as a Tertiary Application to Treat IEP Wastewater*. Millwood, WA: Inland Empire Paper Company.
- Inland Empire Paper Company. (2023). *Spill Prevention, Control, and Countermeasure Plan*. Millwood, WA: Inland Empire Paper Company.
- Inland Empire Paper Company. (2023). *Wastewater Treatment System Operation and Maintenance Manual*. Millwood, WA: Inland Empire Paper Company.
- Inland Empire Paper Company. (2024). *Schedule for Compliance and 2024 Annual Status Report*. Millwood, WA: Inland Empire Paper Company.

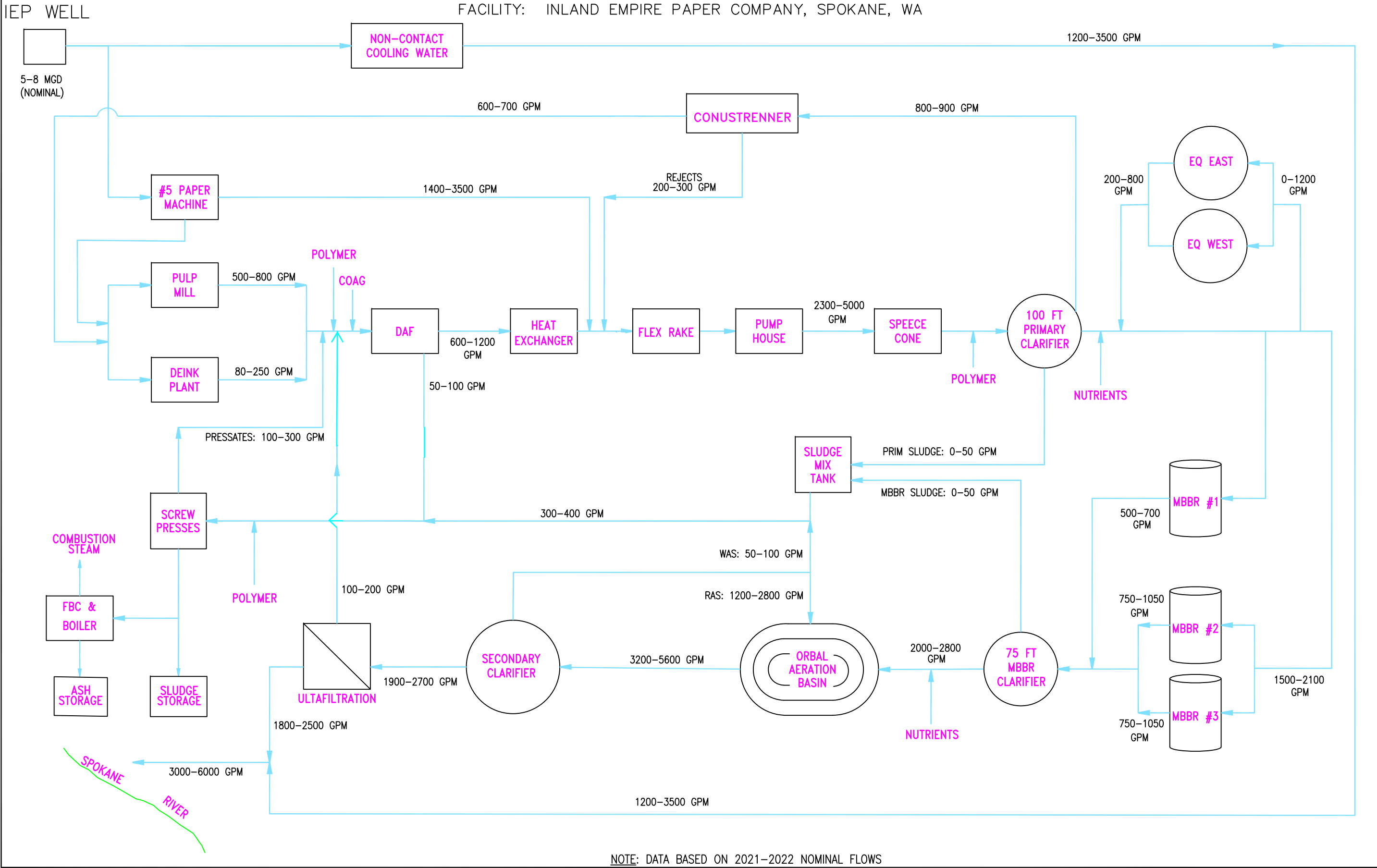
## **APPENDIX A: SITE PLANS AND PROCESS FLOW DIAGRAMS**

Contents: Inland Empire Paper Company Mill Site Plan  
Mill Process Flow Diagram and Water Balance



# MILL LINE DIAGRAM & WATER BALANCE

FACILITY: INLAND EMPIRE PAPER COMPANY, SPOKANE, WA



NOTE: DATA BASED ON 2021-2022 NOMINAL FLOWS

## **APPENDIX B: AERATION SYSTEM SPECIFICATIONS AND DRAWINGS**

Contents: Performance Guarantees (Specifications) for Fine Bubble Diffusers and Rotary Lobe Blowers  
Fine Bubble Diffuser Aeration System Design Drawings

## Performance Guarantee for Fine Bubble Diffusers

This Performance Guarantee is made to Inland Empire Paper Company (IEP) (Buyer) by SSI Aeration Inc. (Vendor) for the fine bubble diffused aeration diffuser grids (diffuser grids), furnished by Vendor pursuant to the purchase order terms and conditions between Vendor and IEP. Subject to the provisions contained within Vendor's Quotation # P-012224[C] dated April 16th, 2024; and the Performance Guarantee herein, Vendor hereby guarantees that the diffuser grids will comply with the following performance criteria:

1. The standard oxygen transfer rate (SOTR) from 16 diffuser grids shall not be less than that specified below in clean water at 14.7 PSI, 20 deg. C, and zero dissolved oxygen at the following specified conditions:
  - a. Minimum Standard Oxygen Transfer Rate (SOTR) (lb/hour): 2,510
  - b. Maximum Volumetric Air Flow (SCFM): 10,560
  - c. Diffuser Submergence (ft): 13.0
  - d. Maximum Diffuser Height Above Floor (ft): 1.0
  - e. Minimum Standard Oxygen Transfer Efficiency (SOTE): 22.75%
  - f. Maximum Volumetric Air Rate per effective membrane surface area (SCFM/SQFT): 6.7 (2.75 SCFM per 9-inch disc diffuser)
  - g. Number of 9-inch Membrane Diffusers per Grid: 240 to 247
  - h. Maximum Dynamic Wet Pressure (DWP) at design air rate, in. w.c.: 20
  - i. Maximum Pressure Loss at top of drop leg, psig: 6.55
  - j. Site Elevation: 1955 ft MSL
  - k. Maximum Liquid Temperature, deg C: 34
  - l. Minimum Target Dissolved Oxygen in Aeration Basin, mg/L: 2

### FACTORY AND FIELD PERFORMANCE TESTING

The performance testing is a demonstration of the diffuser grids' ability to meet the performance criteria stated herein. The following testing procedures shall be implemented to validate actual performance. In the event that the supplied equipment fails to meet the performance criteria, Vendor shall be solely responsible to make any necessary adjustments to its scope to meet the performance criteria.

## FACTORY TESTING

Perform factory quality control testing on the membrane diffusers.

1. Dynamic Wet Pressure (DWP): Factory test minimum 4% of the diffusers (10 diffusers per grid) for a maximum DWP of 10 inches  $\pm$  20% water column at 1.0 SCFM/diffuser, and maximum DWP of 20 inches  $\pm$  20% water column at 2.75 SCFM/diffuser at 2 inches submergence to verify compliance with the performance criteria.
2. Air Flow Visual Uniformity: Visually inspect minimum 4% of the diffusers (10 diffusers per grid) for uniform air distribution across the active surface of the diffuser at 1.0 SCFM and 2 inches submergence. Active surface is defined as the perforated horizontal projected area of the diffuser.
3. Certified copies of the factory test reports shall be submitted to the Buyer prior to shipment.

## FIELD TESTING

1. All diffuser grid ballasts shall be tested to verify they will prevent uplift against a buoyant force. Each grid shall be attached to a lever or other lifting device. A vertical extracting force equal to at least twice the calculated maximum buoyant force to which the grid will be subjected at the specified submergence shall be applied to each grid.
2. A field leakage test shall be performed for the drop leg, manifold, and headers for each grid. The procedure shall consist of submerging all piping in clean water, turning the air on at minimum flow and observing and correcting leaks.
3. The proper elevation of diffusers shall be verified by filling the tank with clean water to the top of the diffusers. Diffusers shall be within  $\pm 1/4"$  of the same elevation.
4. The diffuser grids shall be tested for uniform air distribution. The tank shall be filled with clean water to a depth 2" above the top of the diffusers. The system shall be operated at an air flow of 1.0 SCFM per diffuser, with air flow uniformity being verified by means of visual inspection. The tank shall then be filled to the normal operating level and the surface shall be observed for air flow uniformity at the maximum specified air flow per diffuser.
5. The pressure loss at the top of the drop leg shall be measured for each diffuser grid at the maximum specified air flow per grid.

All field measurements shall be measured by the Buyer's personnel using Buyer's equipment. The initial field tests shall be at Buyer's expense. Vendor shall provide personnel to observe the field tests.



The initial field tests shall be performed within 5 days after start-up of the diffuser grids and verification by the Vendor that the diffuser grids have been installed in accordance with the diffuser grid manufacturer's instructions. Field testing shall be considered complete when the diffuser grids are operational without fault and in accordance with the specified performance criteria. Final acceptance of the diffuser grids shall be contingent upon the successful completion of the field tests.

Buyer shall provide Vendor with written notice of the test results within four (4) weeks after completion of the field tests and a copy of the test data. If the initial field tests are deemed unsuccessful, Vendor shall be provided the opportunity to make adjustments or modifications. If deemed successful, Buyer shall provide Vendor notice that the system has fulfilled the field testing requirements specified herein and Vendor shall have no further obligation or liability hereunder except as follows:

In the event the diffuser panels are unable to comply with the specified performance criteria during the Vendor's warranty period, the Buyer, at Buyer's expense, reserves the right to require the Vendor to conduct a field oxygen transfer test in accordance with American Society of Civil Engineers (ASCE) *Standard Guidelines for In-Process Oxygen Transfer Testing*, (ASCE-18-18). If the diffuser panels are unable to provide the specified minimum SOTR or SOTE, then the Vendor shall make modifications to the grids and retest the grids at Vendor's expense.

Before the field oxygen transfer test is performed, the Vendor, at Buyer's expense, may conduct oxygen transfer testing of Buyer's used diffusers in a third-party lab to determine if the used diffusers are able to comply with the performance criteria. If the diffusers are unable to comply with the performance criteria in the lab, then Vendor shall make the required modifications to the grids in the field until the performance criteria are attained and shall field test the grids at Vendor's expense. The cost of testing shall be at Buyer's expense until testing shows that Vendor's equipment is unable to comply with the performance criteria.

The guarantee shall be in effect while Buyer operates and maintains the warranted equipment in accordance with Vendor's Installation Operation & Maintenance Manual and maintains maintenance records for the duration of the warranty period for Vendor's review should a warranty claim arise.

### **Exclusive Remedy**

In the event the diffuser grids fail to meet the performance criteria, then Vendor will, at its expense, provide operating assistance as required and/or modifications to the equipment supplied by Vendor at Vendor's discretion until the performance criteria is attained or the contract price of the equipment is expended by Vendor.

## **Performance Guarantee for Rotary Lobe Blowers**

This Performance Guarantee is made to Inland Empire Paper Company (IEP) (Buyer) by Beckwith & Kuffel (Vendor) for the Positive Displacement Rotary Lobe Blowers (blowers), furnished by Vendor pursuant to the purchase order terms and conditions between Vendor and IEP. Subject to the provisions contained within Beckwith & Kuffel's Quotation #B24-00107 dated January 9, 2024; and the Performance Guarantee herein, Vendor hereby guarantees that the blowers will comply with the following performance criteria:

1. Air flow capacity, maximum, Standard Cubic Feet per Minute (SCFM) (at 14.7 PSIA, 68 deg F, 36% RH): 5,280 SCFM at 9 psi differential pressure
2. Speed, maximum: 1,800 RPM
3. Site elevation: 1955 ft MSL

### **FACTORY AND FIELD PERFORMANCE TESTING**

The performance testing is a demonstration of the blowers' ability to meet the performance criteria stated herein. The following testing procedures shall be implemented to validate actual performance. In the event that the supplied equipment fails to meet the performance criteria, Vendor shall be solely responsible to make any necessary adjustments to its scope to meet the performance criteria.

#### **FACTORY TESTING**

1. Each blower stage shall be factory tested in accordance with ISO 1217 to verify flow and brake horsepower at the specified blower maximum operating conditions. Performance shall be within +/- 5% of specified operating conditions.
2. A package mechanical run test at the maximum speed and pressure shall be performed for a minimum of three (3) hours on each blower to document that the blower has achieved the specified performance.
3. Motors shall be tested in accordance with IEEE 112 for polyphase motors. Routine (production) tests shall be in accordance with NEMA MG 1. Multispeed motors shall be tested at all speeds. Efficiency and power factor shall be measured in accordance with IEEE 112, Test Method B, and NEMA MG 1, Paragraph 12.60.
4. Certified performance curves and certified copies of the factory test reports shall be submitted to Buyer for approval prior to shipment.

## FIELD TESTING

1. Each blower shall be field tested a minimum of 4 hours. During field testing, the inlet vacuum, discharge pressure, air flow, temperature, rotor speed, noise level, motor current, and voltage shall be measured at a minimum of four speeds within the blower performance range, including the minimum and maximum operating conditions.
2. Noise levels shall be measured with a sound level meter that is properly calibrated and complies with the accuracy requirements of OSHA's noise standard, 29 CFR 1910.95. Blower system, including silencers and sound attenuating housing, shall be designed for operation at noise level not to exceed 80 dB(A) at 3 feet from the blower assembly in any direction in free-field conditions.

All field measurements shall be measured by Buyer's personnel using Buyer's equipment. The initial field performance test shall be at Buyer's expense. Vendor shall provide personnel to observe the performance test.

The initial field performance test shall be performed within 5 days after start-up of the blowers and verification by Vendor that the blowers have been installed in accordance with the blower and motor manufacturer's instructions. Performance testing shall be considered to be complete when the blowers are operational without fault and in accordance with the specified performance criteria. Final acceptance of the blowers shall be contingent upon the successful completion of the field performance test.

Buyer shall provide Vendor with written notice of the test results within four (4) weeks after completion of the performance test and a copy of the test data. If deemed successful, Buyer shall provide Vendor notice that the system has fulfilled the performance requirements specified herein and Vendor shall have no further obligation or liability hereunder.


In the event that the initial performance test is deemed unsuccessful, Vendor shall be provided the opportunity to make adjustments or modifications.

### **Exclusive Remedy**

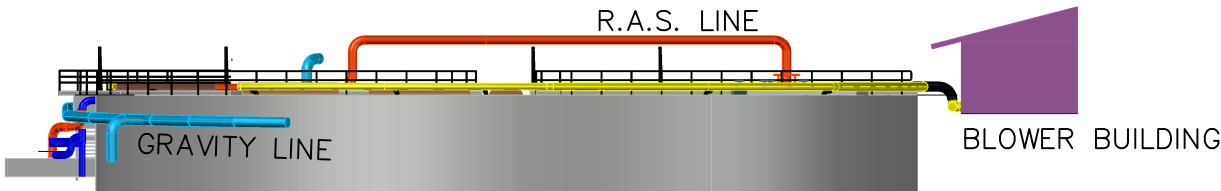
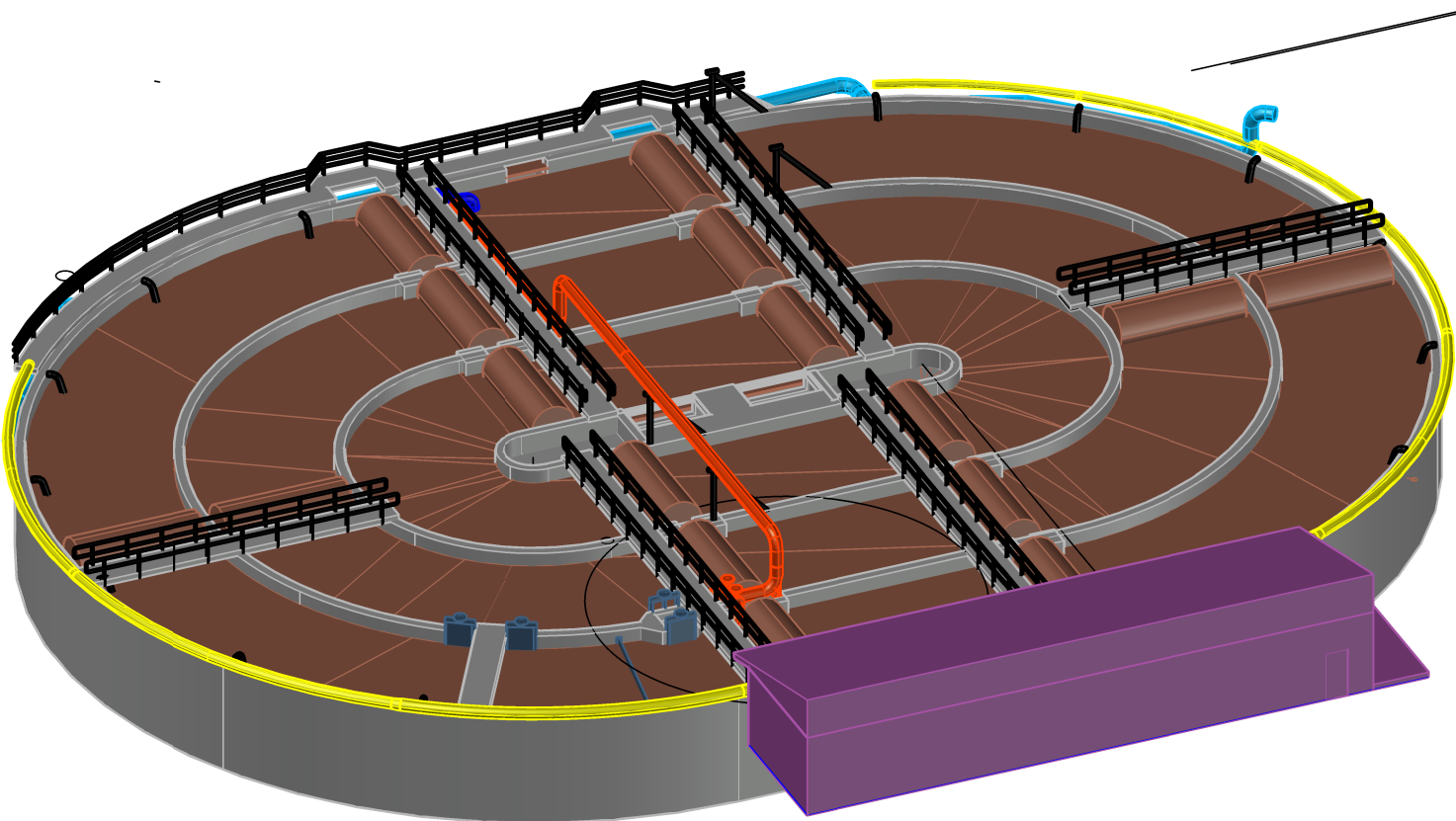
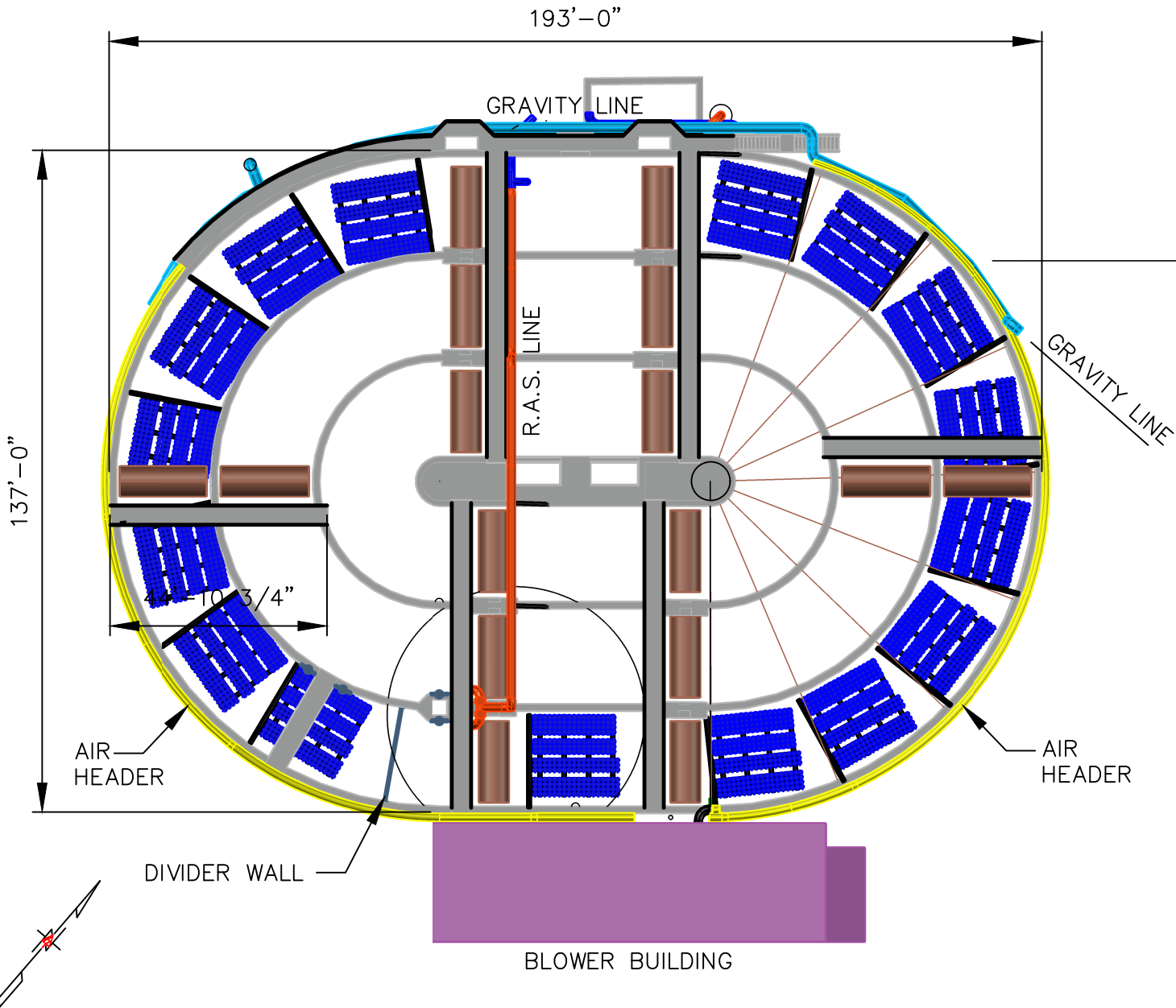
In the event the blowers fail to meet the performance criteria, then Vendor will, at its expense, provide operating assistance as required and/or modifications to the equipment supplied by Vendor or its operation at Vendor's discretion until the performance criteria is attained or not to exceed the contract price of the equipment is expended by Vendor.




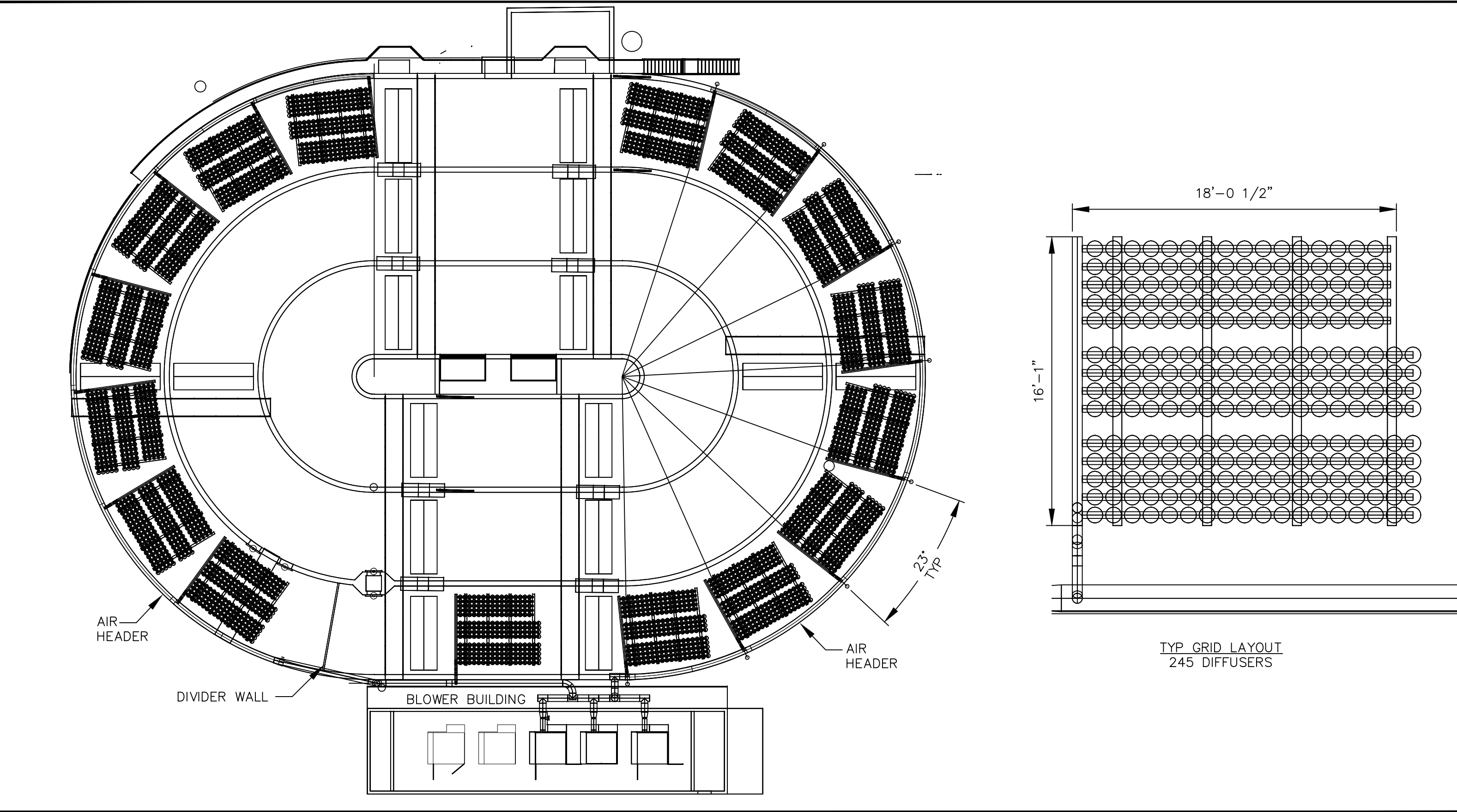



						INLAND EMPIRE PAPER COMPANY MILLWOOD WASHINGTON				ORBAL AERATION UPGRADE GENERAL LAYOUT			
DWG. NO.	TITLE	NO.	DESCRIPTION	BY	DATE	SCALE: NONE	DAY	MONTH	YEAR		P.O.NUMBER	DRAWING NUMBER	REV.
	REFERENCE		REVISIONS			DRAWN BY: KmR	28	MAR	2024		B	XXX-XXX-XXX	0

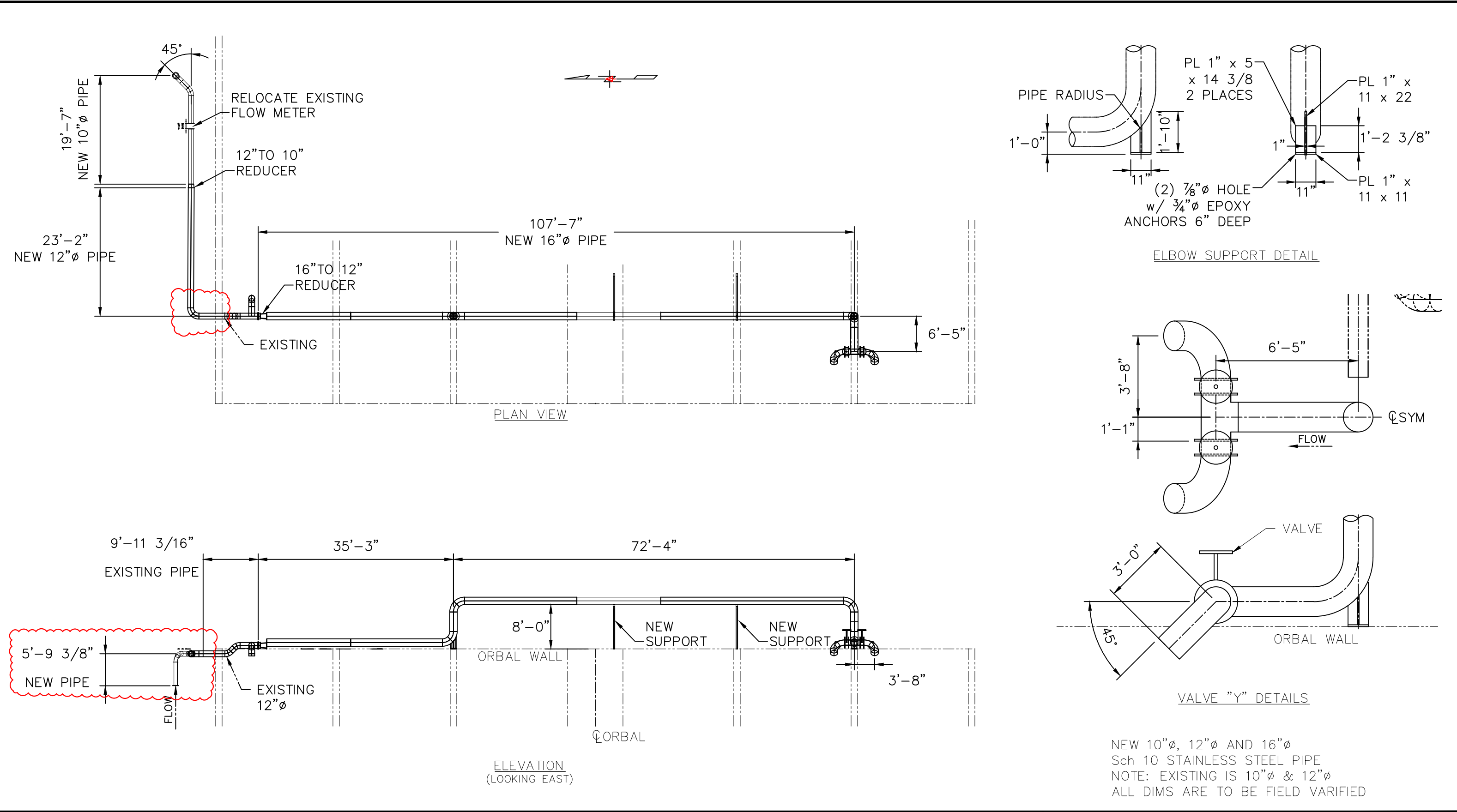





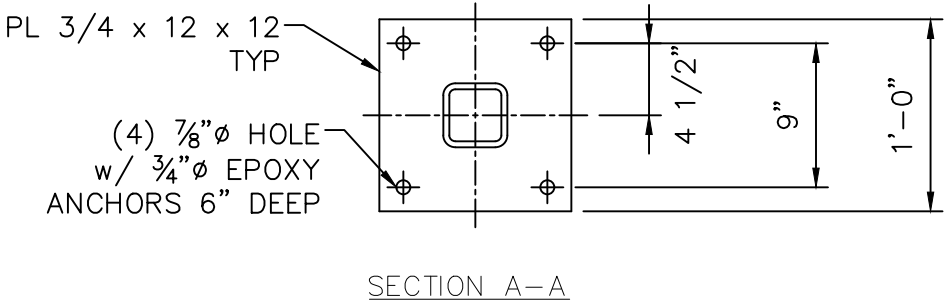
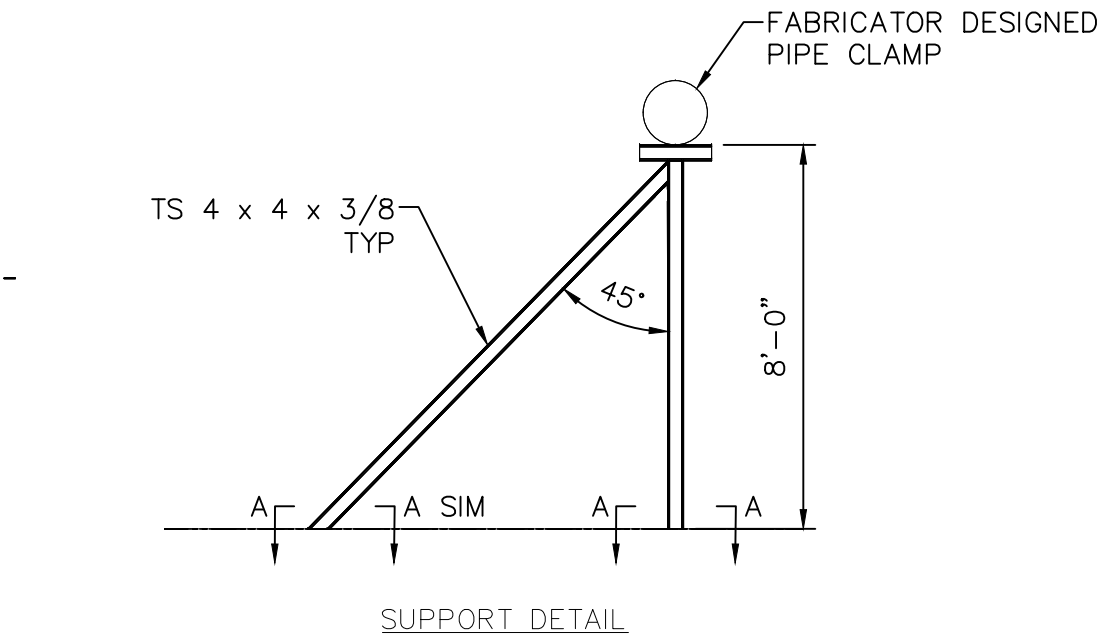
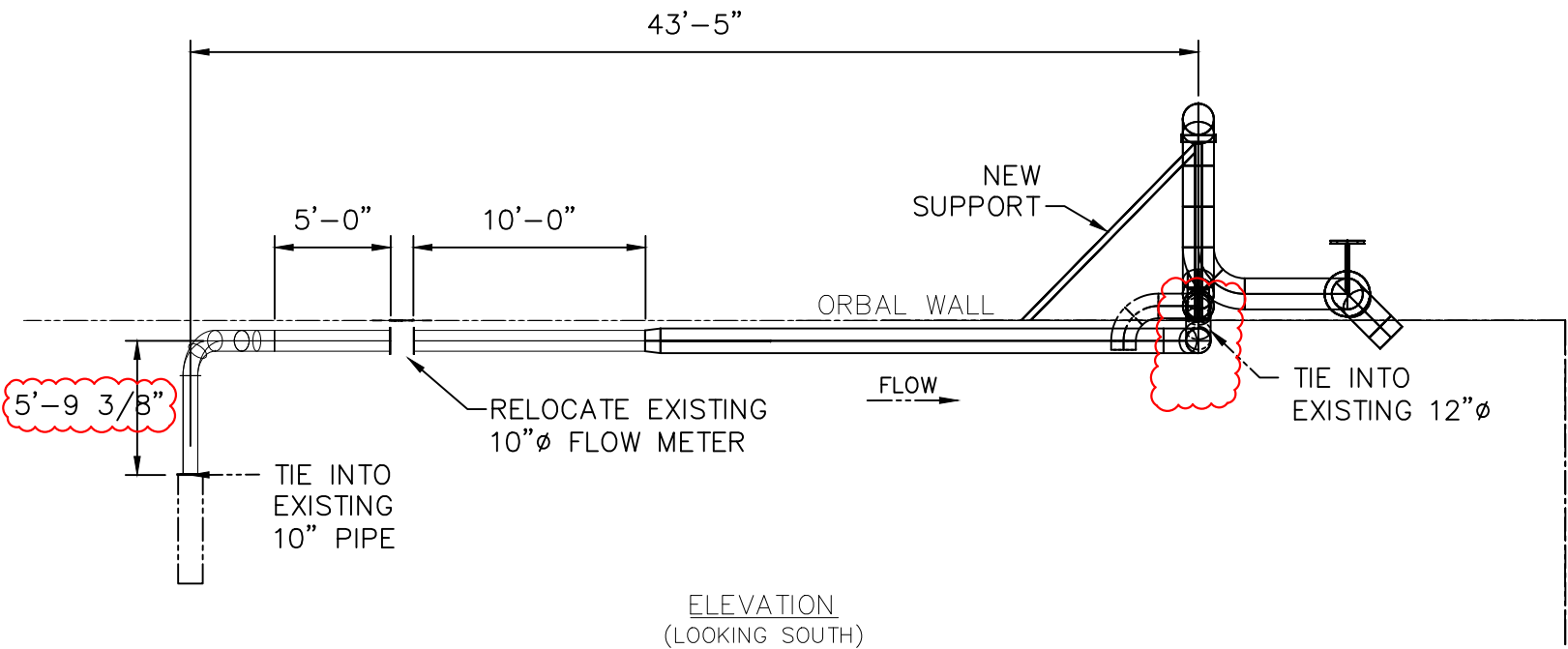
						INLAND EMPIRE PAPER COMPANY MILLWOOD WASHINGTON				ORBAL AERATION UPGRADE GENERAL LAYOUT			
DWG. NO.	TITLE	NO.	DESCRIPTION	BY	DATE	SCALE: NONE	DAY	MONTH	YEAR		DRAWING NUMBER		REV.
	REFERENCE		REVISIONS			DRAWN BY: KmR	28	MAR	2024		P.O.NUMBER	B XXX-XXX-XXX	0




					INLAND EMPIRE PAPER COMPANY MILLWOOD WASHINGTON						ORBAL AERATION UPGRADE GENERAL LAYOUT		
DWG. NO.	TITLE	NO.	DESCRIPTION	BY DATE	SCALE: NONE		DAY	MONTH	YEAR		DRAWING NUMBER		REV.
REFERENCE		REVISIONS			DRAWN BY:	KmR	28	MAR	2024		P.O.NUMBER	B	XXX-XXX-XXX

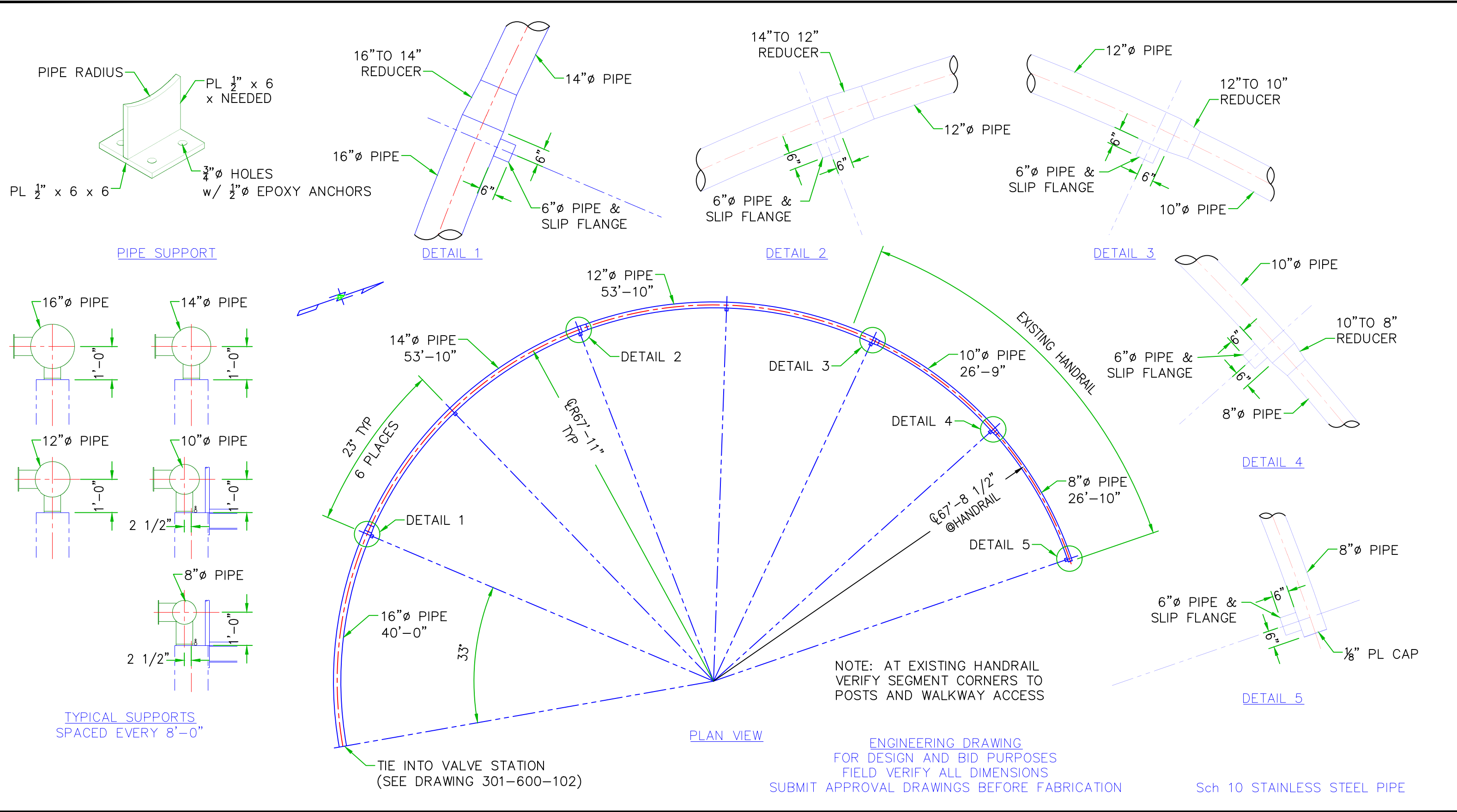



					INLAND EMPIRE PAPER COMPANY MILLWOOD WASHINGTON						R.A.S. PIPELINE UPDATE page 1/2 ORBAL AERATION PROJECT 3141		
DWG. NO.	TITLE	NO.	DESCRIPTION	BY DATE	SCALE: NONE		DAY	MONTH	YEAR		DRAWING NUMBER		REV.
REFERENCE		REVISIONS			DRAWN BY:	KmR	28	12	2024		P.O.NUMBER	B	301-157-B

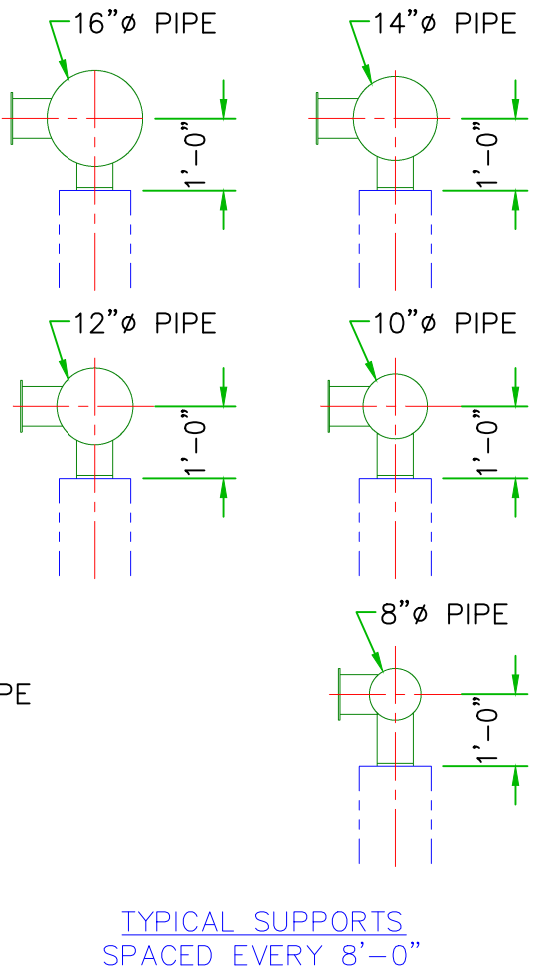
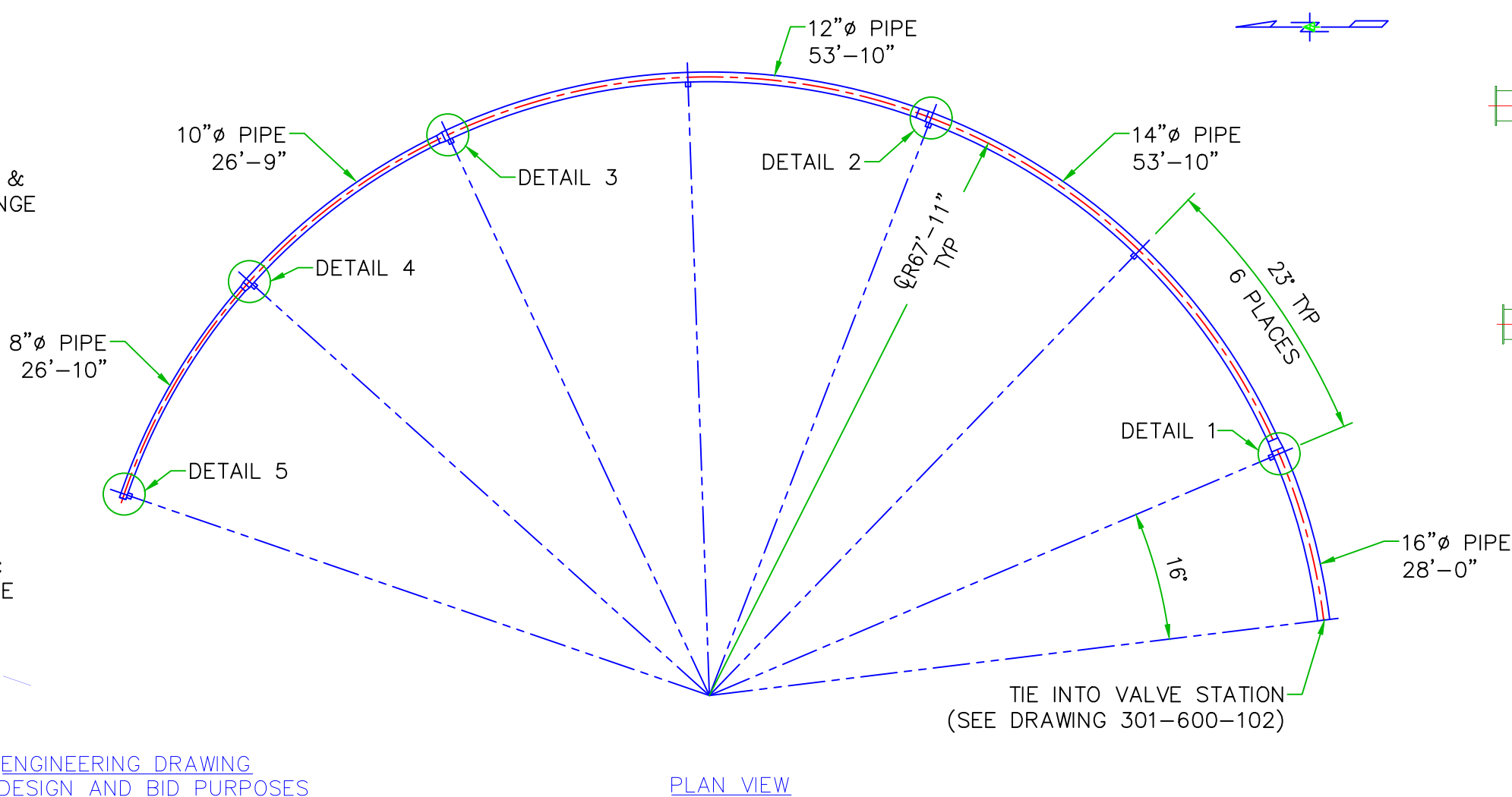
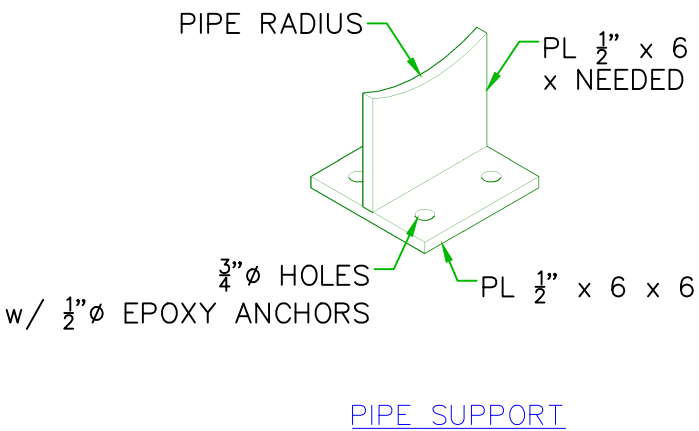


					INLAND EMPIRE PAPER COMPANY MILLWOOD WASHINGTON						R.A.S. PIPELINE UPDATE page 2/2 ORBAL AERATION PROJECT 3141		
DWG. NO.	TITLE	NO.	DESCRIPTION	BY DATE	SCALE: NONE		DAY	MONTH	YEAR		DRAWING NUMBER		REV.
REFERENCE		REVISIONS			DRAWN BY:	KmR	28	12	2024		P.O.NUMBER	B	301-157-B






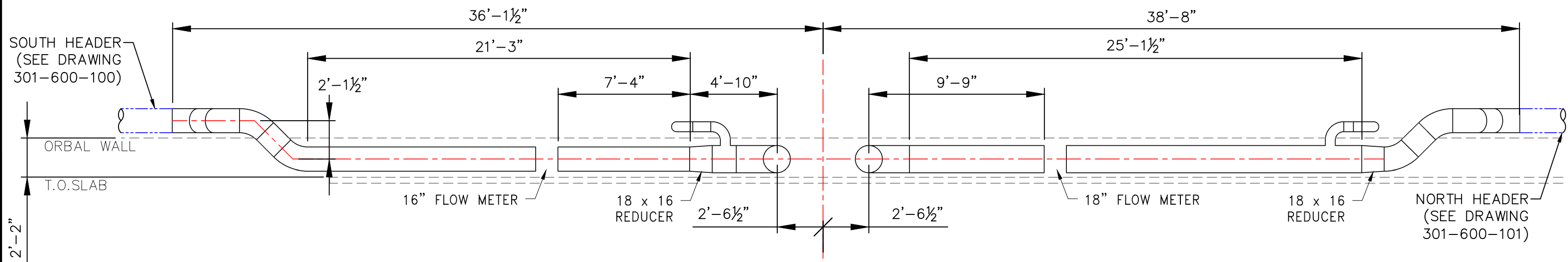
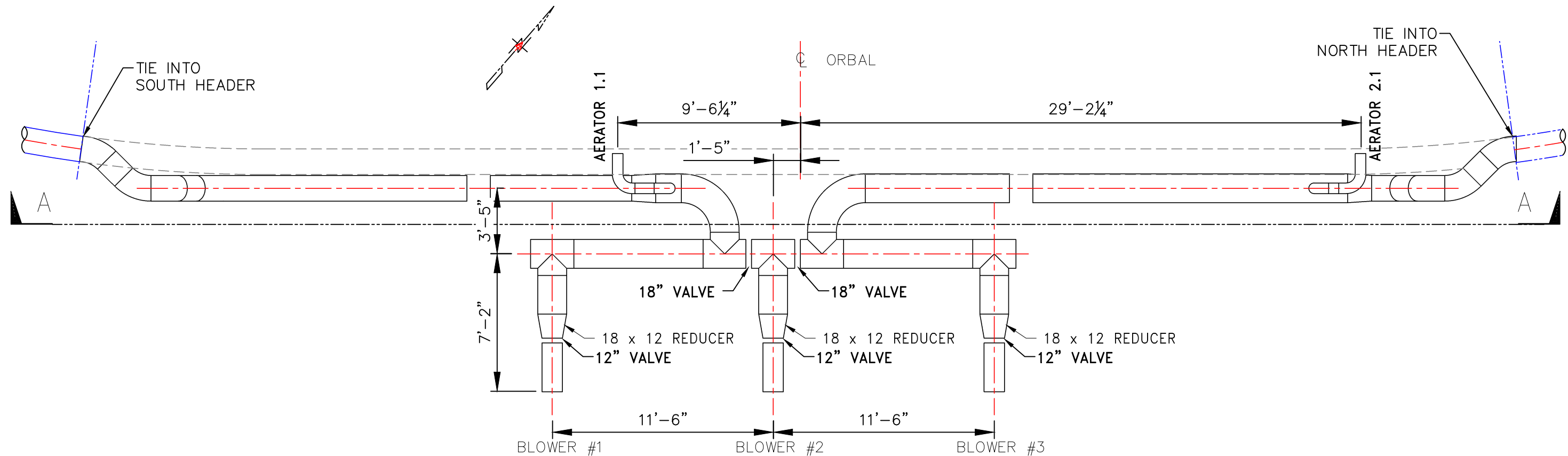
					INLAND EMPIRE PAPER COMPANY MILLWOOD WASHINGTON					SOUTH AIR FEED HEADER ORBAL AERATION PROJECT 3141			
DWG. NO.	TITLE	NO.	DESCRIPTION	BY DATE	SCALE: NONE		DAY	MONTH		YEAR	DRAWING NUMBER		REV.
REFERENCE		REVISIONS			DRAWN BY:	KmR	28	JUL		2024	P.O.NUMBER	B	301-600-100




ENGINEERING DRAWING  
FOR DESIGN AND BID PURPOSES  
FIELD VERIFY ALL DIMENSIONS  
SUBMIT APPROVAL DRAWINGS BEFORE FABRICATION

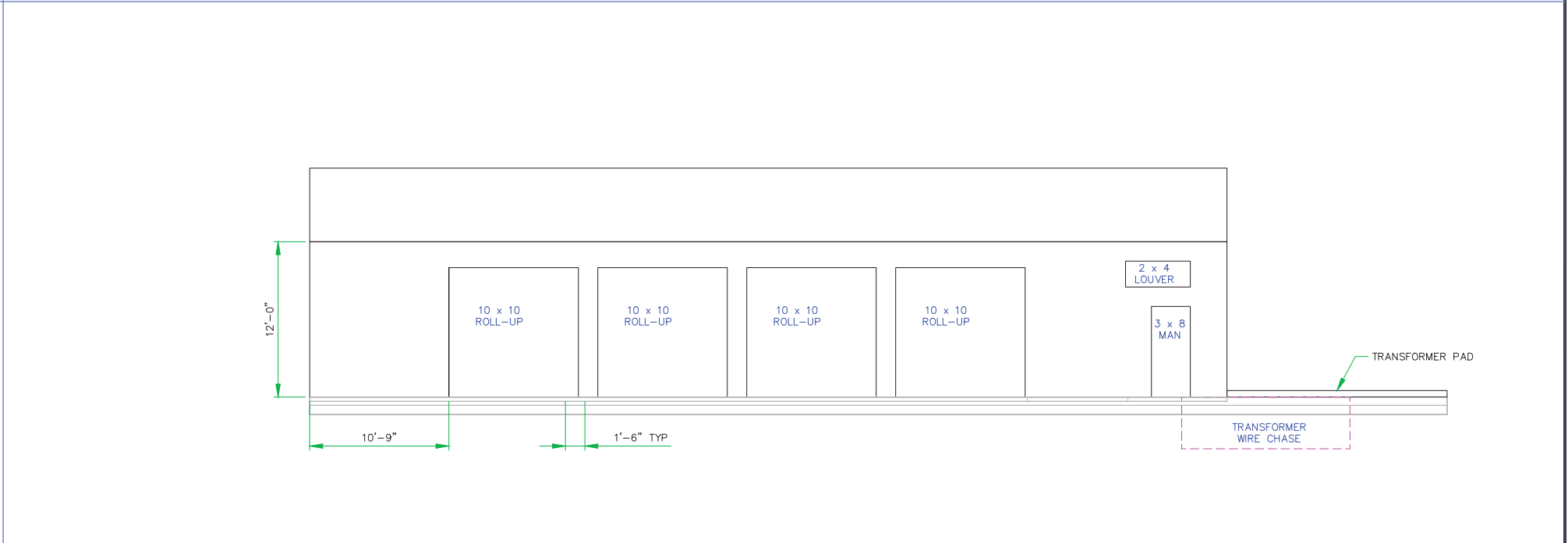
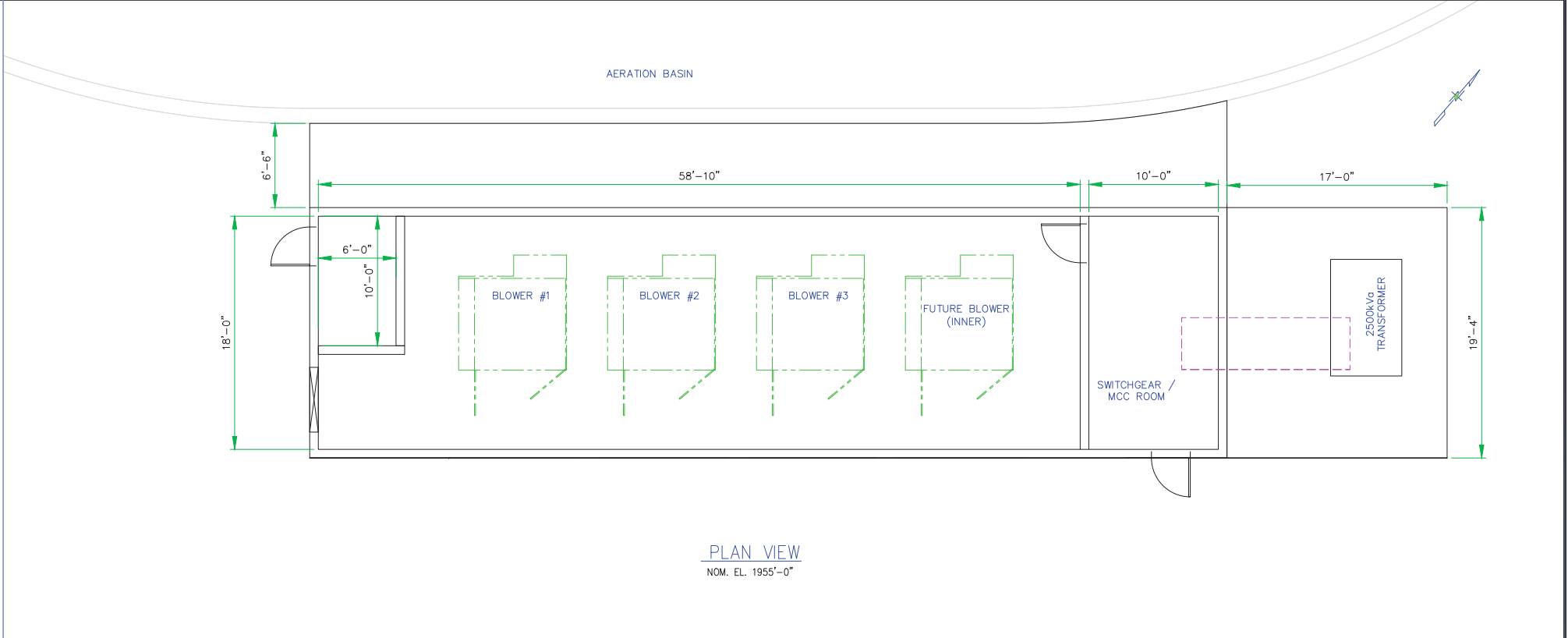
Sch 10 STAINLESS STEEL PIPE

					INLAND EMPIRE PAPER COMPANY MILLWOODWASHINGTON					NORTH AIR FEED HEADER ORBAL AERATION PROJECT 3141			
DWG. NO.	TITLE	NO.	DESCRIPTION	BY DATE	SCALE: NONE		DAY	MONTH		YEAR	DRAWING NUMBER		REV.
REFERENCE		REVISIONS			DRAWN BY:	KmR	28	JUL		2024	P.O.NUMBER	B	301-600-101



ENGINEERING DRAWING  
FOR DESIGN AND BID PURPOSES  
FIELD VERIFY ALL DIMENSIONS  
SUBMIT APPROVAL DRAWINGS BEFORE FABRICATION

					INLAND EMPIRE PAPER COMPANY MILLWOODWASHINGTON						BLOWER VALVE STATION ORBAL AERATION PROJECT 3141		
DWG. NO.	TITLE	NO.	DESCRIPTION	BY DATE	SCALE: 3/16"=1'-0"	DAY	MONTH	YEAR			DRAWING NUMBER	REV.	
REFERENCE		REVISIONS			DRAWN BY:	KmR	20	JULY	2024		P.O.NUMBER	B	301-600-102

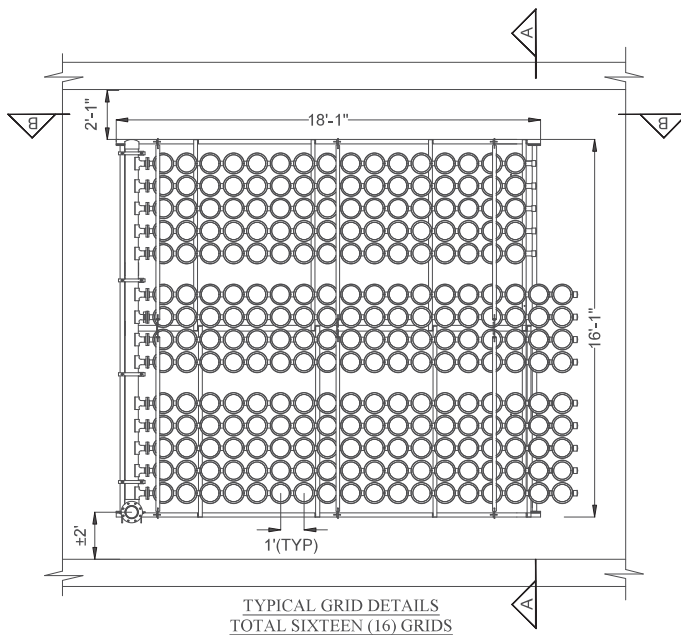


GENERAL NOTES:

1. DIMENSIONS ARE FOR INTERIOR SPACE
2. BLOWER WEIGHT = 6,950lbs EACH
3. LOUVER 40+% FREE AREA = 16,800sqft
4. TRANSFORMER WEIGHT = 12,500lbs.
5. REFERENCED EQUIPMENT INSTALLED BY I.E.P.

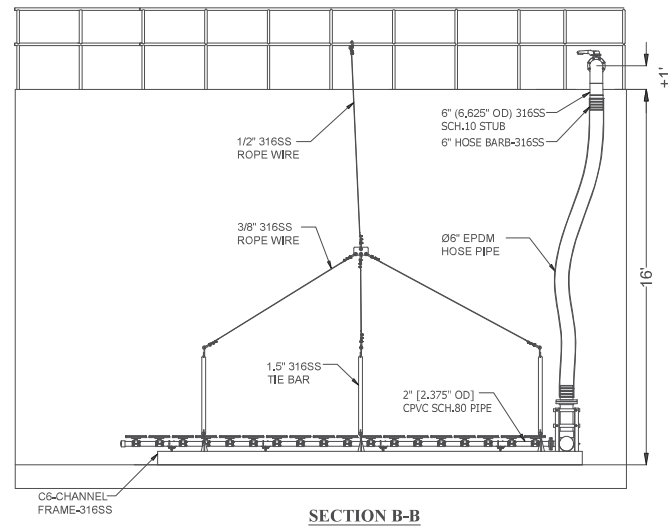
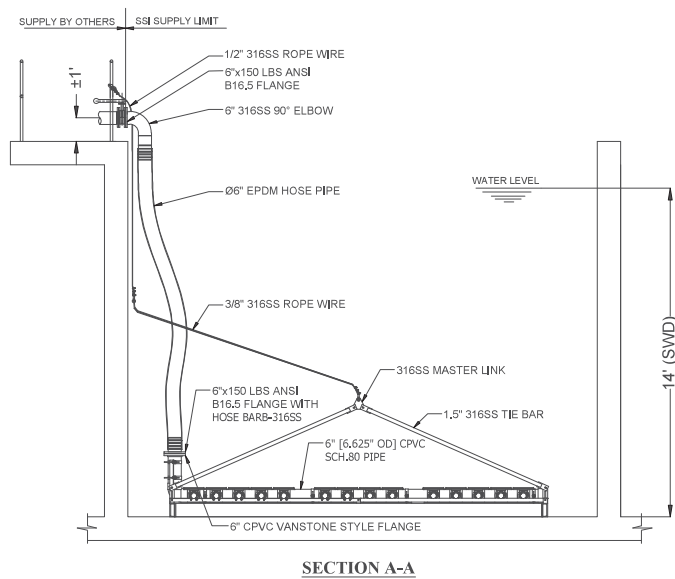
There are various minimum requirements affecting the design and/or supply of this building. IEP is relying upon the Contractor's representation as experts in the design and supply of the specified building and/or services.

[illegible]



**NOTES:**

1. ALL FIELD DIMENSIONS AND DROP LOCATIONS ARE TO BE CONFIRMED BEFORE RELEASING THE ORDER FOR PRODUCTION.
2. THIS DRAWING IS NOT INSTALLATION, SSI WILL PROVIDE INSTALLATION DRAWINGS AT THE TIME OF SHIPMENT WITH SEPARATE COVER.



B	RE SUBMITTAL #2	08/19/2024	PAVAN
A	RE SUBMITTAL #1	07/31/2024	PAVAN
0	ISSUED FOR APPROVAL SUBMITTAL	07/05/2024	BALAKRISHNA
REV	DESCRIPTION	DATE	BY

<b>SSI AFD270-P (9") DISC DUFFUSER WITH PTFE MEMBRANE C/W CLAMP ON SADDLES</b>
<b>INLAND EMPIRE PAPER COMPANY, WA</b>
<b>AERATION TANK - 1 NO.</b>
<b>GRID DETAILS</b>

<b>SSI-Aeration,Inc.</b> CLEAR WATER DEPT.	
SUBMITTED:	APPROVED BY: KIRAN KUMAR
SCALE: NTS	REVIEWED BY: KARTHIK
DATE: AUGUST, 2024	CHECKED BY: SUDARSHAN
	DRAWN BY: BALAKRISHNA
	SHEET NO.: 02
APPROVED SUBMITTAL	
DWG.NO: #22007_Inland Empire Paper Company, WA _ Aeration Tank_AFD270-P_ D01[B]	