312 W Whitewater Street | Whitewater, WI 53190

Wastewater Facility Plan
Technical Memorandum 5
Hydraulic Capacity

City of Whitewater
July 2014

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Donohue Project No.: 12600

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Appendix TM5-B: Wet Weather Operating Procedures

CHAPTER I – PURPOSE AND INTRODUCTION

1.1 PURPOSE

The purpose of this technical memorandum (TM) is to assess the existing treatment plant's hydraulic capacity and identify hydraulic bottlenecks that will need to be addressed when making liquids treatment decisions. Identifying these bottlenecks is important and the location of bottlenecks can modify decisions related to needed liquids treatment improvements.

1.2 INTRODUCTION

Table 1 presents the current flows seen at the treatment plant (2010-2013), the rated flows from the original design documents, and the projected 20-year design flows developed in TM 2.

Table 1: WWTP Flows

Parameter	Average Day	Max Day	Max Week	Max Month
Current Flows	1.50 mgd	6.8 / 11[1] / 15 mgd[2]	4.2 mgd	3.1 mgd
Rated Flow	3.65 mgd	10.4 mgd	7.2 mgd	5.0 mgd
Future Design Flows	1.85 mgd	8.4 / 11[1] / 15 mgd[2]	5.2 mgd	3.8 mgd

1. Peak Hour
2. Peak Instantaneous Flow

Figures 1 and 2 show the probability distributions for the total daily and peak instantaneous flows recorded from 2010-2013.

Figure 1: Daily Influent Flow Probability Distribution

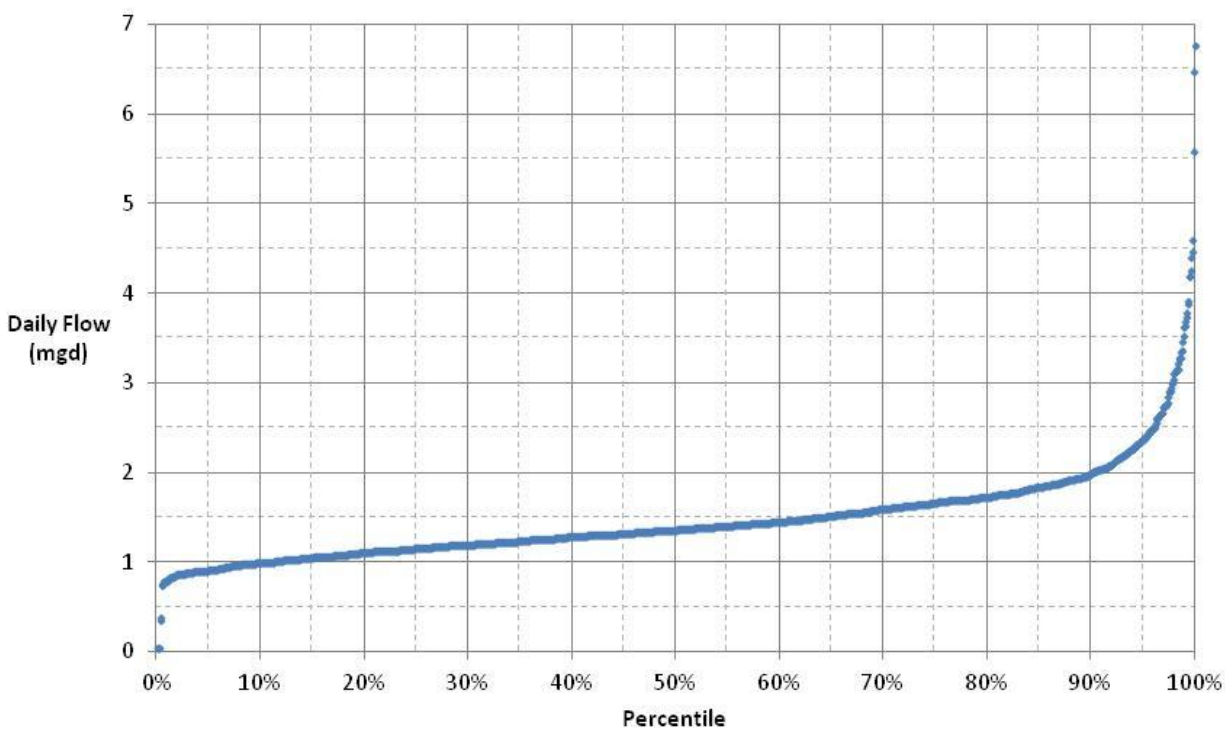
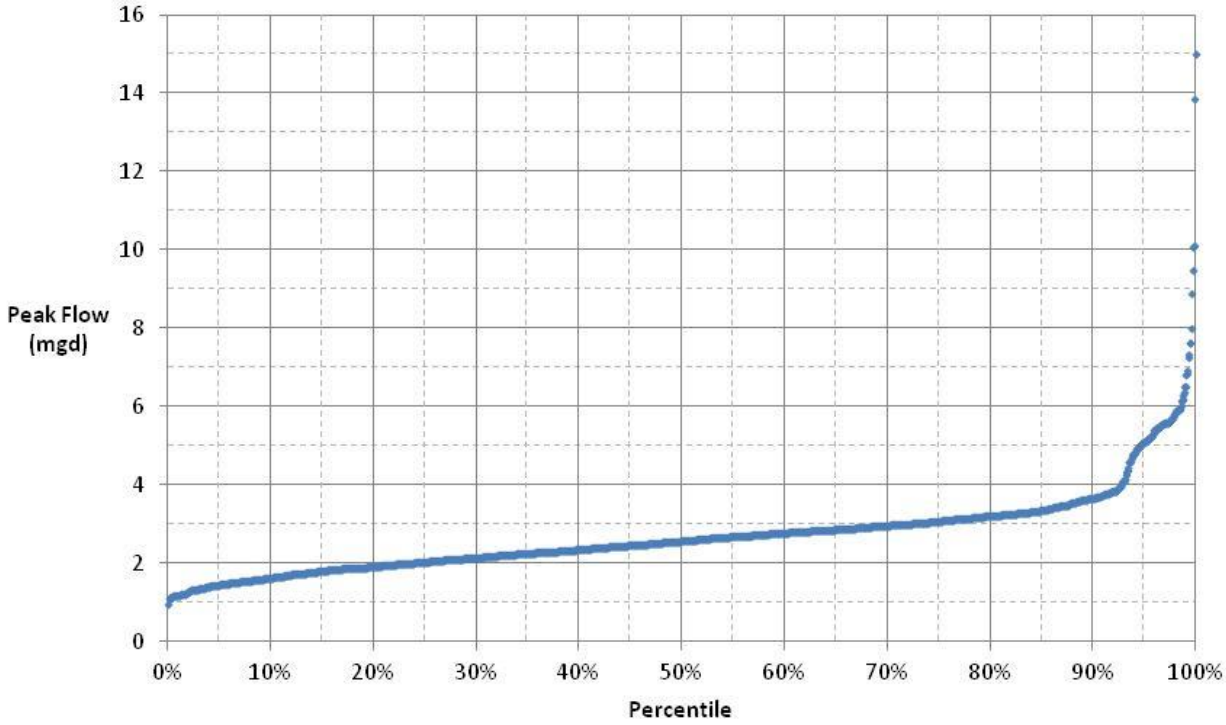


Figure 2: Peak Influent Flow Probability Distribution



Over the past four years, average daily influent flows have never exceeded 7 mgd. Peak flows reported have no duration assigned to them by the data collection system and are simply the highest flow recorded by the influent magnetic flow meter each day whether it lasts for a minute or an hour. Only twice over the four-year period did peak flows exceed the design peak hourly flow rate of 11 mgd.

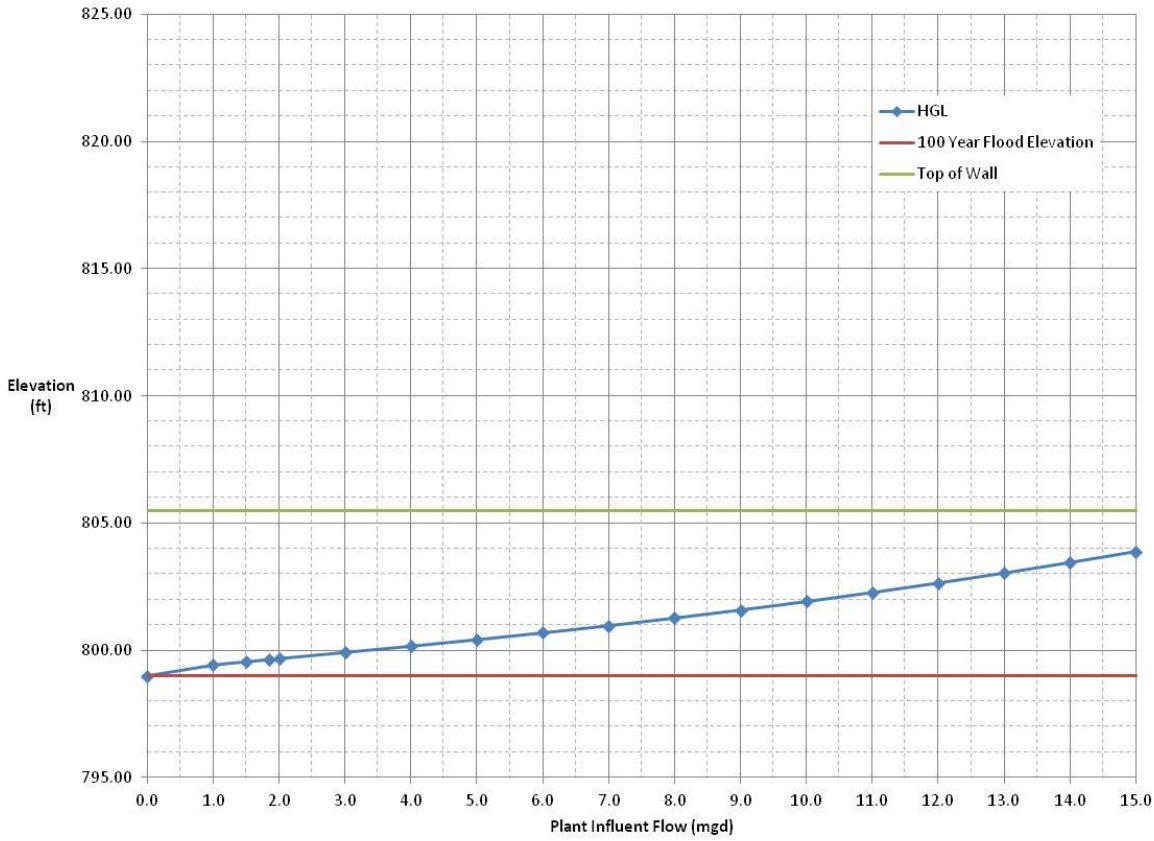
Based on the information provided above and existing plant construction drawings, hydraulic calculations were performed from the plant outfall to the Preliminary Treatment Building for flows ranging from 0-15 mgd. These calculations assume all treatment units are in service and are included in Appendix TM5-A along with a schematic diagram of the plant. Appendix TM5-B contains a copy of the current wet weather operating procedure for the plant.

CHAPTER II –HYDRAULIC ANALYSIS

2.1 OUTFALL PIPE AND EFFLUENT PARSHALL FLUME

Hydraulic calculations are based on a 100-year flood elevation of 799.00 at the Whitewater Creek outfall location which creates submerged flow conditions through the 48” corrugated metal and ductile iron pipes all the way back through the 24” ductile iron pipe to the 18” effluent Parshall flume. Full flow pipe velocities reach 1.85 ft/s in the 48” and 7.39 ft/s in the 24” line at 15 mgd. Despite relatively high velocities in the 24” portion of the outfall, the Parshall flume remains in free flow throughout the range considered. Figure 3 shows the hydraulic grade line (HGL) representing the water surface elevation through the effluent flume channel relative to the top of the structure and the 100-year flood elevation. Headloss through this section is almost entirely due to the flume.

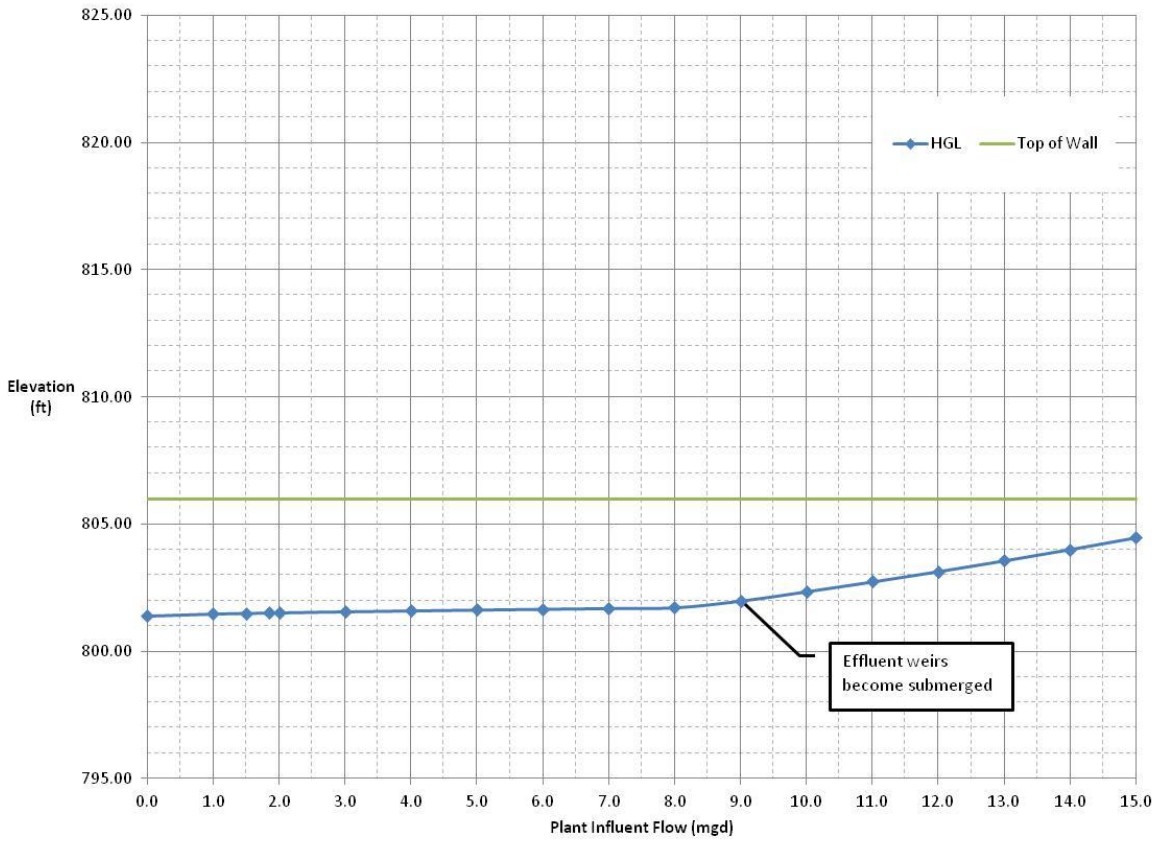
Figure 3: Effluent Flume Hydraulics



2.2 POST AERATION

Headloss through the Post Aeration basins is driven primarily by the two 10 ft long effluent weirs with the water surface beginning to rise more rapidly after the weirs become submerged around 9 mgd as shown in Figure 4

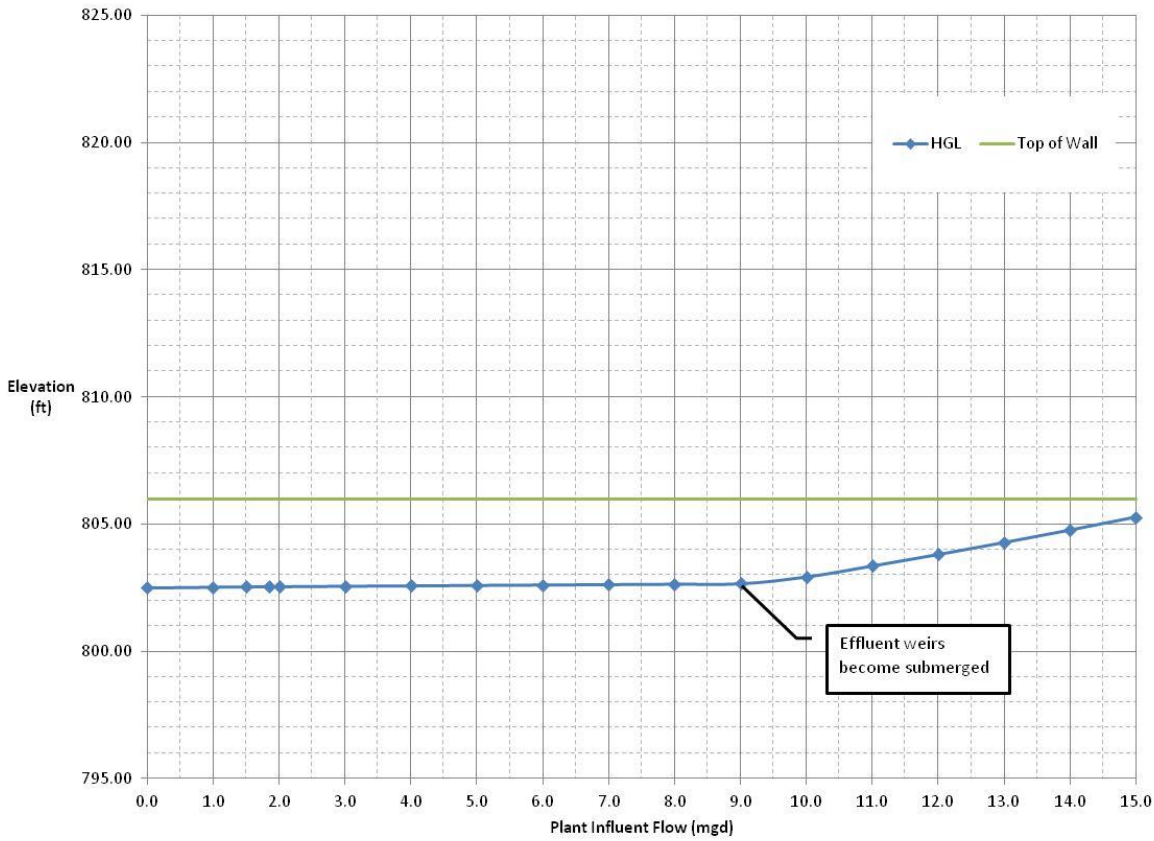
Figure 4: Post Aeration Hydraulics



2.3 UV DISINFECTION

Similar to the Post Aeration Basins, the water level in the UV disinfection basin begins to rise rapidly after the UV effluent weir troughs become submerged around 9 mgd as shown in Figure 5.

Figure 5: UV Disinfection Hydraulics



The UV disinfection system itself is designed to treat 11 mgd.

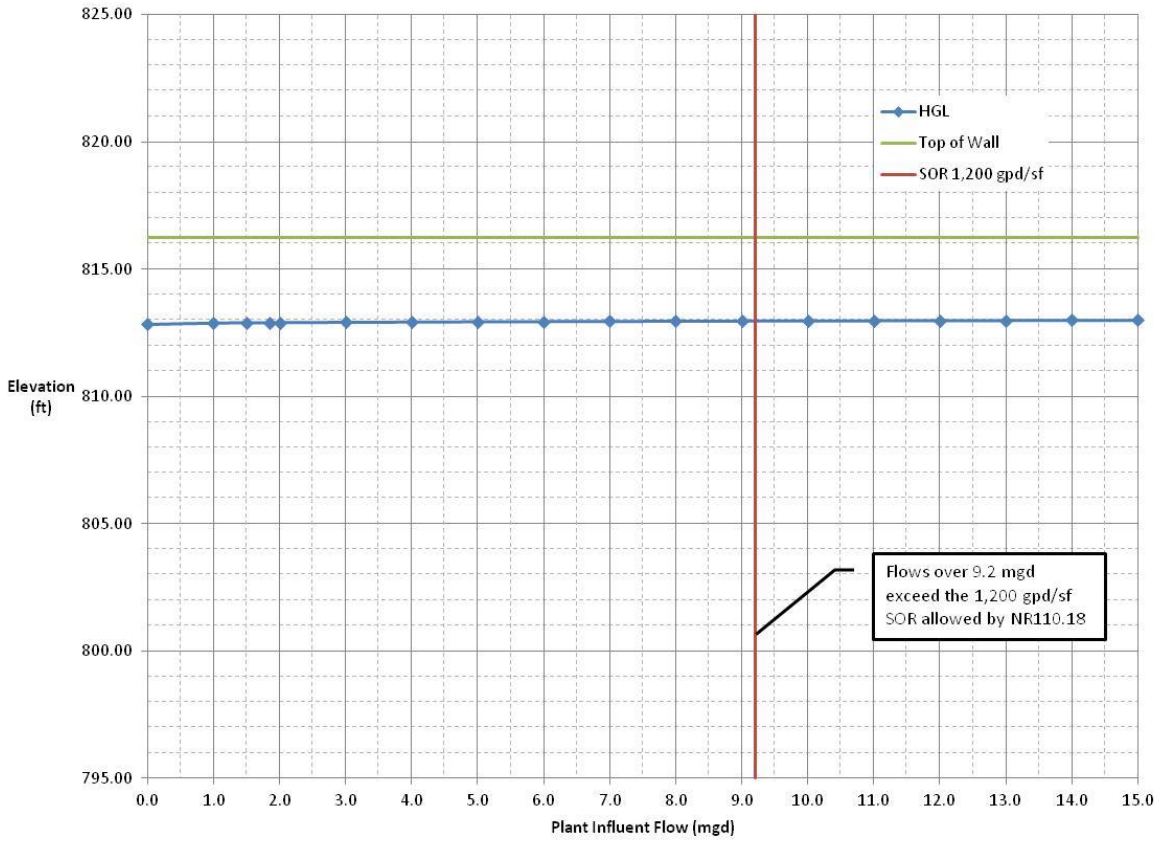
2.4 EFFLUENT FILTERS

The filters are one of the primary hydraulic bottlenecks at the wastewater treatment plant with flows over 4.5 mgd needing to be bypassed around the filters. Actual headloss through filters varies as filter media becomes plugged and filter cells are backwashed. The subsequent hydraulic calculations assume flows in excess of 4.5 mgd are bypassed around the filters to the filter effluent channel.

2.5 SECONDARY CLARIFIERS

The two 70 ft diameter secondary clarifiers have a total surface area of 7,700 square feet, which provides a surface overflow rate of 1,429 gpd/ft^2 at the design peak hour flow rate of 11 mgd. The WAC NR 110.18 sets the maximum hourly surface overflow rate at 1,200 gpd/ft^2, which gives the clarifiers rated peak capacity of 9.2 mgd. The plants wet weather operating procedure in Appendix TM5-B contains provisions for the clarifiers to be partially bypassed in order to preserve treatment during high flows. Figure 6 shows the expected water levels in the secondary clarifiers.

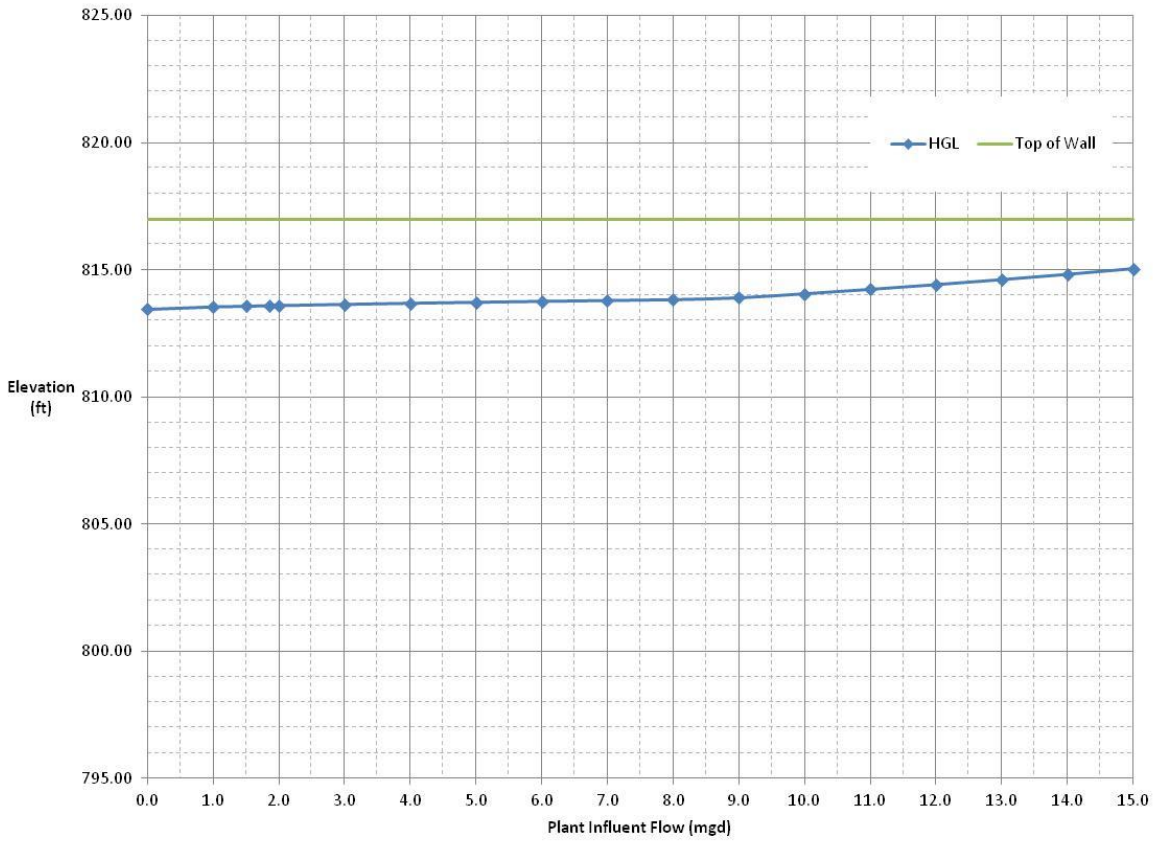
Figure 6: Secondary Clarifier Hydraulics



2.6 SECONDARY CLARIFIER SPLITTER BOX

Two 8 ft long straight edge weirs in the secondary clarifier splitter box divide flow to the two secondary clarifiers. Figure 7 shows the expected water levels in the secondary clarifier splitter box.

Figure 7: Secondary Clarifier Splitter Box Hydraulics



2.7 RBCs

The plant contains six trains of rotating biological contactors (RBCs) housed in three buildings. Trains 1 is currently out of service. Figure 8 shows the expected water levels in the RBC tanks with Train 1 out of service and Figure 9 shows the expected water level with all trains in service.

Figure 8: 4 RBC Trains Hydraulics

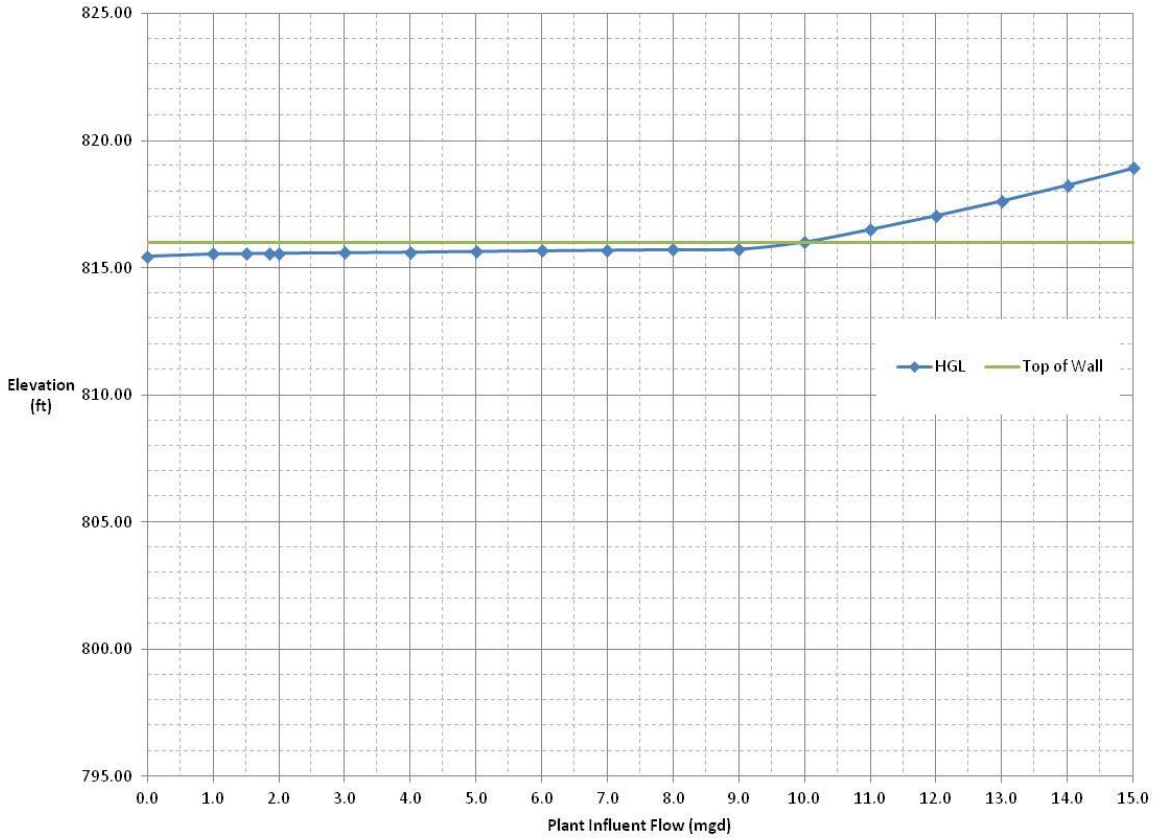
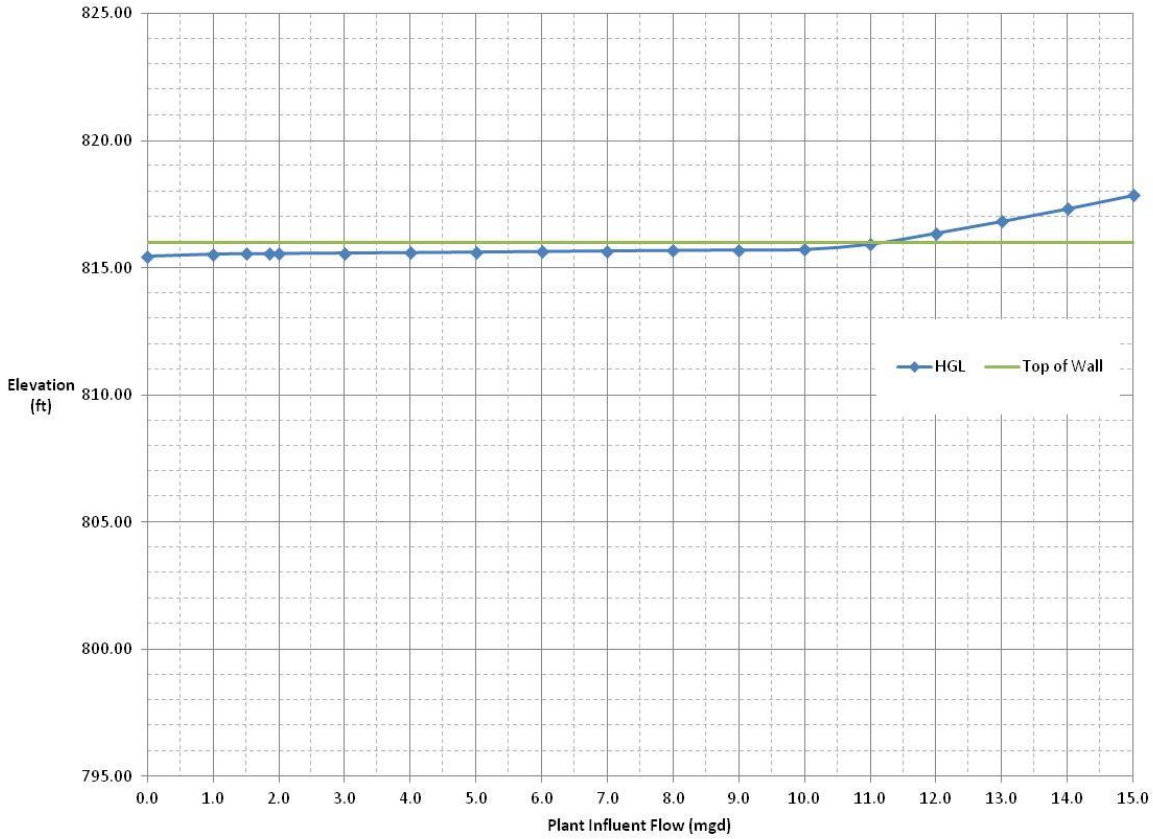


Figure 9: 6 RBC Trains Hydraulics

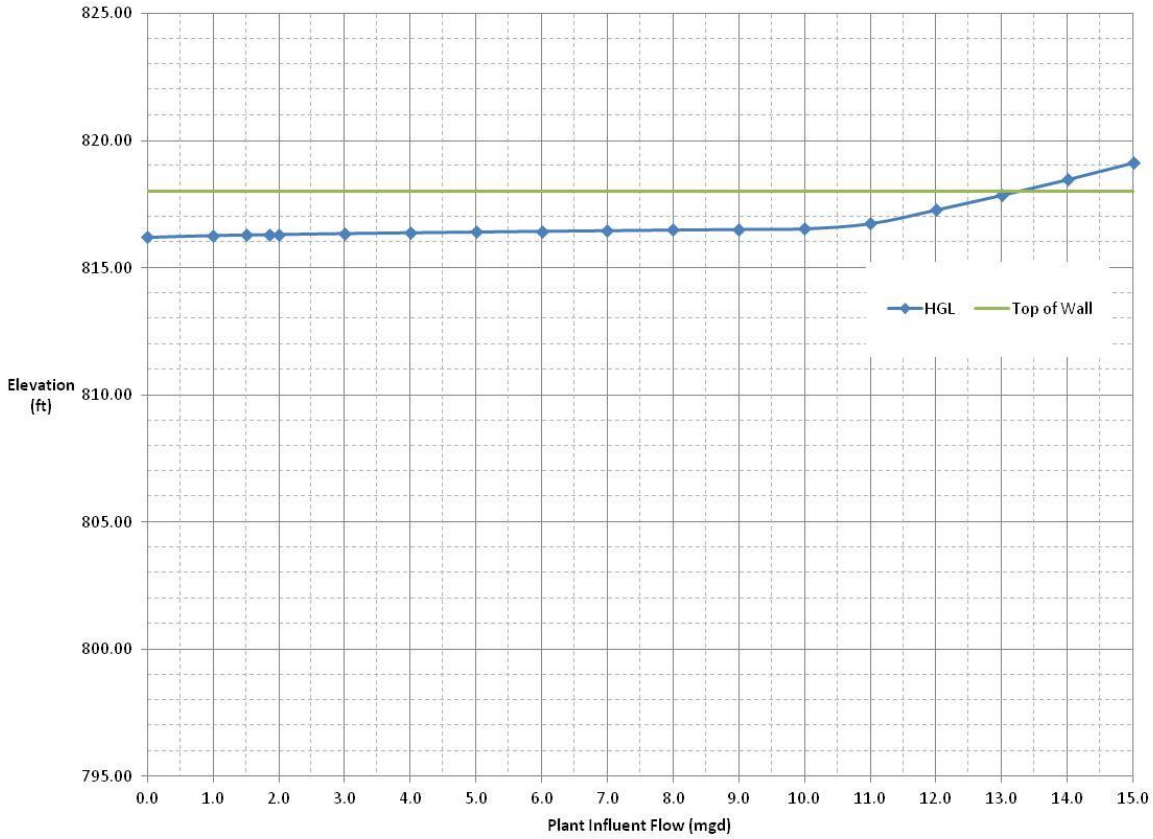


With only 5 trains in service overflows can be expected as plant influent flows begin to exceed 10 mgd, which is reflected in the plant wet weather operating procedure. If all 6 RBC trains are in service overflows can be delayed until approximately 11 mgd. Regardless, the RBC tanks remain a hydraulic bottleneck within the plant. Subsequent hydraulic calculations included in this TM assume all 6 trains are in service.

2.8 RBC SPLITTER BOX

Three 8 ft long straight edge weirs in the RBC splitter box divide flow to the three RBC Buildings. Flow is split between the two trains within each building via a tee fitting in the influent line. Figure 10 shows the expected water levels in the RBC splitter box.

Figure 10: RBC Splitter Box Hydraulics

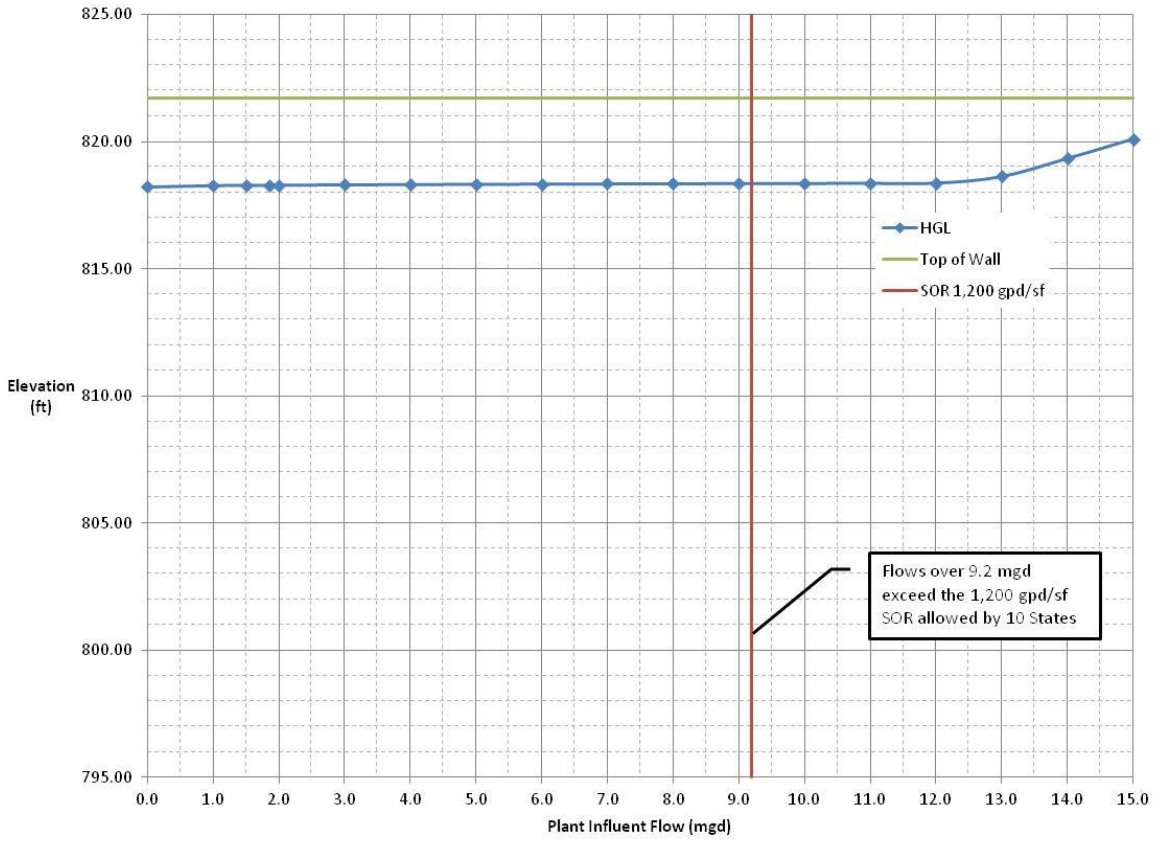


Even with all six trains in service flows begin to overflow the splitter box walls around 13.0 mgd.

2.9 PRIMARY CLARIFIERS

The two 70 ft diameter primary clarifiers have a total surface area of 7,700 square feet, which provides an SOR of 1,429 gpd/ft^2 at the design peak hour flow rate of 11 mgd. The Recommended Standards for Wastewater Facilities (10 States Standards) sets the maximum hourly surface overflow rate at 1,200 gpd/ft^2 for primary clarifiers co-settling secondary sludge, which gives the clarifiers rated peak capacity of 9.2 mgd. Without co-settling the clarifiers would be rated for 1,500 gpd/ft^2 or 11.5 mgd. Figure 11 shows the expected water levels in the primary clarifiers.

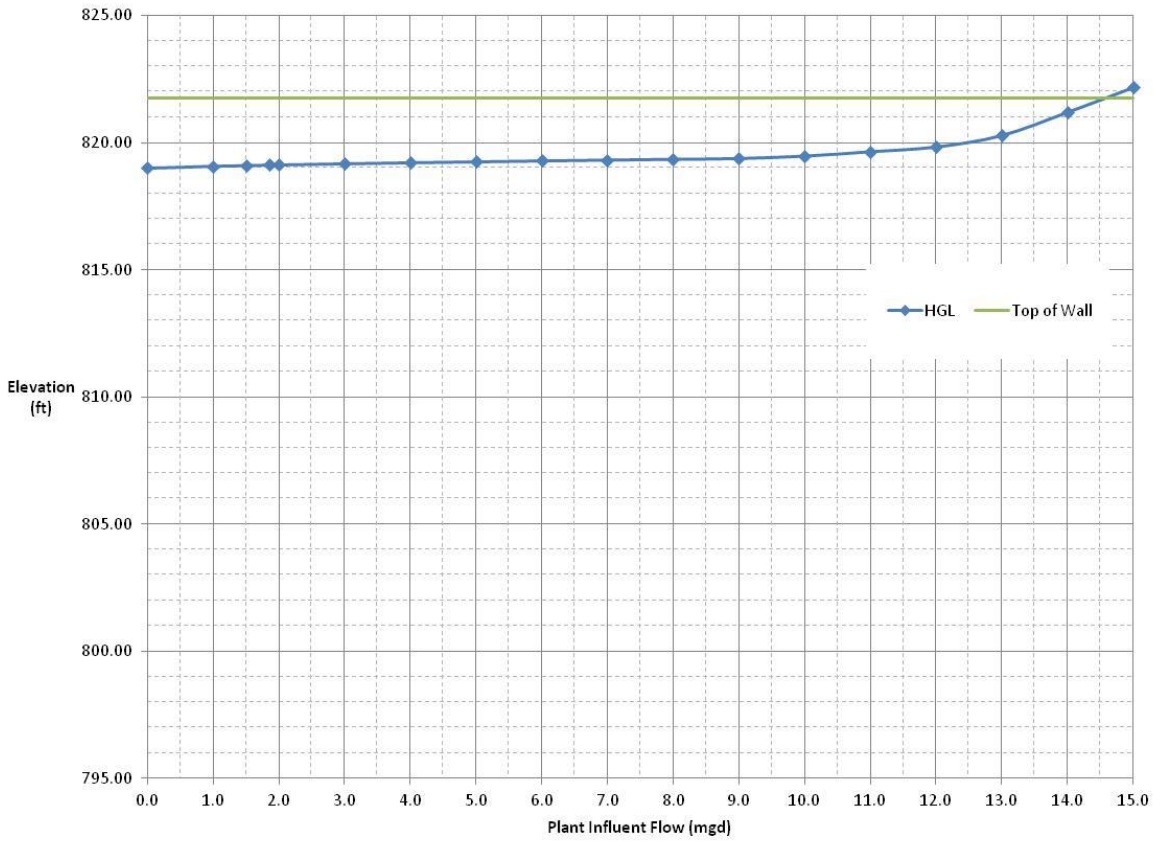
Figure 11: Primary Clarifier Hydraulics



2.10 Primary Clarifier Splitter Box

Two 8 ft long straight edge weirs in the primary clarifier splitter box divide flow to the two primary clarifiers. Figure 12 shows the expected water levels in the secondary clarifier splitter box.

Figure 12: Primary Clarifier Splitter Box Hydraulics

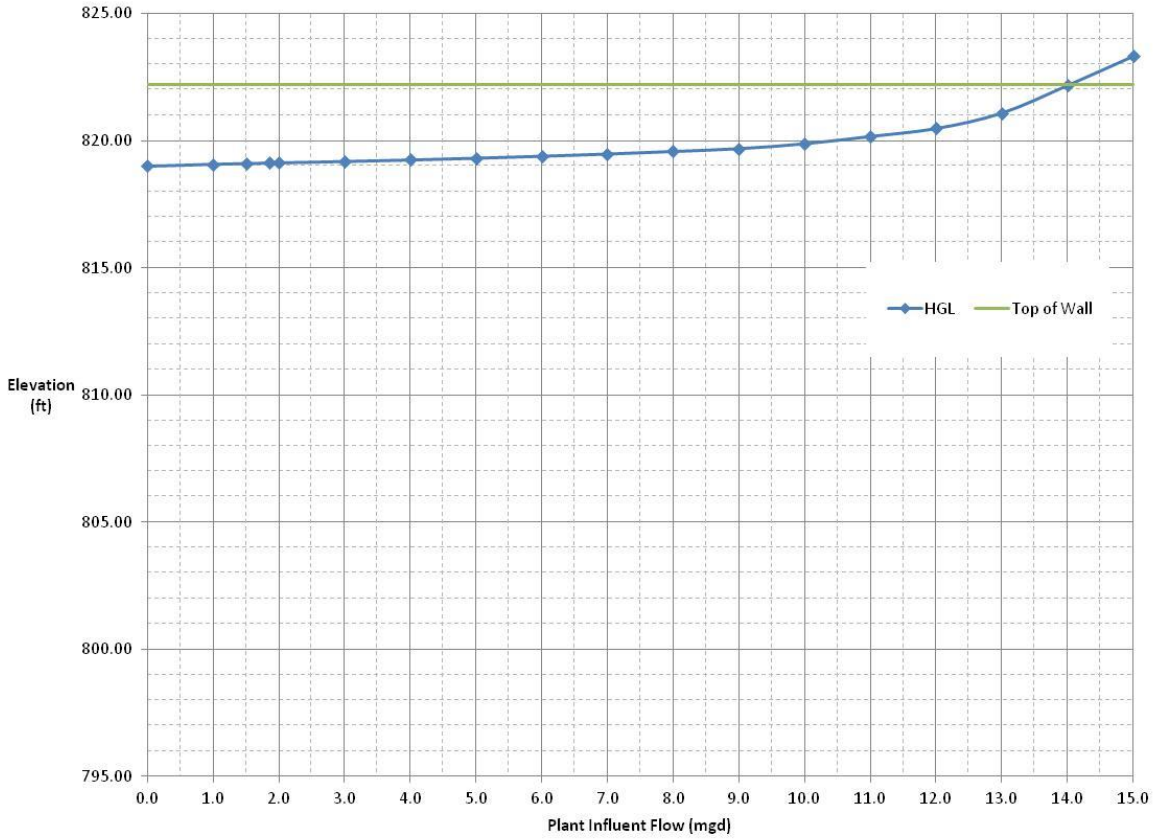


The primary clarifier splitter box will overflow at flows around 14.5 mgd. However, at these high flows downstream weirs throughout the plant are becoming submerged. If hydraulic capacity is increased downstream at the RBCs and secondary clarifiers the primary clarifier splitter box will likely not be a concern.

2.11 GRIT REMOVAL INFLUENT CHANNEL

The rise in water surface elevation from the primary clarifier splitter box to grit chamber influent channel is due primarily to headloss through the 30" primary influent line. Figure 13 shows the expected water levels in the grit chamber influent channel.

Figure 13: Grit Chamber Influent Channel Hydraulics

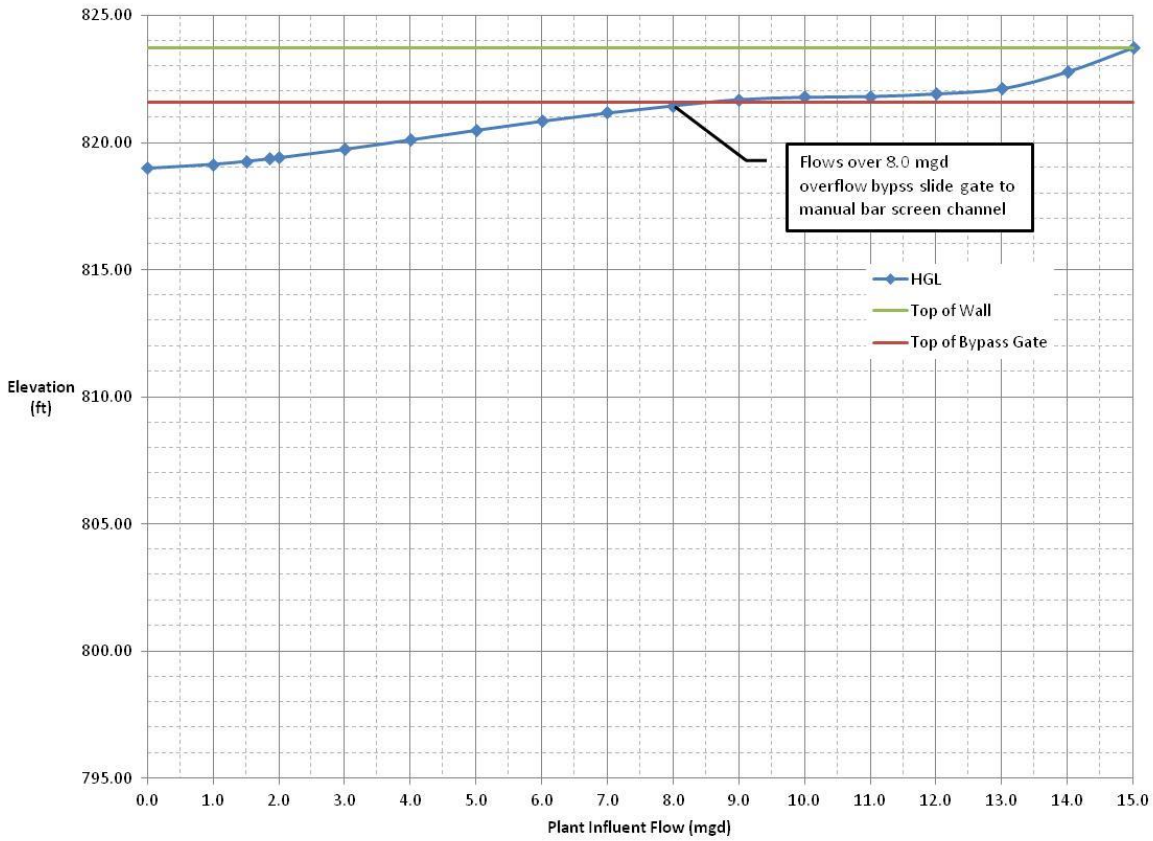


Flows over 13.5 mgd have the potential to overflow the grit chamber influent channel walls depending on the downstream bypassing operations being used. The grit chamber itself is rated for 12 mgd.

2.12 MECHANICAL SCREEN

Hydraulics through the screen are calculated assuming a clean screen field. Actual field conditions will vary greatly as the screen blinds. Figure 14 shows the expected water levels in the screen channel.

Figure 14: Mechanical Screen Hydraulics

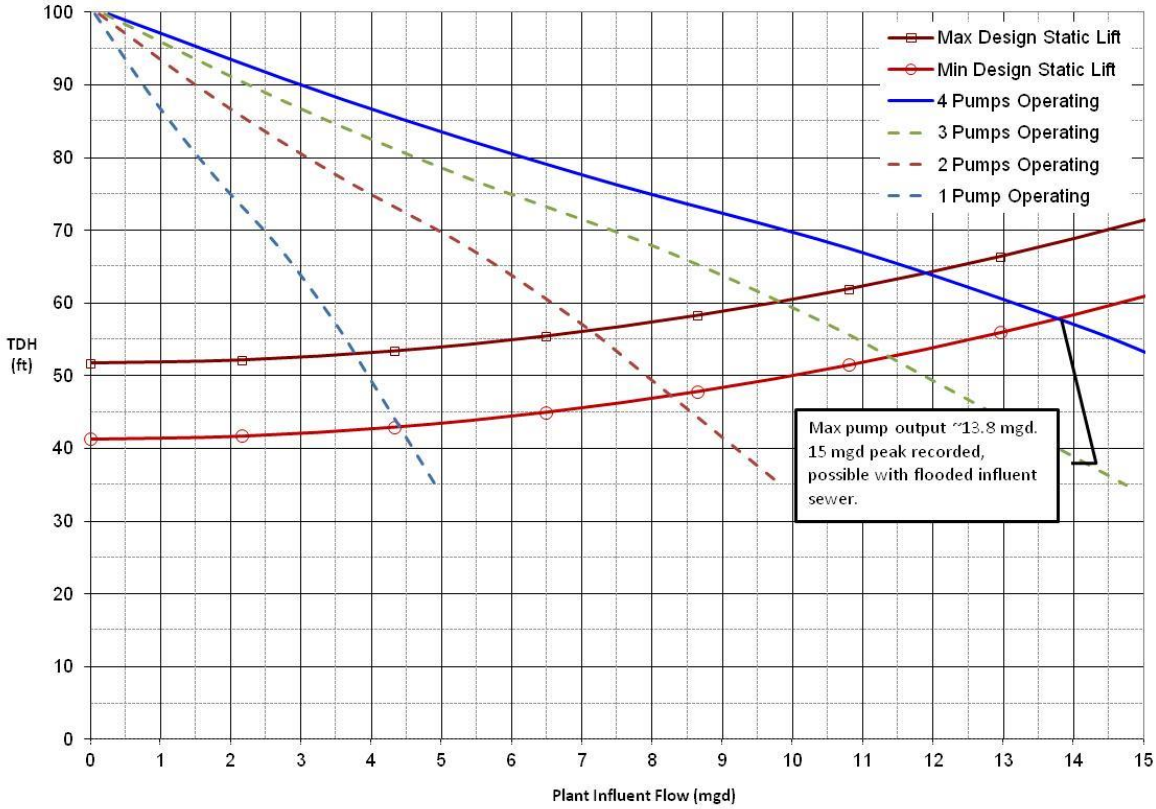


Flows over 8.0 mgd overflow the top of the bypass channel slide gate to the manual bar screen. The screen has manufacturer rated clean water capacity of 10 mgd.

2.13 INFLUENT PUMPS

Raw sewage is pumped to the Preliminary Treatment Building using 4 dry pit submersible pumps designed to produce 11 mgd with one pump out of service. Figure 15 shows the influent pump curves and system curves.

Figure 15: Influent Pump Hydraulics



While the pumps are designed to provide a firm capacity of 11 mgd, peak instantaneous flows up to 15 mgd have been recorded. Flows this high are possible if all four pumps are running at once and the influent sewer is surcharged.

CHAPTER III – CONCLUSIONS

3.1 CONCLUSIONS

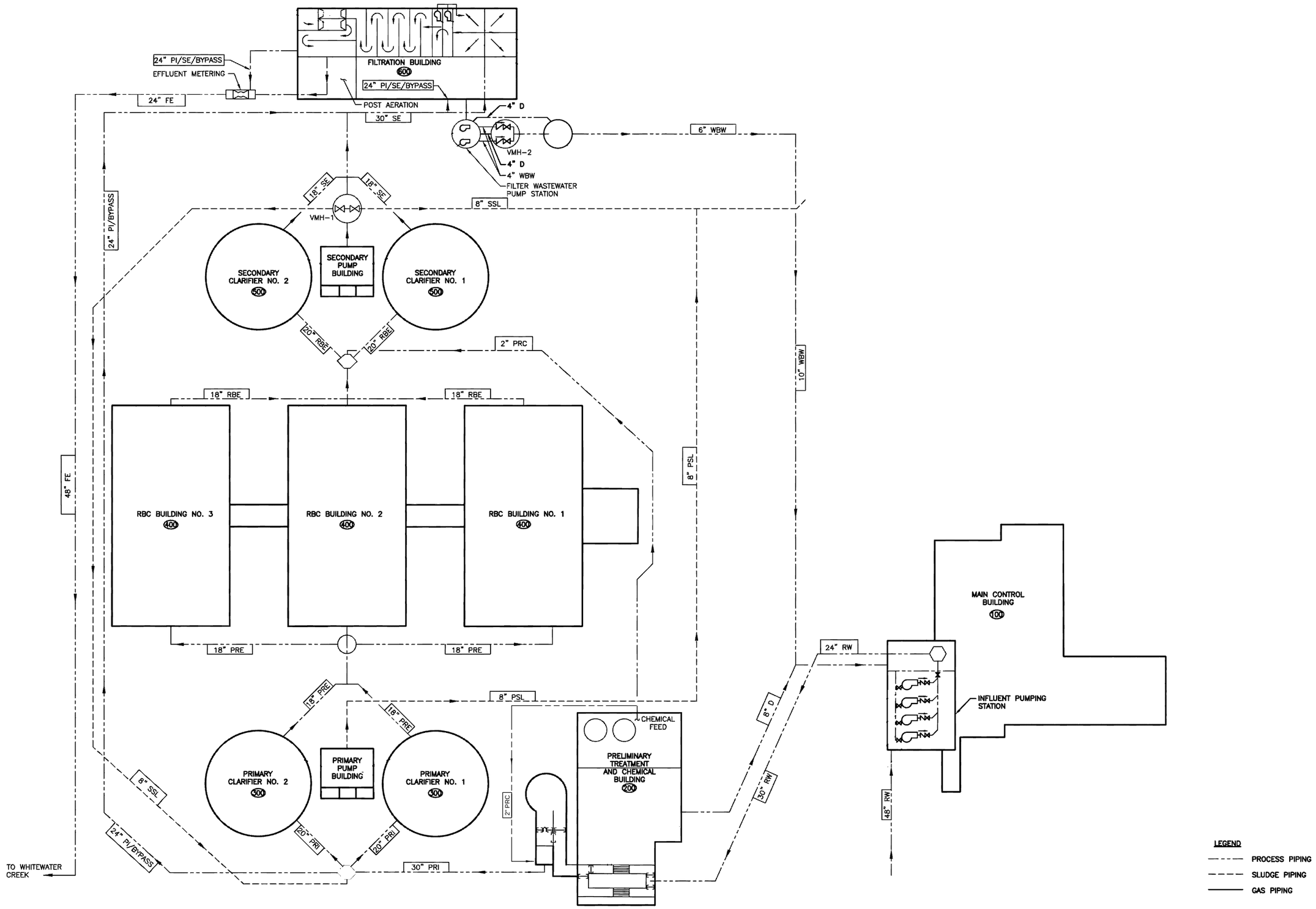
Several primary hydraulic bottlenecks within the existing plant can be identified as shown in Table 2.

Table 2: Hydraulic Bottlenecks

Location	Hydraulic Limitation	Notes
Effluent Filters	4.5 mgd	Additional filter capacity will be evaluated in TM 3.
Mechanical Screen	8.0 mgd	Addition of a second screen should be considered.
RBCs (4 Trains)	8.0 mgd	Secondary treatment will be considered in TM 6.
Secondary Clarifiers	9.2 mgd	Secondary treatment will be considered in TM 6.
Primary Clarifiers	9.2 mgd	If co-settling is discontinued as part of the TM 6 alternatives primary clarifier capacity increases to 11.5 mgd.

There are also several other smaller areas of concern at the RBC splitter box, primary clarifier splitter box, and the grit chamber influent channel. However, these are only issues at higher flows and if considered when making changes to the primary bottlenecks identified can likely be mitigated as part of those improvements.

Appendix TM5-A
Hydraulic Calculations



WASTEWATER TREATMENT PLANT
PIPING SCHEMATIC
CITY OF WHITEWATER
WASTEWATER FACILITY PLAN

WHITEWATER, WISCONSIN

DONOHUE

JULY 2014

12600

City of Whitewater
Wastewater Facility Plan
TM 5 Hydraulics Analysis
Project No. 12600

		START-UP					DESIGN YEAR												
			Max	Max	Peak	Peak		Max	Max	Peak	Peak								
Design Data:		Avg Day	Month	Week	Hour	Instant	Avg Day	Month	Week	Hour	Instant								
Influent Municipal Flows	mgd	**1.50**	**3.10**	**4.20**	**11.00**	**15.00**	**1.85**	**3.80**	**5.20**	**11.00**	**15.00**								
100-Yr Flood Elevation of Whitewater Creek	ft	**799.00**	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00
Filter Capacity	mgd	**4.50**																	
Total Plant Flow	mgd	**0.00**	**1.00**	**1.50**	**1.85**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
Segment from Outfall to MH 77 (48" CMP)																			
Total Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
	gpm	0	694	1,042	1,285	1,389	2,083	2,778	3,472	4,167	4,861	5,556	6,250	6,944	7,639	8,333	9,028	9,722	10,417
	cfs	0.00	1.55	2.32	2.86	3.09	4.64	6.19	7.74	9.28	10.83	12.38	13.93	15.47	17.02	18.57	20.12	21.66	23.21
Diameter	inches	**48.00**	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00
	ft	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Area	sq ft	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57
Wetted Perimeter	ft	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57
Hydraulic Radius	ft	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.12	0.18	0.23	0.25	0.37	0.49	0.62	0.74	0.86	0.99	1.11	1.23	1.35	1.48	1.60	1.72	1.85
Velocity Head	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.05
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00002	0.00002	0.00004	0.00005	0.00006	0.00008	0.00010	0.00012	0.00014	0.00017	0.00019	0.00022
Length	ft	**1,600**	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
"Friction" Headloss	ft	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.04	0.06	0.08	0.10	0.13	0.16	0.19	0.23	0.27	0.31	0.36
K-factor for Exit at Outfall		**1.00**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Sum of K-factors		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.05
Total Headloss	ft	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.18	0.22	0.26	0.31	0.36	0.41
EGL at CMP	ft	799.00	799.00	799.00	799.01	799.01	799.02	799.03	799.05	799.07	799.09	799.12	799.15	799.18	799.22	799.26	799.31	799.36	799.41
HGL at CMP	ft	799.00	799.00	799.00	799.01	799.01	799.01	799.03	799.04	799.06	799.08	799.10	799.13	799.16	799.19	799.23	799.27	799.31	799.36
Segment from MH 77 (48" CMP) to MH (48" DI)																			
Total Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
	gpm	0	694	1,042	1,285	1,389	2,083	2,778	3,472	4,167	4,861	5,556	6,250	6,944	7,639	8,333	9,028	9,722	10,417
	cfs	0.00	1.55	2.32	2.86	3.09	4.64	6.19	7.74	9.28	10.83	12.38	13.93	15.47	17.02	18.57	20.12	21.66	23.21
Diameter	inches	**48.00**	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00
	ft	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Area	sq ft	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57
Wetted Perimeter	ft	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57
Hydraulic Radius	ft	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Roughness Coefficient		**0.024**	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024
Velocity	ft/sec	0.00	0.12	0.18	0.23	0.25	0.37	0.49	0.62	0.74	0.86	0.99	1.11	1.23	1.35	1.48	1.60	1.72	1.85
Velocity Head	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.05
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00000	0.00001	0.00001	0.00002	0.00004	0.00006	0.00010	0.00014	0.00019	0.00025	0.00032	0.00040	0.00048	0.00057	0.00067	0.00078	0.00089
Length	ft	**442**	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442
"Friction" Headloss	ft	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.09	0.11	0.14	0.17	0.21	0.25	0.30	0.34	0.39
K-factor for		**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum of K-factors		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Headloss	ft	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.09	0.11	0.14	0.17	0.21	0.25	0.30	0.34	0.39
EGL at MH	ft	799.00	799.00	799.01	799.01	799.01	799.03	799.06	799.09	799.13	799.17	799.23	799.29	799.36	799.43	799.51	799.60	799.70	799.80
HGL at MH	ft	799.00	799.00	799.01	799.01	799.01	799.03	799.05	799.08	799.12	799.16	799.21	799.27	799.33	799.40	799.48	799.56	799.65	799.75
Segment from MH (48" DI) to MH (24" DI)																			
Total Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
	gpm	0	694	1,042	1,285	1,389	2,083	2,778	3,472	4,167	4,861	5,556	6,250	6,944	7,639	8,333	9,028	9,722	10,417
	cfs	0.00	1.55	2.32	2.86	3.09	4.64	6.19	7.74	9.28	10.83	12.38	13.93	15.47	17.02	18.57	20.12	21.66	23.21
Diameter	inches	**48.00**	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00
	ft	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Area	sq ft	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57
Wetted Perimeter	ft	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57

Total Plant Flow	mgd	**0.00**	**1.00**	**1.50**	**1.85**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
Hydraulic Radius	ft	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.12	0.18	0.23	0.25	0.37	0.49	0.62	0.74	0.86	0.99	1.11	1.23	1.35	1.48	1.60	1.72	1.85
Velocity Head	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.05
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00002	0.00002	0.00004	0.00005	0.00006	0.00008	0.00010	0.00012	0.00014	0.00017	0.00019	0.00022
Length	ft	**532**	532	532	532	532	532	532	532	532	532	532	532	532	532	532	532	532	532
"Friction" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.06	0.08	0.09	0.10	0.12
K-factor for 90 Deg MH		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for 90 Deg MH		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Sum of K-factors		0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03
Total Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.11	0.13	0.15
EGL at MH	ft	799.00	799.00	799.01	799.01	799.02	799.04	799.07	799.11	799.15	799.21	799.27	799.34	799.42	799.51	799.61	799.72	799.83	799.95
HGL at MH	ft	799.00	799.00	799.01	799.01	799.02	799.04	799.06	799.10	799.14	799.20	799.26	799.32	799.40	799.48	799.58	799.68	799.78	799.90
Segment from MH (24" DI) to Effluent Flume																			
Total Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
	gpm	0	694	1,042	1,285	1,389	2,083	2,778	3,472	4,167	4,861	5,556	6,250	6,944	7,639	8,333	9,028	9,722	10,417
	cfs	0.00	1.55	2.32	2.86	3.09	4.64	6.19	7.74	9.28	10.83	12.38	13.93	15.47	17.02	18.57	20.12	21.66	23.21
Diameter	inches	**24.00**	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
	ft	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Area	sq ft	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
Wetted Perimeter	ft	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28
Hydraulic Radius	ft	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.49	0.74	0.91	0.99	1.48	1.97	2.46	2.96	3.45	3.94	4.43	4.93	5.42	5.91	6.40	6.90	7.39
Velocity Head	ft	0.00	0.00	0.01	0.01	0.02	0.03	0.06	0.09	0.14	0.18	0.24	0.31	0.38	0.46	0.54	0.64	0.74	0.85
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00004	0.00009	0.00014	0.00016	0.00036	0.00064	0.00100	0.00144	0.00195	0.00255	0.00323	0.00399	0.00482	0.00574	0.00674	0.00781	0.00897
Length	ft	**130**	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
"Friction" Headloss	ft	0.00	0.01	0.01	0.02	0.02	0.05	0.08	0.13	0.19	0.25	0.33	0.42	0.52	0.63	0.75	0.88	1.02	1.17
K-factor for 24" x 48" Red		**0.05**	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
K-factor for Entrance		**0.50**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Sum of K-factors		0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
"Minor" Headloss	ft	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47
Total Headloss	ft	0.00	0.01	0.02	0.02	0.03	0.07	0.12	0.18	0.26	0.36	0.46	0.59	0.73	0.88	1.04	1.23	1.42	1.63
EGL at Flume Outlet	ft	799.00	799.01	799.03	799.04	799.05	799.10	799.18	799.29	799.41	799.56	799.74	799.93	800.15	800.39	800.65	800.94	801.25	801.58
HGL at Flume Outlet	ft	799.00	799.01	799.02	799.03	799.03	799.07	799.12	799.19	799.28	799.38	799.49	799.63	799.77	799.93	800.11	800.30	800.51	800.74
Effluent Flume Channel																			
Total Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
	gpm	0	694	1,042	1,285	1,389	2,083	2,778	3,472	4,167	4,861	5,556	6,250	6,944	7,639	8,333	9,028	9,722	10,417
	cfs	0.00	1.55	2.32	2.86	3.09	4.64	6.19	7.74	9.28	10.83	12.38	13.93	15.47	17.02	18.57	20.12	21.66	23.21
Flume Invert Elevation	ft	**799.25**	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25
Headloss Through 18" Parshall Flume (Free Flow) Ha	ft	0.00	0.41	0.54	0.62	0.65	0.85	1.02	1.18	1.33	1.47	1.60	1.73	1.85	1.97	2.08	2.20	2.30	2.41
Downstream Depth Hb	ft	NA	NA	NA	NA	NA	NA	NA	NA	0.03	0.13	0.24	0.38	0.52	0.68	0.86	1.05	1.26	1.49
Parshall Flume Submergence (Hb/Ha)	ft	NA	NA	NA	NA	NA	NA	NA	NA	0.02	0.09	0.15	0.22	0.28	0.35	0.41	0.48	0.55	0.62
Parshall in Free Flow (Submergence < 0.70)?	ft	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Channel Invert Elevation	ft	**799.25**	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25	799.25
Channel Width	ft	**3.5**	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
Channel Length	ft	**14**	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Depth of Flow in Channel	ft	0.00	0.41	0.54	0.62	0.65	0.85	1.02	1.18	1.33	1.47	1.60	1.73	1.85	1.97	2.08	2.20	2.30	2.41
Area of Flow in Channel	sf	0.00	1.45	1.89	2.16	2.28	2.96	3.57	4.13	4.65	5.14	5.60	6.05	6.48	6.89	7.30	7.68	8.06	8.43
Wetted Perimeter in Channel	ft	3.50	4.33	4.58	4.74	4.80	5.19	5.54	5.86	6.16	6.44	6.70	6.96	7.20	7.44	7.67	7.89	8.11	8.32
Hydraulic Radius	ft	0.000	0.335	0.412	0.457	0.474	0.570	0.645	0.705	0.755	0.798	0.836	0.870	0.900	0.927	0.951	0.974	0.995	1.014
Velocity of Flow in Channel	ft/sec	0.00	1.07	1.23	1.32	1.36	1.57	1.73	1.87	2.00	2.11	2.21	2.30	2.39	2.47	2.55	2.62	2.69	2.75
Velocity Head	ft	0.00	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.08	0.09	0.09	0.10	0.11	0.11	0.12
Roughness Coefficient, Manning n		**0.015**	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Unit Headloss(ft/ft)		0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Friction Headloss	ft	0.000	0.007	0.007	0.007	0.007	0.007	0.008	0.008	0.008	0.009	0.009	0.009	0.009	0.010	0.010	0.010	0.010	0.011
EGL at UV Effluent Channel Inlet	ft	799.00	799.43	799.57	799.66	799.70	799.96	800.21	800.47	800.75	801.04	801.35	801.67	802.01	802.37	802.75	803.15	803.57	804.00
HGL at UV Effluent Channel Inlet	ft	799.00	799.42	799.55	799.64	799.67	799.92	800.17	800.42	800.69	800.97	801.27	801.59	801.92	802.27	802.65	803.04	803.45	803.89
Top of Wall at Effluent Channel	ft	**805.5**	805.5	805.5	805.5	805.5	805.5	805.5	805.5	805.5	805.5	805.5	805.5	805.5	805.5	805.5	805.5	805.5	805.5
Segment from Effluent Flume Channel to Post Aeration Effluent Channel																			
Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
Channel Invert Elevation	ft	**799.00**	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00	799.00

Total Plant Flow	mgd	**0.00**	**1.00**	**1.50**	**1.85**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
Channel Width	ft	**3.00**	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Channel Length	ft	**49.00**	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00
Depth of Flow in Channel	ft	0.00	0.42	0.55	0.64	0.67	0.92	1.17	1.42	1.69	1.97	2.27	2.59	2.92	3.27	3.65	4.04	4.45	4.89
Area of Flow in Channel	sf	0.00	1.25	1.65	1.91	2.02	2.76	3.50	4.26	5.06	5.91	6.81	7.76	8.76	9.82	10.94	12.12	13.36	14.66
Wetted Perimeter in Channel	ft	3.00	3.83	4.10	4.27	4.35	4.84	5.33	5.84	6.38	6.94	7.54	8.17	8.84	9.55	10.30	11.08	11.91	12.77
Hydraulic Radius	ft	0.00	0.33	0.40	0.45	0.47	0.57	0.66	0.73	0.79	0.85	0.90	0.95	0.99	1.03	1.06	1.09	1.12	1.15
Velocity of Flow in Channel	ft/sec	0.00	1.24	1.41	1.50	1.53	1.68	1.77	1.82	1.83	1.83	1.82	1.79	1.77	1.73	1.70	1.66	1.62	1.58
Velocity Head	ft	0.00	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04
Roughness Coefficient, Manning n		**0.015**	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Unit Headloss(ft/ft)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
"Friction" Headloss	ft	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
K-factor for Reduction		**0.20**	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Sum of K-factors		**0.20**	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Headloss	ft	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
EGL in Post Aeration Effluent Channel	ft	799.00	799.47	799.61	799.70	799.74	799.99	800.24	800.50	800.77	801.06	801.36	801.69	802.03	802.38	802.76	803.16	803.58	804.02
HGL in Post Aeration Effluent Channel	ft	799.00	799.44	799.57	799.66	799.70	799.94	800.19	800.45	800.72	801.01	801.31	801.64	801.98	802.34	802.72	803.12	803.54	803.98
Top of Wall at Post Aeration Effluent Channel	ft	**806.00**	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00
Post Aeration Basin																			
Number of Post Aeration Basins		**1**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total Plant Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
Flow Through Each Post Aeration Basin	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
Post Aeration Basin Top of Wall Elevation		**806.00**	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00
Post Aeration Basin Weir Elevation	ft	**801.40**	801.40	801.40	801.40	801.40	801.40	801.40	801.40	801.40	801.40	801.40	801.40	801.40	801.40	801.40	801.40	801.40	801.40
Length of Straight Edge Weir Each Basin	ft	**20.00**	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Weir Submerged		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Headloss Over Each Weir	ft	0.00	0.08	0.11	0.12	0.13	0.17	0.21	0.24	0.27	0.30	0.33	0.35	0.38	0.40	0.43	0.45	0.47	0.50
HGL in Post Aeration Basin	ft	801.40	801.48	801.51	801.52	801.53	801.57	801.61	801.64	801.67	801.70	801.73	801.99	802.36	802.74	803.14	803.57	804.01	804.47
Bypass Channel																			
Number of Bypass Channels		**1**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total Plant Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
Flow Through Each Bypass Channel	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
Post Aeration Basin Top of Wall Elevation		**806.00**	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00
Bypass Channel Weir Elevation	ft	**801.75**	801.75	801.75	801.75	801.75	801.75	801.75	801.75	801.75	801.75	801.75	801.75	801.75	801.75	801.75	801.75	801.75	801.75
Length of Straight Edge Weir Each Basin	ft	**20.00**	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Weir Submerged		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Headloss Over Each Weir	ft	0.00	0.08	0.11	0.12	0.13	0.17	0.21	0.24	0.27	0.30	0.33	0.35	0.38	0.40	0.43	0.45	0.47	0.50
HGL in Bypass Channel	ft	801.75	801.83	801.86	801.87	801.88	801.92	801.96	801.99	802.02	802.05	802.08	802.34	802.73	803.14	803.57	804.02	804.48	804.97
UV Effluent Basin																			
Number of Existing Inlet Gates Per Basin		**1.00**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Width of Each Existing Gate	ft	**4.00**	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Height of Each Existing Gate	ft	**4.00**	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Area of Each Existing Gate	sf	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Number of New Inlet Gates Per Basin		**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Width of Each New Gate	ft	**4.00**	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Height of Each New Gate	ft	**4.00**	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Area of Each New Gate	sf	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Total Area of Gate Openings Per Basin	sf	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Flow Thru Gates Per Basin	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
Velocity Through Gates	ft/sec	0.00	0.10	0.15	0.18	0.19	0.29	0.39	0.48	0.58	0.68	0.77	0.87	0.97	1.06	1.16	1.26	1.35	1.45
Velocity Head	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03
K-factor for Headloss Through Gates		**2.000**	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Headloss Through Gates	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.04	0.05	0.06	0.07
EGL Upstream of Gates	ft	801.75	801.83	801.86	801.87	801.88	801.92	801.96	802.00	802.03	802.06	802.09	802.36	802.76	803.18	803.61	804.07	804.54	805.03
HGL Upstream of Gates	ft	801.75	801.83	801.86	801.87	801.88	801.92	801.96	801.99	802.02	802.06	802.08	802.35	802.75	803.16	803.59	804.04	804.51	805.00
UV Effluent Weir Troughs																			
Number		**2.5**	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Length of Each Trough	ft	**26.00**	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
Weir Length on Each Trough	ft	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
Total Long Trough Weir Length	ft	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00
Flow In Each Trough	mgd	0.00	0.40	0.60	0.74	0.80	1.20	1.60	2.00	2.40	2.80	3.20	3.60	4.00	4.40	4.80	5.20	5.60	6.00
Trough Width	ft	**1.00**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Total Plant Flow	mgd	**0.00**	**1.00**	**1.50**	**1.85**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
Trough Invert Elevation	ft	**800.00**	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00
Critical Depth (HC) at West End	ft	0.00	0.23	0.30	0.34	0.36	0.47	0.58	0.67	0.75	0.84	0.91	0.99	1.06	1.13	1.20	1.26	1.33	1.39
Depth (H0) at East End	ft	0.00	0.39	0.52	0.60	0.63	0.82	1.00	1.15	1.30	1.44	1.58	1.71	1.83	1.95	2.07	2.18	2.29	2.40
HGL at West End	ft	800.00	800.23	800.30	800.34	800.36	800.47	800.58	800.67	800.75	800.84	800.91	800.99	801.06	801.13	801.20	801.26	801.33	801.39
HGL at East End	ft	800.00	800.39	800.52	800.60	800.63	800.82	801.00	801.15	801.30	801.44	801.58	801.71	801.83	801.95	802.07	802.18	802.29	802.40
Upstream of Troughs																			
Total Weir Length	ft	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00
Weir Elevation	ft	**802.50**	802.50	802.50	802.50	802.50	802.50	802.50	802.50	802.50	802.50	802.50	802.50	802.50	802.50	802.50	802.50	802.50	802.50
Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
Weir Submerged		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Head on Weir	ft	0.000	0.023	0.031	0.035	0.037	0.049	0.059	0.068	0.077	0.086	0.093	0.101	0.108	0.116	0.123	0.129	0.136	0.142
HGL in UV Effluent Channel	ft	802.50	802.52	802.53	802.54	802.54	802.55	802.56	802.57	802.58	802.59	802.59	802.60	802.86	803.28	803.71	804.17	804.65	805.14
UV Channel																			
Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
Channel Invert Elevation	ft	**799.95**	799.95	799.95	799.95	799.95	799.95	799.95	799.95	799.95	799.95	799.95	799.95	799.95	799.95	799.95	799.95	799.95	799.95
Channel Width	ft	**6.00**	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Channel Length	ft	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Depth of Flow in Channel	ft	2.55	2.57	2.58	2.59	2.59	2.60	2.61	2.62	2.63	2.64	2.64	2.65	2.91	3.33	3.76	4.22	4.70	5.19
Area of Flow in Channel	sf	15.30	15.44	15.48	15.51	15.52	15.59	15.65	15.71	15.76	15.81	15.86	15.91	17.44	19.96	22.58	25.32	28.18	31.15
Wetted Perimeter in Channel	ft	11.10	11.15	11.16	11.17	11.17	11.20	11.22	11.24	11.25	11.27	11.29	11.30	11.81	12.65	13.53	14.44	15.39	16.38
Hydraulic Radius	ft	1.38	1.39	1.39	1.39	1.39	1.39	1.40	1.40	1.40	1.40	1.41	1.41	1.48	1.58	1.67	1.75	1.83	1.90
Velocity of Flow in Channel	ft/sec	0.00	0.10	0.15	0.18	0.20	0.30	0.40	0.49	0.59	0.68	0.78	0.88	0.89	0.85	0.82	0.79	0.77	0.74
Velocity Head	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Roughness Coefficient, Manning n		**0.015**	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Unit Headloss(ft/ft)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
"Friction" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K-factor for Reduction		**0.20**	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
K-factor for Reduction		**0.20**	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
K-factor for Reduction		**0.20**	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
K-factor for Reduction		**0.20**	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
K-factor for 90 Deg Bend		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for 90 Deg Bend		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for 90 Deg Bend		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for 90 Deg Bend		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Sum of K-factors		**2.00**	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Headloss for UV Equipment		0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.10	0.11	0.12	0.14	0.15
Total Headloss	ft	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.10	0.11	0.12	0.14	0.15
EGL Upstream of UV	ft	802.50	802.53	802.54	802.55	802.55	802.57	802.58	802.60	802.62	802.64	802.66	802.67	802.94	803.37	803.82	804.29	804.78	805.29
HGL Upstream of UV	ft	802.50	802.53	802.54	802.54	802.55	802.57	802.58	802.60	802.61	802.63	802.65	802.66	802.93	803.36	803.81	804.28	804.77	805.28
Top of Wall Up stream of UV	ft	**806.00**	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00
Filter Backwash Storage Basin																			
Number of Weir Troughs		**2.0**	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Length of Each Trough	ft	**15.00**	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Weir Length on Each Trough	ft	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Total Long Trough Weir Length	ft	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Flow In Each Trough	mgd	0.00	0.50	0.75	0.93	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
Trough Width	ft	**1.50**	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Trough Invert Elevation	ft	**800.50**	800.50	800.50	800.50	800.50	800.50	800.50	800.50	800.50	800.50	800.50	800.50	800.50	800.50	800.50	800.50	800.50	800.50
Critical Depth (HC) at West End	ft	0.00	0.20	0.26	0.30	0.32	0.42	0.51	0.59	0.67	0.74	0.81	0.87	0.94	1.00	1.06	1.12	1.17	1.23
Depth (H0) at East End	ft	0.00	0.35	0.46	0.53	0.56	0.73	0.88	1.02	1.15	1.28	1.40	1.51	1.62	1.73	1.83	1.93	2.03	2.13
HGL at West End	ft	800.50	800.70	800.76	800.80	800.82	800.92	801.01	801.09	801.17	801.24	801.31	801.37	801.44	801.50	801.56	801.62	801.67	801.73
HGL at East End	ft	800.50	800.85	800.96	801.03	801.06	801.23	801.38	801.52	801.65	801.78	801.90	802.01	802.12	802.23	802.33	802.43	802.53	802.63
Upstream of Troughs																			
Total Weir Length	ft	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Weir Elevation	ft	**803.00**	803.00	803.00	803.00	803.00	803.00	803.00	803.00	803.00	803.00	803.00	803.00	803.00	803.00	803.00	803.00	803.00	803.00
Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
Weir Submerged		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
Head on Weir	ft	0.000	0.039	0.051	0.059	0.062	0.081	0.099	0.114	0.129	0.143	0.157	0.169	0.182	0.194	0.205	0.216	0.227	0.238
HGL in Filter Backwash Sorage Basin	ft	803.00	803.04	803.05	803.06	803.06	803.08	803.10	803.11	803.13	803.14	803.16	803.17	803.18	803.55	804.02	804.50	805.00	805.52

West Filter Effluent Channel

Total Plant Flow	mgd	**0.00**	**1.00**	**1.50**	**1.85**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
Number of Existing Inlets Per Basin		**2.00**	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Diameter of Existing Openings	ft	**3.00**	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Area of Each Existing Gate	sf	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07
Total Area of Gate Openings Per Basin	sf	14.14	14.14	14.14	14.14	14.14	14.14	14.14	14.14	14.14	14.14	14.14	14.14	14.14	14.14	14.14	14.14	14.14	14.14
Flow Thru Inlet Per Basin	mgd	0.00	0.50	0.75	0.93	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
Velocity Through Inlets	ft/sec	0.00	0.05	0.08	0.10	0.11	0.16	0.22	0.27	0.33	0.38	0.44	0.49	0.55	0.60	0.66	0.71	0.77	0.82
Velocity Head	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
K-factor for Headloss Through Openings		**2.00**	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Headloss Through Gates	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
EGL Upstream of Gates	ft	803.00	803.04	803.05	803.06	803.06	803.08	803.10	803.12	803.13	803.15	803.16	803.18	803.19	803.57	804.03	804.52	805.02	805.54
HGL Upstream of Gates	ft	803.00	803.04	803.05	803.06	803.06	803.08	803.10	803.12	803.13	803.15	803.16	803.17	803.19	803.56	804.02	804.51	805.01	805.53
Filter Building Floor Elevation	ft	**806.00**	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00
East Filter Effluent Channel																			
Number of Channels		**1**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Flow Through Filters	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
Flow Through Each Channel	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
Filter Building Floor Elevation		**806.00**	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00	806.00
Channel Weir Elevation	ft	**803.32**	803.32	803.32	803.32	803.32	803.32	803.32	803.32	803.32	803.32	803.32	803.32	803.32	803.32	803.32	803.32	803.32	803.32
Length of Broad Crested Weir Each Channel	ft	**20.00**	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Weir Submerged		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
Headloss Over Each Weir	ft	0.00	0.09	0.12	0.14	0.15	0.20	0.24	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
HGL in Channel	ft	803.32	803.41	803.44	803.46	803.47	803.52	803.56	803.58	803.58	803.58	803.58	803.58	803.58	803.82	804.28	804.76	805.27	805.79
Filter Inlet to Filter Bypass																			
Filter Inlet Pipe Outlet Elevation	ft	**810.92**	810.92	810.92	810.92	810.92	810.92	810.92	810.92	810.92	810.92	810.92	810.92	810.92	810.92	810.92	810.92	810.92	810.92
Total Flow Through Filters	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
	gpm	0	694	1,042	1,285	1,389	2,083	2,778	3,125	3,125	3,125	3,125	3,125	3,125	3,125	3,125	3,125	3,125	3,125
	cfs	0.00	1.55	2.32	2.86	3.09	4.64	6.19	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96	6.96
Diameter	inches	**30.00**	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
	ft	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Area	sq ft	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91
Wetted Perimeter	ft	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85
Hydraulic Radius	ft	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.32	0.47	0.58	0.63	0.95	1.26	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42
Velocity Head	ft	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00001	0.00003	0.00004	0.00005	0.00011	0.00019	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025
Length	ft	**55**	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
"Friction" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
K-factor for Exit		**1.00**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
K-factor for 90		**0.20**	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
K-factor for 90		**0.20**	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
K-factor for Butterfly Valve		**0.50**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
K-factor for Line Tee		**0.05**	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sum of K-factors		1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
"Minor" Headloss	ft	0.00	0.00	0.01	0.01	0.01	0.03	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Total Headloss	ft	0.00	0.00	0.01	0.01	0.01	0.03	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
EGL at Split	ft	810.92	810.92	810.93	810.93	810.93	810.95	810.98	810.99	810.99	810.99	810.99	810.99	810.99	810.99	810.99	810.99	810.99	810.99
HGL at Split	ft	810.92	810.92	810.92	810.93	810.93	810.94	810.95	810.96	810.96	810.96	810.96	810.96	810.96	810.96	810.96	810.96	810.96	810.96
West Filter Effluent Channel to Filter Bypass																			
Total Flow Through Filter Bypass	mgd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	1.50	2.50	3.50	4.50	5.50	6.50	7.50	8.50	9.50	10.50
	gpm	0	0	0	0	0	0	0	347	1,042	1,736	2,431	3,125	3,819	4,514	5,208	5,903	6,597	7,292
	cfs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	2.32	3.87	5.42	6.96	8.51	10.06	11.61	13.15	14.70	16.25
Diameter	inches	**24.00**	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
	ft	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Area	sq ft	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
Wetted Perimeter	ft	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28
Hydraulic Radius	ft	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.74	1.23	1.72	2.22	2.71	3.20	3.69	4.19	4.68	5.17
Velocity Head	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.05	0.08	0.11	0.16	0.21	0.27	0.34	0.42
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00009	0.00025	0.00049	0.00081	0.00121	0.00168	0.00224	0.00288	0.00360	0.00439
Length	ft	**45**	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
"Friction" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.05	0.08	0.10	0.13	0.16	0.20

Total Plant Flow	mgd	**0.00**	**1.00**	**1.50**	**1.85**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
K-factor for Exit		**1.00**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
K-factor for Butterfly Valve		**0.50**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
K-factor for Branch Tee		**0.40**	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
K-factor for 30x24 Red		**0.05**	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sum of K-factors		1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.05	0.09	0.15	0.22	0.31	0.41	0.53	0.66	0.81
Total Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06	0.11	0.19	0.28	0.39	0.51	0.66	0.82	1.01
EGL at Split	ft	803.00	803.04	803.05	803.06	803.06	803.08	803.10	803.12	803.15	803.20	803.27	803.36	803.47	803.95	804.55	805.18	805.84	806.55
HGL at Split	ft	803.00	803.04	803.05	803.06	803.06	803.08	803.10	803.12	803.14	803.18	803.23	803.29	803.35	803.79	804.33	804.90	805.50	806.13
Filter Bypass Split to Combined Bypass Tie In																			
Total Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
	gpm	0	694	1,042	1,285	1,389	2,083	2,778	3,472	4,167	4,861	5,556	6,250	6,944	7,639	8,333	9,028	9,722	10,417
	cfs	0.00	1.55	2.32	2.86	3.09	4.64	6.19	7.74	9.28	10.83	12.38	13.93	15.47	17.02	18.57	20.12	21.66	23.21
Diameter	inches	**30.00**	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
	ft	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Area	sq ft	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91
Wetted Perimeter	ft	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85
Hydraulic Radius	ft	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.32	0.47	0.58	0.63	0.95	1.26	1.58	1.89	2.21	2.52	2.84	3.15	3.47	3.78	4.10	4.41	4.73
Velocity Head	ft	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.06	0.08	0.10	0.12	0.15	0.19	0.22	0.26	0.30	0.35
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00001	0.00003	0.00004	0.00005	0.00011	0.00019	0.00030	0.00044	0.00059	0.00078	0.00098	0.00121	0.00147	0.00175	0.00205	0.00238	0.00273
Length	ft	**56**	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56
"Friction" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.07	0.08	0.10	0.11	0.13	0.15
K-factor for Tee Line		**0.05**	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sum of K-factors		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Total Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.09	0.11	0.13	0.15	0.17
EGL at Split	ft	810.92	810.92	810.93	810.94	810.94	810.96	810.99	811.01	811.02	811.03	811.04	811.06	811.07	811.09	811.10	811.12	811.14	811.16
HGL at Split	ft	810.92	810.92	810.93	810.93	810.93	810.95	810.97	810.97	810.97	810.96	810.94	810.93	810.92	810.90	810.88	810.86	810.84	810.82
Combined Bypass Tie In to SE Tie In																			
Flow Through Secondary Clarifiers	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
	gpm	0	694	1,042	1,285	1,389	2,083	2,778	3,472	4,167	4,861	5,556	6,250	6,944	7,639	8,333	9,028	9,722	10,417
	cfs	0.00	1.55	2.32	2.86	3.09	4.64	6.19	7.74	9.28	10.83	12.38	13.93	15.47	17.02	18.57	20.12	21.66	23.21
Diameter	inches	**30.00**	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
	ft	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Area	sq ft	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91
Wetted Perimeter	ft	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85
Hydraulic Radius	ft	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.32	0.47	0.58	0.63	0.95	1.26	1.58	1.89	2.21	2.52	2.84	3.15	3.47	3.78	4.10	4.41	4.73
Velocity Head	ft	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.06	0.08	0.10	0.12	0.15	0.19	0.22	0.26	0.30	0.35
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00001	0.00003	0.00004	0.00005	0.00011	0.00019	0.00030	0.00044	0.00059	0.00078	0.00098	0.00121	0.00147	0.00175	0.00205	0.00238	0.00273
Length	ft	**48**	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
"Friction" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.10	0.11	0.13
K-factor for Butterfly Valve		**0.50**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
K-factor for Tee Branch		**0.40**	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Sum of K-factors		0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31
Total Headloss	ft	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.16	0.20	0.24	0.28	0.33	0.39	0.44
EGL at Split	ft	810.92	810.93	810.93	810.94	810.95	810.98	811.02	811.06	811.09	811.13	811.17	811.22	811.27	811.32	811.39	811.46	811.53	811.61
HGL at Split	ft	810.92	810.92	810.93	810.94	810.94	810.96	811.00	811.02	811.04	811.05	811.07	811.09	811.11	811.14	811.16	811.19	811.23	811.26
SE Tie In to Secondary Clarifier Drop Box																			
Number of Clarifiers in Service		**2**	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Through each Clarifier	mgd	0.00	0.50	0.75	0.93	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	gpm	0	347	521	642	694	1,042	1,389	1,736	2,083	2,431	2,778	3,125	3,472	3,819	4,167	4,514	4,861	5,208
	cfs	0.00	0.77	1.16	1.43	1.55	2.32	3.09	3.87	4.64	5.42	6.19	6.96	7.74	8.51	9.28	10.06	10.83	11.61
Diameter	inches	**18.00**	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
	ft	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Area	sq ft	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77
Wetted Perimeter	ft	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71
Hydraulic Radius	ft	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012

Total Plant Flow	mgd	**0.00**	**1.00**	**1.50**	**1.85**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
Velocity	ft/sec	0.00	0.44	0.66	0.81	0.88	1.31	1.75	2.19	2.63	3.06	3.50	3.94	4.38	4.82	5.25	5.69	6.13	6.57
Velocity Head	ft	0.00	0.00	0.01	0.01	0.01	0.03	0.05	0.07	0.11	0.15	0.19	0.24	0.30	0.36	0.43	0.50	0.58	0.67
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00005	0.00010	0.00016	0.00018	0.00042	0.00074	0.00116	0.00166	0.00226	0.00296	0.00374	0.00462	0.00559	0.00666	0.00781	0.00906	0.01040
Length	ft	**52**	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
"Friction" Headloss	ft	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.06	0.09	0.12	0.15	0.19	0.24	0.29	0.35	0.41	0.47	0.54
K-factor for 18x30 Red		**0.40**	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
K-factor for 45		**0.15**	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
K-factor for Inlet		**0.50**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Sum of K-factors		1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
"Minor" Headloss	ft	0.00	0.00	0.01	0.01	0.01	0.03	0.05	0.08	0.11	0.15	0.20	0.25	0.31	0.38	0.45	0.53	0.61	0.70
Total Headloss	ft	0.00	0.01	0.01	0.02	0.02	0.05	0.09	0.14	0.20	0.27	0.35	0.45	0.55	0.67	0.80	0.93	1.08	1.24
EGL at Drop Box	ft	810.92	810.93	810.95	810.96	810.97	811.03	811.11	811.20	811.29	811.40	811.52	811.66	811.82	811.99	812.18	812.39	812.61	812.85
HGL at Drop Box	ft	810.92	810.93	810.94	810.95	810.96	811.00	811.06	811.13	811.18	811.25	811.33	811.42	811.52	811.63	811.75	811.89	812.03	812.18
Effluent Trough Btm Elev	ft	**810.52**	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52
Effluent Trough Submerged		**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Secondary Clarifier Effluent Trough																			
Trough Invert Elevation	ft	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52	810.52
Freeboard from HGL in Effluent Box to Trough Invert	ft	-0.40	-0.41	-0.42	-0.43	-0.44	-0.48	-0.54	-0.61	-0.66	-0.73	-0.81	-0.90	-1.00	-1.11	-1.23	-1.37	-1.51	-1.66
SE Flow per Clarifier	mgd	0.00	0.50	0.75	0.93	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	cfs	0.00	0.77	1.16	1.43	1.55	2.32	3.09	3.87	4.64	5.42	6.19	6.96	7.74	8.51	9.28	10.06	10.83	11.61
	gpm	0	347	521	642	694	1,042	1,389	1,736	2,083	2,431	2,778	3,125	3,472	3,819	4,167	4,514	4,861	5,208
SE Flow in Each Half of Each Effluent Trough	mgd	0	0.25	0.375	0.4625	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.25	3.5	3.75
	cfs	0	0.386834	0.580251	0.715643	0.773668	1.160502	1.547336	1.93417	2.321004	2.707838	3.094672	3.481506	3.86834	4.255174	4.642008	5.028842	5.415676	5.80251
	gpm	0	173.6111	260.4167	321.1806	347.2222	520.8333	694.4444	868.0556	1041.667	1215.278	1388.889	1562.5	1736.111	1909.722	2083.333	2256.944	2430.556	2604.167
Trough Width	ft	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**
Trough Depth	ft	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**
Velocity in Trough	fps	0.00	0.47	0.67	0.79	0.84	1.11	1.28	1.42	1.54	1.63	1.69	1.72	1.74	1.74	1.73	1.71	1.69	1.65
Critical Depth	ft	0.00	0.11	0.14	0.16	0.17	0.22	0.26	0.31	0.35	0.38	0.42	0.45	0.49	0.52	0.55	0.58	0.61	0.64
Submerged Height at Exit of Launder, hl	ft	0.40	0.41	0.42	0.43	0.44	0.48	0.54	0.61	0.66	0.73	0.81	0.90	1.00	1.11	1.23	1.37	1.51	1.66
Maximum Depth in Effluent Trough, ho	ft	0.40	0.42	0.43	0.45	0.46	0.52	0.60	0.68	0.75	0.83	0.92	1.01	1.11	1.22	1.34	1.47	1.61	1.75
Maximum HGL in Effluent Trough	ft	810.92	810.94	810.95	810.97	810.98	811.04	811.12	811.20	811.27	811.35	811.44	811.53	811.63	811.74	811.86	811.99	812.13	812.27
Bottom of V-Notch Weir		**812.83**	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83
V-notch Weir Submerged?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Secondary Clarifier Water Surface																			
B/V-notch Elevation	ft	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83	812.83
V-notch Depth	inches	**2**	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Center-to-Center Spacing of V-notches	inches	**6**	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Diameter of Clarifier	ft	**70**	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
Width of Effluent Trough	ft	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Width of Effluent Trough Wall	ft	**0.83**	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Diameter of Weir	ft	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33
Weir Length	ft	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11
Number of Weir V-notches		404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404
Head on V-notch Weir	ft	0.00	0.06	0.07	0.07	0.07	0.09	0.10	0.11	0.12	0.12	0.13	0.14	0.14	0.15	0.15	0.16	0.16	0.17
HGL in Final Clarifier	ft	812.83	812.89	812.90	812.90	812.90	812.92	812.93	812.94	812.95	812.95	812.96	812.97	812.97	812.98	812.98	812.99	812.99	813.00
Top of Final Clarifier Wall	ft	**816.25**	816.25	816.25	816.25	816.25	816.25	816.25	816.25	816.25	816.25	816.25	816.25	816.25	816.25	816.25	816.25	816.25	816.25
Secondary Clarifier Overflowing Wall?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Secondary Clarifier to Secondary Splitter Box																			
Number of Clarifiers in Service		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow to Each Clarifier	mgd	0.00	0.50	0.75	0.93	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	cfs	0.00	0.77	1.16	1.43	1.55	2.32	3.09	3.87	4.64	5.42	6.19	6.96	7.74	8.51	9.28	10.06	10.83	11.61
	gpm	0	347	521	642	694	1,042	1,389	1,736	2,083	2,431	2,778	3,125	3,472	3,819	4,167	4,514	4,861	5,208
Feed Line Diameter	in	**20.00**	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
	ft	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67
Area Each	sf	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18
Wetted Perimeter Each	ft	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24
Hydraulic Radius Each (Flowing Full)	ft	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
Flow in Each Feed Line	mgd	0.00	0.50	0.75	0.93	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
Velocity	ft/s	0.00	0.35	0.53	0.66	0.71	1.06	1.42	1.77	2.13	2.48	2.84	3.19	3.55	3.90	4.26	4.61	4.96	5.32
Velocity Head	ft	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.07	0.10	0.12	0.16	0.20	0.24	0.28	0.33	0.38	0.44
Roughness Coefficient, Manning n		**0.012**	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Length Each	ft	**90.00**	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00

Total Plant Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
Friction Headloss	ft	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.06	0.09	0.12	0.15	0.19	0.24	0.29	0.34	0.40	0.46	0.53
K Factor for Exit		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
K Factor for 90 degree Bend		0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K Factor for Plug Valve		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
K Factor for 90 degree Bend		0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K Factor for Entrance		0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Sum of K Factors		3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
Minor Losses (fittings)	ft	0.00	0.01	0.01	0.02	0.02	0.05	0.10	0.15	0.22	0.30	0.39	0.49	0.61	0.73	0.87	1.02	1.19	1.36
Total Head Loss	ft	0.00	0.01	0.02	0.03	0.03	0.08	0.13	0.21	0.30	0.41	0.54	0.68	0.84	1.02	1.21	1.42	1.65	1.90
EGL at Secondary Clarifier Splitter Drop box	ft	812.83	812.90	812.92	812.93	812.94	812.99	813.06	813.15	813.25	813.37	813.50	813.65	813.81	814.00	814.20	814.41	814.64	814.89
HGL at Secondary Clarifier Splitter Drop Box	ft	812.83	812.89	812.91	812.92	812.93	812.98	813.03	813.10	813.18	813.27	813.37	813.49	813.62	813.76	813.92	814.08	814.26	814.45
Secondary Clarifier Splitter Box Weir Elevation	ft	813.45	813.45	813.45	813.45	813.45	813.45	813.45	813.45	813.45	813.45	813.45	813.45	813.45	813.45	813.45	813.45	813.45	813.45
Secondary Clarifier Splitter Box Weir Submerged?		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES
Secondary Clarifer Splitter Box Weir Length per Clarifier	ft	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Secondary Clarifer Splitter Box Total weir Length	ft	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Headloss Over Weir	ft	0.00	0.09	0.12	0.14	0.15	0.20	0.24	0.28	0.31	0.35	0.38	0.41	0.44	0.47	0.50	0.52	0.55	0.57
HGL in Secondary Clarifier Splitter Box	ft	813.45	813.54	813.57	813.59	813.60	813.65	813.69	813.73	813.76	813.80	813.83	813.90	814.06	814.23	814.41	814.60	814.81	815.03
Top of Spliiter Box Wall	ft	817.00	817.00	817.00	817.00	817.00	817.00	817.00	817.00	817.00	817.00	817.00	817.00	817.00	817.00	817.00	817.00	817.00	817.00
Freeboard in Splitter Box	ft	3.55	3.46	3.43	3.41	3.40	3.35	3.31	3.27	3.24	3.20	3.17	3.10	2.94	2.77	2.59	2.40	2.19	1.97
Secondary Spltter Box Overflowing?		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Secondary Splitter Box to West RBC Train Effluent Trough																			
Number of RBC Trains		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Flow Through each Train	mgd	0.00	0.17	0.25	0.31	0.33	0.50	0.67	0.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50
	gpm	0	116	174	214	231	347	463	579	694	810	926	1,042	1,157	1,273	1,389	1,505	1,620	1,736
	cfs	0.00	0.26	0.39	0.48	0.52	0.77	1.03	1.29	1.55	1.81	2.06	2.32	2.58	2.84	3.09	3.35	3.61	3.87
Diameter	inches	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
	ft	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Area	sq ft	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
Wetted Perimeter	ft	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28
Hydraulic Radius	ft	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Roughness Coefficient		0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.49	0.74	0.91	0.99	1.48	1.97	2.46	2.96	3.45	3.94	4.43	4.93	5.42	5.91	6.40	6.90	7.39
Velocity Head	ft	0.00	0.00	0.01	0.01	0.02	0.03	0.06	0.09	0.14	0.18	0.24	0.31	0.38	0.46	0.54	0.64	0.74	0.85
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00004	0.00009	0.00014	0.00016	0.00036	0.00064	0.00100	0.00144	0.00195	0.00255	0.00323	0.00399	0.00482	0.00574	0.00674	0.00781	0.00897
Length	ft	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
"Friction" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.10	0.12	0.15	0.17	0.20	0.23
K-factor for Exit		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
K-factor for 90		0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for Line Tee		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
K-factor for Branch Tee		0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Sum of K-factors		1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
"Minor" Headloss	ft	0.00	0.01	0.01	0.02	0.03	0.06	0.11	0.16	0.24	0.32	0.42	0.53	0.66	0.80	0.95	1.11	1.29	1.48
Diameter	inches	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
	ft	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Area	sq ft	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77
Wetted Perimeter	ft	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71
Hydraulic Radius	ft	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Roughness Coefficient		0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.29	0.44	0.54	0.58	0.88	1.17	1.46	1.75	2.04	2.33	2.63	2.92	3.21	3.50	3.79	4.09	4.38
Velocity Head	ft	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.11	0.13	0.16	0.19	0.22	0.26	0.30
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00002	0.00005	0.00007	0.00008	0.00018	0.00033	0.00051	0.00074	0.00101	0.00131	0.00166	0.00205	0.00249	0.00296	0.00347	0.00403	0.00462
Length	ft	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
"Friction" Headloss	ft	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.07	0.10	0.13	0.17	0.22	0.27	0.32	0.38	0.45	0.52	0.60
K-factor for 24x18 Red		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
K-factor for 90		0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for Tee Branch		0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Sum of K-factors		0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.04	0.05	0.06	0.08	0.10	0.12	0.14	0.17	0.19	0.22
Diameter	inches	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
	ft	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Area	sq ft	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77

Total Plant Flow	mgd	**0.00**	**1.00**	**1.50**	**1.85**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
Wetted Perimeter	ft	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71
Hydraulic Radius	ft	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.15	0.22	0.27	0.29	0.44	0.58	0.73	0.88	1.02	1.17	1.31	1.46	1.61	1.75	1.90	2.04	2.19
Velocity Head	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.07
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00001	0.00001	0.00002	0.00002	0.00005	0.00008	0.00013	0.00018	0.00025	0.00033	0.00042	0.00051	0.00062	0.00074	0.00087	0.00101	0.00116
Length	ft	**6**	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
"Friction" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
K-factor for Butterfly Valve		**0.40**	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
K-factor for 90		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for Inlet		**0.50**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Sum of K-factors		1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.09
Total Headloss	ft	0.00	0.01	0.03	0.04	0.05	0.11	0.19	0.29	0.42	0.57	0.75	0.95	1.17	1.41	1.68	1.98	2.29	2.63
EGL at RBC Effluent Channel	ft	813.45	813.56	813.60	813.63	813.65	813.75	813.88	814.02	814.18	814.37	814.58	814.85	815.23	815.64	816.09	816.58	817.10	817.66
HGL at RBC Effluent Channel	ft	813.45	813.55	813.60	813.63	813.64	813.74	813.85	813.99	814.14	814.30	814.49	814.74	815.09	815.48	815.90	816.36	816.84	817.36
West RBC Train Effluent Trough																			
Trough Invert Elevation	ft	**813.85**	813.85	813.85	813.85	813.85	813.85	813.85	813.85	813.85	813.85	813.85	813.85	813.85	813.85	813.85	813.85	813.85	813.85
Freeboard from HGL in Effluent Pipe to Trough Invert	ft	0.40	0.30	0.25	0.22	0.21	0.11	0.00	-0.14	-0.29	-0.45	-0.64	-0.89	-1.24	-1.63	-2.05	-2.51	-2.99	-3.51
Trough Flow	mgd	0.00	0.17	0.25	0.31	0.33	0.50	0.67	0.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50
	cfs	0.00	0.26	0.39	0.48	0.52	0.77	1.03	1.29	1.55	1.81	2.06	2.32	2.58	2.84	3.09	3.35	3.61	3.87
	gpm	0	116	174	214	231	347	463	579	694	810	926	1,042	1,157	1,273	1,389	1,505	1,620	1,736
Trough Width	ft	**2.58**	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58
Trough Depth	ft	**1.29**	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29
Velocity in Trough	fps	0.00	0.85	0.98	1.05	1.07	1.23	1.35	1.46	1.50	1.34	1.16	0.98	0.79	0.67	0.58	0.52	0.47	0.43
Critical Depth	ft	0.00	0.07	0.09	0.10	0.11	0.14	0.17	0.20	0.22	0.25	0.27	0.29	0.31	0.33	0.35	0.37	0.39	0.41
Submerged Height at Exit of Launder, hl	ft	-0.40	-0.30	-0.25	-0.22	-0.21	-0.11	0.00	0.14	0.29	0.45	0.64	0.89	1.24	1.63	2.05	2.51	2.99	3.51
Maximum Depth in Effluent Trough, ho	ft	0.00	0.12	0.15	0.18	0.19	0.24	0.29	0.34	0.40	0.52	0.69	0.92	1.26	1.65	2.06	2.51	3.00	3.52
Maximum HGL in Effluent Trough	ft	813.85	813.97	814.00	814.03	814.04	814.09	814.14	814.19	814.25	814.37	814.54	814.77	815.11	815.50	815.91	816.36	816.85	817.37
Bottom of V-Notch Weir	ft	**815.30**	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30
V-notch Weir Submerged?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
Top of RBC Wall	ft	**816.00**	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00
RBC Overflowing?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**
West RBC Train Water Surface																			
B/V-notch Elevation	ft	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30	815.30
V-notch Depth	inches	**3**	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Center-to-Center Spacing of V-notches	inches	**6**	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Weir Length	ft	**26.33**	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33
Number of Weir V-notches		53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
Head on V-notch Weir	ft	0.00	0.08	0.10	0.11	0.11	0.13	0.14	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.22	0.23	0.24	0.24
HGL in RBC Tank	ft	815.30	815.39	815.40	815.41	815.41	815.43	815.45	815.46	815.47	815.48	815.49	815.50	815.51	815.71	816.14	816.60	817.09	817.61
Top of RBC Wall	ft	**816.00**	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00
RBC Overflowing?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**
West RBC Influent Channel																			
B/V-notch Elevation	ft	**815.45**	815.45	815.45	815.45	815.45	815.45	815.45	815.45	815.45	815.45	815.45	815.45	815.45	815.45	815.45	815.45	815.45	815.45
V-notch Depth	inches	**3**	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Center-to-Center Spacing of V-notches	inches	**6**	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Weir Length	ft	**26.33**	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33
Number of Weir V-notches		53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
Head on V-notch Weir	ft	0.00	0.08	0.10	0.11	0.11	0.13	0.14	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.22	0.23	0.24	0.24
HGL in RBC Influent Channel	ft	815.45	815.54	815.55	815.56	815.56	815.58	815.60	815.62	815.64	815.66	815.68	815.70	815.72	815.93	816.36	816.83	817.32	817.85
Top of RBC Wall	ft	**816.00**	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00	816.00
Influent Channel Overflowing?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**
West RBC Influent Channel to RBC Splitter Box																			
Number of RBC Trains		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Flow Through each Train	mgd	0.00	0.17	0.25	0.31	0.33	0.50	0.67	0.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50
	gpm	0.00	115.74	173.61	214.12	231.48	347.22	462.96	578.70	694.44	810.19	925.93	1,041.67	1,157.41	1,273.15	1,388.89	1,504.63	1,620.37	1,736.11
	cfs	0.00	0.26	0.39	0.48	0.52	0.77	1.03	1.29	1.55	1.81	2.06	2.32	2.58	2.84	3.09	3.35	3.61	3.87
Diameter	inches	**18.00**	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
	ft	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50

Total Plant Flow	mgd	**0.00**	**1.00**	**1.50**	**1.85**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
Area	sq ft	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77
Wetted Perimeter	ft	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71
Hydraulic Radius	ft	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.15	0.22	0.27	0.29	0.44	0.58	0.73	0.88	1.02	1.17	1.31	1.46	1.61	1.75	1.90	2.04	2.19
Velocity Head	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.07
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00001	0.00001	0.00002	0.00002	0.00005	0.00008	0.00013	0.00018	0.00025	0.00033	0.00042	0.00051	0.00062	0.00074	0.00087	0.00101	0.00116
Length	ft	**20**	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
"Friction" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
K-factor for Tee Branch		**0.50**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
K-factor for Butterfly Valve		**0.40**	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
K-factor for 90		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for Outlet		**1.00**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Sum of K-factors		2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.09	0.10	0.12	0.14	0.16
Diameter	inches	**18.00**	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
	ft	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Area	sq ft	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77
Wetted Perimeter	ft	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71
Hydraulic Radius	ft	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.29	0.44	0.54	0.58	0.88	1.17	1.46	1.75	2.04	2.33	2.63	2.92	3.21	3.50	3.79	4.09	4.38
Velocity Head	ft	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.11	0.13	0.16	0.19	0.22	0.26	0.30
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00002	0.00005	0.00007	0.00008	0.00018	0.00033	0.00051	0.00074	0.00101	0.00131	0.00166	0.00205	0.00249	0.00296	0.00347	0.00403	0.00462
Length	ft	**135**	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135
"Friction" Headloss	ft	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.07	0.10	0.14	0.18	0.22	0.28	0.34	0.40	0.47	0.54	0.62
K-factor for 90		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for 90		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for Inlet		**0.50**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Sum of K-factors		1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.05	0.07	0.09	0.12	0.15	0.18	0.21	0.25	0.29	0.33
Total Headloss	ft	0.00	0.01	0.01	0.02	0.02	0.05	0.08	0.13	0.18	0.25	0.32	0.41	0.51	0.61	0.73	0.85	0.99	1.14
EGL at RBC Splitter Drop Box	ft	815.45	815.54	815.56	815.58	815.58	815.63	815.68	815.74	815.82	815.91	816.01	816.11	816.22	816.54	817.09	817.68	818.32	818.99
HGL at RBC Splitter Drop Box	ft	815.45	815.54	815.56	815.57	815.58	815.62	815.66	815.71	815.78	815.85	815.92	816.00	816.09	816.38	816.90	817.46	818.06	818.70
RBC Splitter Box																			
RBC Box Weir Elevation	ft	**816.20**	816.20	816.20	816.20	816.20	816.20	816.20	816.20	816.20	816.20	816.20	816.20	816.20	816.20	816.20	816.20	816.20	816.20
RBC Splitter Box Weir Submerged?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
RBC Splitter Box Weir Length	ft	**8**	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Headloss Over Weir	ft	0.00	0.07	0.09	0.11	0.11	0.15	0.18	0.21	0.24	0.26	0.29	0.31	0.33	0.36	0.38	0.40	0.42	0.44
HGL in RBC Splitter Box	ft	816.20	816.27	816.29	816.31	816.31	816.35	816.38	816.41	816.44	816.46	816.49	816.51	816.53	816.74	817.28	817.86	818.47	819.13
Top of Spliiter Box Wall	ft	**818.00**	818.00	818.00	818.00	818.00	818.00	818.00	818.00	818.00	818.00	818.00	818.00	818.00	818.00	818.00	818.00	818.00	818.00
Freeboard in Splitter Box	ft	1.80	1.73	1.71	1.69	1.69	1.65	1.62	1.59	1.56	1.54	1.51	1.49	1.47	1.26	0.72	0.14	-0.47	-1.13
RBC Spltter Box Overflowing?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**
RBC Splitter Box to Primary Clarifiers																			
Number of Clarifiers in Service		**2**	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Through each Clarifier	mgd	0.00	0.50	0.75	0.93	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	gpm	0	347	521	642	694	1,042	1,389	1,736	2,083	2,431	2,778	3,125	3,472	3,819	4,167	4,514	4,861	5,208
	cfs	0.00	0.77	1.16	1.43	1.55	2.32	3.09	3.87	4.64	5.42	6.19	6.96	7.74	8.51	9.28	10.06	10.83	11.61
Diameter	inches	**24.00**	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
	ft	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Area	sq ft	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
Wetted Perimeter	ft	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28
Hydraulic Radius	ft	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.25	0.37	0.46	0.49	0.74	0.99	1.23	1.48	1.72	1.97	2.22	2.46	2.71	2.96	3.20	3.45	3.69
Velocity Head	ft	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.03	0.05	0.06	0.08	0.09	0.11	0.14	0.16	0.18	0.21
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00001	0.00002	0.00003	0.00004	0.00009	0.00016	0.00025	0.00036	0.00049	0.00064	0.00081	0.00100	0.00121	0.00144	0.00168	0.00195	0.00224
Length	ft	**40**	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
"Friction" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.09
K-factor for Exit		**1.00**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
K-factor for 90		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for Tee Line		**0.05**	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Total Plant Flow	mgd	**0.00**	**1.00**	**1.50**	**1.85**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
K-factor for Tee Branch		**0.40**	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Sum of K-factors		1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
"Minor" Headloss	ft	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.04	0.06	0.08	0.11	0.13	0.16	0.20	0.24	0.28	0.32	0.37
Total Headloss	ft	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.20	0.25	0.29	0.35	0.40	0.46
Diameter	inches	**18.00**	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
	ft	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Area	sq ft	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77
Wetted Perimeter	ft	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71	4.71
Hydraulic Radius	ft	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Roughness Coefficient		**0.012**	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Velocity	ft/sec	0.00	0.44	0.66	0.81	0.88	1.31	1.75	2.19	2.63	3.06	3.50	3.94	4.38	4.82	5.25	5.69	6.13	6.57
Velocity Head	ft	0.00	0.00	0.01	0.01	0.01	0.03	0.05	0.07	0.11	0.15	0.19	0.24	0.30	0.36	0.43	0.50	0.58	0.67
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00000	0.00005	0.00010	0.00016	0.00018	0.00042	0.00074	0.00116	0.00166	0.00226	0.00296	0.00374	0.00462	0.00559	0.00666	0.00781	0.00906	0.01040
Length	ft	**50**	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
"Friction" Headloss	ft	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.06	0.08	0.11	0.15	0.19	0.23	0.28	0.33	0.39	0.45	0.52
K-factor for 18x24 Red		**0.05**	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
K-factor for 45		**0.15**	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
K-factor for Inlet		**0.50**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Sum of K-factors		0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
"Minor" Headloss	ft	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.08	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47
Total Headloss	ft	0.00	0.00	0.01	0.02	0.02	0.04	0.07	0.11	0.16	0.22	0.28	0.36	0.44	0.53	0.63	0.74	0.86	0.99
EGL at Drop Box	ft	816.20	816.28	816.31	816.33	816.34	816.41	816.48	816.57	816.67	816.78	816.90	817.03	817.18	817.52	818.20	818.94	819.74	820.58
HGL at Drop Box	ft	816.20	816.28	816.30	816.32	816.33	816.38	816.44	816.50	816.56	816.63	816.71	816.79	816.88	817.16	817.77	818.44	819.15	819.91
Effluent Trough Btm Elev	ft	**816.02**	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02
Effluent Trough Submerged		**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Primary Clarifier Effluent Trough																			
Trough Invert Elevation	ft	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02	816.02
Freeboard from HGL in Effluent Box to Trough Invert	ft	-0.18	-0.26	-0.28	-0.30	-0.31	-0.36	-0.42	-0.48	-0.54	-0.61	-0.69	-0.77	-0.86	-1.14	-1.75	-2.42	-3.13	-3.89
PE Flow per Clarifier	mgd	0.00	0.50	0.75	0.93	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	cfs	0.00	0.77	1.16	1.43	1.55	2.32	3.09	3.87	4.64	5.42	6.19	6.96	7.74	8.51	9.28	10.06	10.83	11.61
	gpm	0	347	521	642	694	1,042	1,389	1,736	2,083	2,431	2,778	3,125	3,472	3,819	4,167	4,514	4,861	5,208
PE Flow in Each Half of Each Effluent Trough	mgd	0	0.25	0.375	0.4625	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.25	3.5	3.75
	cfs	0	0.39	0.58	0.72	0.77	1.16	1.55	1.93	2.32	2.71	3.09	3.48	3.87	4.26	4.64	5.03	5.42	5.80
	gpm	0	173.61	260.42	321.18	347.22	520.83	694.44	868.06	1041.67	1215.28	1388.89	1562.50	1736.11	1909.72	2083.33	2256.94	2430.56	2604.17
Trough Width	ft	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**
Trough Depth	ft	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**
Velocity in Trough	fps	0.00	0.71	0.93	1.05	1.09	1.34	1.51	1.64	1.73	1.81	1.86	1.90	1.92	1.72	1.28	1.02	0.86	0.74
Critical Depth	ft	0.00	0.11	0.14	0.16	0.17	0.22	0.26	0.31	0.35	0.38	0.42	0.45	0.49	0.52	0.55	0.58	0.61	0.64
Submerged Height at Exit of Launder, hl	ft	0.18	0.26	0.28	0.30	0.31	0.36	0.42	0.48	0.54	0.61	0.69	0.77	0.86	1.14	1.75	2.42	3.13	3.89
Maximum Depth in Effluent Trough, ho	ft	0.18	0.27	0.31	0.34	0.35	0.43	0.51	0.59	0.67	0.75	0.83	0.92	1.01	1.24	1.81	2.45	3.16	3.91
Maximum HGL in Effluent Trough	ft	816.20	816.29	816.33	816.36	816.37	816.45	816.53	816.61	816.69	816.77	816.85	816.94	817.03	817.26	817.83	818.47	819.18	819.93
Bottom of V-Notch Weir		**818.22**	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22
V-notch Weir Submerged?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**
Primary Clarifier Water Surface																			
B/V-notch Elevation	ft	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22
V-notch Depth	inches	**2**	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Center-to-Center Spacing of V-notches	inches	**6**	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Diameter of Clarifier	ft	**70**	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
Width of Effluent Trough	ft	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Width of Effluent Trough Wall	ft	**0.83**	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Diameter of Weir	ft	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33	64.33
Weir Length	ft	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11	202.11
Number of Weir V-notches		404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404
Head on V-notch Weir	ft	0.00	0.06	0.07	0.07	0.07	0.09	0.10	0.11	0.12	0.12	0.13	0.14	0.14	0.15	0.15	0.16	0.16	0.17
HGL in Primary Clarifier	ft	818.22	818.28	818.29	818.29	818.29	818.31	818.32	818.33	818.34	818.34	818.35	818.36	818.36	818.37	818.37	818.63	819.34	820.10
Top of Primary Clarifier Wall	ft	**821.73**	821.73	821.73	821.73	821.73	821.73	821.73	821.73	821.73	821.73	821.73	821.73	821.73	821.73	821.73	821.73	821.73	821.73
Primary Clarifier Overflowing Wall?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Primary Clarifier to Primary Splitter Box																			
Number of Clarifiers in Service		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Secondary Sludge Flow		**0.196**	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196
Influent Flow		0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00

Total Plant Flow	mgd	**0.00**	**1.00**	**1.50**	**1.85**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
Total Flow to Each Clarifier	mgd	0.10	0.60	0.85	1.02	1.10	1.60	2.10	2.60	3.10	3.60	4.10	4.60	5.10	5.60	6.10	6.60	7.10	7.60
	cfs	0.15	0.93	1.31	1.58	1.70	2.47	3.25	4.02	4.79	5.57	6.34	7.11	7.89	8.66	9.44	10.21	10.98	11.76
	gpm	68	415	589	710	763	1,110	1,457	1,804	2,151	2,499	2,846	3,193	3,540	3,888	4,235	4,582	4,929	5,276
Feed Line Diameter	in	**20.00**	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
	ft	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67
Area Each	sf	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18
Wetted Perimeter Each	ft	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24
Hydraulic Radius Each (Flowing Full)	ft	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
Flow in Each Feed Line	mgd	0.10	0.60	0.85	1.02	1.10	1.60	2.10	2.60	3.10	3.60	4.10	4.60	5.10	5.60	6.10	6.60	7.10	7.60
Velocity	ft/s	0.07	0.42	0.60	0.73	0.78	1.13	1.49	1.84	2.20	2.55	2.91	3.26	3.62	3.97	4.32	4.68	5.03	5.39
Velocity Head	ft	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.20	0.24	0.29	0.34	0.39	0.45
Roughness Coefficient, Manning n		**0.012**	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Length Each	ft	**90.00**	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Friction Headloss	ft	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.06	0.09	0.12	0.16	0.20	0.25	0.30	0.35	0.41	0.48	0.55
K Factor for Exit		**1.00**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
K Factor for 90 degree Bend		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K Factor for 90 Plug Valve		**1.00**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
K Factor for 90 degree Bend		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K Factor for Entrance		**0.50**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Sum of K Factors		3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
Minor Losses (fittings)	ft	0.00	0.01	0.02	0.03	0.03	0.06	0.11	0.16	0.23	0.31	0.41	0.51	0.63	0.76	0.90	1.05	1.22	1.40
Total Head Loss	ft	0.00	0.01	0.02	0.04	0.04	0.09	0.15	0.23	0.32	0.44	0.57	0.71	0.88	1.06	1.25	1.47	1.70	1.95
EGL at Primary Clarifier Splitter Drop box	ft	818.22	818.29	818.31	818.33	818.34	818.39	818.47	818.56	818.66	818.78	818.92	819.07	819.24	819.42	819.63	820.10	821.04	822.04
HGL at Primary Clarifier Splitter Drop Box	ft	818.22	818.29	818.31	818.32	818.33	818.37	818.43	818.50	818.58	818.68	818.78	818.90	819.04	819.18	819.34	819.76	820.64	821.59
Primary Clarifier Splitter Box Weir Elevation	ft	**818.97**	818.97	818.97	818.97	818.97	818.97	818.97	818.97	818.97	818.97	818.97	818.97	818.97	818.97	818.97	818.97	818.97	818.97
Primary Clarifier Splitter Box Weir Submerged?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Primary Clarifier Splitter Box Weir Length	ft	**8**	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Headloss Over Weir	ft	0.03	0.11	0.13	0.15	0.16	0.20	0.25	0.28	0.32	0.35	0.38	0.41	0.44	0.47	0.50	0.53	0.55	0.58
HGL in Primary Clarifier Splitter Box	ft	819.00	819.08	819.10	819.12	819.13	819.17	819.22	819.25	819.29	819.32	819.35	819.38	819.48	819.65	819.84	820.29	821.20	822.17
Top of Spliiter Box Wall	ft	**821.75**	821.75	821.75	821.75	821.75	821.75	821.75	821.75	821.75	821.75	821.75	821.75	821.75	821.75	821.75	821.75	821.75	821.75
Freeboard in Splitter Box	ft	2.75	2.67	2.65	2.63	2.62	2.58	2.53	2.50	2.46	2.43	2.40	2.37	2.27	2.10	1.91	1.46	0.55	-0.42
Primary Spltter Box Overflowing?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**
Primary Splitter Box to Preliminary Treatment Bldg Drop Dox																			
Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
	cfs	0.00	1.55	2.32	2.86	3.09	4.64	6.19	7.74	9.28	10.83	12.38	13.93	15.47	17.02	18.57	20.11	21.66	23.21
	gpm	0	694	1,042	1,285	1,389	2,083	2,778	3,472	4,167	4,861	5,556	6,250	6,944	7,639	8,333	9,028	9,722	10,417
Feed Line Diameter	in	**30.00**	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
	ft	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Area Each	sf	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91
Wetted Perimeter Each	ft	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85
Hydraulic Radius Each (Flowing Full)	ft	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Flow in Each Feed Line	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
Velocity	ft/s	0.00	0.32	0.47	0.58	0.63	0.95	1.26	1.58	1.89	2.21	2.52	2.84	3.15	3.47	3.78	4.10	4.41	4.73
Velocity Head	ft	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.06	0.08	0.10	0.12	0.15	0.19	0.22	0.26	0.30	0.35
Roughness Coefficient, Manning n		**0.012**	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Unit Headloss (Headloss per Ft of Length)	ft/ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Length Each	ft	**170.00**	170.00	170.00	170.00	170.00	170.00	170.00	170.00	170.00	170.00	170.00	170.00	170.00	170.00	170.00	170.00	170.00	170.00
Friction Headloss	ft	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.40	0.46
K Factor for Exit		**1.00**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
K Factor for 90 degree Bend		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K Factor for 90 degree Bend		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K Factor for Entrance		**0.50**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Sum of K Factors		2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
Minor Losses (fittings)	ft	0.00	0.00	0.01	0.01	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.26	0.32	0.39	0.47	0.55	0.63	0.73
Total Head Loss	ft	0.00	0.01	0.01	0.02	0.02	0.05	0.08	0.13	0.19	0.26	0.34	0.43	0.53	0.64	0.76	0.90	1.04	1.19
EGL at Drop box	ft	819.00	819.08	819.12	819.14	819.15	819.22	819.30	819.39	819.48	819.58	819.69	819.81	820.01	820.29	820.60	821.18	822.24	823.36
HGL at Drop Box	ft	819.00	819.08	819.11	819.14	819.14	819.21	819.28	819.35	819.42	819.51	819.59	819.69	819.86	820.11	820.38	820.92	821.93	823.02
Top of Drop Box Wall	ft	**822.19**	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19
Freeboard in Drop Box	ft	3.19	3.11	3.08	3.05	3.05	2.98	2.91	2.84	2.77	2.68	2.60	2.50	2.33	2.08	1.81	1.27	0.26	-0.83
Drop Box Overflowing?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**

Preliminary Treatment Bldg Drop Dox to Screen Channel

Total Plant Flow	mgd	**0.00**	**1.00**	**1.50**	**1.85**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
Total Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
	gpm	0	694	1,042	1,285	1,389	2,083	2,778	3,472	4,167	4,861	5,556	6,250	6,944	7,639	8,333	9,028	9,722	10,417
	cfs	0.00	1.55	2.32	2.86	3.09	4.64	6.19	7.74	9.28	10.83	12.38	13.93	15.47	17.02	18.57	20.11	21.66	23.21
Channel Invert Elevation	ft	**818.22**	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22	818.22
Channel Width	ft	**2.50**	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Channel Length	ft	**22.33**	22.33	22.33	22.33	22.33	22.33	22.33	22.33	22.33	22.33	22.33	22.33	22.33	22.33	22.33	22.33	22.33	22.33
Depth of Flow in Channel	ft	0.78	0.86	0.89	0.92	0.92	0.99	1.06	1.13	1.20	1.29	1.37	1.47	1.64	1.89	2.16	2.70	3.71	4.80
Area of Flow in Channel	sf	1.95	2.15	2.23	2.29	2.31	2.47	2.64	2.82	3.01	3.22	3.44	3.67	4.09	4.72	5.39	6.76	9.29	11.99
Wetted Perimeter in Channel	ft	4.06	4.22	4.29	4.33	4.35	4.48	4.61	4.75	4.91	5.07	5.25	5.44	5.77	6.27	6.81	7.90	9.93	12.10
Hydraulic Radius	ft	0.48	0.51	0.52	0.53	0.53	0.55	0.57	0.59	0.61	0.63	0.65	0.68	0.71	0.75	0.79	0.85	0.94	0.99
Velocity of Flow in Channel	ft/sec	0.00	0.72	1.04	1.25	1.34	1.88	2.34	2.74	3.08	3.37	3.60	3.79	3.78	3.61	3.44	2.98	2.33	1.94
Velocity Head	ft	0.00	0.01	0.02	0.02	0.03	0.05	0.09	0.12	0.15	0.18	0.20	0.22	0.22	0.20	0.18	0.14	0.08	0.06
Roughness Coefficient, Manning n		**0.015**	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Unit Headloss(ft/ft)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
"Friction" Headloss	ft	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.05	0.04	0.04	0.02	0.01	0.01
K-factor for 90 Deg Bend		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for 90 Deg Bend		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
K-factor for 90 Deg Bend		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Sum of K-factors		**0.90**	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.04	0.04	0.04	0.04	0.03	0.02	0.01	0.00
Total Headloss	ft	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.09	0.10	0.10	0.08	0.07	0.04	0.02	0.01
EGL Downstram of Screen	ft	819.00	819.08	819.12	819.15	819.16	819.24	819.33	819.43	819.54	819.66	819.78	819.91	820.11	820.37	820.67	821.22	822.26	823.38
HGL Downstream of Screen	ft	819.00	819.08	819.11	819.12	819.13	819.19	819.25	819.32	819.39	819.48	819.58	819.69	819.88	820.17	820.48	821.09	822.17	823.32
Top of Wall	ft	**822.19**	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19	822.19
Channel Box Overflowing?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**
Preliminary Treatment Bldg Screen Channels																			
Channels in Service		**1**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total Flow	mgd	0.00	1.00	1.50	1.85	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
	gpm	0	694	1,042	1,285	1,389	2,083	2,778	3,472	4,167	4,861	5,556	6,250	6,944	7,639	8,333	9,028	9,722	10,417
	cfs	0.00	1.55	2.32	2.86	3.09	4.64	6.19	7.74	9.28	10.83	12.38	13.93	15.47	17.02	18.57	20.11	21.66	23.21
Channel Invert Elevation	ft	**818.34**	818.34	818.34	818.34	818.34	818.34	818.34	818.34	818.34	818.34	818.34	818.34	818.34	818.34	818.34	818.34	818.34	818.34
Channel Width	ft	**4.00**	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Channel Length	ft	**20.00**	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Depth of Flow in Channel	ft	0.66	0.74	0.77	0.78	0.79	0.85	0.91	0.98	1.05	1.14	1.24	1.35	1.54	1.83	2.14	2.75	3.83	4.98
Area of Flow in Channel	sf	2.65	2.95	3.06	3.14	3.17	3.39	3.63	3.90	4.21	4.56	4.96	5.40	6.17	7.33	8.57	10.99	15.33	19.91
Wetted Perimeter in Channel	ft	5.32	5.47	5.53	5.57	5.59	5.70	5.82	5.95	6.11	6.28	6.48	6.70	7.09	7.66	8.29	9.49	11.66	13.96
Hydraulic Radius	ft	0.50	0.54	0.55	0.56	0.57	0.60	0.62	0.66	0.69	0.73	0.77	0.81	0.87	0.96	1.03	1.16	1.31	1.43
Velocity of Flow in Channel	ft/sec	0.00	0.53	0.76	0.91	0.98	1.37	1.70	1.98	2.20	2.37	2.50	2.58	2.51	2.32	2.17	1.83	1.41	1.17
Velocity Head	ft	0.00	0.00	0.01	0.01	0.01	0.03	0.05	0.06	0.08	0.09	0.10	0.10	0.10	0.08	0.07	0.05	0.03	0.02
Roughness Coefficient, Manning n		**0.015**	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Unit Headloss(ft/ft)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
"Friction" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.00
K-factor for 90 Deg Bend		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Sum of K-factors		**0.30**	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
"Minor" Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Headloss	ft	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.00
Screen Open Area		**0.29**	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Velocity Through the Open Channel	ft/sec	0.00	0.53	0.76	0.91	0.98	1.37	1.70	1.98	2.20	2.37	2.50	2.58	2.51	2.32	2.17	1.83	1.41	1.17
Velocity Through Screen Open Area	ft/sec	0.00	1.81	2.61	3.14	3.36	4.72	5.88	6.84	7.60	8.18	8.60	8.89	8.64	8.01	7.47	6.31	4.87	4.02
Headloss Through Screen	ft	0.00	0.08	0.16	0.23	0.27	0.53	0.82	1.11	1.37	1.59	1.75	1.87	1.77	1.52	1.32	0.94	0.56	0.38
EGL Upstream of Screen	ft	819.00	819.16	819.29	819.39	819.43	819.78	820.16	820.56	820.93	821.26	821.56	821.81	821.89	821.91	822.00	822.18	822.82	823.76
HGL Upstream of Screen	ft	819.00	819.16	819.28	819.37	819.42	819.75	820.12	820.49	820.85	821.18	821.46	821.70	821.80	821.82	821.93	822.12	822.79	823.74
Top of Wall	ft	**823.73**	823.73	823.73	823.73	823.73	823.73	823.73	823.73	823.73	823.73	823.73	823.73	823.73	823.73	823.73	823.73	823.73	823.73
Channel Box Overflowing?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**
Manual Bypass Screen Slide Gate Elevation	ft	**821.59**	821.59	821.59	821.59	821.59	821.59	821.59	821.59	821.59	821.59	821.59	821.59	821.59	821.59	821.59	821.59	821.59	821.59
Slide Gate Overflowing		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**

Appendix TM5-B
Wet Weather Operating Procedures

Wet Weather Flows
Operations

These procedures are guidelines. All conditions during the high flow event should be taken into consideration before making decisions. All actions taken should be done in order to maintain permit conditions as able at the facility. Additional lab analysis should be considered during high flow periods.

Flows at 3.0 MGD sustained or approaching 4.0 MGD:

- Clean manual bar screen & dump basket
- Put brushes down on secondary clarifiers for cleaning
- Put all four cells in service and backwash the highest filter cell
- Continue backwashing filters balancing backwashing return flow with influent flow
- Increase primary & secondary sludge pump run times on SCADA if needed (revisit throughout wet weather event)
- Beyond 3.0 MGD the Alum pump(s) are at 100%. Lab personnel should run Ortho-P tests to determine phosphorus levels. Based on discharge and influent levels of phosphorus the frequency setting (% at Max. EU per pump on SCADA Pc) should be able to be lowered. Alternatively, it may be the case that the frequency setting would have to be turned up. Again, feed rates will be determined by discharge and influent levels of phosphorus.

Flows ≈ 4.5 MGD or as two RAW pumps start:

- Supplemental air blower can be shut off
- Monitor discharge dissolved oxygen and turn on/off blower(s) as required
- Watch secondary clarifier weir levels, this will indicate the significance of the filter backup issue.
- Switch filter backwash control from “normal” to “fast” setpoints
- If flows continue to increase filters will need to be partially bypassed. This is done by first opening gate 600-GAT-16 located under the grating west of the filter cells. Secondly, the filter diversion valve (Y18) located south of the filtration building can be opened. A starting point will be approximately 10 full turns open. This is a multi turn butterfly valve. (The most that should ever be needed due to hydraulics is 30 full turns open)
- Monitor mechanical bar screen for grit issues. If grit build up is too great the bypass channel will have to be opened by pulling up 200-GAT-09&-07.
- Monitor lift station pumping trends.
- Call Johns Disposal for early or pickup of dumpsters as needed.
- Record flows, time and any changes made for reporting purposes!

Flows ≈ 6.5 MGD and greater:

- Management should be contacted if they have not been already

- The influent high flow alarm is set to 6.0MGD (call out). This will trigger "storm mode" which will cause both the mechanical bar screen and the grit pump to run continuously.
- * Any steps taken past this point will require DNR notification! Keep a log of changes made including flows, times and observations.
- The decision to begin a diversion should be made by the utility superintendent or utility director or operator in charge in that respective order. Again, keep a log of the events!
- Closely monitor the levels in the secondary clarifiers. With filters bypassed if the sec. clarifier levels continue to rise the clarifiers will need to be partially bypassed to save treatment. 24" multi-turn valve (Y5) will have to be opened to minimize this condition. Opening 5 full turns is a good starting point.
- At this point you must record the measurements from the gauges located in the secondary splitter box. This is necessary to estimate bypassed flow.
- Monitor "freeboard" in RBC influent troughs.
- A crew should be directed to monitor the collection system for surcharge conditions at known locations. Prepare for diversions if necessary.

<u>Flows ≈ 7.5MGD and greater</u>:

- Keep a close eye on RBC tank levels
- If RBC tanks are nearing an overflow condition open valve Y4 (located just west of the RBC splitter box) as little as necessary to relieve the amount of flow causing the flooding condition to the RBC's and secondary clarifiers. (Valves Y10 & Y11, located on the west side of RBC Bldg. #3, must be open!). Valve Y4 should be throttled as necessary to maintain workable tank levels in the RBC's.
- Take a second readings from the gauges located in the secondary splitter box. This should be done periodically, especially as changes are made to valve Y4.
- Revisit bypassing needs for secondary clarifiers.
- Watch influent wetwell levels! (12.0' is the transducer high level) If 4 Raw pumps are called to run an alarm (call out) will sound.
- If forward flow is too much for the plant to handle the plant influent gate will have to be throttled down to save plant treatment. After this point Manhole #'s I-7 & I-8 will have to be monitored continuously to eliminate backups into the collection system!
- If all the above have been done and the collection system surcharging is getting too great the only alternative is to pump from a MH I-8 out through the lowlands. Further communication w/the DNR should be done at this time!

Updated 5/20/13