

# City of Pinole

## Pinole/Hercules WPCP Project

### Technical Memorandum 5/6

#### Headworks: Influent Pumps, Screening, and Grit Removal

March 1, 2013

PRELIMINARY  
FOR REVIEW ONLY



Prepared under the responsible charge of

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# TM 5/6 - HEADWORKS FACILITY: INFLUENT PUMP STATION, SCREENING, GRIT REMOVAL

*Pinole/Hercules WPCP Project*

*March 1, 2013*

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## Executive Summary

### Purpose

The purpose of this technical memorandum (TM) is to establish design criteria, evaluate two design alternatives, and provide a recommended alternative for the new Headworks Facility at the Pinole/Hercules Water Pollution Control Plant (WPCP).

Two alternatives are discussed in the subsequent sections of this TM. The primary difference between the two alternatives is the location of the traveling rake screens relative to the influent pump station. These alternatives were developed during several meetings that occurred between July 2012 and January 2013 as a part of the WPCP Project preliminary design. These meetings included the HDR design team, Pinole/Hercules WPCP staff, and staff from the City of Pinole and the City of Hercules.

### Background

The WPCP is required to meet renewed National Pollutant Discharge Elimination System (NPDES) permit discharge requirements by 2017. This will require significant upgrades to major treatment processes. In order to deliver 20 million gallons per day (mgd) of peak wet weather flow (PWWF) a new Headworks Facility will need to be constructed and will include new influent screens, a pump station, and grit removal.

### Conclusion

Alternative 1, which provides screening upstream of the influent pump station, is recommended. The estimated construction cost for this alternative is \$5.87 million dollars. The recommended alternative consists of the following components:

- ◆ Two traveling rake type influent screens, each with a 10 mgd capacity.
- ◆ A submersible pump station with two wet wells. Each wet well will contain two, 6.7 mgd pumps to meet PWWF and minimum day flow (MDF).

- ◆ One forced vortex grit chamber with a 12 mgd capacity and bypass for flows in excess of 12 mgd.

## Introduction

The WPCP is in the process of upgrades to meet new discharge requirements in accordance Regional Water Quality Control Board NPDES Permit No. CA0037796 issued in August 2012. The permit requires the WPCP to provide secondary treatment of PWWF of 20.0 mgd by 2017. Currently, the existing Headworks has a firm pumping capacity of 15 mgd, limited screening capability and uses the primary clarifiers for grit removal.

As part of the WPCP upgrades the existing Headworks will be decommissioned and a new Headworks Facility will be constructed south of the existing Control Building. The new Headworks Facility will include new influent screens, influent pump station with submersible pumps, and grit removal.

The principal components of this TM include the following:

- ◆ Description and background of the existing facilities.
- ◆ Design criteria for the new Headworks Facility.
- ◆ Description and evaluation of screens and grit removal technologies.
- ◆ Description and evaluation of two design alternatives.
- ◆ Discussion of the recommended design alternative.

## Background

The WPCP was constructed in 1955 and the existing Headworks Facility was part of the original design. The existing Headworks is located near the center of the WPCP property. The existing pump station is a dry well/wet well type pump station. Flow from City of Pinole and the City of Hercules combine in a manhole east of the pump station and the combined flow enters the Headworks through a 24-in influent sewer pipe. Influent flows up to 6 mgd pass through a single mechanical Duperon Flex Rake screen. Wet weather flow in excess of 6 mgd passes through manually raked bar screens adjacent to the mechanical screen. Screened wastewater enters the wet well and is then pumped via four variable speed pumps in the dry well to the Primary Clarifier Distribution Box. Currently, the existing Headworks has a firm pumping capacity of 15 mgd, limited screening capability and uses the primary clarifiers for grit removal.

The existing liquid stream process does not have designated grit removal, rather inorganic and organic solids are settled in the three primary clarifiers. Primary sludge is screened for grit removal.

At project meetings between July 2012 and February 2013 that included the HDR design team, WPCP staff, and staff from the City of Pinole and the City of Hercules, a number of decisions were made that directed the focus of this TM and the design criteria for the Headworks Facility. The following decisions serve as the guideline for preliminary design:

- ◆ Influent screens will be located upstream of the pump station in Alternative 1 and downstream of the pump station in Alternative 2.
- ◆ The influent pump station will be designed as a submersible type, dual wet well pump station, but will not be a self-cleaning style wet well to reduce construction costs.
- ◆ Grit removal will occur downstream of the influent pump station.
- ◆ Aerated grit removal will not be evaluated due to its larger footprint.
- ◆ No additional flow metering device will be designed within the proposed Headworks Facility.
- ◆ Equipment selection and layouts will be developed to minimize footprints due to the limited space available.
- ◆ Only one pump size will be included in the pump station to minimize costs.
- ◆ Two 10 mgd screens will be considered in both alternatives.
- ◆ Only one grit chamber will be included in each alternative to reduce costs. A bypass channel will be provided if the grit chamber requires maintenance or is taken offline.

## Design Criteria

The following design criteria have been established for the proposed WPCP Headworks Facility.

### Flow

The Headworks Facility will be designed to operate at the projected flows listed in Table 5-1. The screens, influent pump station, and grit chamber will also be designed to handle the minimum day flow (MDF) listed in Table 5-1. These design flows are discussed in detail in TM 1 – Flows and Loads.

*Table 5-1. Pinole/Hercules Buildout Flow Criteria*

Flow Criteria	Flow Rate (mgd)
Peak Wet Weather Flow (PWWF)	20.0
Average Dry Weather Flow (ADWF)	4.06
Minimum Day Flow (MDF)	1.75

## Reliability and Redundancy

Reliability and redundancy minimizes the probability of wastewater overflows in the Headworks and operational issues during peak flows. The influent pump station will have a firm capacity equivalent to the PWWF. Firm capacity is defined as the pumping capacity with one pump out of service. The equipment design will meet the following reliability requirements:

- ◆ Ability to pump PWWF with one pump, motor and variable frequency drive (VFD) out of service.
- ◆ Ability to pump MDF with one pump, motor and VFD out of service.
- ◆ Ability to pump ADWF with one wetwell out of service.
- ◆ Ability to bypass influent flow around the screens if the screens are blinded.
- ◆ Ability to adequately de-grit wastewater between 2 mgd and 20 mgd.
- ◆ Ability to remove settled solids from the influent channel to the grit chamber during low flows.
- ◆ Ability to efficiently pump raw sewage, and be resistant to ragging and clogging caused by stringy material, rag and other solids in the sewage.
- ◆ Ability to locally and remotely monitor supervisory control and data acquisition (SCADA) and alarms for equipment failures and process conditions.
- ◆ Redundant critical auxiliary equipment.

## Operations and Maintenance

Operation and maintenance (O&M) design criteria include items and components necessary to provide safe and effective O&M of the pumps, screens, and grit removal equipment. The existing site has limited space available for equipment removal, parking and access to the screens, influent pump station, and grit removal system. The following items have been identified and will be incorporated into the design of the new Headworks Facility:

- ◆ Space will be provided for equipment removal, maintenance, and parking.
- ◆ Paved access will be provided.
- ◆ Recommended spare parts for all equipment will be included in the project specification requirements.
- ◆ Aluminum access hatches will be provided above pumps and valves for maintenance access. Safety grating will be provided under access hatches to safely view pumps, valves and screens.
- ◆ All submersible pumps will be installed on rails.

## Geotechnical

Preliminary discussions with the geotechnical subconsultant indicated that special foundations are not necessary to support the Headworks foundation. During final design, a geotechnical investigation at the proposed Headworks site will be required to confirm requirements for foundation support.

## Odor Control

The influent screens, influent pump station, and grit chamber will be ventilated at a minimum of 12 air changes per hour to reduce the hazardous area classification to Class 1, Division 2 per the National Electrical Code and National Fire Protection Associations (NFPA) 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities Tables 4.2 and 5.2. The relative footprint of the odor control facility will be completed in subsequent design stages.

## Influent Screening

Table 5-2 provides specific design criteria for each screen.

*Table 5-2. Influent Screen Design Criteria (Per Screen)*

Criteria	Units	Value
Minimum Screen Clear Opening Size	in	1/4
Clean Screen Velocity	fps	2 (minimum)
Channel Width	ft	3.0
Channel Depth	ft	3.0
Minimum Water Depth	in	12
Angle from horizontal	degree	70°-80°
Screenings Conveyance		Shaftless screw conveyor

## Pump Station

The following design criteria will be included in the final design of the wet well:

- ◆ Dimensions and flow velocities will meet Hydraulic Institute (HI) Standards.
- ◆ A dual wet well will be provided.
- ◆ All equipment installed in the wet well will be suitable for the corrosive atmosphere and intended use and will meet the NFPA classification requirements of the wet well.

## Grit Removal

Table 5-3 provides the design criteria for grit removal.



**Table 5-3. Grit Removal Design Criteria**

Criteria	Units	Value
Peak Influent Grit	lb/MG	60
Average Influent Grit Mass	lb/MG	50
Grit Density	lb/cy	1,350
Minimum Grit Pump Flow rate	gpm	Less than 200
Grit Concentration	percent (5)	Greater than 1
Grit Piping Diameter	in	4, to maintain 5 fps
Maximum Headloss	ft	1

## Equipment Technology Alternatives

### Screen Technology

There are numerous screening technologies available for influent screening. Two types of screens are considered for this application; a conventional traveling rake screen (¼-in to ½-in bar spacing) and a flow-through perforated plate type screen (3-10 millimeter perforations). A brief description and evaluation of each screen follows.

#### Conventional Traveling Rake Screen

Travelling rake screens consist of a fixed bar racks and dead plates. Multiple traveling rakes are attached to a link chain that rotates in a continuous circuit from top to bottom around the length of the screen. The rakes collect and remove debris from the front of the screen then drop screenings into a dumpster or conveyor on the back of the screen. Bar spacing can be as small as ¼-in and have a tear drop shape to minimize headloss through the screens. The existing influent screen at the WPCP is a traveling rake type screen manufactured by Duperon. Table 5-4 provides a list of advantages and disadvantages for this technology.

**Table 5-4. Advantages and Disadvantages of Conventional Traveling Rake Screens**

Advantages	Disadvantages
Robust construction, proven reliable operation.	Screening capability is limited due to the near vertical configuration of the bars, and spacing limitations.
All moving parts can be serviced from the operating floor.	Rakes can jam if a large/heaving object obstructs the channel, this requires staff to enter the channel and remove the obstruction.
Multiple manufacturers are available to provide competitive bids and five-year warranties.	
Simple design with few moving parts, relatively low maintenance and the WPCP staff is familiar with its operation.	
Variable speed operation can be matched to flow rate.	

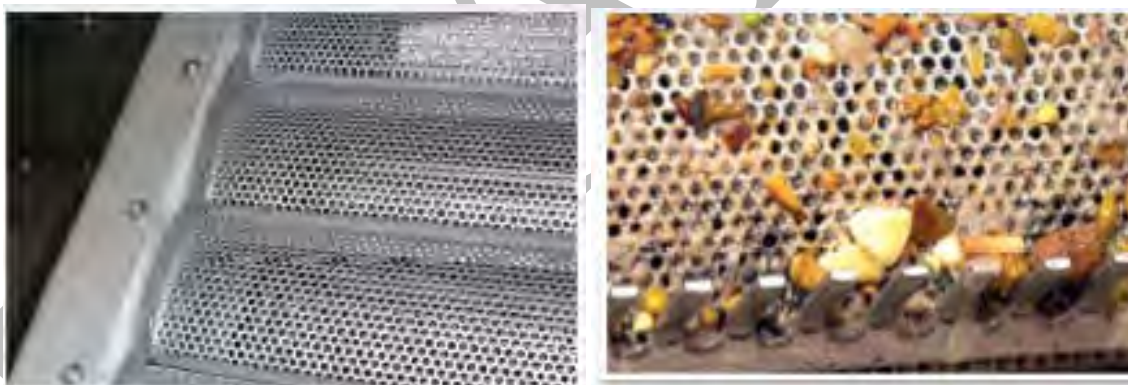
There are a number of manufacturers that market the traveling rake bar screens including the Duperon Flex Rake, Mahr Bar Screen, and HUBER Multi-Rake Bar Screen RakeMax®. Cut sheets for the Duperon Flex Rake Screens are provided in Appendix A.

### Flow-through Perforated Plate Type Screens

Perforated plate type screens consist of a series of joined perforated plates mounted on chains at each end of the plate. The plates are pulled through the influent wastewater, collecting debris on the surface and lifting it out of the waste stream. Debris is removed from the plate by either a brush or a water spray, or both. A mechanical scraper cleans the brush, however additional periodic cleaning by plant staff is also required. Curved plates are recommended because they incorporate tines at set intervals between plates to lift large debris from the wastewater. Overall advantages and disadvantages of the perforated plate screens are listed in Table 5-5. Photographs of perforated plate type screens are shown in Figure 5-1.

*Table 5-5. Advantages and Disadvantages of Flow-through Perforated Plate Type Screens*

Advantages	Disadvantages
Removal of more solids.	More solids to handle at the screenings facility, and removal of more fecal and other organic material
Greater degree of protection for downstream equipment.	Cleaning system will likely require hot water spray to remove grease and solids.
Reduced maintenance of downstream equipment.	Potentially more odors removed from removed fecal matter
Improved performance, and potential for lower maintenance costs.	More complex system when compared to the traditional bar-screen.
	Greater degree of headloss through the screens.



*Figure 5-1. Perforated plate type screens*

A number of manufacturers make perforated plate screens including, the WasteTech FSM Filter Screen (pictured above), Huber Technology EscaMax® Screen, and the Adritz AG AQUA-SCREEN®.

### Comparison of Alternatives

In an effort to compare the screen technology alternative, a list of ranking criteria was developed. The criteria are presented in Table 5-6.

**Table 5-6. Evaluation Criteria for Screening Alternatives**

Criteria	Discussion
Layout/Footprint	The existing site is restricted, and has with minimal room for expansion and maintenance access.
Screen Efficiency	Efficient screenings capture protects downstream equipment, and removes debris that otherwise settles in the primary clarifiers, aeration basins and digesters.
Reliability	Reliability measures how consistently the system performs over a wide range of flows. This criterion evaluates capacity of the screens to operate over a wide range of flow conditions and considers the screens ability to clean and un-jam itself.
Capital Cost	This criterion compares the preliminary capital cost estimates for each screen type.
O&M Costs	O&M costs are considered, and equipment that requires frequent cleaning or has parts that are not easily accessible at grade are ranked lower.

To facilitate selection of the final screen technology alternative an evaluation matrix was developed ranking each alternative on a +, 0, - scale. The matrix and a brief discussion are presented in Table 5-7.

**Table 5-7. Screen Evaluation Matrix**

Criteria	Traveling Rake Screen	Perforated Plate	Discussion
Layout/Footprint	+	0	Travelling rake type screens provide easier maintenance access.
Screen Efficiency	0	+	Perforated plate screens are more efficient at removing a large range of solids.
Reliability	+	0	Traveling rake screens have developed robust jam prevention technologies to reduce down time.
Capital Cost	0	0	Capital cost estimates are similar for each screen type.
O&M Costs	+	0	Traveling rake screens have no wetted parts below the water surface, and are designed for maintenance at the ground elevation.
<b>Total</b>	<b>+3</b>	<b>+1</b>	

Based on the screen evaluation in Table 5-7, it is recommended to proceed with a traveling rack screen. Given the City of Pinole WPCP staff's satisfaction with their existing Duperon traveling rake screen, the preliminary layouts for Alternatives 1 and 2 were developed around the Duperon Flex Rake screen.

## Grit Removal Technology Alternatives

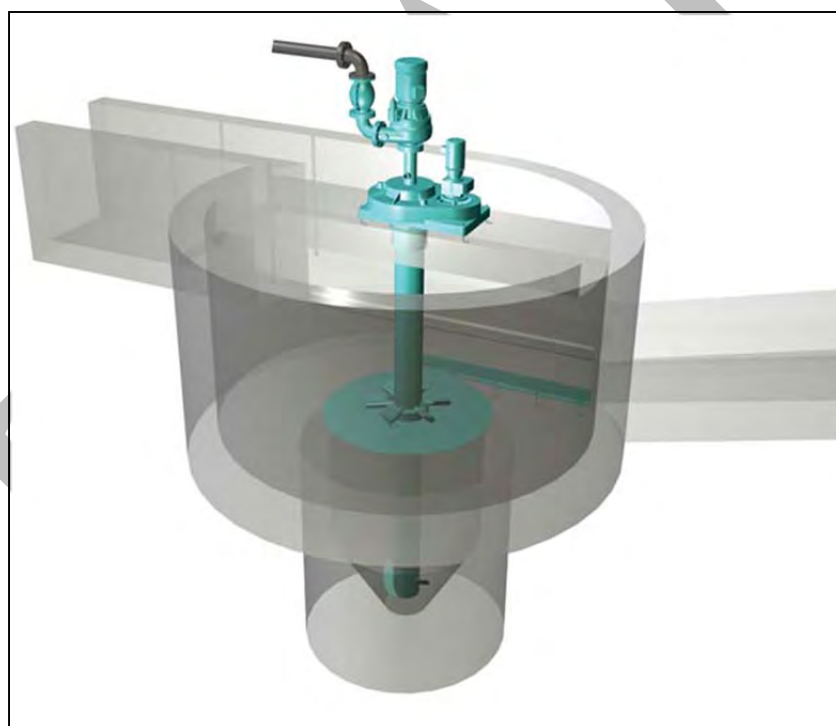
At the July 10, 2012 project meeting HDR, WPCP staff, and staff from the City of Pinole and the City of Hercules concluded that grit removal should be designed downstream of the new influent screens and pumping station. Additionally WPCP and City staff requested that HDR evaluate two grit removal systems. The first system is a forced vortex grit removal system that settles heavier inorganic material to the bottom of a vortex chamber, while lighter organic materials stay suspended in the liquid stream. The second system is the proprietary Eutek HeadCell System that uses stacked trays to trap grit in the boundary layer between each tray and sweep the grit to a collection tray.

### Vortex Grit Removal

The vortex grit removal system separates heavy inorganic solids from the waste stream by creating a vortex in a circular basin. The vortex increases the tangential velocity of grit particles which travel to the basin wall and settle into the grit hopper. An axial flow impeller creates an upward velocity in the chamber which allows the lighter organic particles stay in suspension. A grit transfer pump removes grit from the storage hopper and pumps it to grit cyclones and a grit classifier where it is dewatered. Table 5-8 outlines the advantages and disadvantages of the vortex grit removal. Cut sheets for the Pista® Grit Chamber are provided in Appendix C. Figure 5-2 illustrates the cross section of a Pista® Grit Vortex Grit Chamber.

*Table 5-8. Advantages and Disadvantages of Vortex Grit Removal*

Advantages	Disadvantages
Reinforced concrete structure.	Limited turn-down capacity, with standard units.
Multiple manufacturers available to provide competitive bids on the equipment.	Slightly larger footprint than the Eutek HeadCell.
Simple design with few moving parts, low maintenance.	
Relatively low capital cost.	



*Figure 5-2. Pista® Grit Vortex Grit Chamber*

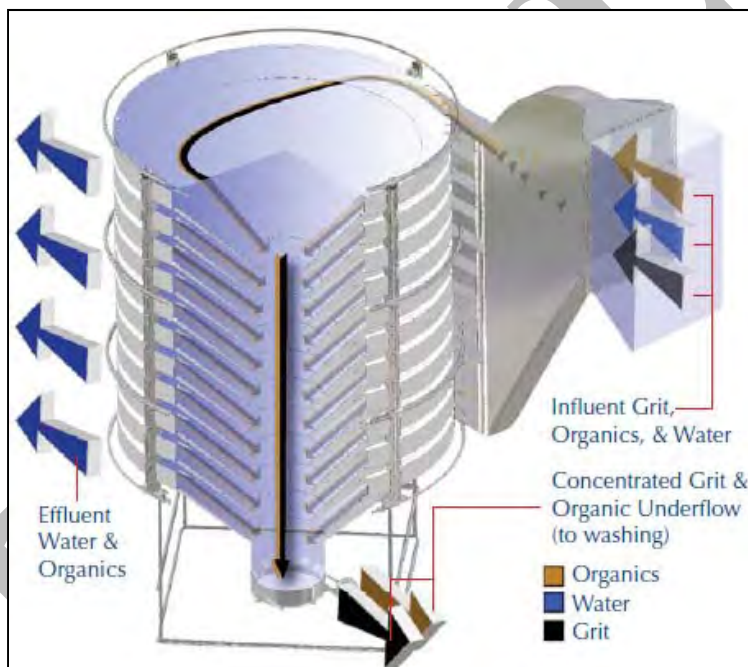
### HeadCell Grit Removal System

The HeadCell system manufactured by Eutek uses the same circular flow pattern as the vortex grit chamber but the design consists of a series of stacked trays, providing a shorter settling distance and increased surface area. The flow is split between the stacked trays and exits over

an effluent weir. Grit is trapped on the trays and falls into a collection bin at the bottom of the chamber. Grit is then pumped to the classifier and dewatering equipment. Table 5-9 shows the advantages and disadvantages of the HeadCell Grit removal system. Figure 5-3 illustrates the Eutek HeadCell stacked tray system. Additional information from the manufacturer, as well as a preliminary bid is included in Appendix C.

**Table 5-9. Advantages and Disadvantages of HeadCell Grit Removal System**

Advantages	Disadvantages
Simple design, no mechanical components in the main tray.	Proprietary design, sole source equipment limits the competitive bid process.
Removes finer grit, which will not settle in the digesters.	
Capacity is based on the number of trays in the system, and easily meets both minimum day flow and peak wet weather flow.	
Only one unit is required, minimizing the overall footprint.	



**Figure 5-3. Eutek HeadCell Grit Removal**

### Grit Removal Design Evaluation

Table 5-10 lists the evaluation criteria used to compare the grit removal technology alternatives.

**Table 5-10. Grit Removal Evaluation Criteria**

Criteria	Discussion
Layout/Footprint	The existing site is restricted, and has minimal room for expansion.
Process Efficiency	Grit removal efficiency is evaluated based on percent removal of various particle sizes and removal of biologically degradable materials. Minimal headloss through the system at all

Criteria	Discussion
	design flows is preferred.
Reliability	Reliability measures how consistently the system performs over a wide range of flows and loads. This criterion evaluates level of redundancy and turn down capacity requirements for each alternative.
Odor Potential/Esthetics	The WPCP is located adjacent to a city park and within ¼ mile of a residential area. Odor control and equipment height are compared between the alternatives.
Capital Cost	Capital cost estimates for each grit removal technology are compared.

To facilitate selection of the grit removal technology alternative an evaluation matrix was developed ranking each alternative on a +, 0, - scale. The matrix and brief discussion are presented in Table 5-11.

**Table 5-11. Grit Removal Evaluation Matrix**

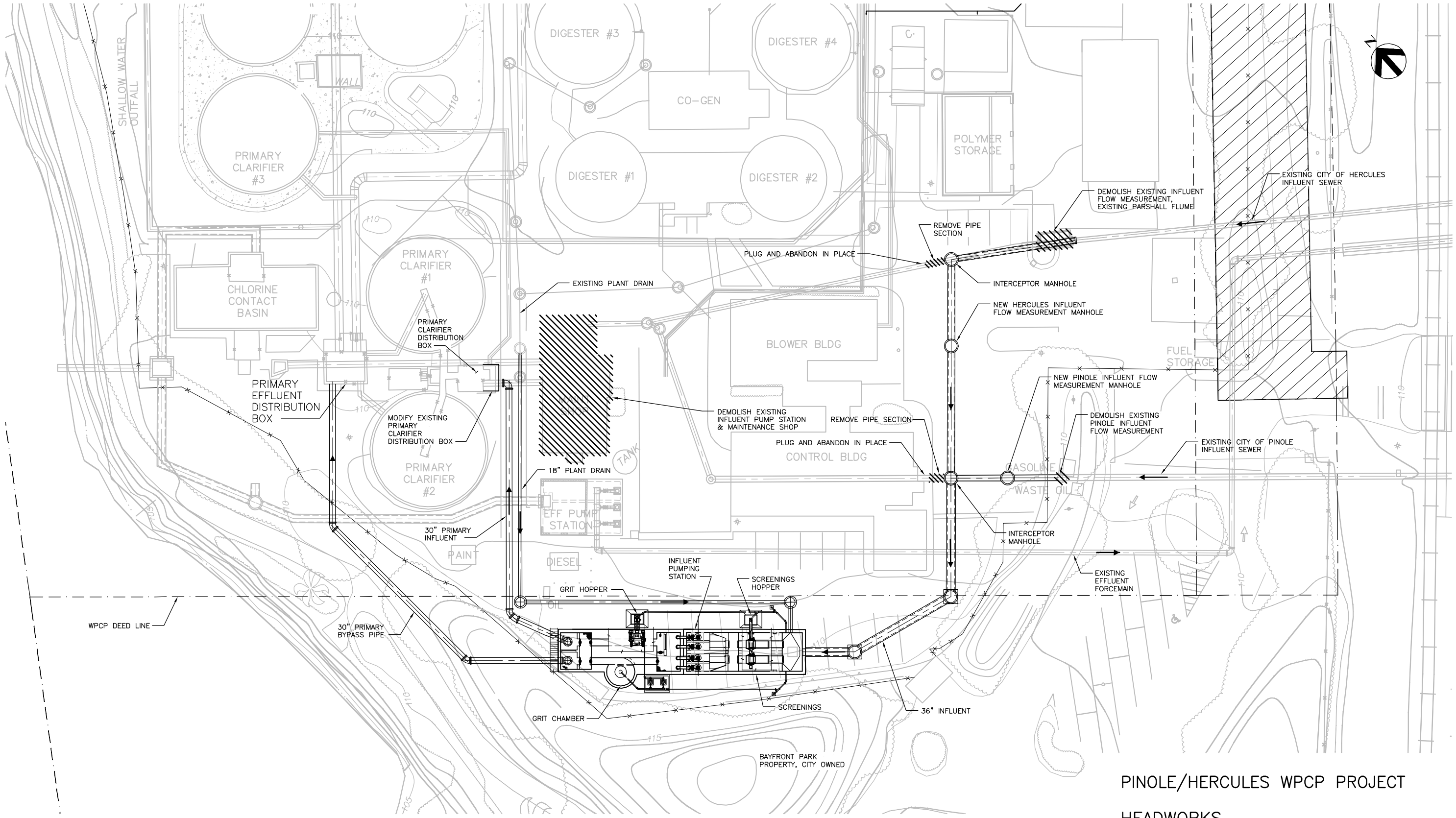
Criteria	Forced Vortex Grit Chamber	Eutek HeadCell Grit Chamber	Discussion
Layout/Footprint	0	+	The Eutek HeadCell Grit Chamber will require a slightly smaller footprint.
Process Efficiency	+	+	Both units are capable of removing a wide range of grit particles with less than 1-ft of headloss through the system.
Reliability	0	+	The Eutek HeadCell system is reliable at lower flows and has a flexible operating range
Odor Potential/Esthetics	0	0	There is similar odor potential for each grit removal alternative.
Capital Cost	+	-	The forced vortex grit chamber and ancillary equipment can be competitively bid which will result in lower capital costs.
<b>Total</b>	<b>+2</b>	<b>+2</b>	

Based on the grit removal evaluation matrix, a force vortex grit chamber has been included in the two Headworks Facility design alternatives because it can be competitively bid. Cutsheets from Pista® Grit Vortex grit chamber are used in the development of the design alternative figures. However, this can re-evaluate this decision during the design phase of the project if desired.

## Design Alternatives

Two design alternatives are presented in the subsequent sections. Each alternative has a similar overall site plan that is shown in Figure 5-4. The new Headworks Facility will be located near the south-west corner of the WPCP property, partially within the WPCP deed line and partially on the City owned Bay Front Park property. The two alternatives are as follows:

- ◆ Alternative 1 – Screening before Influent Pump Station
- ◆ Alternative 2 – Screening after Influent Pump Station



**OVERALL SITE PLAN**  
1" = 20'

**PINOLE/HERCULES WPCP PROJECT**  
**HEADWORKS**  
**OVERALL SITE PLAN**



Figure 5-4

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The existing influent line from the City of Pinole has a slight reverse slope as it goes underneath the Control Building and causes inaccurate flow measurement during low flow periods. This segment of pipe will be abandoned and the existing flow measurement manholes will be demolished and replaced with new flow measurement manholes downstream of their current locations. The new segments of 30-in and 36-in influent piping will flow by gravity to the new Headworks Facility as shown in Figure 5-4. Existing issues with inaccurate flow measurement from the City of Pinole influent sewer slope reversal will be rectified with the abandoning of that section of influent pipe and with the new influent piping alignment and profile.

In each Alternative, the influent sewer pipe from the City of Hercules and from the City of Pinole will be re-routed downstream of the existing flow measurement manholes and combined into a 36-in influent pipeline to the new Headworks Facility. The invert elevation of the new 36-in influent sewer entering the new Headworks Facility will be 95.1-ft.

In each Alternative, the new Headworks will convey influent wastewater up to 12 mgd to the Primary Clarifier Distribution Box via a 30-in primary influent pipe. The Primary Clarifier Distribution Box weir elevation (117.00-ft) will govern the hydraulic lift requirements of the influent pumps. Flows in excess of 12 mgd will bypass the primary clarifiers via the 30-in primary bypass pipe. An 18-inch plant drain will be routed upstream of pumps, screens and grit removal equipment. The site piping for each of the two proposed new Headworks alternatives is shown in Figure 5-4. The process flow through the Headworks Facility is different in each design alternative and will be addressed in the following sections that are specific to Alternatives 1 and 2.

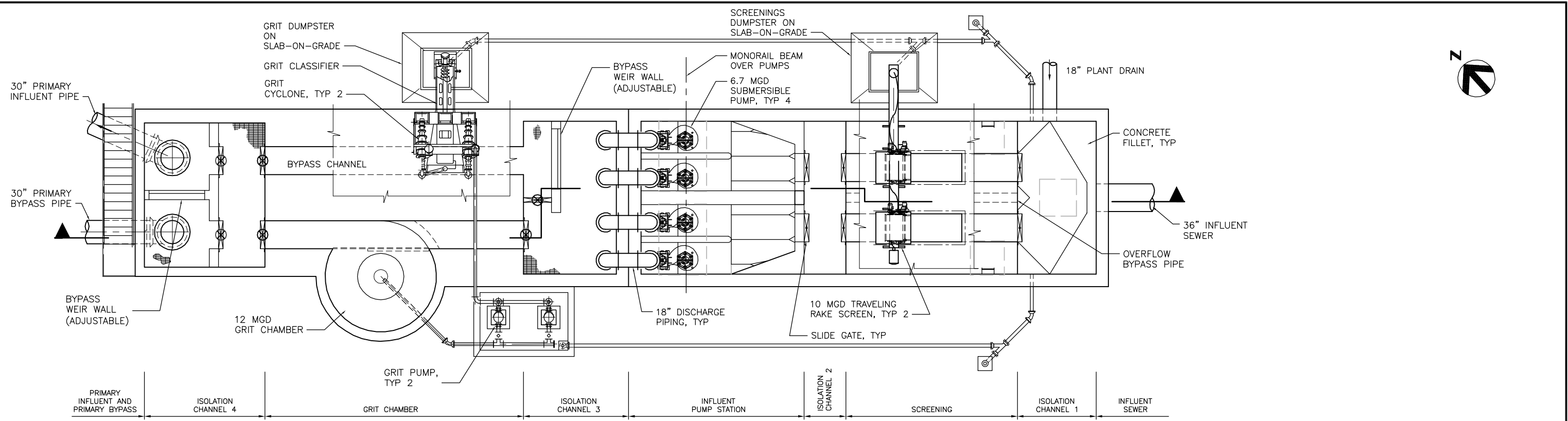
### Alternative 1 - Screening before Influent Pump Station

The plan and section view of Alternative 1 is presented in Figure 5-5. Influent sewage enters Isolation Channel 1 in the Headworks Facility at invert elevation 95.1-ft from the 36-in influent sewer. From Isolation channel 1, flows can be conveyed to either or both 10 mgd traveling rake screens via slide gates. If both screens are blinded, an overflow bypass pipe to bypass screening is also provided.

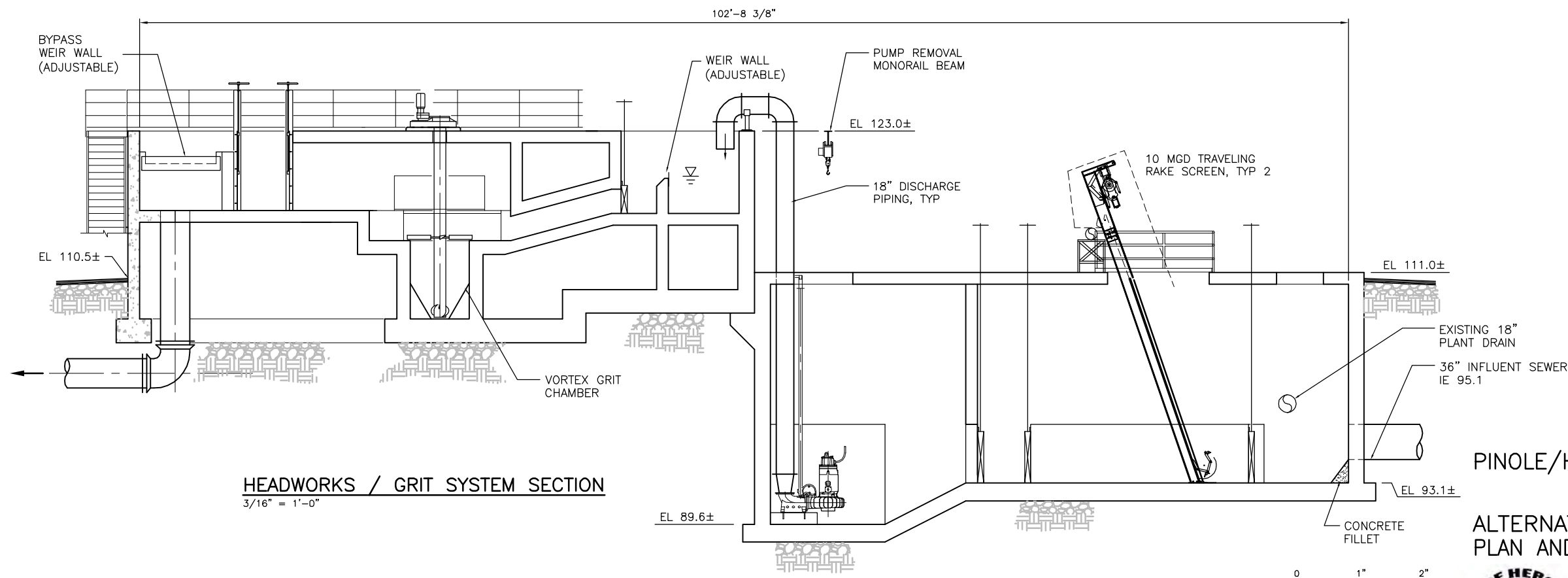
The 10 mgd traveling rake screens will have ¼-in clear openings between bars and are sized to handle PWWF. Screenings will be conveyed up the screen and discharged into a shaftless screw conveyor for conveyance into the adjacent screenings dumpster as shown on Figure 5-5. The screens are angled at 70-degrees from horizontal in the Alternative 1 layout. After screenings are removed, influent flow enters Isolation Channel 2 where influent will pass through slide gates into either or both of the influent pump station wet wells.

Each influent pump station wet well includes a sloped section down to two submersible pumps. The wet wells are sized per HI standards. Each pump will have a capacity of 6.7 mgd and be mounted on rails for removal when required. The discharge piping from each pump will be 18-in, without any valves, for a free discharge into Isolation Channel 3.





**HEADWORKS / GRIT SYSTEM PLAN**  
 3/16" = 1'-0"



**HEADWORKS / GRIT SYSTEM SECTION**  
 3/16" = 1'-0"



PINOLE/HERCULES WPCP PROJECT

ALTERNATIVE 1  
 PLAN AND SECTION



FIGURE 5-5

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Isolation Channel 3 will typically divert all flow up to 12 mgd into the grit chamber. Grit that settles out of the grit chamber will be pumped by the grit pumps to the grit cyclones and classifier. The grit cyclones and classifier will dewater and convey the grit in a grit dumpster at grade. An adjustable bypass weir will convey flows in excess of 12 mgd into the bypass channel routed around the grit chamber. The PWWF can be passed through the proposed grit chamber; however, at this flow rate grit removal efficiency will be reduced. Additional isolation gates are provided to bypass all flow around the grit chamber when maintenance is required.

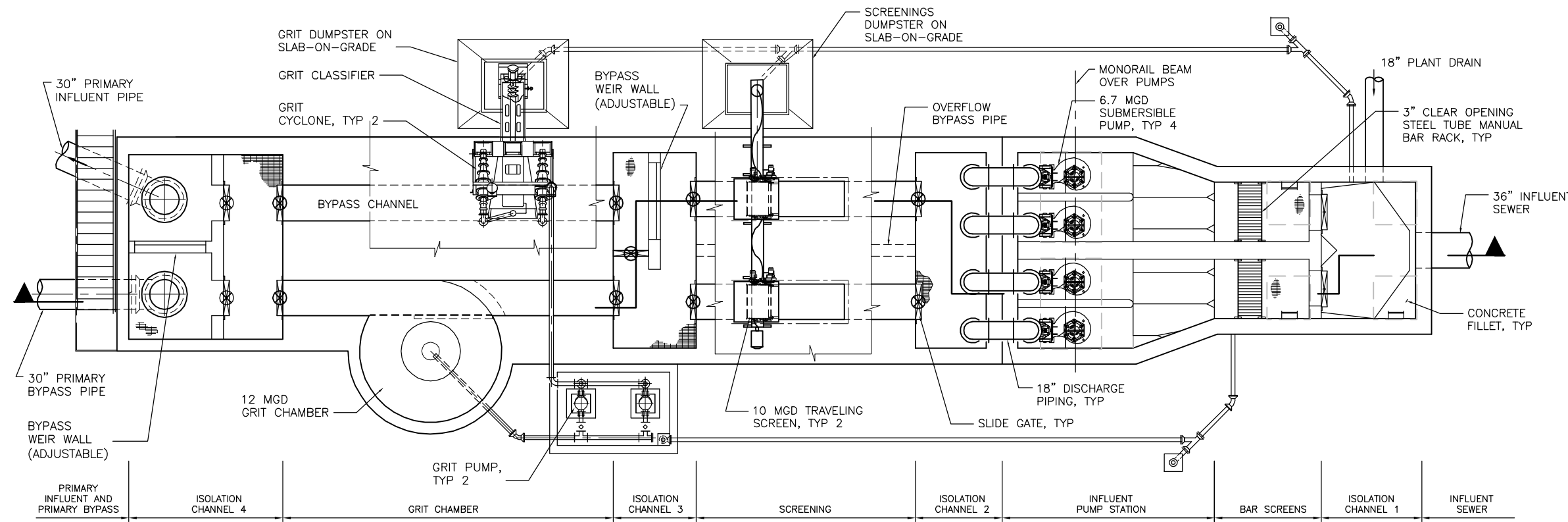
Downstream of the grit chamber, flow will enter isolation channel 4 where it will be conveyed into the 30-in primary influent pipe for routing to the Primary Clarifier Distribution Box which has an effluent weir elevation of 117-ft. The grit chamber, isolation channel 3 and isolation channel 4 are located above-grade to facilitate gravity flow to the Primary Clarifier Distribution Box. Flows in excess of 12 mgd will be bypassed over an adjustable weir wall to the 30-in primary bypass pipe. Isolation gates are included to bypass all flow around the primary clarifiers when necessary.

## Alternative 2 - Screening after Influent Pump Station

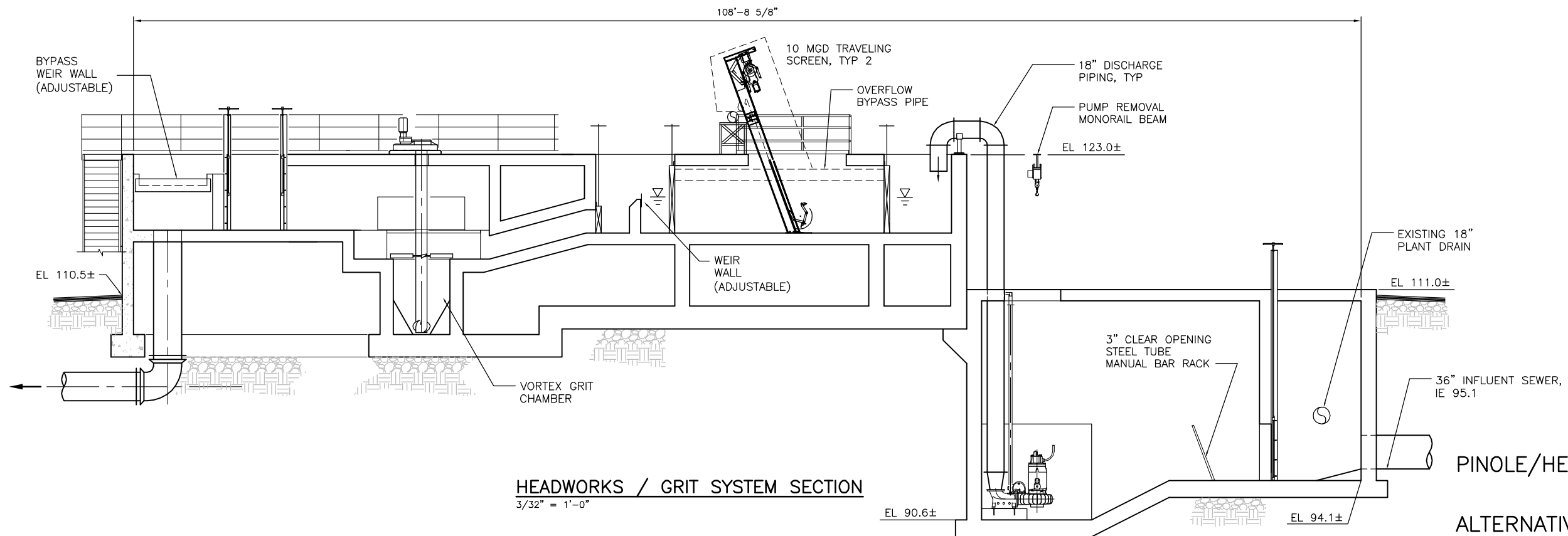
The plan and section of Alternative 2 is presented in Figure 5-6. Influent sewage enters Isolation Channel 1 in the Headworks Facility at invert elevation 95.1-ft from the 36-in influent sewer, similar to Alternative 1. From Isolation Channel 1, flows can be conveyed to either or both wetwells. Each wet well includes two 6.7 mgd submersible pumps and a 3-in clear opening manual barscreen. If the barscreen is blinded, influent will bypass over the top of the manual barscreen.

Each manual barscreen will have 3-in clear openings and be constructed of steel tube to reduce the potential for blocking and/or blinding. The barscreen will be a minimum of 54-in wide to provide adequate hydraulic performance through the screen. Access ladders and hatches upstream of each barscreen are provided for removal of screenings that blind the barscreen. Each influent pump station wet well also includes a sloped section down to two submersible pumps similar to Alternative 1. The wet wells are sized per HI standards. To reduce construction costs, the wet well is not a self-cleaning type. Each pump will have a capacity of 6.7 mgd and be mounted on rails for removal when required. The discharge piping from each pump will be 18-in without any valves for a free discharge into Isolation Channel 2.

Isolation Channel 2 will direct all flow through two 10 mgd traveling rake screens. If both screens are blinded, an overflow bypass pipe to bypass the screens is provided. The traveling rake screens will have ¼-in clear openings between bars and are sized to handle PWWF. Screenings will be conveyed up the screen and discharged into a shaftless screw conveyor for conveyance into an adjacent screenings dumpster as shown in Figure 5-6. The screens are angled at 70-degrees from horizontal in the Alternative 2 layout. As shown in the section view of Figure 5-6, the screens in Alternative 2 are much shorter than the screens in Alternative 1;



**HEADWORKS / GRIT SYSTEM PLAN**  
 3/32" = 1'-0"



**HEADWORKS / GRIT SYSTEM SECTION**  
 3/32" = 1'-0"

PINOLE/HERCULES WPCP PROJECT

ALTERNATIVE 2  
 PLAN AND SECTION



C:\pwworking\sec\d0406435\Figure 5-6.dwg  
 02-22-13 RNATOL 08:28:07

however, the cost savings for shorter screens is only approximately \$20,000 according to one travelling rake type screen manufacturer representative.

After screening, flow is conveyed into Isolation Channel 3 which will typically convey flows to 12 mgd into the grit chamber. Grit that settles out in the grit chamber will be pumped by grit pumps to the grit cyclones and classifier. The grit cyclones and classifier will dewater and convey the grit to a grit dumpster at grade. An adjustable bypass weir will convey flows in excess of 12 mgd around the grit chamber. The PWWF can be passed through the proposed grit chamber; however, at this flow rate grit removal efficiency will be reduced.

Additional isolation gates are provided to bypass all flow around the grit chamber when maintenance is required.

Downstream of the grit chamber, flow will enter Isolation Channel 4 where it will be conveyed into the 30-inch primary influent pipe for routing to the Primary Clarifier Distribution Box which has an effluent weir elevation of 117-ft. The grit chamber, Isolation Channel 3 and Isolation Channel 4 are located above-grade to facilitate gravity flow to the Primary Clarifier Distribution Box. Flows in excess of 12 mgd will be bypassed over an adjustable weir wall to the 30-inch primary bypass pipe. Isolation gates are included to bypass flow around the primary clarifiers when necessary.

## Alternatives Analysis

The main difference between the two alternatives is the location of the ¼-in clear opening traveling rake screens. The screens are moved above grade, downstream of the influent pump station in Alternative 2 in an effort to reduce construction costs. Moving the screens reduces the length of the screens, reduces the excavation and shoring extents for the below-grade structure, and offers some cost saving on the screen equipment. However, this move also requires additional 3-in clear opening manual barscreens and space upstream of each barscreen for maintenance. These additions offset most of the cost savings achieved by moving the screens above grade. The cost estimate comparison in 2012 dollars for Alternatives 1 and 2 is presented in Table 5-12.

*Table 5-12. Alternatives 1 and 2 Cost Estimate Comparison*

CSI Division	Alternative 1	Alternative 2
1 – General Requirements	\$575,000	\$567,000
2 – Site work	1,382,900	1,325,600
3 – Concrete	\$785,700	\$844,700
4 – Masonry	\$0	\$0
5 – Metals	\$120,500	\$120,500
6 – Wood & Plastic	\$0	\$0
7 – Thermal & Moisture Protection	\$25,000	\$25,000
8 – Doors & Windows	\$0	\$0
9 – Finishes & Protective Coatings	\$25,000	\$25,000
10 – Specialties	\$15,000	\$15,000
11 – Equipment	\$974,800	\$914,800

CSI Division	Alternative 1	Alternative 2
12 – Furnishings	\$0	\$0
13 – Instrumentation	\$250,000	\$250,000
14 – Conveying Systems	\$15,000	\$15,000
15 – Mechanical	\$421,000	\$416,500
16 – Electrical	\$390,000	\$390,000
Division 2-16 Subtotal	\$4,415,000	\$4,358,000
Division 1	\$575,000	\$567,000
Contingency (20%)	883,000	872,000
<b>Total Construction Cost (in 2013 dollars)</b>	<b>5,873,000</b>	<b>5,797,000</b>
Engineering and Administration (25%)	1,469,000	1,450,000
<b>Total Project Cost (in 2013 dollars)</b>	<b>7,342,000</b>	<b>7,247,000</b>

As presented in Table 5-12, Alternative 2 was determined to be slightly less expensive than Alternative 1. HDR recommends proceeding with Alternative 1 for final design. The additional maintenance for the 3-in clear opening manual barscreens upstream of the pumps and the increased risk of damaging the submersible pumps without ¼-in screens upstream of the pumps in Alternative 2 is not justified by the estimated cost savings.

## Recommended Project

The recommended project (Alternative 1) of the Headworks Facility consists of the following components:

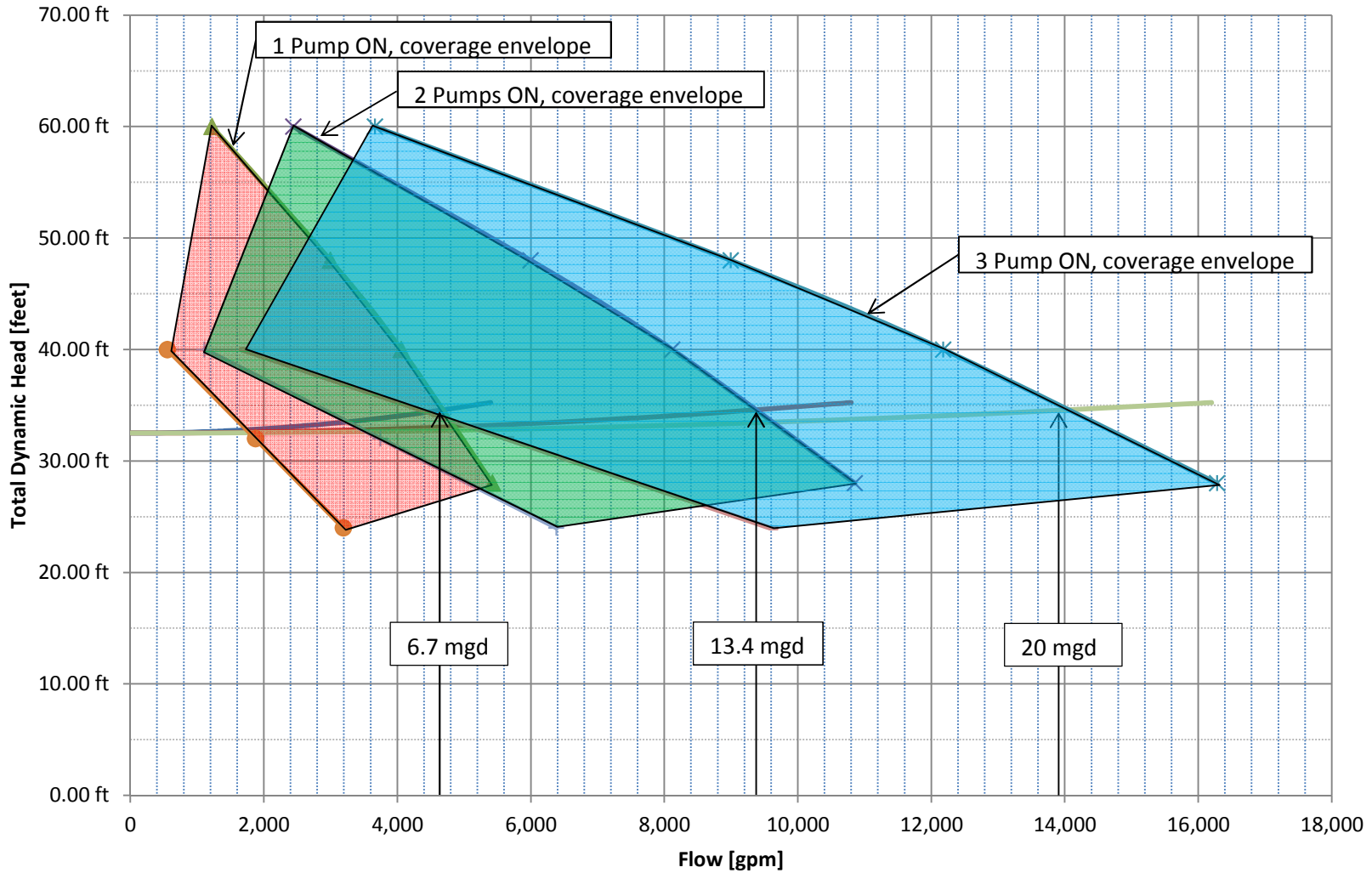
- ◆ Two new ¼-in clear opening traveling rake bar screens installed upstream of the influent pump station for the removal of debris from influent wastewater. Each screen will have a rated capacity of 10 mgd. An emergency bypass line will be provided to convey influent flow to the wet well in the event the screens are blinded.
- ◆ The influent pump station will be a submersible type and constructed with two separate wet wells. Each wet well will include two submersible non-clog centrifugal type pumps each with a flow capacity of 6.7 mgd. The pumps will discharge screened flow to a common box that feeds the grit removal system.
- ◆ One vortex grit chamber will be installed for grit removal. The grit chamber will have a rated capacity of 12 mgd, and will discharge into a common box that will feed a 30-in primary influent pipe and a 30-in primary bypass pipe. The 30-in pipe will convey screened, de-gritted wastewater to the Primary Clarifier Distribution Box.

The hydraulic design, additional design features and the construction cost estimate for the recommended design are discussed in the following sections.

## Hydraulic Design

The preliminary system curve overlaid with the recommended pump curve is presented in Figure 5-7. The preliminary pump selection data is presented in Table 5-13. System curves were developed using the Hazen-Williams equation for pipe friction head losses, the method of

**Figure 5-7. Preliminary Pump Curves & Envelopes and System Curves**



- System Curve for 1 pump ON    — System Curve for 2 pumps ON    — System Curve for 3 pumps ON
- ▲ 1 Flygt 3202 @ 60 Hz            —× 2 Flygt 3202 @ 60 Hz            —\* 3 Flygt 3202 @ 60 Hz
- 1 Flygt 3202 @ 47 Hz            —+ 2 Flygt 3202 @ 47 Hz            — 3 Flygt 3202 @ 47 Hz

loss coefficients for pipe fittings, and static head is based on the differences in water surface elevations (WSE) between the pump station wetwell and the grit removal system distribution box. The pumps will operate at lower efficiencies at low flows since the smaller jockey pumps were removed from the preliminary design.

*Table 5-13. Preliminary Pump Selection Data*

Number of Pumps	Design Point Pump Flow and Head	Model No	Hp	Weight (lb)	Pump Discharge Diameter
4	6.7 mgd at 34.5 feet	Flygt NP 3202	60	1745	12-in

Each wet well will be installed with two pumps. This configuration will enable one wet well to be taken out of service for maintenance for extended periods during the dry weather season.

## Wet Well Operating Levels

Pump operating levels within the wet well were determined using the following criteria:

- ◆ No surcharge of the 36-in influent pipe upstream of the screens.
- ◆ Providing the mechanical bar screens with a 12-in minimum water depth for lubrication.

Details of the pump operating levels (operating band) will be finalized in the detailed design phases of the project and documented accordingly.

## Wet Well Isolation Gates

Type 304 stainless steel (SS) slide gates will be provided to isolate each screening channel and wet well in the pump station. Motorized actuators will be provided on all isolation gates. Slide gates will be designed for maximum anticipated seating and unseating head. Per HI standards, the maximum velocity through the slide gates in the pump station will be 4 feet per second (fps).

## Pipe Size and Material

All project piping will be suitable for its intended use and pressure, adequately supported, and lined and coated to protect the pipe from its environment as necessary. The influent pipeline will be designed with reinforced concrete pipe with PVC T-lock® lining. Discharge piping will be American Water Works Association (AWWA) C115 ductile iron pipe or AWWA C200 steel.

The 18-in diameter discharge piping for each pump will be sized to meet the pipeline velocity design criteria presented earlier in this TM.

## Monorail Pump Hoist System

A monorail hoist will be included as part of the influent pump station design. The monorail hoist will lift pumps on rails directly out of the wet well for maintenance. The hoist will be designed to facilitate loading the pumps onto a flatbed truck.

## Canopy

No canopy structure will be provided Headworks Facility. The canopy was removed from the preliminary design to reduce costs.

## Odor Control

The odor control facility will consist of a fiberglass reinforced plastic (FRP) centrifugal fan, a biological scrubber tower, and associated controls equipment. It will be located adjacent to the Headworks Facility. Odor control intakes will be installed in the top slabs above each wet well influent pump station, screenings area, and grit chamber. Air will be drawn through odor ducts and connected to a centrifugal fan.

The biological scrubbers are relatively maintenance free. The main maintenance items are the fan, the water spray nozzles (only if there is poor quality or hard water), and a small nutrient pump. The media will be specified as synthetic. There is only a thin film of biomass that clings to the synthetic media; therefore, there is no need to periodically clean the media and there is typically no tendency for the biomass to slough off. A soil media type odor control facility could also be considered during final design if desired.

## Cost Estimate

The estimated construction cost for the proposed Headworks Facility is \$5,873,000. This includes allowances for mobilization/demobilization, demolition of the existing Headworks, yard piping, utility relocation, and equipment installation. The costs for equipment are based on recent budget level proposals from manufacturers. A 20-percent construction contingency is included to account for unknown factors. Table 5-14 provides a summary of the estimated construction costs of the Headworks Facility; engineering and administrative costs are not included.

*Table 5-14. Opinion of Probable Cost Summary*

CSI Division	Estimated Probable Cost
1 – General Requirements	\$575,000
2 – Site work	1,382,900
3 – Concrete	\$785,700
4 – Masonry	\$0
5 – Metals	\$120,500
6 – Wood & Plastic	\$0
7 – Thermal & Moisture Protection	\$25,000
8 – Doors & Windows	\$0



CSI Division	Estimated Probable Cost
9 – Finishes & Protective Coatings	\$25,000
10 – Specialties	\$15,000
11 – Equipment	\$974,800
12 – Furnishings	\$0
13 – Instrumentation	\$250,000
14 – Conveying Systems	\$15,000
15 – Mechanical	\$421,000
16 – Electrical	\$390,000
Division 2-16 Subtotal	<b>\$4,415,000</b>
Division 1	\$575,000
Contingency (20%)	883,000
<b>Total Construction Cost (in 2013 dollars)</b>	<b>5,873,000</b>
Engineering and Administration (25%)	1,469,000
<b>Total Project Cost (in 2013 dollars)</b>	<b>7,342,000</b>

DRAFT

Appendix A. Screen Manufacturer Equipment Cutsheets

DRAFT

# Robust Simplicity In The Industry's Most Efficient Fine Screen—Plus Thru-Bar™ Cleaning



## **FlexRake® FPFS**

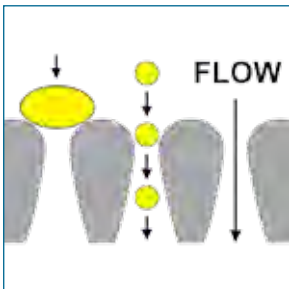
### Mechanically Cleaned Bar Screens

Robustly simple front cleaning, front return Duperon® FlexRake® technology. Utilizes stainless steel tear shaped bars with 1/4 inch, 3/8 inch or 1/2 inch openings.

- Simple With Few Parts and Little Maintenance—Just Runs
- Unique in the Industry: Thru-Bar™ Stainless Steel Scrapers Clean 3 Sides of the Bar as well as the Cross Members
- No Tight Clearances to Bind or Jam
- Engineered for 100% Reliable Alignment of Scrapers Into Bars
- Eliminates Need for Confined Space Entries and In-Channel Maintenance With No Lower Sprockets, Bearings, Tracks or Guides to Foul or Jam
- Five-Year Warranty for Wastewater Applications



Jam Evasion™ with Patented FlexLink™ Technology Protects Your Investment — Lifts or Pivots Around Debris



Tear Shaped Bars— Highest Efficiency in the Industry, 25% - 50% More Efficient

### TYPICAL APPLICATIONS

Wastewater, combined sewer overflows and prison applications. Also used in pulp/paper mills, raw water intakes, and other applications where debris is susceptible to wrapping and clinging on the bar screen.

### UNIT WIDTH

2 feet to 10 feet  
Single Strand FlexRake<sup>®</sup> configuration available for channel widths of 18 inches to 24 inches.

### UNIT LENGTH

10 feet to 100 feet

### ANGLE OF INSTALLATION

Optimum: 30 degrees from vertical  
Range from 10 degrees to 45 degrees, dependent upon site conditions.

### STANDARD MATERIALS OF CONSTRUCTION

Standard: 304 Stainless Steel  
Available in: 316 Stainless Steel

### BAR OPENING

1/4 inch, 3/8 inch and 1/2 inch

### STANDARD SCRAPER SPACING

Every 2nd link

### SCRAPER CONFIGURATION

3:1 UHMW-PE staging scraper/stainless steel Thru-Bar<sup>™</sup> teeth ratio. Scraper positioned every 21 inches.

### TYPICAL MOTOR

1/2 HP, 1 PH/3 PH explosion proof, inverter-duty motor

### STANDARD OPERATING SPEED

0.5 RPM  
Can be increased to 2.2 RPM in high flow conditions.  
1 discharge/minute on low, 4 discharges/minute on high  
Scrapers move 28 inches/minute

### SHIPPING DATA

Ships fully assembled or can be provided in modular form

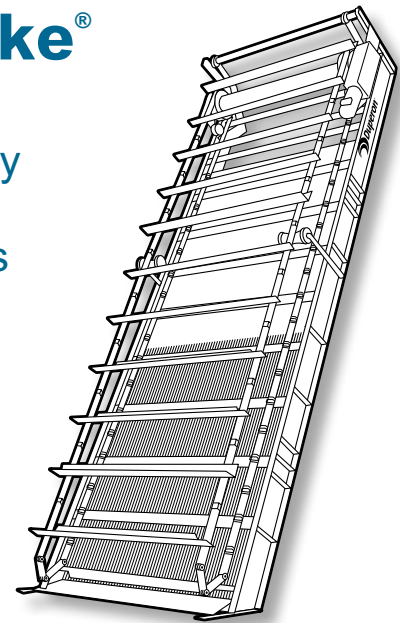
### STANDARD CONTROLS OPTIONS

Packages range from simple start/stop to sophisticated automation. Motor overload protection provided. Contact Duperon<sup>®</sup> for further details and assistance in selecting the perfect package for your site.

### OPERATION OPTIONS

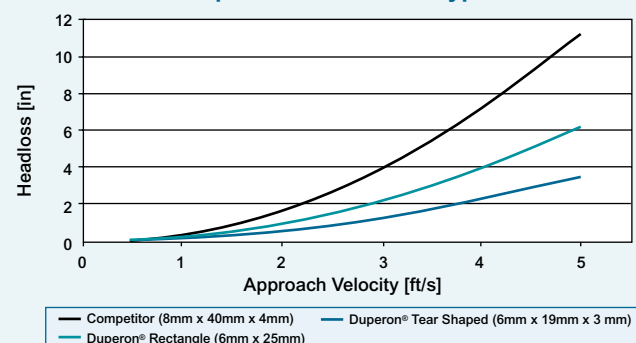
Continuous/Manual.  
Automatic with timer, float, SCADA, differential/high level sensing options with I/O as needed.

## FlexRake<sup>®</sup> FPFS Mechanically Cleaned Bar Screens



- Tear Shaped Bars—What is Larger Than the Openings Stays on Screen to Be Removed; What is Smaller Passes Through Due to Shape of Bars
- Cleans to Bottom of Channel—Bottom Plate Eliminates Debris Accumulation at Base
- Easy To Install and Easy To Operate

Tear Shaped Bars vs. Other Type Bars

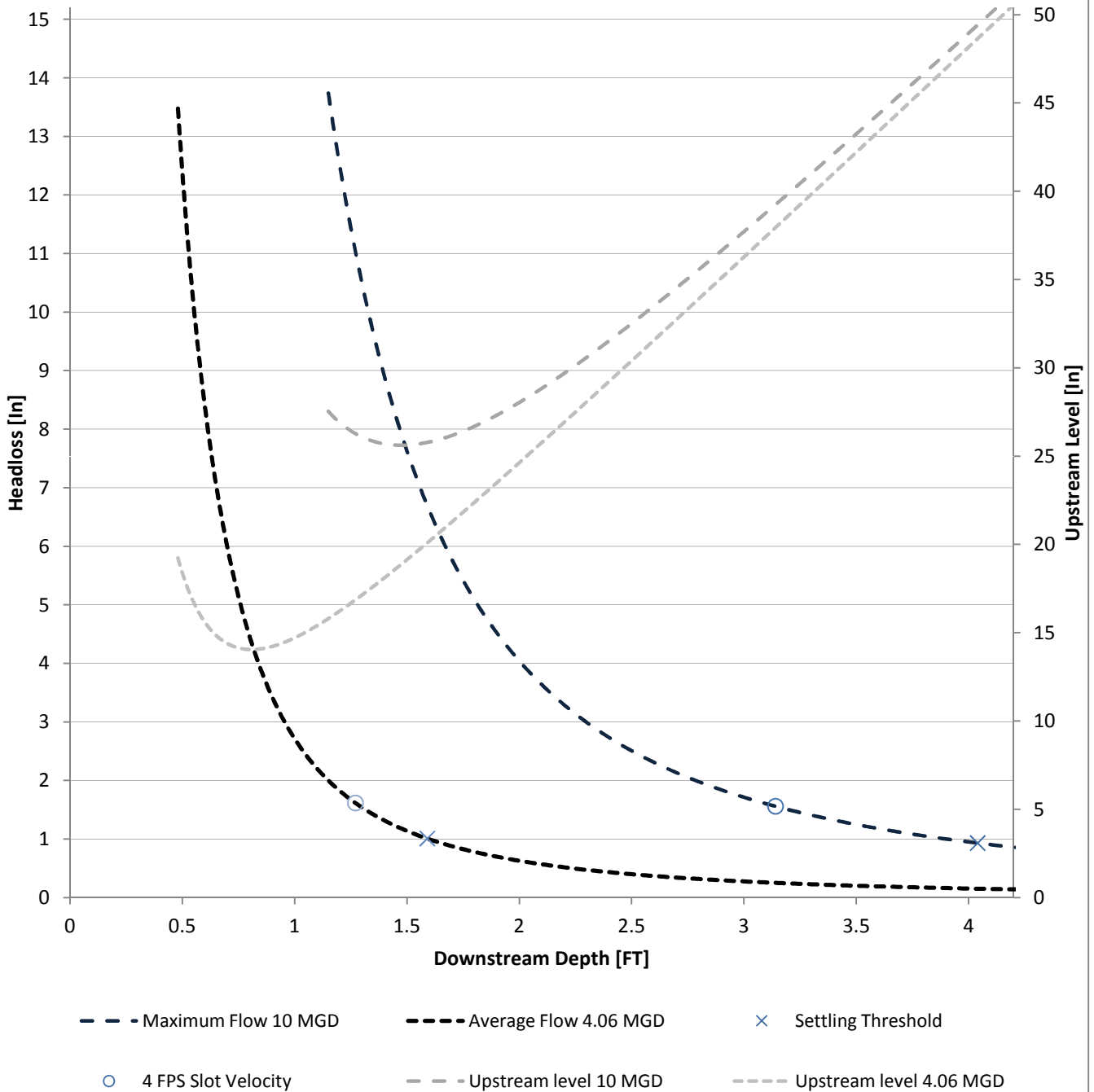


**Duperon's First Law of Simplicity:** One part doing the work of many; two parts, one too many.

# Duperon Corporation

## Head Loss Vs Downstream Water Depth 0% Blocked

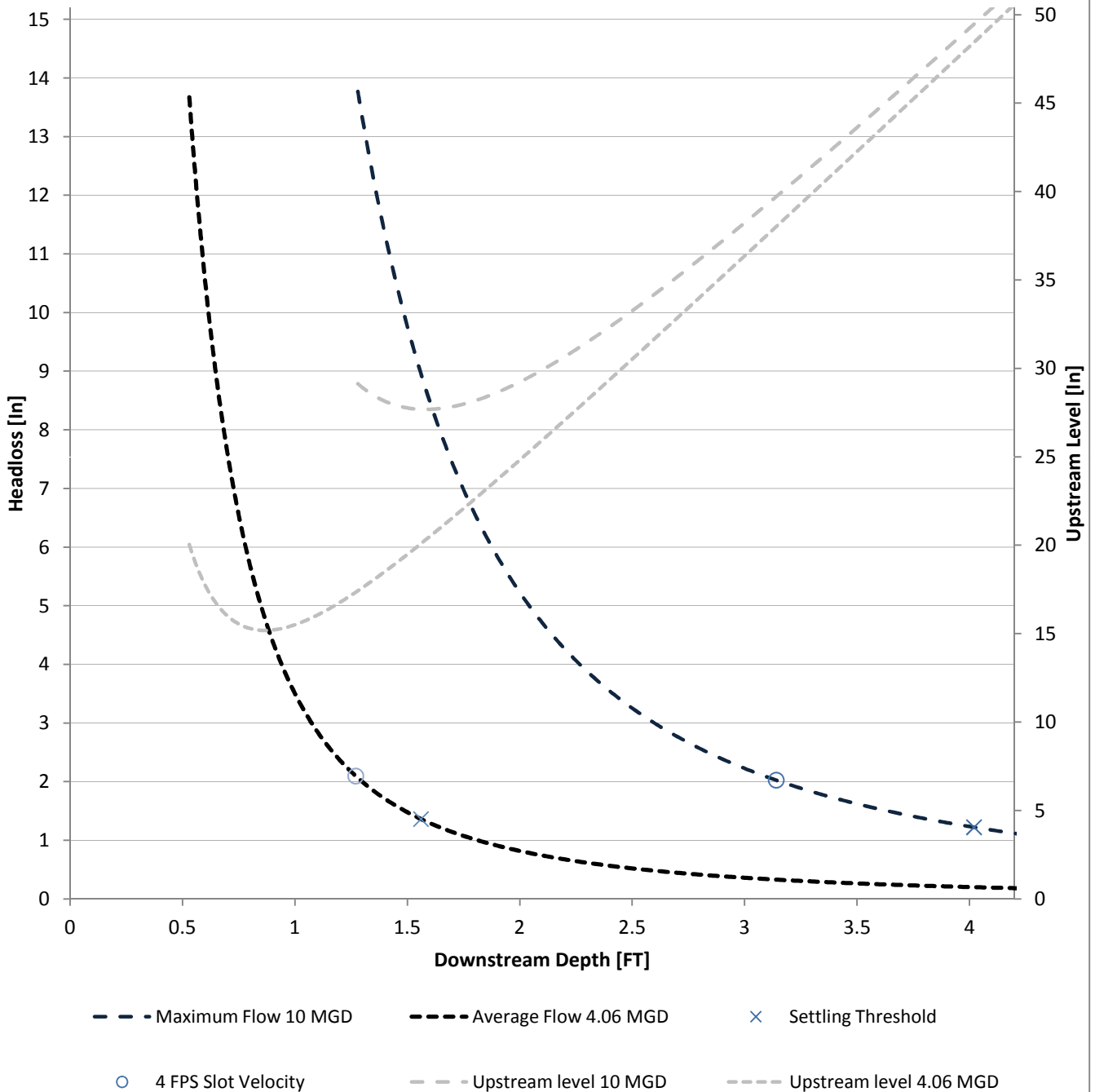
Date: 7/27/2012	Bar Width: 0.25 [In]
Proposal no.: P6335	Clear Opening: 0.25 [In]
Machine Type: FPFS	Channel Depth: 4 Feet
Description: Pinole WWTP	Channel Width: 3 Feet
Site Address: California	Maximum Capture: 7.71 [Ft <sup>3</sup> /Hr]



# Duperon Corporation

## Head Loss Vs Downstream Water Depth 10% Blocked

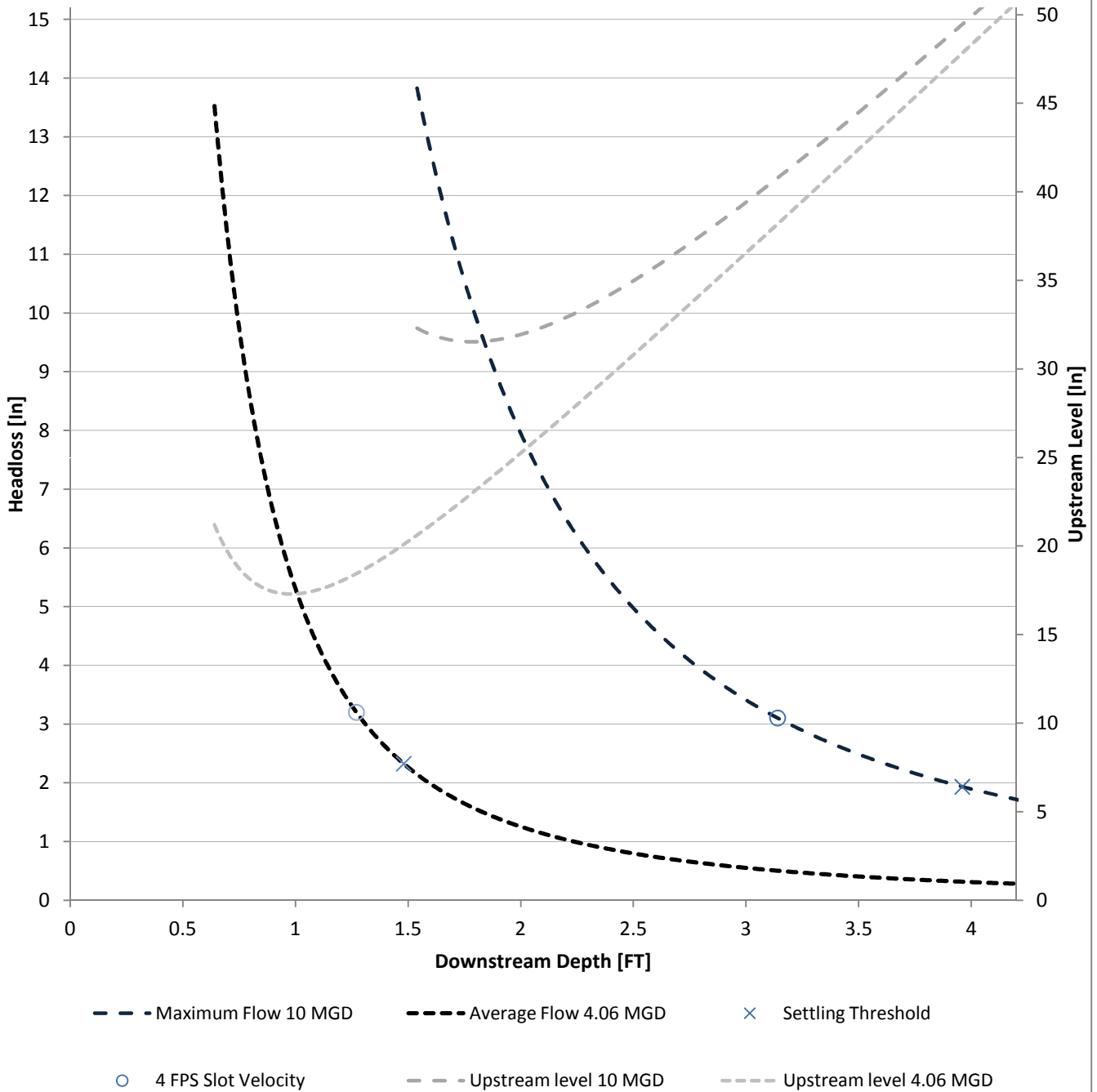
Date: 7/27/2012	Bar Width: 0.25 [In]
Proposal no.: P6335	Clear Opening: 0.25 [In]
Machine Type: FPFS	Channel Depth: 4 Feet
Description: Pinole WWTP	Channel Width: 3 Feet
Site Address: California	Maximum Capture: 7.71 [Ft <sup>3</sup> /Hr]



# Duperon Corporation

## Head Loss Vs Downstream Water Depth 25% Blocked

Date: 7/27/2012	Bar Width: 0.25 [In]
Proposal no.: P6335	Clear Opening: 0.25 [In]
Machine Type: FPFS	Channel Depth: 4 Feet
Description: Pinole WWTP	Channel Width: 3 Feet
Site Address: California	Maximum Capture: 7.71 [Ft <sup>3</sup> /Hr]





Now, there's an easier way!<sup>SM</sup>

DATE: July 31, 2012

Mechanically Cleaned Bar Screen  
Budgetary Proposal Number 6335 R2

## Pinole CA - New Hdwks Bldg

To:  
Pinole, CA New Headworks Building  
Jennifer Shore

Sales Rep:  
JBI Water & Wastewater Equipment Inc.  
Jim Zaiser  
Phone: (916) 933-5500  
Fax: (916) 933-5500  
Email: [jimzaiser@jbiwater.com](mailto:jimzaiser@jbiwater.com)

From:  
Duperon Corporation  
Mike Olvera  
Phone: (800) 383-8479  
Fax: (989) 754-2175  
Email: [molvera@duperon.com](mailto:molvera@duperon.com)







## Scope of Supply:

(2) Full Penetration, Fine Screen Model FlexRake® - Stainless Steel Link Driven, Front Cleaning, Front Return Mechanically Cleaned Bar Screen 3 ft wide x 22 ft long, nominal .25" opening

- Head Sprocket Only Design – no critical components under water
- Continuous Cleaning, top to bottom, the entire width of scraper
- Continuous Cleaning without an operator
- Scrapers of UV Stabilized UHMW and/or Stainless Steel
- Designed to meet a 1 ft head differential
- Enclosure covering operating deck to discharge, including SSTL removable access panels and side shields covering operating deck to lower deck
- Note: (See attached table for channel dimensions)

(1) Controls Package

- Wall mount NEMA 12 painted enclosure (for 2 screens)
- Main circuit breaker for 480/3/60 incoming power
- AC Tech VFD drives for speed control
- Unitronics PLC for differential level control
- Pilot lights, push buttons and selector switches on front door
- Intrinsic safety barrier for float and ultrasonic sensors

Field Mounted Devices

- (2) Three hole NEMA 7/9 PB enclosures for E-Stop, Forward and Reverse

Spare Parts

- Standard Spare Parts Package

On Site Technical Assistance

- (2) Trips (2) day, (1) technician, 8 hours total at site each day

Operation and Maintenance Manuals

- 6 Hard Copies

Warranty

- One Year Standard material and workmanship
- Five Year on all rotating parts

Freight to Jobsite

---

**Price: \$282,000**



**Price is valid for 30 days.**

**Submittals: 4-6 weeks after approved purchase order**

**Equipment Delivery: 8-12 weeks after approval**

**Options:**

Duperon® Washer Compactor – Positive Displacement, Dual Auger System

- Non-clogging: positive displacement technology—what comes in must go out
- 60% dry solids
- Simple and durable dual auger design
- Various discharge configurations including up to 10 ft of discharge horn
- Available in 304 SSTL and 316 SSTL

**\$ 45,000**

Duperon® Washer Compactor Heat Trace

- Insulation Blanket
- Heat Trace
- Glass Cloth Tape
- Power Connection
- Seal Kit
- Thermostat

**\$ 5,000**

Controls

- Relay based Washer Compactor/Auger Conveyor controls with HOA functionality
- Level controls, PLC based controls, and other sophistication

**\$ Please request quote**

**Clarifications:**

Impacts to seismic, high wind requirements and additional structure needed at the site not included in the scope of supply or price listed above.

Any changes to the scope of supply listed above could have impacts on the pricing.

If this is an outdoor installation it is highly recommended to install freeze protection on the screen if temperatures drop below freezing.



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**Not Included:**

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- Bonding, tariffs, permits, taxes, liquidated damages.
- On-site conditions affecting the work described or which affects the installation of the FlexRake.
- Conduit, control stands, control mounting wiring, junction boxes, or other control accessories.
- Stilling wells.
- Any site work or installation tasks (ie, unloading, placement, dewatering, diving, clearing the forebay, wiring, provision of concrete structure, etc.), equipment (such as cranes, hammer drills, etc.), or anchor bolts.
- Release of proprietary information.
- Engineering: Does not include drawings other than those for the FlexRake.
- Discharge system.
- Pre-installation tasks such as touch-up painting (paint will be provided), checking bolts for tightness, removal of shipping containment devices, etc.
- Vibration and noise testing.
- Offloading or handling of delivered equipment.

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**Proposal Terms:**

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- Subject to acceptance by our credit department.
- Provision for retainage is not included in this proposal.
- Pricing is subject to changes based upon time of order and current stainless steel prices.
- Terms may be negotiated upon request

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**Right to Refuse:**

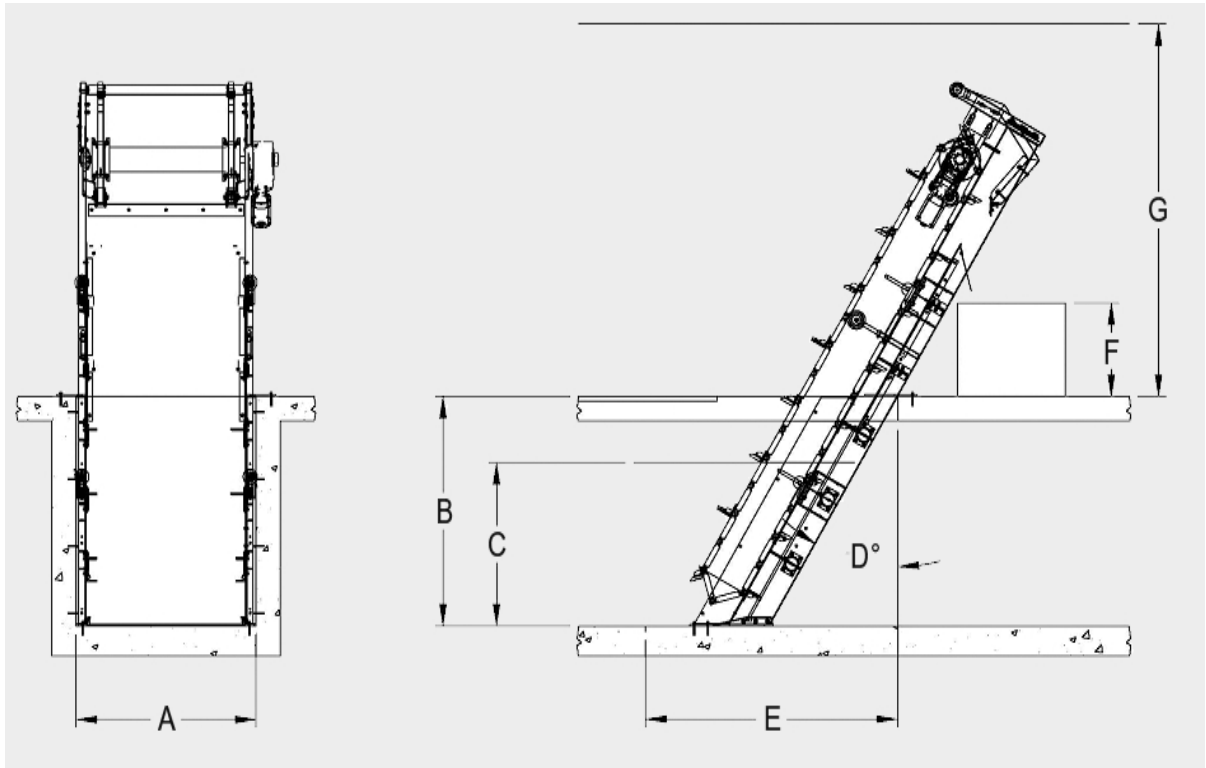
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This proposal is based upon the information available at this time and may be impacted by future specifications, scope, and other requirements. This information may be relied upon and used for project estimating purposes only. Note In the event of cancellation of a purchase order or contract, Duperon Corporation will be compensated for all costs that it or its subcontractors have incurred for performance of work in good faith. Due to the current volatility of the steel market, prices may be impacted at time of order. Please be advised that Duperon Corporation retains the right to revise, withdraw, or negotiate this offer at any time prior to signing a material contract.



## Equipment Scope of Supply:

- 2 FlexRake Full Penetration Fine Screen



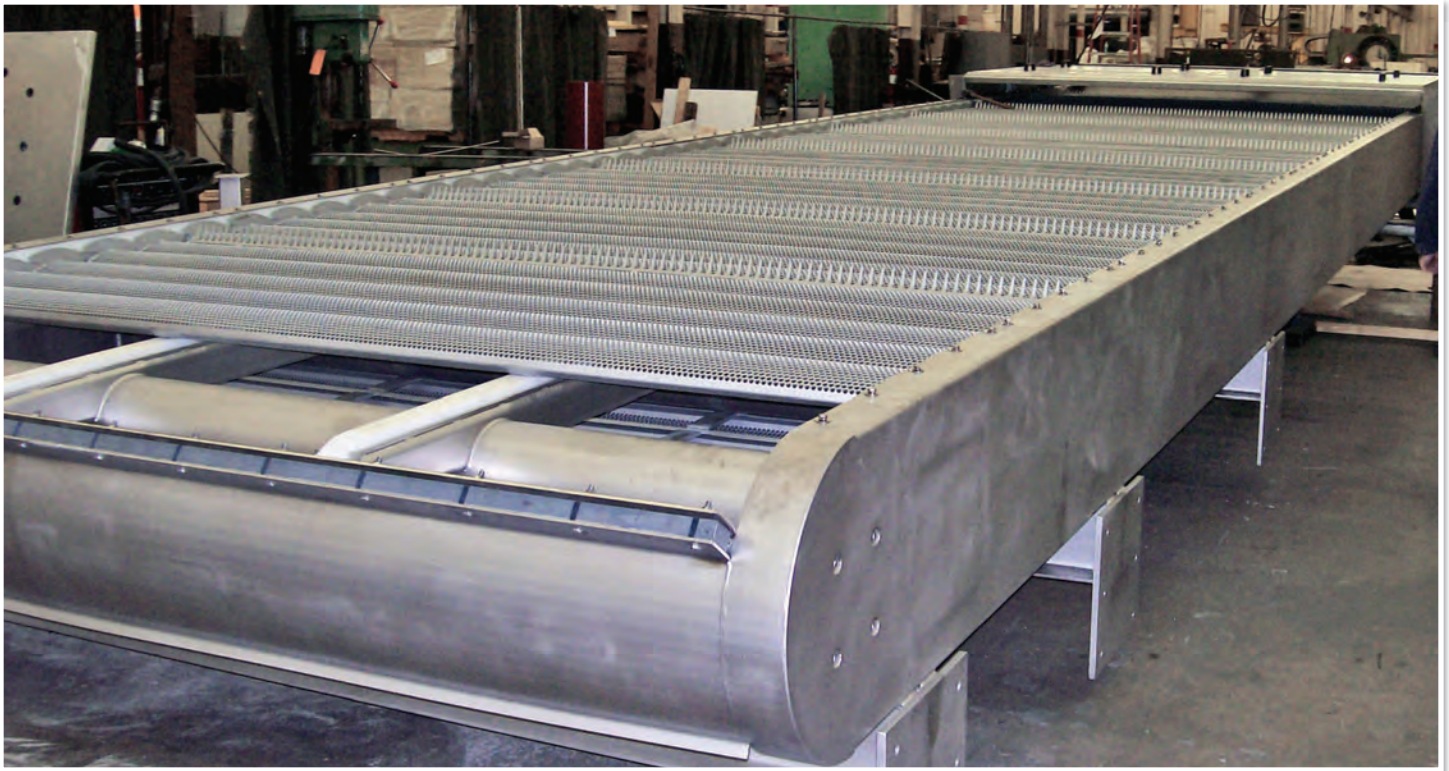
### Site Data:

A) Channel Width in Feet	3	E) Channel Depth in Feet	
B) Channel Height in Feet	4	F) Container Height in Feet	3
C) Max Water Level in Feet		G) Overhead Constraint in Feet	
D) Angle (from Vertical)	30	H) Operating Deck (if diff than B)	12

### Bar Screen Design Data:

Clear Bar Opening in Inches	0.25	Material of Construction	304 SSSL
Average Flow Rate in MGD		Link Material	304 SSSL
Max Flow Rate in MGD	10 MGD	Approximate Weight in Tons	

# PERFORATED FILTER SCREEN



The FSM Filter Screen is characterized by its sturdy construction and operational reliability.

## FEATURES

- Rugged stainless steel construction
- Completely enclosed
- Screenings positively conveyed to discharge point
- Filter elements optimally cleaned due to patented panel shape
- Allows passage of grit without malfunction
- Ability to handle high grease discharges without clogging
- Perforated panels resist stapling effect of fibrous material
- Ease of maintenance
- Indoor or outdoor installation

## BENEFITS

- High reliability
- No need for upstream coarse screening
- Low maintenance costs
- Easily adapted to suit modified operating conditions



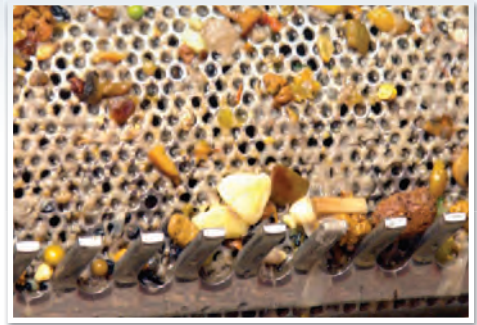
**WASTE-TECH**  
a division of KUSTERS ZIMA



Completely enclosed for odor control and hygienic operation.



Patented panel shape for optimum cleaning.



Screen removes up to 60% of fats and floating matter.

## OVERVIEW

The FSM Filter Screen was developed to solve modern day screening problems which occur in wastewater pretreatment. Following a successful test phase, the first system was installed in 1987. Since that time more than 1,500 units have been installed worldwide with over 350 in the USA. The FSM Filter Screen is characterized by its sturdy construction and operational reliability.

The FSM Filter Screen eliminates operational disruptions caused by fibrous and other inorganic material. Depending on the perforated panel, the screened material is 3 to 5 times greater compared to a bar screen with an opening of 20 mm. Up to 60% of the floating matter and fats are removed. The quality of the screened effluent is noticeably improved, which in turn improves sludge treatment and has favorable consequences for subsequent agricultural use.

## PRINCIPLE OF OPERATION

Wastewater flows through perforated filter elements while contaminants are captured on the face of the element. Larger objects, such as sticks, rocks, bottles, etc. are picked up from the bottom of the channel by the lifting tines at the bottom of every fifth element. The filter panels form a continuous belt which transports the screenings to the discharge point where they are cleaned from the panels by a rotating brush. The screenings are then discharged into a dumpster, conveyor, or compactor.

## DIMENSIONS

Channel widths from 1 to 10 feet

Standard channel depths to 36 feet

Filter element perforations of 3, 6, and 10 mm are standard (*other sizes on request*)

Angles of inclination: 50°, 60°, and 75°

## MATERIAL

Frame: 304 or 316 stainless steel

Filter Element: 304 or 316 stainless steel

Chain: Wear resistant steel, wear resistant 304 or 316 stainless steel

Sprockets: Wear resistant steel, wear resistant 304 or 316 stainless steel

Side Seals: Delrin® plastic

Chain Supports: Delrin® plastic

Drives: Shaft mounted helical gear

For more information call **847.986.2735**  
or visit **wastetechinc.com**

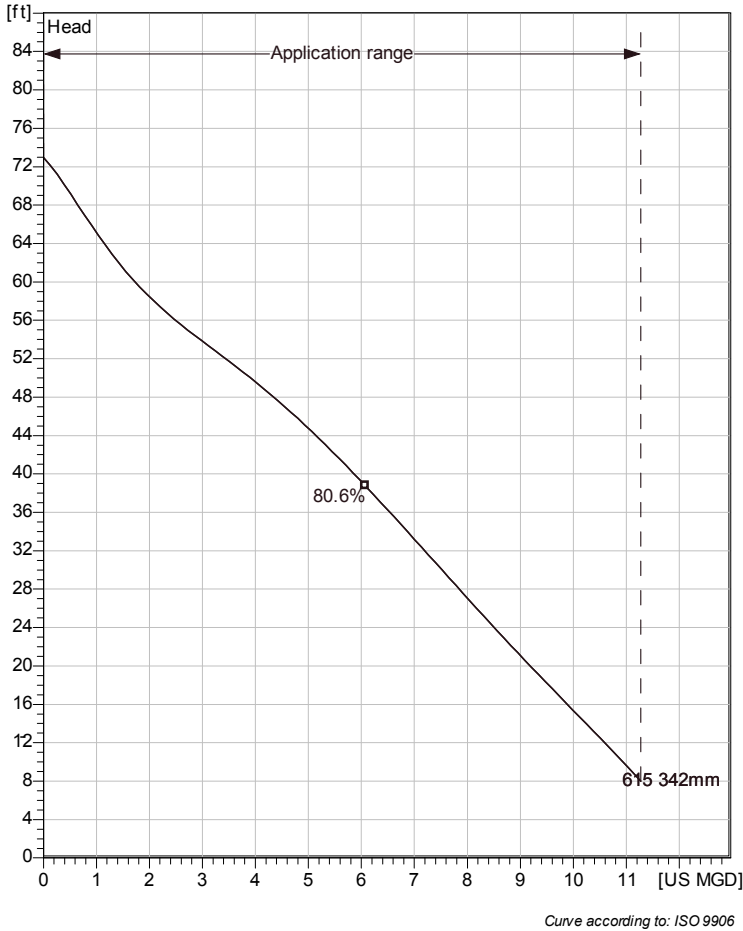


**WASTE-TECH**  
a division of KUSTERS ZIMA

Appendix B. Pump Manufacturer Equipment Cutsheets

DRAFT

**NP 3202 LT 3~ 615**  
Technical specification



Curve according to: ISO 9906



Note: Picture might not correspond to the current configuration.

**General**

Patented self-cleaning semi-open channel impeller, ideal for pumping in waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

**Impeller**

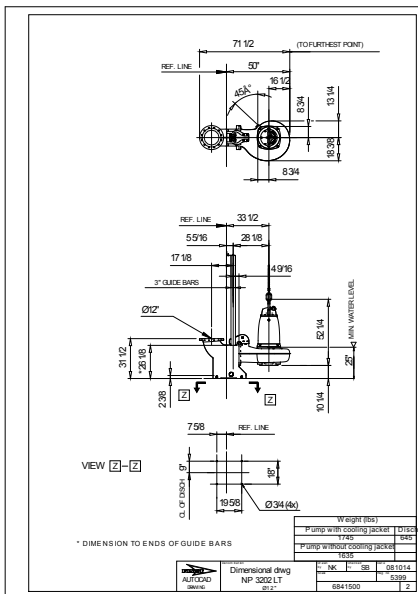
Impeller material	Grey cast iron
Outlet width	11 13/16 inch
Inlet diameter	300 mm
Impeller diameter	342 mm
Number of blades	2

**Motor**

Motor #	N3202.180 30-29-6AA-W 60hp
Stator variant	
Frequency	60 Hz
Rated voltage	460 V
Number of poles	6
Phases	3~
Rated power	60 hp
Rated current	72 A
Starting current	420 A
Rated speed	1170 1/min
Power factor	
1/1 Load	0.86
3/4 Load	0.83
1/2 Load	0.74
Efficiency	
1/1 Load	90.5 %
3/4 Load	91.0 %
1/2 Load	91.0 %

**Configuration**

**Installation: P - Semi permanent, Wet**



Project	Project ID	Created by	Created on	Last update
			2012-07-30	



# NP 3202 LT 3~ 615

## Performance curve

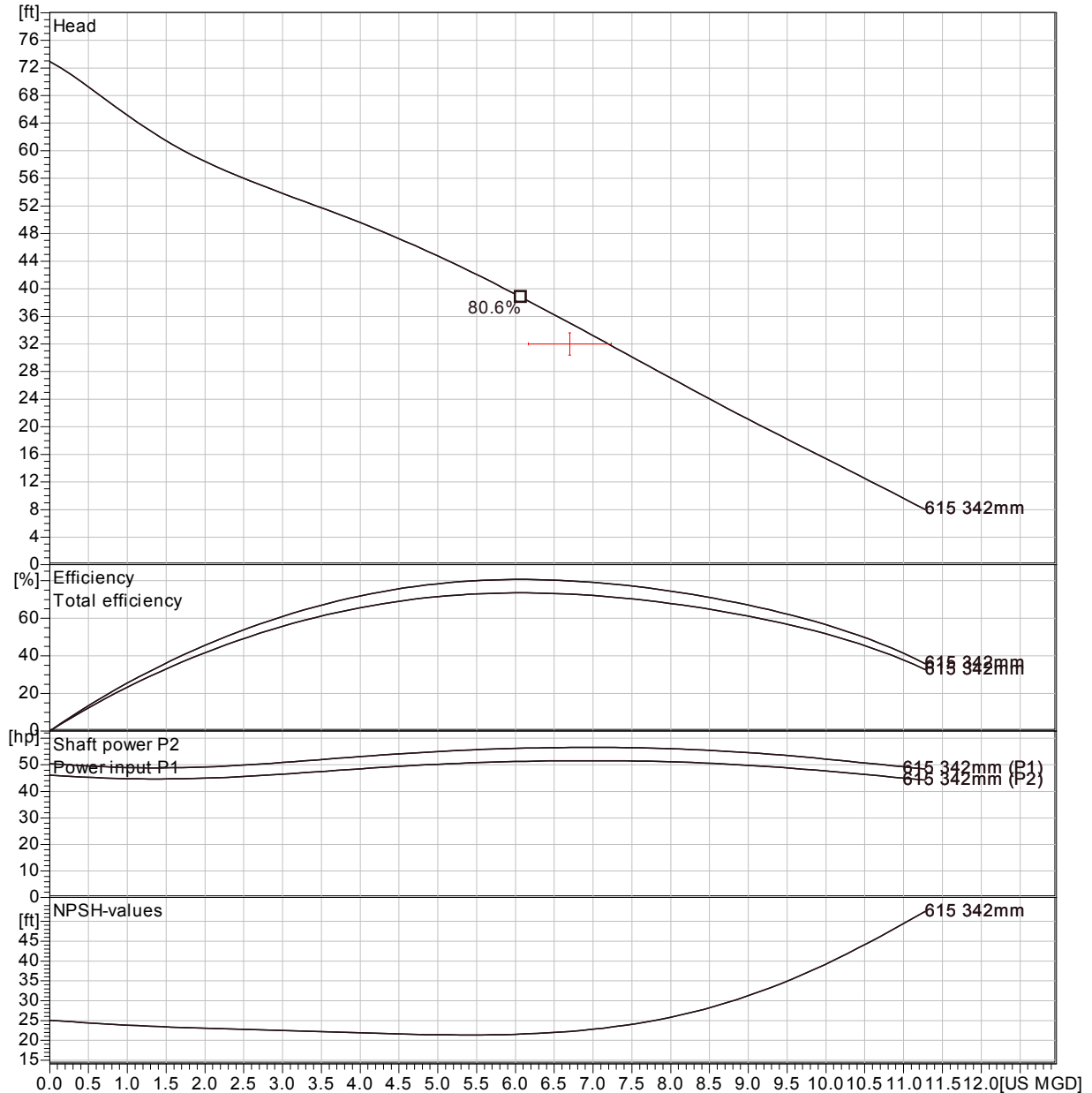
### Pump

Outlet width 11 13/16 inch  
Inlet diameter 300 mm  
Impeller diameter 13 7/16"  
Number of blades 2

### Motor

Motor # N3202.180 30-29-6AA-W 60hp  
Stator variant  
Frequency 60 Hz  
Rated voltage 460 V  
Number of poles 6  
Phases 3~  
Rated power 60 hp  
Rated current 72 A  
Starting current 420 A  
Rated speed 1170 1/min

Power factor  
1/1 Load 0.86  
3/4 Load 0.83  
1/2 Load 0.74  
Efficiency  
1/1 Load 90.5 %  
3/4 Load 91.0 %  
1/2 Load 91.0 %

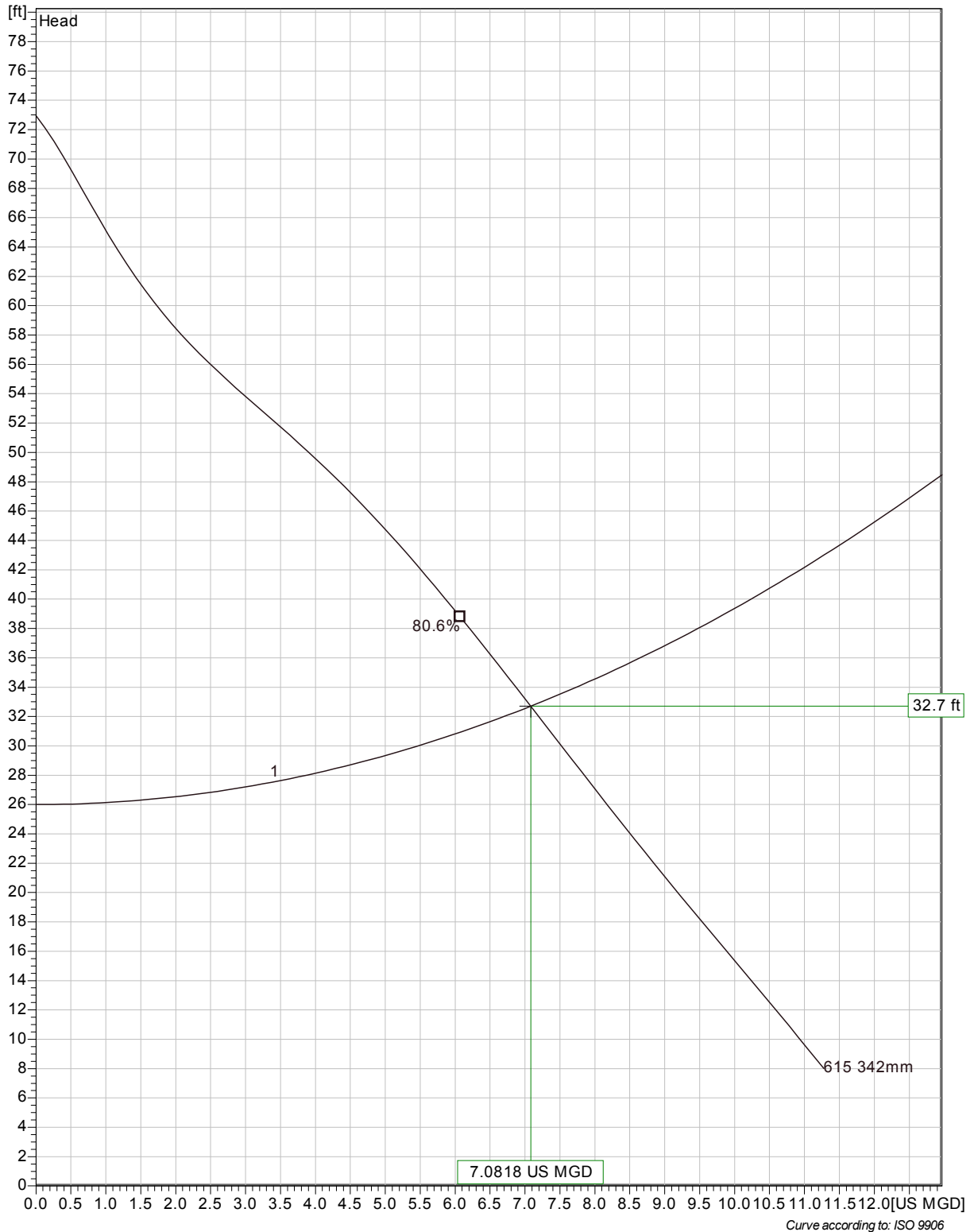


Curve according to: ISO 9906

Duty point		Guarantee			
Flow	Head	Shaft power	NPSHre	Hyd eff.	ISO_9906_Grade_2
6.7 US MGD	32 ft			%	No

Project	Project ID	Created by	Created on	Last update
			2012-07-30	

**NP 3202 LT 3~ 615**  
**Duty Analysis**

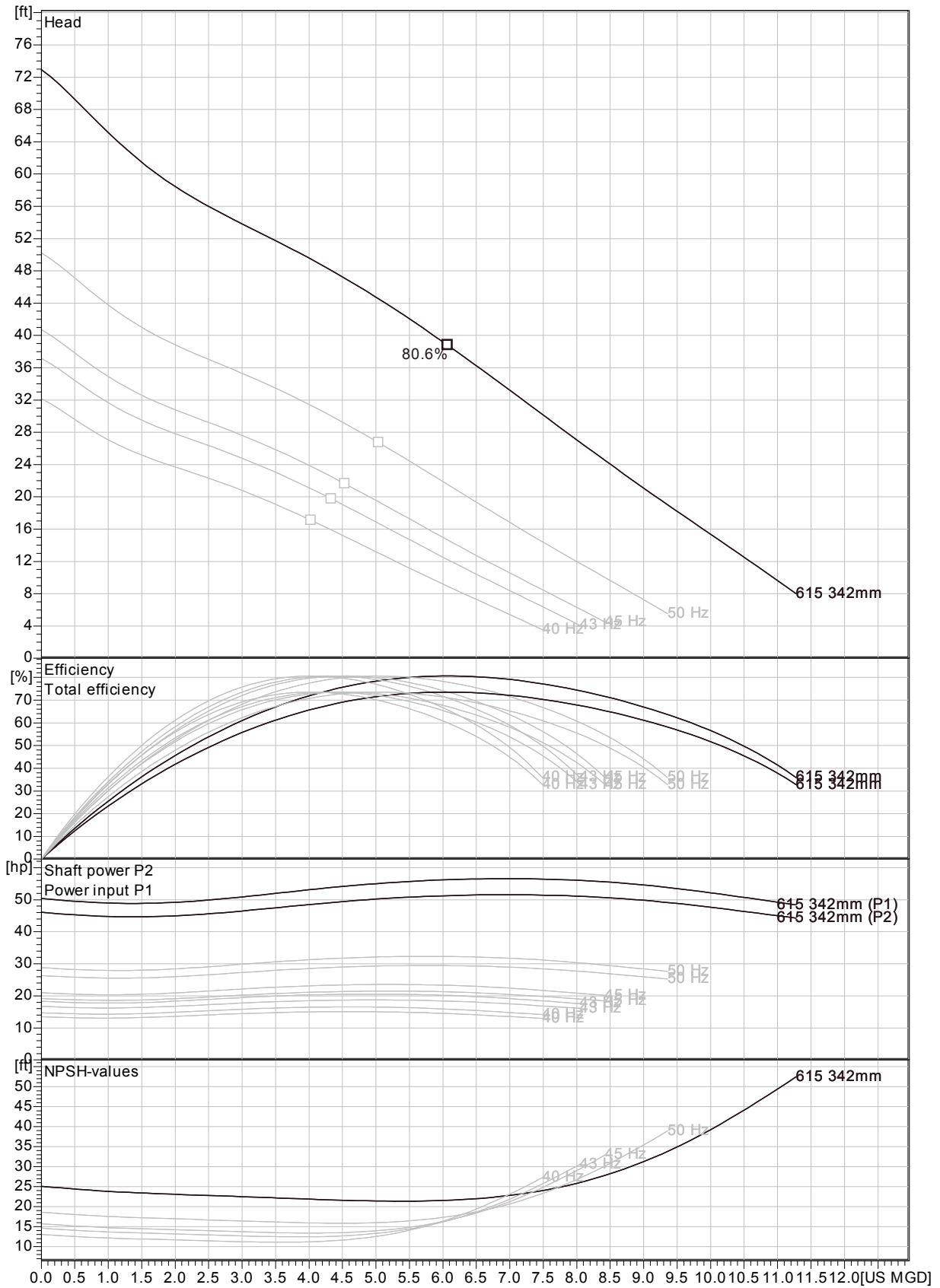


Curve according to: ISO 9906

Pumps running /System	Individual pump			Total					
	Flow	Head	Shaft power	Flow	Head	Shaft power	Hyd. eff.	Specific energy	NPSHre
1	7.08 US MGD	32.7 ft	51.6 hp	7.08 US MGD	32.7 ft	51.6 hp	78.8 %	143 kWh/US MG	23 ft

Project	Project ID	Created by	Created on <b>2012-07-30</b>	Last update
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**NP 3202 LT 3~ 615**  
VFD Curve

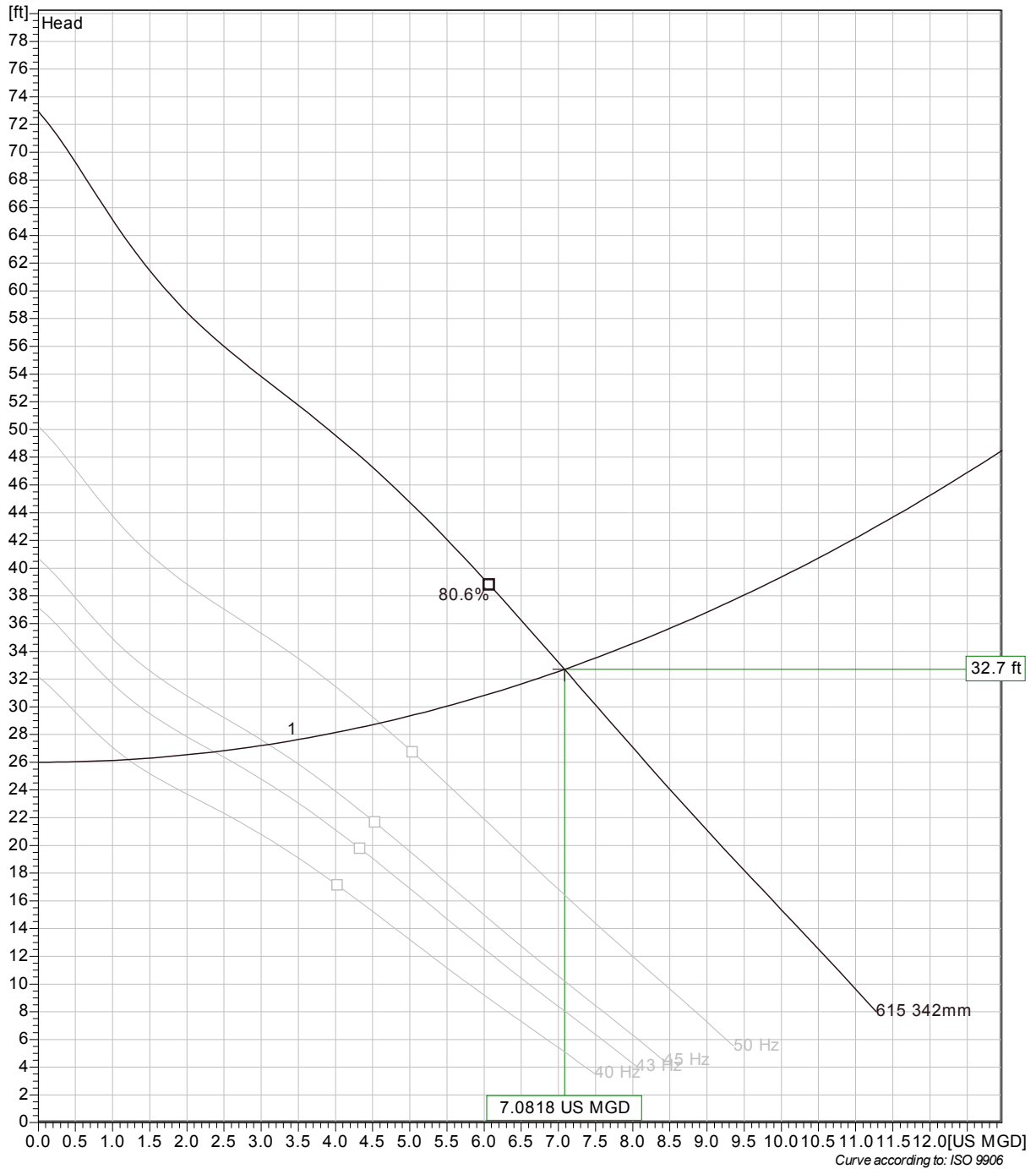


Curve according to: ISO 9906

Project	Project ID	Created by	Created on	Last update
			2012-07-30	

# NP 3202 LT 3~ 615

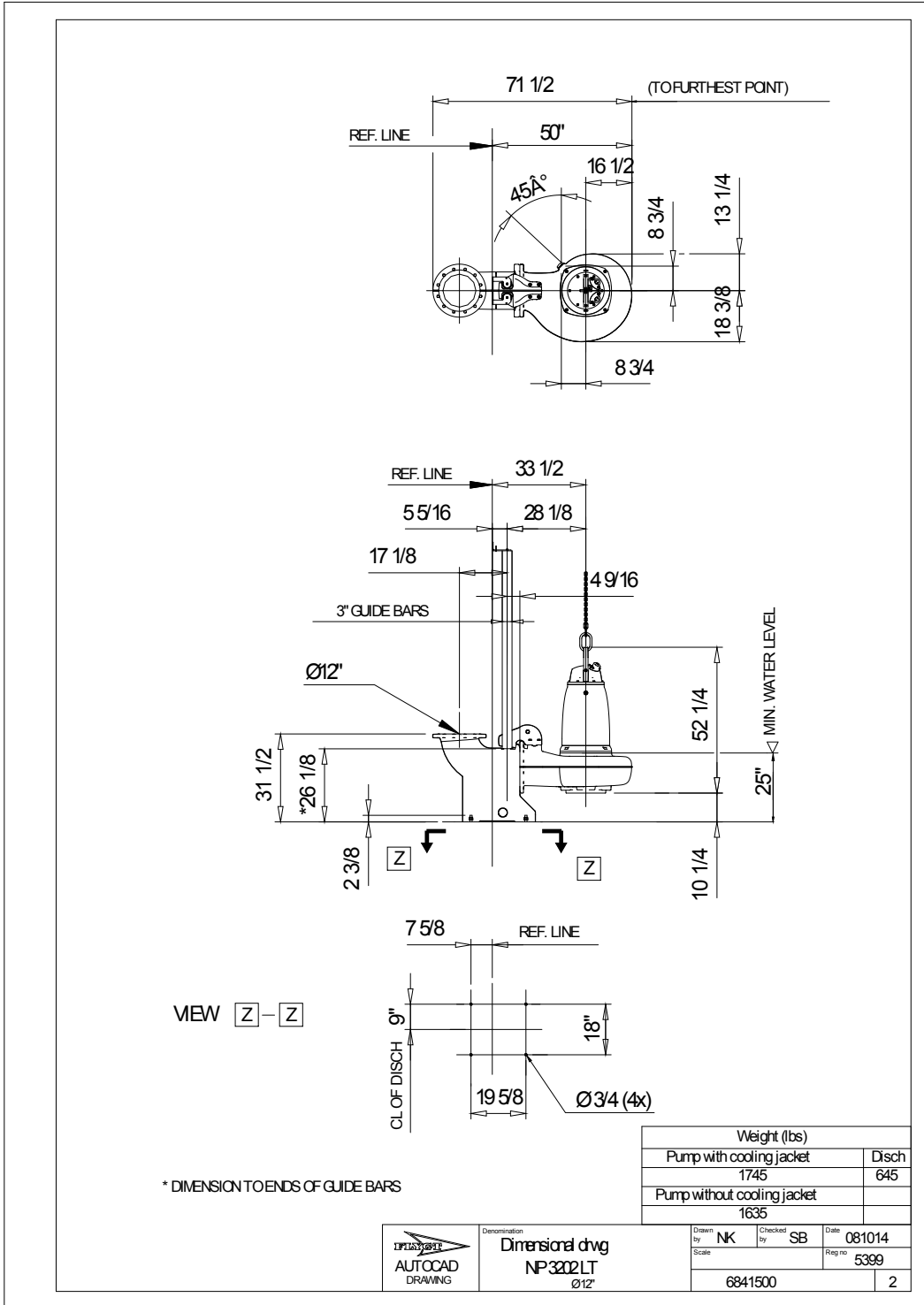
## VFD Analysis



Pumps running /System	Individual pump				Total					
	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hyd eff.	Specific energy	NPSHre
1	60 Hz	7.08 US MGD	32.7 ft	51.6 hp	7.08 US MGD	32.7 ft	51.6 hp	78.8 %	143 kWh/US MG	23 ft
1	50 Hz	4.6 US MGD	28.8 ft	29.1 hp	4.6 US MGD	28.8 ft	29.1 hp	80.1 %	124 kWh/US MG	15.9 ft
1	45 Hz	3.1 US MGD	27.3 ft	20.3 hp	3.1 US MGD	27.3 ft	20.3 hp	73.1 %	131 kWh/US MG	13.7 ft
1	43 Hz	2.37 US MGD	26.7 ft	17.1 hp	2.37 US MGD	26.7 ft	17.1 hp	64.9 %	146 kWh/US MG	13 ft
1	40 Hz	1.21 US MGD	26.2 ft	13.1 hp	1.21 US MGD	26.2 ft	13.1 hp	42.5 %	225 kWh/US MG	12 ft

Project	Project ID	Created by	Created on <b>2012-07-30</b>	Last update
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**NP 3202 LT 3~ 615**  
Dimensional drawing



Project	Project ID	Created by	Created on <b>2012-07-30</b>	Last update
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Appendix C. Grit Removal Equipment Manufacturer Cutsheets

DRAFT

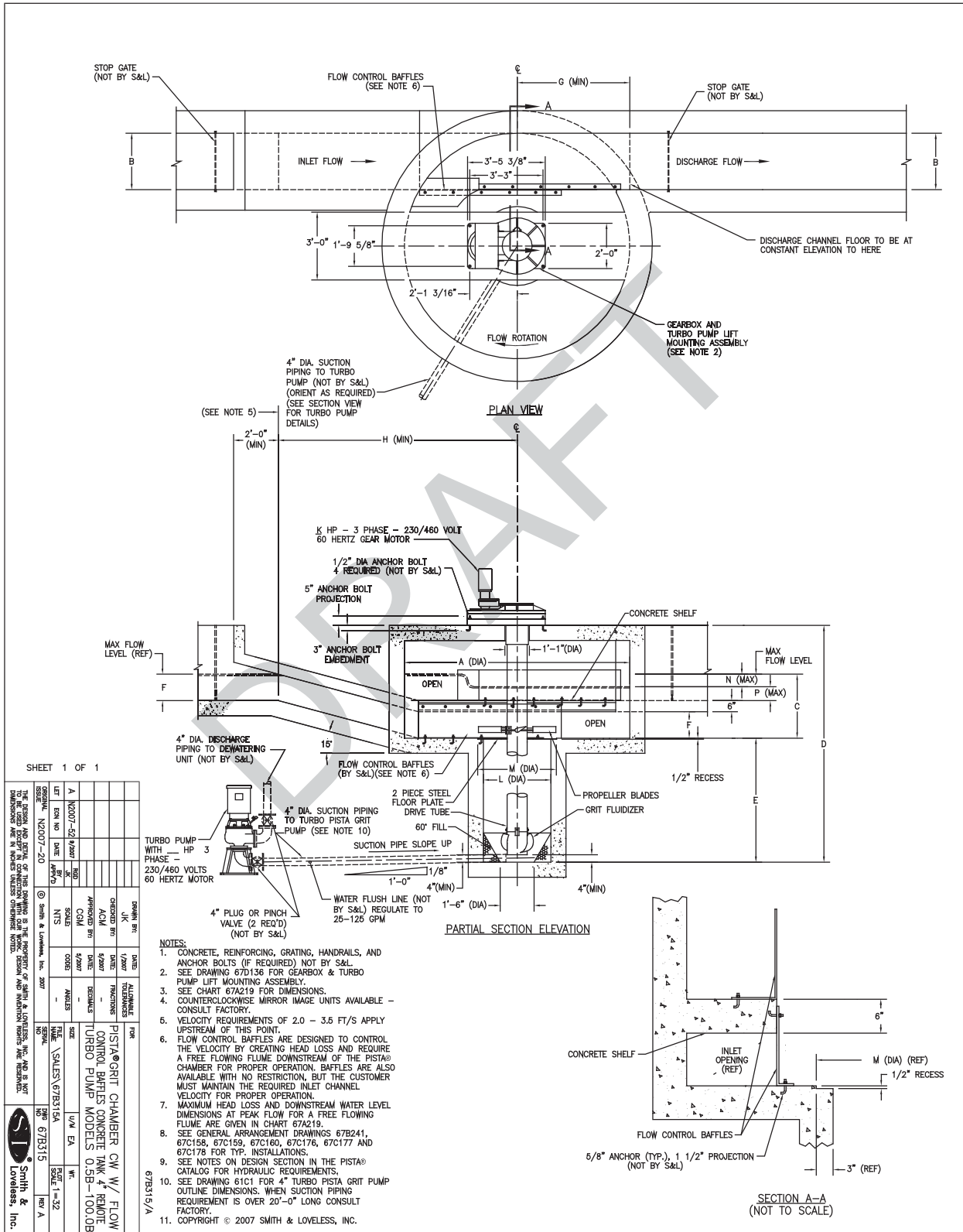
# ENGINEERING DATA



Smith &  
Loveless, Inc.®

14040 West Santa Fe Trail Drive  
Lenexa, Kansas 66215-1284

PISTA® Grit Chamber (Baffles) &  
4" PISTA® Turbo Grit Pump  
Remote Mounted / 0.5B - 100.0B  
Outline Drawing 67B315  
November, 2007  
Page J2



SHEET 1 OF 1

REV	DATE	BY	CHKD	DESCRIPTION
A	11/02/07	SM	SM	ISSUE FOR CONSTRUCTION

NO.	DATE	BY	CHKD	DESCRIPTION
1	11/02/07	SM	SM	ISSUE FOR CONSTRUCTION

NO.	DATE	BY	CHKD	DESCRIPTION
1	11/02/07	SM	SM	ISSUE FOR CONSTRUCTION

NO.	DATE	BY	CHKD	DESCRIPTION
1	11/02/07	SM	SM	ISSUE FOR CONSTRUCTION

NO.	DATE	BY	CHKD	DESCRIPTION
1	11/02/07	SM	SM	ISSUE FOR CONSTRUCTION

NO.	DATE	BY	CHKD	DESCRIPTION
1	11/02/07	SM	SM	ISSUE FOR CONSTRUCTION

# ENGINEERING DATA



Smith &  
Loveless, Inc.®

14040 West Santa Fe Trail Drive  
Lenexa, Kansas 66215-1284

PISTA® Grit Chamber  
Chart 67A219  
Outline Drawings 67B310,  
67B315, 67B316, 67B317  
November, 2007  
Page J5

## CONCRETE 360° PISTA® GRIT CHAMBER W/ FLOW CONTROL BAFFLES DIMENSIONS DRAWINGS 67B310, 67B315, 67B316, AND 67B317

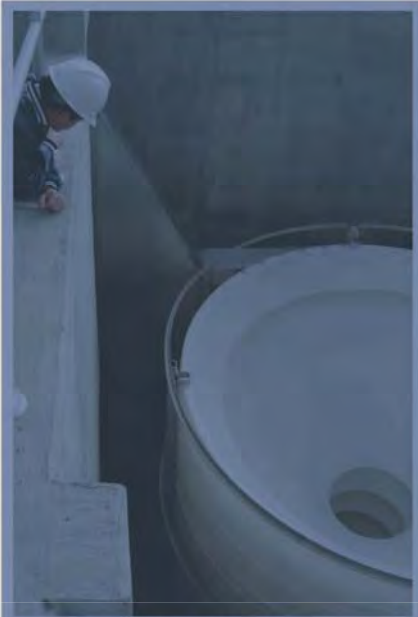
MODELS 0.5B – 100.0B

CHART NUMBER 67A219

MODEL NUMBER	A		B		C		D		E	
	English	Metric (m)	English	Metric (m)	English	Metric (m)	English	Metric (m)	English	Metric (m)
0.5B	6'-0"	1.83	0'-6"	0.15	1'-6"	0.46	8'-8"	2.64	5'-0"	1.52
1.0B	6'-0"	1.83	1'-0"	0.30	1'-6"	0.46	8'-8"	2.64	5'-0"	1.52
2.5B	7'-0"	2.13	1'-6"	0.46	2'-4"	0.71	9'-6"	2.90	5'-0"	1.52
4.0B	8'-0"	2.44	2'-0"	0.61	2'-6"	0.76	9'-8"	2.95	5'-0"	1.52
7.0B	10'-0"	3.05	2'-6"	0.76	2'-10"	0.86	10'-6"	3.20	5'-6"	1.68
12.0B	12'-0"	3.66	3'-0"	0.91	4'-6"	1.37	13'-4"	4.06	6'-8"	2.03
20.0B	16'-0"	4.88	4'-0"	1.22	5'-4"	1.63	14'-4"	4.37	6'-10"	2.08
30.0B	18'-0"	5.49	4'-6"	1.37	7'-0"	2.13	16'-2"	4.93	7'-0"	2.13
50.0B	20'-0"	6.10	5'-0"	1.52	9'-4"	2.84	19'-6"	5.94	8'-0"	2.44
70.0B	24'-0"	7.32	6'-0"	1.83	10'-6"	3.20	20'-8"	6.30	8'-0"	2.44
100.0B	32'-0"	9.75	8'-0"	2.44	10'-6"	3.20	22'-8"	6.91	10'-0"	3.05

MODEL NUMBER	F		MIN. G		MIN. H		K		L	
	English	Metric (m)	English	Metric (m)	English	Metric (m)	English (hp)	Metric (kw)	English	Metric (m)
0.5B	0'-6"	0.15	3'-0"	0.91	5'-4 1/4"	1.63	3/4	0.56	3'-0"	0.91
1.0B	0'-6"	0.15	3'-0"	0.91	6'-0"	1.83	3/4	0.56	3'-0"	0.91
2.5B	0'-11"	0.28	3'-6"	1.07	8'-2"	2.49	3/4	0.56	3'-0"	0.91
4.0B	1'-0"	0.30	4'-0"	1.22	9'-1"	2.77	1	0.75	3'-0"	0.91
7.0B	1'-2"	0.36	5'-0"	1.52	10'-7"	3.23	1	0.75	3'-0"	0.91
12.0B	2'-0"	0.61	6'-0"	1.83	14'-7"	4.45	1 1/2	1.12	5'-0"	1.52
20.0B	2'-5"	0.74	8'-0"	2.44	17'-10"	5.44	1 1/2	1.12	5'-0"	1.52
30.0B	3'-3"	1.00	9'-0"	2.74	21'-10"	6.65	2	1.49	5'-0"	1.52
50.0B	4'-5"	1.35	10'-0"	3.05	27'-7"	8.41	2	1.49	5'-0"	1.52
70.0B	5'-0"	1.52	12'-0"	3.66	31'-6 7/8"	9.62	2	1.49	6'-0"	1.83
100.0B	5'-0"	1.52	16'-0"	4.88	35'-0 7/16"	10.68	2	1.49	8'-0"	2.44





---

## Proposal Package

### Grit Removal System

---

Pinole, CA  
Pinole/Hercules WWTP

---

**Engineer:**  
HDR

**Representative:**  
MISCOwater

**Manufacturer:**

**Hydro**  
International  
wastewater 

2925 NW Aloclek Drive,  
Suite 140  
Hillsboro, OR 97124  
Phone (503) 615-8130  
Toll Free (866) 615-8130  
Fax (503) 615-2906

---

**grit removal at its finest...™**  
[www.hydro-international.biz](http://www.hydro-international.biz)

July 17, 2012

Mr. Dwight Craig  
MISCOwater  
5976 West Las Positas Blvd., Suite 226  
Pleasanton, CA 94588

**RE: Headworks Grit Control & Dewatering System  
Pinole, CA Pinole/Hercules WWTP  
File #12-3176**

Dear Dwight:

We are pleased to present our proposal for a Eutek HeadCell<sup>®</sup> Grit Removal, Classification, Washing, and Dewatering System. Hydro International is dedicated to providing innovative, high performance grit removal equipment through superior engineering, high-quality products and unmatched customer service. Our extensive experience includes thousands of installations throughout the world.

Grit is continually introduced into collection systems, but is not uniformly carried to treatment facilities. As flows increase, the grit load entering the plant elevates. Once in the treatment plant, where velocities are slower than in the collection system, grit will deposit in processes, disrupting systems, decreasing equipment longevity, and increasing maintenance costs. The Eutek HeadCell<sup>®</sup> Grit Removal System offers many benefits over conventional grit removal systems including:

- Removing fine grit protects equipment and processes from abrasive wear and sedimentation
- All-hydraulic design with no moving parts, minimizing operating and maintenance costs
- Small footprint system capable of high efficiency solids capture and removal
- Robust design allowing long component life with minimal wear
- Complete grit system with no weak link through capture to washing/classification to dewatering
- Minimal headloss at peak flows fits most existing flow profiles
- Structured flow ensures maximum utilization of tray surface area and equal surface loading rates throughout the system
- Large surface area with short settling distances ensures higher performance in a smaller footprint
- Compact, yet expandable design capable of high efficiency solids capture and removal
- Continuous boundary layer flow over hydrophobic surfaces prevents grease build-up

We sincerely appreciate your interest in our equipment and look forward to working with you on this project. As you progress with the design, we can quickly generate CAD drawings, budget updates, and specifications as well as review equipment layouts and specifications for your particular application. Reference lists are available through your upon request. If you have any questions or concerns, do not hesitate to contact us.

Regards,  
Hydro International



Lindsey Schweitzer  
Sr. Applications Engineer

# Performance Objective

---

Hydro International is pleased to propose the following Eutek HeadCell<sup>®</sup> grit removal, washing, and dewatering system to be installed in an existing plant. Each component of the grit removal system is designed to remove 95% of all grit 106 or better at a peak flow. The complete grit removal system shall remove 85-95% of all grit particles, with specific gravity of 2.65, greater than or equal to 106 micron at a peak flow of 20.0 mgd.

## Proposed Equipment Summary

---

### Eutek HeadCell<sup>®</sup> Grit Concentrator:

The Eutek HeadCell<sup>®</sup> is an all-hydraulic grit concentrator, which uses vortex flow and a stacked tray design to efficiently capture and settle fine grit via large surface area and short settling distances. The unit can be installed into the process flow, downstream of screening, in any system where limited head is available. The unit requires no external power source, has no internal moving parts, is self-cleaning, and has a compact modular construction. Wide turndown ratios can be accommodated in the Eutek HeadCell<sup>®</sup> when it is combined with Hydro's high performance washing system.

---

Quantity:	1
Size:	12' diameter
Number of Trays per Unit:	11
Surface Area/Unit:	1,243 ft <sup>2</sup>
Loading rate at Peak Flow:	11.2 gpm/ft <sup>2</sup>
Performance:	95% removal of all grit (specific gravity 2.65) ≥ 106 microns @ peak flow
Performance:	95% removal of all grit (specific gravity 2.65) ≥ 75 microns @ average flow
Average Flow/Unit:	4.06 mgd with no more than 1" headloss
Peak Flow/Unit:	20.0 mgd with 12" headloss
Discharge:	Weir
Underflow Connection:	6"
NPW Connection:	1" NPT
NPW Requirement:	Continuous 20 gpm @ 50 psig (contact Hydro for alternative options)
Materials of Construction:	304 SS Support Structure/Duct/Underflow Low Density Polyethylene Trays
Weight Dry (approximate):	6,300 lbs

### Eutek SlurryCup<sup>™</sup> Grit Washing/Classification Unit:

The Eutek SlurryCup<sup>™</sup> is a all hydraulic, high efficiency free vortex unit that effectively captures, classifies, and removes fine grit, sugar sand, and high density fixed solids from grit slurries, in both grit washing and sludge degritting applications. The Eutek SlurryCup<sup>™</sup> is a dynamic grit separator and requires continuous flow to achieve optimum results. Utilizing both boundary layer effects and a secondary washing step the

Eutek SlurryCup™ discharges a clean (low organic) grit slurry, which emits fewer odors and requires only dewatering to meet stringent disposal regulations.

---

Quantity: ..... 1  
Size: ..... 32" diameter  
Performance: ..... 95% removal of all grit (specific gravity 2.6) ≥ 75 microns within flow range  
Design Flow/Unit: ..... 300 gpm with 15' headloss  
Minimum Flow/Unit: ..... 280 gpm with 13' headloss  
Maximum Flow/Unit: ..... 400 gpm with 27' headloss  
Influent Solids Concentration: ..... ≤1.0%  
Influent Connection: ..... 6" flanged pipe  
Effluent Connection: ..... 8" flanged pipe  
Underflow Connection: ..... 3" NPT  
NPW Connection: ..... 1.5" NPT  
Continuous NPW Requirement: ..... Continuous 30 gpm @ 50 psig  
Back Wash NPW Requirement (for 30-120 sec. every 1–2 hrs.) ..... Intermittent 47 gpm @ 50 psig  
Material of Construction: ..... 304 SS  
Weight Dry/Wet (approximate): ..... 1,000 / 1,300 lbs  
Operation Time: ..... Continuous or a minimum of 10-15 minutes

**Eutek Grit Snail® Dewatering Unit:**

The Eutek Grit Snail® uses a slow moving cleated belt to dewater grit by gently escalating grit from the clarifier pool without re-suspending fine grit particles into the clarifier overflow. The large clarifier and a low overflow rate provide sufficient time for fine grit particles to settle. The Eutek Grit Snail® dewateres and retains settleable high-density solids as small as 75 micron from municipal grit slurries or industrial abrasive slurries. The unit is capable of producing dry grit with low organic content for landfill disposal.

---

Quantity: ..... 1  
Capacity: ..... 2.0 cy/hr  
Belt Width: ..... 12"  
Clarifier: ..... 60" Square  
Motor: ..... 1/3 hp, TENV, 480V/3 phase/ 60 hz  
Overflow Connection: ..... 6" flanged pipe  
Drain Connection: ..... 3" flanged pipe  
NPW Connection: ..... 1.5" NPT  
NPW Requirement: ..... continuous 10 gpm @ 50 psig  
Material of Construction (housing): ..... 304 SS Housing  
..... Rubber Cleated Belt  
Weight Dry/Wet (approximate): ..... 1,450 / 3,900 lbs  
Performance: ..... ≥60% (wt) total solids and ≤20% volatile solids

**Control Panel:**

The panel shall contain all timers, starters, switches, and indicator lights to operate one (1) Eutek SlurryCup™ unit, one (1) Eutek Grit Snail® unit, and one (1) Grit Pump run relay in either fully automated or manual mode.

- 
- Quantity: ..... 1
  - Enclosure Material: ..... 304 SS
  - Enclosure Type: ..... NEMA 4X
  - Power Supply: ..... 480 V/15 amp/3-phase
  - Control Logic: ..... Relay Logic
  - Grit Pump Control: ..... Call for Relay

**System Hydraulics:**

System hydraulics is the responsibility of the design engineer. Hydro International can provide information on Eutek HeadCell® hydraulics, Eutek SlurryCup™ flow vs. headloss curves and pumping and piping FAQ's to assist the engineer in determining system hydraulics and pump requirements, upon request.

**Design Recommendations:**

- 3/4" or finer screening prior to the grit removal system
- Estimated grit load a peak flow 0.8 yd<sup>3</sup>/hr
- 2 – 3 ft/s channel velocities at peak flow as recommended by industry design manuals
- 4 – 7 ft/s grit slurry pipe velocities as recommended by industry design manuals
- Incorporate a drain line, piped to a floor drain, in the grit dumpster to allow for further dewatering prior to disposal
- A minimum 18" of access clearance around all equipment and minimum 3' of access clearance above equipment
- Operators find that it is useful to locate a spray hose adjacent to the equipment so that they can spray all equipment down during an inspection
- Incorporate a minimal access platform to facilitate inspection access to the top of the equipment
- Intermittent operation of grit pump/Eutek SlurryCup™ system may be an option. Contact Hydro for further information.
- Grit pumps may require NPW for seal flushing. Requirements for flushing are dependent on the make, model, and seal type of the pump specified by the engineer.

**Start-up**

One (1) factory trained representative, two (2) trips, for start-up and instruction services as required totaling four (4) days.

**Quote Validity: 30 days**

**Exclusions**

Any item(s) not specifically described above are excluded and are not to be supplied by Hydro International including but not limited to the following:

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Erection and installation</li> <li>• Anchor Bolts</li> <li>• Interconnecting piping and valving not expressly stated above</li> <li>• Pipe connections and fittings not expressly stated above</li> <li>• All pipe supports, hangers and braces</li> <li>• Controls, switches, control panels and instrumentation of any kind not expressly</li> </ul> | <ul style="list-style-type: none"> <li>stated above</li> <li>• Wiring and conduit</li> <li>• Grit pump(s)</li> <li>• Field or touch-up paint, painting, blasting and touch-up of surface finish</li> <li>• Spare parts not specifically stated above</li> <li>• Unloading, hauling and storage charge</li> <li>• Lubricating oil and greases</li> <li>• Grit study, field performance testing,</li> </ul> |
|---|---|

- laboratory testing and sample collection and analysis
- All concrete and grouting work
- Insulation and heat tracing of any kind
- Seismic analysis
- Grit dumpsters

### **Options**

Quotes will be provided upon request for the following optional features:

- Stainless steel valve bodies
- Additional field days for startup or training
- Explosion proof upgrade
- Odor control covers for the Eutek Grit Snail®
- PLC Based Control Panel
- Upgrade 304 to 316 Stainless Steel
- Seismic Certification
- Grit Pump(s)
- Extended Warranty

### **Warranty**

Hydro International's Standard Warranty shall apply per the Terms and Conditions of Sale.

### **Delivery**

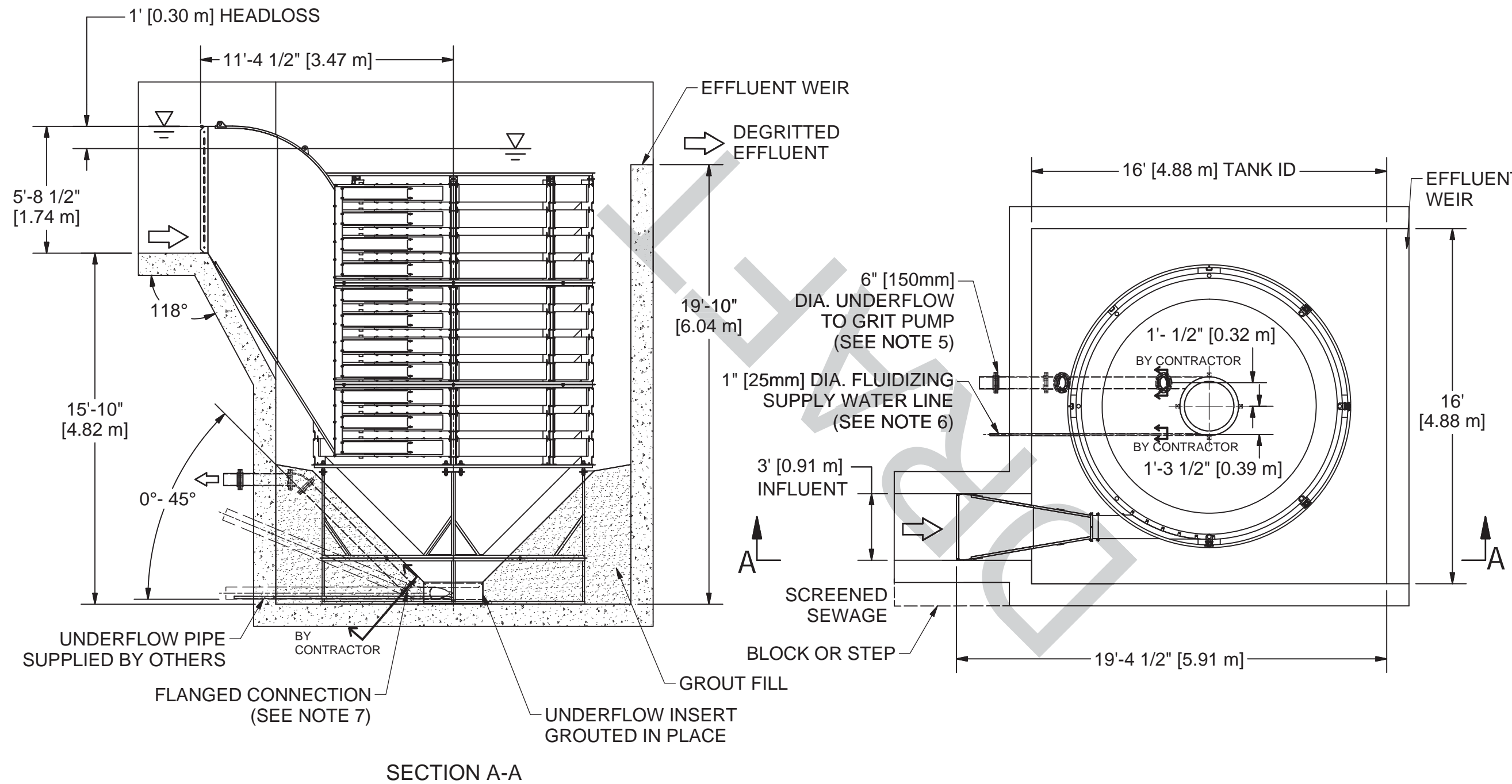
Please allow 4 weeks after receipt of purchase order for approval drawings. Shipment is typically a maximum of 16 weeks after receipt of "Approved" or "Approved As Noted, Resubmittal Not Required" submittal package. Price includes truck freight to jobsite, but does not include any state or local taxes if required.

### **Terms & Conditions**

This proposal is made pursuant to Hydro International's standard Terms & Conditions of Sale, attached hereto and made a part hereof.

DRAFT

DO NOT CHANGE DUCT LAYOUT OR PIPE ORIENTATION WITHOUT CONSULTING HYDRO INTERNATIONAL



1. ALLOW GRIT PUMP TO FULLY DRAIN HEADCELL TANK.
2. PLANT FLOW BYPASS RECOMMENDED TO ALLOW THE HEADCELL TO BE TAKEN OUT OF SERVICE IF MAINTENANCE IS REQUIRED.
3. CLOCKWISE & COUNTERCLOCKWISE UNITS ARE AVAILABLE.
4. ALTERNATE EFFLUENT CONFIGURATIONS ARE AVAILABLE.
5. THE GRIT PUMP SUCTION LINE SHOULD BE DESIGNED FOR A 4-7 ft/s [1.2-2.2 m/s] LINE VELOCITY.
6. FLUIDIZING WATER REQUIREMENTS  
11 gpm [0.7 l/s] FOR 4', 6', AND 9' HEADCELL  
20 gpm [1.3 l/s] FOR 12' HEADCELL
7. UNDERFLOW PIPE CONNECTION CAN BE SUPPLIED AT 0°, 22.5°, OR 45° ANGLE.

REV	BY	DATE	DESCRIPTION
-	SR	9/9/2010	FIRST RELEASE

**REVISION HISTORY**

Date	Scale	
9/9/2010	3/16" = 1'0"	
Drawn By	Checked By	Approved By
SR		

Title  
**EUTEK HEADCELL PROPOSAL DRAWING**

12' DIAMETER  
11 TRAY  
106 MICRON



2925 NW Aloclek Drive  
Suite 140  
Hillsboro, OR 97124  
Tel: (503) 615-8130  
Fax: (503) 615-2906  
email: sales@eutek.com

ANY WARRANTY GIVEN BY HYDRO INTERNATIONAL WILL APPLY ONLY TO THOSE ITEMS SUPPLIED BY IT. ACCORDINGLY HYDRO INTERNATIONAL CANNOT ACCEPT ANY RESPONSIBILITY FOR ANY STRUCTURE, PLANT, OR EQUIPMENT, (OR THE PERFORMANCE THERE OF) DESIGNED, BUILT, MANUFACTURED, OR SUPPLIED BY ANY THIRD PARTY. HYDRO INTERNATIONAL HAVE A POLICY OF CONTINUOUS DEVELOPMENT AND RESERVE THE RIGHT TO AMEND THE SPECIFICATION. HYDRO INTERNATIONAL CANNOT ACCEPT LIABILITY FOR PERFORMANCE OF ITS EQUIPMENT, (OR ANY PART THEREOF), IF THE EQUIPMENT IS SUBJECT TO CONDITIONS OUTSIDE ANY DESIGN SPECIFICATION. HYDRO INTERNATIONAL OWNS THE COPYRIGHT OF THIS DRAWING, WHICH IS SUPPLIED IN CONFIDENCE. IT MUST NOT BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED AND MUST NOT BE REPRODUCED, IN WHOLE OR IN PART, WITHOUT PRIOR PERMISSION IN WRITING FROM HYDRO INTERNATIONAL.  
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**DO NOT SCALE DRAWING**

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERANCES ARE:

FRACTIONS ± 1/4  
DECIMALS ± 0.25  
ANGLES ± 1'

Approximate Weight:	<b>6300 LBS</b>
Finish:	Next Assembly: -
Treatment:	Ref. No. <b>PROPOSAL</b>
Sheet Size: <b>B</b>	Sheet: <b>1 OF 1</b>
Drawing No. <b>12' 11 Tray 106m HC</b>	Rev: -

1. SLURRYCUPS ARE AVAILABLE IN CLOCKWISE AND COUNTER-CLOCKWISE ORIENTATION.
2. PLUMBING WILL BE LAYED OUT AND INSTALLED ON EQUIPMENT DURING FABRICATION TO INSURE PROPER FIT AND CORRECTNESS.
3. CONTRACTOR WILL BE REQUIRED TO MAKE A SINGLE WATER CONNECTION FOR EACH SLURRYCUP/GRITSNAIL GROUPING.
4. EQUIPMENT WEIGHTS:  
EACH SLURRYCUP: DRY: 1,000 LBS.; WET: 1,300 LBS.  
GRIT SNAIL: DRY: 1,700 LBS.; WET: 4,500 LBS.  
SUPPORT STRUCTURE: 500 LBS.
5. PROVIDE ADEQUATE CLEARANCE AROUND EQUIPMENT FOR OPERATIONS AND MAINTENANCE.

C	SR	05/10/10	RE-ISSUE NEW BORDER
REV	BY	DATE	DESCRIPTION
<b>REVISION HISTORY</b>			
Date	04/06/01		Scale 3/8" = 1' 0"
Drawn By	Checked By	Approved By	
AN	JDG	-	

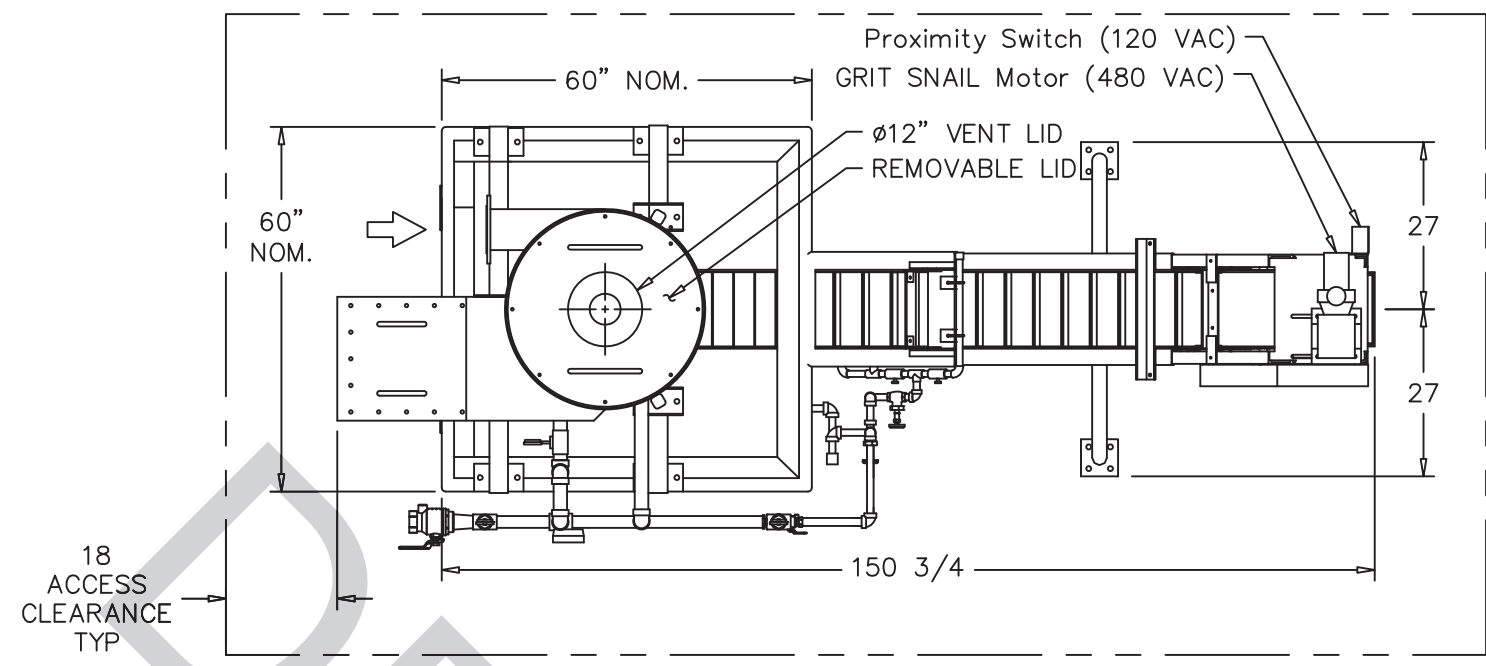
Title  
**EUTEK SLURRYCUP  
 32 INCH  
 w/ EUTEK GRIT SNAIL  
 2 CU YD/HR  
 60 INCH CLARIFIER**

PROPOSAL DRAWING

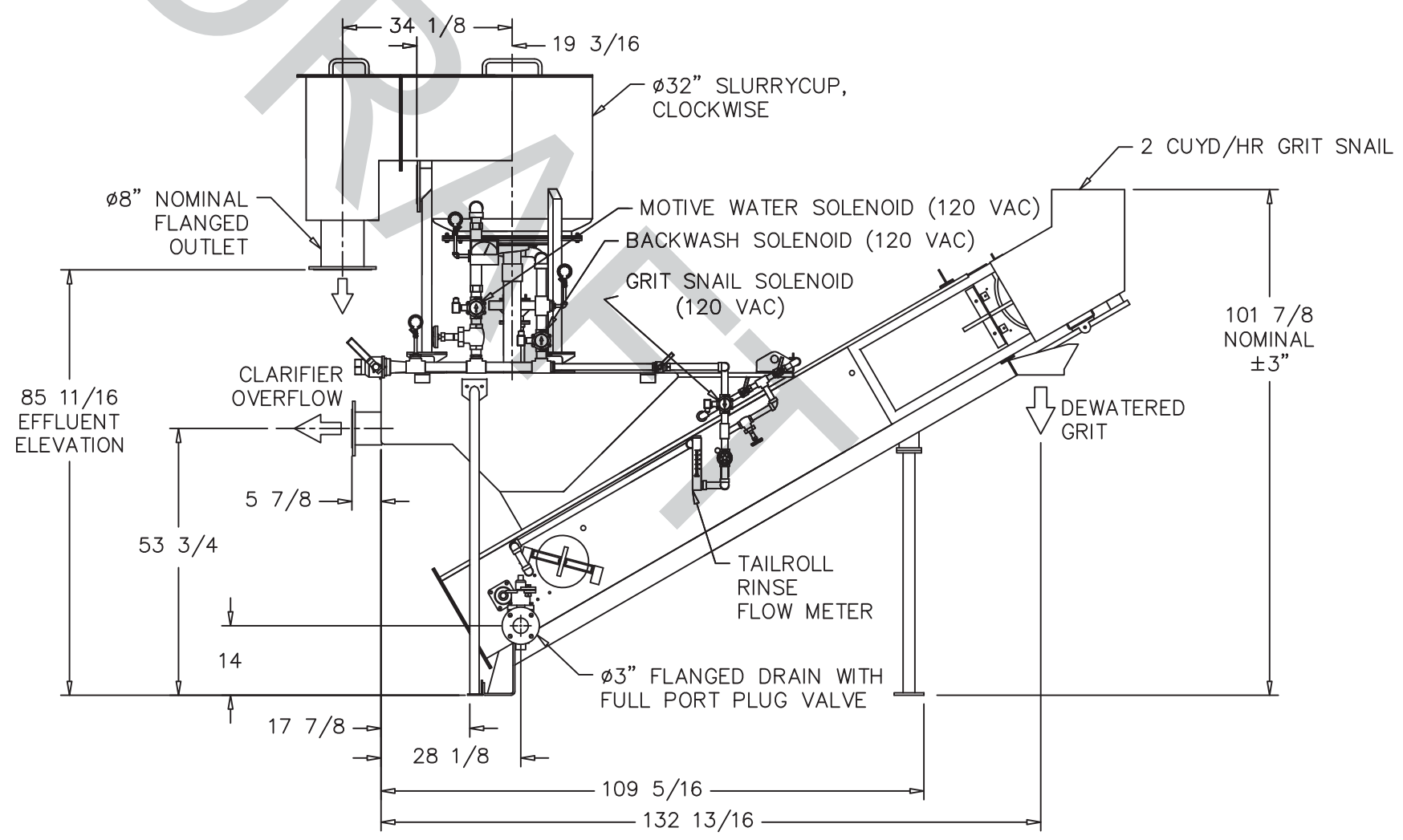
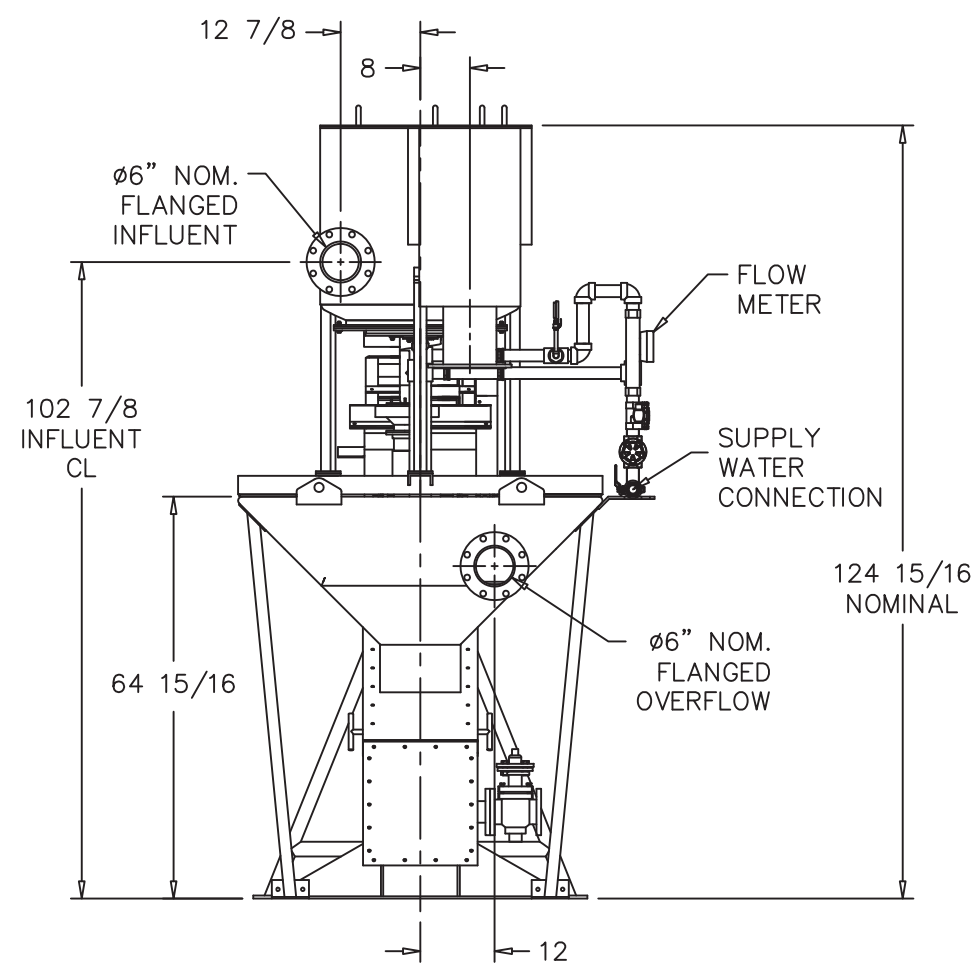


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Next Assembly:	-
Ref. No.	PROPOSAL
Drawing No.	SC32-GS1260-DB
Rev	C



ALTERNATE FLOW CONFIGURATIONS



ANY WARRANTY GIVEN BY HYDRO INTERNATIONAL WILL APPLY ONLY TO THOSE ITEMS SUPPLIED BY IT. ACCORDINGLY HYDRO INTERNATIONAL CANNOT ACCEPT ANY RESPONSIBILITY FOR ANY STRUCTURE, PLANT, OR EQUIPMENT, (OR THE PERFORMANCE THERE OF) DESIGNED, BUILT, MANUFACTURED, OR SUPPLIED BY ANY THIRD PARTY. HYDRO INTERNATIONAL HAVE A POLICY OF CONTINUOUS DEVELOPMENT AND RESERVE THE RIGHT TO AMEND THE SPECIFICATION. HYDRO INTERNATIONAL CANNOT ACCEPT LIABILITY FOR PERFORMANCE OF ITS EQUIPMENT, (OR ANY PART THEREOF), IF THE EQUIPMENT IS SUBJECT TO CONDITIONS OUTSIDE ANY DESIGN SPECIFICATION. HYDRO INTERNATIONAL OWNS THE COPYRIGHT OF THIS DRAWING, WHICH IS SUPPLIED IN CONFIDENCE. IT MUST NOT BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED AND MUST NOT BE REPRODUCED, IN WHOLE OR IN PART, WITHOUT PRIOR PERMISSION IN WRITING FROM HYDRO INTERNATIONAL.  
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**DO NOT SCALE DRAWING**  
 UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERANCES ARE:  
 FRACTIONS ± 1/16  
 DECIMALS ± .06  
 ANGLES ± 1'

Approximate Weight:	SEE NOTE 4
Finish:	-
Treatment:	-
Sheet Size:	B
Sheet:	1 OF 1



# Standard Terms & Conditions of Sale

- 1. DEFINITIONS.** "Hydro" is Hydro International Wastewater, Inc., with an address of 2925 NW Aloclek Drive #140 in Hillsboro, Oregon. "Buyer" is the party purchasing the goods from Hydro.
- 2. GENERAL.** Hydro's agreement is based on these terms and conditions of sale. This document, together with any additional writings signed by Hydro, represents a final, complete, and exclusive statement of the agreement between the parties and may not be modified, supplemented, explained, or waived by parol evidence, Buyer's purchase order, any course of dealing, Buyer's payment or acceptance, or in any other way except in writing signed by Hydro through its authorized representative. These terms and conditions are intended to cover all activity of Hydro and Buyer hereunder, including sales and use of products, parts, and work, and all related matters (references to products include parts and references to work include construction and installation). Hydro's obligations hereunder are expressly conditioned on Buyer's assent to these terms and conditions. Hydro objects to any terms that are different from, or additional to, these terms and conditions. Any applicable detail drawings and specifications are hereby incorporated and made a part of these Terms and Conditions of Sale insofar as they apply to the material supplied hereunder.
- 3. SPECIFICATIONS.** Products are supplied in accordance with information received by Hydro, or its duly authorized agent, from Buyer. Hydro shall have no responsibility for products created or sold based upon inaccurate and/or incomplete information supplied to it. Buyer shall ensure that Hydro receives all relevant information in time to enable it to supply the appropriate products.
- 4. INSTALLATION AND APPLICATION OF PRODUCTS.** Products supplied hereunder shall be installed and used only in the particular application for which they were specifically designed. Buyer should not presume that any products supplied by Hydro may be utilized for any applications other than those specified; nor shall Hydro's obligations, including, without limitation, any warranty obligations, survive Buyer's transfer of products supplied hereunder to third parties unless the products are transferred with Hydro's consent. In addition, Buyer shall not use any product supplied hereunder at any location other than at the location for which Hydro has previously received notice from Buyer. Any breach of any of the foregoing restrictions may amount to an infringement of the patent for the products in question and will in any event void all express or implied warranties relating to the products supplied hereunder.
- 5. PURCHASE PRICE AND PAYMENT TERMS.** All prices are in U.S. dollars and all payments shall be made in U.S. dollars. Payment terms are as follows:

	Incremental Payment	Cumulative Payment
Upon Approval of Shop Drawings	10%	10%
Upon Delivery of Equipment to Site	80%	90%
Upon Final Acceptance or 45 days following completion of equipment start up	10%	100%

If payments are not made in conformance with the terms stated herein, any unpaid balance shall be subject to interest at a rate 1½% per month, but not to exceed the maximum amount permitted by law. If shipment is delayed by Buyer, the previously agreed date of readiness for shipment shall be deemed to be the date of shipment for payment purposes. If manufacture is delayed by Buyer, a payment shall be made based on purchase price and percentage of completion, with the balance payable in accordance with the terms as stated. If at any time in Hydro's judgment Buyer may be or may become unable or unwilling to meet the terms specified, Hydro may require satisfactory assurance or full or partial payment as a condition to commencing, or continuing manufacture, or in advance of shipment.

Until payment in full has been received by Hydro, this Standard Terms and Conditions of Sale shall constitute a security agreement and Buyer hereby grants Hydro a purchase money security interest in and to the products produced by Hydro hereunder, and any products or proceeds thereof. In particular:

- Hydro will retain an express purchase money security interest in and to the products and all proceeds thereof.
  - Until full payment for the products is received by Hydro, Hydro reserves the right to retake possession of the products at any time and for this purpose Buyer authorizes Hydro or its duly authorized agent to enter upon land or premises where it believes the product may be.
  - Proceeds of any disposal of the products shall be held in trust for Hydro pursuant to the terms of the Maine Uniform Commercial Code.
  - Buyer grants Hydro a power of attorney for the purpose of filing a UCC-1 financing statement in the name of Buyer to evidence Hydro's security interest in the products.
- 6. BACKCHARGES.** In the event that Buyer is required to make repairs, corrections or modifications to the goods supplied by Hydro, it shall only do so upon written approval from Hydro. Backcharges shall be limited to the costs directly associated in making the repairs, corrections or modifications to the goods supplied by Hydro. The costs of such backcharges shall be subject to approval by Hydro and shall be limited to: (1) directly related labor and material costs, (2) directly related equipment and tool rental at prevailing rates in the project location and (3) Buyer's overhead & supervision costs to make repairs, corrections or modifications to the goods supplied by Hydro. Buyer shall submit complete documentation to Hydro's satisfaction including but not limited to labor time sheets, material lists, and rental fees detailing the nature of the back charges. Backcharges shall be in the form of an adjustment to the

contract price or reduction in retained payments and not a direct payment. No incidental or consequential backcharges shall be allowed.

7. **DELIVERY.** The goods are sold F.O.B. manufacturing site, freight prepaid to Buyer at job site. Except as outlined in Paragraph 8 below, the risk of loss passes to Buyer after Hydro delivers the goods to the carrier. Hydro reserves the right to select the method of shipment and carrier. Delivery dates are approximate only and are not a guarantee of delivery on a particular day. Hydro is not liable for failure or delays in deliveries of any cause whatsoever beyond the control of Hydro.
8. **TITLE & INSURANCE:** Title to the product(s) and risk of loss or damage shall pass to Buyer upon delivery to a carrier as outlined in Paragraph 7 above, or, in the event Buyer delays shipment, by the previously agreed date of readiness for shipment, except that a security interest in the product(s) or any replacement shall remain in Hydro's name, regardless of the mode of attachment to realty or other property, until the full price has been paid in cash. Buyer agrees to protect Hydro's interest by adequately insuring the product(s) against loss or damage from any external cause with Hydro named as insured or co-insured.
9. **ERECTION:** Unless otherwise stated in writing, the goods provided hereunder shall be assembled and erected by and at the expense of Buyer.
10. **CANCELLATION & BREACH:** Orders placed cannot be canceled, nor shipments of goods made up, or in process, be deferred beyond the original shipment dates specified, except with Hydro's written consent and upon terms which shall indemnify Hydro against all loss. In the event of cancellation or the substantial breach of Buyer's obligations, as by failing to make any of the payments when due, the parties agree that Hydro will suffer a serious and substantial damage that will be difficult, if not impossible, to measure, both as of the time of entering into this purchase agreement and as of the time of such cancellation or breach. Therefore, the parties agree that, upon such cancellation or breach, Buyer shall pay to Hydro the sums set forth herein below, which sums the parties do hereby agree shall constitute agreed and liquidated damages in such event:
  - If cancellation or breach shall occur after the acceptance of the purchase order but prior to mailing of submittal documents by Hydro to Buyer, liquidated damages shall be 10% of the selling price.
  - If cancellation or breach shall occur within thirty (30) days from the mailing of submittal documents by Hydro to Buyer, the liquidated damages shall be 20% of the selling price.
  - If the cancellation or breach occurs after thirty (30) days from the mailing of submittal documents by Hydro to Buyer, but prior to notification that the order is ready for shipment, the liquidated damages shall be the total of 30% of the selling price plus the expenses incurred, cost of material, and reasonable value of the work expended to fill the order involved herein by Hydro's engineers and other employees, agents and representatives after the mailing of general arrangement drawings by Hydro to Buyer, said sums to be determined at the sole reasonable discretion of Hydro; provided, however, that the total liquidated damages under this provision shall not exceed the total selling price.
  - If cancellation or breach shall occur after Hydro has notified Buyer that the order is ready for shipment, then the liquidated damages shall be the total selling price, less costs associated with startup or field testing.
11. **MATERIALS OF CONSTRUCTION, PAINTS AND COATINGS:** Buyer is responsible for determining the suitability of, and for giving final approval of, the materials of construction, paints, coatings, etc. to be used by Hydro.
12. **WARRANTY:** Any product that proves defective in material, workmanship or design within twelve (12) months after delivery (or entry into storage) will be, at the discretion of HYDRO, modified, repaired or replaced, or Buyer's payment for the products will be refunded. This shall be Buyer's sole remedy. HYDRO EXPRESSLY EXCLUDES AND DISCLAIMS ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHER WARRANTIES, EXPRESS OR IMPLIED.

This warranty does not cover any defects or costs caused by: (1) normal wear and tear of equipment from designed operation. (2) modification, alteration, repair or service of the goods by anyone other than Hydro; (3) physical abuse to, or misuse of, the goods, or operation thereof in a manner contrary to Hydro's instructions; (4) any use of the goods other than that for which they were intended; (5) chemicals or components which were not disclosed to Hydro; (6) storage contrary to Hydro's instructions; or (7) failure to maintain the goods in accordance with Hydro's instructions.

This warranty does not apply to component parts of the goods that were not both originally designed and manufactured by Hydro, including, but not limited to, valves and controls. These component parts do not carry any warranties by Hydro, and only carry the warranties, if any, of their manufacturers.

In order for Buyer to make a claim under this warranty, Buyer must promptly, and within the warranty period, notify Hydro in writing of any defect(s) in the goods covered by this warranty. If any defect(s) in the goods covered by this warranty are visible at the time of delivery, Buyer must notify Hydro of the defect(s) in writing within five working days. To make any claim under this warranty, Buyer must also fully comply with written authorization and return instructions from Hydro.
13. **FIELD SERVICE:** Startup/Field Service will only be scheduled upon written request. Buyer shall notify Hydro of schedule requirements at least ten (10) working days in advance, or additional charges may be added to cover late-scheduled travel costs. Additional costs will be limited to those arising out of late-scheduled costs. Should Buyer have outstanding balances due Hydro, no startup / field service will be scheduled until such payments are received by Hydro. Hydro will send documents to Buyer defining the service or startup requirements. Buyer assumes all responsibility for the readiness of the system when it requests startup service. Should Hydro's Field Service Engineer arrive at the jobsite and determine that the system cannot be started up within a reasonable time, Hydro shall have the option to bring the Field Service Engineer home and bill Buyer for time, travel and living expenses. Additional field service is available from Hydro at the prevailing per-diem rate at the time of the request for service plus all travel and living expenses, portal-to-portal. A purchase order or change order will be required prior to scheduling this additional service.

14. **LIMITATION OF HYDRO'S LIABILITY.** Hydro assumes no liability or responsibility for the misuse of its products by Buyer, Buyer's employees, agents or assigns, or other use inconsistent with the use appropriate to the performance specification requirements submitted to Hydro, and Buyer agrees to indemnify and hold harmless Hydro for any loss, costs, expense or liability that it may incur or be put to as a result of misuse or inconsistent use of the products. In addition, Hydro shall have no liability to Buyer for any consequential or incidental damages incurred by Buyer in connection with the contract documents or the products purchased by Buyer. Hydro shall not be liable for any loss which results from delay in delivery caused by any reason beyond its control, including, but not limited to, acts of God, casualty, civil disturbance, labor disputes, strikes, transportation or inability to obtain materials or services, any interruption of its facilities, or act of any governmental authority. The time for delivery shall be extended during the continuance of such conditions.
15. **CONFIDENTIAL INFORMATION.** The information contained herein and in related contract documents is considered proprietary and confidential information. Buyer agrees to keep such information confidential and not to disclose such information to third parties.
16. **INTERPRETATION OF CONTRACT.** This contract shall be construed according to the laws of the State of Maine.
17. **CHOICE OF FORUM.** Buyer and Hydro hereby consent and agree that the United States District Court for the District of Maine or the District Court or Superior Court located in the City of Portland, County of Cumberland, Maine will have exclusive jurisdiction over any legal action or proceeding arising out of or relating to the contract documents, and each party consents to the personal jurisdiction of such Courts for the purpose of any such action or proceeding. Buyer and Hydro further hereby consent and agree that the exclusive venue for any legal action or proceeding arising out of or relating to the contract documents will be in the County of Cumberland, Maine. Each party hereby waives all rights it has or which may hereafter arise to contest such exclusive jurisdiction and venue.
18. **ATTORNEYS' FEES.** If any judicial or non-judicial proceeding is initiated for the purpose of enforcing a provision of this contract, the prevailing party shall be awarded reasonable attorneys' fees in addition to all other costs associated with the proceeding, whether or not the proceeding advances to judgment.
19. **SEVERABILITY.** If any provisions of this contract are held invalid by a court of competent jurisdiction, the remainder of this contract shall not be rendered invalid, and such invalid provisions shall be modified, in keeping with the letter and spirit of this contract, to the extent permitted by applicable law so as to be rendered valid.

DRAFT

# Eutek HeadCell™

*High performance grit removal in a small footprint - ideal for new systems and retrofitting.*

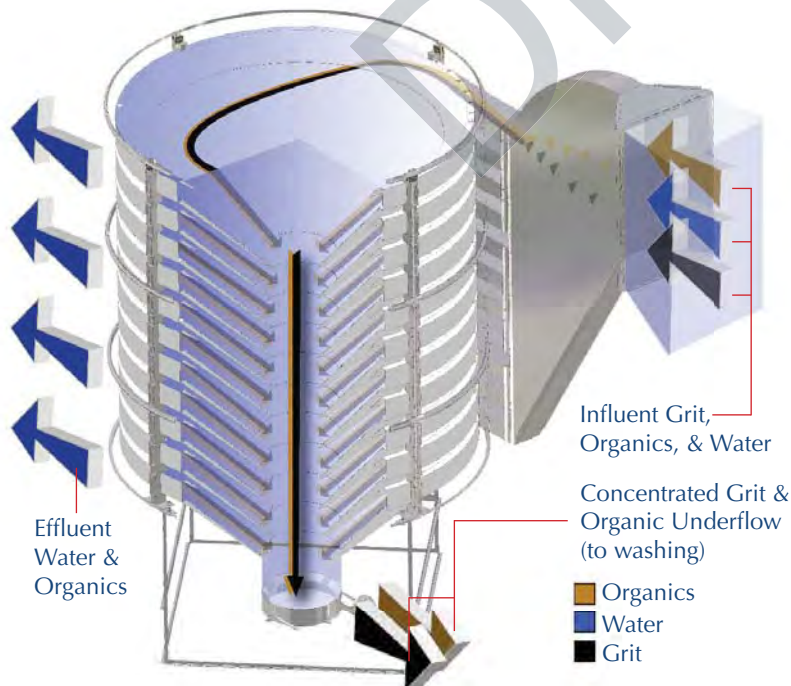
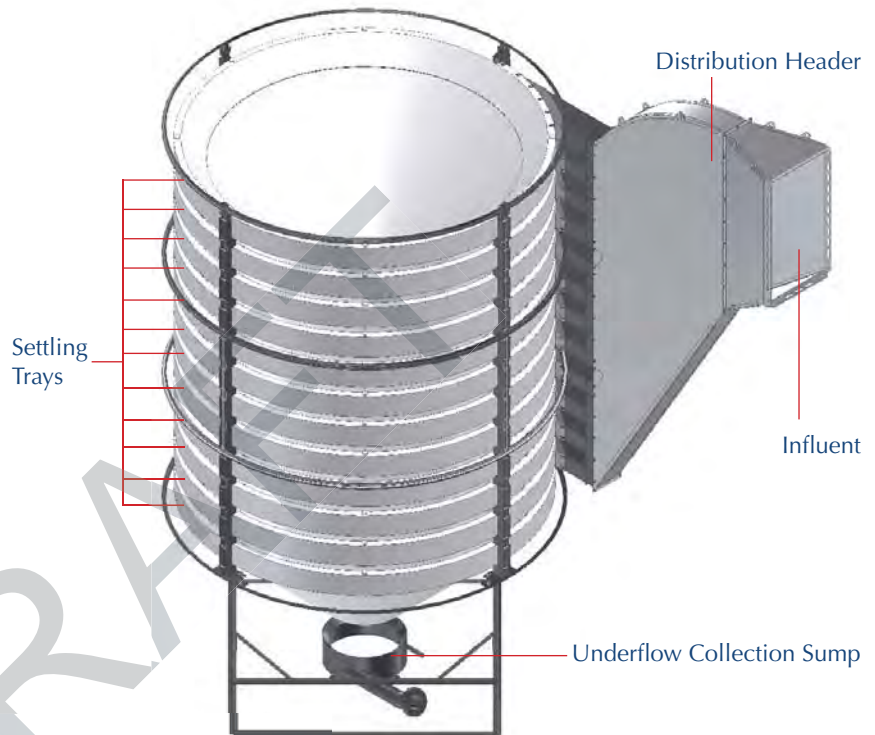
## APPLICATIONS

- Grit removal for new, expanding, and upgrading WWTPs
- Retrofits into existing grit chambers
- Pre-treatment for MBR and many other process upgrades

## ADVANTAGES

- Large surface area in a small footprint
- No moving parts or external power source
- Less than a foot of headloss to operate
- Double treatment capacity in the same footprint as existing equipment
- Economical to own and operate
- Accommodates high turndown ratios

The **HeadCell** is the ideal grit separator providing high performance grit removal in a small footprint. The **HeadCell** is a multiple tray concentrator that can be sized to remove fine grit over a wide range of flows with less than a foot of headloss.



## HOW IT WORKS

The stack of hydraulically independent polyethylene trays are submerged in a concrete chamber. Screened sewage enters the influent duct and passes into the grit chamber. The channel directs the flow into the high efficiency distribution header to evenly distribute the influent tangentially into the modular multiple-tray system.

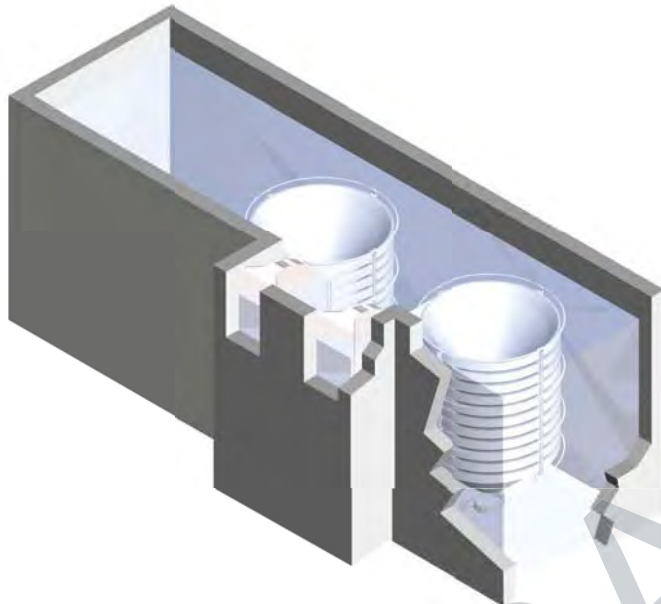
Tangential feed establishes a vortex flow pattern causing solids to settle into a boundary layer on each tray. Gravity then sweeps solids to the center opening which allows them to fall to a common collection sump.

Flow spirals between the stacked trays, grit settles out by gravity along the sloped surface of each tray and into the center opening. Degrittified effluent flows out of the trays, over a weir and into an effluent trough. The **HeadCell** typically requires less than 12 inches of headloss

The settled solids are continuously pumped from the grit sump to a SlurryCup™ or TeaCup™ grit washing system and then dewatered by a Grit Snail™ dewatering escalator.

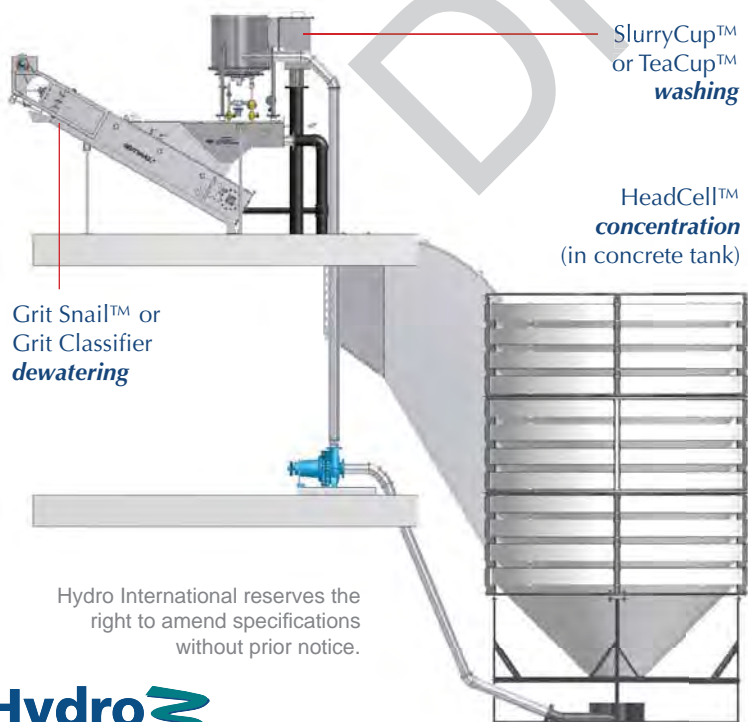
### The Ideal Retrofit Solution

The stacked tray design, and small footprint of the **HeadCell** make it the ideal solution for plants to retrofit with high performance grit removal. The **HeadCell** easily fits into existing structures and uses existing channels, which significantly reduces concrete costs during installation. A retrofitted **HeadCell** system can increase flow capacity and still capture finer grit in the same footprint.

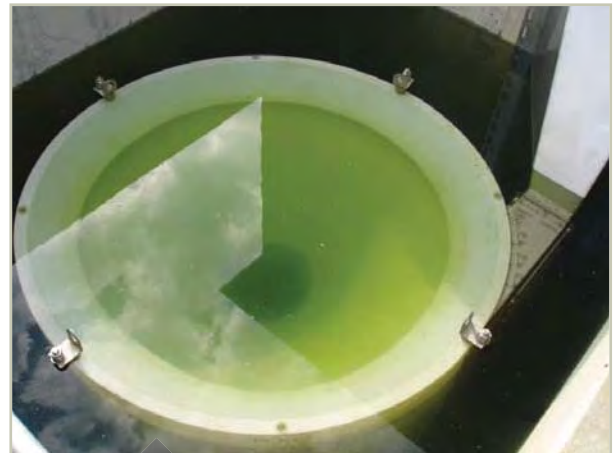


Two HeadCell Units Retrofitted Into An Existing Grit Basin

### The Ideal Grit Removal System



Hydro International reserves the right to amend specifications without prior notice.



### HeadCell Capacity

- Handles 1-50 MGD in a single stack of trays
- Sized for peak flow at peak grit loads
- Virtually no turndown ratio limits
- Modular and expandable

### HeadCell Design Notes

- Structured flow & short settling distances eliminate inefficiency and increase grit capture
- Large surface area effectively uses plant space
- Evenly split flows eliminate short circuiting
- Continuous boundary layer flows over hydrophobic surfaces, minimizes grease buildup and keeps trays clean
- All-hydraulic design with no moving parts ensures a long product life

For more information please call our office at 503.615.8130 or inquire at [www.hydro-international.biz](http://www.hydro-international.biz).



Certificate No. 961366