Eagle River Wastewater Treatment Facility Headworks Upgrade

Design Study Report

April 2015

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LIST OF ACRONYMS

ADEC - Alaska Department of Environmental Conservation
ADF - Average Daily Flow
ASU - Anchorage Sewer Utility
AWWU - Anchorage Water and Wastewater Utility
EPA - Environmental Protection Agency
ERWWTF - Eagle River Wastewater Treatment Facility
FSP - Future Service Population
IBC - International Building Code
MASS - Municipality of Anchorage Standard Specifications
MDF - Maximum Daily Flow
MGD - Million Gallons per Day
MOA - Municipality of Anchorage
PHF - Peak Hour Flow
RBC - Rotating Biological Contactor
SCADA – Supervisory Control and Data Acquisition
SWTP - Storm Water Treatment Plan
UV – Ultraviolet
WWMP - Wastewater Master Plan

EXECUTIVE SUMMARY

SeaWolf Engineering 2015 has been contracted to design an upgraded headworks process at the ERWWTF that can handle current flow rates. The ERWWTF was constructed in 1971, and is owned and operated by the Anchorage Water and Wastewater Utility (AWWU). The facility is currently configured to be a conventional activated sludge process with tertiary granular media filtration and UV sanitation, where the treated effluent discharges into Eagle River. In 2013 and 2014 the headworks of the facility experienced overflows as a result of influent flows greater than the capacity of the system. Because of this, AWWU requested an upgrade to the headworks portion of the facility with a 30 year outlook and a budget of $9 million

SeaWolf Engineering 2015 designed a solution to enable the headworks to support the incoming flow rates of the service population for the next 30 years. With the limited ability of the current headworks configuration, the proper amounts of screening and grit material are not being removed from the wastewater and is causing unnecessary loads to the downstream processes. Furthermore, the absence of any dewatering equipment requires the facility to transport their processed screenings and grit material to the King Street Dewatering Facility (20 miles away from facility) to be dewatered before being taken to the Anchorage Regional Landfill (2.2 miles away from the facility) for final disposal. Several options were considered, including one that does not require the construction of a new building. The final recommended option includes constructing a new building for the headworks equipment.

The recommended headworks equipment was selected based on the estimated future flow rates. The future average daily flow (ADF) is estimated to be 2.2 MGD. The recommended design has a parshall flume to measure flow after which the channel splits into four 2 ft. wide concrete channels. Three of the channels will be identical with a 3 mm. screen/dewatering unit and a 4 MGD grit chamber. The fourth channel is for future expansion. A single grit dewatering unit services the three grit chambers with room for a second. A side channel, with the addition of weir gates, allows the system to be bypassed during overflow events or manually by an operator. After the headworks, the channels merge and the influent flows to the existing primary clarifiers in the adjacent building.

If the recommended design is selected, a manhole would be constructed to tap into the pipe and create a new line for the new headworks building. The line would feed into a 2 ft. wide rectangular concrete channel, pass through the parshall flume, enter the headworks building, pass through the screens, pass through the grit chambers, and continue on to the primary clarifiers in building one. The dewatered solids from the screens would be screw pumped to a dumpster in the loading bay of the new building. The grit from the grit chambers would be screw pumped to the grit dewatering equipment and then screw pumped to the dumpster in the loading bay. Trucks would then transport the solids to the nearby landfill. The main building would have a gabled roof, and the loading bay would have its own gabled roof to keep the pavement under the loading bay clear. The loading bay would have a lower floor than the rest of

the building because of the hill the building would be built into. It would be constructed to IBC and Fire Code.

The recommended design aligns the headworks building perpendicular to the East wall of building one, and is seven feet south of the influent pipe. There would be a walkway connecting building one to the headworks building. The existing influent pipe could be tapped into without stopping the flow. Drainage swales could be installed around the building, with rip rap in the steepest areas to mitigate erosion. This would direct runoff to the vacant southeast corner of ERWWTF property. Excavation of existing soils would be required to make room for the new building. Trucks transporting solids to and from the landfill would use the South entrance to enter and exit the facility.

The estimated cost of the headworks upgrade is roughly $7 Million.

1.0 INTRODUCTION

AWWU solicited for engineering services on the Two Vertical Plant Projects in the Municipality of Anchorage Area with a 30 year outlook and a budget of $9 million. SeaWolf Engineering won the bid to provide AWWU with Pre-Design recommendations for Task 1: Headworks of Project A: ERWWTF located in Eagle River, Alaska.

The ERWWTF was constructed in 1971, and is owned and operated by the Anchorage Water and Wastewater Utility (AWWU). The facility is currently configured to be a conventional activated sludge process with tertiary granular media filtration and UV sanitation, where the treated effluent discharges into Eagle River.

The 2006 Facility Plan from AWWU states that ERWWTF's design capacities are 2.5 MGD ADF, 6.8 MGD MDF, and 7.7 MGD PHF. However, in both 2013 and 2014 the headworks of the ERWWTF overflowed with recorded peak flow rates less than the design flow rate of the facility. An update to the headworks is required to meet the design flow rates of the facility, as well as for the increased flow rates to meet the population growth in the service area. In addition, the current solid waste from the headworks is transported to the King Street Dewatering Facility (20 miles away from facility) to be dewatered before being taken to the Anchorage Regional Landfill (2.2 miles away from the facility) for final disposal.

The upgrade to the headworks is to alleviate the problems associated with the lack of hydraulic capacity, and accommodate an increased flow due to future population growth, to upgrade the headworks equipment, and to dewater the solids on site. This Design Study Report prepared for AWWU addresses the existing conditions, permitting, cost estimation, projected flows, site and building plans, and process equipment for the ERWWTF Headworks.

2.0 BACKGROUND/EXISTING CONDITIONS

ERWWTF was constructed in 1971 and received upgrades in 1978 and 1991. The facility is currently configured as a conventional activated sludge process with tertiary granular media filtrations and a design ADF of 2.5 MGD. The treated effluent discharges into Eagle River. The current facility process diagram can be seen in Figure 1 or in Appendix A.

The current headworks configuration lacks the proper screening equipment, has very limited grit removal equipment, and has no dewatering equipment. With the limited ability of the current headworks configuration, the proper amounts of screening and grit material are not being removed from the wastewater and is causing unnecessary loads to the downstream processes. Furthermore, the absence of any dewatering equipment requires the facility to transport their processed screenings and grit material to the King Street Dewatering Facility (20 miles away from facility) to be dewatered before being taken to the Anchorage Regional Landfill (2.2 miles away

from facility) for final disposal. This unnecessary step in the preliminary treatment process has proved to be costly and the client has asked for a direct solution.

The treatment system was converted from a fixed film RBC process to a conventional activated sludge process in 1989. This retrofit included addition of aeration basins for biological treatment, followed by two circular secondary clarifiers and granular media filters for tertiary treatment. This treatment process is currently used at the facility. The facility also has a SCADA system that monitors the treatment facility. The ERWWTF recently implemented a UV disinfection system.

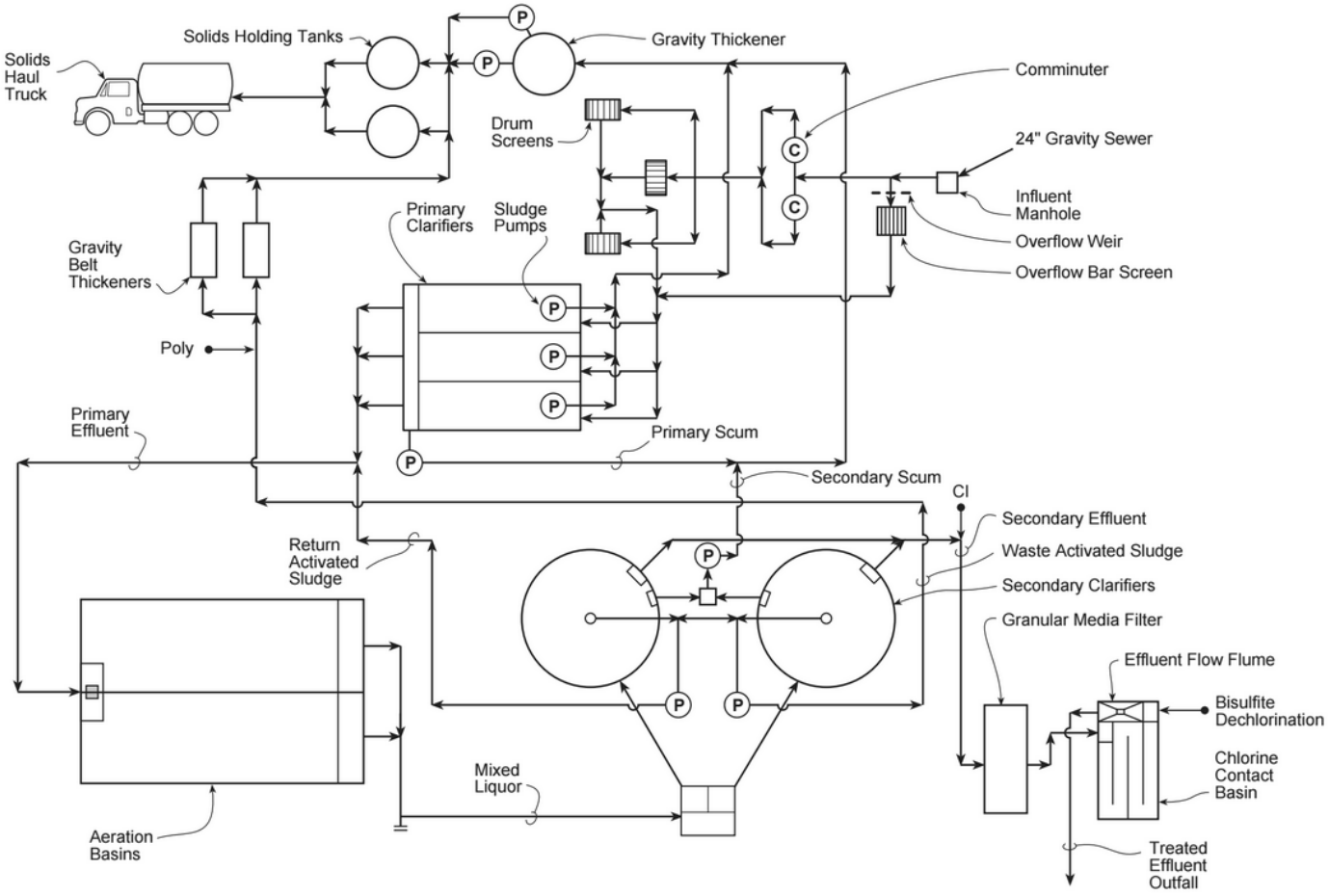


Figure 1. ERWWTF - Current Facility Process Diagram

2.1 Project Location

Eagle River is located west of the Glenn Highway between Eagle River and Artillery Road. Figure 1 shows the location of the ERWWTF (AWWU WWMP 2014).

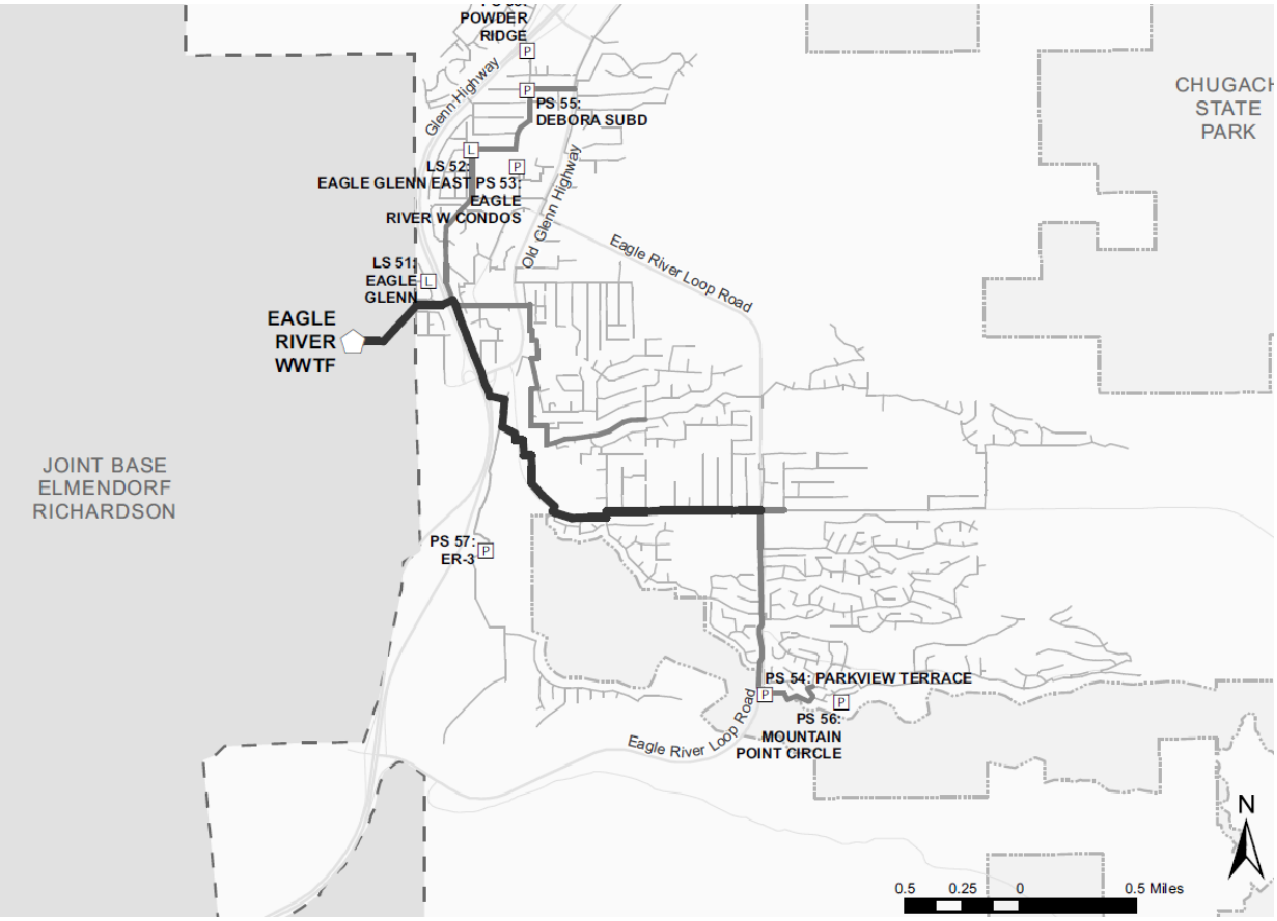


Figure 2. Project Location.

3.0 HYDRAULIC DESIGN

3.1 Population

ASU services the Northern Communities that are not on private wastewater systems. The interceptor basins collect wastewater from the Northern Communities and transports the influent sewer to the ERWWTF for treatment. The planning period for this study is 30 years and the projected service population for the facility is expected to be 29,000 people. The ERWWTF is sized and able to meet current flows, but the headworks configuration is currently undersized. This design study report focuses solely on the headworks.

The population impacts the current and future flow rates of the treatment facility. The resident population in the Northern Communities is approximately 34,982 people and the ASU service in the Northern Communities is approximately 17,716 people (U.S. Census 2010). The estimate for the population in 2045 was found by using the historical population growth rate data (2014 Anchorage Wastewater Master Plan) and by extrapolating the population growth rate for the 30-year outlook.

The Northern Communities region has seven planning areas. Each planning area has a different growth rate based on factors such as commercial and residential development. Five of the seven planning areas were included in the overall service population. Peters Creek and Eklutna were excluded from the 30-year design life since they have a private wastewater treatment system on-site, and they were assumed to use their private wastewater treatment system during the 30-year period. The future service population in 2045 is expected to be approximately 29,000 people. Calculations are included in Appendix C.

3.2 Flow Projections

The current headworks is undersized in comparison to the entire facility. Table 1 shows the current design capacities of ERWWTF from the 2006 Facility's Plan. The current headworks does not have the capacity for current peak flow rates, in part due to operation constraints of the fine screens. The existing three rotary drum fine screens are AustinMac, Inc. Model 24-inch rotary strainer. Operators report that each screen may handle 1.5 to 2.0 MGD when clean. Theoretically, with 3 screening units operational the headworks should be able to handle 4.5 MGD PHF. However, the headworks experienced overflow events during peak flows in 2013 and 2014.

Table 1. Current Facility Design Capacities

Flows	Current Design Flows
Average Daily Flow	2.5 MGD
Maximum Daily Flow	6.8 MGD
Peak Hourly Flow	7.7 MGD

Table 2 shows peak hourly flows in 2013 and 2014 approaching the headworks' capacity (Appendix C).

Table 2. Flow Data that Surpasses Current Headworks Capacities.

Month	Flows in 2013	Flows in 2014
January	4.404 MGD	3.680 MGD
April	3.784 MGD	2.970 MGD
May	4.253 MGD	2.691 MGD
October	3.743 MGD	4.428 MGD
November	4.281 MGD	3.012 MGD

The ADF rate is typically used to evaluate treatment plant capacity, develop peak flow factors, and estimate chemical and pumping costs, sludge production, and organic loads. MDF is the average maximum flow that can be expected during a 24-hour duration and is used to evaluate treatment process limitations during design of new treatment facilities. It is also important in sizing hydraulic facilities such as wastewater collection piping, as well as pump station wet wells and pumps. PHF is the maximum flow condition anticipated for a short duration and is used for sizing hydraulic capacities of system components such as pipes, pumps, and headworks. Factors are multipliers derived from observed pipe and facility flows and industry-standards.

The projected flow rates are based on the FSP. Current flow rates were provided by the Eagle River annual reports (see Appendix C). Based on historical data, an individual in the Northern Communities has a wastewater output of 75 gallons per day (see Appendix C). The following equation was used for approximating the ADF:

ADF = FSP x 75 gallons/day

The MDF and PHF are estimated by applying peaking factors to the ADF. For the maximum daily and peak hourly factors, peaking factors were extrapolated from historical data and the ERWWTF annual reports. For more information about the peaking factor, see Appendix C. The annual reports range from 1983 to 2014. The peaking factor for the MDF is 1.8 and the peaking factor

for the PHF is 3.6 to be conservative (see Calculations). The following equations were used for obtaining the MDF and PHF:

MDF = 1.8 x ADF

PHF = 3.6 x ADF

Table 2 shows the flow rates to ERWWTF for current conditions and the estimate for 2045.

Table 3. Comparison of current and future flow rates.

Flow	**2014 Flow Rate**	**2045 Flow Rate**
Average Daily Flow	1.4 MGD	2.2 MGD
Maximum Daily Flow	2.3 MGD	4.0 MGD
Peak Hourly Flow	4.4 MGD	8.0 MGD

For designing the headworks' capacities, the current and projected flows calculated in Table 3 were used. The new headworks configuration will be able to operate with the current and future flows as per the Proposal. The calculations for the expected flow rates in 2045 are included in Appendix C.

Each of the three new screen channels will be designed to accommodate a flow of 4.0 MGD enabling a redundant channel to handle a MDF of 4.0 MGD on typical facility operations. A discussion about the process design will be presented under Section 3.4 Process Design.

3.3 Hydraulic Capacity of Influent Pipe

The influent sewer entering the facility must be checked to ensure that it can handle projected flows. The Manning Equation was used to calculate the hydraulic capacity of the pipe. Based on record drawings, the pipe is asbestos concrete, has a diameter of 24", and was installed at a slope of 0.3%. The influent pipe, when it is near full, is estimated to have a maximum flow capacity of 9.5 MGD with the existing conditions. The projected peak hourly flow in 2045 will be 8 MGD, which is within this parameter. The influent pipe will not be a limiting factor during the 30-year outlook. The calculations are included in Appendix C.

3.4 Process Design

With the current and future projected flow rates gathered, the general process design for the proposed headworks building was then evaluated. It is important to note that there were several factors that went into influencing the process design. As directly requested by the client, these factors included the need for a raw sewage flow measurement device, and the need for proper screening, grit removal and dewatering equipment. Some of the more obvious factors also influencing the design included the location of the influent sewer pipe, the elevation profile of the proposed building location, and the space limitations.

As mentioned in section 3.2, the current configuration of the facility's headworks is both undersized and under-designed when compared to the rest of the facility. Not only is the current headworks configuration reaching its hydraulic capacity, but it lacks the proper screening equipment, has very limited grit removal equipment, and has no dewatering equipment. With the limited ability of the current headworks configuration, the proper amounts of screening and grit material are not being removed from the wastewater and is causing unnecessary loads to the downstream processes. Furthermore, the absence of any dewatering equipment requires the facility to transport their processed screenings and grit material to the King Street Dewatering Facility (20 miles away from facility) to be dewatered before being taken to the Anchorage Regional Landfill (2.2 miles away from facility) for final disposal. This unnecessary step in the preliminary treatment process has proved to be costly and the client has asked for a direct solution.

All the above factors were considered in the design of the process plan and the selection of the screening, grit removal and dewatering equipment. Figure 2 and Appendix A, shows a diagram of the recommended process design for the new headworks building. Please note that this is a general diagram for the process design, detailing the flow schematic of the major process equipment. The actual physical layout of the process equipment can be found in Appendix A, under Section 6.0 Site Plan.

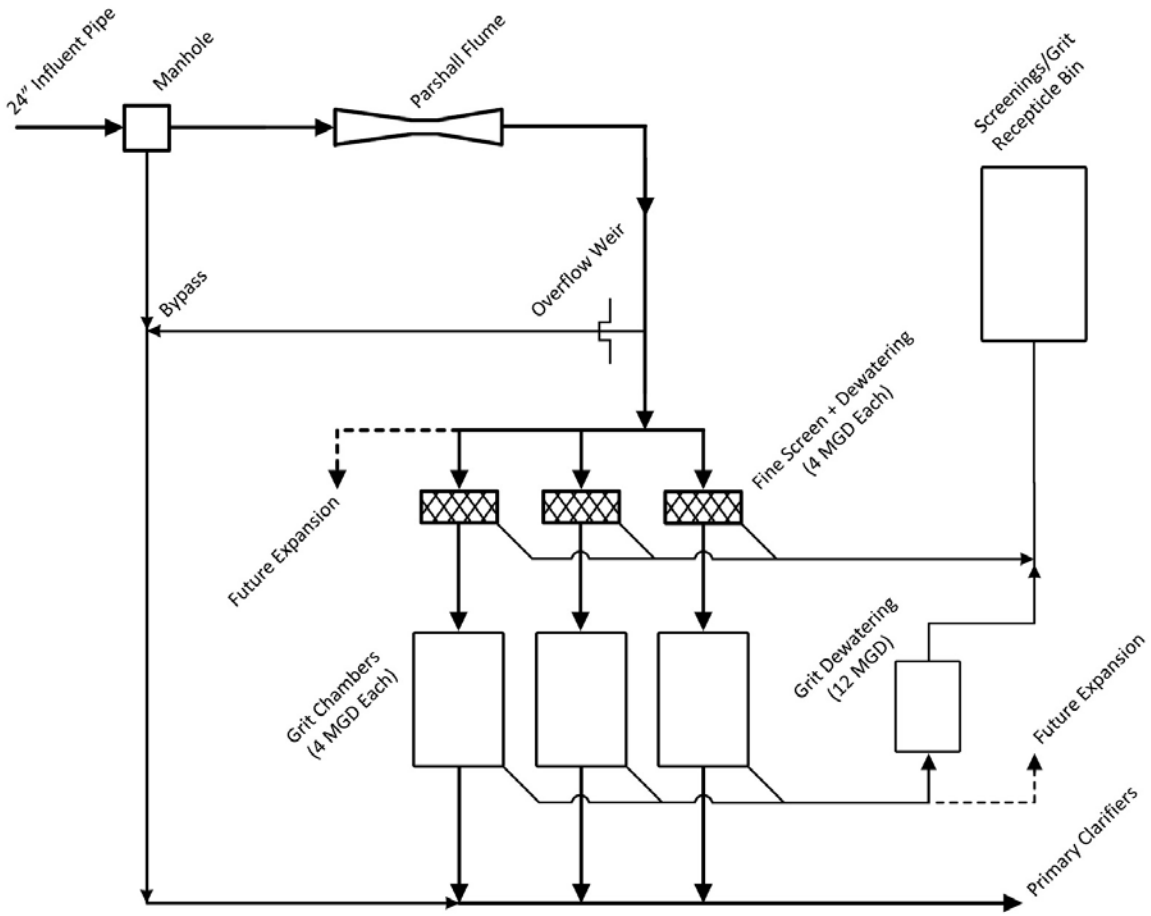


Figure 3. ERWWTF - Proposed Headworks Process Diagram

The recommended design for the process plan includes the following process equipment; a parshall flume for raw sewage flow measurement, three separate systems (channel ways) each consisting of their own set of fine screening and grit removal chambers, a single grit dewatering unit, and a receptacle bin (solids holding bin) for storing the dewatered screenings and grit material. It is important to note that each of the fine screening equipment includes its own dewatering device which is explained in more detail in Section 3.4.3 Screening Equipment.

The design of the process plan was largely influenced by the need for proper screening and grit removal equipment. The selection of the screening and grit removal equipment was based on the need for each separate system (channel) to handle 4.0 MGD, which would allow for a total capacity of 12.0 MGD. Given the 30-year projected peak flow rate of 8.0 MGD, this system was designed to handle flows well above the projected peak flow rates. This was done for redundancy purposes. With this design, only two systems will need to be in operation while the third system will be readily available on standby for maintenance or emergency purposes. For future expansion beyond the 30-year outlook, the new headworks building will be designed with room to expand and include a fourth system. The process diagram for the whole facility if the recommended design is accepted is in Figure 3 and Appendix A.

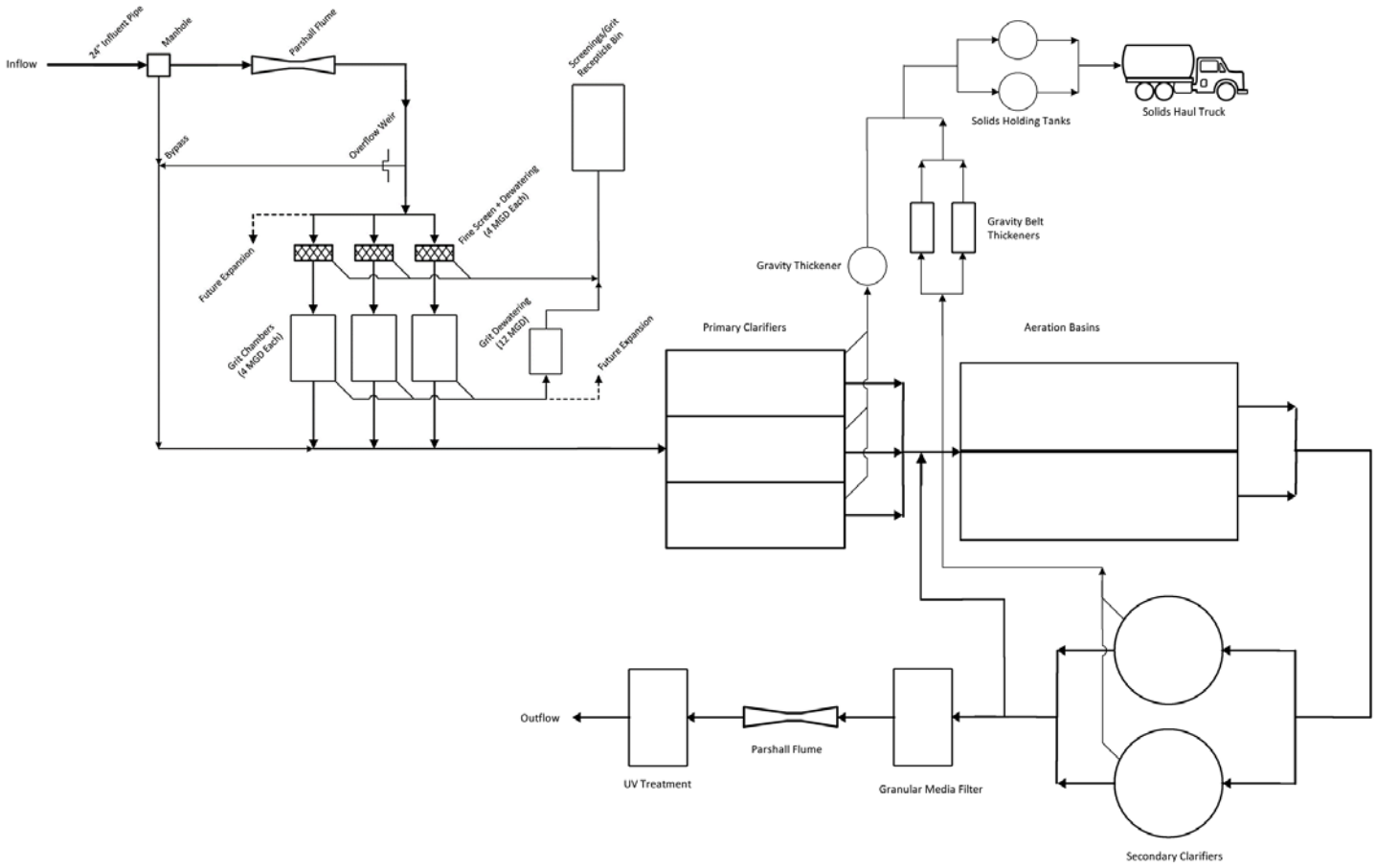


Figure 4. ERWWTF - Proposed Facility Process Diagram

3.4.1 Channel Design

A concrete rectangular channel design is recommended to carry the wastewater throughout the new headworks building. Several factors were considered during the selection and design of the channel. These included the ground elevation profile, velocity of the influent wastewater, and the cost of construction. The channel was designed such that the velocity of the wastewater traveling throughout the channel would be between 2 and 4 ft/s. This is a commonly accepted velocity flow range for wastewater flow. A velocity lower than 2 ft/s causes settling and deposition of solids particles, and a velocity higher than 4 ft/s creates undesirable turbulent flows reducing the removal rate of the screenings and grit particles. To handle the current and future projected flow rates, a channel width of 2 feet and a channel height of 3 feet is recommended. For a single channel, the depth of the influent sewer will range between 0.45 feet to 1.0 foot for current flows of 1.42 MGD and 4.0 MGD and 0.6 feet to almost 1 foot for projected flows in 30 years of 2.2 MGD and 4.0 MGD. The detailed calculations can be found in Appendix C.

3.4.2 Wastewater Influent Flow Measurement

To understand the flows entering the wastewater facility, various flow measurement devices were evaluated including several different types of flumes and weir designs. Of those evaluated, it is recommended that a parshall flume be used to measure the influent wastewater flows. Not only is this a widely used and recognized design, but when compared to other designs, it is the least likely to become clogged and it can handle a wide range of flow rates. A 12" pre-fabricated parshall flume provided by Plasti-Fab Inc. is recommended to measure the flow entering the facility. The 12" flume can handle flow rates from 0.25 MGD to 10.4 MGD. It will be designed to fit in the channel, should require minimal maintenance, if any, and can function properly over a wide range of flow rates. The exact dimensions can be found in Appendix B.

3.4.3 Screening Equipment

Screening equipment was chosen based on the design flow rate of 4.0 MGD, screen openings less than 6 mm to prevent damage to downstream equipment, and compatibility with dewatering equipment. The dewatering unit is required to handle up to 4 MGD due to the system layout and the 30-year projected peak flow rate of 8.0 MGD, as mentioned in section 3.4. The dewatering equipment was selected based on the need to reduce the water content of the solids in order to take them to the nearby landfill. This means the dewatering unit needs to reduce the water content enough to pass the paint filter test that the landfill requires. Currently, the screenings are transported 20 miles away to the King Street Dewatering Facility. This is an unnecessary distance to travel, considering that the Anchorage Regional Landfill is 2.2 miles away from the ERWWTF. Although companies contracted to empty the solids typically charge a flat rate for emptying the solids (based on quotes received over the phone), if ERWWTF were to keep the work in-house this would reduce fuel costs by close to 90% due to the significantly shorter distance.

The Helisieve 2 in 1 system is recommended for its cost-efficiency and its ability to fulfill the required objectives. This is an all-in-one screening, conveying, and dewatering system made by Parkson. It contains either ¼ or ⅛ inch perforations, produces solids dry enough for the landfill, and has an attached dewatering system for easy installation. The following is a list of other features and benefits.

Features:

- Self-cleaning fine screen
- 3 spiral diameters
- Shaftless spiral
- Integral dewatering
- In-tank septage pre-treatment
- Optional heat trace

Benefits:

- Improved downstream treatment
- Low operator maintenance
- Fits in many channel sizes
- No submerged bearing or shaft to get solids wrapped around
- Economical without additional dewatering equipment
- Pre-treat septage
- Solids dry enough to take to landfill

For dimensions, specifications, and other information please refer to Appendix B.

3.4.4 Grit Removal/Dewatering Equipment

The selection of the grit removal equipment was based largely on the need for three redundant systems. This would require a space efficient, low maintenance, and cost effective design. Several different types of grit removal systems were considered however it is recommended that a vortex-type grit chamber design be used. The advantages to this type of system are the high grit removal efficiency over a wide flow range, the small footprint needed for installation, and minimal head loss through the system.

It is recommended that the 'Pista 360' grit chamber provided by manufacturer *Smith and Loveless Inc*. be used for this project. This specific system operates on the principle of a forced vortex flow pattern. It is equipped with the patented 'V-Force Baffle', which is an integral flow control baffle, designed to ensure proper vortex flow, prevent short circuiting and allows for a full 360 degree rotation from the inlet to the outlet channel. A top-mounted, vertical, Ni-Hard 'Pista Turbo' grit pump discharges accumulated grit from the storage hopper of the grit chamber to a grit dewatering unit. The grit pump only operates when sufficient grit has accumulated and can be operated automatically or manually. With the selected system, grit is typically removed every four hours but can be adjusted for variable flow rates. The specific unit recommended for this project is capable of handling flows up to 4 MGD and requires only 500 cubic feet of space (8 ft. in diameter and 10 ft. in depth). For detailed information about the grit chambers, please refer to Appendix B, model 4.0B.

For the purposes of dewatering the processed grit, it is recommended that the 'Pista Turbo' grit washer model 250, also manufactured by *Smith and Loveless Inc.*, be used in conjunction with the 'Pista 360' grit chambers. This unit is capable of a grit retention of 95% down to 140 mesh particle size, passes the paint filter test and has a large capacity in comparison to the grit chambers.

3.4.5 Plant Drain Collection System

Water removed from the screens will be emptied back into the channels. Water removed from the grit chambers will go directly to the plant drain and be pumped into the centralized drain system. The centralized drain system is then pumped to the beginning of the headworks building to be processed again.

4.0 WASTE MANAGEMENT

4.1 Grit/Screenings Projections

With the ERWWTF's current headworks configuration, it is difficult to estimate the exact amounts of screenings and grit quantities which can be removed from the headworks. The lack of proper screening and grit removal equipment, and the absence of dewatering equipment, suggests that the facility is currently not removing enough screenings and grit material. Currently the ERWWTF removes about 1 cubic yard of grit per week and about 4 tons of screenings per month. These numbers were rough estimates provided by the client. The current setup of the headworks configuration has a very limited grit removal system and with a more adequately sized system like the one recommended, the grit removal rate would roughly double to about 2 cubic yards of grit per week. Using these rough estimates and factoring in the 30-year projected flow rates, it was estimated that the projected screenings and grit would be about 12 tons/month and 30 tons/month, respectively. These numbers were based off using the peak hour flow rate factor and would realistically be lower in quantity. Is also important to note that these projections do not include dewatered screenings or grit.

4.2 Solids Holding and Disposal

Using the 30-year grit and screenings projection from section 4.1, the total solids monthly projection is approximately 30 tons per month, or 7.5 tons per week. Seeing as these projections do not take into account the dewatering process, the tonnage per month will be less. As the reduction in weight depends on the screening and grit dewatering equipment chosen, we will use 10.5 tons for storage dimensions. This will allow for extra storage space and the option for longer periods between emptying the solids.

Based on current operations of emptying the solids every week, the solids holding bin should have the dimensions to carry 8 tons of solids per week. Based on the tonnage and the ease of removal, a 15 cubic yard commercial roll-off dumpster from Alaska Waste is recommended. Considering that Alaska Waste does not recommend completely filling the dumpster, a dumpster that can hold a minimum of 11 tons was chosen.

A 15 cubic yard dumpster acquired from Alaska Waste has a $126 monthly rental price with an emptying fee of $122 plus $68/ton. Resulting in a $4,400 monthly cost. Other commercial

dumpster suppliers have similar charging rates. As the facility has enough space, two dumpsters could easily be used to increase solids storage.

5.0 BUILDING DESIGN

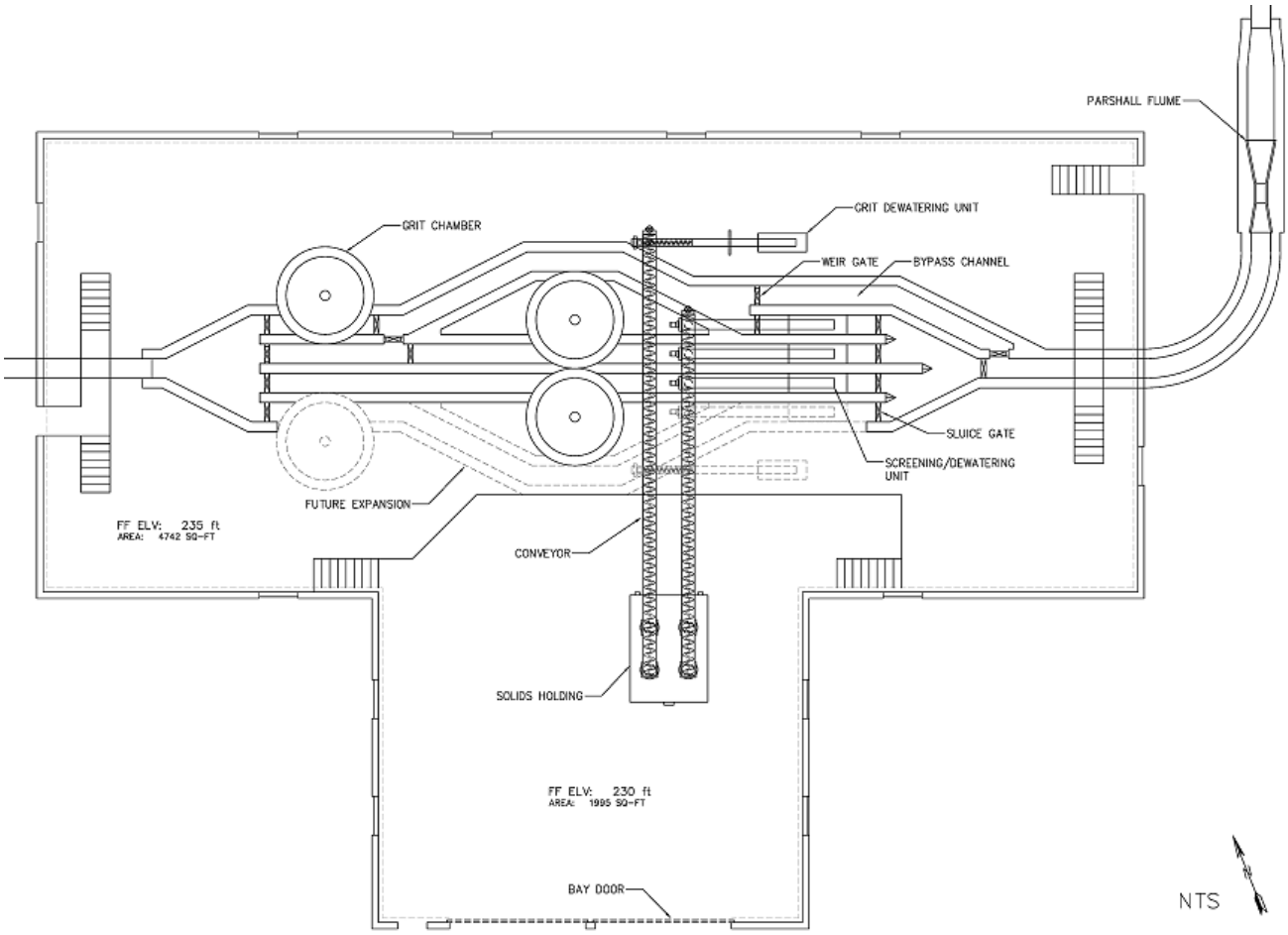


Figure 5. ERWWTF Proposed Headworks Floor Plan

5.1 Floor Plan

The recommended floor plan is designed to maximize space-efficiency while still allowing access to the equipment (See Figure 3). The Parshall Flume is installed outside the building, and can be accessed via a hatch above it. Four channels are designed for construction, though it is recommended that only three of the channels with a grit chamber and screen be installed, with room left for the installation of a fourth grit chamber and screen when the average flow increases. Sluice gates are arranged in such a way that a complete bypass of the headworks equipment is possible in the case of higher peak flow than the headworks can handle. One dewatering system is recommended to be installed during construction, with room left for a

second when average flow increases. Grit that is removed by the grit chambers is pumped to the dewatering equipment. The dewatered solids removed by the screens and the solids from the dewatering equipment are transported via screw pumps to the dumpster in the loading bay. When the dumpster fills up, the solids are trucked to the local landfill. This should occur about every 1-2 weeks. Stairs are in the design to provide access across the channels at both ends of the building and between the loading bay and the upper ground level of the headworks building. The upper floor of the headworks building does not extend over the loading bay in the design. The building is oriented perpendicular to building one. It will be designed to the International Building Code as amended by the MOA and Fire Code. See Appendix A for the building floor plan.

5.2 Roof

The recommended roof of the headworks building is a gabled roof designed to shed evenly to two sides of the building. The gabled roof recommended for the loading bay will shed to either side of the road leading out of the loading bay so it does not obstruct the flow of traffic. The gabled roof design creates more space along the long edge of the roof in the untrussed areas. Cost permitting, a relatively inexpensive crane system could be constructed under the trusses to move equipment, if necessary.

5.3 Walls

The recommended walls of the headworks building are pre-fabricated 4” insulated panels.

5.4 Bay Doors

The recommended bay doors are insulated, and approximately 14’ wide, 14’ tall, and 3” thick.

5.5 Floors

The floors are recommended to be composed of 6” reinforced concrete slabs.

5.6 Alternatives

There were four alternatives considered for the recommended headworks upgrade. One alternative involved not constructing a new headworks building (See Figure 4), and the other three were different arrangements of the equipment that ultimately resulted in different building designs. The recommended design was selected for its efficient use of space, minimization of head loss, serviceability, and cost savings.

5.6.1 Floor Plan A1

The existing building could be used to upgrade the headworks by removing the current headworks equipment to make better use of the available space, and installing equipment that can handle the projected flow rates. This would be expensive, would require that the plant be

taken out of operation for demolition and construction, and would severely limit opportunities for future expansion. Consequently, we do not recommend using the current space available to upgrade the headworks. For details, see Appendix A.

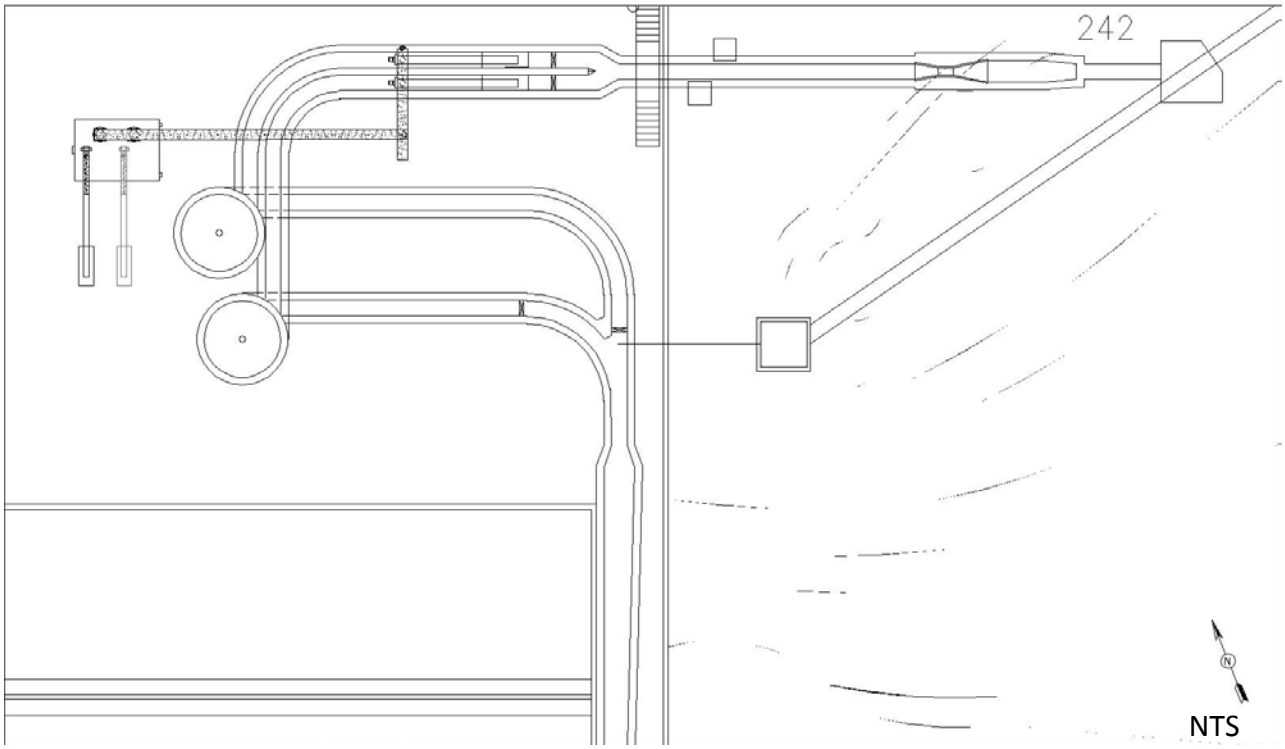


Figure 5. Alternative Headworks Floor Plan

5.6.2 Floor Plan A2

The floor plan arrangement of the second alternative has the grit chambers in a more centralized location, but requires more concrete for the bypass channel than the main design. This alternative was dismissed because of its space inefficiency and the lack of serviceability for the grit chambers. For details, see Appendix A.

5.6.3 Floor Plan A3

The third alternative floor plan also places the grit chambers in a more centralized location. In addition, it places the Parshall Flume inside the building and aligns the loading bay with the edge of the headworks building. This alternative was dismissed because of the space inefficiency and capital cost. For details, see Appendix A.

5.7 Tap Into Buried Pipe

After the headworks building has been constructed, the dirt around the buried pipe is recommended to be excavated so that the existing pipe can be tapped into. It is recommended that a manhole be constructed at that location, and that the old pipe be left in place.

5.8 Buried Channel Connections

Eleven and a half feet before the parshall flume, it is recommended that the pipe discharge into a buried rectangular concrete channel. The channel should remain closed, until it reaches the parshall flume, and then should close again until the channel enters the headworks building.

5.9 Primary Clarifier Connection

It is recommended that the channel widen just before the clarifiers to lower the velocity of the wastewater, and that it shorten as it discharges into each clarifier. Sluice gates at the entrance of each clarifier will be used to regulate flow rates into each clarifier.

6.0 SITE PLAN

6.1 Building Location

The northwest corner of the building will be located forty five feet away from building 1, south of the influent pipe by seven feet at the nearest point. The west wall of the building will be parallel with the east wall of building 1. The building will be located here so the influent pipe will not have to be disturbed during construction, this will make construction cost effective and easy. The orientation of the building is the same as building 1 for aesthetic purposes and any other orientation would increase the cost for construction. For more details on the location of the building see Appendix A.

6.2 Geotechnical Conditions

No geotechnical data was available for the ERWWTF site. A geotechnical report for the nearby Artillery Road was used to estimate the soil conditions of the site. The estimated bearing capacity of the soil is 1000 psf. The soil 13 ft. below the surface is ASTM SM, silty sand with gravel. See Appendix F for the Artillery Road borehole log. A geotechnical investigation is recommended to verify the soil type and bearing capacity.

6.3 Walkway

The walkway connecting the headworks building to building 1 is recommended to be a simple concrete path. This cuts down on construction cost as well as maintenance cost. The path will be 4 feet wide by 45 feet long. The location of the walkway will be determined by the entrance of building 1 and the designed headworks building. The Walkway will be compliant with the ADA for safety and the concrete will meet MASS requirements. For more details see Appendix A.

6.4 Drive Path

The drive path for the truck used to dispose of the solids will come in from the south entrance and follow the road to the headworks building. No construction is needed for this section; the current road will suffice. Once the truck reaches the headworks building, it will back into the bay doors for loading, then pull out of the bay doors and exit the same way it entered. The only addition to the road will be right in front of the bay doors where the truck backs into. The pavements will be 4 inches thick and will connect to the current road. The pavement will have a slope of two percent away from the headworks building for proper drainage. Trucks entering the southern entrance will make for less traffic in the parking lot for employees. The complete construction of the drive path will be in compliance with MASS. For a visual, please see Appendix A.

6.5 Drainage

Drain swales will be constructed around the perimeter of the building with culverts going under the corridor, influent pipe, and the driveway. The drain swales will be approximately 4 feet wide with a 3:1 slope or flatter sides. The swales will be lined with grass or rip rap in the steep locations. The culverts will be constructed of 8 inch diameter galvanized corrugated steel pipe. A 8 inch pipe can handle around 900 gallons per minute and the max drainage the culverts will ever see is around 430 gallons per minute, for calculations on drainage please refer to Appendix C. The swales will collect at one central swale and be dispersed into a vacant area of the lot to the south east. Drainage around the facility will meet MASS code for effective and efficient drainage. For a visual of the drainage path, see Appendix A.

6.6 Construction Plan

6.6.1 Plant Operation During Construction

The facility will be able to operate like normal during construction. The new headworks building is being designed to stay enough away from the influent pipe to not disturb it, this makes for easier and cost effective construction. The only time normal plant operations will be affected is when the pipe is tapped into to divert the wastewater through the new headworks building. The old influent pipe will be used as a shunt for the new headworks building. There will be no temporary rerouting of the pipe.

6.6.2 Excavation

Excavation for the building, drive path, pipes, and drainage will have a total cut of 2900 cubic yards, this includes the 4 foot foundation for the designed building. All excavation will be contracted out.

6.6.3 Construction

Construction of the designed building will be constructed using the materials in section 5. The building shall meet all the required codes and permits previewed in section 7.7. All construction for the building will be contracted out and price can be found in the cost estimation.

7.0 PERMITS

The Alaska Department of Environmental Conservation (ADEC) will require a Type 2 Stormwater Treatment Plan (SWTP) to be acquired because the total disturbed land will be greater than 10,000 square feet but less than 1 acre. To obtain this permit a SWTP will have to be sent to the ADEC for approval, the contractor will be responsible for this.

The MOA will grant a construction permit if the following codes have been met:

- Building code
- Plumbing code
- Mechanical code
- Electrical code
- Concrete code
- Fire code
- International building code

The construction permit will be obtained by submitting the following

- Full legal description of property
- Two copies of soil engineers reports and recommendations for new building
- Three sets of complete construction plans
- Code study
- Calculations and specs
- Two copies of any previous agreements
- Three certified plot plans stamped and signed by a professional land surveyor

The previous submittals are the responsibility of the contractor. Obtaining these permits will be the responsibility of the contractor as well.

An operator of a Publicly Owned Treatment facility requesting to discharge to surface waters must apply for an Alaska Pollutant Discharge Elimination System (APDES) permit. This permit will allow the construction of the building as well as the operation after construction. This permit will be the responsibility of AWWU to file and obtain.

For more details on permits please see Appendix E.

8.0 COST ESTIMATION

The table below summarizes the estimated cost to complete the proposed improvements at the Eagle River Wastewater Treatment Facility. The total cost for the project is estimated at roughly **$7 million**. Costs were rounded up in this table, however, the more specific costs and breakdowns are listed in Appendix D.

This estimate was constructed by making phone calls, using historical documents, and referencing drawings. For the equipment and equipment's installation costs, calls were made to several companies for quotes. For all building costs the cost estimate from building three supplied by AWWU was referenced. As the cost estimate from building 3 listed only lump sum costs, our team compared the new building design with that of building three to estimate the increase or decrease in costs for each category, such as materials and installation.

This includes all costs associated with the design and construction of the new headworks building. As this is a 35% cost estimate, changes and improvements will be addressed as needed. For a more detailed cost estimate please refer to Appendix D.

Table 4. General 35% Cost Estimate

Description	Cost
Equipment	$750,000.00
Construction and Materials	$3,900,000.00
Engineering Design	$1,500,000.00
15% Contingency	$920,000.00
Total Project Cost	**$7,070,000.00**

REFERENCES

HDR Alaska, Inc. (2014). *Municipitality of Anchorage Anchorage Water & Wastewater Utility 2014 Anchorage Wastewater Master Plan*. Anchorage, Alaska.

ERWWTF (1983-2014). *Eagle River Annual Reports*. Anchorage, Alaska.

GV Jones & Associates, Inc. (2006). *Eagle River Wastewater Treatment Facility Facility Plan Update*. Anchorage, Alaska.

APPENDIX A

Drawings and Diagrams

VERIFY SCALES

BAR IS ONE INCH ON ORIGINAL DRAWING

0 1"

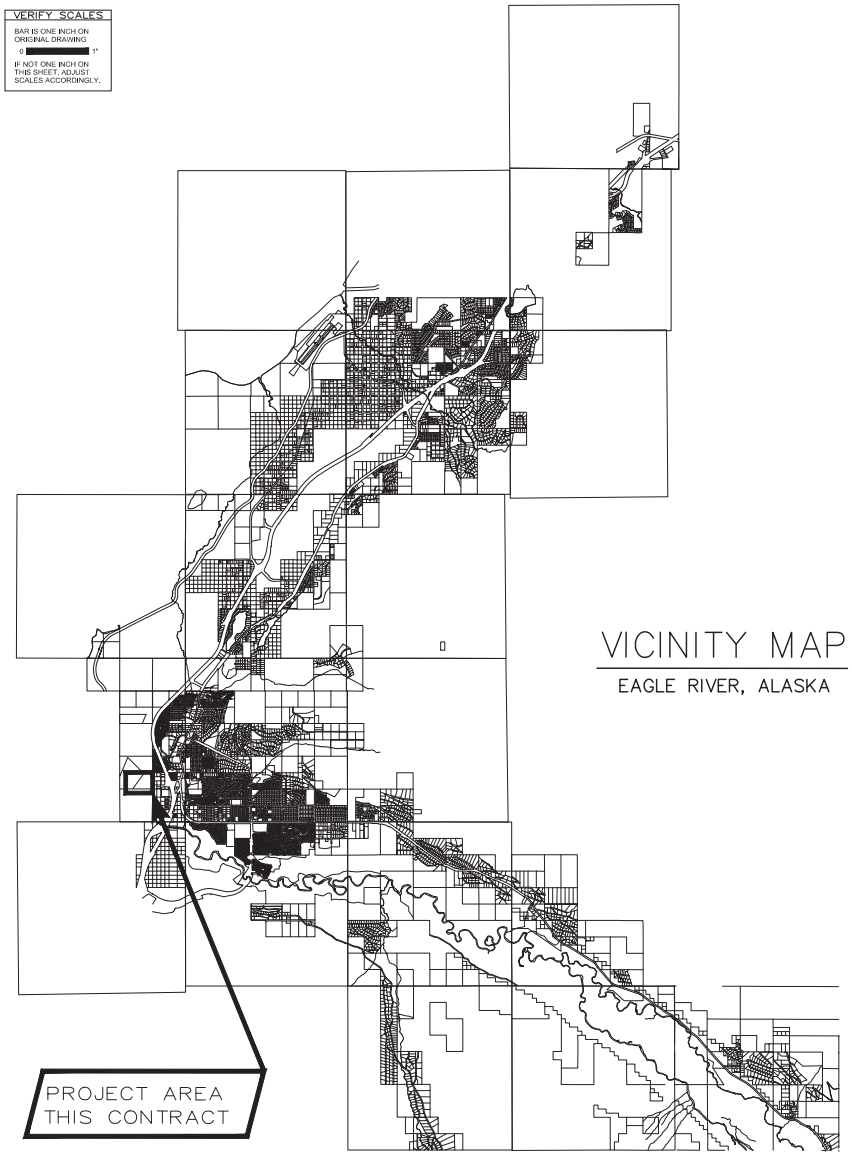
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

N

UNOFFICIAL GRAPHIC SCALE

0 1/2 1 MILE 2 MILES

KNIK ARM



VICINITY MAP

EAGLE RIVER, ALASKA

ANCHORAGE ALASKA

ANCHORAGE WATER & WASTEWATER UTILITY

AWU

MUNICIPALITY OF ANCHORAGE

AWWU PLAN SET
NO. N/A

MUNICIPALITY OF ANCHORAGE
WATER & WASTEWATER UTILITY

EAGLE RIVER WWTF
HEADWORKS UPGRADE

PROJECT IDENTIFICATION No. N/A

04/19/2015

SHEET INDEX	
SHEET NO.	SUBJECT
1	COVER SHEET
2	KEY MAPS, NOTES, LEGEND, INDEX, & ABBREVIATIONS
3	SITE PLAN
4	SITE PLAN
5	HEADWORKS BUILDING DRAINAGE PLAN
6	HEADWORKS BUILDING PLAN VIEW
7	HEADWORKS BUILDING ELEVATION VIEW
8	HEADWORKS BUILDING CROSS-SECTIONS
9	HEADWORKS BUILDING CROSS-SECTIONS
10	HEADWORKS BUILDING CROSS-SECTIONS
11	HEADWORKS BUILDING ALTERNATE LAYOUT
12	HEADWORKS BUILDING ALTERNATE LAYOUT
13	HEADWORKS BUILDING ALTERNATE LAYOUT
14	TYPICALS

EAGLE RIVER WWTF
HEADWORKS UPGRADE

INVITATION TO BID No. N/A

AWWU PROJECT ID. NO. N/A

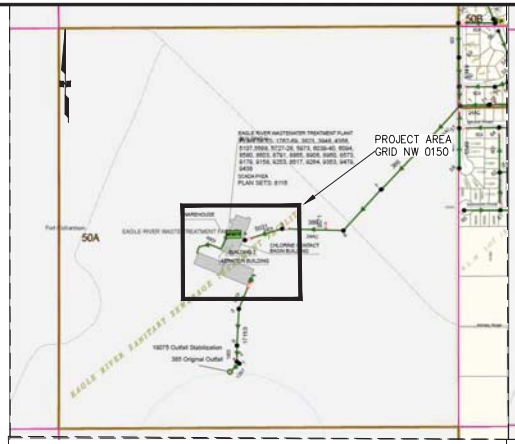
ACAD FILE: ERWWTF H1 04-19-2015 PLOT SCALE=1:2 PLOT DATE=04/19/2015

ABBREVIATIONS

CSCP = CORRUGATED STEEL CULVER PIPE

LEGEND

SYMBOL EXISTING (E)	SYMBOL PROPOSED (P)	PLAN LEGEND
—— SD ——	—— SD ——	STORM DRAIN LINE
		STORM DRAIN MANHOLE
		CATCH BASIN MANHOLE
		CULVERT



SEWER KEY MAP
N.T.S.

WATER KEY MAP
N.T.S.

AWWU PLAN SET NO. N/A

GENERAL NOTES

1. ALL CONSTRUCTION SHALL BE INSTALLED AS SPECIFIED IN THE MOST CURRENT EDITION OF THE MUNICIPALITY OF ANCHORAGE STANDARD SPECIFICATIONS FOR STREETS–DRAINAGE– UTILITIES–PARKS (MASS), THE AWWU DESIGN AND CONSTRUCTION PRACTICES MANUAL, AND THE SPECIAL PROVISIONS.

2. MAINTAIN A MINIMUM OF TEN (10) FEET HORIZONTAL SEPARATION BETWEEN WATER AND SANITARY SEWER MAINS AND SERVICES. A MINIMUM VERTICAL SEPARATION OF EIGHTEEN (18) INCHES SHALL BE MAINTAINED AT ALL WATER/SEWER CROSSINGS.

3. MAINTAIN A MIMIMUM OF 36–INCHES OF VERTICAL SEPARATION BETWEEN ANY STORM SEWER (STORM DRAIN OR FOOTING DRAIN) AND WATERLINE (MAINS OR SERVICES) OR SANITARY SEWER (MAINS OR SERVICES). IF 36–INCHES CANNOT BE MAINTAINED, PROVIDE A MINIMUM OF 4–INCH THICK INSULATION.

4. ALL WATER/SEWER PIPE INSULATION SHALL BE RIGID BOARD, HIGH DENSITY EXTRUDED POLYSTYRENE, MIN. 60 P.S.I., FOR UNDERGROUND INSTALLATIONS EQUIVALENT TO R–20 PER FOUR (4) INCH THICK INSULATION.

5. CONTRACTOR SHALL VERIFY AND RECORD THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES ENCOUNTERED IN THE FIELD AND RECORD ANY CHANGES ON THE CONTRACTOR RECORD DRAWINGS.

6. THE CONTRACTOR SHALL RESTORE ALL DISTURBED PROPERTY, INCLUDING DRAINAGE SWALES, DISTURBED BY CONTRACT ACTIVITIES TO PRECONSTRUCTION CONDITION.

7. IN CASE OF CONFLICT BETWEEN STATIONING LOCATION OF PIPE OR FITTINGS, USE DIMENSIONED LOCATIONS RELATIVE TO THE CENTERLINE OR PROPERTY LINE, THE DIMENSIONED LOCATIONS SHALL GOVERN.

8. THE CONTRACTOR SHALL RECORD SURVEY NOTES FOR SUBMITTAL WITH RECORD DRAWING PLANS PRIOR TO CONTRACT FINAL PAYMENT.

9. CONTRACTOR SHALL FIELD INSTALL "MEG–A–LUG" JOINT RESTRAINT ON ALL MECHANICAL JOINTS.

10. CONTRACTOR SHALL USE DUCTILE IRON PIPE (DIP) LONG SOLID SLEEVES WITH RESTRAINED JOINTS TO FACILITATE CONNECTING DIP TO DIP OF SAME SIZE.

11. ALL DUCTILE AND CAST IRON PIPE AND FITTINGS SHALL BE ENCASED IN 8–MILS OF POLYETHYLENE WRAP, AS PER MASS SECTION 60.07 "POLYETHYLENE ENCASEMENT."

12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR EROSION AND SEDIMENT CONTROLS AS NECESSARY TO COMPLY WITH FEDERAL, STATE, AND MUNICIPAL LAWS THAT PROHIBIT UNPERMITTED DISCHARGE OF POLLUTANTS, INCLUDING SEDIMENTS, THAT ARE A RESULT OF EROSION AND OTHER CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL CONDUCT ALL WORK SO SEDIMENT IS NOT TRANSPORTED ONTO THE ROADWAY OR ADJACENT PROPERTY. AT A MINIMUM, THE CONTRACTOR SHALL SWEEP UP ANY SEDIMENT TRACKED ONTO PAVED SURFACES IN PUBLIC RIGHT–OF–WAY WITHIN 24 HOURS OF THE TRACKING TO MINIMIZE THE WASH–OFF OF SEDIMENT INTO THE STORM DRAINS OR WATERWAYS.

13. STATIONING SHALL BE PIPE CENTERLINE UNLESS NOTED OTHERWISE

SANITARY SEWER NOTES

1. EXISTING CUSTOMERS SHALL BE NOTIFIED SEVENTY–TWO (72) HOURS IN ADVANCE OF SANITARY SEWER SERVICE INTERRUPTION. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE TEMPORARY SANITARY SEWER SERVICE TO THE EXISTING CUSTOMERS IF DEEMED NECESSARY BY THE ENGINEER. (TEMPORARY SEWER SERVICE NEEDS AWWU REVIEW AND APPROVAL PRIOR TO CONSTRUCTION).

2. ALL MANHOLES SHALL HAVE A MIMIMUM OF ONE–SIX (6") INCH GRADE RING. MAXIMUM GRADE RING ADJUSTMENT SHALL NOT EXCEED EIGHTEEN (18") INCHES.

3. ALL SANITARY SEWER MAINS SHALL BE CLASS 50, DUCTILE IRON PIPE.

4. SANITARY SEWER SERVICES SHALL BE 4" UNLESS NOTED ON PLANS WITH A MINIMUM SLOPE FOR 6–INCH SERVICES TO BE 1% AND FOR 4–INCH SERVICES TO BE 2%.

5. SANITARY SEWER SERVICES SHALL BE PLACED NO CLOSER THAN: 15 FEET HORIZONTALLY MEASURED TO ANY FIRE HYDRANT OR FIRE HYDRANT LEG; 10 FEET HORIZONTALLY MEASURED TO ANY WATER MAIN, WATER SERVICE, STORM SEWER, FOOTING DRAIN, STREET LIGHT, TRANSFORMER PAD, ELECTRICAL/TELEPHONE/CABLE BOX; AND 5 FEET HORIZONTALLY MEASURED TO ANY SIDE LOT LINE.

6. ALL BEDDING SHALL BE TYPE II–A FOR DUCTILE IRON PIPE

7. SEWER MAIN, SERVICE TRENCHES AND BEDDING SHALL BE COMPACTED TO MIN. OF 95% OF MAXIMUM DENSITY.

8. THE CONTRACTOR SHALL RELOCATE ANY SEWER SERVICE CONNECTIONS INSTALLED WITH LESS THAN MINIMUM STANDARD MEASURED DISTANCES PRIOR TO FINAL ACCEPTANCE BY AWWU.

WATER NOTES

1. AWWU, AFD AND EXISTING CUSTOMERS SHALL BE NOTIFIED SEVENTY–TWO (72) HOURS IN ADVANCE OF WATER SERVICE INTERRUPTION. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE TEMPORARY WATER SERVICE TO THE EXISTING CUSTOMERS IF THE OUTAGE EXCEEDS 6–HOURS OR IF DEEMED NECESSARY BY THE ENGINEER. THE CONTRACTOR SHALL HAVE A TEMPORARY WATER SERVICE PLAN REVIEWED AND APPROVED BY ADEC.

2. ALL WATER MAINS SHALL BE CLASS 52, DUCTILE IRON PIPE.

3. ALL BENDS, TEES, FIRE HYDRANTS AND DEAD–ENDS SHALL HAVE RESTRAINED FITTINGS.

4. NO PIPE LENGTH LESS THAN EIGHT (8') FEET SHALL BE INCORPORATED IN THE WATER SYSTEM EXCEPT FOR THOSE NECESSARY FOR FIRE HYDRANTS OR VALVE LOCATIONS UNLESS RESTRAINED.

5. THRUST RESTRAINT SHALL BE PROVIDED BY USE OF FIELD–LOK GASKETS (OR EQUAL) OR MEG–A–LUG FITTINGS (OR EQUAL) ON ALL MECHANICAL JOINTS. THE USE OF THRUST BLOCKS WILL NOT BE ALLOWED FOR NEW PIPE.

6. WATER SERVICES SHALL BE 1" UNLESS NOTED ON PLANS.

7. WATER SERVICES SHALL BE PLACED NO CLOSER THAN: 15 FEET HORIZONTALLY MEASURED TO ANY FIRE HYDRANT OR FIRE HYDRANT LEG; 10 FEET HORIZONTALLY MEASURED TO ANY SANITARY SEWER MAIN, SANITARY SEWER SERVICE, STORM SEWER, FOOTING DRAIN, STREET LIGHT, TRANSFORMER PAD, ELECTRICAL/TELEPHONE/CABLE BOX; AND 5 FEET HORIZONTALLY MEASURED TO ANY SIDE LOT LINE

8. THE CONTRACTOR SHALL HAVE THE NEWLY INSTALLED WATER MAIN OPEN BORE FLUSHED BY AWWU PRIOR TO INSTALLATION OF WATER SERVICES. PROVIDE A MINIMUM OF 48 HOURS ADVANCE NOTICE.

9. ALL WATER MAIN AND SERVICE TRENCHES AND BEDDING SHALL BE COMPACTED TO 95% OF MAXIMUM DENSITY.

10. ALL WATER MAINS AND SERVICES SHALL HAVE A MINIMUM OF 10 FEET OF BURY AT ALL POINTS.

11. MAXIMUM DEFLECTION OF PIPE PER JOINT SHALL NOT EXCEED 80% OF THE MANUFACTURERS RECOMMENDED DEFLECTION (4 DEGREES).

12. ALL PIPE BEDDING SHALL BE TYPE II–A FOR DUCTILE IRON PIPE.

13. THE CONTRACTOR SHALL RELOCATE ANY WATER SERVICE CONNECTIONS INSTALLED WITH LESS THAN MINIMUM STANDARD DISTANCES PRIOR TO ACCEPTANCE BY AWWU.

14. THE DEAD END OF THE WATER MAIN SHALL BE RESTRAINED FOR A MINIMUM OF 40' FROM END.

CALL BEFORE YOU DIG

The Contractor shall notify all area utility companies prior to commencement of excavation. The following is a partial list:

LOCATE CALL CENTER of ALASKA (includes ATU, AWWU, CEA, ENG, Butler Aviation/Tesoro, Prime Cable, MLP, Traffic Signals, MOA Storm/Streets)	278–3121
STATE STORM/STREET LIGHTS	333–2411
MILITARY PETROLEUM LINES	

RECORD DRAWING Note: To be filled out on original drawings upon project completion.

1. DATA PROVIDED BY: _____
   This shall serve to certify that these Record Drawings are a true and accurate representation of the project as constructed.
   CONTRACTOR: _____
   BY: _____ TITLE: _____
   DATE: _____
2. DATA TRANSFERRED BY: _____
   COMPANY: _____
   DATE: _____
3. Based on periodic field observations by the Engineer (or an individual under his/her direct supervision), the Contractor–provided data appears to represent the project as constructed.
   DATA TRANSFER CHECKED BY: _____
   COMPANY: _____
   BY: _____ TITLE: _____
   DATE: _____

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STATE OF ALASKA 49TH — REGISTERED PROFESSIONAL ENGINEER — SEAL

ANCHORAGE WATER & WASTEWATER UTILITY — AWWU — A DEPARTMENT OF THE MUNICIPALITY OF ANCHORAGE

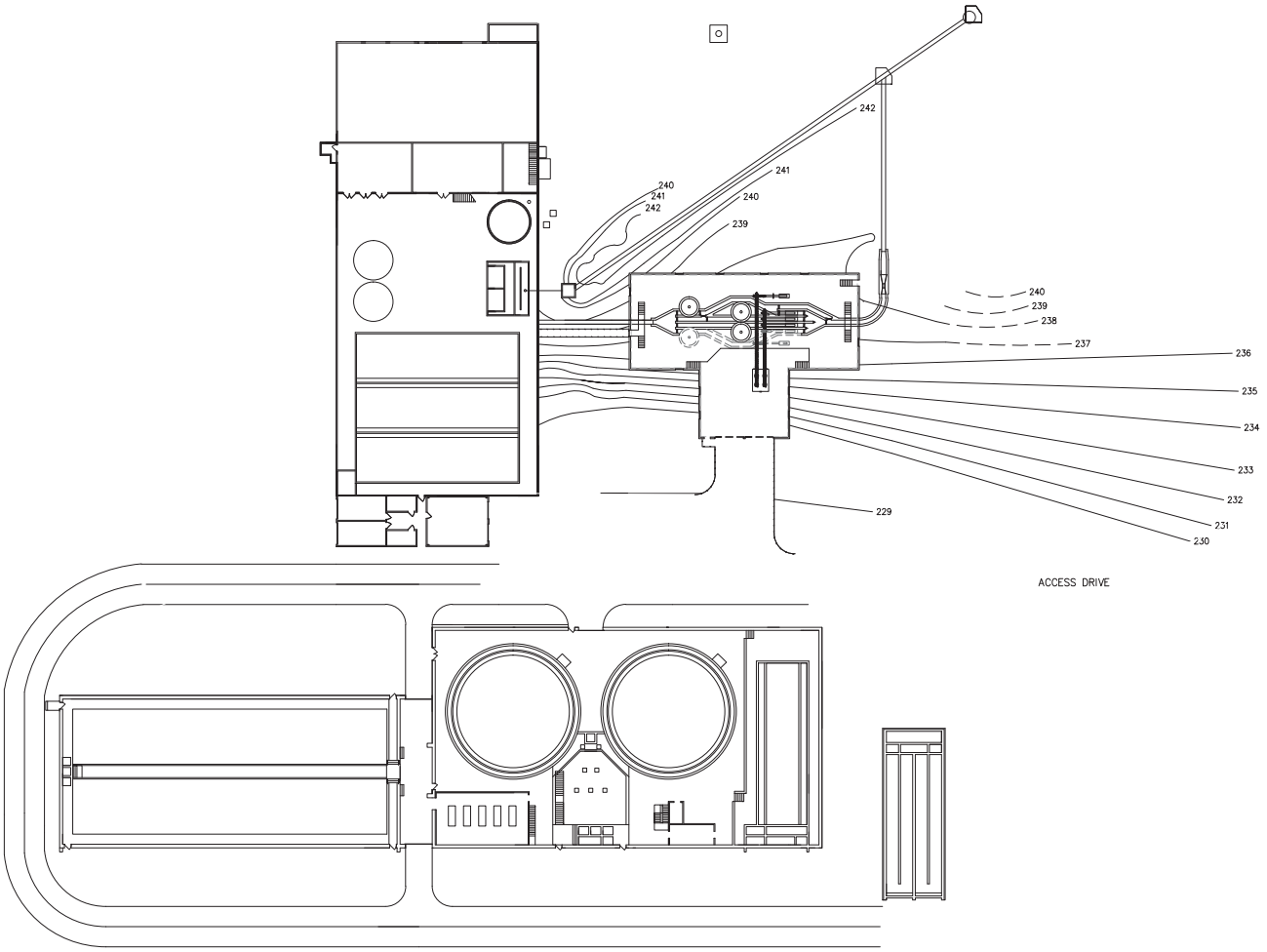
MUNICIPALITY OF ANCHORAGE
WATER & WASTEWATER UTILITY

EAGLE RIVER WWTF HEADWORKS UPGRADE

KEY MAP, NOTES, LEGEND, & ABBREVIATIONS

HORZ SCALE: N/A VERT SCALE: N/A	DATE: 04/19/2015	GRID: NW0150
PROJ. ID.: N/A		SHEET 2 of 14

ACAD FILE: ERWWTF HU 04–19–2015 PLOT SCALE: 1:2 PLOT DATE: 04/19/2015



1 SITE PLAN
SCALE: 1" = 30'-0"

SHEET NOTES:

1.

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SCALE IN FEET

AWWU PLAN SET NO. N/A

EAGLE RIVER WWTF

PLOT DATE: 04/19/2015

PLOT SCALE: 1:2

ACAD FILE: ERWWTF HU 4-19-2015.DWG

VERIFY SCALE — THIS BAR REPRESENTS ONE INCH ON ORIGINAL DRAWING. IF BAR IS NOT ONE INCH, ADJUST DRAWING SCALE ACCORDINGLY. FULL SIZE SCALE HORZ SCALE: N/A VERT SCALE: N/A

DATA	DRAWN BY	CHECKED BY	DATA	DRAWN BY	CHECKED BY
BASE			TELEPHONE		
TOPOGRAPHY			ELECTRIC		
PROFILE			CABLE TV		
SANITARY SEWER			TRAFFIC SIGNAL		
STORM SEWER			DESIGN		
WATER			QUANTITIES		
GAS			MUN. FINAL CHECK		

PLAN CHECK

REV	DATE	DESCRIPTION	BY

REVISIONS

RECORD DRAWING — Note: To be filled out on original drawings upon project completion.

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BY: _____ TITLE: _____
DATE: _____

2. DATA TRANSFERRED BY: _____
COMPANY: _____
DATE: _____

3. Based on periodic field observations by the Engineer (or an individual under his/her direct supervision), the Contractor-provided data appears to represent the project as constructed.
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BY: _____ TITLE: _____
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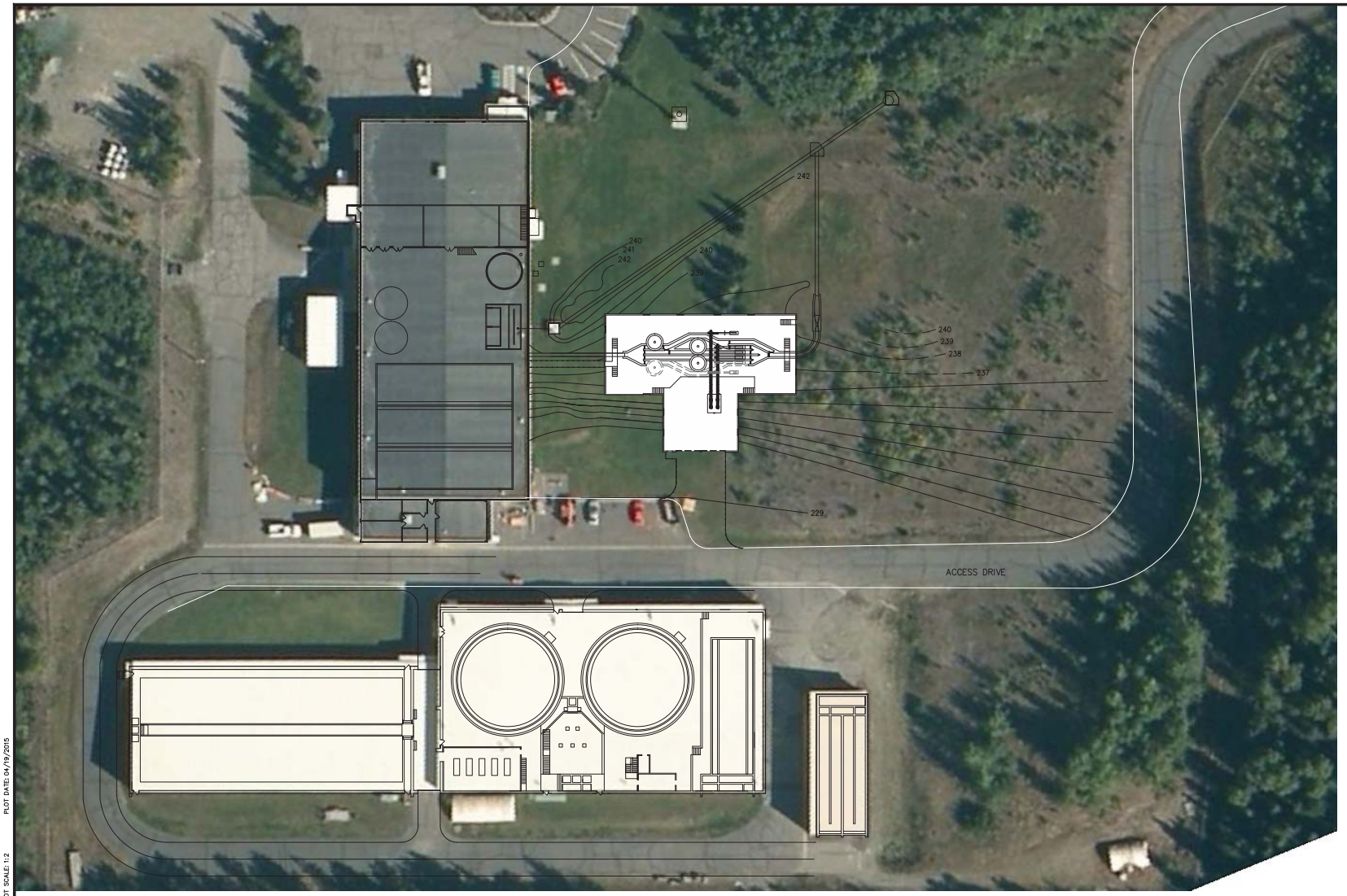
MUNICIPALITY OF ANCHORAGE
WATER & WASTEWATER UTILITY

EAGLE RIVER WWTF HEADWORKS UPGRADE

SITE PLAN

HORZ SCALE: N/A
VERT SCALE: N/A
DATE: 04/19/2015
GRID: NWD150
PROJ. ID.: N/A

SHEET 3 of 14



1 SITE PLAN WITH SATELLITE IMAGERY
SCALE: 1" = 30'-0"

SHEET NOTES:

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SCALE IN FEET

AWWU PLAN SET NO. N/A

EAGLE RIVER WWTF

PLOT DATE: 04/19/2015
PLOT SCALE: 1:2
ACAD FILE: ERWWTF HU 4-19-2015.DWG

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BASE			TELEPHONE		
TOPOGRAPHY			ELECTRIC		
PROFILE			CABLE TV		
SANITARY SEWER			TRAFFIC SIGNAL		
STORM SEWER			DESIGN		
WATER			QUANTITIES		
GAS			MUN. FINAL CHECK		
PLAN CHECK					

REV	DATE	DESCRIPTION	BY
REVISIONS			

RECORD DRAWING — Note: To be filled out on original drawings upon project completion.

1. DATA PROVIDED BY: _____
   This shall serve to certify that these Record Drawings are a true and accurate representation of the project as constructed.
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   BY: _____ TITLE: _____
   DATE: _____
2. DATA TRANSFERRED BY: _____
   COMPANY: _____
   DATE: _____
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   COMPANY: _____
   BY: _____ TITLE: _____
   DATE: _____

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MUNICIPALITY OF ANCHORAGE
WATER & WASTEWATER UTILITY

EAGLE RIVER WWTF HEADWORKS UPGRADE

SITE PLAN

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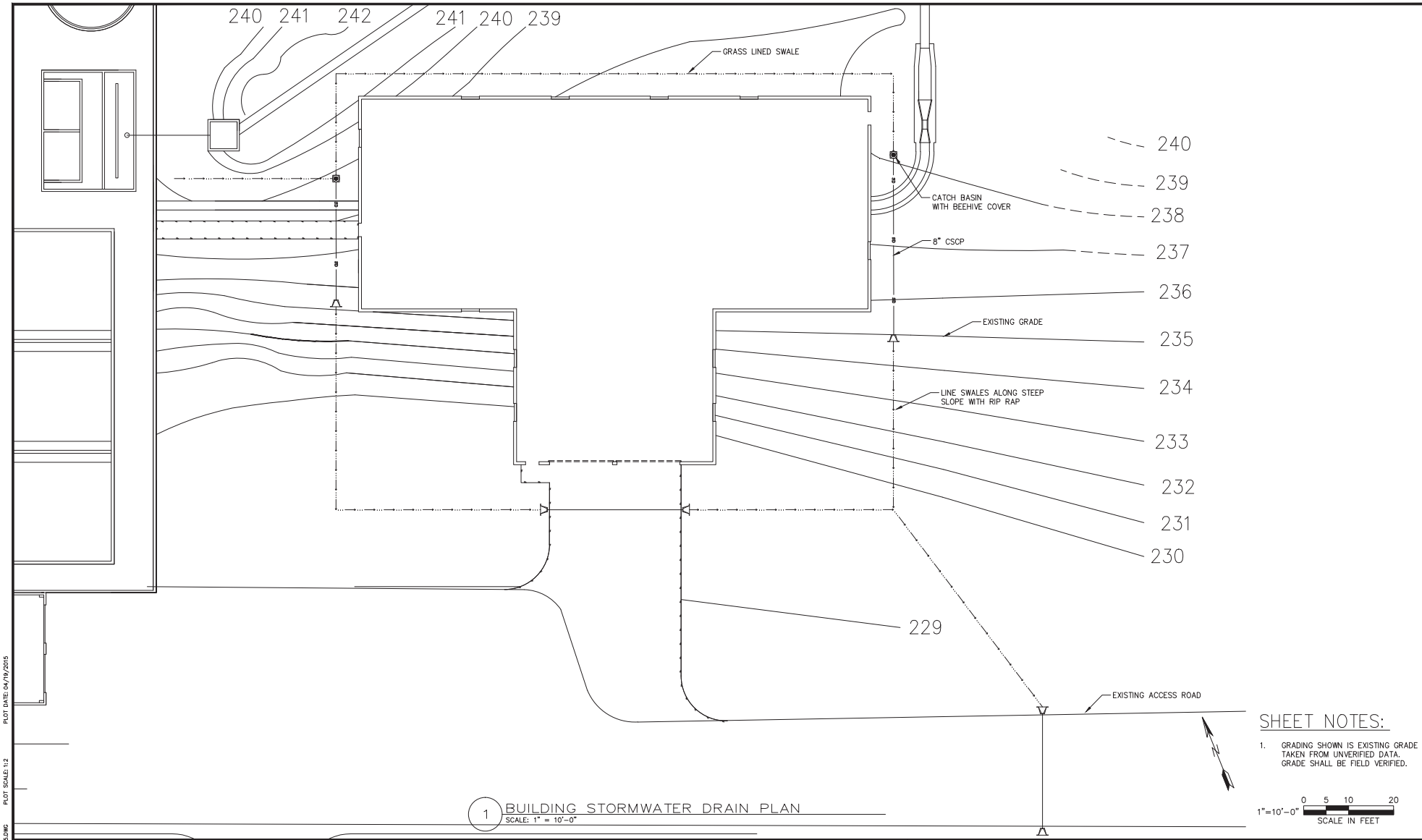
VERT SCALE: N/A
DATE: 04/19/2015
GRID: NWD150
PROJ. ID.: N/A



1 BUILDING STORMWATER DRAIN PLAN
SCALE: 1" = 10'-0"

SHEET NOTES:

1. GRADING SHOWN IS EXISTING GRADE TAKEN FROM UNVERIFIED DATA. GRADE SHALL BE FIELD VERIFIED.

1"=10'-0" 0 5 10 20
SCALE IN FEET

AWWU PLAN SET NO. N/A

EAGLE RIVER WWTF

PLOT DATE: 04/19/2015
PLOT SCALE: 1:2
ACAD FILE: ERWWTF HU 4-19-2015.DWG

VERIFY SCALE
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FULL SIZE SCALE
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VERT SCALE: N/A

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TOPOGRAPHY			ELECTRIC		
PROFILE			CABLE TV		
SANITARY SEWER			TRAFFIC SIGNAL		
STORM SEWER			DESIGN		
WATER			QUANTITIES		
GAS			MUN. FINAL CHECK		

PLAN CHECK

REV	DATE	DESCRIPTION	BY

REVISIONS

RECORD DRAWING Note: To be filled out on original drawings upon project completion.

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CONTRACTOR: _____
BY: _____ TITLE: _____
DATE: _____
2. DATA TRANSFERRED BY: _____
COMPANY: _____
DATE: _____
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COMPANY: _____
BY: _____ TITLE: _____
DATE: _____

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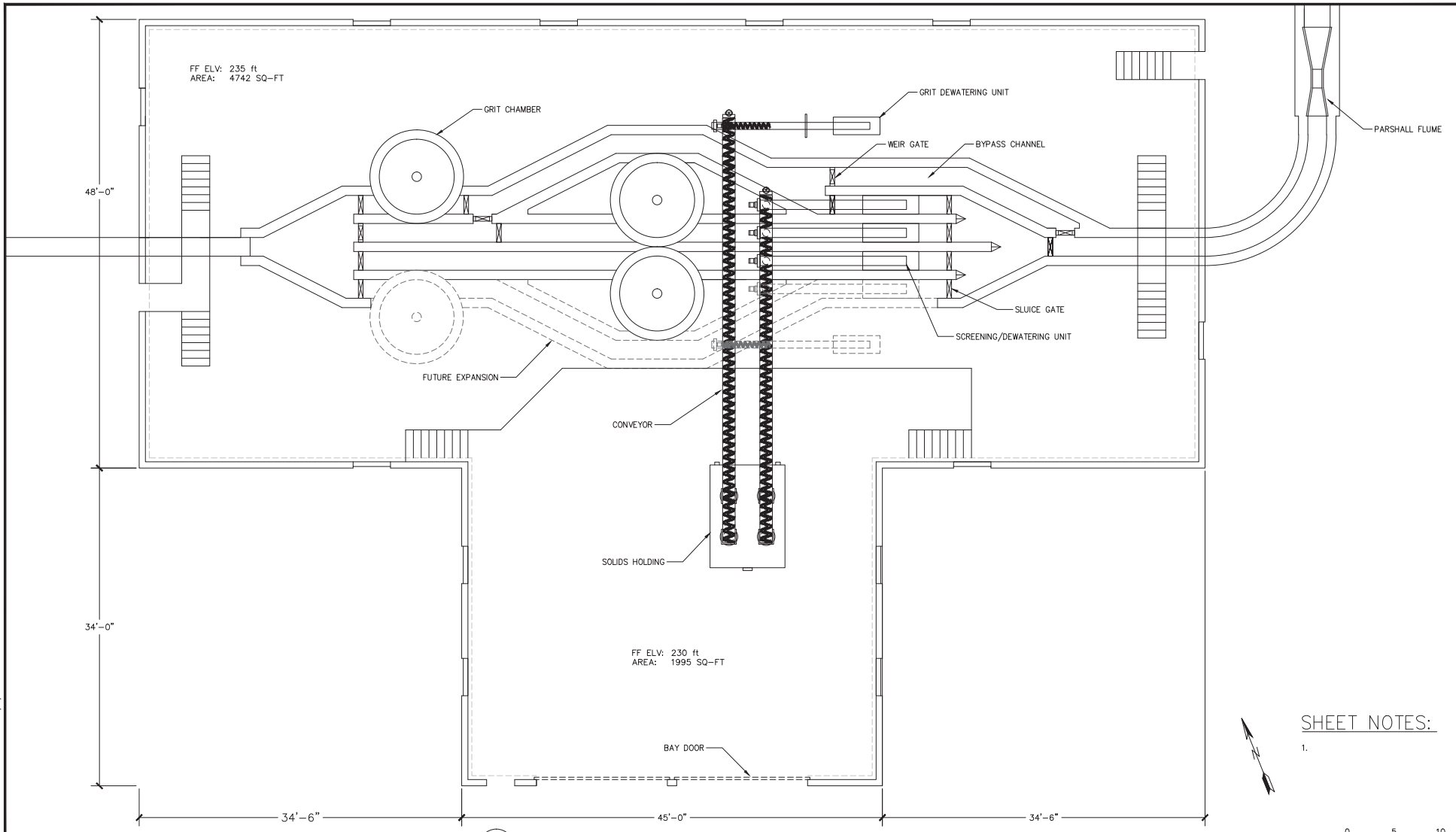
EAGLE RIVER WWTF HEADWORKS UPGRADE

HEADWORKS BUILDING DRAINAGE PLAN

HORZ SCALE: N/A
VERT SCALE: N/A
DATE: 04/19/2015
GRID: NW0150
PROJ. ID.: N/A
SHEET 5 of 14



1 BUILDING PLAN VIEW
SCALE: 1" = 5'-0"

AWWU PLAN SET NO. N/A

EAGLE RIVER WWTF

SHEET NOTES:

1.

1"=5'-0" 0 5 10 SCALE IN FEET

PLOT DATE: 04/19/2015
PLOT SCALE: 1:2
ACAD FILE: ERWWTF HU 4-19-2015.DWG

VERIFY SCALE — THIS BAR REPRESENTS ONE INCH ON ORIGINAL DRAWING. IF BAR IS NOT ONE INCH, ADJUST DRAWING SCALE ACCORDINGLY. FULL SIZE SCALE HORZ SCALE: N/A VERT SCALE: N/A

DATA	DRAWN BY	CHECKED BY	DATA	DRAWN BY	CHECKED BY
BASE			TELEPHONE		
TOPOGRAPHY			ELECTRIC		
PROFILE			CABLE TV		
SANITARY SEWER			TRAFFIC SIGNAL		
STORM SEWER			DESIGN		
WATER			QUANTITIES		
GAS			MUN. FINAL CHECK		

PLAN CHECK

REV	DATE	DESCRIPTION	BY

REVISIONS

RECORD DRAWING — Note: To be filled out on original drawings upon project completion.

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BY: _____ TITLE: _____
DATE: _____

2. DATA TRANSFERRED BY: _____
COMPANY: _____
DATE: _____

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BY: _____ TITLE: _____
DATE: _____

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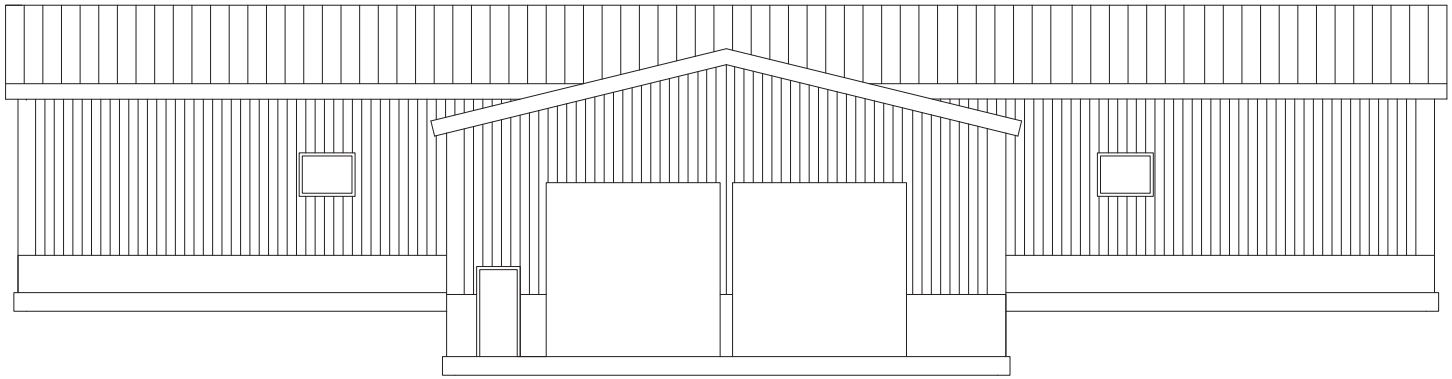
WATER & WASTEWATER UTILITY

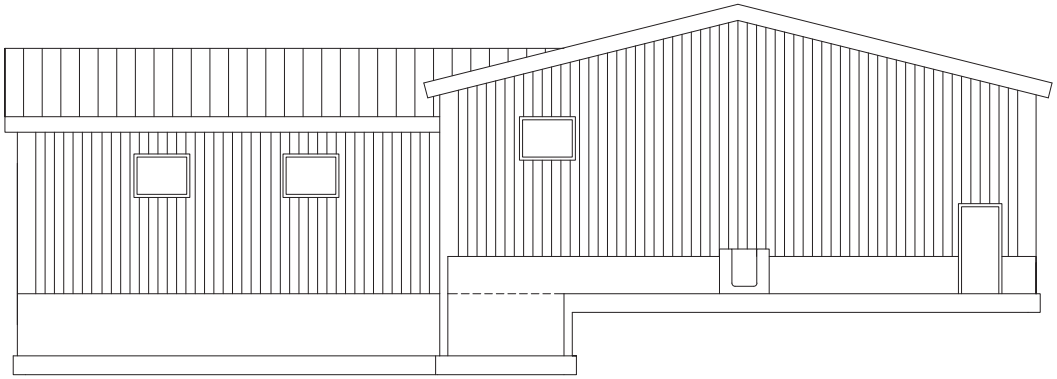
EAGLE RIVER WWTF HEADWORKS UPGRADE

HEADWORKS BUILDING PLAN VIEW

HORZ SCALE: N/A
VERT SCALE: N/A
DATE: 04/19/2015
GRID: NW0150
PROJ. ID.: N/A
SHEET 6 of 14



1 ELEVATION VIEW – SOUTH FACING WALL
SCALE: 1" = 5'–0"



2 ELEVATION VIEW – EAST FACING WALL
SCALE: 1" = 5'–0"

AWWU PLAN SET NO. N/A

EAGLE RIVER WWTF

SHEET NOTES:

1.

1"=5'–0" 0 5 10
SCALE IN FEET

PLOT DATE: 04/19/2015
PLOT SCALE: 1:2
ACAD FILE: ERWWTF HU 4-19-2015.DWG

VERIFY SCALE
THIS BAR REPRESENTS ONE INCH ON ORIGINAL DRAWING.
IF BAR IS NOT ONE INCH, ADJUST DRAWING SCALE ACCORDINGLY.
FULL SIZE SCALE
HORZ SCALE: N/A
VERT SCALE: N/A

DATA	DRAWN BY	CHECKED BY	DATA	DRAWN BY	CHECKED BY
BASE			TELEPHONE		
TOPOGRAPHY			ELECTRIC		
PROFILE			CABLE TV		
SANITARY SEWER			TRAFFIC SIGNAL		
STORM SEWER			DESIGN		
WATER			QUANTITIES		
GAS			MUN. FINAL CHECK		

PLAN CHECK

REV	DATE	DESCRIPTION	BY

REVISIONS

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DATE: _____

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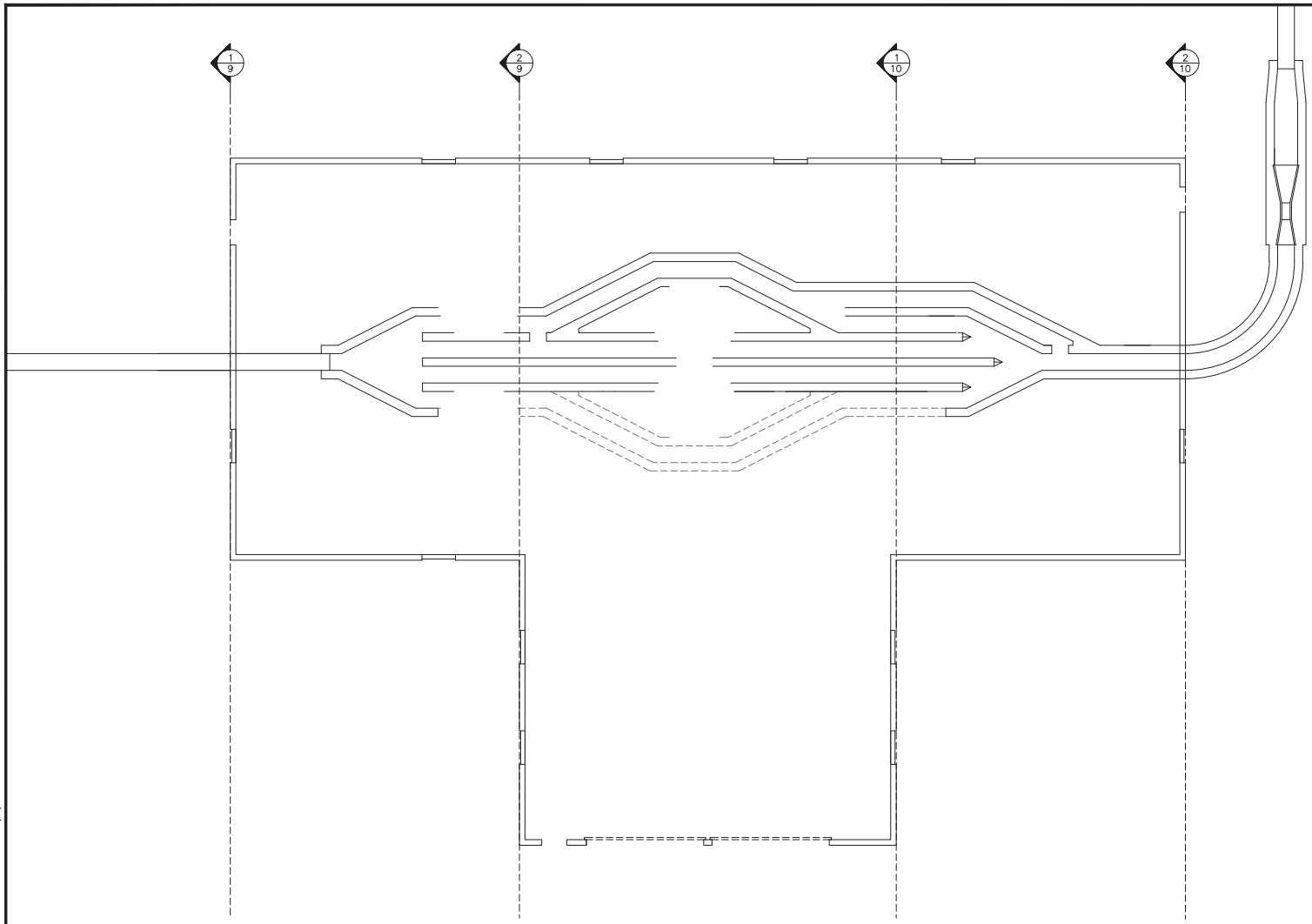
EAGLE RIVER WWTF HEADWORKS UPGRADE

HEADWORKS BUILDING ELEVATION VIEW

HORZ SCALE: N/A
VERT SCALE: N/A
DATE: 04/19/2015
GRID: NW0150
PROJ. ID.: N/A



1 GENERAL CROSS-SECTION
SCALE: NTS

SHEET NOTES:

1.

SCALE: NTS

AWWU PLAN SET NO. N/A

EAGLE RIVER WWTF

PLOT DATE: 04/19/2015

PLOT SCALE: 1:2

ACAD FILE: ERWWTF HU 4-19-2015.DWG

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DATA	DRAWN BY	CHECKED BY	DATA	DRAWN BY	CHECKED BY
BASE			TELEPHONE		
TOPOGRAPHY			ELECTRIC		
PROFILE			CABLE TV		
SANITARY SEWER			TRAFFIC SIGNAL		
STORM SEWER			DESIGN		
WATER			QUANTITIES		
GAS			MUN. FINAL CHECK		

PLAN CHECK

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REVISIONS

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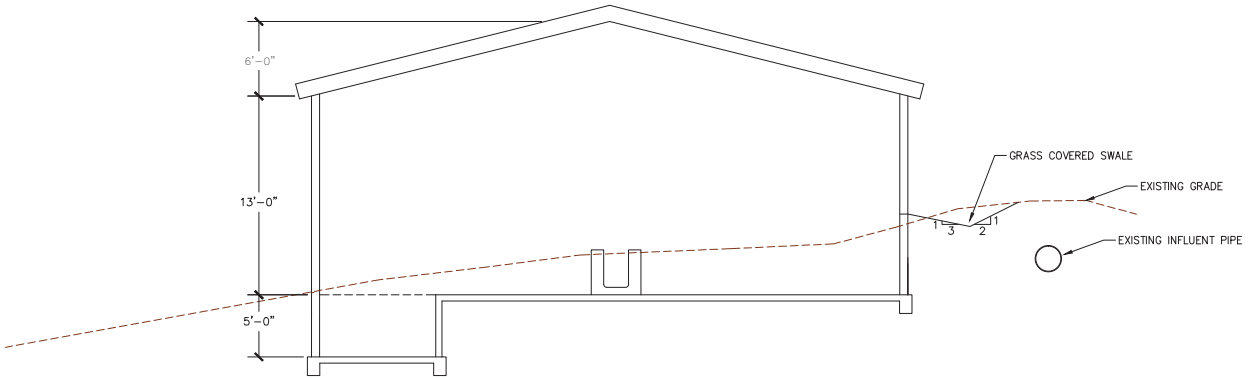
WATER & WASTEWATER UTILITY

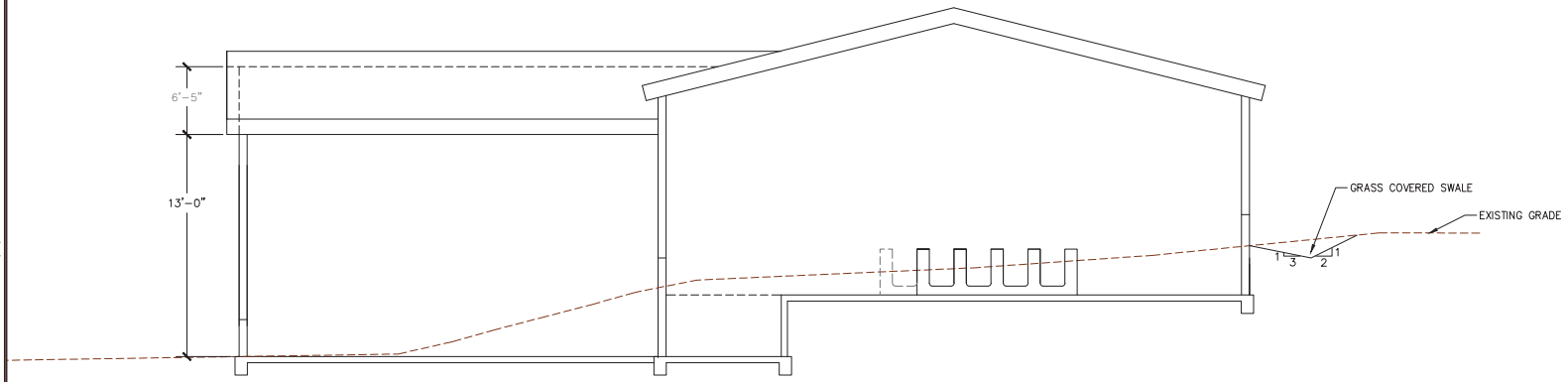
EAGLE RIVER WWTF HEADWORKS UPGRADE

HEADWORKS BUILDING CROSS-SECTIONS

HORZ SCALE: N/A
VERT SCALE: N/A
DATE: 04/19/2015
GRID: NW0150
PROJ. ID.: N/A
SHEET 8 of 14



1 CROSS-SECTION
SCALE: 1" = 5'-0"



2 CROSS-SECTION
SCALE: 1" = 5'-0"

SHEET NOTES:

1.

1"=5'-0" 0 5 10
SCALE IN FEET

AWWU PLAN SET NO. N/A

EAGLE RIVER WWTF

PLOT DATE: 04/19/2015
PLOT SCALE: 1:2
ACAD FILE: ERWWTF HU 4-19-2015.DWG

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DATA	DRAWN BY	CHECKED BY	DATA	DRAWN BY	CHECKED BY
BASE			TELEPHONE		
TOPOGRAPHY			ELECTRIC		
PROFILE			CABLE TV		
SANITARY SEWER			TRAFFIC SIGNAL		
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GAS			MUN. FINAL CHECK		

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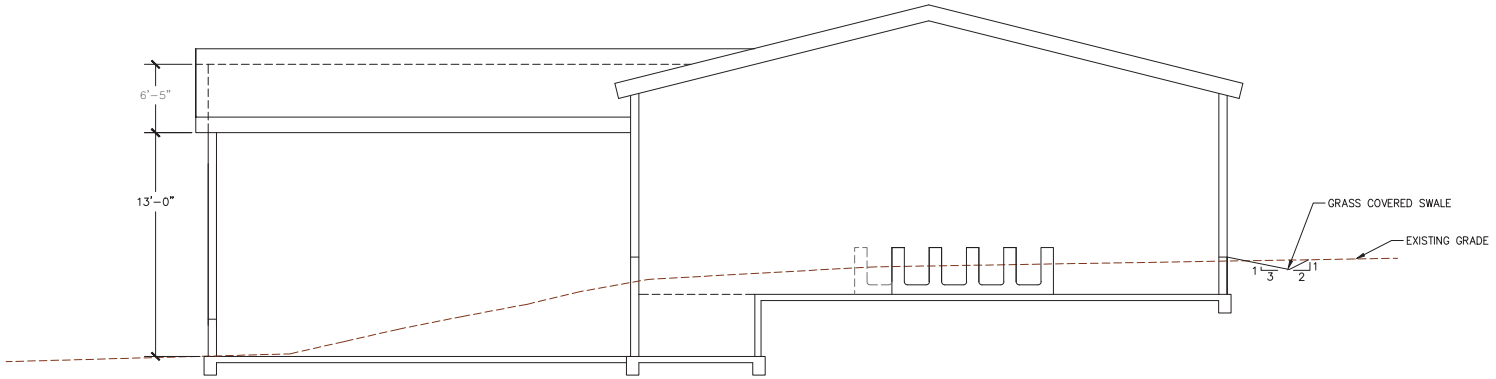
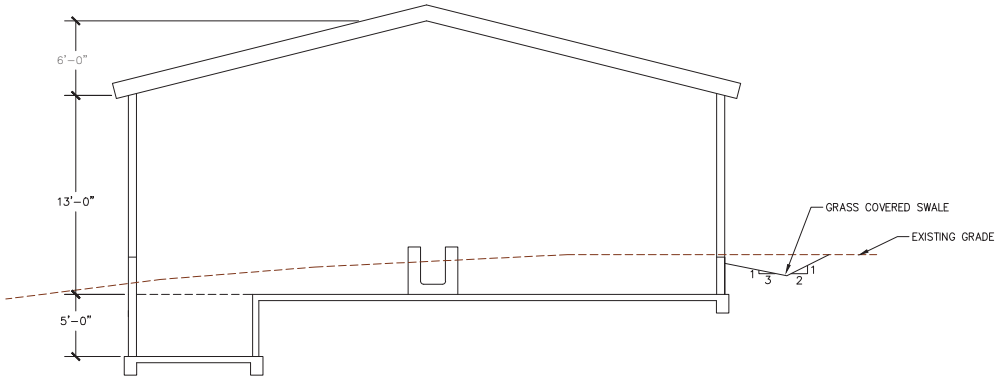
EAGLE RIVER WWTF HEADWORKS UPGRADE

HEADWORKS BUILDING CROSS-SECTIONS

HORZ SCALE: N/A
VERT SCALE: N/A
DATE: 04/19/2015
GRID: NW0150
PROJ. ID.: N/A
SHEET 9 of 14



1 CROSS-SECTION
SCALE: 1" = 5'-0"



2 CROSS-SECTION
SCALE: 1" = 5'-0"

SHEET NOTES:

1.

1"=5'-0" 0 5 10
SCALE IN FEET

AWWU PLAN SET NO. N/A

EAGLE RIVER WWTF

PLOT DATE: 04/19/2015
PLOT SCALE: 1:2
ACAD FILE: ERWWTF HU 4-19-2015.DWG

VERIFY SCALE
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FULL SIZE SCALE
HORZ SCALE: N/A
VERT SCALE: N/A

DATA	DRAWN BY	CHECKED BY	DATA	DRAWN BY	CHECKED BY
BASE			TELEPHONE		
TOPOGRAPHY			ELECTRIC		
PROFILE			CABLE TV		
SANITARY SEWER			TRAFFIC SIGNAL		
STORM SEWER			DESIGN		
WATER			QUANTITIES		
GAS			MUN. FINAL CHECK		

PLAN CHECK

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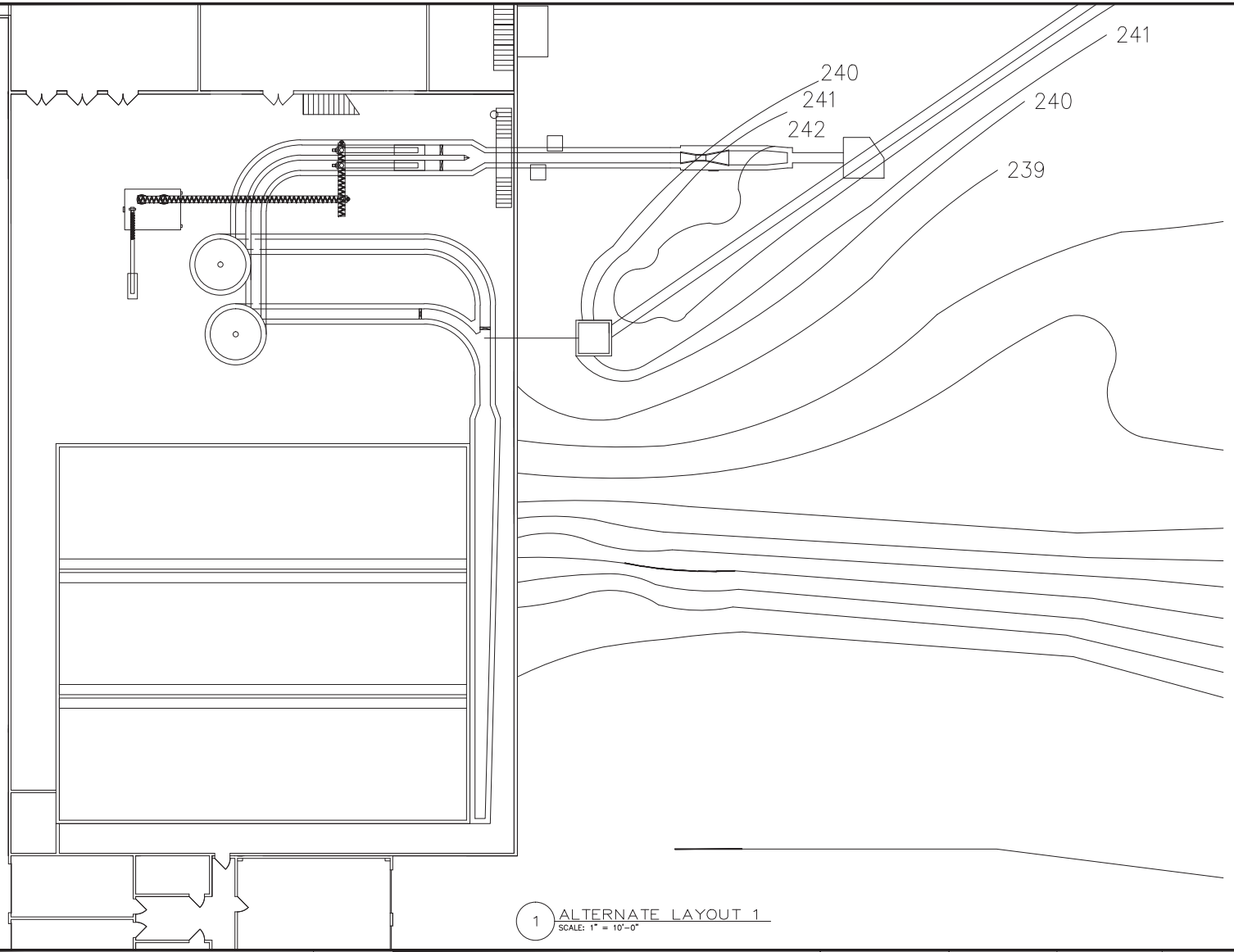
MUNICIPALITY OF ANCHORAGE
WATER & WASTEWATER UTILITY
EAGLE RIVER WWTF HEADWORKS UPGRADE

HEADWORKS BUILDING CROSS-SECTIONS

HORZ SCALE: N/A
VERT SCALE: N/A
DATE: 04/19/2015
GRID: NW0150
PROJ. ID.: N/A
SHEET 10 of 14



1 ALTERNATE LAYOUT 1
SCALE: 1" = 10'-0"

SHEET NOTES:

1.

1"=5'-0" 0 5 10 20
SCALE IN FEET

AWWU PLAN SET NO. N/A

EAGLE RIVER WWTF

PLOT DATE: 04/19/2015

PLOT SCALE: 1:2

ACAD FILE: ERWWTF HU 4-19-2015.DWG

VERIFY SCALE

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FULL SIZE SCALE
HORZ SCALE: N/A
VERT SCALE: N/A

DATA	DRAWN BY	CHECKED BY
BASE		
TOPOGRAPHY		
PROFILE		
SANITARY SEWER		
STORM SEWER		
WATER		
GAS		

DATA	DRAWN BY	CHECKED BY
TELEPHONE		
ELECTRIC		
CABLE TV		
TRAFFIC SIGNAL		
DESIGN		
QUANTITIES		
MUN. FINAL CHECK		

PLAN CHECK

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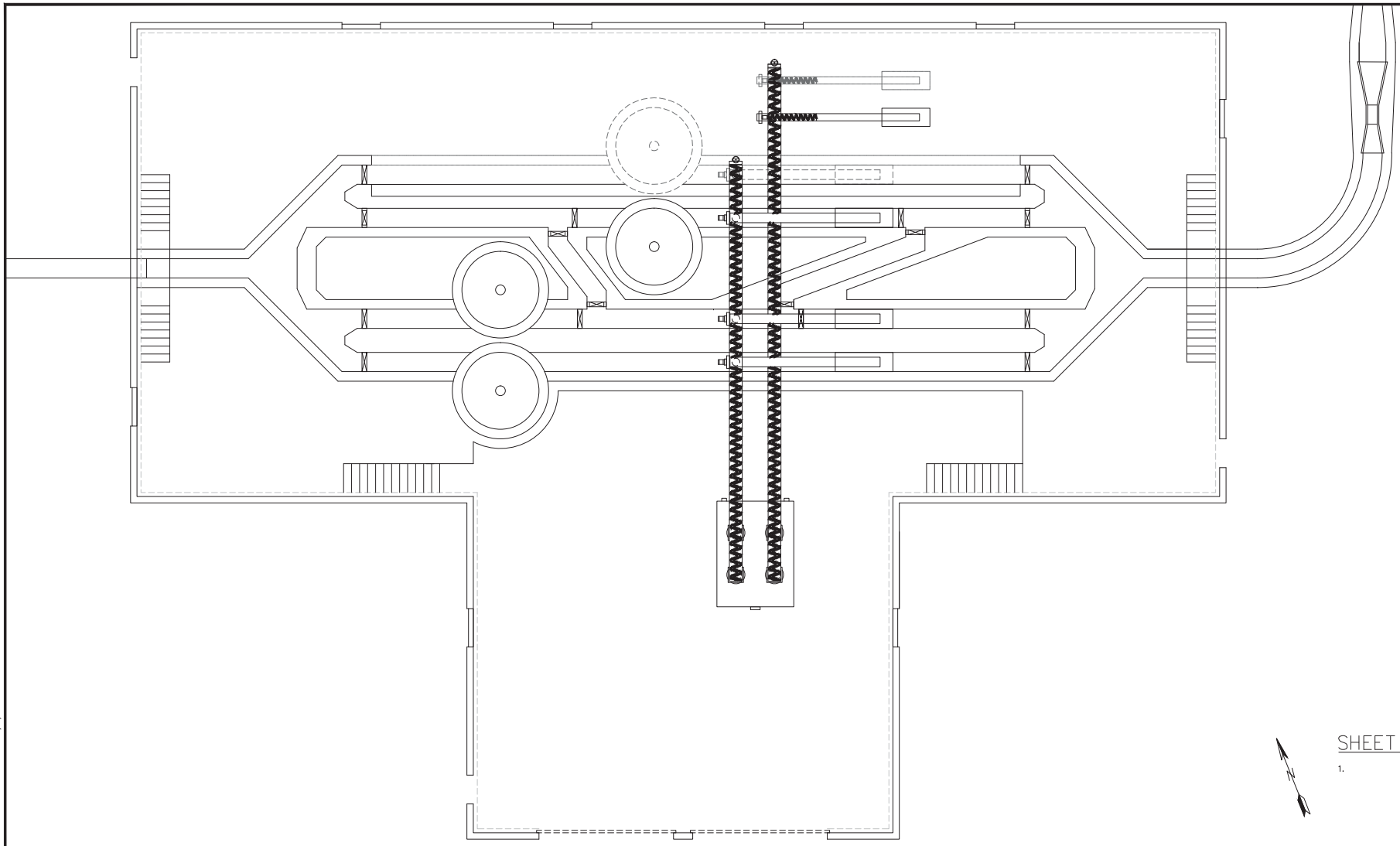
WATER & WASTEWATER UTILITY

EAGLE RIVER WWTF HEADWORKS UPGRADE

HEADWORKS BUILDING ALTERNATE LAYOUT

HORZ SCALE: N/A
VERT SCALE: N/A
DATE: 04/19/2015
GRID: NW0150
PROJ. ID.: N/A

SHEET 11 of 14



1 ALTERNATE LAYOUT 2
SCALE: 1" = 5'-0"

AWWU PLAN SET NO. N/A

EAGLE RIVER WWTF

SHEET NOTES:

1.

1"=5'-0" 0 5 10
SCALE IN FEET

PLOT DATE: 04/19/2015
PLOT SCALE: 1:2
ACAD FILE: ERWWTF HU 4-19-2015.DWG

VERIFY SCALE
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FULL SIZE SCALE
HORZ SCALE: N/A
VERT SCALE: N/A

DATA	DRAWN BY	CHECKED BY	DATA	DRAWN BY	CHECKED BY
BASE			TELEPHONE		
TOPOGRAPHY			ELECTRIC		
PROFILE			CABLE TV		
SANITARY SEWER			TRAFFIC SIGNAL		
STORM SEWER			DESIGN		
WATER			QUANTITIES		
GAS			MUN. FINAL CHECK		

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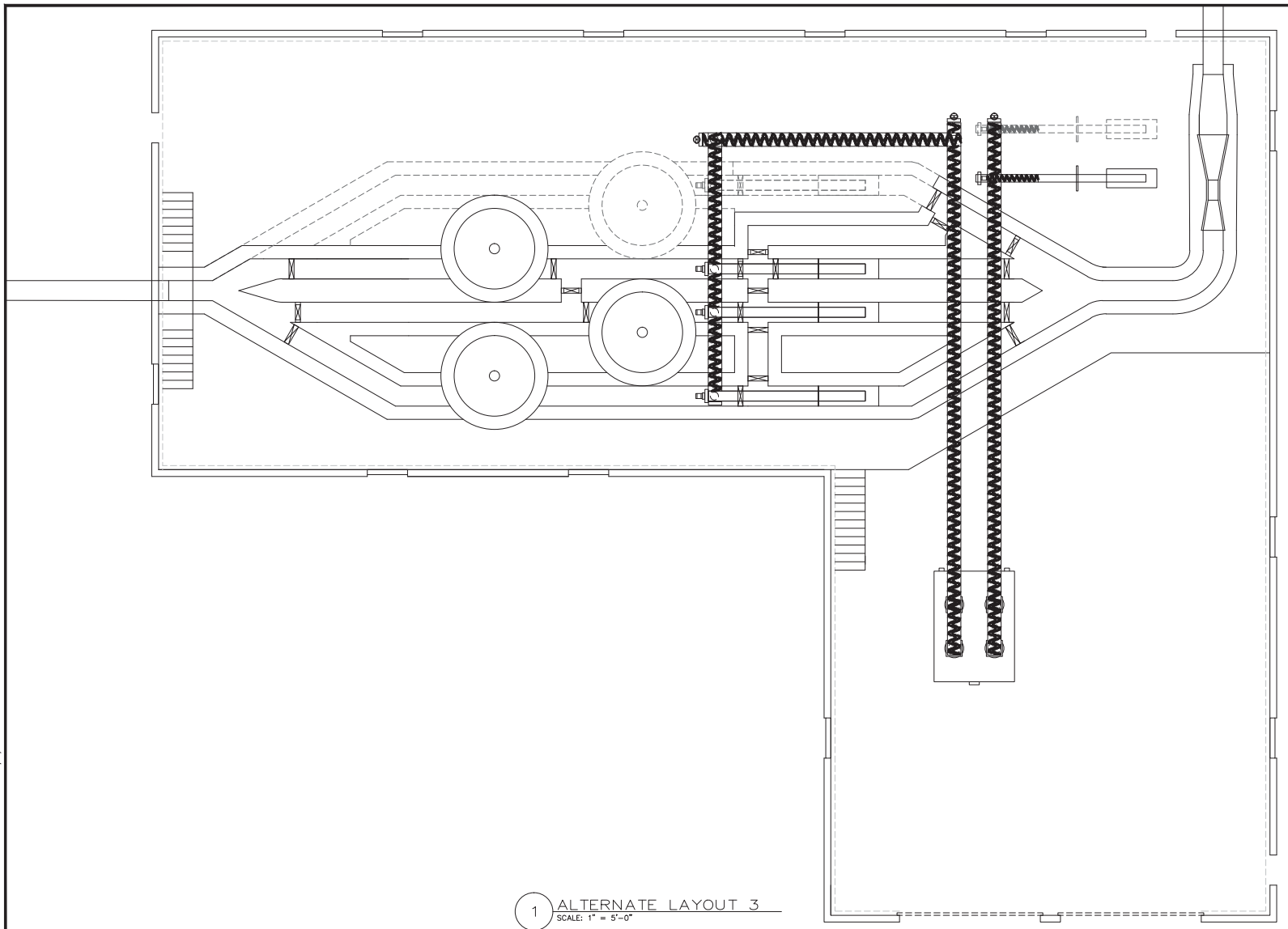
WATER & WASTEWATER UTILITY

EAGLE RIVER WWTF HEADWORKS UPGRADE

HEADWORKS BUILDING ALTERNATE LAYOUT

HORZ SCALE: N/A
VERT SCALE: N/A
DATE: 04/19/2015
GRID: NW0150
PROJ. ID.: N/A
SHEET 12 of 14



1 ALTERNATE LAYOUT 3
SCALE: 1" = 5'-0"

SHEET NOTES:

1.

1"=5'-0" 0 5 10
SCALE IN FEET

AWWU PLAN SET NO. N/A

EAGLE RIVER WWTF

PLOT DATE: 04/19/2015
PLOT SCALE: 1:2
ACAD FILE: ERWWTF HU 4-19-2015.DWG

VERIFY SCALE
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FULL SIZE SCALE
HORZ SCALE: N/A
VERT SCALE: N/A

DATA	DRAWN BY	CHECKED BY	DATA	DRAWN BY	CHECKED BY
BASE			TELEPHONE		
TOPOGRAPHY			ELECTRIC		
PROFILE			CABLE TV		
SANITARY SEWER			TRAFFIC SIGNAL		
STORM SEWER			DESIGN		
WATER			QUANTITIES		
GAS			MUN. FINAL CHECK		

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REV	DATE	DESCRIPTION	BY

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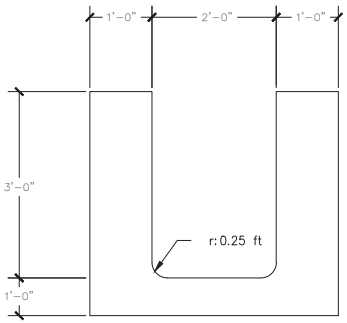
EAGLE RIVER WWTF HEADWORKS UPGRADE

HEADWORKS BUILDING ALTERNATE LAYOUT

HORZ SCALE: N/A
VERT SCALE: N/A
DATE: 04/19/2015
GRID: NW0150
PROJ. ID.: N/A
SHEET 13 of 14



1 CHANNEL TYPICAL
SCALE: 1" = 1'-0"

AWWU PLAN SET NO. N/A

EAGLE RIVER WWTF

SHEET NOTES:

1.

N

1"=5'-0" 0 1 2
SCALE IN FEET

PLOT DATE: 04/19/2015
PLOT SCALE: 1:2
ACAD FILE: ERWWTF HU 4-19-2015.DWG

VERIFY SCALE
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FULL SIZE SCALE
HORZ SCALE: N/A
VERT SCALE: N/A

DATA	DRAWN BY	CHECKED BY	DATA	DRAWN BY	CHECKED BY	REV	DATE	DESCRIPTION	BY
BASE			TELEPHONE						
TOPOGRAPHY			ELECTRIC						
PROFILE			CABLE TV						
SANITARY SEWER			TRAFFIC SIGNAL						
STORM SEWER			DESIGN						
WATER			QUANTITIES						
GAS			MUN. FINAL CHECK						
PLAN CHECK						REVISIONS			

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WATER & WASTEWATER UTILITY

EAGLE RIVER WWTF HEADWORKS UPGRADE

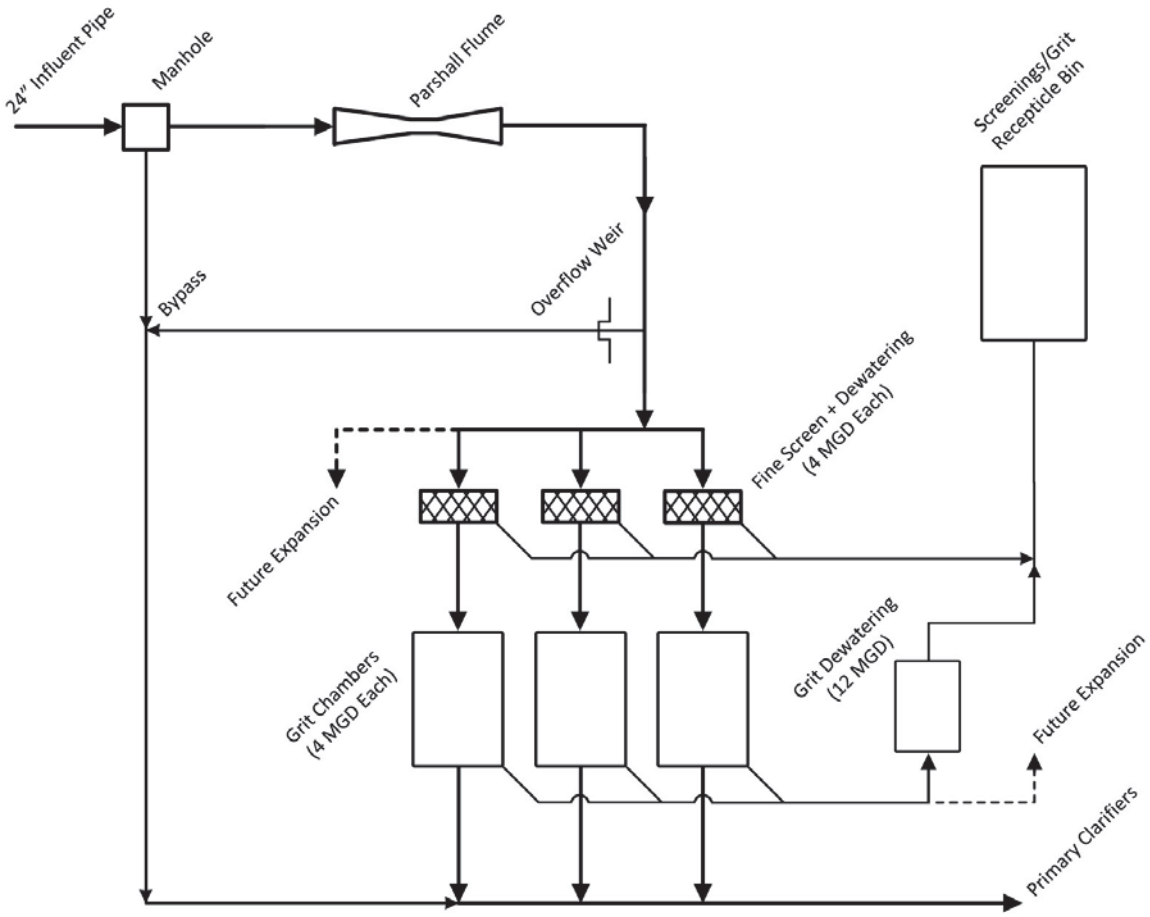
TYPICALS

HORZ SCALE: N/A
VERT SCALE: N/A
DATE: 04/19/2015
GRID: NWD150
PROJ. ID.: N/A
SHEET 14 of 14

ANCHORAGE WATER WASTEWATER UTILITY Eagle River
Wastewater Treatment Facility

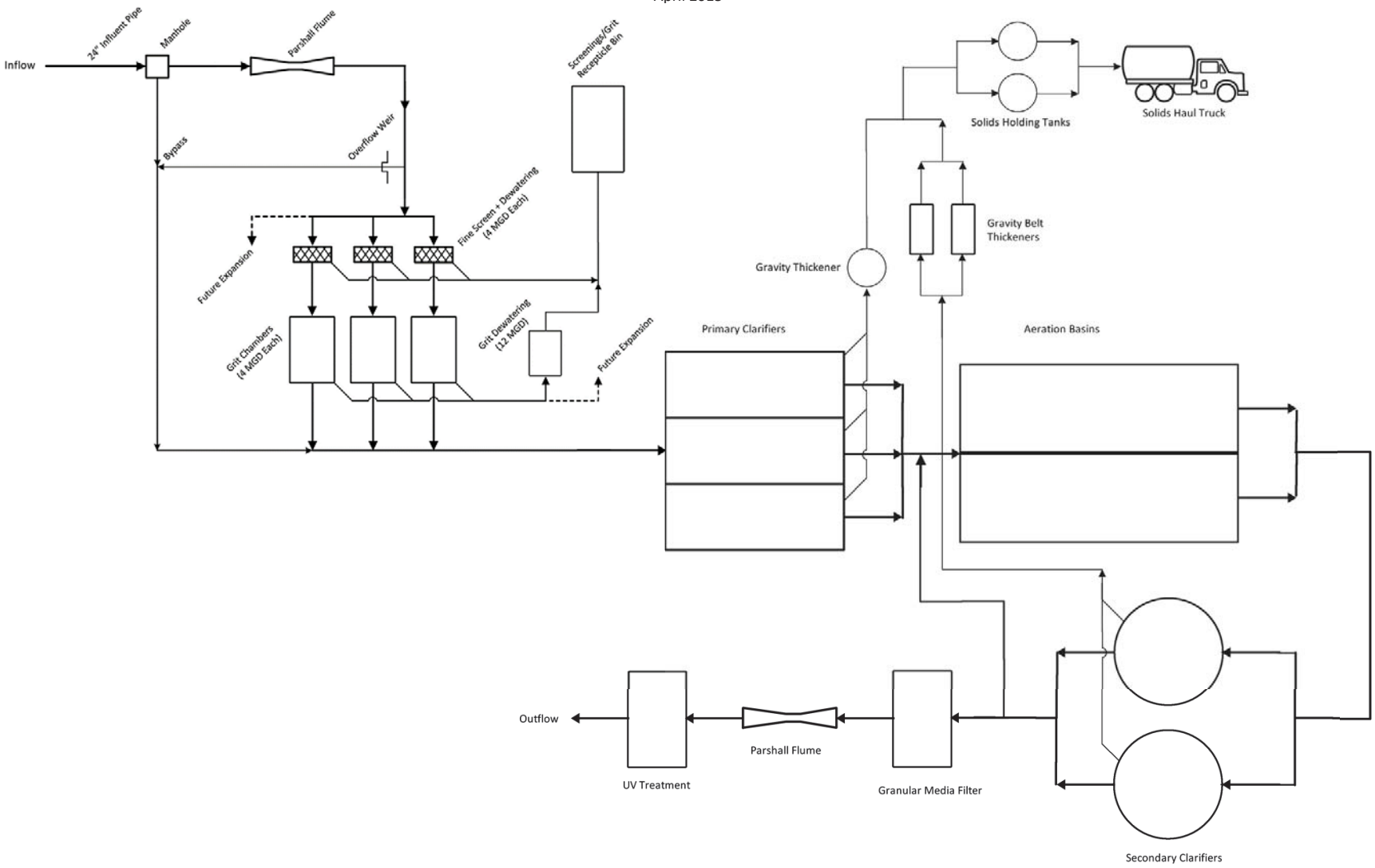
Headworks Process Diagram

April 2015



ANCHORAGE WATER WASTEWATER UTILITY Eagle River
Wastewater Treatment Facility

Facility Process Diagram
April 2015



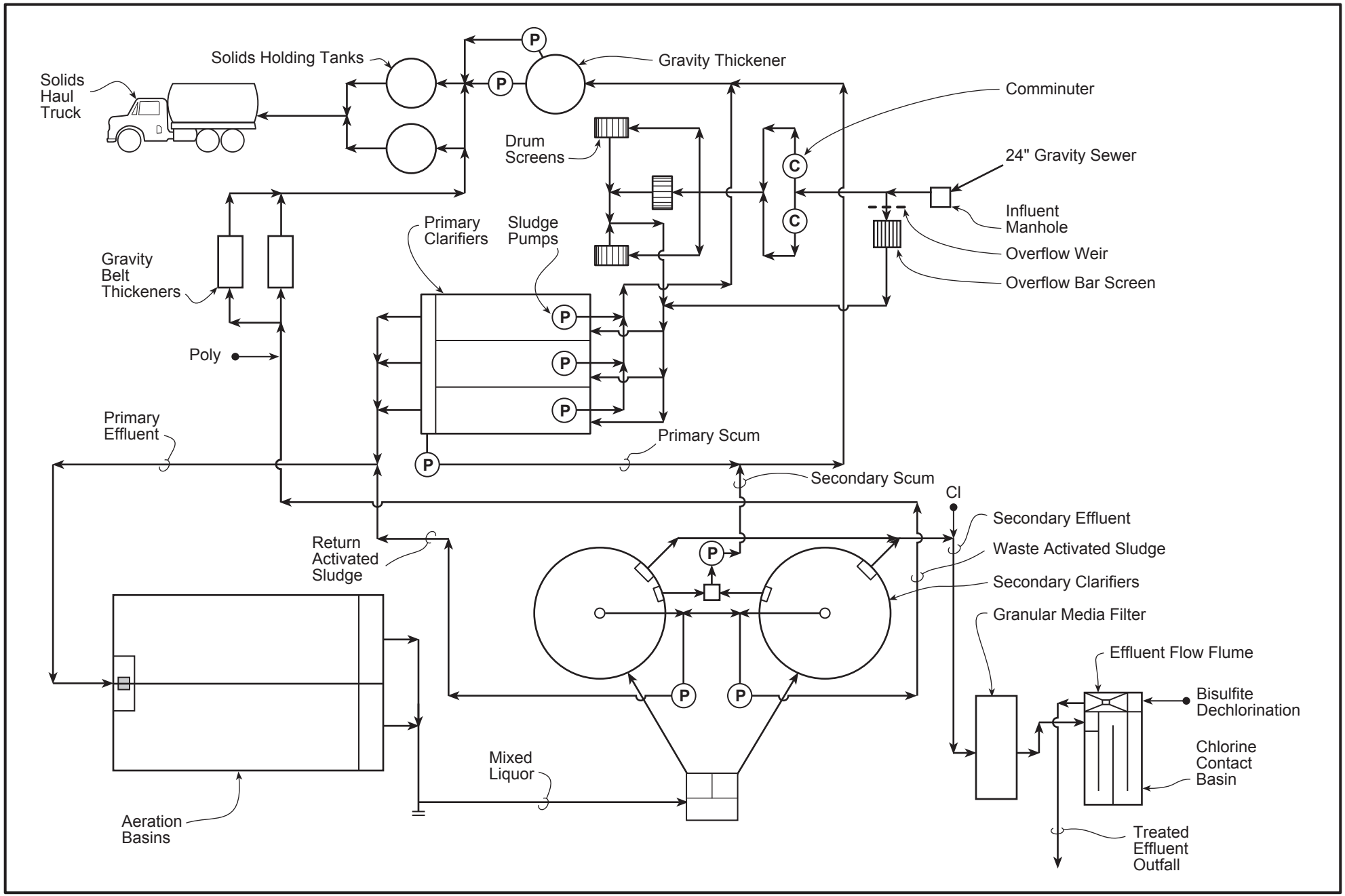


Figure 1.1.1
PROCESS SCHEMATIC
Existing Process
ERWWTF Plan Update

APPENDIX B

Mechanical Equipment

Parshall Flumes

Wide Flow Range

Dimensionally Stable

Excellent Resolution

Maintenance Free

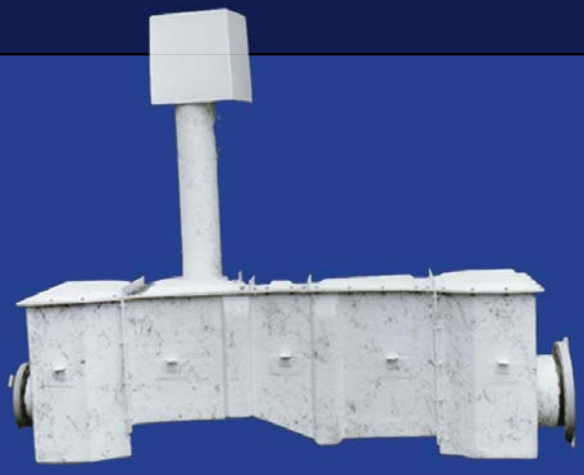
Engineered & Built to Order

25 year Corrosion Warranty

As a leader in the flume fabrication revolution that began over forty years ago, Plasti-Fab has thousands of flumes installed in corrosive environments around the world. Plasti-Fab products are fabricated from highly corrosion resistant composite fiberglass reinforced plastic (FRP) with a 25 year corrosion warranty. Plasti-Fab is recognized around the world as an experienced innovator providing composite solutions for municipal and industrial fluid measurement applications.

Key Features

- Precise throat dimensions for accurate flow measurement
- Standard 1/4" wall thickness
- Premium grade isophthalic gel coat for long term corrosion resistance
- Head Gage for visual fluid level check
- Reinforced with engineered box rib design for strength on larger size
- Free standing with up to 30" of water depth
- The most widely used water measurement flume



For our complete product catalog visit us online at www.plasti-fab.com

Design Features and Accessories

Convenient Features & Accessories

- Parshall Flumes standard with:
  - Molded in Head Gage of 100ths of a Foot and Centimeters
  - Anchor Clips
  - Temporary Spreaders
  - 2" Flange on top and ends
  - Premium grade Isophthalic Gel Coat
- Available with:
  - Inlet Adapter with Pipe Stub
  - Inlet Adapter to bolt to Vault Wall
  - Inlet Wingwalls
  - Outlet Adapter with Pipe Stub
  - Outlet Adapter to bolt to Vault Wall
  - Outlet Bulkhead
- Standard Optional Accessories:
  - Ultrasonic mounting Bracket
  - pH Probe Cavity with Liftout Bracket
  - Bubble pipe with Cavity
  - Sample pipe with Cavity
  - Pressure Transducer Cavity
  - Integral or remote Stilling Well

- Additional customization options:
  - Threaded Taps
  - Permanent Cross Ties
  - Caulking Collars
  - Slip Flanges with 150 lb. bolting connections
  - Neoprene Boots with Stainless Steel Bands
  - Head Gages in MGD, GPM, CFS, Etc.
  - Capacitance Probe Side Cavity with Stainless Steel Ground Plate
  - Top Grating
  - Sectioning for undersized openings
  - Nesting smaller flume
  - Two Vial Bubble Level
  - Tranquilizing Racks
  - Energy Absorbing Basins
  - Many specially engineered solutions available, such as integration into Packaged Metering Manholes -- consult representative or factory

The Plasti-Fab line of flumes is THE premier line of flumes available for measurement of fluids. Precisely molded throat dimensions make it possible for consistent and accurate flow measurement. All Composite materials are guaranteed against corrosion for 25 years.

Contact us for more information

Plasti-Fab, Inc.
P.O. Box 100
Tualatin, OR 97062-0100
(503) 692-5460
sales@plasti-fab.com

www.Plasti-Fab.com

WORLD CLASS Plasti-Fab® COMPOSITE SOLUTIONS

Plasti-Fab®, INC.

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PO BOX 100 ☐ TUALATIN OR 97068
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E-MAIL: sales@plasti-fab.com
WEB: http://www.plasti-fab.com

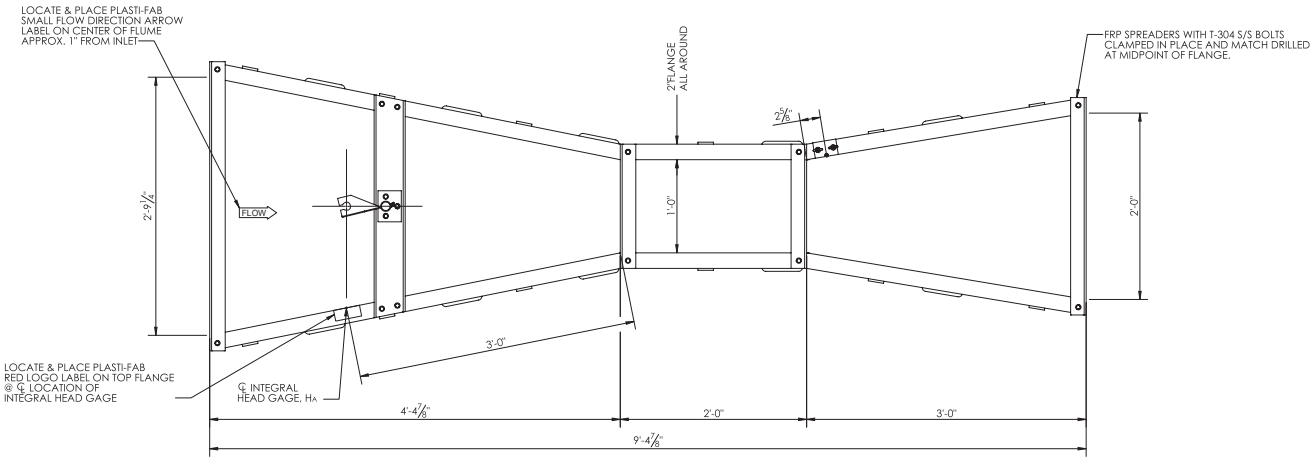
PARSHALL FLUME GENERAL FLOW RANGE

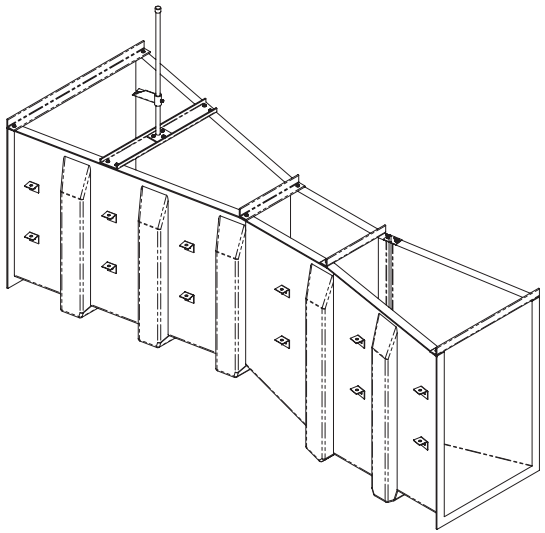
Following is a list of general flow ranges and equations for the most common sizes of Parshall flumes. The actual capability of the flume may reach somewhat higher or lower than listed below.

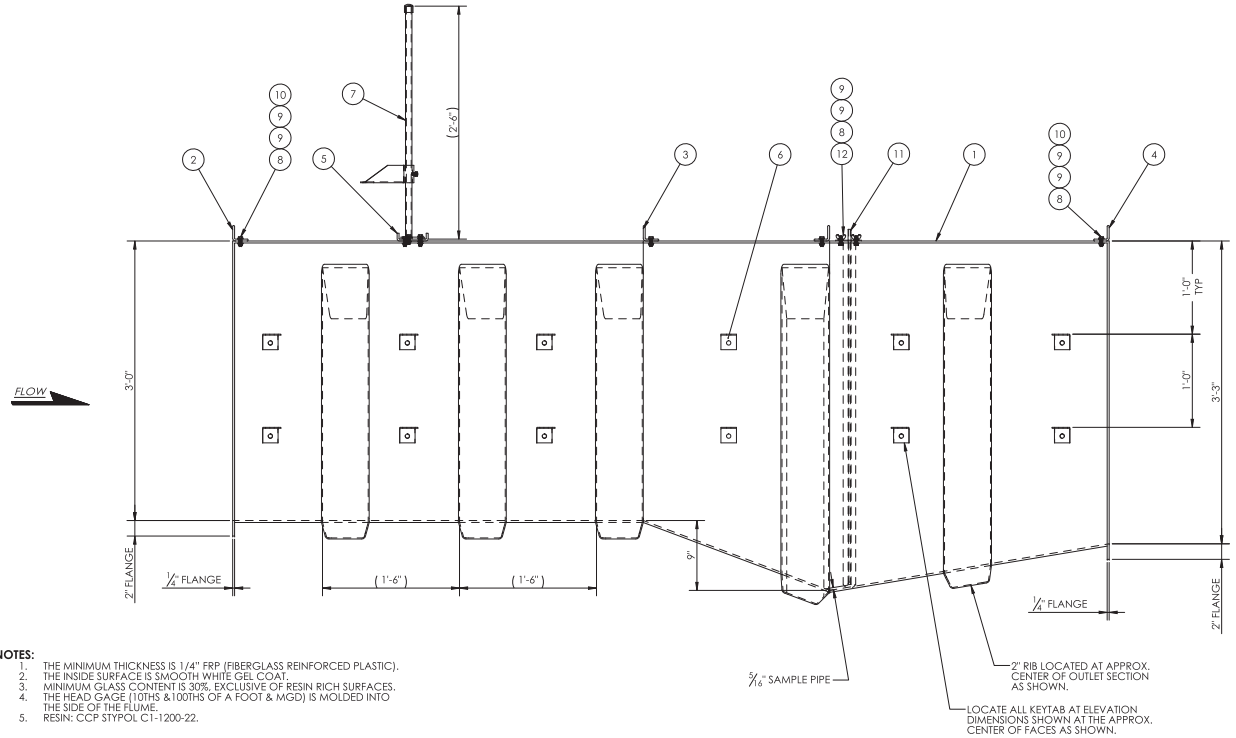
	Conversions:	
CFS x 448.8 = GPM	MGD x 694.4 = GPM	MGD x 1.55 = CFS
GPM ÷ 448.8 = CFS	GPM ÷ 694.4 = MGD	CFS x 0.646 = MGD

Parshall	Flow Range – GPM	Equation: Q = CFS (H = Head in Feet)
1" *	2 – 90	$Q = .338\ H^{1.55}$
2" *	5 – 175	$Q = .676\ H^{1.55}$
3"	15 – 830	$Q = .992\ H^{1.547}$
6"	25 – 1,750	$Q = 2.06\ H^{1.58}$
9"	45 – 3,900	$Q = 3.07\ H^{1.53}$
12"	160 – 7,200	$Q = 4.\ H^{1.522}$
18"	230 – 11,000	$Q = 6.\ H^{1.538}$
24"	295 – 14,800	$Q = 8.\ H^{1.55}$
30"	365 – 18,700	$Q = 10.\ H^{1.559}$
36"	435 - 22,600	$Q = 12.\ H^{1.566}$

*1" & 2" Parshall may clog and are not recommended for sanitary waste.







NOTES:

1. THE MINIMUM THICKNESS IS 1/4" FRP (FIBERGLASS REINFORCED PLASTIC).
2. THE INSIDE SURFACE IS SMOOTH WHITE GEL COAT.
3. MINIMUM GLASS CONTENT IS 30%, EXCLUSIVE OF RESIN RICH SURFACES.
4. THE HEAD GAGE (10THS &100THS OF A FOOT & MGD) IS MOLDED INTO THE SIDE OF THE FLUME.
5. RESIN: CCP STYPOL C1-1200-22.

BOM TABLE

ITEM NO.	QTY.	DESCRIPTION	MATERIAL
1	1	12" PARSHALL FLUME	FRP (HLU, POLYESTER)
2	1	2" X 2" X 1/4" ANGLE	FRP (PULTRUDED, POLYESTER)
3	2	2" X 2" X 1/4" ANGLE	FRP (PULTRUDED, POLYESTER)
4	1	2" X 2" X 1/4" ANGLE	FRP (PULTRUDED, POLYESTER)
5	1	CHANNEL 4" X 1" X 1/4" THICK X 2'-4 3/4" LG	FRP (PULTRUDED, POLYESTER)
6	24	2" KEYTAB CLIP	A36
7	1	SONIC BRACKET ASSEMBLY	T-304 S/S
8	17	HHCS, 5/16-18UNC X 1"	T-304 S/S
9	34	5/16 FLAT WASHER	T-304 S/S
10	15	HEX NUT, 5/16-18UNC	T-304 S/S
11	1	SAMPLE PIPE ASSEMBLY, 6" PARSHALL (SEE NOTE #7)	T-304 S/S
12	2	WING NUT, 5/16-18UNC	T-304 S/S

PROJECT:	Plasti-Fab TUALATIN, OR.	PLASTI-FAB PART NUMBER:	TITLE: 12" PARSHALL FLUME WITH SONIC BRACKET & 2" NPT COUPLER
CUSTOMER:		MATERIAL INFORMATION:	
REP:	UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN FEET/INCHES	SPECIAL FINISH REQUIREMENT:	
P.O. NO:	TOLERANCES UNLESS OTHERWISE SPECIFIED.		
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF PLASTI-FAB. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSIONOF PLASTI-FAB IS PROHIBITED.	≤ 6'-0" ± 1/16"	NAME: DATE:	SIZE D DRAWING NO.: REV.
	> 6'-0" AND ≤ 25'-0" ± 1/8"	DRAWN BY:	
	> 25'-0" ± 1/2"	CHECKED BY:	WEIGHT: SCALE: SHEET:

Flow Chart for 12” Parshall Flume

Head (feet)	MGD	CFS	GPM
0.16			
0.17			
0.18			
0.19			
0.20	0.223	0.345	154.98
0.21	0.240	0.372	166.93
0.22	0.258	0.399	179.18
0.23	0.276	0.427	191.72
0.24	0.294	0.456	204.55
0.25	0.313	0.485	217.66
0.26	0.332	0.515	231.05
0.27	0.352	0.545	244.71
0.28	0.372	0.576	258.64
0.29	0.392	0.608	272.82
0.30	0.413	0.640	287.27
0.31	0.434	0.673	301.97
0.32	0.456	0.706	316.92
0.33	0.477	0.740	332.12
0.34	0.500	0.774	347.56
0.35	0.522	0.809	363.23
0.36	0.545	0.845	379.14
0.37	0.568	0.881	395.29
0.38	0.592	0.917	411.66
0.39	0.616	0.954	428.27
0.40	0.640	0.992	445.09
0.41	0.664	1.030	462.14
0.42	0.689	1.068	479.40
0.43	0.714	1.107	496.88
0.44	0.740	1.147	514.57
0.45	0.765	1.186	532.48
0.46	0.791	1.227	550.59
0.47	0.818	1.268	568.91
0.48	0.844	1.309	587.44
0.49	0.871	1.351	606.17
0.50	0.899	1.393	625.09
0.51	0.926	1.435	644.22
0.52	0.954	1.478	663.54
0.53	0.982	1.522	683.06
0.54	1.010	1.566	702.77
0.55	1.039	1.610	722.68

Head (feet)	MGD	CFS	GPM
0.56	1.068	1.655	742.77
0.57	1.097	1.700	763.05
0.58	1.126	1.746	783.52
0.59	1.156	1.792	804.17
0.60	1.186	1.838	825.01
0.61	1.216	1.885	846.03
0.62	1.247	1.932	867.23
0.63	1.277	1.980	888.61
0.64	1.308	2.028	910.16
0.65	1.340	2.076	931.89
0.66	1.371	2.125	953.80
0.67	1.403	2.174	975.89
0.68	1.435	2.224	998.14
0.69	1.467	2.274	1,020.6
0.70	1.500	2.324	1,043.2
0.71	1.532	2.375	1,065.9
0.72	1.565	2.426	1,088.9
0.73	1.598	2.478	1,112.0
0.74	1.632	2.529	1,135.2
0.75	1.666	2.582	1,158.7
0.76	1.700	2.634	1,182.3
0.77	1.734	2.687	1,206.0
0.78	1.768	2.740	1,229.9
0.79	1.803	2.794	1,254.0
0.80	1.838	2.848	1,278.2
0.81	1.873	2.903	1,302.6
0.82	1.908	2.957	1,327.2
0.83	1.943	3.012	1,351.9
0.84	1.979	3.068	1,376.8
0.85	2.015	3.123	1,401.8
0.86	2.051	3.180	1,427.0
0.87	2.088	3.236	1,452.3
0.88	2.124	3.293	1,477.8
0.89	2.161	3.350	1,503.4
0.90	2.198	3.407	1,529.2
0.91	2.236	3.465	1,555.2
0.92	2.273	3.523	1,581.2
0.93	2.311	3.582	1,607.5
0.94	2.349	3.640	1,633.9
0.95	2.387	3.700	1,660.4

Flow Chart for 12” Parshall Flume

0.96	2.425	3.759	1,687.1
0.97	2.464	3.819	1,713.9
0.98	2.503	3.879	1,740.8
0.99	2.541	3.939	1,767.9
1.00	2.581	4.000	1,795.2
1.01	2.620	4.061	1,822.6
1.02	2.660	4.122	1,850.1
1.03	2.699	4.184	1,877.8
1.04	2.739	4.246	1,905.6
1.05	2.780	4.308	1,933.6
1.06	2.820	4.371	1,961.7
1.07	2.861	4.434	1,989.9
1.08	2.901	4.497	2,018.3
1.09	2.942	4.561	2,046.8
1.10	2.984	4.624	2,075.5
1.11	3.025	4.689	2,104.2
1.12	3.066	4.753	2,133.2
1.13	3.108	4.818	2,162.2
1.14	3.150	4.883	2,191.4
1.15	3.192	4.948	2,220.7
1.16	3.235	5.014	2,250.2
1.17	3.277	5.080	2,279.8
1.18	3.320	5.146	2,309.5
1.19	3.363	5.212	2,339.4
1.20	3.406	5.279	2,369.3
1.21	3.449	5.346	2,399.5
1.22	3.493	5.414	2,429.7
1.23	3.536	5.481	2,460.1
1.24	3.580	5.549	2,490.6
1.25	3.624	5.618	2,521.2
1.26	3.669	5.686	2,552.0
1.27	3.713	5.755	2,582.9
1.28	3.758	5.824	2,613.9
1.29	3.802	5.894	2,645.0
1.30	3.847	5.963	2,676.3
1.31	3.892	6.033	2,707.7
1.32	3.938	6.103	2,739.2
1.33	3.983	6.174	2,770.9
1.34	4.029	6.245	2,802.6
1.35	4.075	6.316	2,834.5

1.36	4.121	6.387	2,866.5
1.37	4.167	6.459	2,898.7
1.38	4.213	6.531	2,931.0
1.39	4.260	6.603	2,963.3
1.40	4.307	6.675	2,995.8
1.41	4.354	6.748	3,028.5
1.42	4.401	6.821	3,061.2
1.43	4.448	6.894	3,094.1
1.44	4.495	6.968	3,127.1
1.45	4.543	7.041	3,160.2
1.46	4.591	7.115	3,193.4
1.47	4.639	7.190	3,226.8
1.48	4.687	7.264	3,260.3
1.49	4.735	7.339	3,293.8
1.50	4.783	7.414	3,327.5
1.51	4.832	7.490	3,361.4
1.52	4.881	7.565	3,395.3
1.53	4.930	7.641	3,429.4
1.54	4.979	7.717	3,463.5
1.55	5.028	7.794	3,497.8
1.56	5.078	7.870	3,532.2
1.57	5.127	7.947	3,566.7
1.58	5.177	8.024	3,601.4
1.59	5.227	8.102	3,636.1
1.60	5.277	8.180	3,671.0
1.61	5.327	8.258	3,706.0
1.62	5.378	8.336	3,741.1
1.63	5.428	8.414	3,776.3
1.64	5.479	8.493	3,811.6
1.65	5.530	8.572	3,847.0
1.66	5.581	8.651	3,882.6
1.67	5.633	8.730	3,918.2
1.68	5.684	8.810	3,954.0
1.69	5.736	8.890	3,989.8
1.70	5.787	8.970	4,025.8
1.71	5.839	9.051	4,061.9
1.72	5.891	9.131	4,098.1
1.73	5.943	9.212	4,134.5
1.74	5.996	9.293	4,170.9
1.75	6.048	9.375	4,207.4

Flow Chart for 12” Parshall Flume

1.76	6.101	9.456	4,244.1
1.77	6.154	9.538	4,280.8
1.78	6.207	9.621	4,317.7
1.79	6.260	9.703	4,354.7
1.80	6.313	9.786	4,391.7
1.81	6.367	9.868	4,428.9
1.82	6.420	9.952	4,466.2
1.83	6.474	10.035	4,503.6
1.84	6.528	10.118	4,541.1
1.85	6.582	10.202	4,578.8
1.86	6.636	10.286	4,616.5
1.87	6.691	10.371	4,654.3
1.88	6.745	10.455	4,692.2
1.89	6.800	10.540	4,730.3
1.90	6.855	10.625	4,768.4
1.91	6.910	10.710	4,806.7
1.92	6.965	10.796	4,845.0
1.93	7.020	10.881	4,883.5
1.94	7.076	10.967	4,922.1
1.95	7.131	11.053	4,960.7
1.96	7.187	11.140	4,999.5
1.97	7.243	11.226	5,038.4
1.98	7.299	11.313	5,077.4
1.99	7.355	11.400	5,116.4
2.00	7.411	11.488	5,155.6
2.01	7.468	11.575	5,194.9
2.02	7.524	11.663	5,234.3
2.03	7.581	11.751	5,273.8
2.04	7.638	11.839	5,313.4
2.05	7.695	11.927	5,353.1
2.06	7.752	12.016	5,392.9
2.07	7.810	12.105	5,432.7
2.08	7.867	12.194	5,472.7
2.09	7.925	12.284	5,512.8
2.10	7.983	12.373	5,553.0
2.11	8.041	12.463	5,593.3
2.12	8.099	12.553	5,633.7
2.13	8.157	12.643	5,674.2
2.14	8.215	12.734	5,714.8
2.15	8.274	12.824	5,755.5
2.16	8.332	12.915	5,796.3
2.17	8.391	13.006	5,837.2
2.18	8.450	13.098	5,878.2
2.19	8.509	13.189	5,919.3
2.20	8.568	13.281	5,960.5
2.21	8.628	13.373	6,001.7
2.22	8.687	13.465	6,043.1
2.23	8.747	13.558	6,084.6
2.24	8.807	13.650	6,126.2
2.25	8.866	13.743	6,167.9
2.26	8.927	13.836	6,209.6
2.27	8.987	13.929	6,251.5
2.28	9.047	14.023	6,293.5
2.29	9.107	14.117	6,335.5
2.30	9.168	14.211	6,377.7
2.31	9.229	14.305	6,419.9
2.32	9.290	14.399	6,462.3
2.33	9.351	14.494	6,504.7
2.34	9.412	14.588	6,547.3
2.35	9.473	14.683	6,589.9
2.36	9.535	14.779	6,632.6
2.37	9.596	14.874	6,675.4
2.38	9.658	14.970	6,718.4
2.39	9.720	15.065	6,761.4
2.40	9.782	15.161	6,804.5
2.41	9.844	15.258	6,847.7
2.42	9.906	15.354	6,891.0
2.43	9.968	15.451	6,934.3
2.44	10.031	15.548	6,977.8
2.45	10.093	15.645	7,021.4
2.46	10.156	15.742	7,065.1
2.47	10.219	15.840	7,108.8
2.48	10.282	15.937	7,152.7
2.49	10.345	16.035	7,196.6
2.50	10.409	16.133	7,240.6

Cost-efficient and easy to install

Screen-convey-dewater

Hycor® Helisieve® In-Channel Fine Screen

All-in-one: screening, conveying and dewatering system

The Helisieve® system uses shaftless spiral technology to perform screening, solids conveying and dewatering in one cost efficient operation. The heart of the system is a heavy-duty carbon steel spiral that conveys screenings to the dewatering zone and dewaters them to acceptable landfill requirements.

The spiral is fabricated in a continuous flight to assure a strong, stable structure. It is surrounded by a stainless steel tube that encloses screenings, minimizes odors and provides a clean, hygienic operation.

The Helisieve® system's shaftless core handles a greater volume of solids than shafted screw designs. Fibrous and bulky solids have a clear, barrier free path to the dewatering zone. The shaftless design also eliminates the need for maintenance-intensive bottom support bearings and intermediate hanger bearings.

Three operations in one

Screening:

Influent moves into the fine screening area where the perforated screen removes solids. A spiral-mounted brush keeps the screen surface clean.

Conveying:

The spiral moves the screenings upward through the transport area. There is no shaft to restrict flow or become entangled with long, stringy solids.

Dewatering:

Solids are dewatered by compression against a plug of material formed in the flightless zone. Liquid is discharged through a perforated screen. A removable drain box simplifies access to the screen and solids plug. Solids at 30% dry weight are common.

Advantages

- Cost-effective: integrates three processes: screening, conveying and dewatering, in one compact unit.
- Efficient: the shaftless spiral provides greater conveying capacity and eliminates entanglement of solids around a shaft.
- Lowers disposal costs: dewatering reduces weight and volume. Thirty percent dry weight solids are common.
- Hygienic: screens are enclosed by the stainless steel tube and can be discharged directly into sealed containers to minimize odor and handling. Optional bagger assemblies simplify disposal.
- Designed to last: rugged steel alloy spiral fabricated in a continuous flight to tight manufacturing tolerances.
- Compact and easy to install: shipped assembled, with flexible seals, for quick channel positioning, or in its own tank housing.
- Economical: one low horsepower gearmotor drives the entire system.
- Up-front serviceability: pivots out for easy access for above-channel maintenance.
- Low maintenance: no troublesome submerged end bearings or intermediate hanger bearings

Hundreds of units sold over the last 20 years

Shaftless spiral provides greater conveying capacity

Screen openings

0.125” (3 mm) and 0.250” (6 mm) diameter and .040” x .4” perforated slots.

Helisieve Plus® in-tank system for pumped flows

Screens, conveys and dewaters like the Helisieve unit, but is self contained in a stainless steel tank. Suitable for industrial and municipal processes.

Designed to last, easy to install

Parkson™
Treating Water Right

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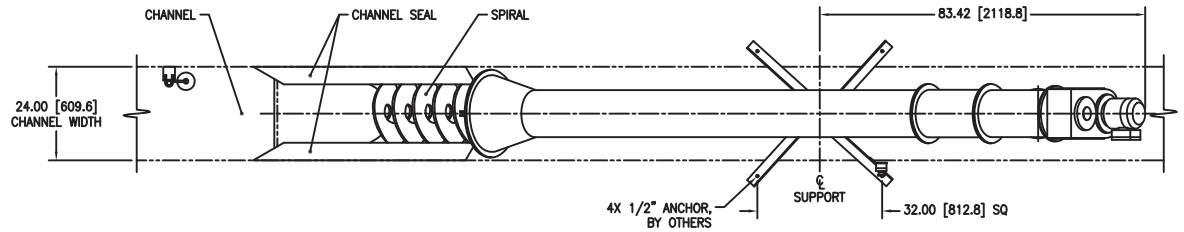
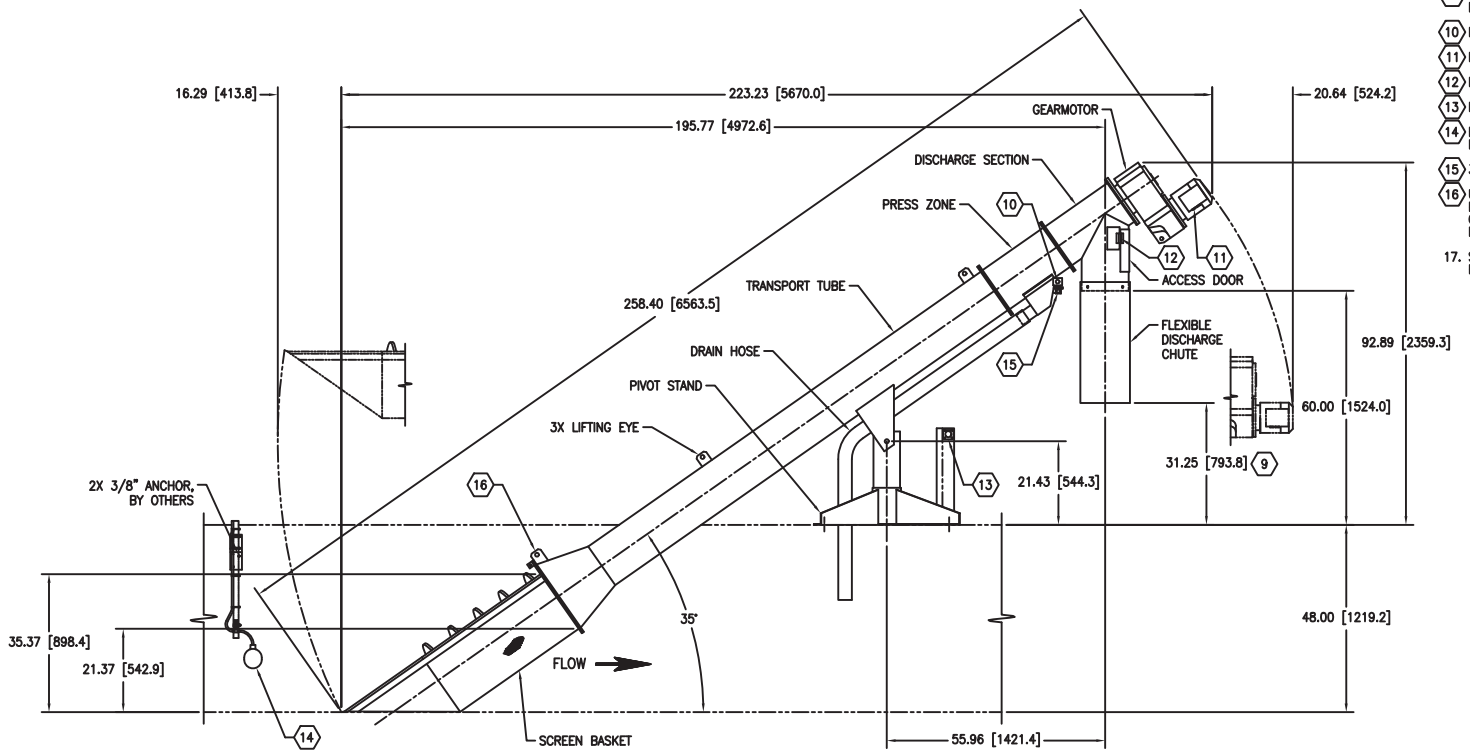
Montreal www.parkson.com
Dubai



TOP VIEW



SIDE VIEW
(CHANNEL SEALS NOT SHOWN)

NOTE:

1. ALL 304L STAINLESS STEEL CONSTRUCTION EXCEPT FOR REDUCER, MOTOR, SPIRAL, ELECTRICAL FIXTURES, DISCHARGE CHUTE, AND CHANNEL SEALS.
2. GEARMOTOR: 1.5 HP [1.1 kW], 1800 RPM, 230/460 V, 3 PH, 60 HZ, TEFC, SEVERE DUTY.
3. SPIRAL SPEED: 7.4 RPM.
4. SCREEN OPENING: ø.25 [ø6.4].
5. RECOMMENDED CLEARANCE TO BE 36.00 [914.4] AROUND AND ABOVE UNIT.
6. WEIGHT: 1,755 LB [795 kg].
7. DIMENSIONS WRITTEN IN INCHES [mm] UNLESS OTHERWISE SPECIFIED.
8. PROVIDE SUFFICIENT FLEXIBILITY IN WATER AND ELECTRICAL CONNECTIONS TO ALLOW THE UNIT TO PIVOT OUT OF THE CHANNEL. ALL INTERCONNECTING WIRING, CONDUIT AND PIPING FROM UNIT MOUNTED DEVICES WILL BE SUPPLIED BY OTHERS.
9. GROUND CLEARANCE FOR DISCHARGE RECEPTACLE. DO NOT REMOVE FLEXIBLE DISCHARGE CHUTE/GUARD.
10. NEMA 4X SOLENOID VALVE: 1/2" NPT CONDUIT CONNECTION.
11. MOTOR: 2X 1/2" NPT CONDUIT CONNECTION.
12. NEMA 4X INTERLOCK SWITCH: 6 FOOT [1.8 M] LONG INTEGRAL CABLE.
13. NEMA 4X LOCAL E-STOP: 1/2" NPT CONDUIT CONNECTION.
14. FLOAT SWITCH: 20 FOOT [6.1 M] LONG INTEGRAL CABLE (MOUNTING BRACKET INCLUDED; 1" PIPE PROVIDED BY OTHERS).
15. 3/4" NPT WATER SPRAY CONNECTION.
16. UNIT IS BASKET END HEAVY. CUSTOMER MUST PROVIDE LIFTING DEVICE TO PIVOT UNIT OUT OF CHANNEL. LIFTING CAPABILITY MUST EQUAL A MINIMUM OF 60% OF UNIT WEIGHT, APPLIED AT LIFTING POINT SHOWN. CHANNEL MUST BE EMPTY AND SCREEN BASKET CLEAR OF SOLIDS.
17. STANDARD UNIT SHOWN. CONSULT PARKSON CORPORATION OR YOUR LOCAL HYCOR PRODUCTS REPRESENTATIVE FOR AVAILABLE OPTIONS.

PARKSON CORPORATION

The Owner, Project Engineer, and all others involved with the project design must implement and follow all safety standards required by local, state and federal laws when incorporating Parkson Corporation equipment into the overall project design. Parkson Corporation will not be responsible for location and/or placement of equipment in the plant design, nor is Parkson Corporation responsible for plant safety design and for the failure to follow appropriate safety precautions in the operation and maintenance of Parkson Corporation equipment.

REV	DESCRIPTION	DATE	BY

DRAWN BY | DATE
CHECKED BY | DATE
SCALE 1/32" = 1"

REFERENCE INFORMATION
REV DATE: 03/31/04

INFORMATION ONLY

PROJECT NAME

TITLE
HLS500
HYCOR® HELISIEVE® UNIT

DRAWING NO | REV

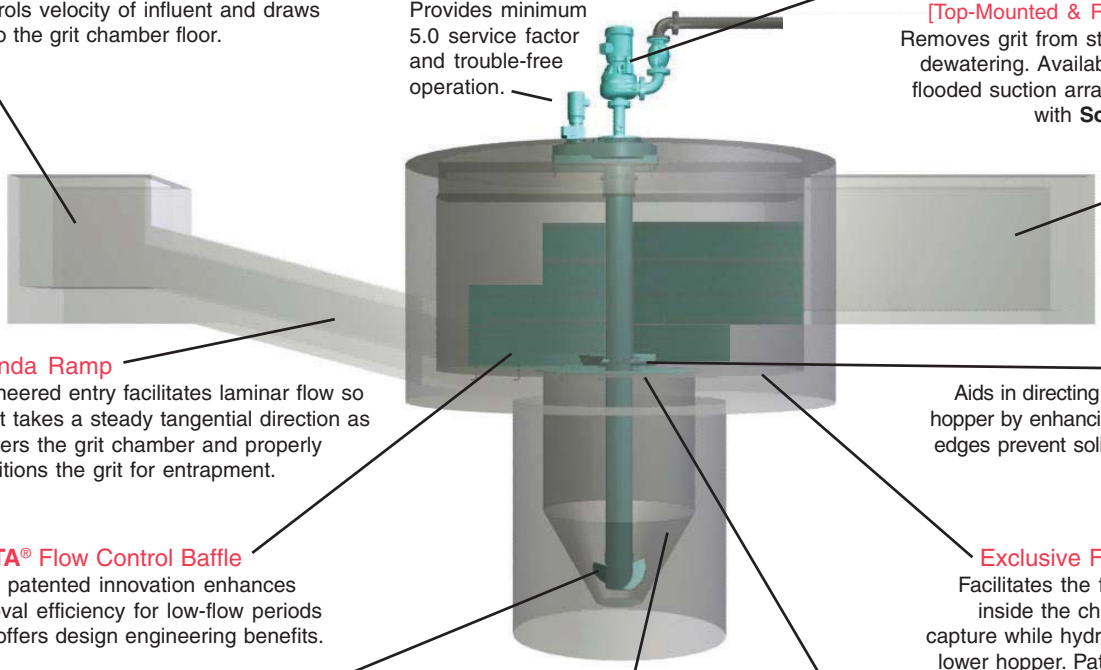
360° Grit Chamber Features and Benefits

With Flow Control Baffle, Model B

Inlet Channel
Controls velocity of influent and draws grit to the grit chamber floor.

Bull Gear Drive
Provides minimum 5.0 service factor and trouble-free operation.

PISTA® Turbo Grit Pump
[Top-Mounted & Remote-Mounted Options]
Removes grit from storage hopper to washing dewatering. Available in vacuum-primed and flooded suction arrangements. Now available with **SonicStart®** prime sensing.



Outlet Channel
S&L can assist with design information for optimal performance.

Coanda Ramp
Engineered entry facilitates laminar flow so that it takes a steady tangential direction as it enters the grit chamber and properly conditions the grit for entrapment.

Axial-Flow Propeller
Aids in directing organic-free grit into lower hopper by enhancing flow patterns. Rounded edges prevent solids build-up, thus ensuring high efficiency.

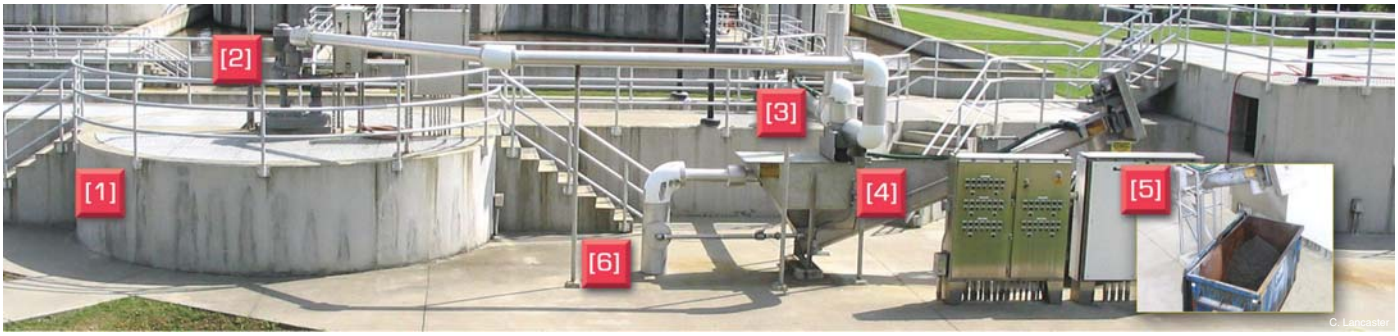
PISTA® Flow Control Baffle
New, patented innovation enhances removal efficiency for low-flow periods and offers design engineering benefits.

Exclusive Flat-Bottom Basin Floor
Facilitates the forced vortex flow pattern inside the chamber. Minimizes organic capture while hydraulically directing grit into lower hopper. Patented, 360-degree in-line design.

PISTA® Grit Fluidizer
Patented blade exclusive to S&L design. Loosens collected grit, preventing compacting.

Storage Hopper
Stores removed grit prior to dewatering.

Hopper Cover Plate
Stationary and recessed, it removes for quick access to storage hopper.



Grit Removal, Handling & Dewatering System Flow Scheme

[1] ***PISTA® Grit Chamber*** **—** Influent enters flat-floor grit chamber hydraulically guided by coanda ramp, internal baffles and central, low-speed propeller. Forced vortex drives grit particles to center chamber floor and into lower grit hopper while organics and flow continue to plant.

[2] ***PISTA® Turbo Grit Pump*** **—** Top-mounted or remote mounted unit pumps collected grit slurry (kept fluid by the **PISTA®** Grit Fluidizer) to the **PISTA®**'s second-stage grit washing and dewatering system while also providing proper head.

[3] ***PISTA® Grit Concentrator*** **—** Specifically engineered for the **PISTA®** system, this abrasion-resistant Ni-Hard unit washes and separates grit further. It positions on the grit discharge line.

[4] ***PISTA® Grit Screw Conveyor*** **—** Grit from the concentrator deposits into the parallel (lamella) plate section of the S&L dewatering screw conveyor, which aids in retaining finer grit and reducing the stream's turbulence and overflow rate.

[5] ***Dewatered Grit Discharges*** from the top of the inclined screw conveyor into a container for disposal.

[6] ***The Flow and any Residual Organics are Returned*** to the inlet channel prior to the grit chamber, typically 93% of flow and 95% of organics.

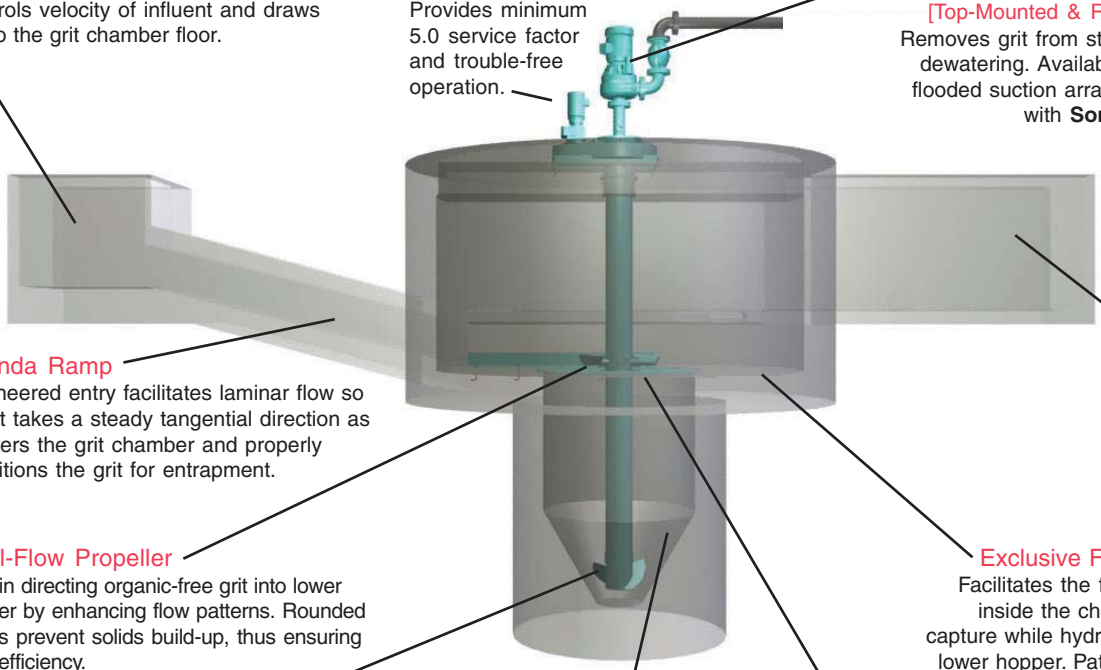
360° Grit Chamber Features and Benefits

Model A

Inlet Channel
Controls velocity of influent and draws grit to the grit chamber floor.

Bull Gear Drive
Provides minimum 5.0 service factor and trouble-free operation.

PISTA® Turbo Grit Pump
[Top-Mounted & Remote-Mounted Options]
Removes grit from storage hopper to washing dewatering. Available in vacuum-primed and flooded suction arrangements. Now available with **SonicStart**™ prime sensing.



Coanda Ramp
Engineered entry facilitates laminar flow so that it takes a steady tangential direction as it enters the grit chamber and properly conditions the grit for entrapment.

Outlet Channel
S&L can assist with design information for optimal performance.

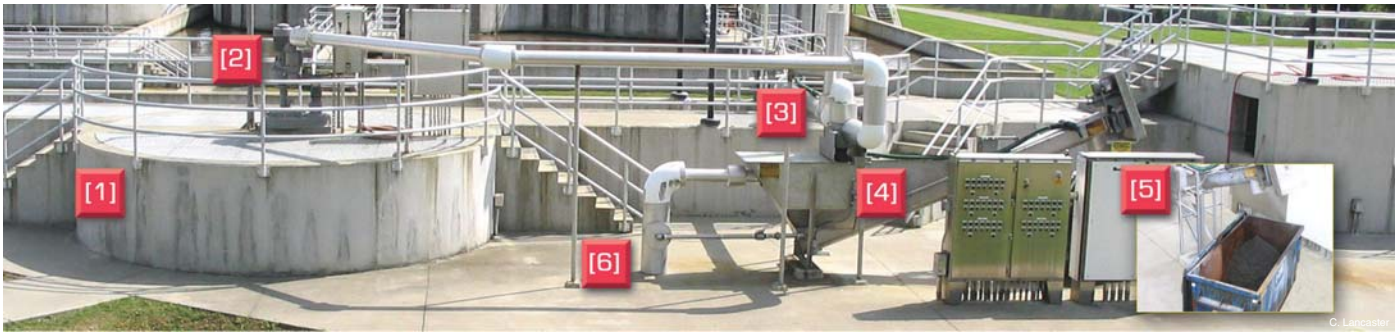
Axial-Flow Propeller
Aids in directing organic-free grit into lower hopper by enhancing flow patterns. Rounded edges prevent solids build-up, thus ensuring high efficiency.

Exclusive Flat-Bottom Basin Floor
Facilitates the forced vortex flow pattern inside the chamber. Minimizes organic capture while hydraulically directing grit into lower hopper. Patented, 360-degree in-line design.

PISTA® Grit Fluidizer
Patented blade exclusive to S&L design. Loosens collected grit, preventing compacting.

Storage Hopper
Stores removed grit prior to dewatering.

Hopper Cover Plate
Stationary and recessed, it removes for quick access to storage hopper.



PISTA® GRIT REMOVAL SYSTEM

Grit Removal, Handling & Dewatering System Flow Scheme

[1] ***PISTA® Grit Chamber*** — Influent enters flat-floor grit chamber hydraulically guided by coanda ramp, internal baffles and central, low-speed propeller. Forced vortex drives grit particles to center chamber floor and into lower grit hopper while organics and flow continue to plant.

[2] ***PISTA® Turbo Grit Pump*** — Top-mounted or remote mounted unit pumps collected grit slurry (kept fluid by the **PISTA®** Grit Fluidizer) to the **PISTA®**'s second-stage grit washing and dewatering system while also providing proper head.

[3] ***PISTA® Grit Concentrator*** — Specifically engineered for the **PISTA®** system, this abrasion-resistant Ni-Hard unit washes and separates grit further. It positions on the grit discharge line.

[4] ***PISTA® Grit Screw Conveyor*** — Grit from the concentrator deposits into the parallel (lamella) plate section of the S&L dewatering screw conveyor, which aids in retaining finer grit and reducing the stream's turbulence and overflow rate.

[5] ***Dewatered Grit Discharges*** from the top of the inclined screw conveyor into a container for disposal.

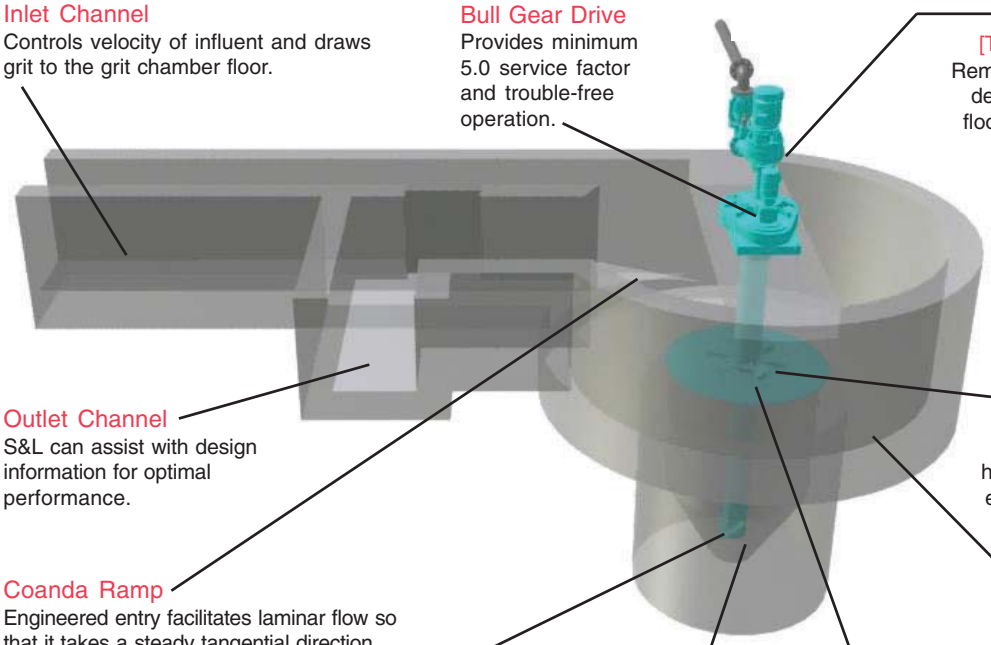
[6] ***The Flow and any Residual Organics are Returned*** to the inlet channel prior to the grit chamber, typically 93% of flow and 95% of organics.

270° Grit Chamber Features and Benefits

Inlet Channel
Controls velocity of influent and draws grit to the grit chamber floor.

Bull Gear Drive
Provides minimum 5.0 service factor and trouble-free operation.

PISTA® Turbo Grit Pump
[Top-Mounted & Remote-Mounted Options]
Removes grit from storage hopper to washing dewatering. Available in vacuum-primed and flooded suction arrangements. Now available with **SonicStart**™ prime sensing.



Outlet Channel
S&L can assist with design information for optimal performance.

Axial-Flow Propeller
Aids in directing organic-free grit into lower hopper by enhancing flow patterns. Rounded edges prevent solids build-up, thus ensuring high efficiency.

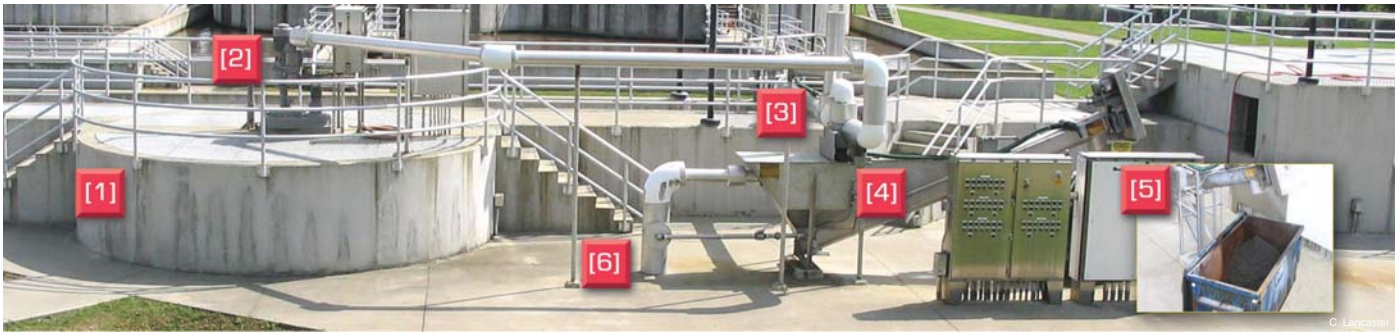
Coanda Ramp
Engineered entry facilitates laminar flow so that it takes a steady tangential direction as it enters the grit chamber and properly conditions the grit for entrapment.

Exclusive Flat-Bottom Basin Floor
Facilitates the forced vortex flow pattern inside the chamber. Minimizes organic capture while hydraulically directing grit into lower hopper. Patented, 360-degree in-line design.

PISTA® Grit Fluidizer
Patented blade exclusive to S&L design. Loosens collected grit, preventing compacting.

Storage Hopper
Stores removed grit prior to dewatering.

Hopper Cover Plate
Stationary and recessed, it removes for quick access to storage hopper.



PISTA® GRIT REMOVAL SYSTEM Grit Removal, Handling & Dewatering System Flow Scheme

[1] ***PISTA® Grit Chamber —*** Influent enters flat-floor grit chamber hydraulically guided by coanda ramp, internal baffles and central, low-speed propeller. Forced vortex drives grit particles to center chamber floor and into lower grit hopper while organics and flow continue to plant.

[2] ***PISTA® Turbo Grit Pump —*** Top-mounted or remote mounted unit pumps collected grit slurry (kept fluid by the **PISTA®** Grit Fluidizer) to the **PISTA®**'s second-stage grit washing and dewatering system while also providing proper head.

[3] ***PISTA® Grit Concentrator —*** Specifically engineered for the **PISTA®** system, this abrasion-resistant Ni-Hard unit washes and separates grit further. It positions on the grit discharge line.

[4] ***PISTA® Grit Screw Conveyor —*** Grit from the concentrator deposits into the parallel (lamella) plate section of the S&L dewatering screw conveyor, which aids in retaining finer grit and reducing the stream's turbulence and overflow rate.

[5] ***Dewatered Grit Discharges*** from the top of the inclined screw conveyor into a container for disposal.

[6] ***The Flow and any Residual Organics are Returned*** to the inlet channel prior to the grit chamber, typically 93% of flow and 95% of organics.

PURPOSE

The **PISTA®** Grit Removal System is a complete grit removal system that includes the **PISTA®** Grit Chamber, the Turbo **PISTA®** Grit Pump, the **PISTA** Grit Concentrator, and the **PISTA®** Grit Screw Conveyor. Each component has been specifically designed for the capture, washing and dewatering of fine grit.

The **PISTA®** Grit Chamber solves grit removal problems whether it is sewage, water, or an industrial liquid flow application. It removes grit from an incoming water or wastewater stream. It is designed to remove grit in its standard configuration down to 0.15 mm in size (100 mesh). The **PISTA®** Grit Chamber also does an excellent job separating organics from the grit. Ideally, the upper magnitude for the grit would be approximately 2.0 mm (9 mesh). Larger sizes would be collected as long as the specific gravity is around 2.5 or greater. Organics are kept in suspension in the waste by means of the density difference. Where other grit removal devices are sensitive to flow variations the **PISTA®** Grit Chamber's velocities at the middle of the unit, where organics are separated from the grit, are maintained near an optimum design value at all flows.

Organics are kept in suspension because of their lighter density or specific gravity. The grit and any organics that are captured in the **PISTA®** Grit Chamber are moved along the flat bottom of the grit chamber. As they near the center, the particle velocity is increased by a specially designed axial flow propeller and resultant induced spiral flow. The lifting force on the particle attached to the bottom is a function of the cross-sectional area and the velocity squared. The lighter and larger organics are fluidized into the main stream through the **PISTA®** Grit Chamber. Only a small gap is provided between the torque tube and the floor plate to allow the grit to enter the storage hopper while the lighter organics are detached from the flat bottom and drawn upward to the effluent flume.

Because no device is 100% efficient, a small percentage of organics will be trapped with the grit. The second stage **PISTA®** Grit Concentrator, located on the grit discharge line, is designed for ultimate separation of organics. This second stage concentrator returns virtually all organics and most of the excess water to the inlet channel of the **PISTA®** Grit Chamber. Final dewatering may be accomplished by discharging directly into the Smith & Loveless dewatering screw, with parallel plate separator.

TURBO GRIT REMOVAL PUMP

The Smith & Loveless, Inc. Turbo **PISTA®** Grit Pump is mounted directly on top of the flanged center pipe for discharging the grit from the storage hopper of the **PISTA®** Grit Chamber. Remote mounted arrangements are available, but the top mounted configuration is best. The Turbo **PISTA®** Grit Pump, when used in conjunction with the **PISTA®** Grit Concentrator, eliminates the necessity for air blowers for lifting and provides the pumping head and capacity necessary for optimizing the efficiency of the second stage **PISTA®** Grit Concentrator. The reduced discharge rate/under-flow from the second stage concentrator greatly improves the performance of the final dewatering screw or other device.

POSITION IN THE TREATMENT PROCESS

The nature of the operation of the **PISTA®** Grit Chamber dictates where it should be installed. Our general recommendation is that it should be placed before anything else in the treatment plant except a suitable bar rack to prevent sticks and other foreign objects from entering the **PISTA®** Grit Chamber. Being located ahead of all other equipment in a treatment plant, it will remove the grit which can quickly cause mechanical failure, excessive wear on downstream mechanical devices, or accumulate in basins and channels.

The head loss in the **PISTA®** Grit Chamber (1/4" or 6mm maximum, except for Model B), is no more than in an open flume. Consult the factory for Model B Type **PISTA®** head loss, as it differs per application. This makes it ideal for installation as an initial phase of a treatment process. It also makes it ideal for the insertion into an already existing flow scheme.

PISTA® Grit Chambers can be installed above ground or below ground. They can be supplied in steel for easy installation and/or attachment to a concrete channel. They can be installed in multiples for added flow and reliability. Their low cost and small space requirement make it possible to protect almost any size plant from the detrimental effects of grit. The low power usage requirements for the grit chamber also make it ideal for any size plant.

The **PISTA®** Grit Chamber can be applied in the municipal or industrial process schemes for pretreatment of raw water or wastewater. Industrially, there are many

applications. Independent tests have, for example, proven the Smith & Loveless, Inc. **PISTA®** Grit Chamber to be far superior to other grit removal devices in the handling of fly ash from power generating plants. Smith & Loveless, Inc. has the technical expertise and laboratory facilities to test samples and we are anxious to assist you in utilizing this cost effective separation system.

OPERATION

The **PISTA®** Grit Chamber operates on the vortex principle. The hydraulics force the grit to the chamber floor. The grit is propelled to the floor sufficiently in one revolution of the chamber's contents so as not to be within the influence of the outlet of the chamber. The grit on the bottom, along with other material, is propelled along the bottom towards the center. The flow moves circumferentially and downward to the bottom, across the bottom still moving in a circle, up the middle to the top, across the top still moving in a circle to the outside. As the captured solids move towards the center, they pick up velocity because the area of flow is decreasing. When the solids approach the middle, the propeller increases the velocity to the point where lighter organics are lifted and returned to the flow passing through the **PISTA®** Grit Chamber. The grit moves inward and drops into the center storage hopper.

Each feature of the **PISTA®** Grit Chamber makes an important contribution to the overall performance. Any alteration in dimension or placement can seriously affect the efficiency of grit removal. The **PISTA®** Grit Chamber offers more discrete separation and superior handling of organics. Specific design features surrounding the inlet baffle when used in conjunction with the coanda ramp, upper chamber and other velocity control mechanisms should not be altered.

When sufficient grit is accumulated in the storage hopper, the grit must be removed. Grit removal may be performed manually or automatically.

Manual operation involves only the following steps:

1. Close the discharge plug valve.
2. Turn the switch for the Turbo **PISTA®** Grit Pump to the "On" position. This will initiate the pump priming cycle. When the vacuum pump stops running the Turbo **PISTA®** Grit Pump is primed and will start.
3. Open the discharge plug valve and operate the pump until all the grit is removed.
4. Shut off the pump and leave the discharge plug valve open so that the contents of the discharge pipe and pump can drain back into the **PISTA** Grit Chamber. In cold weather, the discharge valve should be left open to prevent freezing in the closed position.

The manual grit removal operation is now completed.

Automatic operation is as follows:

1. The 24-hour timer, or push to initiate button, initiates the grit removal cycle.
2. When the grit removal cycle is initiated, the pneumatically operated pinch valve on the pump discharge closes.
3. The vacuum pump starts simultaneously with the pneumatic valve operator and draws water up into the pump. The vacuum pump runs until the liquid level reaches the **SONIC START®** sensor.
4. The liquid touches the **SONIC START®** sensor, which signals the control system to close the priming solenoid valve and shut-off the vacuum pump.
5. The Turbo **PISTA®** Grit Pump starts and the pneumatically operated valve opens. The Turbo **PISTA®** Grit Pump operates for an adjustable period set for the amount of time for the grit to be removed. This should be set for the early morning period and other such times during the day as may be necessary.
6. When the Turbo **PISTA®** Grit Pump stops, the valve remains open to allow the contents of the discharge pipe and pump to drain back into the **PISTA®** Grit Chamber.

This completes the automatic grit removal cycle.

The second stage **PISTA®** Grit Concentrator operates on the constant flow principle and is sized to match the discharge from the Turbo **PISTA®** Grit Pump. The grit is discharged out the bottom, while most of the water and organic material are returned to the inlet of the **PISTA®** Grit Chamber via a return line connected at the top of the second stage concentrator.

The pressure required to effectively operate the second stage concentrator is readily available from the Turbo **PISTA®** Grit Pump. An airlift device is not adequate for this purpose.

HYDRAULICS

The influent flow, in a typical wastewater treatment system, is subjected to a significant degree of variation during the day and from start-up to design conditions. The Smith & Loveless, Inc. **PISTA®** Grit Chamber should be selected so that the peak design flow rate is within the recommended maximum flow of the unit. An important feature of the **PISTA®** Grit Chamber is that no decrease in efficiency is experienced at flows less than the design rate.

PISTA® Model	Recommended Maximum Flow English	Recommended Maximum Flow Metric
0.5/0.5A/0.5B	0.5 MGD	1,892 CMD
1.0/1.0A/1.0B	1.0 MGD	3,785 CMD
2.5/2.5A/2.5B	2.5 MGD	9,465 CMD
4.0/4.0A/4.0B	4.0 MGD	15,140 CMD
7.0/7.0A/7.0B	7.0 MGD	26,495 CMD
12.0/12.0A/12.0B	12.0 MGD	45,420 CMD
20.0/20.0A/20.0B	20.0 MGD	75,700 CMD
30.0/30.0A/30.0B	30.0 MGD	113,550 CMD
50.0/50.0A/50.0B	50.0 MGD	189,250 CMD
70.0/70.0A/70.0B	70.0 MGD	265,000 CMD
100.0/100.0A/100.0B	100.0 MGD	378,500 CMD

Specific dimensional data dealing with each size **PISTA®** Grit Chamber is provided with the drawings. It is important to adhere to the recommendations in these tables. Liquid levels tabulated are for peak design flow rates. Since the design flow rate is normally not present during the initial installation, the velocity envelope, Figure 1, is provided to assist you in optimizing influent channel velocities. It at all possible, the velocities in the influent channel should fall within these guidelines, when used in conjunction with the influent channel widths given in the tables.

Ideal inlet channel velocities at average flow and acceptable for all flows – 2 to 3 FPS (0.6 to 0.9 m/sec).
Absolute maximum inlet channel velocity at peak flow – 3.5 FPS (1.07 m/sec).
Initial minimum inlet channel velocity must exceed – 0.5 FPS (0.15 m/sec).

Initial peak flows must exceed 2 FPS (0.6 m/sec) to wash any grit that may have accumulated in the inlet flume at the lower flows into the grit chamber for removal. The **PISTA®** can pass higher flow volumes than the rated peak, however the removal efficiency of the unit may decrease. The use of flow control baffles provides proper velocities over the widest range of flows, and reduces the outlet channel length.

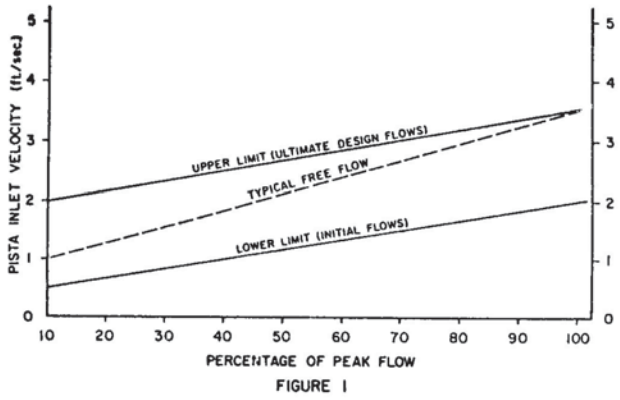


FIGURE 1

2 FPS (0.6 m/sec) is required to wash any grit that may have accumulated in the inlet flume at the lower flows into the grit chamber for removal.

The entrance flume or pipe into the **PISTA®** Grit Chamber should provide for a smooth laminar type flow with little turbulence. To optimize this, we recommend a straight run into the **PISTA®** Grit Chamber as shown on the drawings. Note this requirement is greatly reduced in the Model A and B, 360◦ units.

If at all possible, the entrance to the **PISTA®** Grit Chamber should be exactly as shown on the drawings. Please contact Smith & Loveless for any needed assistance.

The downstream channel should maintain a constant elevation and be without 90° bends or channel narrowing that is not shown on the drawings. The 270° unit needs the channel raised and narrowed for flow control. The use of flow control baffles (Model B units) eliminates the required downstream channel. To maintain proper water velocities in the **PISTA®**, there can be no downstream restrictions that would cause the water levels in the effluent channel to be higher than it would be with a free-flowing flume. We again ask that you contact us if there are any questions, or it is not possible to optimize the installation using these guidelines.

Smith & Loveless, Inc.®

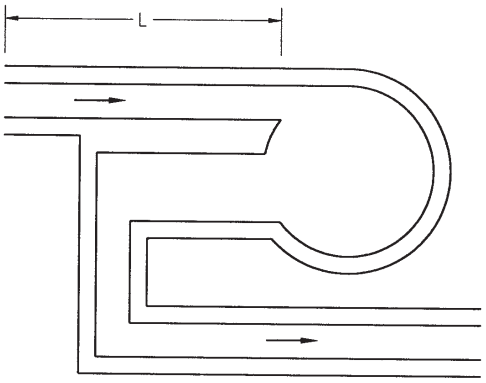
14040 West Santa Fe Trail Drive
Lenexa, Kansas 66215-1284

The **PISTA®** Grit Chamber is designed such that the most ideal velocity arrangement is if the downstream channel is a free flowing flume. On certain larger Model A units, the level is controlled by a submerged weir located in the discharge channel. The downstream side of the weir should be a free flowing flume.

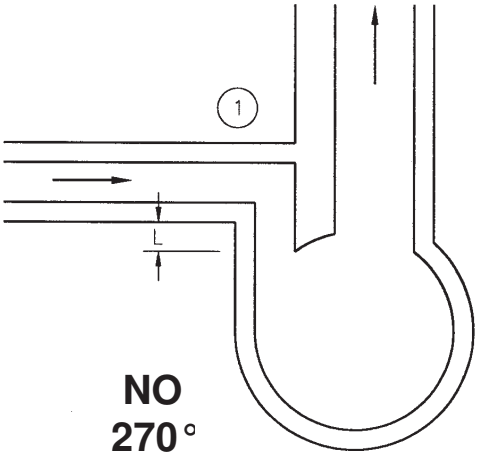
PISTA® GRIT CHAMBER LAYOUT

The straight length of influent channel required varies according to the model and type of chamber configuration. The 360° Model A and B units have greatly reduced influent channel straight lengths, as shown on the drawings. If obtaining the necessary influent channel length becomes a problem for the 270° models, consider rotating the chamber such that any required bends are placed in the effluent flume, in accordance with the downstream channel limitations.

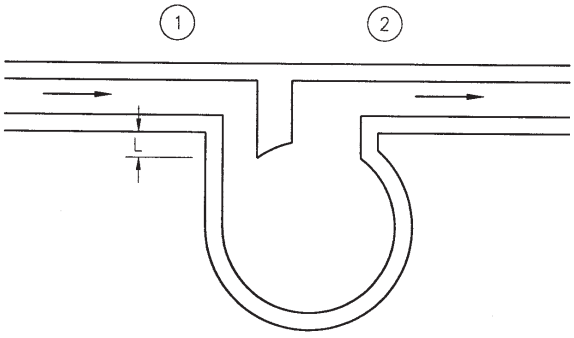
The straight-in arrangement (seen on this page) for the 270° units offer increased length of the influent channel having virtually the same space requirement, and an equivalent number of 90° bends.



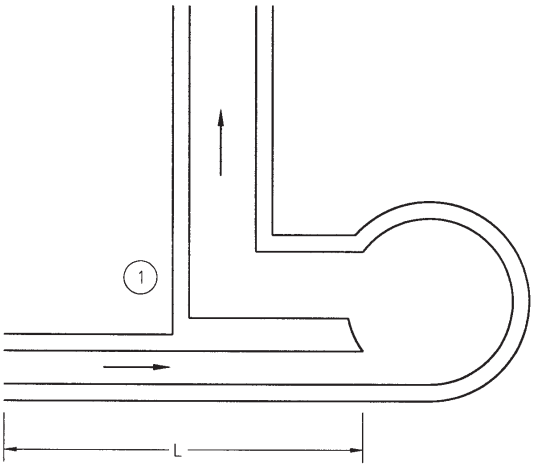
YES
270°



NO
270°



NO
270°



YES
270°

PISTA® Grit Removal System

PISTA® TURBO GRIT PUMP SELECTION

The Smith & Loveless, Inc. Turbo **PISTA®** Grit Pump is an excellent grit pumping device, and in most cases, will satisfy the need for lifting the grit to the required elevation. Suction lift, of course, should be held to a minimum, placing the Turbo **PISTA®** Grit Pump directly on top of the **PISTA®** Grit Chamber whenever possible.

The Turbo **PISTA®** Grit Pump discharge line should be as short as practical and will need to contain a full opening eccentric plug valve as shown on the drawings. The plug valve is required for priming and if automatic grit removal is desired, it will need to be a pneumatically operated pinch valve.

The vacuum priming system should be located adjacent to the Turbo **PISTA®** Grit Pump. It will normally be provided in a weatherproof enclosure mounted on the drive unit for the **PISTA®** Grit Chamber.

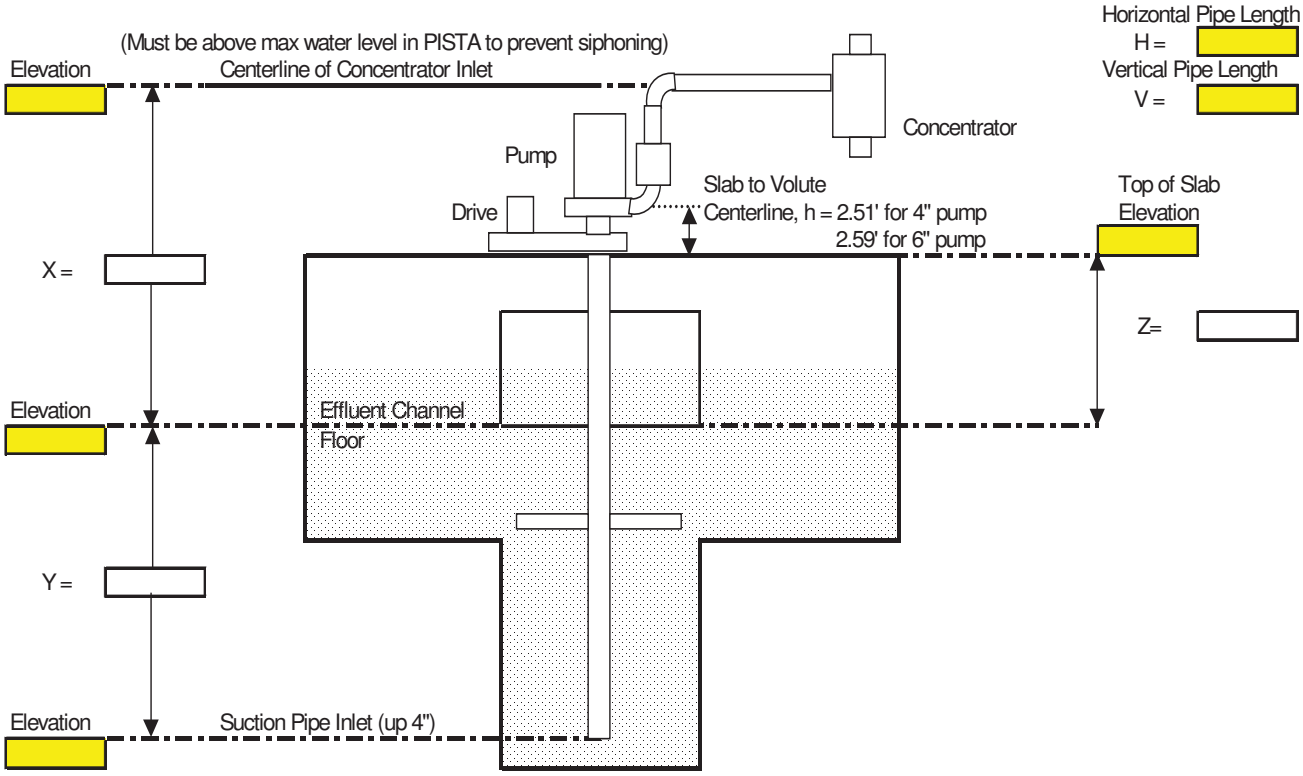
The top-mounted vacuum primed Turbo **PISTA®** Grit Pump should always be employed in conjunction with the Smith & Loveless, Inc. second stage **PISTA®** Grit Concentrator. The optimum rate through the **PISTA®** Grit Concentrator is established by selecting the pump for 250 GPM (15.8 lps) based on the following friction coefficients applicable to Schedule 40 steel pipe. Typically, Models 0.5 to 20.0 will use a four-inch (4") pump and a 250 GPM concentrator. Typically, Models 30.0 and larger will use a six-inch (6") pump and 500 GPM concentrator.

Nominal Pipe Size		Flow		Velocity		Friction Loss
Inch	mm	GPM	lps	Ft/Sec	m/sec	Ft/100 Ft
4"	100	250	15.8	6.3	1.9	4.6
6"	150	500	31.5	5.7	1.7	2.4

When selecting the Turbo **PISTA®** Grit Pump, the first thing to consider is the allowable static suction lift. Referring to the pump performance rating curves in this section, you will note that the allowable static suction lift varies from 0' to 20' (0 to 6.1 m). These static suction lift ratings shown should be reduced one-foot (0.3 m) for each 1000' (305 m) elevation above mean sea level. They relate to the physical lift as shown on the drawings and the friction loss in the 4" (100 mm) suction pipe need not be considered.

However, to compensate for lifting the grit, it will be necessary to correct the actual elevation difference between the centerline of the pump casing and the low water level in the grit chamber, for the specific gravity of the slurry. See Pages C6 and C7 for Pump Design Calculations.

TOP MOUNTED PUMP CALCULATIONS



Formula Constants Dependent on Design of Plant:

Friction Factor f =	4.6'/100' pipe for 4" grit piping
	2.4'/100' pipe for 6" grit piping
Concentrator C =	12' for 250 GPM concentrator
	25' for 500 GPM concentrator

To Calculate Equivalent Pipe Length:

EPL = H + V + (Qty elbow * EPL elbow) =

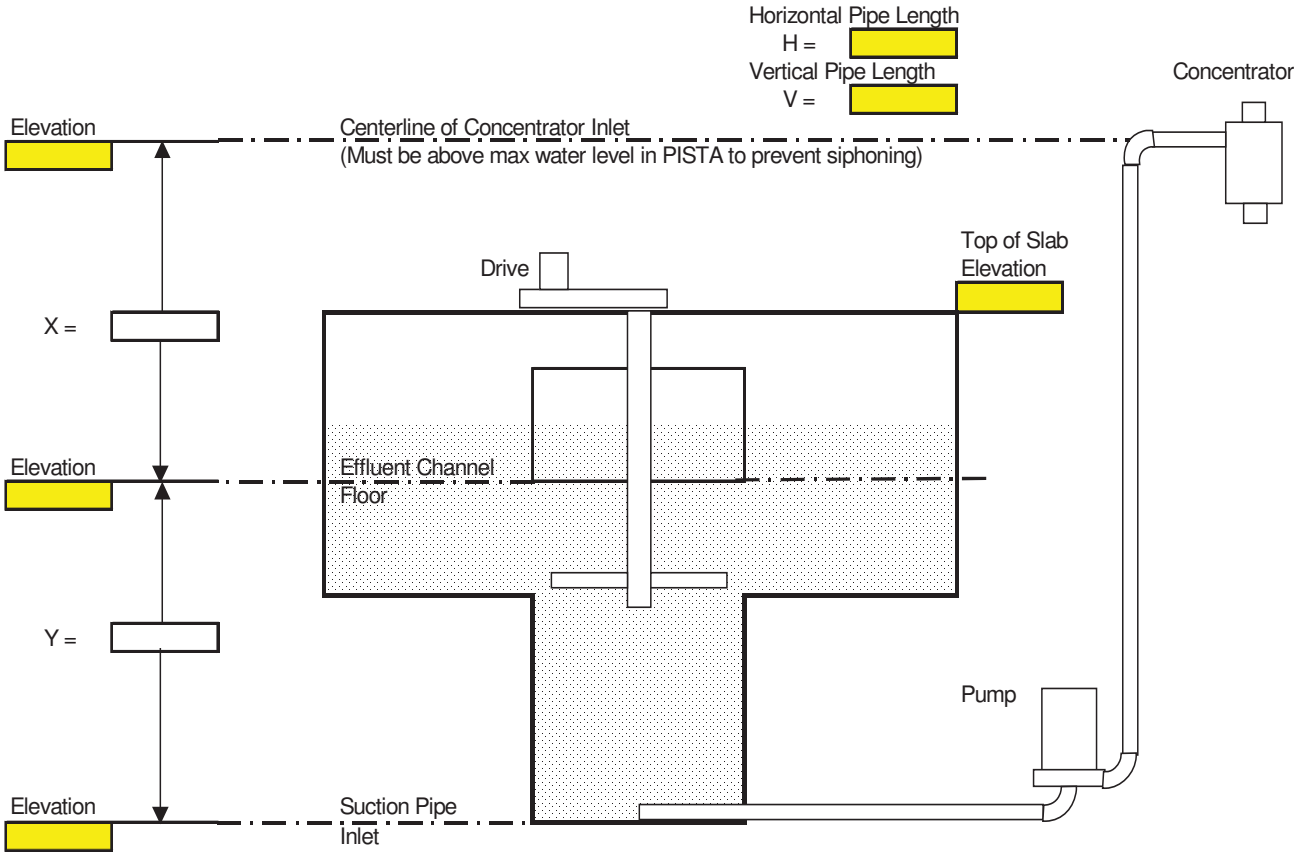
90 deg elbow	11' for 4" piping
	16' for 6" piping
90 deg long radius	7' for 4" piping
	11' for 6" piping
45 deg elbows	5' for 4" piping
	7.7' for 6" piping

TOTAL DYNAMIC HEAD (TDH)

Static Head A =	(X) (1.4) =	
Static Head B =	(Y) (0.4) =	
Friction Head F =	(EPL) (f) (1.4) =	
Pump P =		2.0
Concentrator C =		
TDH =	**A + B + F + P + C =**	
Suction Lift (MSL) = (Z + h)(1.4) + (Y)(0.4) =		
Pump Pick		
RPM	BHP from curve	
(BHP from curve)(1.4) = HP draw at design		
	Impeller Size	

PISTA® Grit Removal System

REMOTE MOUNTED PUMP CALCULATIONS



Formula Constants Dependent on Design of Plant:

Friction Factor f =	4.6'/100' pipe for 4" grit piping
	2.4'/100' pipe for 6" grit piping
Concentrator C =	12' for 250 GPM concentrator
	25' for 500 GPM concentrator

To Calculate Equivalent Pipe Length:

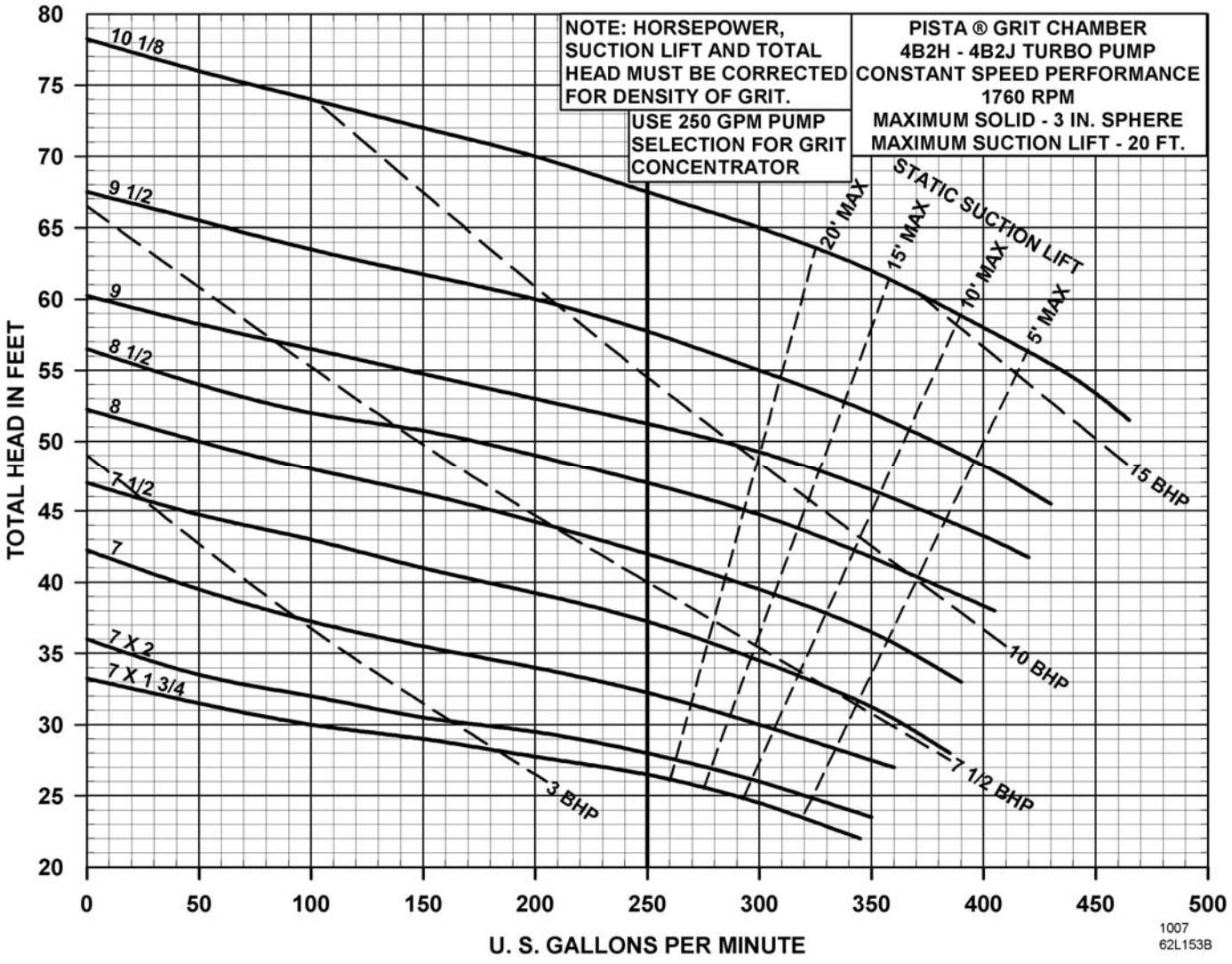
EPL = H + V + (Qty elbow * EPL elbow) =

90 deg elbow	11' for 4" piping
	16' for 6" piping
90 deg long radius	7' for 4" piping
	11' for 6" piping
45 deg elbows	5' for 4" piping
	7.7' for 6" piping

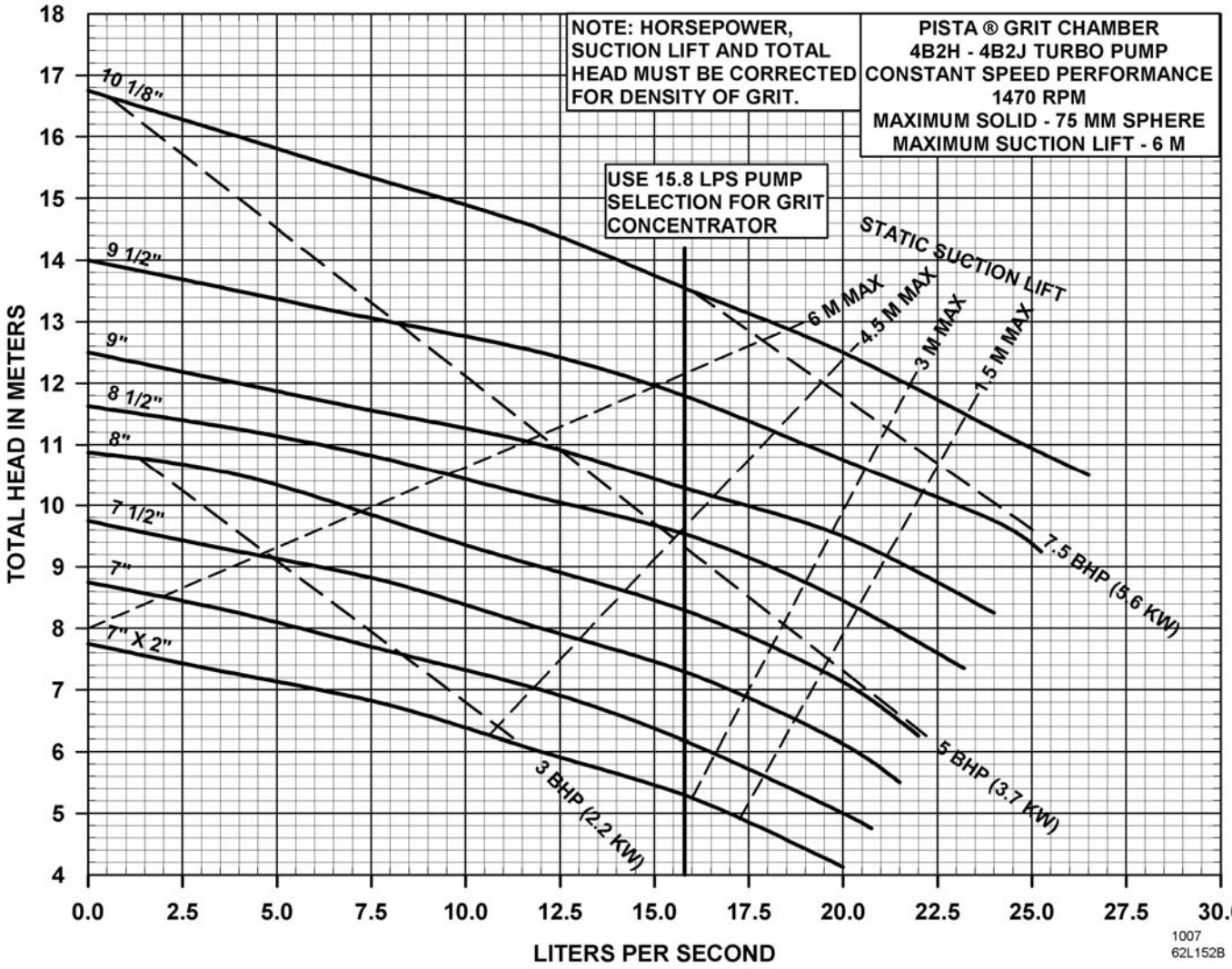
Static Head A =	(X) (1.4) =	
Static Head B =	(Y) (0.4) =	
Friction Head F =	(EPL) (f) (1.4) =	
Pump P =		2.0
Concentrator C =		
TDH =	A + B + F + P + C =	

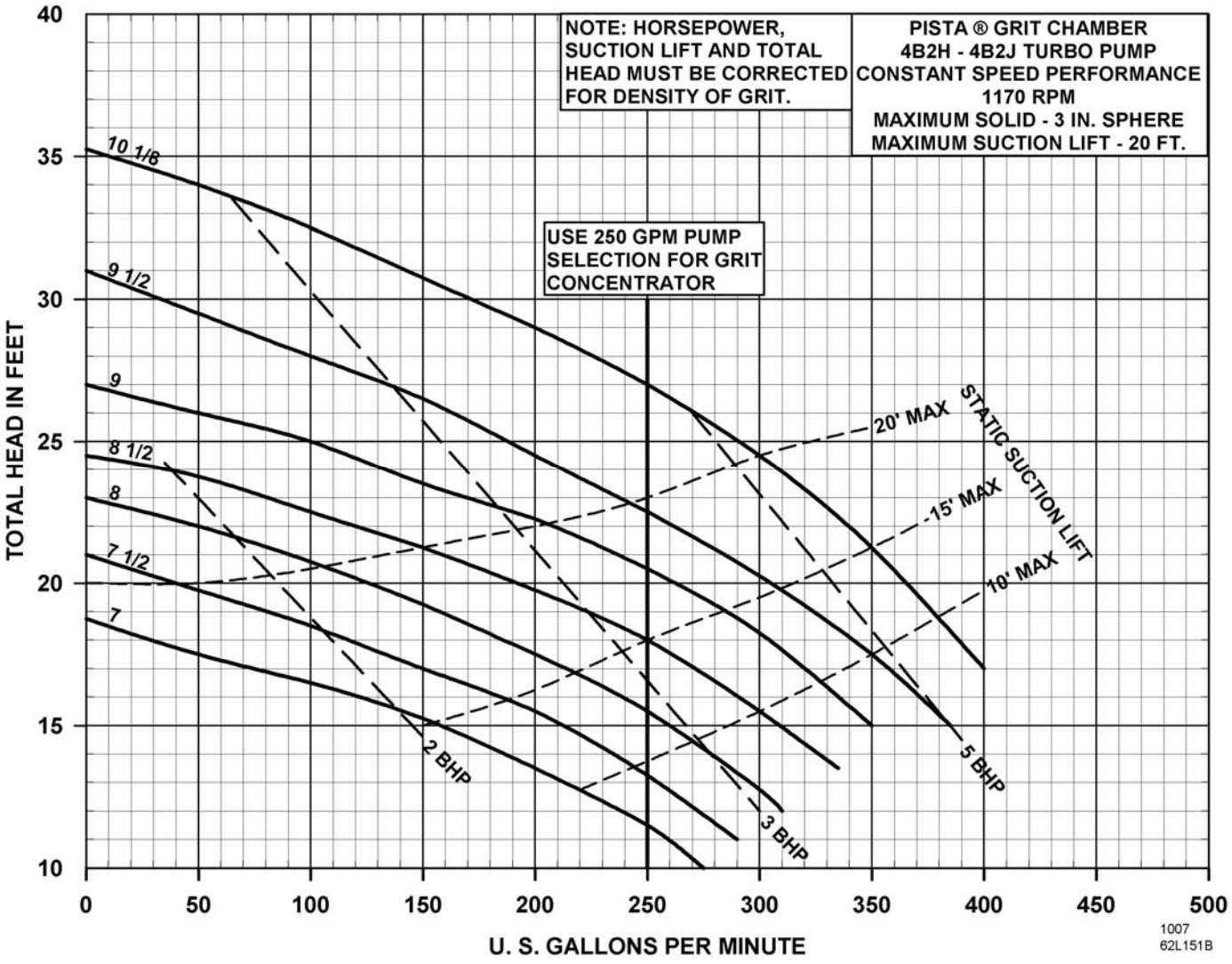
Pump Pick
RPM
BHP from curve
(BHP from curve) (1.4) = HP draw at design
Impeller Size

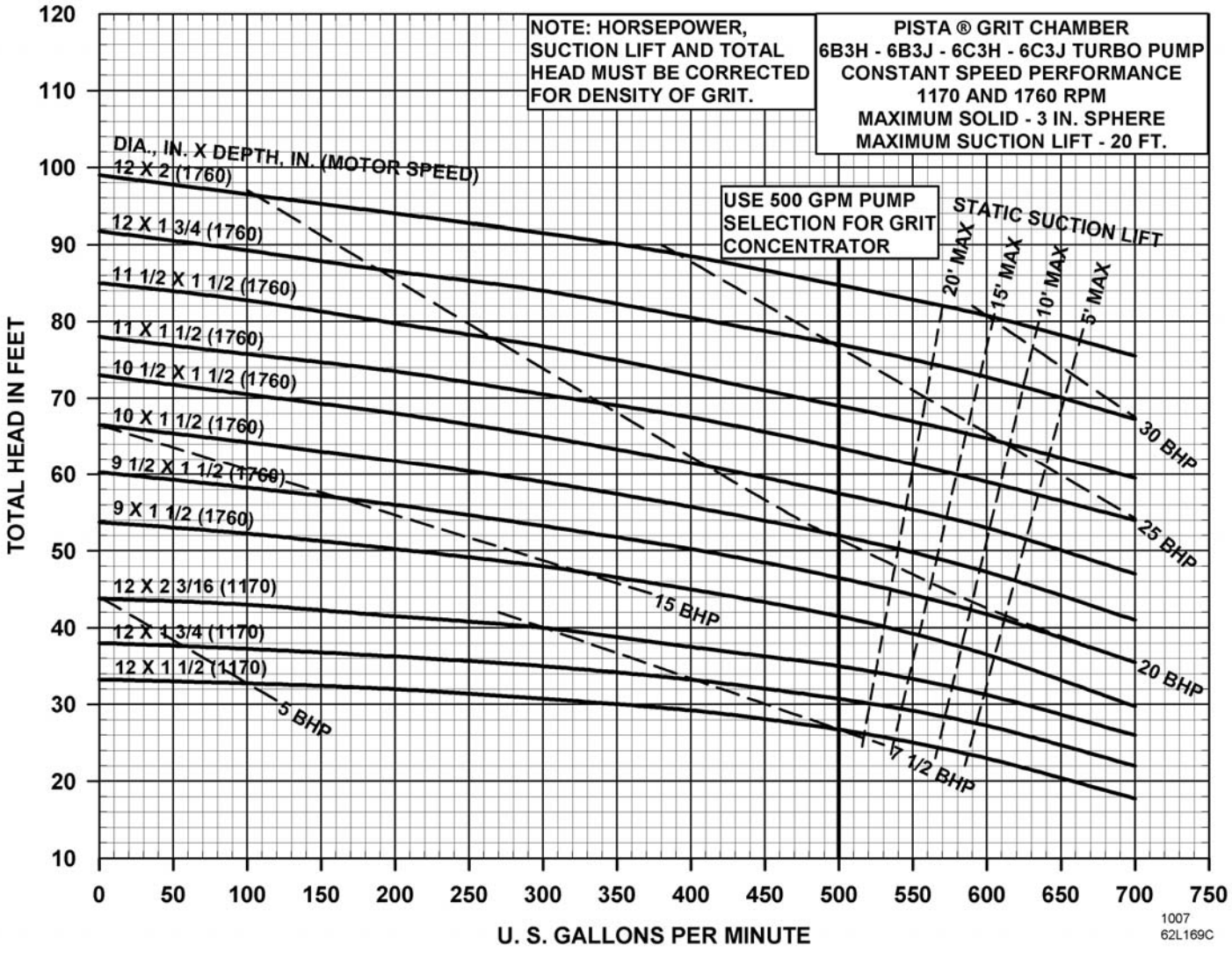
PISTA® Grit Removal System



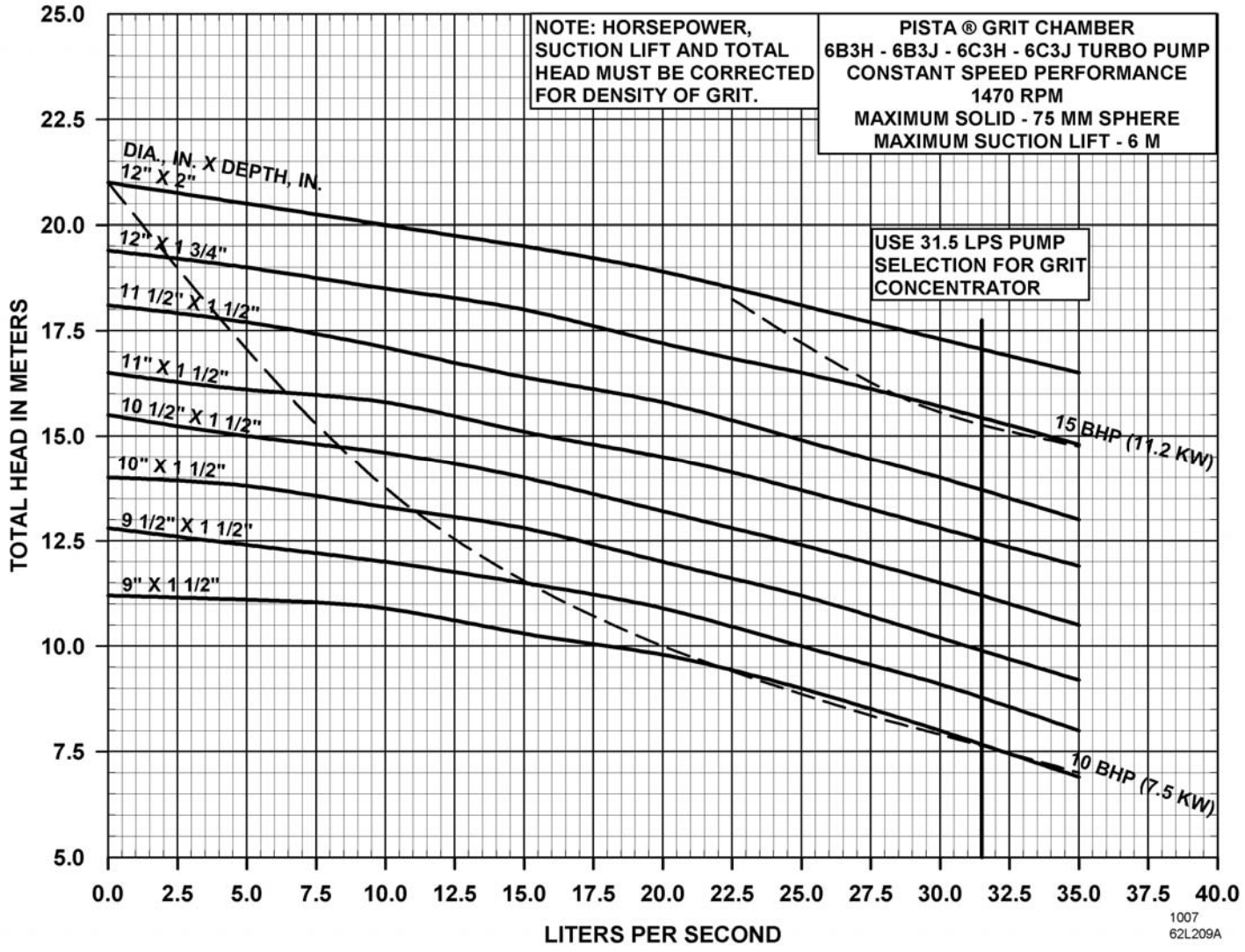
PISTA® Grit Removal System







PISTA® Grit Removal System



PISTA® Grit Removal System

BAR SCREEN

A suitable bar screen is recommended ahead of the **PISTA®** Grit Chamber to prevent sticks and other foreign objects from entering the unit. This bar screen should preclude material that might cause clogging in the grit storage hopper.

A mechanically cleaned bar screen, ahead of the **PISTA®** Grit Chamber, requires consideration in placement and operation. The mechanically cleaned bar screen that is used continually should be placed so that its flume centerline is in line with the **PISTA®** Grit Chamber influent centerline. A manually cleaned bypass bar screen should be placed to one side when the intent is to use it infrequently during maintenance of the mechanically cleaned screen.

The mechanically cleaned bar screen builds up a dam of debris when it is not operating. This dam traps water and grit, surcharging the influent sewer. When the bar screen starts its cleaning process the dam is immediately removed and a surge of water and grit from the sewer passes through the **PISTA®** Grit Chamber. The solution to this problem is to operate the bar screen often with a timer to prevent a high dam of debris on the screen. The bar screen should not be considered as part of the **PISTA®** Grit Chamber influent channel.

GRIT PUMPING

The location of the second stage **PISTA®** Grit Concentrator should be adjacent to the **PISTA®** Grit Chamber. The grit discharge line from the Turbo Pump should be 4" diameter to minimize clogging for 250 GPM flow, and 6" for 500 GPM flow.

The second stage **PISTA®** Grit Concentrator should always be employed and it is necessary to use the Turbo Pump for optimum flow and pressure to this device. The grit discharge line must be run as direct as possible, minimizing the number of bends and elbows.

The length of the grit discharge line should not exceed 50'. Consult the factory if more than 50' is required. Arrangement drawings 67C176, 67C177 AND 67C178 depict typical routing of the discharge line for various final dewatering devices. The return line, from the second stage **PISTA®** Grit Concentrator to the **PISTA®** Grit Chamber inlet channel, should be a minimum of 6" diameter.

Airlift type grit removal devices are not recommended, as the Turbo **PISTA®** Grit Pump and **PISTA®** Grit Concentrator combination provide much cleaner grit and allow for the dewatering unit to do a much better job.

ENVIRONMENTAL CONSIDERATIONS

The grit discharge line will need to contain a 4" or 6" valve as shown on the drawings. When the Top Mounted Turbo **PISTA®** Grit Pump is used, this valve may be manually or automatically controlled. Regardless of how employed, when the Turbo **PISTA®** Grit Pump is used we recommend the valve be left open when the pump is not operating. This keeps the discharge line free from grit and water and prevents freezing. The vacuum line should be heat taped where freezing is a consideration.

The second stage **PISTA®** Grit Concentrator is self-draining and should not be a problem in freezing temperatures. However, since the final dewatering device (screw conveyors, etc.) will set above grade, they will be totally exposed to the environment, and hence, subject to freezing problems encountered in cold climates. Depending on the climate, the only well engineered solution may be a heated housing around the entire **PISTA®** unit or location inside a building. Please consult the factory for any needed assistance in this area.

A suitable floor drain should be provided in the area of the final dewatering equipment to facilitate runoff and wash down. It is suggested that this drain be sized to handle a maximum flow of 200 GPM. A hose bib for wash-down is also recommended.

PISTA® GRIT CHAMBER VARIABLE AND FIXED DIMENSIONS

The following dimensions are fixed for each model:

Steel Tank	Models 0.5 – 7.0 *	Models 0.5A – 7.0A **
ID Upper Chamber	A	A
Width of Discharge Flume	B	B
Width of Inlet Flume	C	B
ID Storage Hopper	F	36”
ID Base of Grout	H	12”
Slope of Storage Hopper	--	--

*** Refer to Drawing 67D168.**

**** Refer to Drawing 67D133.**

Concrete Tank	Models 0.5 – 100.0 *	Models 0.5A – 100.0A **	Models 0.5B – 100.0B ***
ID Upper Chamber	A	A	A
Width of Discharge Flume	B	B	B
Width of Inlet Flume	C	B	B
ID Storage Hopper	F	--	--
ID Base of Grout	H	--	--
Slope of Storage Hopper	--	--	--
Diameter of Floor Plate	N	--	--

*** For 4” pump, reference Drawing 67D132 or 67D135.**
For 6” pump, reference Drawing 67B252 or 67B254.
**** For 4” pump, reference Drawing 67D167 or 67D179.**
For 6” pump, reference Drawing 67B246 or 67B248.
***** For 4” pump, reference Drawing 67B310 or 67B315.**
For 6” pump, reference Drawing 67B316 or 67B317.

The upper chamber height and storage hopper depth may be increased, but affect Turbo **PISTA®** Grit Pump suction lift. See Notes on Design applicable to selection of the Turbo **PISTA®** Grit Pump.

Dimension L (C – on Models 0.5A – 100.0A and 0.5B – 100B) is a maximum water level at the design peak flow of the unit for a specific downstream condition. This level should not be exceeded, as bridge interference or other problems may occur. The most important thing is to make sure the inlet channel velocities are in accordance with the described requirements.

PRINCIPLES OF GRIT PIPING

As we all know, a chain is only as strong as the weakest link. This also applies to grit removal. In many cases, the weak link is the grit piping between the grit storage hopper and the grit handling equipment.

Grit plugging can be a real problem if the piping is not laid out correctly. For this reason, Smith & Loveless recommends the use of the top mounted Turbo **PISTA®** Grit Pump. This arrangement prevents any chance of plugging within the pump suction line because the suction line is in the vertical position, and drains after every pumping cycle.

If a remote mounted suction-type pump is used, the pump suction line should be as short as possible, preferably less than 10' long. The ideal situation is to have a short, straight suction run directly into the side of the bottom of the grit storage chamber with an eccentric plug valve to isolate the pump. Smith & Loveless recommends a slight incline (1/8" per foot) up from the pump to the storage chamber. This prevents air entrapment from occurring. Do not use a "turn down" elbow for the suction line in the grit storage hopper. Never have the suction line exit the grit storage hopper vertically down through the bottom, or plugging will occur.

When using the remote mounted suction pump, the grit storage hopper should be pumped completely out every cycle. This prevents grit from accumulating within the suction line. A flushing connection should also be incorporated into the grit pump suction line to allow for flushing should plugging occur. Never use elbows in the suction line; however, if elbows are necessary, sanitary tees with clean out capability must be used.

The eccentric plug valve located in the pump suction line should be turned, so that the rubber face seals against the flow from the **PISTA®** Grit Chamber. If it is not turned in this direction, grit will pack around the movable plug, on the backside, and prevent it from turning. Small engineering details such as this can prevent a real problem from occurring.

Smith & Loveless often sees two grit pumps specified in order to provide 100% back-up. Normally when this occurs, the pumps are tied in together. Smith & Loveless does not recommend this because it only provides additional elbows and piping. Bottom line, it creates additional places for grit to plug the line. Instead, Smith & Loveless recommends specifying a spare rotating assembly for 100% backup. As you know, the Smith & Loveless pump is designed so that the rotating assemblies can be changed out in a matter of minutes, limiting any down time.

The discharge piping length should be kept to a minimum (less than 20'), and as straight as possible. Doing this eliminates unnecessary elbows and fittings. The piping must not contain any traps that can accumulate grit.

The isolation valve on the discharge side of the pump must be a pinch valve. A pinch valve is preferred because it seals even if grit is present within the valve. The pinch valve must be located in the vertical position to eliminate accumulation of grit within the valve. Check valves must never be used in any grit pumping line. Not only do they provide the opportunity for plugging; but they also very rarely work properly, and will wear quickly due to the presence of grit. The pump must also operate for a sufficient length of time to clear the line entirely of grit.

Another link in the grit removal chain is the use of good screening equipment ahead of the **PISTA®** Grit Chamber. This prevents large debris from entering the system and plugging the pipelines.

Smith & Loveless offers a complete line of grit handling equipment – the **PISTA®** Grit Removal System – along with diagrams showing the best possible arrangement.

In summary, Smith & Loveless recommends the use of the top mounted Turbo **PISTA®** Grit Pump, which eliminates the possibility of plugging within the pump suction pipe. The Turbo **PISTA®** Grit Pump incorporates a recessed Ni-Hard impeller for added wear resistance. Smith & Loveless further recommends coupling the Turbo **PISTA®** Grit Pump with the **PISTA®** Grit Concentrator, which provides for secondary treatment of residual organics and secondary grit dewatering. The **PISTA®** Grit Concentrator returns 93-94% of the water pumped to it along with 95-96% of the residual organic matter. Along with the Turbo **PISTA®** Grit Pump and the **PISTA®** Grit Concentrator, Smith & Loveless recommends the use of the new **PISTA®** Grit Screw Conveyor with parallel plates. The **PISTA®** Grit Screw Conveyor provides unequaled retention of fine grit. When you couple grit-handling equipment, such as this, along with the straight thru **PISTA®** Grit Chamber, you have a grit removal system that was designed specifically for grit removal

PISTA® GRIT REMOVAL SYSTEM

applications, coordinated to work as a complete system, and is second to none. This system removes more grit from the incoming wastewater than any other system, and provides a low maintenance grit handling system.

The following is a layout checklist for the grit pumping equipment.

1. The top mounted Turbo **PISTA®** Grit Pump is recommended for use because it limits the possibility of grit plugging within the suction line.

2. If a remote mounted suction pump is used, incorporate the following:

    a. Plug valves or pinch valves to isolate the pump.

    b. A flushing connection.

    c. Slope up the pump suction line from the pump to the **PISTA®** Grit Chamber.

    d. Never use elbow in the suction line; however, if they are necessary, you must use quick disconnect fittings or sanitary tees with a clean-out.

    e. Suction line must be less than 10’ long.

    f. Discharge piping must be less than 20’ long.

    g. All unnecessary elbows, bends, dips or manifolds should be eliminated.

    h. The discharge valve is recommended to be a pinch valve.

    i. The grit pumping cycle must be long enough to completely move all of the grit out of the **PISTA®** Grit Storage Hopper and also continue to pump long enough to remove all grit from the line.

    j. Do not locate traps in the suction or discharge line.

    k. Do not use check valves in grit piping.

ELECTRICAL SEQUENCE OF OPERATION FOR THE PISTA® GRIT REMOVAL SYSTEM USING THE TOP MOUNTED TURBO PISTA® GRIT PUMP

The Smith & Loveless **PISTA®** Grit Removal System is a complete grit removal system. It includes a paddle drive unit for the **PISTA®** Grit Chamber, a Top Mounted Turbo **PISTA®** Grit Pump for grit removal from the **PISTA®** Grit Chamber, a **PISTA®** Grit Concentrator for grit washing and hydraulic load reduction, and a **PISTA®** Grit Screw Conveyor for dewatering material discharged by the Turbo **PISTA®** Grit Pump. Additionally, Smith & Loveless supplies a control panel to automatically control the operation of this system. The proper sequence of each piece of equipment is important to maintain efficient operation of the system.

The **PISTA®** Grit Chamber's paddle drive runs continuously. There is no reason to shut down the paddle drive except for preventative maintenance or repair. An "Off-On" selector switch on the front of the control panel controls the drive.

The Turbo **PISTA®** Grit Pump and **PISTA®** Grit Screw Conveyor operate as a unit in the automatic mode to remove the grit from the bottom of the **PISTA®** Grit Chamber. Each has its own Hand-Off-Auto selector switch, if needed, for manual operation.

The Turbo **PISTA®** Grit Pump is controlled by a 24-hour, 96-pin clock timer controlling the frequency of initiation of the pump. In parallel with the timer, there is a pushbutton on the panel for manual starting of the Turbo **PISTA®** Grit Pump at anytime without interfering with the timed cycle. Once the Turbo **PISTA®** Grit Pump is running there is a timer to control the length of time the pump operates each cycle. The Turbo **PISTA®** Grit Pump stops when the timer "times out". The priming of the pump starts automatically within the startup sequence of the Turbo **PISTA®** Grit Pump. The Turbo **PISTA®** Grit Pump will only start after it receives a signal from a control relay saying that it has primed. There is also a "Fail" timer on the prime circuit. If it takes too long to prime, the grit cycle shuts down and a prime fail light on the panel illuminates.

The **PISTA®** Grit Screw Conveyor will start once the Turbo **PISTA®** Grit Pump is proven to be running. It is connected to an adjustable "Off Delay" timer to continue running (10-15 minutes) to remove all the grit once the Turbo **PISTA®** Grit Pump is shut off. Once the conveyor stops, the entire system is reset and ready for the next cycle. If the conveyor fails to start within 30 seconds, a timer will time out and shut down the Turbo **PISTA®** Grit Pump also.

PISTA® Grit Removal System

ELECTRICAL SEQUENCE OF OPERATION FOR THE PISTA® GRIT REMOVAL SYSTEM USING THE REMOTE MOUNTED TURBO PISTA® GRIT PUMP

The Smith & Loveless **PISTA®** Grit Removal System is a complete grit removal system. It includes a paddle drive unit for the **PISTA®** Grit Chamber, a Remote Mounted Turbo **PISTA®** Grit Pump for grit removal from the **PISTA®** Grit Chamber, a **PISTA®** Grit Concentrator for grit washing and hydraulic load reduction, and a **PISTA®** Grit Screw Conveyor for dewatering material discharged by the Turbo **PISTA®** Grit Pump. Additionally, Smith & Loveless supplies a control panel to automatically control the operation of this system. The proper sequence of each piece of equipment is important to maintain efficient operation of the system.

The **PISTA®** Grit Chamber's paddle drive runs continuously. There is no reason to shut down the paddle drive except for preventative maintenance or repair. An "Off-On" selector switch on the front of the control panel controls the drive.

The Turbo **PISTA®** Grit Pump and **PISTA®** Grit Screw Conveyor operate as a unit in the automatic mode to remove the grit from the bottom of the **PISTA®** Grit Chamber. Each has its own Hand-Off-Auto selector switch, if needed, for manual operation.

The Turbo **PISTA®** Grit Pump is controlled by a 24-hour, 96-pin clock timer controlling the frequency of initiation of the pump. In parallel with the timer, there is a pushbutton on the panel for manual starting of the Turbo **PISTA®** Grit Pump at anytime without interfering with the timed cycle. Once the Turbo **PISTA®** Grit Pump is running there is a timer to control the length of time the pump operates each cycle. The Turbo **PISTA®** Grit Pump stops when the timer "times out".

The **PISTA®** Grit Screw Conveyor will start once the Turbo **PISTA®** Grit Pump is proven to be running. It is connected to an adjustable "Off Delay" timer to continue running (10-15 minutes) to remove all the grit once the Turbo **PISTA®** Grit Pump is shut off. Once the conveyor stops, the entire system is reset and ready for the next cycle. If the conveyor fails to start within 30 seconds, a timer will timeout and shut down the Turbo **PISTA®** Grit Pump also.

PISTA® GRIT REMOVAL SYSTEM

ENGINEERING DATA

Smith &
Loveless, Inc.®

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

DESIGN DATA TABLES

The following ten (10) tables will assist you in sizing and specifying your **PISTA®** Grit Removal System. Tables 1 & 2 detail the straight through or 360-degree **PISTA®** Grit Chamber utilizing concrete for the chamber. Table 3 details the **PISTA®** Grit Chamber utilizing a steel chamber. Table 4 is the 270-degree **PISTA®** Grit Chamber utilizing concrete for the chamber. Table 5 covers the **PISTA®** grit storage volume. Table 6 details the Turbo **PISTA®** Grit Pump. Table 7 covers the **PISTA®** Grit Concentrator and Tables 8, 9 and 10 are three (3) final dewatering **PISTA®** systems to select from.

Starting on page F5, you will find tables that contain the design date in metric units.

Table 1
PISTA® GRIT CHAMBER DESIGN DATA – CONCRETE TANK – 360° UNITS

Model	0.5A, 0.5B	1.0A, 1.0B	2.5A, 2.5B	4.0A, 4.0B	7.0A, 7.0B	12.0A, 12.0B	20.0A, 20.0B
Maximum Flow (MGD)	0.5	1.0	2.5	4.0	7.0	12.0	20.0
Chamber Diameter	6' – 0"	6' – 0"	7' – 0"	8' – 0"	10' – 0"	12' – 0"	16' – 0"
Chamber Depth	3' – 8"	3' – 8"	4' – 6"	4' – 8"	5' – 0"	6' – 8"	7' – 6"
Grit Hopper Diameter	3' – 0"	3' – 0"	3' – 0"	3' – 0"	3' – 0"	5' – 0"	5' – 0"
Grit Hopper Depth	5' – 0"	5' – 0"	5' – 0"	5' – 0"	5' – 6"	6' – 8"	6' –10"
Drive: HP	3/4	3/4	3/4	1	1	1-1/2	1-1/2
Input RPM	54	54	54	54	54	54	54
Output RPM	20	20	20	20	20	20	20
Estimated Shipping Wt. (Lbs.)	2000	2000	2000	2000	2500	2500	3000

Table 2
PISTA® GRIT CHAMBER DESIGN DATA – CONCRETE TANK – 360° UNITS

Model	30.0A, 30.0B	50.0A, 50.0B	70.0A, 70.0B	100.0A, 100.0B
Maximum Flow (MGD)	30.0	50.0	70.0	100.0
Chamber Diameter	18' – 0"	20' – 0"	24' – 0"	32' – 0"
Chamber Depth	9' – 2"	11' – 6"	12' – 8"	12' – 8"
Grit Hopper Diameter	5' – 0"	5' – 0"	6' –0"	8' – 0"
Grit Hopper Depth	7' – 0"	8' – 0"	8' – 0"	10' – 0"
Drive: HP	2	2	2	2
Input RPM	54	54	54	54
Output RPM	20	20	20	20
Estimated Shipping Wt. (Lbs.)	3000	3700	4000	5000

Table 3
PISTA® GRIT CHAMBER DESIGN DATA – STEEL TANK – 360° UNITS

Model	0.5A, 0.5B	1.0A, 1.0B	2.5A, 2.5B	4.0A, 4.0B	7.0A, 7.0B
Maximum Flow (MGD)	0.5	1.0	2.5	4.0	7.0
Chamber Diameter	6'-0"	6' – 0"	7' – 0"	8' – 0"	9' – 10 ¼"
Chamber Depth	2' – 6 5/8"	2' – 6 5/8"	3' – 4 5/8"	3' – 6 ¾ "	3' – 10 ¾"
Grit Hopper Diameter	3' – 0"	3' – 0"	3' – 0"	3' – 0"	3' – 0"
Grit Hopper Depth	5' – 0"	5' – 0"	5' – 0"	5' – 0"	5' – 6"
Drive: HP	3/4	3/4	3/4	1	1
Input RPM	54	54	54	54	54
Output RPM	20	20	20	20	20
Estimated Shipping Wt. (Lbs.)	4000	4000	4500	5500	7000

Table 4 PISTA® GRIT CHAMBER DESIGN DATA – CONCRETE TANK – 270° UNITS											
Model	**0.5**	**1.0**	**2.5**	**4.0**	**7.0**	**12.0**	**20.0**	**30.0**	**50.0**	**70.0**	**100.0**
Maximum Flow (MGD)	0.5	1.0	2.5	4.0	7.0	12.0	20.0	30.0	50.0	70.0	100.0
Chamber Diameter	6' – 0"		7' – 0"	8' – 0"	10' – 0" *	12' – 0"	16' – 0"	18' – 0"	20' – 0"	24'– 0"	32' – 0"
Chamber Depth	3' – 8"		3' – 8"	4' – 0"	4' – 9"	5' – 0"	5' – 6"	6' – 6"	8' – 0"	8' – 0"	10' – 0"
Grit Hopper Diameter	3' – 0"		3' – 0"	3' – 0"	5' – 0"	5' – 0"	5' – 0"	5' – 0"	5' – 0"	6' – 0"	8' – 0"
Grit Hopper Depth	5' – 0"		5' – 0"	5' – 0"	5' – 6"	6' – 8"	6' – 10"	7' – 0"	8' – 0"	8' – 0"	10' – 0"
Drive: HP	3/4		3/4	3/4	1	1	2	2	2	2	2
Input RPM	54		54	54	37	37	36	36	36	36	36
Output RPM	20		20	20	14	14	13	13	13	13	13
Estimated Shipping Wt. (Lbs.)	2000		2000	2000	2500	2500	3000	3000	3000	3000	3000
Add for Steel Shell	2300		2600	3300	4800	N/A	N/A	N/A	N/A	N/A	N/A

* 9' – 10-¼" in Steel

Now that you have selected the **PISTA®** Grit Chamber model you require, you can determine the grit storage volume in the **PISTA®** Grit Chamber.

Table 5 PISTA® GRIT CHAMBER GRIT HOPPER STORAGE VOLUME **	
MODEL	**CUBIC FEET**
0.5, 0.5A, 0.5B	32
1.0, 1.0A, 1.0B	32
2.5, 2.5A, 2.5B	32
4.0, 4.0A, 4.0B	32
7.0A, 7.0B	35
7.0	76
12.0, 12.0A, 12.0B	100
20.0, 20.0A, 20.0B	102
30.0, 30.0A, 30.0B	106
50.0, 50.0A, 50.0B	125
70.0, 70.0A, 70.0B	164
100.0, 100.0A, 100.0B	335

** Volumes seen above are based on the hopper dimensions listed in Tables 1 through 4, and utilizing a 60° sloped bottom in the **PISTA®** Grit Chamber's grit hopper.

The following **PISTA®** Grit Removal System components will provide the end-user with the best removal and dewatering efficiencies in the market. In order to provide periodic pump out of the grit chamber, Smith & Loveless recommends the use of the Top Mounted Turbo **PISTA®** Grit Pump or Remote Mounted Turbo **PISTA®** Grit Pump (Table 6). Smith & Loveless then recommends the use of the **PISTA®** Grit Concentrator (Table 7) and one of three **PISTA®** Grit Dewatering Devices (Tables 8, 9, & 10). This total Grit Removal System will produce some of the best grit removal efficiencies and dewatering capabilities on the market today.

Table 6
RECOMMENDED FOR ALL PISTA® GRIT CHAMBER MODELS
GENERAL INFORMATION
TURBO PISTA® GRIT PUMP

Pump Rate, GPM	**250**	**500**
Casing Suction Size Discharge Nozzle	4” 4”	6” 6”
Impeller Max. Diameter Min.	10” 7”	12” 9”
Shaft Size for Mechanical Seal	1-7/8” or 2-1/8”	1-7/8”, 2-1/8” or 3”
Shaft	Stainless Steel	Stainless Steel
Seal Holder	Bronze	Bronze
Seal	Carbon and Ceramic	Carbon and Ceramic
Shaft Overhang (Lowest Bearing to Top of Impeller)	6” Max.	6” Max.
Motor Insulation	Class F	Class F
Casing	Ni-Hard	Ni-Hard
Impeller Design/Material	Recessed 5-Vane Turbo/Ni-Hard	Recessed 5-Vane Turbo/Ni-Hard
Estimated Shipping Weight – Lbs. (Including Motor)	750	970

Table 7
RECOMMENDED FOR ALL PISTA® GRIT CHAMBER MODELS
GENERAL INFORMATION
PISTA® GRIT CONCENTRATOR

Pump Rate, GPM - Inlet	**250**	**500**
Head loss through Concentrator, FT @ Design Pump Rate	12	25
Underflow, GPM @ Design Pump Rate	20	30
Inlet Diameter (outer diameter), Inches (plain end)	4-1/2	4-1/2
Underflow Outlet Diameter (outer diameter), Inches (plain end)	5-1/2	4-3/4
Drain Outlet Diameter, Inches (flanged)	6	6
Material – Nickel Hardened Iron, Brinell Hardness	550+	550+

Table 8
PISTA® GRIT SCREW CONVEYOR WITH PARALLEL PLATE SEPARATOR
RECOMMENDED FOR ALL PISTA® GRIT CHAMBER MODELS

Model	15	17
Drawing Number	67C168	67B202
Dewatering Trough Length	15' – 0"	17' – 0"
Dewatering Screw Diameter	9"	14"
Discharge	8"	12"
Outlet Weir Trough	4"	6"
Drive Motor (HP)	1	3
Screw Speed (RPM)	9	11
Angle of Inclination	22°	22°
Overall Length	18' – 8"	20' – 9"
Inlet Separator:		
Length	5' – 0"	6' – 8"
Width	2' – 6"	4' – 0"
Height	4' – 8"	5' – 6"
Settling Area	15.1 ft^2	33.0 ft^2
Approximate Shipping Weight (LBS.)	2000	3000
Maximum Capacity (GPM)	50	100

Table 9
SEPARATOR SCREEN WITH PISTA® GRIT CONCENTRATOR

HEIGHT	WIDTH	DEPTH	INLET	OUTLET	EST. WT.	RECOMMENDED PISTA® MODELS
80-7/8"	39-3/4"	49"	4"	6"	660 Lbs.	0.5, 0.5A, 0.5B, 1.0, 1.0A, 1.0B, 2.5, 2.5A, 2.5B, 4.0, 4.0A, 4.0B, 7.0, 7.0A, 7.0B

Table 10
PISTA® GRIT CART

APPROXIMATE OVERALL DIMENSIONS			APPROX. SHIP. WT. POUNDS	RECOMMENDED PISTA® GRIT CHAMBER MODELS
LENGTH	WIDTH	HEIGHT		
55"	35"	32"	200	0.5, 0.5A, 0.5B, 1.0, 1.0A, 1.0B, 2.5, 2.5A, 2.5B, 4.0, 4.0A, 4.0B

1.0 GENERAL DESCRIPTION

One Model 4.0B **PISTA**® grit removal systems, suitable for installation in a concrete structure. Each **PISTA**® shall be complete with the following: drive motor, spur gear final drive head, air bell, propeller, fluidizer vanes, **V-FORCE BAFFLE™**, drive tube, top mounted grit pump, second stage concentrator, and dewatering grit screw. Automatic electrical controls in NEMA 4X enclosure and remotely located vacuum priming panel in NEMA 4Xs also included.

2.0 PISTA® GRIT REMOVAL EQUIPMENT

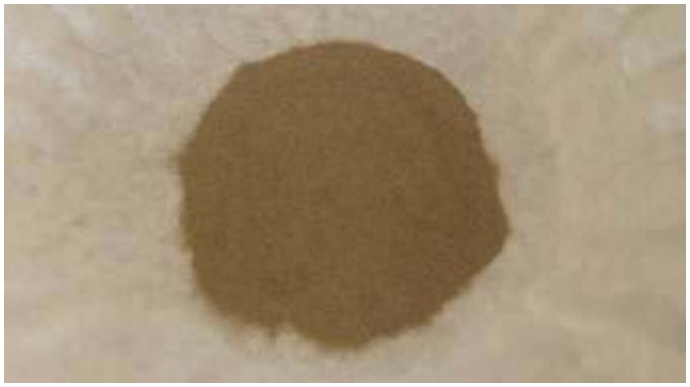
The flow in the removal chamber shall travel between the inlet and outlet a minimum of 360 degrees, providing maximum travel of the liquid for effective grit removal. Each **PISTA**® system shall handle all flows equal to or less than the hydraulic peak flow of 4.0 MGD.

The fluidizing vanes provide mechanical fluidization of the lower hopper and eliminate the need for additional water lines to the chamber. This eliminates at least 20 gpm of continuous water addition or requirement to re-treat of over 10 million gallons per year.

The headloss through the unit can be less than ¼ inch with open **V-FORCE BAFFLE™** throat opening, assuming water level is being controlled downstream of the new grit tank. The maximum headloss with internal baffle controlling water levels is less than 2.4" at the peak flow of 4.0 MGD (**recommended**).

The **PISTA**® with **V-FORCE BAFFLE ™** shall be capable of removing 95% of grit particles down to 140 mesh (105 micron) particle size.

Fine grit removed by **PISTA**® system.



The standard dimensions of the Model 4.0B **PISTA**® are as follows:

Upper Chamber Diameter	8'-0"
Upper Chamber Depth	4'-8"
Lower Chamber Diameter	3'-0"
Lower Chamber Depth	5'-0"
Inlet & Outlet Channel Widths	2'-0"

3.0 CORROSION PROTECTION

All fabricated steel components shall be commercial blasted and prime coated by the Manufacturer with one 3-mil DFT coat of Tnemec 66-1211 prior to shipment. All motors and gearboxes shall be furnished with the original manufacturer's coating. Final touch up and finish painting is the responsibility of the purchasing contractor. Components in 304 or 316 stainless steel available.

4.0 ITEMS NOT INCLUDED

- Field assembly/erection or installation
- Interconnecting piping, wiring and conduit
- Field paint, painting, and final surface preparation
- Lubricants
- Anchorage, anchor bolts
- Field testing, if required
- Grouting
- All concrete work

Complete **PISTA**® Grit Removal System Installation Photo

5.0 DELIVERY, TERMS, BUDGET PRICING

Submittal drawings and other technical engineering details are expected to be complete in 4-6 weeks after receipt of a purchase order. Once Smith & Loveless receives approved drawings, manufacturing would take 14-16 weeks.

Payment Terms -To be determined

Budget Price List (FOB, Factory) – Offer Valid for 90 days.

One Model 4.0B **PISTA**® System	$140,000
One Carbon Steel V-Force Baffle	Included
One Carbon Steel Grit Chamber Mechanism	Included
One Top Mounted Turbo Grit Pump with Ni-Hard impeller and volute	Included
One Ni-Hard Concentrator	Included
One Carbon Steel Screw Conveyor	Included
Adder for 304 SS Model 250 Turbo Grit Washer (in lieu of Screw Conveyor)	$40,000
Freight	Included
Start up and training	Included

Smith & Loveless Inc.
Above All Others.

PISTA® TURBO™ Grit Washer

FEATURING Tri-Cleanse Technology™

- **Intense Hydro-Flushing**
- **High Air Infusion**
- **Thorough Grit Agitation**

PISTA® TURBO™ Grit Washer Provides Superior Grit Quality

The **PISTA® TURBO™** Grit Washer uses **TRI-CLEANSE TECHNOLOGY™** to produce clean grit while minimizing the odor caused by putrescible organics and the costs associated with growing landfill restrictions. Smith & Loveless' **PISTA® TURBO™** Grit Washer featuring **TRI-CLEANSE TECHNOLOGY™** boasts a sleek, compact design with a similar footprint to S&L's **PISTA®** Grit Screw Conveyor.

The **PISTA® TURBO™** Grit Washer uses an inlet hopper to receive the mixture of water and grit from the second stage **PISTA®** Grit Concentrator, and is equipped with an energy dissipation zone to prevent turbulence in the remaining portion of the hopper. Parallel plates located in the settling zone of the hopper improve the retention of fine grit.

The custom-engineered and patented screw has the unique **PISTA®** Grit Fluidizing Vanes in the washer hopper anda continuous shaft design off the flight segment.

A dedicated PLC controller provides the necessary control functions to properly operate the **PISTA® TURBO™** Grit Washer through its various cycles and to control the operation of the air infusion, grit wash water and spray water.

Features

- Superior Organics Removal
- Excellent Fine Grit Retention
- Stainless Steel Construction
- Triple Washing Action
- Passes Paint Filter Test
- Sleek, Compact Design
- Large Capacity
- Made in America

Why a PISTA® TURBO™ Grit Washer?

- Increasing Landfill Restrictions and Disposal Costs
- Growing Concerns About Odor and Disease-Carrying Insects
- Opportunity to Reuse/Sell Cleaned Grit for Road Bedding
- Planning for Stricter Environmental Regulations in United States

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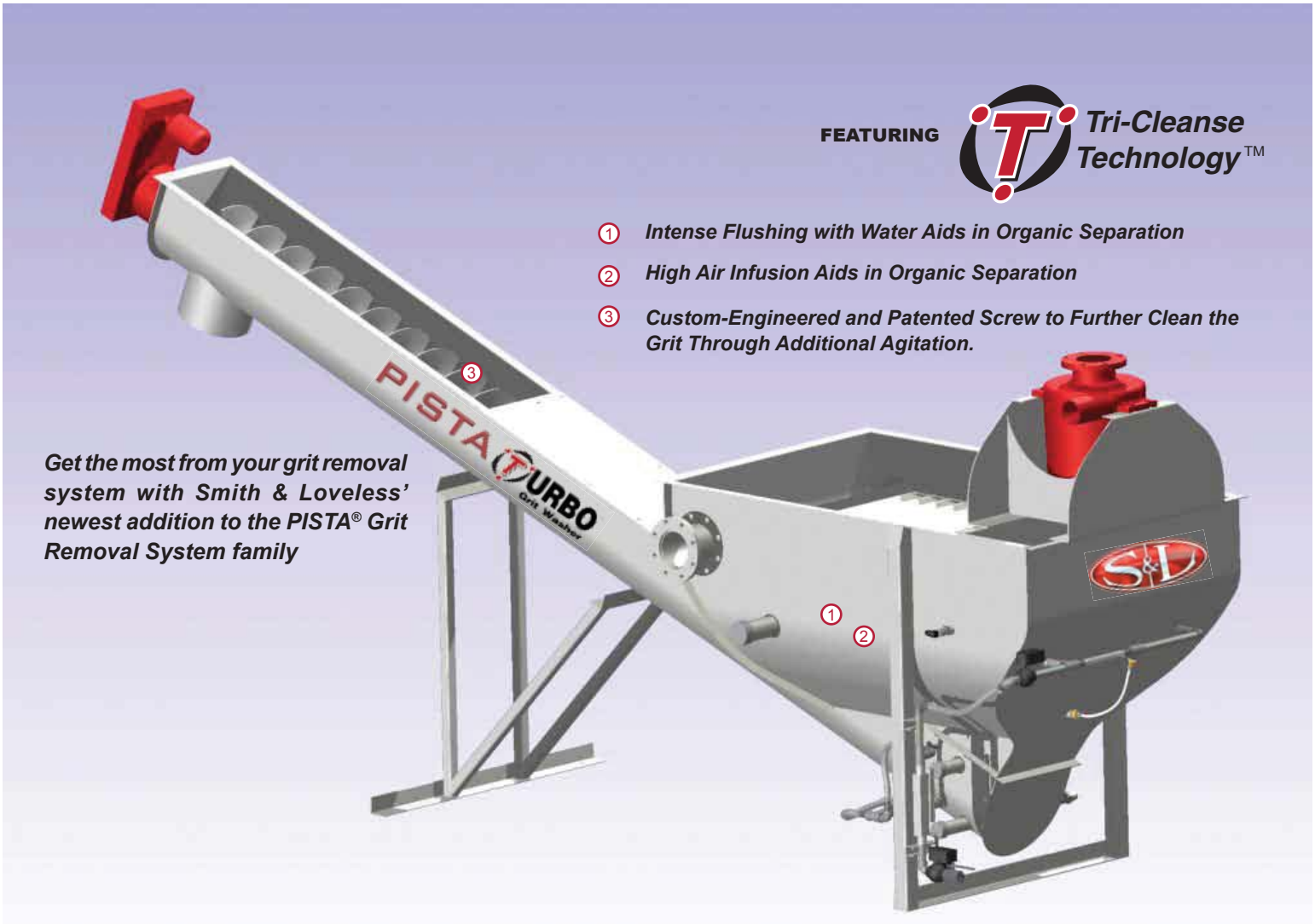
PISTA® TURBO™ Grit Washer with Triple-Action Washing



PISTA® TURBO™ Grit Washer Performance Details

- Grit retention of 95% down to 140 mesh (105 microns) particle size
- Less than or equal to 5% putrescible organic material in washed grit
- Less than 10% water content in washed grit
- Passes paint filter test

Model	Grit Slurry Feed Rate	Maximum Capacity
Model 250	250 GPM / 16 LPS	41 ft^3/hr (2.47 tons/hr) / 1.2 m^3/hr (2.2 metric tons/hr)
Model 500	500 GPM / 32 LPS	172 ft^3/hr (10.36 tons/hr) / 4.9 m^3/hr (9.4 metric tons/hr)

Advantages

- Drier, cleaner grit with less putrescible organic material
- Less odor
- Parallel plates aid in fine particle retention
- Choice of materials: 304 Stainless, 316 Stainless or Painted Carbon Steel
- System includes only one motor and drive to maintain
- Designed and manufactured in America

PISTA TURBO Grit Washer

Parkson™
Treating Water Right

Hycor® Helicon® Spiral Conveyor

Automatic, trouble-free solids handling for municipal and industrial applications

The Hycor® Helicon® Spiral conveyor is the answer for efficient, reliable automatic transport.

The conveyor is frequently used in conjunction with other Hycor equipment to create a solids management system that conveys the screened solids to washing or dewatering, and ultimately to disposal.

The Helicon conveyor is totally enclosed. Bolt-on covers contain odors, keep extraneous materials out, eliminate spills and minimize housekeeping.

Receiving screenings from multiple pieces of equipment

The conveyor is part of the proven Hycor family of liquid/solid separation equipment based on shaftless spiral technology. Hycor's shaftless spiral design is extremely simple, uncomplicated and will provide years of trouble-free performance.

The shaftless spiral provides clear, unrestricted throughput with no center shaft to snag or wrap solids. There are no intermediate hanger bearings to obstruct flow and no maintenance-intensive end bearings.Whether solids are dry, moist, viscous, bulky, fibrous or stringy, the Helicon handles them all with smooth, quiet, vibration-free performance.

Even particles of different sizes move through the trough unimpeded. The Helicon conveyor is quality fabricated. The housing and covers are corrosion-resistant stainless steel, and the transport spiral is heavy-duty, high strength carbon steel.

Shaftless conveying spiral provides clear, unrestricted throughput

Helicon® Conveying Features

- Labor-saving, automatic, reliable conveyance adds new efficiency to the process
- Smooth running, heavy-duty shaftless spiral provides large capacity, trouble-free conveying, even for difficult fibrous or stringy material
- Totally enclosed conveying system keeps transport areas clean, contains odors and alleviates spills
- Versatile, cost-efficient – can be specified with multiple entry points to collect material from different equipment
- Rugged, durable, trough liner
- Low maintenance – no hanger or loaded end bearings to grease and repair or to snag solids
- User-friendly! Operates smoothly and automatically
- Specify push or pull design for maximum flexibility

Optional bagger assembly minimizes odors and reduces housekeeping

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Anchorage, AK 99518

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(907) 273-2797 - **FAX**

Contact Us Online by Email: CUSTOMER SERVICE

Alaska Waste is proud to offer a diverse range of commercial waste services to Anchorage and the surrounding communities. From reliable commercial front load services for offices, restaurants, and apartment buildings to maximum capacity containers for large businesses and contractors, our commercial waste services feature a variety of sizes of dumpsters, roll offs, and compactors to meet your needs.

Commercial Front Load Services

Whether you are a small business owner, property manager, or you are just working on a home remodel project, Alaska Waste offers commercial waste services tailored to fit your needs. For small to mid-size projects, our commercial front load dumpsters are available in a range of sizes from 2.6 to 8.0 cubic yards to accommodate your commercial waste disposal needs.

- **2.6 cubic yards** – This front load container is ideal for small businesses, duplexes, and fourplex buildings.
- **4.0 – 6.0 cubic yards** – Well suited for medium-sized businesses and office buildings, a 4.0 or 6.0 cubic yard front load container also works well for home remodel projects and smaller construction projects.
- **8.0 cubic yards** – For large businesses, restaurants, and multi-unit apartment buildings and condominiums, an 8.0 cubic yard front load container provides additional space for your commercial waste collection needs.

Commercial Hook lift and Roll-off Services:

At Alaska Waste, our commercial hook lift and roll off services provide commercial waste solutions for do it yourselfer's, homebuilders, and commercial contractors Anchorage and the surrounding communities. Our hook lift and roll off service containers are available in 10, 12, 15, and 40 cubic yard dimensions to provide commercial waste solutions for even the largest projects.

- **10-12 cubic yards** – These commercial hook lift containers work well for home remodeling projects, roofing projects, and small construction sites.
- **15 cubic yards** – Our 15 cubic yard roll off container provides the additional space that may be needed to accommodate the commercial garbage hauling needs of retail shopping centers, commercial warehouses, and larger construction sites.
- **40 cubic yards** – The 40 cubic yard roll off container is our largest commercial container and is well suited for large demolition projects and commercial construction sites.

Commercial Compactor Services:

Alaska Waste offers commercial compactor services for larger businesses, office buildings, and multi-tenant shopping centers, in and around Anchorage. Ranging in size from 15 to 37 cubic yard capacities, compactors offer a convenient solution for businesses or buildings that accumulate commercial waste and recyclable materials at a faster rate.

TIPS FOR NEW COMMERCIAL WASTE SERVICE CUSTOMERS

The list below highlights items prohibited by the Municipality of Anchorage (MOA) through regular commercial refuse collection. A complete list, including disposal options, can be viewed at www.muni.org/sws/disposalrestrict.cfm which details the necessary handling for each item, or MOA Solid Waste Services (SWS) can be reached at 343-6262.

- Hazardous Waste
- Medical Waste
- Liquid Waste
- Chemical products
- Paints, Thinners and Removers

- Herbicides and Pesticides
- Oil filters (unless drained for 24 hours)
- Oil rags or any type of oily waste
- Refrigerators or Freezers
- Fluorescent tubes are considered hazardous as they often contain mercury. Proper disposal procedures vary depending on quantity, contact SWS for options.
- Tires exceeding a quantity of 10 must be taken directly to the landfill for disposal. All tires must be removed from the rims.
- Industrial Process Waste (except for roll offs), contact Alaska Waste Customer Service at 563-3717 for more information
- Radioactive materials, naturally occurring (NORM)
- Dirt and Rocks

REMINDERS:

- To avoid spillage, and/or additional charges, please make sure lids are closed and all contents are within the dimension of the containers. Commercial waste should not be stacked above the top of the container or left outside of the container.
- Please ensure that your container is free from parked vehicles or other objects in front and around the container. This will allow us to provide service on your scheduled service day and help avoid potential accidents.

For more information about our roll off service or other commercial waste services that Alaska Waste offers in this area, please contact the Anchorage Customer Service Department at (907) 563-3717.

EMAIL CUSTOMER SERVICE WASILLA: (907) 376-2158 KENAI: (907) 283-9390 EAGLE RIVER: (907) 688-4446 HOMER: (907) 235-8539
ANCHORAGE: (907) 563-3717 FAIRBANKS: (907) 452-2009 KODIAK: (907) 486-5308 SEWARD: (907) 224-5833

APPENDIX C

Calculations

Project: Eagle River Wastewater Treatment Facility Headworks
Client: AWWU
Date: 02/22/2015
Future Population Calculations

Year	Eklutna	Birchwood	Peters Creek	Chugiak	Eagle River	Eagle River Valley	South Fork	Total	r for Birchwood	r for Chugiak	r for Eagle River	r for E.R. Valley	r for South Fork
2010	0	583	0	549	6323	9681	580	17716					
2011	0	616	0	550	6405	9823	621	18015	0.053571429	0.001818182	0.012802498	0.014455869	0.066022544
2012	0	649	0	551	6489	9966	663	18317	0.050847458	0.001814882	0.012944984	0.014348786	0.063348416
2013	0	683	0	551	6573	10111	705	18623	0.049780381	0	0.012779553	0.014340817	0.059574468
2014	0	819	0	552	6627	10230	720	18949	0.166056166	0.001811594	0.008148483	0.011632454	0.020833333
2015	0	957	0	553	6682	10351	735	19278	0.144200627	0.001808318	0.008231069	0.011689692	0.020408163
2016	0	1097	0	554	6738	10473	750	19612	0.127620784	0.001805054	0.008311072	0.011649002	0.02
2017	0	1238	0	555	6795	10596	766	19950	0.113893376	0.001801802	0.008388521	0.011608154	0.020887728
2018	0	1381	0	556	6852	10721	781	20291	0.103548154	0.001798561	0.008318739	0.01165936	0.019206146
2019	0	1525	0	557	6910	10848	797	20637	0.09442623	0.001795332	0.008393632	0.011707227	0.020075282
2020	0	1672	0	558	6968	10976	813	20986	0.08791866	0.001792115	0.008323766	0.011661808	0.019680197
2021	0	1825	0	559	7030	11110	830	21353	0.083835616	0.001788909	0.008819346	0.012061206	0.020481928
2022	0	1980	0	560	7092	11246	847	21724	0.078282828	0.001785714	0.008742245	0.012093189	0.020070838
2023	0	2141	0	563	7150	11383	864	22101	0.075198505	0.005328597	0.008111888	0.012035492	0.019675926
2024	0	2308	0	566	7210	11522	879	22484	0.072357019	0.005300353	0.008321775	0.012063878	0.017064846
2025	0	2477	0	569	7270	11663	894	22872	0.068227695	0.005272408	0.008253095	0.012089514	0.016778523
2026	0	2640	0	584	7319	11797	907	23246	0.061742424	0.025684932	0.006694904	0.01135882	0.014332966
2027	0	2784	0	607	7369	11933	919	23612	0.051724138	0.037891269	0.006785181	0.011396966	0.013057671
2028	0	2930	0	630	7419	12071	933	23982	0.049829352	0.036507937	0.006739453	0.011432359	0.015005359
2029	0	3077	0	654	7469	12210	946	24357	0.047773806	0.036697248	0.006694337	0.011384111	0.013742072
2030	0	3227	0	678	7521	12351	959	24736	0.046482801	0.03539823	0.006913974	0.01141608	0.013555787
2031	0	3310	0	696	7545	12423	967	24940	0.025075529	0.025862069	0.003180915	0.005795702	0.008273009
2032	0	3395	0	714	7569	12495	974	25146	0.025036819	0.025210084	0.003170828	0.005762305	0.007186858
2033	0	3479	0	732	7593	12567	982	25353	0.024144869	0.024590164	0.003160806	0.005729291	0.00814664
2034	0	3565	0	750	7617	12639	990	25562	0.024742268	0.025210084	0.003170828	0.005762305	0.008213552
2035	0	3653	0	769	7641	12712	998	25774	0.024742268	0.025210084	0.003170828	0.005762305	0.008213552
2036	0	3744	0	789	7665	12785	1006	25990	0.024742268	0.025210084	0.003170828	0.005762305	0.008213552
2037	0	3836	0	809	7690	12859	1015	26209	0.024742268	0.025210084	0.003170828	0.005762305	0.008213552
2038	0	3931	0	829	7714	12933	1023	26431	0.024742268	0.025210084	0.003170828	0.005762305	0.008213552
2039	0	4028	0	850	7739	13008	1031	26656	0.024742268	0.025210084	0.003170828	0.005762305	0.008213552
2040	0	4128	0	871	7763	13083	1040	26885	0.024742268	0.025210084	0.003170828	0.005762305	0.008213552
2041	0	4230	0	893	7788	13158	1048	27118	0.024742268	0.025210084	0.003170828	0.005762305	0.008213552
2042	0	4335	0	916	7812	13234	1057	27354	0.024742268	0.025210084	0.003170828	0.005762305	0.008213552
2043	0	4442	0	939	7837	13310	1066	27594	0.024742268	0.025210084	0.003170828	0.005762305	0.008213552
2044	0	4552	0	963	7862	13387	1074	27838	0.024742268	0.025210084	0.003170828	0.005762305	0.008213552
2045	0	4665	0	987	7887	13464	1083	28086	0.024742268	0.025210084	0.003170828	0.005762305	0.008213552

Year	r (%)
2011-2020	1.18
2021-2030	1.22
2031-2040	0.67
avg. r	1.02

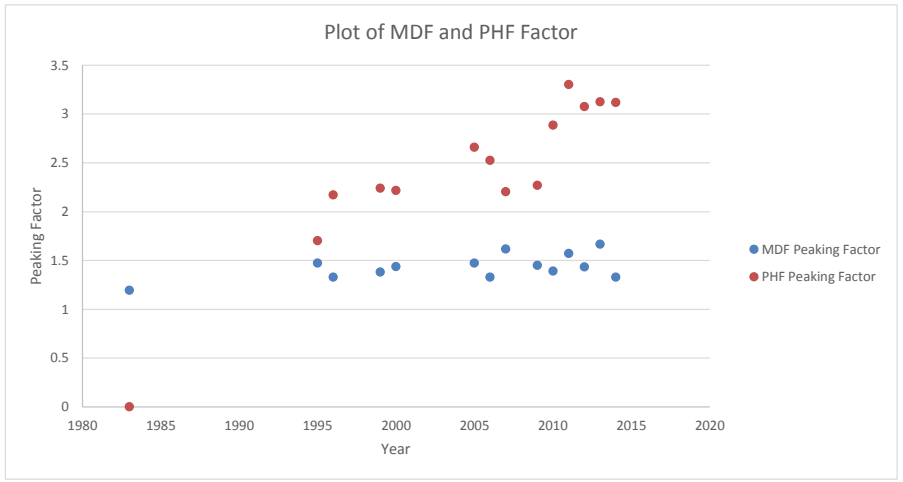
The year's calculated for service population growth.
The future year's population we are interested in.

Project: Eagle River Wastewater Treatment Facility Headworks
Client: AWWU
Date: 2/12/2015

Peaking Factors for MDF and PHF

Year	ADF (MGD)	MDF (MGD)	PHF (MGD)	MDF Peaking Factor	PHF Peaking Factor
1983	0.628	0.75		1.194267516	0
1995	1.34	1.974	2.282	1.473134328	1.702985075
1996	1.29	1.712	2.8	1.327131783	2.170542636
1999	1.34	1.849	3	1.379850746	2.23880597
2000	1.34	1.924	2.97	1.435820896	2.21641791
2005	1.52	2.24	4.04	1.473684211	2.657894737
2006	1.52	2.02	3.84	1.328947368	2.526315789
2007	1.51	2.44	3.33	1.61589404	2.205298013
2009	1.44	2.09	3.27	1.451388889	2.270833333
2010	1.32	1.834	3.81	1.389393939	2.886363636
2011	1.34	2.104	4.425	1.570149254	3.302238806
2012	1.44	2.063	4.427	1.432638889	3.074305556
2013	1.37	2.282	4.281	1.665693431	3.124817518
2014	1.42	1.888	4.428	1.329577465	3.118309859

Below is a graphical presentation of the MDF and PHF factors. Over the time period, the peaking factors are shown to be constantly linear To be conservative, the MDF factor of 1.8 and PHF factor of 3.6 were recommended.



Project: Eagle River Wastewater Treatment Facility Headworks

Client: AWWU

Date: 3/24/2015

Channel Sizing

Manning's Equation

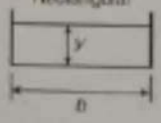
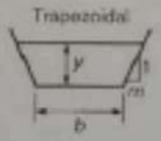
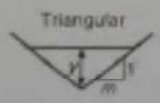
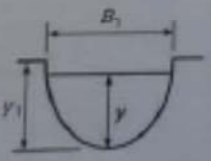
$$V = \frac{1.49 * R^{2/3} s^{1/2}}{n}$$

V	= Avg. velocity (length/time, usually ft/s)
s	= Water surface slope (unitless)
R	= Hydraulic radius (length, usually ft)
n	= Roughness coefficient
1.49	= English units conversion factor, set to 1.0 for metric

Conversion

Q (cfs) = Q (mgd) x 1.547

TABLE 2.1 Geometric elements for channels of different shape (y = flow depth)

Section	Area, A	Wetted Perimeter, P	Top Width, B
Rectangular 	by	$b + 2y$	b
Trapezoidal 	$y(b + my)$	$b + 2y(1 + m^2)^{1/2}$	$b + 2my$
Triangular 	my^2	$2y(1 + m^2)^{1/2}$	$2my$
Circular[1] 	$(\theta - \sin\theta)\, d^2/8$	$\theta d/2$	$d \sin(\theta/2)$
Parabolic[1] 	$(2/3)\, By$	$(B/2)\{(1 + x^2)^{1/2} + (1/x) \ln [x + (1 + x^2)^{1/2}]\}$	$B_1(y/y_1)^{1/2}$

[1] $\theta = 2 \cos^{-1}[1 - 2(y/d)]$
$\dagger x = 4y/B$

From Sturm, *Open Channel Hydraulics*, McGraw-Hill, 2009.

Project: Eagle River Wastewater Treatment Facility Headworks

Client: AWWU

Date: 4/15/2015

Manning Calculations

Manning Pipe Flow Calculator:

http://www.hawsedc.com/engcalcs/Manning-Pipe-Flow.php

Set units: m mm ft inches

Pipe diameter, d_0	24	inches
Manning roughness, n ?	0.011	
Pressure slope (possibly ? equal to pipe slope), S_0	0.3	% rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	100	%

Results:

Flow, q	9.4630	MGD
Velocity, v	4.6609	ft/sec
Velocity head, h_v	4.0516	inches
Flow area	3.1416	ft^2
Wetted perimeter	6.2831	ft
Hydraulic radius	0.5000	ft
Top width, T	0.0000	ft
Froude number, F	0.00	
Shear stress (tractive force), tau	0.3746	psf

Manning N values:

http://www.engineeringtoolbox.com/mannings-roughness-d_799.html

Surface Material	Manning's Roughness Coefficient - *n* -
Asbestos cement	0.011

Project: Eagle River Wastewater Treatment Facility Headworks
Client: AWWU
Date: 03/24/2015
Flow Rates and Channel Sizes

FLOWRATES						
	2014 Annual Report			Calculated for 2045		
	MGD	*GPM*	*cfs*	*MGD*	*GPM*	*cfs*
Avg Day	1.4	972.22	2.17	2	1388.89	3.09
Peak Hr.	4.4	3055.55	6.81	8	5555.55	12.38
Min Day	1.1	763.89	1.70		0.00	0.00
Max Day	2.3	1597.22	3.56	4	2777.78	6.19

Qmin	1.70	cfs	
Qmax	12.38	cfs	
	n	dia. (ft)	width(ft)
Pipe	0.011	2	n/a
Rec	0.015	n/a	2

Influent Pipe								
Q (mgd)	Q (cfs)	A	P	R	S	Θ	y	V
1.05	1.63	0.53	1.98	0.27	0.003	1.98	0.45	3.07
1.30	2.01	0.61	2.09	0.29	0.003	2.09	0.50	3.27
1.56	2.42	0.70	2.21	0.32	0.003	2.21	0.55	3.45
1.85	2.87	0.79	2.32	0.34	0.003	2.32	0.60	3.62
2.16	3.35	0.89	2.43	0.36	0.003	2.43	0.65	3.78
2.49	3.85	0.98	2.53	0.39	0.003	2.53	0.70	3.93
2.83	4.38	1.08	2.64	0.41	0.003	2.64	0.75	4.07
3.19	4.93	1.17	2.74	0.43	0.003	2.74	0.80	4.21
3.56	5.51	1.27	2.84	0.45	0.003	2.84	0.85	4.33
3.94	6.10	1.37	2.94	0.47	0.003	2.94	0.90	4.45
4.33	6.70	1.47	3.04	0.48	0.003	3.04	0.95	4.56
4.73	7.32	1.57	3.14	0.50	0.003	3.14	1.00	4.66
5.14	7.95	1.67	3.24	0.52	0.003	3.24	1.05	4.76
5.54	8.58	1.77	3.34	0.53	0.003	3.34	1.10	4.84
5.95	9.21	1.87	3.44	0.54	0.003	3.44	1.15	4.93
6.36	9.84	1.97	3.54	0.56	0.003	3.54	1.20	5.00
6.76	10.46	2.07	3.65	0.57	0.003	3.65	1.25	5.07
7.16	11.08	2.16	3.75	0.58	0.003	3.75	1.30	5.12
7.55	11.68	2.26	3.86	0.59	0.003	3.86	1.35	5.18
7.92	12.26	2.35	3.96	0.59	0.003	3.96	1.40	5.22
8.29	12.82	2.44	4.08	0.60	0.003	4.08	1.45	5.26
8.63	13.35	2.53	4.19	0.60	0.003	4.19	1.50	5.28
8.95	13.85	2.61	4.31	0.61	0.003	4.31	1.55	5.30
9.25	14.31	2.69	4.43	0.61	0.003	4.43	1.60	5.31
9.52	14.73	2.77	4.56	0.61	0.003	4.56	1.65	5.31
9.75	15.09	2.85	4.69	0.61	0.003	4.69	1.70	5.30
9.94	15.39	2.91	4.84	0.60	0.003	4.84	1.75	5.28
10.09	15.61	2.98	5.00	0.60	0.003	5.00	1.80	5.24
10.17	15.73	3.03	5.17	0.59	0.003	5.17	1.85	5.18

Rectangular Channel								
Q (mgd)	Q (cfs)	A	P	R	S	y	V	
1.00	1.54	0.70	2.70	0.26	0.003	0.35	2.21	
1.22	1.88	0.80	2.80	0.29	0.003	0.40	2.35	
1.45	2.24	0.90	2.90	0.31	0.003	0.45	2.49	
1.69	2.61	1.00	3.00	0.33	0.003	0.50	2.61	
1.93	2.99	1.10	3.10	0.35	0.003	0.55	2.72	
2.19	3.39	1.20	3.20	0.38	0.003	0.60	2.82	
2.45	3.79	1.30	3.30	0.39	0.003	0.65	2.92	
2.72	4.20	1.40	3.40	0.41	0.003	0.70	3.00	
2.99	4.63	1.50	3.50	0.43	0.003	0.75	3.08	
3.27	5.06	1.60	3.60	0.44	0.003	0.80	3.16	
3.55	5.49	1.70	3.70	0.46	0.003	0.85	3.23	
3.84	5.93	1.80	3.80	0.47	0.003	0.90	3.30	
4.13	6.38	1.90	3.90	0.49	0.003	0.95	3.36	
4.42	6.84	2.00	4.00	0.50	0.003	1.00	3.42	
4.71	7.29	2.10	4.10	0.51	0.003	1.05	3.47	
5.01	7.76	2.20	4.20	0.52	0.003	1.10	3.53	
5.31	8.22	2.30	4.30	0.53	0.003	1.15	3.58	
5.62	8.69	2.40	4.40	0.55	0.003	1.20	3.62	
5.93	9.17	2.50	4.50	0.56	0.003	1.25	3.67	
6.23	9.64	2.60	4.60	0.57	0.003	1.30	3.71	
6.54	10.12	2.70	4.70	0.57	0.003	1.35	3.75	
6.86	10.61	2.80	4.80	0.58	0.003	1.40	3.79	
7.17	11.09	2.90	4.90	0.59	0.003	1.45	3.82	
7.48	11.58	3.00	5.00	0.60	0.003	1.50	3.86	
7.80	12.07	3.10	5.10	0.61	0.003	1.55	3.89	
8.12	12.56	3.20	5.20	0.62	0.003	1.60	3.93	
8.44	13.06	3.30	5.30	0.62	0.003	1.65	3.96	
8.76	13.55	3.40	5.40	0.63	0.003	1.70	3.99	
9.08	14.05	3.50	5.50	0.64	0.003	1.75	4.01	

Project: Eagle River Wastewater Treatment Facility Headworks
Client: AWWU
Date: 4/9/2015

Northern Communities Wastewater Usage Per Person

Year	Service Population	ADF (MGD)	Wastewater Usage (gpd)
2010	17716	1.32	74.5
2011	18015	1.34	74.4
2012	18317	1.44	78.6
2013	18623	1.37	73.6
2014	18949	1.42	74.9

Population growth trend data was obtained from WWMP 2014.
ADF data was obtained from ERWWTF annual reports.

From 2010 to 2014, with the exception of 2012, the wastewater usage for each person has been consistenly around 75 gpd.

For the 30-year outlook flow projections, a wastewater usage of 75 gpd was used.

Project: Eagle River Wastewater Treatment Facility Headworks
Client: AWWU
Date: 4/06/2015

Culvert Size

Rational Method

Q=C*i*A

Q	Peak Discharge (cfs)
C	Rational method runoff coefficient (.05 - .95)
i	Rainfall intensity (inch/hour)
A	Drainage area (acre)

C	1	
	Ground Cover	Runoff Coefficient, c
	Lawns	0.05 - 0.35
	Forest	0.05 - 0.25
	Cultivated land	0.08-0.41
	Meadow	0.1 - 0.5
	Parks, cemeteries	0.1 - 0.25
	Unimproved areas	0.1 - 0.3
	Pasture	0.12 - 0.62
	Residential areas	0.3 - 0.75
	Business areas	0.5 - 0.95
	Industrial areas	0.5 - 0.9
	Asphalt streets	0.7 - 0.95
	Brick streets	0.7 - 0.85
	Roofs	0.75 - 0.95
	Concrete streets	0.7 - 0.95
i	0.8	100 year storm event found on noaa website
A	1.2	(250*210)/43750
Q = 1*.8*1.2	0.96	
Q =	.96 cfs = 430 gpm	
	Use 8" culvert	

Eagle River Annual Report 2014

Month	Concentration - mg/l				Loadings - pounds				Effluent Flow MGD					Precip
	TSS mg/L DAILY AVE		BOD mg/L DAILY AVE		TSS # DAILY AVE		BOD # DAILY AVE		Min Day Flow	Peak	Total	Max Day Flow	Ave Daily/Month	
	INF	EFF	INF	EFF	INF	EFF	INF	EFF						
Jan	223	4.4	269	4	2,514	49	3,034	43	1.23	3.680	44.310	1.888	1.429	
Feb	186	2.8	263	3	2,103	31	2,976	36	1.30	3.428	38.764	1.537	1.384	
Mar	203	2.3	240	3	2,284	25	2,707	34	1.27	2.726	42.661	1.546	1.376	
Apr	208	2.3	251	3	2,417	27	2,918	29	1.31	2.970	42.974	1.604	1.432	
May	215	2.3	246	3	2,498	27	2,865	31	1.30	2.691	43.402	1.564	1.400	
Jun	216	2.9	267	3	2,414	32	2,990	36	1.28	3.266	41.046	1.518	1.368	
Jul	233	5.7	256	6	2,569	63	2,828	66	1.24	2.799	41.196	1.433	1.329	
Aug	246	2.5	263	3	2,715	27	2,910	32	1.11	3.552	41.481	1.503	1.338	
Sep	229	3.5	271	3	2,533	39	2,994	33	1.19	2.745	41.806	1.536	1.394	
Oct	200	2.3	250	3	2,165	25	2,718	38	1.25	4.428	41.256	1.468	1.331	
Nov	210	2.3	254	3	2,188	24	2,652	27	1.10	3.012	39.379	1.457	1.313	
Dec	225	2.3	299	3	2,373	25	3,160	30	1.09	2.849	40.003	1.441	1.290	
TOTAL					28,773	394	34,752	435			498.278			
AVER.	216	3.0	261	3	2,398	33	2,896	36	1.22	3.179	41.523	1.541	1.365	
									Ave Daily Flow - From Total =		1.37	01/24/14 = Date of Max Flow		

Month	Chemical Usage - pounds				Energy Used			Screenings		Sludge		SST % solids	Loads to Asplund	Gal/Load
	CAUSTIC SODA	SODA ASH SCADA	POLYMER	SODA ASH ROUNDS	POWER KWH	GENSET KWH	NAT GAS CCF	Gallons	Tons	Gallons Hauled	Dry Tons Hauled			
Jan	0	23575.35	125	21,577	145,680	1,080	5,812	22,000	4	205,952	52		64	3,218
Feb	0	22,541.12	120	17,536	136,440	840	7,632	22,000	4	160,900	43	7.1	51	3,218
Mar	0	28,162.53	150	18,728	151,320	960	6,046	22,000	4	215,807	64		67	3,221
Apr	0	25,346.10	135	17,362	147,720	720	4,113	33,000	6	186,644	55		58	3,218
May	0	22,619.06	115	19,719	151,560	1,080	1,613	22,000	4	196,298	56	6.8	61	3,218
Jun	0	21,578.92	86	21,953	138,960	1,560	938	22,000	4	177,879	47		56	3,176
Jul	0	22,825.63	96	21,259	162,480	360	568	24,750	4	144,588	41		45	3,213
Aug	0	27,489.98	95	25,254	146,640	840	947	19,250	3	148,028	42	6.8	46	3,218
Sep	0	23,368.54	80	21,680	144,720	1,080	1,748	22,000	4	163,715	46		51	3,210
Oct	0	21,095.13	95	20,524	160,920	960	4,892	27,500	5	154,562	44		48	3,220
Nov	0	24,491.25	85	23,493	149,160	720	6,995	19,250	3	167,215	46	6.1	52	3,216
Dec	0	23,510.00	90	24,035	154,200	840	7,563	27,500	5	164,098	42		51	3,218
TOTAL	0	286,604	1,272	253,120	1,789,800	11,040	48,867	283,250	50	2,085,686	578		650	38,564
AVER.	0	23,884	106	21,093	149,150	920	4,072	23,604	4	173,807	48	6.7	54	3,214

Eagle River Annual Report 2013

Month	Concentration - mg/l				Loadings - pounds				Effluent Flow MGD					Precip
	TSS mg/L DAILY AVE		BOD mg/L DAILY AVE		TSS # DAILY AVE		BOD # DAILY AVE		Min Day Flow	Peak	Total	Max Day Flow	Ave Daily/Month	
	INF	EFF	INF	EFF	INF	EFF	INF	EFF						
Jan	209	1.8	264	3	2,303	20	2,904	31	1.23	4.404	42.479	2.282	1.370	1.22
Feb	214	1.5	259	3	2,263	16	2,743	29	1.19	2.841	36.267	1.458	1.295	1.23
Mar	212	2.8	255	3	2,266	32	2,745	35	1.20	3.341	40.265	1.573	1.299	
Apr	209	2.6	233	<3	2,483	31	2,772	38	1.24	3.784	42.902	1.640	1.430	
May	196	1.0	231	3	2,430	12	2,873	32	1.40	4.253	46.915	1.804	1.513	
Jun	208	1.5	266	2	2,413	17	3,087	29	1.32	2.699	42.108	1.568	1.404	
Jul	212	2.4	260	3	2,391	27	2,937	31	1.28	2.922	41.411	1.474	1.336	
Aug	225	2.8	250	7	2,590	31	2,875	84	1.28	3.043	43.604	1.600	1.407	
Sep	218	1.8	233	3	2,664	21	2,845	35	1.37	3.641	46.969	1.885	1.566	
Oct	199	4.0	241	4	2,522	51	3,055	56	1.40	3.743	46.976	1.691	1.515	
Nov	186	2.0	234	3	2,268	25	2,859	34	1.38	4.281	44.733	1.689	1.491	
Dec	226	3.3	279	<3	2,593	37	3,198	34	1.31	3.644	43.069	1.550	1.389	
TOTAL					29,186	320	34,893	468			517.698			2.45
AVER.	210	2.3	250	<3	2,432	27	2,908	39	1.30	3.550	43.142	1.685	1.418	1.23
									Ave Daily Flow - From Total =		1.42	01/13/13 = Date of Max Flow		

Month	Chemical Usage - pounds				Energy Used			Screenings		Sludge		SST % solids	Loads to Asplund	Gal/Load
	CAUSTIC SODA	SODA ASH SCADA	POLYMER	SODA ASH ROUNDS	POWER KWH	GENSET KWH	NAT GAS CCF	Gallons	Tons	Gallons Hauled	Dry Tons Hauled			
Jan	0	24504.88	150	24,255	162,000	1,080	6,920	33,000	6	188,392	47	6.1	56	3,364
Feb	0	18,956.50	138	18,018	137,280	960	5,268	22,000	4	168,534	37	5.8	51	3,304
Mar	0	24,796.20	144	20,357	151,440	960	6,361	24,750	4	166,389	40		51	3,263
Apr	0	23,826.95	150	20,207	145,920	720	5,503	22,000	2	168,876	13	7.0	53	3,186
May	0	23,081.92	150	18,414	146,400	0	2,707	30,250	5	183,359	49	6.1	58	3,161
Jun	0	19,050.95	138	15,609	143,160	360	971	24,750	4	176,909	48	7.0	54	3,276
Jul	0	23,740.39	144	19,140	142,320	720	732	30,250	4	175,014	41	4.0	53	3,302
Aug	0	22,266.78	150	15,285	154,320	240	722	19,250	3	167,556	30	6.5	52	3,222
Sep	0	27,630.09	113	18,051	130,320	360	1,896	24,750	4	148,229	40	6.5	46	3,222
Oct	0	25,560.78	105	23,760	145,680	1,920	2,590	27,500	5	151,125	41		47	3,215
Nov	0	22,357.68	95	19,216	139,440	960	6,525	22,000	4	152,250	34	6.7	47	3,239
Dec	0	23,079.21	150	20,332	153,000	840	8,811	22,000	4	177,371	47	6.2	55	3,225
TOTAL	0	278,852	1,627	232,644	1,751,280	9,120	49,006	302,500	49	2,024,004	467		623	38,979
AVER.	0	23,238	136	19,387	145,940	760	4,084	25,208	4	168,667	39	6.2	52	3,248

APPENDIX D

Cost Estimation

MUNICIPALITY OF ANCHORAGE WATER WASTEWATER UTILITY
Eagle River Wastewater Treatment Facility Headworks Upgrade
Schedule of Values

	Description	Unit	Quantity	Unit Price	Cost
Equipment (Installation Included)					
	Helisieve Screening/Dewatering	Each	3	$65,000	$195,000
	Parshall Flume	Each	1	$5,500	$5,500
	PISTA 360 V Force Baffle Grit Removal	Each	3	$140,000	$420,000
	PISTA Turbo Grit Washer Grit Dewatering	Each	3	$40,000	$120,000
Construction and Materials					
General					
	Mobilization	LS	1	$180,502	$180,502
	Demobilization	LS	1	$97,191	$97,191
	Project Management	LS	1	$225,702	$225,702
Materials					
	Concret, Cast-in-Place	LS	1	$766,259	$766,259
	Structural Steel Framing	LS	1	$370,642	$370,642
	Grating	LS	1	$66,086	$66,086
	Carpentry	LS	1	$70,689	$70,689
	Metal Wall Panels	LS	1	$100,512	$100,512
	Metal Roof Panels	LS	1	$85,473	$85,473
	Steel Doors and Frames	LS	1	$9,439	$9,439
	Plastic Windows	LS	1	$12,586	$12,586
	Finish Hardware	LS	1	$9,436	$9,436
Installation					
	Structural Steel Framing-Erection	LS	1	$106,400	$106,400
	Grating	LS	1	$30,584	$30,584
	Carpentry	LS	1	$27,602	$27,602
	Metal Wall Panels	LS	1	$84,000	$84,000
	Metal Roof Panels	LS	1	$71,476	$71,476
	Steel Doors and Frames	LS	1	$9,727	$9,727
	Plastic Windows	LS	1	$9,727	$9,727
	Finish Hardware	LS	1	$9,727	$9,727
	Parshall Flume	LS		$21,616	$21,616
Mechanical					
	Process Piping-Material and Installation	LS	1	$23,520	$23,520
	Gate, Valves, and Operators- Material and Installation	LS	1	$191,800	$191,800

	Unit Heaters- Material and Installation	LS	1	$103,096	$103,096
	Power Ventilation-Material and Installation	LS	1	$67,760	$67,760
	HVAC- Material and Installation	LS	1	$221,200	$221,200
Electrical					
	Panels and Distribution	LS	1	$186,620	$186,620
	Electric Feeders	LS	1	$119,022	$119,022
	Power and Light Branch Cirtcuits	LS	1	$135,800	$135,800
	Power Trim	LS	1	$40,600	$40,600
	Luminairs Trim	LS	1	$51,800	$51,800
	Fire Alarm and Security	LS	1	$106,400	$106,400
Instrumentation					
	SCADA System	LS	1	$134,400	$134,400
Extras					
	Identification Devices	LS	1	$29,750	$29,750
	Cabinets, Fire Extinguishers, Accessories	LS	1	$15,053	$15,053
Finishes					
	Paints and Coatings	LS	1	$97,000	$97,000
Engineering					
	Engineering Design	LS	1	$1,500,000	$1,500,000
Contingency					
	15% Contingency	LS	1	$919,455	$919,455
TOTAL COST					
	Total Project Cost	LS	1	$7,049,152	**$7,049,152**

APPENDIX E

Permits

Municipality of Anchorage

Handout AG.06

Building Permit Requirements for Commercial Buildings

The following will be needed for application for a building permit. Permits are considered abandoned and expired if no activity occurs within 360 days. You must do enough work within this period of time to call for an inspection to prove activity. All fees are required upon submittal of application, with the exception of traffic review fees and landscape review fees, which are calculated during zoning review and are payable prior to issuance of any permit.

COMMERCIAL BUILDING (New and additions; for metal buildings, see Policy S.04)

1. Full legal description of property (lot, block and subdivision), street address, tax account number.

2. Two copies of Soil Engineers reports and recommendations for new building and additions.

3. Three sets of COMPLETE CONSTRUCTION PLANS (stamped and signed by appropriate Alaskan P.E. or Architect), showing how the building is to be built.

4. Code study, including building construction type, occupancy, exiting, and applicable code.

5. One set of engineering calculations and specifications for all commercial buildings.

6. Submit two copies of any previous agreements, clarifications, requests for Alternate Means and Methods, etc., when applicable. Agreements and other special considerations shall be signed by agreeing parties.

7. Three certified plot plans stamped and signed by a Professional Land Surveyor, registered in the State of Alaska, showing the proposed location of the building site and including the following information:

   LOT IDENTIFICATION
   - a) legal description
   - b) lot square footage
   - c) basis and evidence of horizontal control
   - d) lot line dimensions and directions
   - e) dedicated easements and rights-of-way
   - f) description of all found and established lot corner monumentation
   - g) north arrow, scale of map, grid number and date of survey

   SITE INFORMATION
   - a) basis of vertical datum
   - b) lot corner elevations
   - c) existing and proposed lot drainage pattern
   - d) building footprint dimensions and the location referenced to front, side and back lot lines measured to the nearest tenth of a foot.
   - e) proposed finished floor elevation land building corner elevations
   - f) dimensions of upper floor projections and roof and deck overhangs
   - g) location of any existing structure(s) and utilities referenced to the property line

Right-of-Way

Show all civil design items on and adjacent to the lot, such as existing and proposed water, sewer, storm drainage, and existing and proposed service connection lines.

Show existing and proposed roads, type of road (strip paved, gravel, etc.), presence and type of curb and gutter, sidewalks, trails, and other improvements in the right(s) of way.

Show the driveway(s) as existing or planned, type of road being joined into, and presence and type of curb and gutter.

All plot plans shall be sealed and signed by a professional Land Surveyor who is currently registered in the State of Alaska. The Surveyor shall state on the plot plan that he has conducted a physical survey of the lot and that he has found or established all the lot corners as shown on the plan and, to the best of his knowledge and abilities, all dimensions have been measured true and correct.

8. One State DEC approval for WELL AND SEPTIC TANK, if the building is to be on a private system, or written determination from the On-Site Water and Wastewater program at the Building Safety Division if on-site system is not required.

9. Plans submitted for commercial, industrial, 5-plex and above shall be drawn by a LICENSED ARCHITECT AND APPLICABLE ENGINEERS, by discipline registered in the State of Alaska. Change orders shall be endorsed by the professional designer of record.

10. Three copies of PARKING LOT LAYOUT conforming to Title 21 and 23 of AMC, showing access to adjoining roadways, limits of paving, dimensions of aisles and stalls, and indicating handicap parking stalls, loading berths and refuse collection areas. Fee for review may be required.

11. Three copies of HANDICAP RAMP DETAILS and HANDICAP SIGNAGE.

12. Two copies of ON-SITE DRAINAGE PLANS as per Appendix Chapter 70, Uniform Building Code, to an outfall which shows no impact on adjoining properties.

13. Three (3) signed copies of **Handout AG.21, Stormwater Treatment Plan Review, Stormwater Site Plan Review Checklist, Small and Large Projects** with supporting documents. One copy is to be attached to inspector's plans, one copy is for the contractor/job site, and one copy is provided for the Municipal project file

14. A Certified "as-built" of the complete structure must be submitted before any Conditional or Final Certificate of Occupancy will be issued. The "Completed Structural As-Built" will contain the following information:

    a) The drawing shall be identified as a "Final Structure As-Built";
    b) The legal description of the lot and record plat file number;
    c) The date of survey, north arrow, drawing scale and grid number;
    d) The Surveyor's name and address;
    e) The Surveyor's signed registered seal (must have original signature);
    f) A drawing depicting the lot lines, lot dimensions and bearings;
    g) The monumentation the Surveyor used to determine the location of the lot lines;
    h) Easements and right-of-ways of record and appropriate building setback requirements;
    i) The physical outline of the foundation with the field measured dimensions;
    j) Distance measured perpendicular to the property lines from the nearest corners of the foundation to the front, sides and rear property lines;
    k) A surveyor's certification stating:

    I (name of surveyor), hereby certify that I have performed an As-Built survey of the foundation on this lot and all the dimensions and information as shown hereon are true and no encroachments exist unless shown otherwise.

15. Any structure to be built in Hazard Zones 4 and 5 may require engineered design and Geotechnical Commission Review. Check with a Building Safety Division plans examiner for complete requirements.

16. Health Department approval for food service area (restaurants, grocery store, etc.) childcare and similar facilities, swimming pools, hot tubs, must be submitted before final approval will be given.

17. When required by Title 21, three copies of a landscape plan that includes the information specified by AMC 21.45.125(B). Fee involved.

18. Planning and Zoning Commission and Urban Design Commission approvals or resolutions when applicable.

COMMERCIAL BUILDING (Interior Alterations)

1. Three sets COMPLETE PLANS showing how alteration work is to be performed.

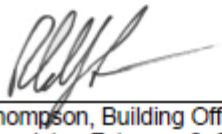
2. A code analysis for the building must be submitted to allow for complete review.

3. Submit two copies of any written previous agreements, clarifications and Requests for Alternate Methods and Materials, with signatures of approval, as required.

4. PARKING CALCULATION AND PARKING LAYOUT when changing occupancy or use of existing building. An additional fee will be charged.

5. Health Department approval for food service areas (restaurants, grocery stores, etc.) childcare and similar facilities, swimming pools, hot tubs, etc. must be submitted before final approval will be given.

6. When required by Title 21, three copies of a landscape plan that includes the information specified in AMC 21.45.125(B). An additional review fee will be charged.



Ron Thompson, Building Official
Effective date: February 9, 2006
(Ref. 96-12, 97-08, 00-03, 01-03, 02-05, 02-06; 03-08)

NEW COMMERCIAL BUILDING PRE-PERMIT CHECKLIST:		Check	Route	
1.	Completed **Commercial Permit Worksheet**		**S**	
2.	Three **Sets of Drawings** *stamped* by an Architect and Engineer *licensed* in the State of Alaska		**A**	
3.	One **Set of Calculations** to match the drawings			
4.	Three **Plot Plans** showing the proposed location of the building site, stamped by an Alaska registered Land Surveyor		**M**	
5.	**Code Study** showing construction type, use, and occupancy		**P**	
6.	Two **Geo Technical** reports (One to Mike Krueger, soils)		**E**	
7.	For lots requiring site water and/or sewer, a permit or application from DHHS must be provided.			
8.	**Plan Review Time**			
If all of the above has been provided and acceptable, approve the plan to be submitted for review. *CHECK-IN INITIALS*				

MUNICIPALITY OF ANCHORAGE
Storm Water Treatment Plan Review

CHECKLIST #2 – page 1 of 2

Projects disturbing 10,000 square feet or more

Use this checklist for all projects that disturb 10,000 square feet or more. This includes, but is not limited to, triplexes and larger multi-housing projects; commercial developments; single family residential or duplex; road, street, and drainage construction projects; filling and grading, and utility construction.

Project Name: _____ Permit Number_____

Area of Disturbance (acres):____ Project Type (single family/duplex/commercial/other): _____

Subdivision:_____ Lot:_____ Block:_____ Tract:_____ Parcel:_____

Street Address: _____

Contact Name_____ Phone Number:_____

The Minimum Requirements that may apply to any proposed new development or redevelopment are identified here and, if applicable, satisfied through the submission of an acceptable Storm Water Treatment Plan. Contents of Storm Water Treatment Plans vary with the size of parcel, type and size of proposed development, individual site characteristics, and other information required by the Municipality to assess compliance with Chapter 21 of the Municipal Code. Below is a list of the minimum components required for a complete submission of a Storm Water Treatment Plan.

SWTP Element	Area of Disturbance		
	Less than 10,000 square feet	10,000 square feet or more but less than one acre	One acre or greater
	Submittal of SWTP Element Required?		
Existing and Proposed Conditions, including: Description of o Existing conditions and Proposed development o Timetable of construction activities o Site drainage and receiving waters Location of wetlands, drainageways, streams and associated setbacks and easements Calculations used to determine runoff quantity and to design/select BMPs	No	Yes	Yes
Construction Stormwater Quality Control – Type of SWPPP	Type 1 [2,3]	Type 2 [2,4]	Type 3 [4]
• Site plan showing location of erosion and sediment control practices	Yes	Yes	Yes
• Dewatering plan	Yes [1]	Yes [1]	Yes [1]
• Copy of NOI	No [5]	No [5]	Yes
Preliminary Conditions Summary	Yes	Yes	Yes
Permanent Stormwater Quality Control Plan including Site plan showing location of permanent BMPs Calculations used to determine runoff quantity and to design/select BMPs	Yes [7]	Yes [7]	Yes [7]
Special Reports and Studies [6]	Yes	Yes	Yes
Other Permits	Yes	Yes	Yes
Operations and Maintenance Manual for permanent BMPs	Yes	Yes	Yes

[1] Required if groundwater or pumped discharges will be involved
[2] UNLESS: If the project is part of a common plan of development that collectively disturbs 10,000 square feet up to 1 acre, a Type 2 SWPPP is required. If the project is part of a common plan of development that collectively disturbs 1 acre or more, a Type 3 SWPPP is required.
[3] Type 1 SWPPP projects must submit Checklist #1.
[4] Type 2 and Type 3 SWPPP projects must submit a SWPPP in accordance with the Storm Water Treatment Plan Review Guidance Manual.
[5] UNLESS: A copy of the NOI is required if the project is part of a common plan of development that collectively disturbs one or more acres.
6 Special reports and studies includes a Drainage Plan, if prepared in compliance with Title 21.07 and the DCM; special reports and studies, such as soils, geotechnical, wetlands, or hydrological reports or analyses; pollution prevention plans applicable to permanent site activities, such as MultiSector General Permit SWPPPs or Spill Prevention Control and Countermeasure (SPCC) plans; and copies of other permits, such as a wetlands permit.
7 Permanent stormwater treatment BMPs are not required for single lot single-family residential or duplex projects.

MUNICIPALITY OF ANCHORAGE
Storm Water Treatment Plan Review

CHECKLIST #2 – page 2 of 2

Projects disturbing 10,000 square feet or more

OWNER'S or OWNER'S REPRESENTATIVE STATEMENT FOR STORM WATER TREATMENT PLAN REVIEWS

I have completed the above checklist and have enclosed the necessary design information concerning the above referenced proposed project and BMPs for review. The above items are required for project plan review and I understand that a review does not necessarily guarantee that an approval to construct will be issued by this Department. By my signature I certify that I will install or perform necessary BMPs, maintain them throughout the project, keep a copy of my approved Storm Water Treatment Plan on the construction site, and that the project is (check one):

____ privately owned and that I am the owner or duly authorized representative responsible for the overall management of the project.

____ owned by a sole proprietorship and that I am the proprietor or duly authorized representative responsible for the overall management of the project.

____ owned by a partnership of which I am a general partner or duly authorized representative responsible for the overall management of the project.

____ owned by a corporation of which I am a principal executive officer of at least the level of vice-president, or a duly authorized representative responsible for the overall management of the project.

____ owned by a municipal, state, or federal or other public agency, of which I am a principal executive officer, ranking elected official, or other duly authorized employee

If a Type 1 or Type 2 SWPPP is included in the submittal, I further certify that the project

____ is not part of a larger common plan of development OR

____ is part of a larger common plan of development which collectively disturbs ___ acres.

(If the project is part of a common plan of development that collectively disturbs 1 or more acres, submit a Type 3 SWPPP and a copy of the NOI.)

_____ Checklist #3 is completed and attached.

Municipal inspections and inspection fees will start with permit issuance. **It is your responsibility to notify Watershed Management Services if the project start will be later than the permit issuance date.**

_____

Signature (please sign in ink) Date

_____

Name and Official Title (print or type)

_____

Company or Agency (if applicable)

ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM (APDES)

APPLICATION FORM 2A

Publicly Owned Treatment Works (POTWs)

Please submit this form to:

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Wastewater Discharge Authorization Program
555 Cordova Street
Anchorage, AK 99501
DEC.Water.WQPermit@alaska.gov

Form 2A must be completed for all new or existing publicly owned treatment works (POTWs) and other treatment works treating domestic sewage (TWTDS) that are required to obtain an APDES permit under 18 AAC 83.015. See the Instructions, Section B, for information on how to complete Form 2A.

SECTION 1 – FACILITY INFORMATION

Facility Name:

Mailing Address: City: State: AK Zip:

Physical Address/Location: City: State: AK Zip:

Phone: Cell Phone: Fax:

Email:

Geographic Location: Latitude: Longitude:

Lat/Long Coordinate Source: ☐ Internet ☐ Map ☐ GPS/Survey ☐ Other_____

Source Map Scale (if applicable): Facility Reference Point:

Horizontal Accuracy: Horizontal Datum:

Is this a new or existing facility? ☐ New ☐ Existing

Is the discharge associated with this permit located within a coastal zone boundary of an approved coastal district? ☐ Yes ☐ No

If Yes, submit a completed Coastal Project Questionnaire along with this APDES permit application.

SECTION 2 – ON-SITE CONTACT INFORMATION

Name:

Phone: Cell Phone:

Email:

SECTION 3 – RESPONSIBLE PARTY INFORMATION
☐ Check if same as On-Site Contact

Name:

Name of individual authorized to act on behalf of the responsible party (if applicable):

Mailing Address: City: State: Zip:

Phone: Cell Phone:

Email: Fax:

Status of responsible party: ☐ Federal ☐ State ☐ Private ☐ Public (other than federal or state) ☐ Other entity

Name of facility owner (if different from the Responsible Party):

SECTION 4 – CONSULTANT INFORMATION (if applicable)

Name:

Affiliated Company (if applicable):

Mailing Address: City: State: Zip:

Phone: Cell Phone:

Email: Fax:

SECTION 5 – CONTRACTOR INFORMATION (if applicable)

Name:

Affiliated Company (if applicable):

Mailing Address: City: State: Zip:

Phone: Cell Phone:

Email: Fax:

Responsibilities:

SECTION 6 – EXISTING ENVIRONMENTAL PERMITS (Provide permit number or note if applied for)

A) Hazardous Waste Management (RCRA):

B) Underground Injection Control (Safe Drinking Water Act):

C) APDES or NPDES (Clean Water Act):

D) Prevention of Significant Deterioration (Clean Air Act):

E) Nonattainment (Clean Air Act):

F) National Emission Standards for Hazardous Pollutants (Clean Air Act):

G) Ocean Dumping Permits (Marine Protection Research and Sanctuaries Act):

H) Dredge or Fill Permits:

I) Other:

SECTION 7 – ADDITIONAL FACILITY INFORMATION

A. Collection System

Indicate the type(s) of collection system(s) used by the treatment plant and estimate the percent (by miles of sewer line) that each type comprises.

☐ Separate Sanitary Sewer %

☐ Combined Storm and Sanitary Sewer %

Provide the name and population of each municipal entity served by the facility. State whether each entity owns or maintains the collection system and, if known, whether the collection system is a separate sanitary sewer or a combined storm and sanitary sewer.

Municipal Entity	Population	Collection System Ownership	Type of Sewer
		☐ Owns ☐ Maintains	☐ Separate Sanitary ☐ Combined Storm and Sanitary
		☐ Owns ☐ Maintains	☐ Separate Sanitary ☐ Combined Storm and Sanitary
		☐ Owns ☐ Maintains	☐ Separate Sanitary ☐ Combined Storm and Sanitary

B. Indian Country

Is the treatment works located in Indian Country? ☐ Yes ☐ No

Does the treatment works discharge to a receiving water that is either in Indian Country or that is upstream from (and eventually flows through) Indian Country? ☐ Yes ☐ No

C. Flow

Indicate the facility's design flow rate (i.e., the wastewater flow rate that the plant was built to handle), the annual average daily flow rate, and the maximum daily flow rate for each of the previous three years. Each year's data must be based on a 12-month time period with the 12th month of "this year" occurring no more than three months prior to this application submittal.

Design Flow Rate (mgd):

	Two Years Ago	Last Year	This Year
Year (MM/YY – MM/YY)			
Annual Average Daily Flow Rate (mgd)			
Maximum Daily Flow Rate (mgd)			

SECTION 8 – OUTFALLS AND OTHER DISCHARGE OR DISPOSAL METHODS

Complete questions 8.A through 8.E and provide the information requested for any question answered with a "Yes".

A) Does the treatment works discharge wastewater to waters of the United States? ☐ Yes ☐ No

If yes, list how many of each of the following types of discharge points the treatment works uses:

Number of treated wastewater outfalls:	
Discharge of untreated or partially treated wastewater:	
Number of combined sewer overflow points:	
Number of constructed emergency overflows (prior to headworks):	
Other (specify):	

B) Does the treatment works discharge wastewater to basins, ponds, or other surface impoundments that do not have outlets for discharge to waters of the U.S.? ☐ Yes ☐ No

If yes, provide the following for each surface impoundment:

Location of Impoundment	Average Daily Volume Discharged (in mgd)	Type of Discharge
		☐ Continuous ☐ Intermittent
		☐ Continuous ☐ Intermittent
		☐ Continuous ☐ Intermittent

C) Does the treatment works apply wastewater to the land? ☐ Yes ☐ No

If yes, provide the following for each land application site:

Location of Each Land Application Site	Average Daily Volume (gallons per day)	Size (acres)	Type of Discharge
			☐ Continuous ☐ Intermittent
			☐ Continuous ☐ Intermittent
			☐ Continuous ☐ Intermittent

D) Does the treatment works discharge or transport treated or untreated wastewater to another treatment works? ☐ Yes ☐ No

If yes, describe the means by which the wastewater from the treatment works is discharged or transported to the other treatment works (e.g., pipe, tank truck):

Name of organization transporting the discharge (if the transport is provided by a party other than the applicant)**:**

Contact Person:

Mailing Address: City: State: Zip:

Phone: Cell Phone:

Email: Fax:

For each treatment works that receives this discharge, provide the following (attach additional sheets if necessary)			
Name of the receiving treatment works:			
Contact Person:			
Mailing Address:	City:	State:	Zip:
Phone:	Cell Phone:		
Email:	Fax:		
If known, provide the APDES or NPDES permit number of the treatment works that receives this discharge:			
Average daily flow rate to the receiving treatment works (mgd):			

E) Does the treatment works discharge or dispose of wastewater in a manner not included in Section 8.A through 8.D? (e.g. underground percolation, injection well)? ☐ Yes ☐ No

Describe the disposal method, including the location and size of each disposal site (if applicable), the annual daily volume disposed of using this method in gallons per day, and whether the disposal is continuous or intermittent.

SECTION 9 – WASTEWATER DISCHARGES

If you answered "Yes" to question 8.A, complete questions 9.A through 9.C and Section 10 **once for each outfall** (including bypass points) through which wastewater is discharged. Attached additional sheets as necessary. Do not include information on combined sewer overflows in this section. If you answered "No" to question 8.A, go to Section 11, "Additional Information for Design Flow Greater than 0.1 MGD."

A) Description of Outfall

Outfall Number: Borough and city or town in which outfall is located:

Geographic Location: Latitude: Longitude:

Distance from shore (ft.):

Depth below surface (ft.):

Average daily flow rate (mgd):

Is outfall equipped with a diffuser? ☐ Yes ☐ No Type of diffuser used:

Does the outfall have an intermittent or periodic discharge? ☐ Yes ☐ No If yes, provide the following information:

Number of times per year the discharge occurs:

Average duration of each discharge:

Average flow per discharge (mgd):

Months in which discharge occurs:

B) Description of Receiving Water

Name of receiving water:

Name of watershed river or stream system:

United States Soil Conservation Service or Natural Resource Conservation Service 14-digit watershed code (if known):

Name of State Management or River Basin:

United States Geological Survey 8-digit hydrologic cataloging unit code (if known):

Critical flow of receiving stream Acute (cfs): Chronic (cfs):

Total hardness of receiving stream at critical low flow (mg/L of $CaCO_3$):

C) Description of Treatment

What levels of treatment are provided?

☐ Primary ☐ Equivalent to Secondary ☐ Secondary ☐ Advanced ☐ Other:

Indicate the following removal rates (as applicable):

Design 5-day Biochemical Oxygen Demand (BOD_5) removal or
Design 5-day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$) removal: %

Design suspended solids (SS) removal: %

Design phosphorus (P) removal: %

Design nitrogen (N) removal: %

Other (specify):

What type of disinfection is used for the effluent from this outfall? If disinfection varies by season, please describe:

If disinfection is by chlorination, is dechlorination used for this outfall? ☐ Yes ☐ No

Does the treatment plant have post aeration? ☐ Yes ☐ No

D) Mixing Zone

Do you wish to request authorization from the Department for a mixing zone? ☐ Yes (Complete Form 2M) ☐ No

SECTION 10 –TESTING AND EFFLUENT MONITORING

All applicants must provide effluent testing data for the following parameters **for each outfall** through which effluent is discharged. Provide the *maximum* daily discharge, expressed as concentration or mass, based upon actual sample values. Provide the *average* daily discharge for all samples, expressed as concentration or mass, and the number of samples used to obtain this value. Indicate the approved analytical method used. Provide the threshold level, such as the method detection limit, minimum level, or other designated method endpoint for the analytical method used. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. At a minimum, effluent testing data must be based on at least three samples and must be no more than four and one-half years apart. See the instructions for additional information. Answer the questions at the end of this section to determine if additional effluent parameters are required to be tested for this facility. Attach additional sheets if necessary.

Outfall Number: _____

PARAMETER	MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	THRESHOLD LEVEL
	Concentration or Mass	Units	Concentration or Mass	Units	Number of Samples		
BOD_5 or							
$CBOD_5$							
Fecal Coliform							
Flow Rate							
pH (Minimum)							
pH (Maximum)							
Temperature (Winter)							
Temperature (Summer)							
Total Suspended Solids (TSS)							

Does the POTW have a design flow greater than or equal to 1 million gallons per day? ☐ Yes ☐ No

Does the POTW have an approved pretreatment program? ☐ Yes ☐ No

Is the POTW required to develop a pretreatment program? ☐ Yes ☐ No

If any of the above questions are marked “Yes”, or if required by the Department to ensure compliance, the applicant must also submit effluent monitoring information for additional parameters by completing and submitting Supplement A attached to this Form.

SECTION 11 – ADDITIONAL INFORMATION FOR DESIGN FLOW GREATER THAN .1 MILLION GPD (100,000 gallons per day)

A) Effluent Testing Data (Greater than 0.1 MGD Only)

Applicants that discharge to the waters of the US must provide effluent testing data for the following parameters. Provide the indicated effluent testing required by the permitting authority for each outfall through which effluent is discharged. Attached additional sheets as necessary. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 or other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. At a minimum, effluent testing must be based on at least three pollutant scans and must be no more than four and one-half years old.

PARAMETER	MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	THRESHOLD LEVEL
	Concentration or Mass	Units	Concentration or Mass	Units	Number of Samples		
Ammonia (as N)							
Chlorine, total residual (TRC)							
Dissolved Oxygen							
Nitrate/Nitrite							
Kjeldahl Nitrogen							
Oil and Grease							
Phosphorus							
Total Dissolved Solids							

B) Inflow and Infiltration

Estimate the average number of gallons per day that flow into the treatment works from inflow and/or infiltration: _____ gpd

Describe steps the facility is taking to minimize inflow and infiltration:

C) Topographic Map

Attach to this application a topographic map of the area extending at least one mile beyond facility property boundaries. This map must show the outline of the facility and the following information. (You may submit more than one map if one map does not show the entire area.)

- The area surrounding the treatment plant and all unit processes.
- The major pipes or other structures through which wastewater enters the treatment works and the pipes or other structures through which treated wastewater is discharged from the treatment plant, including outfalls from bypass piping, if applicable.
- Each well where wastewater from the treatment plant is injected underground;
- Wells, springs, other surface water bodies, and drinking water wells that are: 1) within ¼ mile of the property boundaries of the treatment works, and 2) listed in the public record or otherwise known to the applicant;
- Any areas where the sewage sludge produced by the treatment works is stored, treated, or disposed; and
- If the treatment works receives waste that is classified as hazardous under the Resource Conservation and Recovery Act (RCRA) by truck, rail, or special pipe, show on the map where that hazardous waste enters the treatment works and where it is treated, stored, and/or disposed.

D) Process Flow Diagram or Schematic

Attach to this application a diagram showing the processes of the treatment plant, including all bypass piping and all backup power sources or redundancy in the system. Also, provide a water balance showing all treatment units, including disinfection (e.g. chlorination and de-chlorination). The water balance must also show daily average flow rates at influent and discharge points and approximate daily flow rates between treatment units. Include a brief narrative description of the diagram.

E) Scheduled Improvements and Schedules of Implementation

Provide information on any uncompleted implementation schedule or uncompleted plans for improvements that will affect the wastewater treatment, effluent quality, or design capacity of the treatment works. If the treatment works has several different implementation schedules or is planning several improvements, submit separate responses to question 11.E for each. (If none, go to Section 12.)

List the outfall number for each affected outfall:

_____ _____ _____

_____ _____ _____

Provide a narrative description for each required improvement:

Provide the following scheduled dates for the improvement steps listed below, as applicable. Indicate dates as accurately as possible.

Improvement Stage	**Schedule** MM/DD/YYYY	**Actual Completion** MM/DD/YYYY
Begin Construction	_____	_____
End Construction	_____	_____
Begin Discharge	_____	_____
Attain Operational Level	_____	_____

Provide a description of permits and clearances concerning other federal and state requirements:

SECTION 12 – SUPPLEMENTAL INFORMATION

All applicants must complete all applicable sections of Form 2A, as explained in the instructions. Indicate below which parts of Form 2A you have completed and are submitting.

- Supplement A, Testing and Effluent Monitoring: must be completed by all applicants with a design flow greater than or equal to 1 million gallons per day.
- Supplement B, Whole Effluent Toxicity Monitoring: must be completed by all applicants.
- Supplement C, Industrial Dischargers: must be completed by all applicants with one or more significant industrial users discharging to the treatment works and by all applicants receiving hazardous or corrective action wastes.
- Supplement D, Combined Sewer Systems: must be completed by all applicants with a combined sewer system.

Indicate below which supplemental form(s) are being submitted with this application.

Supplement A:_____ Supplement B: _____ Supplement C: _____ Supplement D: _____

SECTION 13 – CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Right to Enter Premises
By submitting this application, the applicant hereby consents to entry upon the premises by representatives of the Alaska Department of Environmental Conservation in order to: 1) have access to and copy any records that permit conditions require the applicant to keep; 2) inspect any facilities, equipment, including monitoring and control equipment, practices, or operations regulated or required under a permit; and 3) sample or monitor any substances or parameters at any location for the purpose of assuring permit compliance or as otherwise authorized by 33 U.S.C. 1251-1387 (Clean Water Act).

Print Name: _____ Title: _____

Signature: _____ Date: _____

Any other information necessary to assess wastewater treatment practices and the treatment works or to identify appropriate permitting requirements must be submitted upon request from the Department.

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SUPPLEMENT A – Testing and Effluent Monitoring

Submit effluent monitoring information for the following additional parameters **for each outfall** through which effluent is discharged in accordance with Section 10 of this form if the treatment works has a design flow greater than or equal to 1 million gallons per day, if it has or is required to have a pretreatment program, or is otherwise required by the Department to ensure compliance.

PARAMETER	MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	THRESHOLD LEVEL
	Concentration or Mass	Units	Concentration or Mass	Units	Number of Samples		
Hardness (as $CaCO_3$)							
Metals (Total Recoverable), Cyanide, and Total Phenols							
Antimony							
Arsenic							
Beryllium							
Cadmium							
Chromium							
Copper							
Lead							
Mercury							
Nickel							
Selenium							
Silver							
Thallium							
Zinc							
Cyanide							
Total phenolic compounds							
Volatile Organic Compounds							
Acrolein							
Acrylonitrile							
Benzene							
Bromoform							
Carbon tetrachloride							
Chlorobenzene							
Chlorodibromo-methane							
Chloroethane							

PARAMETER	MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	THRESHOLD LEVEL
	Concentration or Mass	Units	Concentration or Mass	Units	Number of Samples		
2-chloroethylvinyl ether							
Chloroform							
Dichlorobromo-methane							
1,1-dichloroethane							
1,2-dichloroethane							
Trans-1,2-dichloroethylene							
1,1-dichloroethylene							
1,2-dichloropropane							
1,3-dichloropropylene							
Ethylbenzene							
Methyl bromide							
Methyl chloride							
Methylene chloride							
1,1,2,2-tetrachloro-ethane							
Tetrachloroethylene							
Toluene							
1,1,1-trichloro-ethane							
1,1,2-trichloro-ethane							
Trichloroethylene							
Vinyl chloride							
Acid-Extractable Compounds							
P-chloro-m-cresol							
2-chlorophenol							
2,4-dichlorophenol							
2,4-dimethylphenol							
4,6-dinitro-o-cresol							
2,4-dinitrophenol							
2-nitrophenol							
4-nitrophenol							
Pentachlorophenol							

PARAMETER	MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	THRESHOLD LEVEL
	Concentration or Mass	Units	Concentration or Mass	Units	Number of Samples		
Phenol							
2,4,6-trichlorophenol							
Base-Neutral Compounds							
Acenaphthene							
Acenaphthylene							
Anthracene							
Benzidine							
Benzo(a)anthracene							
Benzo(a)pyrene							
3,4-benzo fluoranthene							
Benzo(ghi)perylene							
Benzo(k)fluor-anthene							
Bis(2-chloroethoxy) methane							
Bis(2-chloroethyl) ether							
Bis(2-chloroiso-propyl) ether							
Bis(2-ethylhexyl)-phthalate							
4-bromophenyl phenyl ether							
Butyl benzyl phthalate							
2-chloronaphthalene							
4-chlorophenyl phenyl ether							
Chrysene							
Di-n-butyl phthalate							
Di-n-octyl phthalate							
Dibenzo(a,h)an-thracene							
1,2-dichlorobenzene							
1,3-dichlorobenzene							
1,4-dichlorobenzene							
3,3-dichloroben-zidine							
Diethyl phthalate							
Dimethyl phthalate							

PARAMETER	MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	THRESHOLD LEVEL
	Concentration or Mass	Units	Concentration or Mass	Units	Number of Samples		
2,4-dinitrotoluene							
2,6-dinitrotoluene							
1,2-diphenylhydrazine							
Fluoranthene							
Fluorene							
Hexachlorobenzene							
Hexachlorobutadiene							
Hexachlorocyclopentadiene							
Hexachloroethane							
Indeno(1,2,3-cd)-pyrene							
Isophorone							
Naphthalene							
Nitrobenzene							
N-nitrosodi-n-propylamine							
N-nitrosodimethylamine							
N-nitrosodiphenylamine							
Phenanthrene							
Pyrene							
1,2,4-trichlorobenzene							

SUPPLEMENT B –Whole Effluent Toxicity Monitoring

POTWs meeting one or more of the following criteria must provide the results of whole effluent toxicity tests for acute or chronic toxicity for each of the facility's discharge points: 1) POTWs with a design flow rate greater than or equal to 1.0 mgd; 2) POTWs with a pretreatment program (or those that are required to have one under 40 CFR Part 403); or 3) POTWs required by the permitting authority to submit data for these parameters.

- At a minimum, these results must include quarterly testing for a 12-month period within the past one year using multiple species (minimum of two species), or the results from four tests performed at least annually in the four and one-half years prior to the application, provided the results show no appreciable toxicity, and testing for acute and/or chronic toxicity, depending on the range of receiving water dilution. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136.
- In addition, submit the results of any other whole effluent toxicity tests from the past four and one-half years. If a whole effluent toxicity test conducted during the past four and one-half years revealed toxicity, provide any information on the cause of the toxicity or any results of a toxicity reduction evaluation, if one was conducted.
- If you have already submitted any of the information requested in this section, you need not submit it again. Rather, provide the information requested in the last question of this section for previously submitted information. If EPA approved methods were not used, report the reasons for using alternate methods.
- If test summaries are available that contain all of the information requested below, they may be submitted in place of this section.

If no biomonitoring data is required, do not complete this section. Refer to the Instructions Section B for directions on which other sections of the form to complete.

1. Required Tests.

Indicate the number of whole effluent toxicity tests conducted in the past four and one-half years.

_____ chronic _____ acute

2. Individual Test Data.

Complete the following chart for each whole effluent toxicity test conducted in the last four and one-half years. Allow one column per test (where each species constitutes a test). Copy this table if more than three tests are being reported.

	Test number:		**Test number:**		**Test number:**	
a. Test information.						
Test species & test method number						
Age at initiation of test						
Outfall number						
Dates sample collected						
Date test started						
Duration						

	Test number:		Test number:		Test number:	
b. Give the toxicity test methods followed.						
Manual title						
Edition number and year of publication						
Page number(s)						
c. Give the sample collection method(s) used. For multiple grab samples, indicate the number of grab samples used.						
24-Hour composite						
Grab						
d. Indicate where the sample was taken in relation to disinfection. (Check all that apply for each)						
Before disinfection						
After disinfection						
After dechlorination						
e. Describe the point in the treatment process at which the sample was collected.						
Sample was collected:						
f. For each test, indicate whether the test was intended to assess chronic toxicity, acute toxicity, or both.						
Chronic toxicity						
Acute toxicity						
g. Provide the type of test performed.						
Static						
Static-renewal						
Flow-through						
h. Source of dilution water. If laboratory water, specify type; if receiving water, specify source.						
Laboratory water						
Receiving water						
i. Type of dilution water. If salt water, specify "natural" or type of artificial sea salts or brine used.						
Fresh water						
Salt water						
j. Give the percentage effluent used for all concentrations in the test series.						
k. Parameters measured during the test. (State whether parameter meets test method specifications)						
pH						
Salinity						
Temperature						
Ammonia						

	Test number:	Test number:	Test number:
Dissolved oxygen			
l. Test results.			
Acute:			
Percent survival in 100% effluent	%	%	%
LC_{50}			
95% C.I.	%	%	%
Control percent survival	%	%	%
Other (describe)			
Chronic:			
NOEC	%	%	%
IC_{25}	%	%	%
Control percent survival	%	%	%
Other (describe)			
m. Quality Control/Quality Assurance			
Is reference toxicant data available?			
Was reference toxicant test within acceptable bounds?			
What date was reference toxicant test run (MM/DD/YYYY)?			
Other (describe)			

3. Toxicity Reduction Evaluation.

Is the treatment works involved in a Toxicity Reduction Evaluation? ☐ Yes ☐ No

If yes, describe:

4. Summary of Submitted Biomonitoring Test Information.

If you have submitted biomonitoring test information, or information regarding the cause of toxicity, within the past four and one-half years, provide the dates the information was submitted to the permitting authority and a summary of the results.

Date submitted (MM/DD/YYYY): _____

Summary of results (see instructions):

SUPPLEMENT C – Industrial User Discharges and RCRA/CERCLA Wastes

All treatment works receiving discharges from significant industrial users or which receive RCRA, CERCLA, or other remedial wastes must complete Supplement C.

GENERAL INFORMATION

1. Pretreatment Program.

Does the treatment works have, or is it subject to, an approved pretreatment program? ☐ Yes ☐ No

2. Number of Significant Industrial Users (SIUs).

Provide the number of each of the following types of industrial users that discharge to the treatment works.

Number of non-categorical SIUs **:** _____ Number of Categorical Industrial Users (CIUs): _____

SIGNIFICANT INDUSTRIAL USER INFORMATION

3. Industrial User Contact Information.

Supply the following information for each SIU. If more than one SIU discharges to the treatment works, copy the questions 3 through 8 and provide the information requested for each SIU.

Provide the name and address of each SIU discharging to the treatment works. Submit additional pages as necessary.

Company Name:		Phone:
Mailing Address:		Fax:
City:	State:	Zip:
Contact Person:		Email:

4. Industrial Processes.

Describe all of the industrial processes that affect or contribute to the SIU's discharge.

5. Principal Product(s) and Raw Material(s).

Describe all of the principal processes and raw materials that affect or contribute to the SIU's discharge.

Principal product(s): _____

Raw material(s): _____

6. Flow Rate.

a. Process wastewater flow rate: Indicate the average daily volume of process wastewater discharged into the collection system in gallons per day (gpd) and whether the discharge is continuous or intermittent.

_____ gpd ☐ continuous ☐ intermittent

b. Non-process wastewater flow rate: Indicate the average daily volume of non-process wastewater flow discharged into the collection system in gallons per day (gpd) and whether the discharge is continuous or intermittent.

_____ gpd ☐ continuous ☐ intermittent

7. Pretreatment Standards. Indicate whether the SIU is subject to the following:

Local limits ☐ Yes ☐ No

Categorical pretreatment standards ☐ Yes ☐ No

If subject to categorical pretreatment standards, which category and subcategory?

8. Problems at the Treatment Works Attributed to Waste Discharged by the SIU. Has the SIU caused or contributed to any problems (e.g., upsets, interference) at the treatment works in the past three years?

☐ Yes ☐ No If yes, describe each episode below.

RCRA HAZARDOUS WASTE RECEIVED BY TRUCK, RAIL, OR DEDICATED PIPELINE

9. RCRA Waste.

Does the treatment works receive (or has it in the past three years) received RCRA hazardous waste by truck, rail, or dedicated pipe?

☐ Yes ☐ No (If no, skip to question 12)

10. Waste Transport.

Method by which RCRA waste is received (check all that apply):

☐ Truck ☐ Rail ☐ Dedicated Pipe

11. Waste Description.

Provide EPA hazardous waste number and amount (volume or mass, specify units).

EPA Hazardous Waste Number	Amount	Units

CERCLA (SUPERFUND) WASTEWATER, RCRA REMEDIATION/CORRECTIVE ACTION WASTEWATER, AND OTHER REMEDIAL ACTIVITY WASTEWATER:

12. Remediation Waste.

Does the treatment works currently (or has it been notified that it will) receive waste from remedial activities?

☐ Yes (complete 13 through 15) ☐ No

Provide a list of sites and the requested information (questions 13-15) for each current and future site.

13. Waste Origin.

Describe the site and type of facility at which the CERCLA, RCRA, or other remedial waste originates or is expected to originate in the next five years.

14. Pollutants.

List the hazardous constituents that are received (or are expected to be received). Include data on volume and concentration, if known. (Attach additional sheets if necessary.)

15. Waste Treatment.

a. Is this waste treated (or will it be treated) prior to entering the treatment works? ☐ Yes ☐ No

If yes, describe the treatment (provide information about the removal efficiency.)

b. Is the discharge (or will the discharge be) continuous or intermittent? ☐ Continuous ☐ Intermittent

If intermittent, describe discharge schedule.

SUPPLEMENT D – COMBINED SEWER SYSTEMS

Complete Supplement D if the treatment works has a combined sewer system.

1. System Map. Provide a map indicating the following (may be included with Basic Application Information):

- All CSO discharge poin;.
- Sensitive use areas potentially affected by CSOs (e.g., beaches, drinking water supplies, shellfish beds, sensitive aquatic ecosystems, and outstanding natural resource waters); and
- Waters that support threatened and endangered species potentially affected by CSOs.

2. System Diagram. Provide a diagram, either in the map provided in the previous question or on a separate drawing, of the combined sewer collection system that includes the following information:

- Locations of major sewer trunk lines, both combined and separate sanitary;
- Locations of points where separate sanitary sewers feed into the combined sewer system;
- Locations of in-line and off-line storage structures;
- Locations of flow-regulating devices; and
- Locations of pump stations.

CSO OUTFALLS

3. Description of Outfall.

Outfall number: _____

Location:

City or town (if applicable): State: AK Zip Code:

Borough or Similar Government Subdivision:

Latitude: Longitude:

Distance from shore (if applicable) _____ ft

Depth below surface (if applicable) _____ ft

Which of the following were monitored during the last year for this CSO? (check all that apply)

☐ Rainfall ☐ CSO pollutant concentrations ☐ Receiving water quality

☐ CSO flow volume ☐ CSO frequency

How many storm events were monitored during the last year? _____

4. CSO Events.

Provide the number of CSO events in the last year.

_____ events ☐ actual or ☐ approx

Provide the average duration per CSO event.

_____ hours ☐ actual or ☐ approx

Provide the average volume per CSO event.

_____ million gallons ☐ actual or ☐ approx

Provide the minimum rainfall that caused a CSO event in the last year.

_____ inches of rain.

5. Description of Receiving Waters.

Name of receiving water: _____

Name of watershed/river/stream system: _____

United States Soil Conservation Service 14-digit watershed code (if known): _____

Name of State Management/River Basin: _____

United States Geological Survey 8-digit hydrologic cataloging unit code (if known): _____

6. CSO Operations.

Describe any known water quality impacts on the receiving water caused by this CSO (e.g., permanent or intermittent beach closings, permanent or intermittent shellfish bed closings, fish kills, fish advisories, other recreational loss, or violation of any applicable State Water Quality Standard).

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INSTRUCTIONS

Section A: General Instructions

Section B: Instructions for Form 2A

Section C: Activities Which Do Not Require Permits

Section D: Glossary

SECTION A – GENERAL INSTRUCTIONS

Who Must Apply
With the exceptions described in Section C of these instructions, state laws prohibit the discharge of pollutants into the waters of the United States without a permit. (18 AAC 83.015)

Form 2A of the APDES application forms collects information for POTWs and other treatment works treating domestic sewage (TWTDS). This application form must be used for all new or existing POTWs to apply for an APDES permit administered by ADEC.

Applicants should contact ADEC with any questions regarding whether an APDES permit is required and to obtain application forms. State laws provide for severe penalties if a permit is not applied for when required.

Note that there are certain exclusions to the permit requirements listed above. The exclusions are described in detail in Section C of these instructions. Certain activities are excluded from permit requirements and do not require the submission of any forms.

Where to File
The application forms should be mailed to:

Alaska Department of Environmental Conservation
Wastewater Discharge Authorization Program
555 Cordova Street
Anchorage, AK 99501

Or signed electronically and sent to:

DEC.Water.WQPermit@alaska.gov

An electronic signature is defined as an electronic sound, symbol, or process attached to or logically associated with a record and executed or adopted by a person with the intent to sign the record.

When to File
Unless the Department has granted permission to submit an application at a later date, an applicant must apply for a permit by submitting this form at least 180 days before an existing permit expires or before a new discharge is to commence.

Fees
ADEC requires a fee for APDES permitting and compliance services in accordance with state regulations. An applicant must pay the appropriate fee listed in Table F of 18 AAC 72.957 for authorization to discharge pollutants under an individual APDES permit.

Availability of Information to Public
Information contained in this application form or its attachments will, upon request, be made available to the public for inspection and copying. A permit applicant may assert a claim of confidentiality for proprietary or confidential business information by stamping the words "confidential business information" on each page of a submission containing proprietary or confidential business information. The Department will treat the stamped submission as confidential if the information satisfies 40 CFR §2.208, adopted by reference in 18 AAC 83.010, and is not otherwise required to be made public under state law. A claim of confidentiality may not be asserted for the name and address of any permit applicant or permittee, a permit application, a permit, effluent data, sewage sludge data, or any information required by APDES or NPDES application forms provided by the Department, whether submitted on the forms themselves or in any attachments used to supply information required by the forms. The Department will notify EPA of a confidentiality claim when providing EPA with information submitted to the Department containing a claim of confidentiality.

Completeness
An application for an APDES permit will be considered complete when the permit fee required under 18 AAC 83.905 is paid and the Department, in its sole discretion, determines that the application form and any supplemental information are satisfactory. Every question on this form and any additional required forms must be answered; enter "NA" (for not applicable) if a particular item does not fit the circumstances or characteristics of the facility or activity. If information previously submitted to the Department answers a question, a copy of the previous submission may be attached. Attach a separate sheet entitled "Additional Information" if more space is necessary to answer a question.

Financial Assistance for Pollution Control

There are a number of direct loans, loan guarantees, and grants available to firms and communities for pollution control expenditures. These are provided by the Small Business Administration, the Economic Development Administration, the U.S. Department of Agriculture, and the Department of Housing and Urban Development. Each EPA Regional office has an economic assistance coordinator who can provide additional information.

ADEC Facilities Program administers grant and loan programs for construction of domestic wastewater treatment facilities. Visit the ADEC Facilities Program web pages by clicking the links for the loan and grant programs at http://www.dec.state.ak.us/water/index.htm or call 907-269-7502 for more information. In addition, the Alaska Department of Commerce, Community, and Economic Development (DCCED) can also provide financial assistance. Access the DCCED web page at http://www.commerce.state.ak.us/dca/grt/blockgrants.htm or call 907-451-2716 for more information.

Retention of Records

An applicant shall keep records of all data used to complete a permit application and any supplemental information submitted with the permit for a period of at least three years from the application signature date [18 AAC 83.305(d)].

Questions

Questions regarding the information requested on any APDES application form may be directed to the following:

Anchorage:	Phone: 907-269-6285	Fax: 907-269-3487
Fairbanks:	Phone: 907-451-2100	Fax: 907-451-2187
Juneau:	Phone: 907-465-5300	Fax: 907-465-5274

Email: DEC.Water.WQPermit@alaska.gov

SECTION B – INSTRUCTIONS FOR FORM 2A

Who Must File Form 2A

This form must be completed by all applicants for POTWs and TWTDS.

Section 1 – Facility Information

Enter the facility's official or legal name. Do not use a colloquial name. Provide the complete physical address or location of the facility. If the facility does not have a street name or number, give the most accurate alternative geographic information (e.g. distance from or in the vicinity of a geographic identifier). Include the latitude and longitude of the site to the sixth decimal place. For latitude and longitude information interpolated from a hardcopy map, the fourth decimal place is acceptable and the source map scale must be provided. The preferred location information will be provided as the latitude and longitude in decimal degrees, Alaska Albers Projection, North American Datum of 1983. The preferred source of the coordinates will be by a GPS unit, but other methods will be accepted, including survey, internet (such as Topozone.com), and printed map. Clearly identify the facility reference point (e.g. facility front door, center of building, etc.) horizontal accuracy and unit of measurement (e.g. 10 meters), and horizontal datum.

For additional information on coastal zone boundaries, see 11 AAC 110.010, Applicability of the Alaska Coastal Management Consistency Review Program.

Section 2 – On-Site Contact Information

Give the name, title, work telephone number, and Email address of a person who is thoroughly familiar with the operation of the facility and with the facts reported in this application and who can be contacted by reviewing offices if necessary. Attach supplemental information if contact information changes seasonally.

Section 3 – Responsible Party Information

Give the name, as it is legally referred to, of the person, firm, public organization, or other entity who is responsible for operating the facility described in this application. This may or may not be the same name as the facility. Do not use a colloquial name. The responsible party is the legal entity that controls the facility's operation rather than the plant or site manager. All correspondence will be sent to the identified party at this address.

Check the appropriate box to indicate the legal status of the responsible party. Indicate "public" for a facility solely owned by local government(s) such as a city, town, borough, etc.

Section 4 – Consultant Information

If a consultant assisted in the preparation of this application, provide their name, title, affiliated company (if applicable), complete mailing address, work telephone number, and Email address.

Section 5 – Contractor Information

If a contractor is responsible for any operational or maintenance aspects of this facility, provide their name, title, affiliated company (if applicable), complete mailing address, work telephone number, and Email address, and list the responsibilities specific to that contractor. If more than one contractor is employed with this facility, attach supplemental equivalent information to this application for each contractor.

Section 6 – Existing Environmental Permits

Give the number of all permits or construction approvals presently effective or applied for under any of the listed programs. If more than one permit is currently effective for the facility under a particular permit program, list additional permit numbers on a separate sheet of paper. Under "other", list any relevant federal, state, or local environmental permits or applications.

Section 7 – Additional Facility Information

A. Provide the name and population of each municipal entity served by the facility, including unincorporated connector districts. Note whether each municipal entity owns or maintains the collection system and, if the information is available, whether the collection system is a separate sanitary sewer or a combined storm and sanitary sewer. Attach additional sheets as necessary.

B. Indicate if the treatment works is located in Indian Country and if the treatment discharges to a receiving water that is in Indian Country.

C. Indicate facility flow rates in million gallons per day (mgd). Each year's data must be based on a 12-month time period with the 12th month of the most recent year occurring no more than three months prior to this application submittal.

D. Indicate if you would like to request authorization for a mixing zone. If "yes" complete form 2M.

Section 8 – Outfalls and Other Discharge or Disposal Methods

Answer questions A through E by checking the box next to either "Yes" or "No". For every question marked "Yes", complete the information immediately following the question. Attach additional sheets if necessary.

Section 9 – Wastewater Discharges

Complete each question in Section 9 separately for each outfall. For more than one outfall, attach additional copies of Section 9.

A. Provide latitude and longitude to the nearest second. Provide the average daily flow rate in mgd. If the outfall is equipped with a diffuser, provide the type of diffuser used (e.g., high-rate).

B. Enter as much information about the receiving water as is known or available.

C. Include the design percentage for any other removal that an advanced treatment system is designed to achieve. Briefly describe the type of disinfection used for the treatment, noting any seasonal variations. Write "NA" for any item that is not applicable to the discharge.

D. Indicate if a mixing zone is being requested. If yes, complete Form 2M in conjunction with this form.

Section 10 – Testing and Effluent Monitoring

Undertake sampling and analysis and submit effluent monitoring information for samples taken from each outfall through which effluent is discharged to waters of the United States in accordance with the analytical methods approved under 40 CFR Part 136, adopted by reference in 18 AAC 83.010. Alternative methods may be approved and specified in an existing NPDES or APDES permit. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. Effluent testing data must be based on at least three samples taken no more than four and one-half years before the date of the permit application. Samples must be representative of the seasonal variation in the discharge from each outfall. Existing data may be used, if available, in lieu of sampling done solely for the purpose of this application.

Grab samples shall be used for pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, and fecal coliform. Twenty-four hour composite samples shall be used for all other pollutants; for a composite sample, only one analysis of the

composite of aliquots is required. Report metals as total recoverable, unless specified otherwise. Do not include information on combined sewer overflows in this section. A facility that does not use chlorine for disinfection, does not use chlorine elsewhere in the treatment process, and has no reasonable potential to discharge chlorine in the facility's effluent, is not required to sample or analyze chlorine.

When two or more outfalls with substantially identical effluent are discharging to the same receiving water segment, the Department may, on a case-by-case basis, allow for the submission of sampling data for only one outfall. The Department may also allow composite samples from one or more outfalls that discharge into the same mixing zone. Certain treatment works as specified are required to submit Supplement A of this form. The Department may require sampling and analysis for additional pollutants on a case-by-case basis. All existing data for each specified pollutant for which data has been collected within four and one-half years of this application must be included in the pollutant data summary; however, for pollutant samples taken on a monthly or more frequent basis, only the data collected within one year of this application must be submitted.

Section 11 – Additional Information for Design Flow Greater Than .1 Million GPD

Only applicants with a facility design flow greater than or equal to 0.1 mgd must complete this section. More than one topographical map may be submitted if necessary to show the entire area and required processes. Provide another map if a topographic map is unavailable. Complete each question regarding scheduled improvements separately for each improvement. If the treatment works has several different implementation schedules or is planning several improvements, attach additional copies of Section 11 for each**.**

Section 12 – Supplemental Information

Review the following criteria to determine if your treatment works is required to submit supplemental information.

Expanded Effluent Testing Data

A treatment works that discharges effluent to waters of the United States and meets one or more of the following criteria must complete Supplement A – Testing and Effluent Monitoring:

1. Has a design flow rate greater than or equal to 1 mgd,
2. Is required to have a pretreatment program (or has one in place), or
3. Is otherwise required by the permitting authority to provide the information.

Toxicity Testing Data

A treatment works that meets one or more of the following criteria must complete Supplement B – Whole Effluent Toxicity Monitoring:

1. Has a design flow rate greater than or equal to 1 mgd,
2. Is required to have a pretreatment program (or has one in place), or
3. Is otherwise required by the permitting authority to submit results of toxicity testing.

Industrial User Discharges and RCRA/CERCLA Wastes

A treatment works that accepts process wastewater from any significant industrial users (SIUs) or receives RCRA or CERCLA wastes must complete Supplement C – Industrial Dischargers and RCRA/CERCLA Wastes. SIUs are defined as:

1. All industrial users subject to Categorical Pretreatment Standards under 40 CFR §403.6 and 40 CFR Chapter I, Subchapter N (see instructions); and
2. Any other industrial user that:
   a. Discharges an average of 25,000 gallons per day or more of process wastewater to the treatment works (with certain exclusions); or
   b. Contributes a process waste stream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the treatment plant; or
   c. Is designated as an SIU by the control authority.

Combined Sewer Systems

A treatment works that has a combined sewer system must complete Supplement D – Combined Sewer

Systems.

Section 13 – Certification

Alaska Statute 46.03.790 provides for severe penalties for submitting false information on this application form. State regulations at 18 AAC 83.385 require this application be signed and certified as follows:

1. **For a corporation**, a responsible corporate officer shall sign the application; in this subsection, a responsible corporate officer means:
   (A) a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or
   (B) the manager of one or more manufacturing, production, or operating facilities, if
      (i) the manager is authorized to make management decisions that govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental statutes and regulations;
      (ii) the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and
      (iii) authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
2. **For a partnership or sole proprietorship**, the general partner or the proprietor, respectively, shall sign the application; and
3. **For a municipality, state, federal, or other public agency**, either a principal executive officer or ranking elected official shall sign the application; in this subsection, a principal executive officer of an agency means
   (A) the chief executive officer of the agency or
   (B) a senior executive officer having responsibility for the overall operations of a principal geographic unit or division of the agency.

Include the name and title of the person signing the form and the date of signing.

SECTION C – ACTIVITIES WHICH DO NOT REQUIRE AN APDES PERMIT

Under the provisions of the Clean Water Act (CWA) and regulations at 18 AAC 83.015(b), the following discharges do not require an APDES permit but are subject to any applicable waste disposal permit requirements of AS 46.03.100 or any other state authorization.

(1) DISCHARGES FROM VESSELS: Any discharges of sewage from a vessel, effluent from a properly functioning marine engine, laundry, shower, and galley sink wastes, or any other discharge incidental to the normal operation of a vessel as that term is defined in AS 46.03.826(14). However, this exclusion does not apply to rubbish, trash, garbage, or other materials discharged overboard, or other discharges when the vessel is operating in a capacity other than as a means of transportation, including when the vessel is used as an energy or mining facility, a storage facility, or a seafood processing facility; secured to a storage facility or a seafood processing facility; or secured to the bed of the ocean, contiguous zone, or waters of the United States for the purpose of mineral or oil exploration or development.

(2) DREDGED OR FILL MATERIAL: Any discharge of dredged or fill material into waters of the United States that is regulated under 33 U.S.C 1322 (Clean Water Act, sec. 404)

(3) DISCHARGES INTO PUBLICLY OWNED TREATMENT WORKS: The introduction of sewage, industrial wastes, or other pollutants into publicly owned treatment works (POTWs) by an indirect discharger. However, this exclusion does not apply to an indirect discharger defined as a significant industrial user under 40 CFR Part 403, adopted by reference at 18 AAC 83.010, if the indirect discharge is or will be to a POTW without an approved pretreatment program. The Department will provide an opportunity for any POTW that may receive indirect discharges from a significant industrial user to comment on the significant industrial user's permit.

(4) DISCHARGES IN COMPLIANCE WITH AN ON-SCENE COORDINATOR'S INSTRUCTIONS: Any discharge in compliance with the instructions of an on-scene coordinator under 40 CFR Part 300 (The National Oil and Hazardous Substances Contingency Plan) or 33 CFR Part 153 (Control of Pollution by Oil and Hazardous Substances, Discharge Removal).

(5) DISCHARGES FROM AGRICULTURAL AND SILVICULTURAL ACTIVITIES: Any introduction of pollutants from nonpoint source agricultural and silvicultural activities, including storm water runoff from orchards, cultivated crops, pastures, rangelands, and forest lands. However, this exclusion does not apply to discharges from concentrated animal feeding operations, discharges from concentrated aquatic animal production facilities, discharges to aquaculture projects, and discharges from silvicultural point sources.

(6) Any return flow from irrigated agriculture.

(7) Any discharge into a privately owned treatment works, unless the Department otherwise requires under 18 AAC 83.485.

(8) Any discharge of a pollutant from a POTW into marine waters where the discharger has been granted a waiver under 33 U.S.C. 1311(h).

SECTION D – GLOSSARY

NOTE: This Glossary includes terms used in the instructions and in Forms 1, 2A, 2B, 2C, 2D, 2E, and 2F. If you have any questions concerning the meaning of any of these terms, please contact ADEC.

ADEC means the Alaska Department of Environmental Conservation.

ADMINSTRATOR means the administrator of the United States Environmental Protection Agency (EPA), or an authorized representative.

ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM or APDES means the state's program, approved by EPA under 33.U.S.C. 1342(b), for issuing, modifying, revoking and reissuing, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements under 33 U.S.C. 1317, 1328, 1342, and 1345.

ALIQUOT means a sample of specified volume used to make up a total composite sample.

ANIMAL FEEDING OPERATION (AFO) means a lot or facility (other than an aquatic animal production facility) where the following conditions are met

1) Animals (other than aquatic animals) have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period; and

2) Crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.

Two or more animal feeding operations under common ownership are a single animal feeding operation if they adjoin each other or if they use a common area or system for the disposal of wastes.

ANIMAL UNIT means a unit of measurement for any animal feeding operation calculated by adding the following numbers: The number of slaughter and feeder cattle multiplied by 1.0; Plus the number of mature dairy cattle multiplied by 1.4; Plus the number of swine weighing over 25 kilograms (*approximately 55 pounds*) multiplied by 0.4; Plus the number of sheep multiplied by 0.1; Plus the number of horses multiplied by 2.0.

APPLICATION means a submission of required information on (A) the EPA standard national forms for applying for an NPDES permit, or (B) the Department equivalent forms adopted by the state for use in the APDES program and approved by EPA for use by the state, including any approved modifications or revisions.

APPROVED PROGRAM or APPROVED STATE means a state program which has been approved or authorized by EPA under 40 CFR Part 123.

AQUACULTURE PROJECT means a defined managed water area which uses discharges of pollutants into that designated area for the maintenance or production of harvestable freshwater, estuarine, or marine plants or animals. "Designated project area" means the portions of the waters of the United States within which the applicant plans to confine the cultivated species, using a method of plan or operation (including, but not limited to, physical confinement) which, on the basis of reliable scientific evidence, is expected to ensure the specific individual organisms comprising an aquaculture crop will enjoy increased growth attributable to the discharge of pollutants and be harvested within a defined geographic area.

AVERAGE MONTHLY DISCHARGE LIMITATION means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all the daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

AVERAGE WEEKLY DISCHARGE LIMITATION means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all the daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

BEST MANAGEMENT PRACTICES (BMP) means (A) schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States; and (B) treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

BIOLOGICAL MONITORING TEST or BIOMONITORING TEST means any test which includes the use of aquatic algal, invertebrate, or vertebrate species to measure acute or chronic toxicity, and any biological or chemical measure of bioaccumulation.

BYPASS means the intentional diversion of wastes from any portion of a treatment facility.

COMMISSIONER means the commissioner of the Alaska Department of Environmental Conservation.

CONCENTRATED ANIMAL FEEDING OPERATION (CAFO) means an animal feeding operation which meets the criteria set forth in either (A) or (B) below or which the **Director** designates as such on a case-by-case basis:

(A) Large CAFO: As many as or more than the numbers of animals specified in any of the following categories are stabled or confined:

1. 700 mature dairy cows, whether milked or dry cows;
2. 1,000 veal calves;
3. 1,000 cattle other than mature dairy cows or veal calves;
4. 2,500 swine each weighing 55 pounds or more;
5. 10,000 swine each weighing less than 55 pounds;
6. 500 horses;
7. 10,000 sheep or lambs;
8. 55,000 turkeys;
9. 30,000 laying hens or broilers, if the AFO uses a liquid manure handling system;
10. 125,000 chickens (other than laying hens), if the AFO uses other than a liquid manure handling system;
11. 82,000 laying hens, if the AFO uses other than a liquid manure handling system;
12. 30,000 ducks, if the AFO uses other than a liquid manure handling system; or
13. 5,000 ducks, if the AFO uses a liquid manure handling system.

(B) Medium CAFO: The type and number of animals falls within any of the ranges listed below, *and* if pollutants are discharged into the waters of the United States

through a man-made ditch, flushing system, or other similar man-made device; *or* if pollutants are discharged directly into waters of the United States which originate outside of and pass over, across, or through the facility or otherwise come into contact with the animals confined in the operation:

1. 200 to 699 mature dairy cows, whether milked or dry cows;
2. 300 to 999 veal calves;
3. 300 to 999 cattle other than mature dairy cows or veal calves;
4. 750 to 2,499 swine each weighing 55 pounds or more;
5. 3,000 to 9,999 swine each weighing less than 55 pounds;
6. 150 to 499 horses;
7. 3,000 to 9,999 sheep or lambs;
8. 16,500 to 54,999 turkeys;
9. 9,000 to 29,999 laying hens or broilers, if the AFO uses a liquid manure handling system;
10. 37,500 to 124,999 chickens (other than laying hens), if the AFP uses other than a liquid manure handling system;
11. 25,000 to 81,999 laying hens, if the AFO uses other than a liquid manure handling system;
12. 10,000 to 29,999 ducks, if the AFO uses other than a liquid manure handling system; or
13. 1,500 to 4,999 ducks, if the AFO uses a liquid manure handling system.

CONCENTRATED AQUATIC ANIMAL PRODUCTION FACILITY means a hatchery, fish farm, or other facility which contains, grows or holds aquatic animals in either of the following categories, or which the Director designates as such on a case-by-case basis:

(A) Cold water fish species or other cold water aquatic animals including, but not limited to, the Salmonidae family of fish (e.g., trout and salmon) in ponds, raceways or other similar structures which discharge at least 30 days per year but does not include:

1. Facilities which produce less than 9,090 harvest weight kilograms (approximately 20,000 pounds) of aquatic animals per year; and
2. Facilities which feed less than 2,272 kilograms (approximately 5,000 pounds) of food during the calendar month of maximum feeding.

(B) Warm water fish species or other warm water aquatic animals including, but not limited to, the Ameiuridae, Cetrarchiclae, and Cyprinidae families of fish (e.g., respectively, catfish, sunfish, and minnows) in ponds, raceways, or other similar structures which discharge at least 30 days per year, but does not include:

1. Closed ponds which discharge only during periods of excess runoff; or
2. Facilities which produce less than 45,454 harvest weight kilograms (approximately 100,000 pounds) of aquatic animals per year.

CONTACT COOLING WATER means water used to reduce temperature which comes into contact with a raw material, intermediate product, waste product other than heat, or finished product.

CONTIGUOUS ZONE means the entire zone established by the United States under article 24 of the Convention on the Territorial Sea and the Contiguous Zone.

CONTINUOUS DISCHARGE means a discharge that occurs without interruption throughout the operating hours of the facility, except for infrequent shutdowns for maintenance, process changes, or other similar activities.

CLEAN WATER ACT (CWA) means the federal law codified at 33 U.S.C. 1251-1387, also known or referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972.

DAILY DISCHARGE means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling; the daily discharge is calculated for a pollutant with limitations expressed in (A) unit of mass, as the total mass of the pollutant discharged over the day, and (B) other units of measurement, as the average measurement of the pollutant over the day.

DEPARTMENT means the Alaska Department of Environmental Conservation.

DIRECT DISCHARGE means the discharge of a pollutant.

DIRECTOR means the commissioner or the commissioner's designee assigned to administer the APDES Program or a portion of it, unless the context identifies an EPA director.

DISCHARGE when used without qualification means the discharge of a pollutant.

DISCHARGE (OF A POLLUTANT)

A) means any addition of any pollutant or combination of pollutants

   i) to waters of the United States from any point source; or

   ii) to waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft that is being used as a means of transportation;

B) includes any addition of pollutants into waters of the United States from

   (i) surface runoff that is collected or channeled by humans;

   (ii) discharges through pipes, sewers, or other conveyances owned by a state, municipality, or other person that do not lead to a treatment works; and

C) does not include an addition of pollutants by any indirect discharger.

DISCHARGE MONITORING REPORT(DMR) means the EPA uniform national form, adopted by reference in 18 AAC 83.410(d), for the self-monitoring results by permittees, including any department equivalent modified to substitute the Department's name address, logo, and other similar information, as appropriate, in place of information pertaining to EPA.

DRAFT PERMIT means a document prepared under 18 AAC 83.115, indicating the Department's tentative decision to issue or deny, modify, revoke and reissue, terminate, or reissue a permit.

EFFLUENT LIMITATION or EFFLUENT LIMIT means any restriction imposed by the Department on quantities, discharge rates, and concentrations of pollutants that are discharged from

point sources into waters of the United States, the waters of the contiguous zone, or the ocean.

EFFLUENT LIMITATION GUIDELINES means a regulation published by the administrator under 33 U.S.C. 1314(b) to adopt or revise effluent limitations.

ENVIRONMENTAL PROTECTION AGENCY or EPA means the United States Environmental Protection Agency.

EXISTING SOURCE or EXISTING DISCHARGER (*in the APDES program*) means any source which is not a new source or a new discharger.

FACILITY or ACTIVITY means any point source or any other facility or activity, including land or appurtenances, that is subject to regulation under the APDES program.

FEDERAL INDIAN RESERVATION means all land within the limits of any Indian reservation under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and including rights-of-way running through the reservation.

GENERAL PERMIT means an APDES permit issued under 18 AAC 83.205, or an NPDES permit issued by EPA under 40 CFR §122.28 before the state's acceptance of delegation of the NPDES program, authorizing a category of discharges under 33 U.S.C. 1251 – 1387 within a geographical area.

HAZARDOUS SUBSTANCE means any of the substances designated under 40 CFR Part 116 in accordance with 33 U.S.C. 1321. (*NOTE: These substances are listed in Table 2C-4 of the instructions to Form 2C*)

IN OPERATION means a facility which is treating, storing, or disposing of hazardous waste.

INDIAN TRIBE means any Indian tribe, band, group, or community recognized by the United States Secretary of the Interior and exercising governmental authority over a federal Indian reservation.

INDIRECT DISCHARGER means a nondomestic discharger introducing pollutants to a publicly owned treatment works.

INDIVIDUAL CONTROL STRATEGY means a final APDES permit with supporting documentation showing that effluent limits are consistent with an approved wasteload allocation or other documentation which shows that applicable water quality standards with be met no later than three years after the individual control strategy is established.

INTERSTATE AGENCY means an agency of two or more states established by or under an agreement or compact approved by the United States Congress, or any other agency of two or more states having substantial powers or duties pertaining to the control of pollution as determined and approved by the administrator under 33 U.S.C 1251 – 1387 and regulations adopted under those provisions.

LOG SORTING AND LOG STORAGE FACILITIES means facilities where discharges result from the holding of unprocessed wood, such as logs or roundwood with bark or after removal of bark held in self-contained bodies of water such as mill ponds or log ponds or stored on land for wet decking where water is applied intentionally on the logs.

MAJOR FACILITY means any NPDES facility or activity classified as a major facility by the regional administrator, or any APDES facility or activity classified as a major facility by the regional administrator in conjunction with the Department.

MAXIMUM DAILY DISCHARGE LIMITATION means the highest allowable daily discharge.

MGD means millions of gallons per day.

MINOR FACILITY means any facility that is not a major facility.

MUNICIPALITY means a city, village, town, borough, district, association, or other public body created by or under state law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under Section 208 of CWA [33 U.S.C. 1288].

MUNICIPAL SEPARATE STORM SEWER SYSTEM or MS4 has the meaning given in 40 CFR 122.26(b)(4) and (b)(7), adopted by reference in 18 AAC 83.010.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM or NPDES (A) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of CWA [33 U.S.C 1317, 1328, 1342, and 1345]; (B) includes the APDES program, as approved by EPA.

NEW DISCHARGER (A) means any building, structure, facility, or installation

(i) from which there is or may be a discharge of pollutants;

(ii) that did not commence the discharge of pollutants at a particular site before August 13, 1979;

(iii) that is not a new source; and

(iv) that has never received a finally effective NPDES permit for discharges at that site;

(B) includes

(i) an indirect discharger that commenced or commences discharging into waters of the United States after August 13, 1979;

(ii) any existing mobile point source other than an offshore or coastal oil and gas exploratory drilling rig or a coastal oil and gas development drilling rig such as a seafood processing rig, seafood processing vessel, or aggregate plant, that begins discharging at a site for which it does not have a permit; and

(iii) any offshore or coastal mobile oil and gas exploratory drilling rig or coastal mobile oil and gas developmental rig that commenced or commences the discharge of pollutants after August 13, 1979, at a site under EPA's permitting jurisdiction for which it is not covered by an individual or general permit and which is located in an area determined by the regional administrator in the issuance of a final permit to be an area of biological concern considering the factors specific in 40 CFR §125.122(a)(1) – (10), adopted by reference in 18 AAC 83.010;

(iv) an offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig will be considered a new discharger only for the duration of its discharge in an area of biological concern.

NEW SOURCE (A) means any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced

(i) after promulgation of standards of performance under Section 306 of CWA [33 U.S.C. 1316] that are applicable to a new source; or

(ii) after proposal of standards of performance in accordance with Section 306 of CWA [33 U.S.C. 1316] that are applicable to a new source, but only if the standards are promulgated in accordance with Section 306 of CWA [33 U.S.C 1316] within 120 days of their proposal;

(B) except as otherwise provided in an applicable new source performance standard, is a source that

(i) is constructed at a site at which no other source is located;

(ii) totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or

(iii) has processes which are substantially independent of an existing source at the same site, considering such factors as the extent to which the new facility is integrated with the existing plant, and the extent to which the new facility is engaged in the same general type of activity as the existing source.

(C) for purposes of (A) and (B), is a new source only if a new source performance standard is independently applicable to it; if there is no independently applicable standard, the source is a new discharger;

(D) is construction of a new source that has commenced if the owner or operator has

(i) begun, or caused to begin as part of a continuous on-site construction program, any placement, assembly, or installation of facilities or equipment or significant site preparation work including clearing, excavation or removal of existing buildings, structures, or facilities that is necessary for the placement, assembly, or installation of new source facilities or equipment; or

(ii) entered into a binding contractual obligation for the purchase of a facilities or equipment intended to be used in its operation within a reasonable time; options to purchase or contracts that can be terminated or modified without substantial loss, contracts for feasibility engineering and design studies do not constitute a contractual obligation;

(E) does not include construction on a site that results in a modification to an existing source subject to 18 AAC 83.130, if the construction does not create a new building, structure, facility, or installation meeting the criteria in (A) – (D) of this paragraph, but otherwise alters, replaces, or adds to existing process or production equipment.

(F) as used in (A)-(E) of this paragraph:

(i) "existing source" means any source that is not a new source or a new discharger;

(ii) "facility or equipment" means any building, structure, process or production equipment or machinery which form a permanent part of the new source and which will be used in its operation, if the facility or equipment is of such value as to represent a substantial commitment to construct, but does not include any facility or equipment used in connection with feasibility, engineering, and design studies regarding the source or water pollution treatment for the source;

(iii) "source" means any building, structure, facility, or installation from which there is or may be a discharge of pollutants;

NONCONTACT COOLING WATER means water used to reduce temperature which does not come into direct contact with any raw material, intermediate product, waste product (*other than heat*), or finished product.

ON-SITE CONTACT means the person who is thoroughly familiar with the operation of the facility and with the facts reported in this application and who can be contacted by reviewing offices if necessary.

OPERATOR means the party responsible for the overall operation of a facility. *(See "Responsible Party")*

OUTFALL means a point source.

OWNER means the owner of any facility subject to regulation under the APDES program.

PERMIT (A) means an authorization, license, or equivalent control document issued by the Department to implement the requirements of the APDES Program and 18 AAC 83; (B) includes an APDES general permit and an EPA-issued NPDES general permit.

PERSON means an individual, association, partnership, corporation, municipality, state or federal agency, or an agent or employee thereof.

POINT SOURCE (A) means any discernible, confined, and discrete conveyance, including any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged; (B) does not include return flows from irrigated agricultural storm water runoff.

POLLUTANT (A) means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical waste, biological materials, radioactive materials except those regulated under 42 U.S.C. 2011, heat, wrecked or discarded equipment, rocks, sand, cellar dirt and industrial, municipal, or agriculture waste discharged into water;

(B) does not include sewage from vessels or water, gas, or other material that is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well

(i) is used either to facilitate production or for disposal purposes

(ii) is approved by authority of the Department, and

(iii) if the Department determines that the injection or disposal will not result in the degradation of ground or surface water resources.

PRELIMINARY DRAFT PERMIT means a draft permit that the Department intends to provide notice of under 18 AAC 83.120 and that is provided in advance to the applicant under 18 AAC 83.115(e).

PRETREATMENT has the meaning given in 40 CFR §403.3(q), adopted by reference in 18 AAC 83.010.

PRIMARY INDUSTRY CATEGORY means any industry category listed in Appendix A to 40 CFR Part 122, adopted by reference in 18 AAC 83.010.

PRIVATELY OWNED TREATMENT WORKS means any device or system that is used to treat wastes from any facility whose operator is not the operator of the treatment works and is not a POTW.

PROCESS WASTEWATER means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material,

intermediate product, finished product, byproduct, or waste product.

PROPOSED FINAL PERMIT means a permit, prepared after the public comment period and any public hearing and administrative appeal, that may be sent to EPA for review before final issuance by the Department.

PUBLICLY OWNED TREATMENT WORKS or POTW (A) means a treatment works as defined by 33 U.S.C. 1292 that is owned by a state or municipality; municipality includes a municipality that has jurisdiction over the indirect discharges to and the discharges from such a treatment works;

(B) includes

(i) any device and system used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature; and

(ii) any sewer, pipes, and other conveyances that conveys wastewater to a POTW treatment plant.

RECOMMENCING DISCHARGER means a source that recommences discharge after terminating operations.

REGIONAL ADMINISTRATOR means the regional administrator of EPA Region 10 or the authorized representative of the regional administrator.

RESPONSIBLE PARTY means the person, firm, public organization, or any other entity responsible for the overall operation of the facility. This may or may not be the same name as the facility. The responsible party is the legal entity which controls the facility's operation rather than the plant or site manager and receives all correspondence from the Department.

ROCK CRUSHING OR GRAVEL WASHING FACILITIES means facilities that process crushed and broken stone, gravel, and riprap.

SCHEDULE OF COMPLIANCE means a schedule of remedial measures in a permit, including an enforceable sequence of interim requirements such as actions, operations, or milestone events, leading to compliance with 33 U.S.C. 1251 – 1387 and 18 AAC 83.

SECONDARY INDUSTRY CATEGORY means any industry category that is not a primary industry category.

SEPTAGE means the liquid and solid material pumped from a septic tank, cesspool, or similar domestic sewage treatment system, or a holding tank when the system is cleaned or maintained.

SEVERE PROPERTY DAMAGE means substantial physical damage to property, damage to treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass; in this paragraph, “severe property damage” does not include economic loss caused by delays in production.

SEWAGE FROM VESSELS means human body wastes and the wastes from toilets and other receptacles intended to receive or retain body wastes that are discharged from vessels and regulated under Section 312 of CWA [33 U.S.C. 1322].

SEWAGE SLUDGE (A) means any solid, semi-solid, or liquid residue removed during the treatment of municipal wastewater or domestic sewage; (B) includes solids removed during primary, secondary, or advanced wastewater treatment, scum, **septage**, portable toilet pumpings, type III marine sanitation device pumpings under 33 CFR Part 159, and sewage sludge products; (C) does not include grit, screenings, or ash generated during the incineration of sewage sludge.

SEWAGE SLUDGE USE OR DISPOSAL PRACTICE means the collection, storage, treatment, transportation, processing, monitoring, use, or disposal of sewage sludge.

SILVICULTURAL POINT SOURCE (A) means any discernable, confined, and discrete conveyance related to rock crushing and gravel washing, log sorting, or log storage facilities that are operated in connection with silvicultural activities and from which pollutants are discharged into waters of the United States; (B) does not include non-point source silvicultural activities such as nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance from which there is natural runoff. However, some of these activities (such as stream crossing for roads) may require a CWA Section 404 permit.

SITE means the land or water area where any facility or activity is physically located or conducted, including adjacent land used in connection with the facility or activity.

STATE means the State of Alaska.

STATE AND EPA AGREEMENT means an agreement between the regional administrator and the state that coordinates EPA and state activities, responsibilities, and programs, including those under 33 U.S.C. 1251-1387.

STORMWATER means stormwater runoff, snow melt runoff, and surface runoff and drainage.

STORMWATER DISCHARGE ASSOCIATED WITH INDUSTRIAL ACTIVITY means the discharge from any conveyance that is used for collecting and conveying stormwater and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant.

SURFACE IMPOUNDMENT or IMPOUNDMENT means a facility or part of a facility which is a natural topographic depression, manmade excavation, or diked area formed primarily of earthen materials (*although it may be lined with manmade materials*), which is designed to hold an accumulation of liquid wastes or wastes containing free liquids, and which is not an injection well. Examples of surface impoundments are holding, storage, settling, and aeration pits, ponds, and lagoons.

TOTAL DISSOLVED SOLIDS means the total dissolved solids as determined by use of the method specified in 40 CFR Part 136, adopted by reference in 18 AAC 83.010.

TOXIC POLLUTANT means any pollutant listed as toxic under Section 307(a)(1) of CWA [33 U.S.C. 1317(a)(1)].

TREATMENT WORKS TREATING DOMESTIC SEWAGE (TWTDS) means a POTW or any other sewage sludge or waste water treatment devices or systems, regardless of ownership (including federal facilities), used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated for the disposal of sewage sludge.

UNDERGROUND INJECTION means well injection.

UPSET means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee; upset does not include the following: (A) noncompliance to the extent caused by operational error; (B) improperly designed or installed treatment facilities: (C) inadequate treatment facilities; (D) lack of preventive maintenance; (E) careless or improper operation.

VARIANCE (A) means any mechanism or provision under 33 U.S.C. 1311 or 1326 or under 18 AAC 83.160, or in the applicable effluent limitations guidelines, that allows a modification or waiver of the generally applicable effluent limitation requirements or time deadlines of 33 U.S.C 1251 – 1387; (B) includes provisions that allow the establishment of alternative limitations based on fundamentally different factors or based upon 33 U.S.C. 1311(c), (g) – (i), or 1326(a).

WATERS OF THE UNITED STATES or WATERS OF THE U.S. (A) means:

(i) all waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide;

(ii) all interstate waters, including interstate wetlands;

(iii) all other waters such as intrastate lakes, rivers, streams, including intermittent streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce, including any such waters that are or could be used by interstate or foreign travelers for recreational or other purposes; from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or that are used or could be used for industrial purposes by industries in interstate commerce;

(iv) all impoundments of waters otherwise defined as waters of the United States;

(v) tributaries of waters identified in paragraphs (i) – (iv);

(vi) the territorial sea; and

(vii) wetlands adjacent to waters, other than waters that are themselves wetlands, identified in paragraphs (i) - (vi).

(B) does not include

(i) waste treatment systems including treatment ponds or lagoons designed to meet the requirements of 33 U.S.C. 1251 – 1387 (CWA), other than cooling ponds as defined in 40 CFR §423.11(m), adopted by reference in 18 AAC 83.010 that also meet the criteria of this paragraph;

(ii) prior converted cropland; however, notwithstanding the determination of an area's status as prior converted cropland by any federal agency other than EPA, the final authority regarding CWA jurisdiction remains with EPA.

WELL INJECTION or UNDERGROUND INJECTION means the subsurface emplacement of fluids through a bored, drilled, or driven well; or through a dug well, where the depth of the dug well is greater than the largest surface dimension.

WETLANDS means those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, and generally include swamps, marshes, bogs, and similar areas.

WHOLE EFFLUENT TOXICITY means the aggregate toxic effect of an effluent measured directly by a toxicity test.

through a man-made ditch, flushing system, or other similar man-made device; *or* if pollutants are discharged directly into waters of the United States which originate outside of and pass over, across, or through the facility or otherwise come into contact with the animals confined in the operation:

1. 200 to 699 mature dairy cows, whether milked or dry cows;
2. 300 to 999 veal calves;
3. 300 to 999 cattle other than mature dairy cows or veal calves;
4. 750 to 2,499 swine each weighing 55 pounds or more;
5. 3,000 to 9,999 swine each weighing less than 55 pounds;
6. 150 to 499 horses;
7. 3,000 to 9,999 sheep or lambs;
8. 16,500 to 54,999 turkeys;
9. 9,000 to 29,999 laying hens or broilers, if the AFO uses a liquid manure handling system;
10. 37,500 to 124,999 chickens (other than laying hens), if the AFP uses other than a liquid manure handling system;
11. 25,000 to 81,999 laying hens, if the AFO uses other than a liquid manure handling system;
12. 10,000 to 29,999 ducks, if the AFO uses other than a liquid manure handling system; or
13. 1,500 to 4,999 ducks, if the AFO uses a liquid manure handling system.

CONCENTRATED AQUATIC ANIMAL PRODUCTION FACILITY means a hatchery, fish farm, or other facility which contains, grows or holds aquatic animals in either of the following categories, or which the Director designates as such on a case-by-case basis:

(A) Cold water fish species or other cold water aquatic animals including, but not limited to, the Salmonidae family of fish (e.g., trout and salmon) in ponds, raceways or other similar structures which discharge at least 30 days per year but does not include:

1. Facilities which produce less than 9,090 harvest weight kilograms (approximately 20,000 pounds) of aquatic animals per year; and
2. Facilities which feed less than 2,272 kilograms (approximately 5,000 pounds) of food during the calendar month of maximum feeding.

(B) Warm water fish species or other warm water aquatic animals including, but not limited to, the Ameiuridae, Cetrarchiclae, and Cyprinidae families of fish (e.g., respectively, catfish, sunfish, and minnows) in ponds, raceways, or other similar structures which discharge at least 30 days per year, but does not include:

1. Closed ponds which discharge only during periods of excess runoff; or
2. Facilities which produce less than 45,454 harvest weight kilograms (approximately 100,000 pounds) of aquatic animals per year.

CONTACT COOLING WATER means water used to reduce temperature which comes into contact with a raw material, intermediate product, waste product other than heat, or finished product.

CONTIGUOUS ZONE means the entire zone established by the United States under article 24 of the Convention on the Territorial Sea and the Contiguous Zone.

CONTINUOUS DISCHARGE means a discharge that occurs without interruption throughout the operating hours of the facility, except for infrequent shutdowns for maintenance, process changes, or other similar activities.

CLEAN WATER ACT (CWA) means the federal law codified at 33 U.S.C. 1251-1387, also known or referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972.

DAILY DISCHARGE means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling; the daily discharge is calculated for a pollutant with limitations expressed in (A) unit of mass, as the total mass of the pollutant discharged over the day, and (B) other units of measurement, as the average measurement of the pollutant over the day.

DEPARTMENT means the Alaska Department of Environmental Conservation.

DIRECT DISCHARGE means the discharge of a pollutant.

DIRECTOR means the commissioner or the commissioner's designee assigned to administer the APDES Program or a portion of it, unless the context identifies an EPA director.

DISCHARGE when used without qualification means the discharge of a pollutant.

DISCHARGE (OF A POLLUTANT)

A) means any addition of any pollutant or combination of pollutants

   i) to waters of the United States from any point source; or

   ii) to waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft that is being used as a means of transportation;

B) includes any addition of pollutants into waters of the United States from

   (i) surface runoff that is collected or channeled by humans;

   (ii) discharges through pipes, sewers, or other conveyances owned by a state, municipality, or other person that do not lead to a treatment works; and

C) does not include an addition of pollutants by any indirect discharger.

DISCHARGE MONITORING REPORT(DMR) means the EPA uniform national form, adopted by reference in 18 AAC 83.410(d), for the self-monitoring results by permittees, including any department equivalent modified to substitute the Department's name address, logo, and other similar information, as appropriate, in place of information pertaining to EPA.

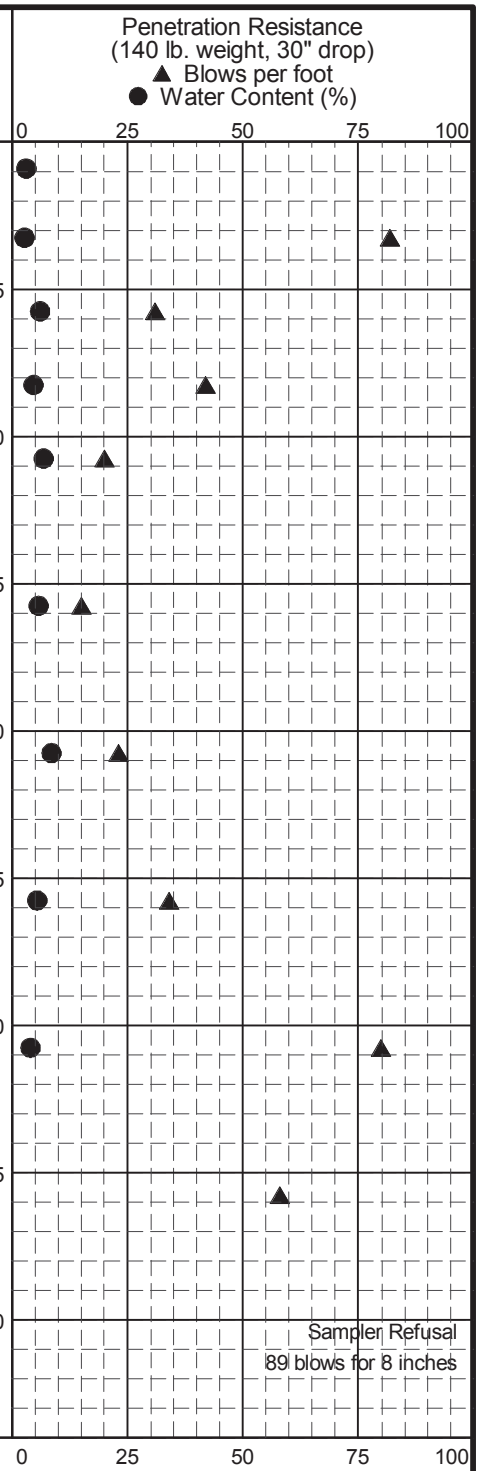
DRAFT PERMIT means a document prepared under 18 AAC 83.115, indicating the Department's tentative decision to issue or deny, modify, revoke and reissue, terminate, or reissue a permit.

EFFLUENT LIMITATION or EFFLUENT LIMIT means any restriction imposed by the Department on quantities, discharge rates, and concentrations of pollutants that are discharged from

APPENDIX F

Artillery Road Geotechnical Log

MATERIAL DESCRIPTION Approx. Elevation: 316 feet	Depth, Ft.	Symbol	Samples	Ground Water Depth, Ft.
4 inches *Asphalt* S1: 41% Gravel, 46% Sand, 14% Fines (F2 (0.02mm))	0.3		S1	
Dense, brown, *Silty Sand with Gravel (SM)*; moist [FILL]	2.0		S2	
Very dense, brown to gray *Gravel with Silt and Sand (GP-GM)*; moist [FILL]	5.3		S3	
Medium dense to dense, brown, *Silty Sand with Gravel (SM)*; approximately 0-2% organics (based on visual estimate); moist [FILL] S4: 31% Gravel, 50% Sand, 20% Fines (F3 (P200))			S4	
			S5	
Roughly 2 inches of Asphalt debris observed in Sample S5 at approximately 11.3 feet bgs	13.0			
Medium dense to dense, brown, *Silty Sand with Gravel (SM)*; moist			S6	
			S7	
			S8	
Very dense, brown to gray to gray-brown to red-yellow, *Silty Gravel with Sand (GM)*; moist to wet S9: 48% Gravel, 38% Sand, 14% Fines (F2 (P200))	28.0		S9	
			S10	8/13/13
			S11	
CONTINUED NEXT PAGE	43.0			



LEGEND

* Sample Not Recovered
Grab Sample
2" O.D. Split Spoon Sample
3" O.D. Split Spoon Sample
Ground Water Level At Time Of Drilling

● Water Content (%)
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. PP (Pocket Penetrometer) tests estimate Unconfined Compressive Strength of Cohesive Soils. TV (Torvane) tests estimate the Undrained Shear Strength of Cohesive Soils. All measurements in tons per square foot.

Glenn Highway Widening
Eagle River, Alaska

LOG OF BORING B-22

February 2014 32-1-02307-002

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-24
Sheet 1 of 2

GEOTECHNICAL LOG 02307-002 GINT.GPJ S&W GEO1.GDT 2/3/14

Soil Classification and Bearing Table

From CFR* 3285.202 - Manufactured Housing Installation

SOIL CLASSIFICATION		SOIL DESCRIPTION	ALLOWABLE PRESSURE	BLOW COUNT	TORQUE
Classification Number (5)	ASTM D 2487 or D 2488		Pounds Per Square Foot (1)	ASTM D 1586	Probe (3) Value (4) Inch Pounds
1		Rock or Hard Pan	4000		
2	GW,GP SW,SP,SG SM	Sandy gravel and gravel; very dense and/or cemented sands; course gravel/cobbles; preloaded silts, clays and corals	2000	40+	More than 550
3	GC,SC,ML	Sandy; silty sand; clayey sand; silty gravel; medium dense course sands; sandy gravel; and very stiff silt, sand clays	1500	24 - 39	351 - 550
4A	CG,MH(2)	Loose to Medium dense sands; firm to stiff clays and silts; alluvial fills	1000	18 - 23	276 - 350
4B	CH,MH(2)	Loose sands; firm clays; alluvial fills	1000	12 - 17	175 - 275
5	OL,OH,PT	Uncompacted fill; peat; organic clays	Refer to CFR* 3285.202(e)	0 - 11	Less than 175

1) The values provided in this table have been adjusted for overburden pressure, embedment depth, water table height, or settlement problems.
2) For soils classified as CH or MH, without either torque probe values or blow count test results, selected anchors must be rated for a 4B soil.
3) The torque probe is a device for measuring the torque value of soils to assist in valuating the holding capacity of the soil in which the ground anchor is placed The shaft must be of suitable length for the depth of the ground anchor.
4) The torque value is measurement of the load resistance provided by the soil when subject to the turning or twisting force of the probe.
5) The allowable pressure of 1500 psf may be used, unless the site specific information requires the use of lower values based on soil classification and type.

* Code of Federal Regulations (CFR)