HALEY WARD

ENGINEERING | ENVIRONMENTAL | SURVEYING

WASTEWATER COLLECTION AND TREATMENT SYSTEM EVALUATION

FOR VEAZIE SEWER DISTRICT

Veazie, Maine

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INTRODUCTION

Haley Ward, Inc. (Haley Ward) appreciates the opportunity to provide the Veazie Sewer District (District) with this evaluation of the wastewater collection system, County Road Pump Station and Buck Hill Pump Station, and the Wastewater Treatment Plant (WWTP). This evaluation of the WWTP will include existing system conditions, operational constraints, design vs. actual loading, safety concerns and recommendations of systems that need replacement, and other upgrades to improve operational efficiencies. We also understand that as Veazie has experienced an increase in residents, consideration for future growth has been included in this evaluation. A standard 20-year planning horizon has been considered.

The following provides an executive summary of our findings.

a) The WWTP was constructed in 1989 and is licensed to discharge 0.35 million gallons per day (MGD) of secondary treated wastewater to the Penobscot River. A significant upgrade to the WWTP was performed in 2001.

b) Wastewater flows and loads for the past five years were reviewed.

c) The current and future considerations for flows and loading indicate that the existing scheme for treatment (complete mix/partial mix) will be adequate and is recommended moving forward for the next 20 years.

d) Current and future projections for growth in Veazie are likely to be accommodated by the capacity already in place at the WWTP. If additional growth significantly exceeds that which has been planned, there is room for an additional blower and additional diffusers within the partial mix portions of Lagoons #1 and #2.

e) Overall, the WWTP is in fair condition; however, due to deferred maintenance over the years of operation, there are numerous improvements that should be considered. These improvements will ensure proper operation which will allow for compliance with the WWTP's WDL. There are several safety improvements that should be considered to protect District staff. There are also several improvements that should be considered to ease operation for District staff, which will increase efficiencies.

DESCRIPTION OF THE EXISTING SYSTEMS

Wastewater Collection System and Pump Stations

The District serves approximately 1,800 users in the Town of Veazie. The wastewater collection system is comprised of approximately 7.76 miles of various size mains. The pipe material used for the mains include ductile iron, vitrified clay, and PVC pipe. The wastewater collection system is separated from the storm drainage system and there are no combined sewer overflow outfalls. See the VSD Sewer Infrastructure Map in **Appendix A**.

The District has two pump stations, the County Road Pump Station and the Buck Hill Pump Station. The County Road Pump Station is located along the Penobscot River and is accessed from Old County Road. This pump station serves a majority of the eastern portion of the Town of Veazie. The pump station is a Smith & Loveless, vacuum primed, wet well mounted pump station and was installed in 1986. There have been no major upgrades to this pump station in the 35 years of service. However, the District replaced the impellers due to clogging issues, which reduced the pumping rate and needs to be evaluated to determine if the pump station has adequate pumping capacity.

The Buck Hill Pump Station is located on Buck Hill Drive and serves approximately 13 residential homes along Buck Hill Drive. This pump station is also a Smith & Loveless, vacuum primed, wet well mounted pump station and was installed in the late 1990s/early 2000s.

Wastewater Treatment Plant

The District's WWTP is located along the Penobscot River at the end of Hobson Avenue. The WWTP was constructed in 1989 and is licensed to discharge secondary treated wastewater to the Penobscot River. The original WWTP began operation in August of 1989 and consisted of a manually cleaned bar rack for pretreatment, a three pond aerated-facultative lagoon treatment system, and a gas chlorination system for disinfection. Tapered aeration in the ponds was provided by surface mechanical aspirators mounted on floats. Aspirators were added or removed from the lagoons to meet seasonal operating conditions. The aerators were operated with timers to meet diurnal oxygen demands. Influent and effluent flow measurement was provided by Parshall flumes with flow monitored and continuously recorded on circular chart recorders. The lagoon system was designed to meet secondary treatment standards for BOD (30 mg/l) and TSS (30 mg/l).

Following the completion of the WWTP, several minor upgrades were made to the treatment system to improve operation and the effluent quality, which included the replacement of the original gas chlorination system with a sodium hypochlorite system and additional mechanical aspirating aerators were installed to increase aeration capacity in the lagoons. In the late 1990s, the WWTP had difficulty meeting discharge license effluent limits even with the BOD and TSS mass loadings and flows were generally below the original plant design. A Wastewater Facilities Study was performed in 1999 and found that the existing aerated-facultative lagoon treatment process could not meet existing license requirements at existing wastewater flows and loads due to insufficient treatment volume and aeration capacity. These process limitations would also prevent any future sewered growth in the Town of Veazie. The study found to remain an aerated-facultative lagoon system would require acquiring additional land to expand the WWTP site and increase the volume of the lagoons and also require additional aeration capacity.

Based on the findings from the 1999 study, a major upgrade to the WWTP was performed in 2001 to convert the treatment system to a complete mix/partial mix lagoon system. This

mode of operation is how the WWTP is currently being operated. See the Veazie Wastewater Treatment Facility Upgrade/Expansion Plan Set, January 2001, in **Appendix B**. This project included the construction of the headworks building, blower building, installation of diffused air system in Lagoon #1 and #2, baffling Lagoon #1, and installing a floating cover system on Lagoon #3.

The complete mix/partial mix lagoon system is the simplest and most economical treatment system based on the system flow and available land. An alternate to onsite treatment would be to pump the Town's wastewater to the City of Bangor's wastewater collection system for treatment at the City's WWTP. The closet available connection point to the City of Bangor's wastewater collection system is on Mount Hope Avenue by Rolling Meadow Drive or on State Street by the eastern side of the Mount Hope Cemetery. Both of these points are approximately 1.1 miles from the VSD WWTP. This would involve installing a pump station at the current WWTP and pumping to one of these locations. The pump station would need to be sized to accommodate the peak flow from the Town. A pump station to accommodate this flow would cost approximately $1 million and the force main to connect to the City's collection system would be approximately $1.2 million. The VSD would still need to operate the collection system and pump stations and pay the City of Bangor for treatment of the Town's wastewater.

WWTP Layout

The WWTP is located on the western side of the Penobscot River, at the end of Hobson Avenue in the southwestern corner of the Town of Veazie. The facility consists of an administration building; headworks with screening and grit removal systems; two aerated lagoons (Lagoon #1 and #2) and one settling lagoon (Lagoon #3); chlorine contact chamber and associated disinfection injection/chemical storage building; aeration/blower control building; and emergency stand-by generator (Administration Building). The building facades are a variety of vinyl siding, wooden siding, brick, and exposed concrete block. There two sections of security fence that restricts access to the treatment systems.

Wastewater flow enters the WWTP by gravity flow and passes through the Headworks Building to receive preliminary treatment. The headworks preliminary treatment consists of mechanical grinding, followed by screening, washing and compacting to remove the trash, and unwanted solids from the waste stream. The system was designed to provide fine screening of the influent wastewater while washing out most of the organic material. A water line was installed to the Headworks Building for wash water for the screening equipment and for general building cleaning. The Headworks Building is approximately 50 feet by 29 feet, concrete block building with an asphalt shingled roof.

The influent wastewater passes through the primary channel of the headworks that contains a JWC Environmental 30K Series Muffin Monster grinder (Model 30005-0032-DI-197). The grinder is an open-channel, three horsepower (HP) electric model, and is designed for continuous operation, and consists of two parallel shafts with intermeshing cutters and spacers. The wastewater is then screened to remove the trash and unwanted

solids in a JWC Environmental Auger Monster (Model AGD3200-12). The unit contains a two HP electric motor driven auger which is used to dewater and compress the unwanted solids and debris for disposal. This unit contains a fine screen segment with six mm perforations, which provides an average suspended solids reduction of approximately five percent. The original design included washing of the screenings, but this appears to have been removed. Washing the screenings is an important process to remove organic material, from the screenings, that could be used in the treatment and nutrient removal process. The volatile solids content of the screenings can be quite high and because putrescible material (including fecal matter) is contained within the screenings, they should be properly handled and disposed of. There is a secondary channel with a manually cleaned bar rack that can be used to bypass the primary channel with the grinder and screening equipment, if necessary. Manually operated slide gates are used to isolate the primary or secondary channel of the headworks. The influent channels are manually cleaned, periodically, to remove grit, which is then disposed of at a landfill.

An open channel ultrasonic flow meter (Siemens) and Parshall flume are located at the end of the primary and secondary channels and continuously monitor and record influent flow and temperature. An automatic composite sampler (QCEC Century 3000) is used for influent sampling. The composite sampler, controls for the grinder and screening equipment, and flow meter display unit are located in the electrical/mechanical room of the Headworks Building.

Due to the potentially hazardous and moist environment, there is an exhaust fan and automatic intake louver to provide ventilation for the treatment area of the Headworks Building. Ultima gas monitoring units are used to continuously monitor oxygen, hydrogen sulfide, and the lower explosive limit in the treatment area. The Headworks Building is heated by in-floor radiant heat using a 70,000 BTU/hr, Weil-McLain gas fired boiler (Model GV-3). The boiler is located in the electrical/mechanical room of the Headworks Building. Unit heaters would not be effective in the treatment area due to the necessary ventilation. There is auxiliary electric heat and ventilation in the electrical/mechanical room of the Headworks Building.

After preliminary treatment, the wastewater flows to the lagoons. Under normal operation, all three lagoons are in operation in series. Piping flexibility designed into the original plant allows any lagoon to be bypassed and taken out of service.

The normal liquid operating depth in all of the lagoons is between 10.5 feet and 11.5 feet. At a liquid depth of 11 feet, the volumes of Lagoons #1, #2, and #3 are 2.442, 0.959, and 1.065 million gallons, respectively, for a total volume of 4.466 million gallons. At the design dry weather flow of 0.20 million gallons per day (MGD), the total lagoon detention time is 22.33 days.

Lagoon #1 has a 40 mil, smooth HDPE liner and has two curtains baffles that divide the lagoon into three 0.814 million gallon cells. The aeration system in the first cell has five

floating lateral diffused air headers with a total of thirty-two (32) membrane tube diffuser assemblies (Environmental Dynamics, Inc. Flexair 88S-Magnum). The aeration system for this first cell is designed for complete mix. Each diffuser assembly has four, meter long tube diffusers that are configured in an H pattern. The diffusers nearer the edge of the lagoon are at a higher elevation to provide mixing in this area. These diffusers are equipped with throttling valves to control air flow and mixing intensity.

The second and third cells in Lagoon #1 are designed for partial mixing. The second cell has two submerged air header laterals with a total of eight membrane tube diffuser assemblies with four, half meter long tube diffusers (Environmental Dynamics, Inc. Flexair 44F-18 Magnum) and eight membrane tube diffuser assemblies with two, half meter long tube diffusers (Environmental Dynamics, Inc. Flexair 42F-Magnum). The third cell has two submerged air header laterals with a total of 14 membrane tube diffuser assemblies with two, half meter long tube diffusers (Environmental Dynamics, Inc. Flexair 42F-Magnum). All the diffusers in the partial mix cells are on the lagoon bottom. There is the remains of the framework of a floating aerator in the southern portion of the third cell. The effluent from Lagoon #1 is discharged through a precast concrete structure, TLV #1, which is located in the southwest corner of Lagoon #1. TLV #1 controls the liquid level of Lagoon #1.

The wastewater enters Lagoon #2 through a precast concrete structure located in the northeast corner of the lagoon. Lagoon #2 has a 40 mil, smooth HDPE liner and is designed for partial mixing. This lagoon has three submerged air header laterals with a total of six membrane tube diffuser assemblies with two, half meter long tube diffusers (Environmental Dynamics, Inc. Flexair 88S-Magnum). These diffusers are also on the lagoon bottom. There is the remains of the framework of a floating aerator in the southwestern corner of the Lagoon #2.

The air to the diffused air aeration system in Lagoon #1 and #2 is supplied by four blowers that are located in the Blower Building. The Blower Building is located at the south end of Lagoon #1 and #2 and is approximately 40 feet by 30 feet, wooden framed building with vinyl siding and an asphalt shingled roof. There are two separate sections of the Blower Building, the western section is a garage area and the eastern section is the blower room.

The blowers are numbered B-1, B-2, B-3, and B-4 north to south. The blowers used for the aeration system are manufactured by United Blower, Inc. with a unit capacity of 300 scfm (under standard conditions). The blower units are Tuthill Corporation Model 5006-21L2 bi-lobe, positive displacement blower units. Each blower is driven by a GE, 25 HP, 1760 RPM, 230/460 Volt, 3 Phase electric motor (Model 5KE284AC205) with variable frequency drive (VFD). The VFDs for B-1, B-2, and B-4 are Allen Bradley 1336 Plus II units and the VFD for B-3 is an Allen Bradley Power Flex 400 unit. There is a space available in the blower room for an additional blower in the future, if necessary.

The blowers discharge to two eight-inch diameter, stainless steel, main air headers. One header provides air to the complete mix zone in Lagoon #1 and the other header

provides air to the partial mix zones in Lagoon #1 and Lagoon #2. The discharge piping from each blower is four-inch diameter stainless steel piping. Each blower has a double disc check valve and three control valves (Butterfly gate valves) on the discharge piping which allow for each blower to discharge to either of the main headers and both main headers can be connected. Based on the original design under normal operating conditions, two blowers are dedicated to the complete mix zone in Lagoon #1 and one blower to the partial mix zones in Lagoon #1 and Lagoon #2. The fourth blower is a spare. Currently, the District is operating the blowers in pairs, one for the complete mix zone and the other for the partial mix zone.

Blower operation, including operating status, pressures, temperatures, and VFD conditions are monitored and transmitted to the control system in the Administration Building. The air flow in the two air headers is measured and transmitted to the control system in the Administration Building.

The effluent from Lagoon #2 is discharged through a precast concrete structure, TLV #2, which is located in the southeast corner of Lagoon #2. TLV #2 controls the liquid level of Lagoon #2.

The wastewater enters Lagoon #3 through a precast concrete structure located in the northeast corner of the lagoon. Lagoon #3 has a modular insulated floating cover. The cover was manufactured by the Lemna Corporation and is constructed of 40 mil HDPE with two-inch thick extruded polystyrene insulation. There are two areas of the cover that have cutouts for mechanical aspirating aerators. These aerators are no longer in service and have been removed. The dissolved oxygen and temperature in all lagoons is continuously monitored by the SCADA system.

The effluent from Lagoon #3 is discharged through a precast concrete structure, TLV #3, which is located in the southwest corner of Lagoon #3. TLV #3 controls the liquid level of Lagoon #3.

The effluent from the Lagoon #3 flows through a chlorine contact chamber for disinfection prior to being discharged into the Penobscot River. The seasonal disinfection requirement is in place from May 15 to September 30 every year. An open channel ultrasonic flow meter (Siemens) and Parshall flume are located at the beginning of the chlorine contact chamber and continuously monitor and record effluent flow. The chlorine contact chamber has two channels that are operated in parallel. Both channels have provisions for manually installed slide gates, which are used to isolate the channels for maintenance and cleaning. The District has installed pressure treated, wooden covers over the channels to limit exposure to sunlight, which can degrade the effects of chlorine, and reduce the amount of airborne debris (leaves, grass, dirt) that enters the channels. At the end of the channels is a weir to regulate the liquid level in the chamber. An automatic composite sampler is used for effluent sampling and is located in a plastic enclosure that is mounted on top of the chlorine contact chamber near the discharge. The effluent from the chlorine contact chamber is the discharged to the Penobscot River

through a 30-inch diameter pipe.

Adjacent to the chlorine contact chamber is the Chlorination Building. This building is approximately 20 feet by 20 feet, wooden framed and wooden sided building, with an asphalt shingled roof. The building was part of the original WWTP construction and was originally designed for chlorine gas injection. The building is divided in two separate sections, the north section of the building is a storage area (originally the gas injection area), and the southern section is the chemical storage/disinfection injection area. There is not water available in this building.

The District injects sodium hydroxide for pH control and sodium hypochlorite for disinfection. Stenner Pump Company peristaltic injection pumps (Model 85MHP5) are located in the chemical storage/disinfection injection area of the Chlorination Building and are used to inject the chemicals to the influent side of the chlorine contact chamber. Due to the potentially hazardous environment, there is an exhaust fan and automatic intake louver to provide ventilation for the chemical storage/disinfection injection area of the Chlorination Building. The control for the ventilation system is located outside of the building by the access door to allow for the ventilation system to be activated prior to entry to the space. There is a Wallace & Tiernan Series 50-135 chlorine gas monitoring unit in this area but it does not appear to be operational and was likely used when chlorine gas was used for disinfection. This gas detection unit should be removed and disposed of. The section of the Chlorination Building is heated by Chromalox electric unit heater (Model CCR-007 004-027545-028).

Future Growth and Treatment Considerations

The improvements considered within the context of any typical planning study often follow a 20-year design period. As will be shown, the last significant design improvements within the system of the WWTP, occurring in 1999, were based on a 20-year design period and assumed the following conditions.

In 1999, Veazie had an estimated sewered population of 1,800 and approximately 725 equivalent sewer users. Each single-family residential dwelling, apartment, and trailer is classified as one equivalent user. This equates to an average of 2.48 persons per equivalent user. The dry weather summer flow to the plant averaged 120,000 gpd or 67 gpd/person. For estimating flow from future sewered development, an infiltration allowance of 25 gpd/person was added. Therefore, it was estimated that each future equivalent sewer user will require a treatment capacity of approximately 230 gpd.

It was assumed that the average flow to the plant was to increase by 100,000 gpd over the next 20 years. This equates to a sewered population increase of 1,087 persons or 438 equivalent users. This also represents an increase in sewered population of 60%. It should be noted that at this time, there was discussions occurring in the community relative to the potential for building residential developments on the larger pieces of undeveloped land in Town including the Davis Farm and adjacent land surrounding Buck Hill. As the numbers have shown, that did not completely come to fruition. There has been a recent

increase in development associated with the Davis Farm land; however, nothing of significance has been undertaken in the Buck Hill region.

Based on the sewered growth and future flow estimates presented above, the future wastewater flows and loads had been calculated and are presented in the Table below. BOD and TSS have been estimated at 0.18 and 0.20 pounds per capita per day, plus a small allowance for commercial users.

TABLE 1 | EXISTING AND DESIGN YEAR WASTEWATER FLOWS AND LOADS (prepared in 1999)

Item	1999	Future
Estimated Sewered Population	1,800	2,887
No. of Equivalent Users	725	1,163
Average Persons per Equivalent User	2.48	2.48
Influent Flow		
Dry Weather Flow (GPD)	120,000	193,000
Wet Weather Flow (GPD)	260,000	420,000
Peak Month (GPD)	420,000	550,000
Influent BOD_5 (lbs./day)	329	530
Influent TSS (lbs./day)	365	587

Current Flows and Loads

Haley Ward has performed a review of the last four and a half years of influent and effluent data documented by the WWTP staff. As will be shown, the design year projected in 1999 has not been achieved. The following table provides a comparison of Flows and Loads from what was estimated in 1999 to what has occurred for the last four and a half years.

TABLE 2 | EXISTING AND DESIGN YEAR WASTEWATER FLOWS AND LOADS

Item	2000	2017-2021
Estimated Sewered Population	1,744	1,814*
No. of Equivalent Users	732	782
Average Persons per Equivalent User	2.38	2.32
Influent Flow		
Dry Weather Flow (GPD)**	120,000	140,000
Wet Weather Flow (GPD)***	260,000	220,000
Peak Month (GPD)	420,000	500,000
Influent BOD_5 (lbs./day)	329	178****
Influent TSS (lbs./day)	365	231

* 2020 Census population
**Dry Weather Flow: June-September
***Wet Weather Flow: January-May and October-December

****BOD5 value estimated as 120% of CBOD5 value observed

Based on this review, it is clear the current treatment technology in place for the WWTP has capacity to accommodate future growth. If we were to look out 20 years based on the last 20 years of growth as provided by the US Census Bureau, Veazie has grown from a population of 1,744 in 2000 to a population of 1,814 per the 2020 census. This equates to a growth of approximately 4%. If Veazie follows this trend for the next 20 years, the treatment facility has plenty of capacity for potential future growth within the community. Haley Ward performed a very detailed analysis of several options in the original facilities report undertaken prior to the 1999 upgrade project. We evaluated four alternatives for providing treatment for the wastewater generated by the community. All four alternatives did factor in utilizing the lagoon systems that were currently in place in 1999, given that the initial investment in these facilities provided a significant financial advantage when compared to other technologies that were considered. Given that growth within the Community has not kept pace with the design expectation, we believe the current treatment technology implemented is a sound alternative for the future of the facility. Based on a comparison of current and design data, the facility has the ability to accept an increase of nearly 60% its current sewer population.

With this in mind, we do recognize that as components of the facility age, there are likely more energy efficient options for delivering the necessary oxygen for treatment needs. This would include blower and diffuser improvements. These items will be discussed later on in the report.

Current Waste Discharge License Parameters

The Maine Department of Environmental Protection (MDEP) regulates the WWTP. In 2018, the MDEP issued the WWTP's current Waste Discharge License (WDL), ME0100706 W002754-6C-K-R. WDL's are issued for a five-year term and the license for the WWTP will need to be renewed in 2023. The WDL authorizes the WWTP to discharge an average of 0.35 MGD of secondary treated wastewater from the publicly owned treatment plant to the Penobscot River in Veazie. See the current WDL in **Appendix D**. Below is a table summarizing the effluent limitations and monitoring requirements from the WDL.

TABLE 3 | WDL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

Effluent Characteristics	Discharge Limitations						Min. Monitoring Req.	
	Monthly Avg.	Weekly Avg.	Daily Max.	Monthly Avg.	Weekly Avg.	Daily Max.	Measurement Frequency	Sample Type
Flow	0.35 MGD	-	Report MGD	-	-	-	Continuous	Recorder
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	73#/day	117#/day	131#/day	25 mg/L	40 mg/L	45 mg/L	2/Month	24-hr Composite
$COBD_5$ % Removal	-	-	-	65%	-	-	1/Month	Calc.
TSS	88#/day	131#/day	146#/day	30 mg/L	45 mg/L	50 mg/L	2/Month	24-hr Composite
TSS % Removal	-	-	-	85%	-	-	1/Month	Calc.
Settleable Solids	-	-	-	-	-	0.3 ml/L	3/Week	Grab
E. coli Bacteria (May 15-Sept. 30)	-	-	-	64/100 ml	-	427/1000 ml	1/Week	Grab
Total Residual Chlorine	-	-	-	-	-	1.0 mg/L	5/Week	Grab
pH	-	-	-	-	-	6.0-9.0 SU	3/Week	Grab
Mercury	-	-	-	6.3ng/L	-	9.4 ng/L	1/Year	Grab

Potential Modifications to the Waste Discharge License Parameters

The MDEP reviewed the District's current WDL and indicated that following the next license renewal the E. Coli Bacteria testing window will be extended from May 15 through September 15 to April 15 through October 30. This is based on a statutory rule change to Title 38 Section 465.

The MDEP has a Proposed Nutrient Rule (Chapter 583) which is currently in the stakeholder review process and will likely be implemented next year. This rule will focus on total phosphorus in freshwater discharges. In the process of drafting this rule, the MDEP reviewed all current WWTP and found that the District's WWTP does not have reasonable potential to exceed the total phosphorus limit based on their initial calculations. The proposed total phosphorus limit for the Penobscot River (Class B stream or river) will be 30 parts per billion (ppb) based on August median river flows. The MDEP considers the generic WWTP discharge for treated sanitary sewer effluent to average 2.2 ppb. The MDEP did suggest that the District may want to consider performing O&M sampling for total phosphorus to provide background data. When the rule is implemented, the MDEP will likely request that all WWTP's that they believe do not have reasonable potential to exceed the total phosphorus limit to perform sampling (10 samples) to confirm this belief. The MDEP indicated that nitrogen limits will be established for marine discharges and will not be used for freshwater discharges.

MDEP indicated that because there are no identified substances that may be discharged in the District's collection system and are toxic or have toxic characteristics, Whole Effluent Toxicity (WET) testing is not necessary. WET testing is typically required in communities with industrial discharges. Based on Chapter 530 *Surface Waters Toxics Control Program,* the categorization of the relative risk of toxic contamination of receiving waters by a discharge the District is in the lowest risk category, Level IV. A Level IV are dischargers that have a chronic dilution factor of at least 500 to 1 and a permitted flow of less than one million gallons per day.

The MDEP indicated that for the next permit renewal the District will need to provide reasoning to remain with the $CBOD_5$ discharge limit rather than the more typical BOD_5 discharge limit (30mg/L). The original WDL included discharge limits for BOD_5 and TSS to evaluate the lagoon system's performance. However, it was found that nitrification was occurring in the BOD_5 test bottle and evaluations performed prior to the 2001 upgrade found that little credence can be placed on BOD_5 analyses when evaluating treatment conditions in aerated lagoons. Due to this effect, the WDL discharge parameter was changed from BOD_5 to $CBOD_5$. $CBOD_5$ should be used for the evaluation of lagoon performance and troubleshooting. The District has been testing for influent and effluent $CBOD_5$ as well as BOD_5 and should continue to test for both parameters to have data available for evaluation, should the MDEP change the discharge parameters. The table below is provided to show the correlation between BOD_5 and $CBOD_5$ for the last 5 years.

TABLE 4 | BOD_5 VS. $CBOD_5$

Year	Average Influent BOD_5 (mg/L)	Average Effluent BOD_5 (mg/L)	Average Influent $CBOD_5$ (mg/L)	Average Effluent $CBOD_5$ (mg/L)
2017	145.96	17.36	119.04	8.49
2018	161.13	12.30	141.21	8.26
2019	140.55	16.75	139.86	16.70
2020	117.55	9.63	145.00	7.90
2021	115.83	9.76	134.67	8.57
AVERAGE	136.20	13.16	135.96	9.98

Based on the available data, it does not appear that the District would have a problem with meeting a 30 mg/L BOD_5 discharge limit. The District should continue taking O&M samples of the effluent for BOD_5 for background data in the event that the MDEP intends the change the discharge parameter to BOD_5.

EVALUATION OF THE WASTEWATER COLLECTION SYSTEM

The wastewater collection system is comprised of approximately 8.21 miles of various size gravity sewer mains. The pipe material used for the mains include ductile iron, vitrified clay, and PVC pipe. The wastewater collection system is separated from the storm

drainage system and there are no combined sewer overflow outfalls. Inflow and Infiltration (I&I) into the wastewater collection system has been a concern for the District.

Collection System Mains

Below is a table of the wastewater collection system based on the District's Infrastructure Map that was compiled by Plisga & Day Land Surveyors in 2017.

TABLE 5 | COLLECTION SYSTEM MAINS

Main Size (in)	Pipe Material			Total Length (Feet) Pipe Size
	Ductile Iron	PVC	Asbestos Concrete /Transite	
6	738	150	0	888
8	12,629	8,421	10,595	31,645
10	0	325	0	325
12	0	5,200	2,408	7,608
14	1,600	1,100	0	2,700
15	0	0	194	194
Total Length (Feet) Pipe Material	14,967	15,196	13,197	43,360
Percentage of System	34.5%	35%	30.5%	100%

The available information indicates that there are several 6-inch diameter mains in the collection system. These 6-inch diameter mains are located on Flagg Street (220 linear feet), Highview Terrance (150 linear feet), Maple Street (388 linear feet) and Rock Street (130 linear feet). The New England Interstate Water Pollution Control Commission *TR-16 Guides of the Design of Wastewater Treatment Works* indicates that no public gravity sewer be less than 8-inches in diameter. The District should consider upsizing these mains when they are replaced.

The oldest mains in the system were installed in 1968 and are located on Davis Drive and Route 2. However, most of the collection system (approximately 49%) was installed in the 1980's. Below is a table of the collection system age.

TABLE 6 | COLLECTION SYSTEM MAIN AGE

Installation Date	Total Length (Feet)	Percentage
1968-1969	8,241	19%
1970-1979	7,530	17%
1980-1989	21,074	49%
1990-1999	3,413	8%
2000+	2,922	7%

Cleaning is an important part of pipe maintenance. The benefits of implementing a sewer maintenance plan is to reduce sanitary sewer overflow (SSO), basement backups, and any other discharge from the collection system. The District has been cleaning mains with the District owned jetting equipment. In 2018, 2019 and 2020 the District cleaned 7,321 linear feet, 11,449 linear feet, and 12,616 linear feet, respectively. This accounts for approximately 72% of the system. There is no requirement for the percentage of the collection system that must be cleaned per year. The EPA *Collection System Collection Systems O&M Fact Sheet: Sewer Cleaning and Inspections* indicated that the average percentage of the collection system that should be cleaned each year should be approximately 30%. A maintenance plan should be developed to achieve this amount of the system. Problem areas may need to be prioritized and cleaned at a higher frequency. Problem areas can include older sections of the system, area with shallow slopes or sags in the main, areas with pipe material that are susceptible to corrosion (asbestos cement, transite, clay, etc) or other problem areas that are known to the District staff. Also, areas with users that discharge high level of grease and fats (restaurants, commercial kitchens, schools, etc.) may need to be cleaned at a higher frequency.

Inspection programs are another important part of the maintenance plan. Closed-circuit television (CCTV) inspection are cost effective and can provide a detailed and documented inspection that is critical to the maintenance plan. The EPA *Collection System Collection Systems O&M Fact Sheet: Sewer Cleaning and Inspections* indicate that approximately 7% of the collection system should be inspected each year. We would recommend that the District plan to CCTV inspect 10% of the collection system each year. This would mean that the sewer mains would be inspected on a 10-year frequency.

The CCTV inspection should be performed in accordance with the NASSCO (National Association of Sewer Service Companies) Pipeline Assessment Certification Program (PACP). The NASSCO PACP is used to properly and consistently assess the condition of mains. This conditional assessment program can be used to prioritize the mains that need to be replaced/rehabilitated or if no action is necessary. The NASSCO PACP uses a numerical grading system to express the severity of the pipe defect based on the risk of further deterioration or failure. The numerical grade range between 1 to 5, with 1 being minor defects and 5 being a severe defect. Below is a description of the numerical grading system:

- Severity Grade 1: Excellent. Pipe segment has minor defects, failure unlikely in the foreseeable future.
- Severity Grade 2: Good. Pipe segment has minor defects, pipe unlikely to fail for at least 20 years or more.
- Severity Grade 3: Fair. Pipe segment has moderate defects, deterioration may continue, at a ten to twenty year timeframe.
- Severity Grade 4: Poor. Pipe segment has severe defects, risk of failure within the next five to ten years.

- Severity Grade 5: Immediate Attention. Pipe segment has failed or will likely fail within the next five years, requires immediate attention.

Cleaning the main is necessary to accurately assess the condition of the main. Due to this we would suggest that the District coordinate their cleaning schedule with the CCTV inspection schedule to reduce the cost of the inspection.

Collection System Manholes

There are 232 known sewer manholes within the District's wastewater collection system. The EPA *Collection System Collection Systems O&M Fact Sheet: Sewer Cleaning and Inspections* indicate that approximately 20% of the collection system manholes should be inspected each year, which would be approximately 47 manholes. The manhole should be evaluated on the following items: structural condition of the chimney and barrel sections, condition of the pipe connection, observed infiltration or signs of infiltration (staining of walls of structure), accumulation of solids and debris in the manhole, excessive flow through the manhole.

Inflow and Infiltration

Inflow and Infiltration (I/I) are major contributors to flow within the collection system that can be an issue at the WWTP. The New England Interstate Water Pollution Control Commission *TR-16 Guides of the Design of Wastewater Treatment Works* indicate that an average daily per capita flow of not less than 70 GPD should be used for the design of residential collection systems, plus an appropriate allowance for infiltration. The guidance indicates that an allowance of 250 to 500 GPD/inch diameter/mile of sewer is a normal range of infiltration due to aging of the pipe system. Based on the size of the collection system, the typical infiltration should be approximately 17,746 to 35,492 GPD or 13 to 25 GPD per capita. This would result in a total average daily per capita flow of between 83 to 95 GPD. The average daily flow (ADF) at the WWTP from 2017 and 2021 is approximately 0.19 MGD, which is a per capita flow of approximately 135 GPD. This would indicate that I/I may exceed acceptable levels.

The *TR-16* guidance document also indicates that the ratio for the Maximum 24-Hour Flow and Peak Flow on Maximum Day should be approximately 2.8 and 5.0 times the ADF, respectively. This would result in a Maximum 24-Hour Flow of approximately 0.532 MGD and Peak Flow on Maximum Day of 0.95 MG.

The former District superintendent had developed an Ongoing Inflow and Infiltration Program. This program included I/I remediation and repairs for 2018, 2019 and 2020. This program also included manhole inspections that were performed each year.

The I/I Program indicates that in 2018 the District performed the following I/I items/tasks:

- Eliminated seven floor drain connections to the sanitary sewer system
- Replaced three clay services with signs of infiltration
- Identified manholes to install catch pans under the covers to reduce surface inflow
- Performed visual spot checks to estimate sewer flow on several streets

- Performed smoke testing which identified a defect on Main Street
- Investigated Greystone Trailer Park for I/I contributions.

The 2018 program does not identify which manhole that catch pans were needed, or if this item was completed. The program does not indicate if the Main Street defect was corrected. Sixty-five manholes were inspected in 2018, which is 28% of the manholes. The program indicates that all infiltration identified during the manhole inspections were repaired, except for manhole 605.

The I/I Program indicates that in 2019 the District performed the following I/I items/tasks:

- Eliminated five floor drain connections to the sanitary sewer system
- Identified manholes to install catch pans under the covers to reduce surface inflow
- Performed visual spot checks to estimate sewer flow on several streets
- Performed smoke testing which identified several manholes for future repairs
- Investigated Greystone Trailer Park for I/I contributions.

The 2019 program does not identify which manhole that catch pans were needed, or if this item was completed. Eighty-seven manholes were inspected in 2019, which is 37.5% of the manholes. The program indicates that all infiltration identified during the manhole inspections and smoke test were repaired, except for manhole 210, 270, 405, and 1040. The program indicates that the work that has been performed to the sewer system in the Grey Stone Trailer Park appears to be reducing flows.

The I/I Program indicates that in 2020 the District performed the following I/I items/tasks:

- Identified manholes to install catch pans under the covers to reduce surface inflow
- Performed visual spot checks to estimate sewer flow on several streets
- Performed smoke testing which identified several manholes for future repairs
- Investigated Greystone Trailer Park for I/I contributions.

The 2020 program does not identify which manhole that catch pans were needed, or if this item was completed. Eighty-three manholes were inspected in 2019, which is 35.8% of the manholes. The program indicates that all infiltration identified during the manhole inspections and smoke test were repaired, except for manhole 605, 937, 938 and 940. The program indicates that the work that has been performed to the sewer system in the Grey Stone Trailer Park appears to have greatly reduced the flows from the park.

Recently District staff located a potential area with excessive I/I. This area of concern is located along the main that serves Grey Stone Trailer Park near the Town Office. The main in this area runs under Route 2 and the railroad tracks. District staff noticed a significant difference between dry weather and wet weather flow in this area. An additional manhole was discovered near the Town Office. This area should be further investigated using CCTV inspection to determine the source of the I/I.

It should be noted that Grey Stone Trailer Park has been an area of concern regarding I/I for some time. The sewer system in the Grey Stone Trailer Park is a private system.

Inspection documents from the park that were provided by the District indicate that there are severe defects in the Grey Stone collection system that should be repaired. Improvements that were scheduled at the Trailer Park were anticipated to reduce the amount of I/I contributed to the District's collection system. We are not aware of the status of the improvements to remove I/I within their Park's collection system. If the Park does not act on the proposed improvements, the District should consider installing a permanent flow meter (Parshall flume and ultrasonic level sensor) at the connection of the between the Park and the District's collection system for billing purposes. The signal from the level sensor is converted to a flow rate. This would require an additional structure with a Parshall flume and an electrical connection for the ultrasonic level sensor. A lower cost alternative to a permanent flow meter, would be for the District to purchase and install another ISCO 2150 flowmeter to monitor the flow from the Park. The ISCO 2150 can be installed in a normal sewer manhole and operates on batteries, but this unit would be less accurate than Parshall flume/ultrasonic level sensor.

Conclusion

District staff should continue to investigate the collection system for I/I by comparing dry weather and wet weather flow. These investigations should be documented. The I/I program indicated that in 2018, 2019 and 2020, several streets had been investigated, but did not provide the location, time or flows observed during the investigation. The District owns several ISCO portable flowmeters which can be used to monitor areas for potential I/I. Haley Ward has similar ISCO portable flowmeters and could assist the District with the installation, monitoring, and data analysis.

The District should also consider locating all of the manholes and using a GIS program to annotate the condition of the various collection system components. This information can be used by the District to analyze the collection system and help determine rehabilitation projects. The GIS system can also be beneficial to District staff to help locate manholes.

We would recommend that the District clean 30% of the mains and CCTV inspect 10% of the mains each year. The District should also inspect at least 20% on the manholes each year. Based on the previously established I/I program, the District should inspect and repair the infiltration identified in manholes 605, 210, 270, 405, 1040, 605, 937, 938 and 940. The District should also determine if the catch pans have been installed throughout the system.

The District should continue the VSD Ongoing Inflow and Infiltration Program. The program should be updated for work performed in 2021. Additional descriptions of the work performed and the visual inspections of sewer flows should be added to the program. Ideally, this plan can be prepared forward looking such that a schedule is developed for reviewing pipe segments and manholes. The schedule can be followed and planned annually. It will also allow for a prioritization of improvements.

EVALUATION OF THE WASTEWATER PUMP STATIONS

The District has two pump stations, the County Road Pump Station and the Buck Hill Pump Station.

County Road Pump Station

The County Road Pump Station consists of a duplex wet well mounted pump skid, 10-foot diameter precast concrete wet well (18.1 vertical feet), and a portable standby generator in a prefabricated steel building enclosure. The standby generator and enclosure are in good condition, the concrete wet well is in fair condition, and the pump system is in poor condition. There is an approximately 875 linear foot gravel access road to the pump station off Old County Road that appears to be in good condition. There is also a six-foot chain link security fence surrounding the pump station that appears to be in good condition.

Figure 1: County Road Pump Station

The Smith & Loveless (S&L), vacuum primed, wet well mounted, duplex, 20 Horsepower (HP) pump system is original to the 1986 construction; however, the impellers were changed in 2009 to a S&L 9-7/8-inch X-pellers, due to continual clogging issues. The original design (S&L Serial No. 16-3422) was rated for 400 Gallons Per Minute (GPM) at 90' Total Dynamic Head (TDH). With the change to the X-peller in 2009, the serial number changed to 16-08616 and the system was rated for 380 GPM at 88' TDH. In 2017, the impellers were changed to a 10-1/8-inch X-peller for additional capacity. A simple drawdown test show that both Pump 1 and Pump 2 have an average pump rate of approximately 183.5 GPM, which is significantly lower than the rated flow for the impellers. This is approximately 46% of the original rated capacity for the pump station. The resulting flowrate is a significant reduction in the capacity of the pump station and could be caused by wear of the impellers or volute. The reduced capacity can cause extended operation of the pumps to serve the area and lead to higher operating cost. More importantly, during peak flow and wet weather conditions, the pump station may not be

able to keep up with influent flow which could lead to Sanitary Sewer Overflow (SSO) events at the station.

Figure 2: County Road Pump Station Control Panel

District staff indicated that during severe wet weather, a septage hauling company has been used to truck wastewater from this pump station to lower the wet well level and avoid an SSO event. This can be attributed to significant wet weather flows in the collection system due to I&I. However, the reduced capacity of the pump station is the main factor in the pump station's inability to handle wet weather flows.

During the initial inspection, significant vibration was noted in both pumps. Pump 2 had been recently removed and dynamically balanced by a local company but still exhibited considerable vibration. Based on our review of the pump curve and the current operating point, it is likely that the vibration is caused by discharge cavitation. This can occur when the pump is running too far left on the pump curve and the discharge pressure is extremely high. The high discharge pressure causes fluid to circulate inside the pump volute causing cavitation. Signs of discharge cavitation include wear on the tips of the impeller and on the pump volute. See the pump curve in Appendix E.

Figure 3: County Road Pump Station Pumps

District staff located and installed an original impeller on Pump 1 and this appears to have significantly reduced the vibration. Another drawdown test was performed on Pump 1 and showed an average pump rate of approximately 305 GPM with the original impeller. This is approximately 76% of the rated capacity of the pump and a significant improvement over the X-peller. District staff is monitoring the pump for clogging. Only Pump 1 has been retrofitted at this time, if the flowrates remain high and clogging is not an issue the District should consider changing the impeller on Pump 2. There are several alternative if clogging continues to be an issue. These alternatives include installing a cutting/grinding impeller, but as the District has found this can affect the pumping capacity and cause vibration issues. Some communities have installed channel grinders ahead of pump stations to eliminate the rags and debris that can cause clogging. This is an additional piece of equipment that must be serviced and maintained, but would allow the pumps to run at the intended operating point.

The S&L wet well mounted pump station require vacuum pumps for initial priming and to maintain the pumps prime. These systems are complex and can be problematic because they are necessary for the pump system operation. District staff indicated that they regularly trouble shoot vacuum issues.

The pumps were originally controlled by float level control switches but have been retrofitted to a Milltronics HydroRanger 200 with an ultrasonic level sensor for level control and the old float level control switches are used for alarm conditions. This pump station has radio equipment to transmit information to the District's SCADA system.

The S&L pump station has a clam-shell style fiberglass enclosure to protect the pumps from the elements and it appears to be in fair condition. This enclosure has an electric heater and a ventilation fan. This enclosure is effective at protecting the pumps and allows for access to the pump systems for maintenance, however, it is not convenient for

maintenance during inclement weather as it exposes both the pump equipment and staff to the weather.

The District purchased a portable standby generator. This generator is in good condition and at the time of the inspection only had 169 hours. The generator is stored at the County Road Pump Station in a metal storage building and is connected to an automatic transfer switch for the pump station. District staff indicated that in an emergency, this generator could be disconnected from the County Road Pump Station and used at the Buck Hill Pump Station.

There is a motion activated exterior light at the County Road Pump Station. This exterior light is directed at the pump station and does not illuminate the generator building. Additional exterior lighting should be added to illuminate both the pump station and the generator building to facilitate safe work conditions during night work at the pump station and enhance security around the pump station. The exterior light could be controlled in a dawn-to-dusk mode or motion activated with an override switch to allow continuous operation if needed.

Buck Hill Pump Station

The Buck Hill Pump Station consists of a duplex wet well mounted pump skid on a six-foot diameter precast concrete wet well. There is no standby generator at this location, and it does not appear to have provisions to connect a standby generator. The concrete wet well is in fair condition and the pump system is in poor condition. There is an approximately 300 linear foot gravel access road to the pump station off Buck Hill Drive that appears to be in good condition. There is also a six-foot chain link security fence surrounding the pump station that appears to be in good condition.

Figure 4: Buck Hill Pump Station

The Smith & Loveless (S&L), vacuum primed, wet well mounted, duplex, 7.5 HP pump system is original to the 2003 construction; however, the impellers were changed in 2013

from 7-7/8-inch diameter to 8-3/4-inch diameter. The original design (S&L Serial No. FX-01098) was rated for 75 GPM at 69' TDH. A simple drawdown test show that Pump 1 has an average pump rate of approximately 48.5 GPM and Pump 2 has an average pump rate of approximately 57.25 GPM. This is approximately 65% and 76% of the rated capacity for Pump 1 and Pump 2, respectively. This flowrate is a significant reduction in the capacity of the pump station and could be caused by wear of the impellors or volute. The reduced capacity can cause extended operation to serve the area and lead to higher operating cost. Similar to the County Road Pump Station, this reduced capacity could lead to SSO events at the station during peak flow and wet weather conditions. See the pump curve in Appendix E.

During the initial inspection, a vibration was noted in both pumps. This vibration did not appear to be as severe as the pumps at the County Road Pump Station but should be noted and further investigated. Similar to the County Road Pump Station, this vibration appears to be caused by discharge cavitation, when the operating point of the pump is too far left on the pump curve. Typically, vibration monitoring of wastewater pumping systems is not performed due to the variation in the fluid/solids that are being pumped. Vibrations can be temporary due to material that is pumped and can be the result of clogging. Clogging is typically monitored through the amperage draw of the pump motor.

Similar to the County Road Pump Station, the Buck Hill Pump Station is a S&L wet well mounted pump station that requires vacuum pumps for initial priming and to maintain system prime. These systems are complex and can be problematic because they are necessary for the pump system operation. District staff indicated that they regularly trouble shoot vacuum issues.

S&L indicated that a Protronix II level controller was purchased by the District in 2018. This is a PLC controller with touch screen HMI interface but does not appear to have been installed. The HMI interface at the pump station is not connected. It appears that this pump station has been reconfigured to operate by way of float level control switches with a MicroLogix 1100 programmable logic controller system. This is not the S&L factory control system that was provided with the system. There does appear to be an alternator to switch lead/lag pump operation after each pump cycle. There is also a Siemen ultrasonic sensor to monitor the level in the pump station and report to the SCADA system but is not used for level control. This pump station has radio equipment to transmit level data and alarm conditions to the District's SCADA system. District staff indicated that communication with the pump station had been problematic until recent modifications.

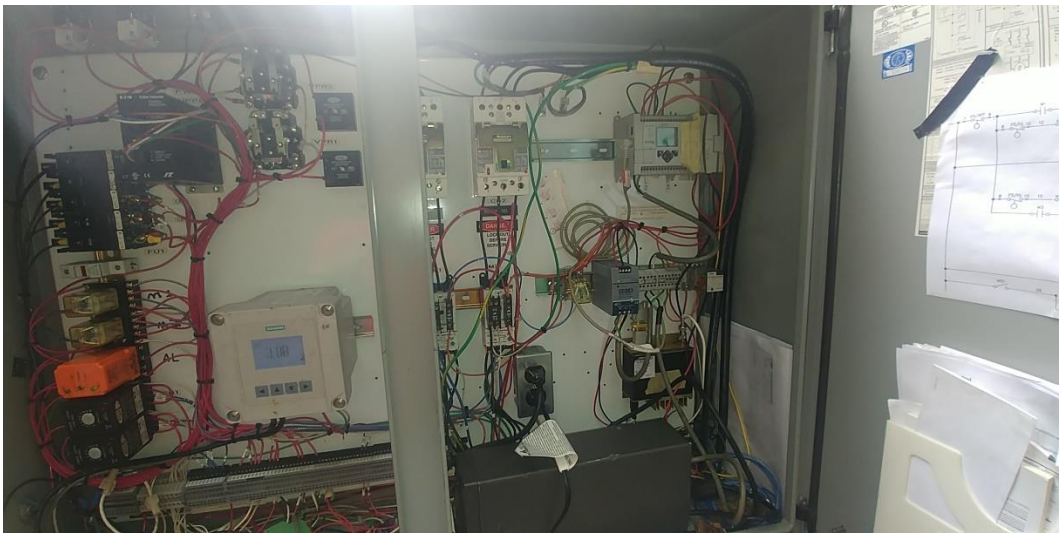


Figure 5: Buck Hill Pump Station Control Panel

This S&L pump station has a split case fiberglass enclosure to protect the pumps from the elements and appears to be in fair condition. This enclosure has an electric heater and a ventilation fan. This enclosure is effective at protecting the pumps and allows for access to the pump systems for maintenance. However, like the County Road Pump Station, it is not convenient for maintenance during inclement weather as it exposes both the pump equipment and staff to the weather.

Figure 6: Buck Hill Pump Station Pumps

The Buck Hill Pump Station is located at the bottom of the relatively steep access road. The immediate area around the pump station is paved and the top of the pump station structure is flush with the pavement. It appears that surface water flow could run down the hill and directly into the wet well access hatch. This should be corrected by either lowering the pavement around the structure or installing a paved diversion berm to direct surface flow away from the access hatch.

There is no exterior lighting at the Buck Hill Pump Station. Exterior lighting should be added at the pump station to facilitate safe work conditions during night work at the pump station and enhance security around the pump station. The exterior lighting could be controlled in dawn-to-dusk mode or motion activated with an override switch to allow continuous operation if needed.

Conclusion

The pump systems and level controllers for both pump stations should be replaced. The useful life of pump equipment is typically between 20-30 years, with good maintenance. The County Road Pump Station is 35 years old, and the Buck Hill Pump Station is 18 years old. Both concrete structures appear in good condition and these types of concrete structures can have a useful life of 50+ years. Using the simple drawdown test and comparing the flows to the manufacturer's pump curves, both pump systems are not operating at their original design point and are not operating efficiently. The County Road and Buck Hill Pump Stations are operating at less than 55% and 30% pump efficiency, respectively. This results in higher than normal electrical demand and operating cost.

There are several pump manufacturers that offer aboveground, self-priming wastewater pumps that do not require vacuum pump systems. An alternative to this would be submersible pumps; however, submersible pumps require removal from the wet well for maintenance and inspection. Aboveground pump stations allow for easier access for maintenance and inspection. An enclosure could be constructed to house the pumps and allow for access and protect the pumps and District staff from the elements. Pump manufactures also offer several different impeller and volute designs that can be less prone to clogging.

The control panel and level control systems at both pump stations could be improved. Based on the current edition of NFPA 70E, National Electric Code, control panels are to be constructed to provide arc-flash protection. This is to protect workers by separating the utility power from the control wiring or de-energizing the control panel before it can be opened so the utility power cannot be contacted by workers during maintenance. Neither of the current pump station control panels provide this protection. The level control system for both pump stations appear to use a mixture of ultrasonic level sensors and mechanical float level control switches to control pump operation, alarm conditions and SCADA reporting. The County Road Pump Station uses an ultrasonic sensor for pump control and SCADA reporting but uses float switches for alarm conditions. The Buck Hill Pump Station uses an ultrasonic sensor for SCADA reporting but uses float switches for pump control and alarm conditions. Typically, the main level control system collects data from either an ultrasonic level sensor or pressure transducer which is used for pump control, alarm conditions, and SCADA reporting. Backup mechanical float level switches are used in the event that the main level sensor fails to provide redundancy.

The District should determine the preferred type of pump station (wet well/dry well, submersible, aboveground, etc.), control system (mechanical floats, ultrasonic sensor,

pressure transducer, etc.), and any specific equipment and/or equipment manufacturers prior to future improvements. The District should then standardize their approach once the preferred system has been selected, so both pump stations are uniform. Having similar pump stations and uniform equipment will ease operations. Standardizing on one type of system can also reduce the number of spart parts necessary to have on hand for emergency repairs.

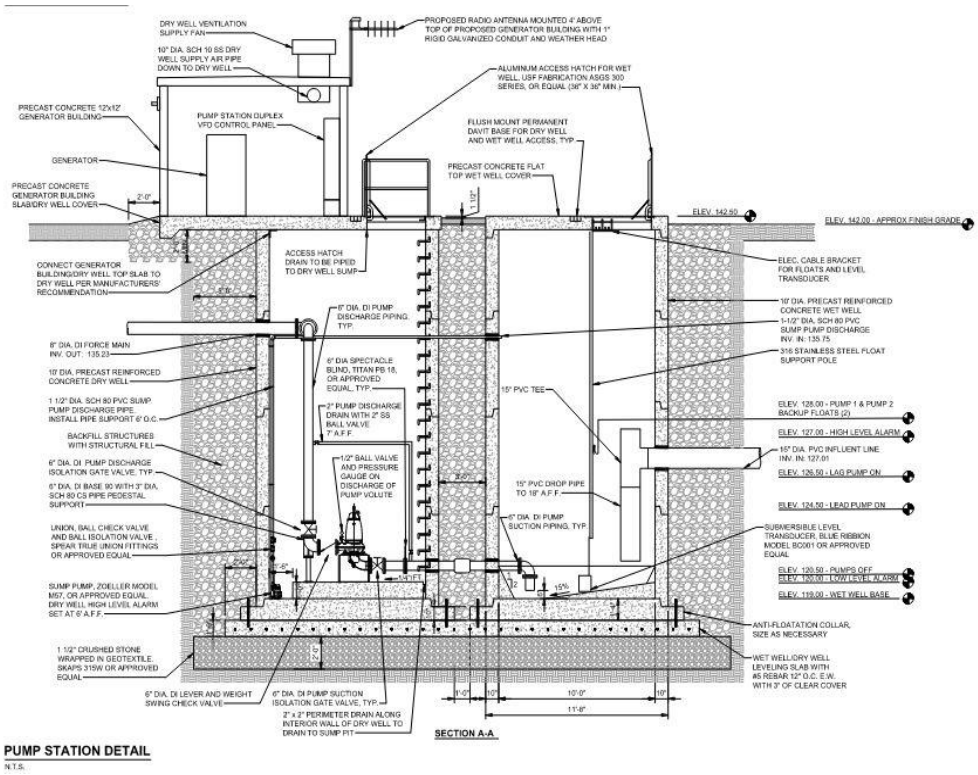
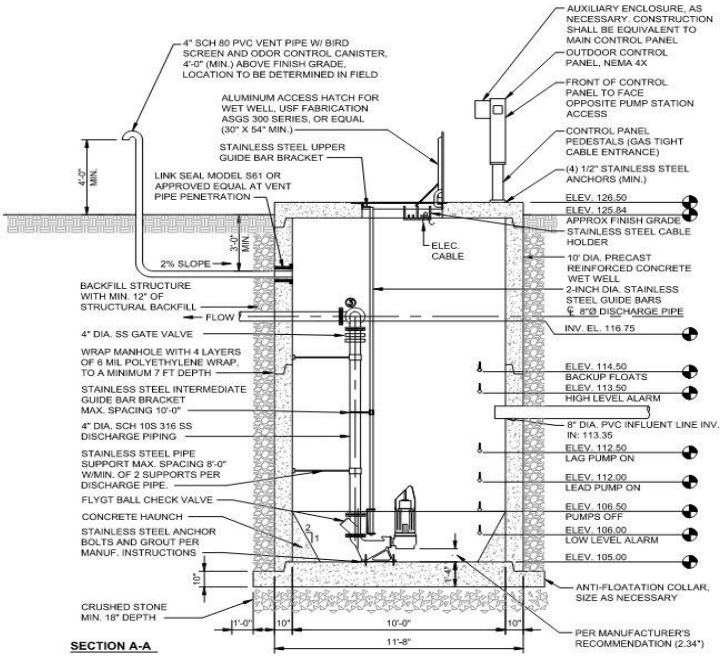
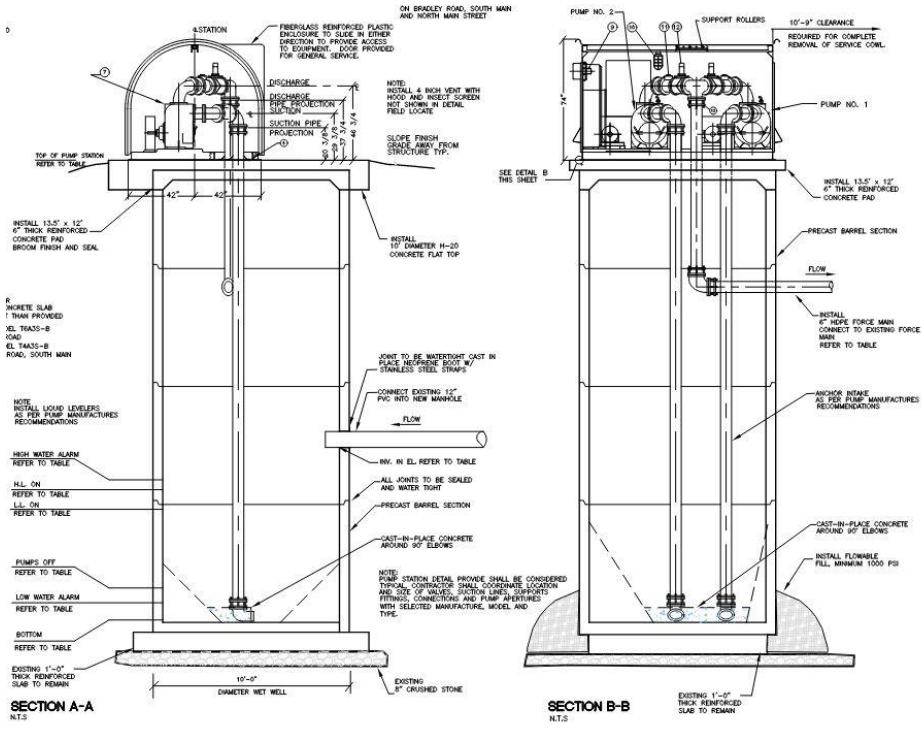


Figure 7: Wet Well/Dry Well Pump Station



PUMP STATION DETAIL
N.T.S.

Figure 8: Submersible Pump Station



LIFT STATION DETAILS
N.T.S.

Figure 9: Aboveground Pump Station

The District should consider installing an electrical connection and transfer switch for a portable generator at the Buck Hill Pump Station. This pump station has approximately 1,500 to 1,800 gallons of storage capacity in the wet well. During extended power outages the District has hired a septage hauling company to provide a pump truck to remove water from the pump station and truck to the WWTP. Provisions to connect a portable generator to the pump station should be installed to provide resilience for extended power outages. Purchasing or renting a portable generator may be more economical than hiring a pump truck and would provide another alternative to maintain pump station operation in the event that a pump truck is not available.

EVALUATION OF THE WASTEWATER TREATMENT PLANT

The District's WWTP is located along the Penobscot River at the end of Hobson Avenue. The WWTP was constructed in 1989 and is licensed to discharge an average of 0.35 million gallons per day (MGD) of secondary treated wastewater to the Penobscot River.

HEADWORKS

Building

Overall, the Headworks Building is in fair condition. This building was constructed as part of the 2001 WWTP upgrade. The masonry structure appears to be sound; however, District staff indicated that when the floors are washed in the treatment area, the water seeps between the foundation and concrete block wall. This should be addressed to stop any further degradation of the mortar joint between the foundation and concrete blocks. The interior and exterior joint between the foundation and concrete block wall should be repointed and an epoxy material or concrete curb should be cast over the interior joint for additional protection against wash water.

Figure 10: Headworks Building

The asphalt roof shingles appear to be in fair condition. The singles appear to be original to the 2001 WWTP upgrade and are approximately 20 years old. Typical asphalt shingles

have a service life of 20-30 years. The District should plan to replace these shingles within the next 10-years.

There are three windows in the treatment area of the headworks building, which appear to be original to the 2001 WWTP upgrade. Portion of the window on the northwest end of the building has been broken and repaired with a piece of plywood. The widow on the southwest end of the building is cracked. Both of these windows should be replaced.


Figure 11 & 12: Headworks Building Damaged Windows

There are two six-foot steel doors that provide access to the treatment area, which appear to be in fair condition. There is a three-foot steel door that provides access to the electrical/mechanical room. The door frame of this door is showing signs of corrosion and should be cleaned, primed and painted to prevent further corrosion. The door hardware in the Headworks area is in poor condition and should be replaced.

The lighting in both the treatment area and electrical/mechanical room appears to be in good condition. Emergency lighting is provided in both areas. All lighting in the treatment area should be explosion proof (NFPA Class 1, Division 1). The fixture identification tags are not visible, however it does appear that the lighting in this area meets this classification.

The ventilation system in the treatment area appears to be original to the 2001 upgrade. The service life of an exhaust fan is 15-20 years and is dependent on the environmental conditions where the fan is located. The treatment area is a moisture laden area that can be detrimental to the life of an exhaust fan. The exhaust fan and components appear to be explosion proof (NFPA Class I Division I), which is appropriate for this location. Currently the ventilation is manually activated prior to entry to the space which would classify this space as NFPA Class I Division I. The ventilation system must be continuous operation and ventilated at 12 air changes per hour for the area to be classified as Class I Division II, per the requirements of NFPA 820. Continuous operation would lower the hazardous atmosphere classification and reduce the moisture from the space but would likely require a significant amount of additional heating during the wintertime. The heat in the treatment area is currently provided by in-floor radiant heat and gas fired boiler that is in the mechanical room. This area requires minimal heat to maintain the area above freezing with the current operation of the ventilation system. The radiant system heats the components in the space rather than the air in the space is likely the most economical heating option for this area. Due to the potentially hazardous atmosphere, direct fire heaters cannot be used in this area. Explosion proof unit heaters could be used in this area but due to the moisture ladened atmosphere corrosion can be a significant issue. The existing Weil-McLain Model GV-3, propane fired boiler appears to be in fair condition.

There are concrete stairs and a loading dock on the northeast corner of the building. The loading dock is used for the disposal of screenings and grit from the headworks. The concrete surface at the top of the stairs and along the loading dock is spalling and should be repaired to prevent further erosion and eliminate a potential tripping hazard. The handrail along the stairs and north side of the loading dock appear to be in good condition and provide adequate protection. The handrail between the stairs and loading dock appear to be in good condition; however, the attachment to the concrete should be addressed. A chain is used across the end of the loading dock, this should be replaced with either a removable handrail or a gate to provide fall protection when the loading dock is not in use.

Figure 13: Headworks Building Loading Dock

The primary and secondary channels in the treatment area are covered with grating. The existing grating appears in fair condition; however, several sections around the equipment have been removed to provide better access to the equipment. These sections of grating should be reinstalled, or removable handrails should be installed in these locations to provide fall protection for District staff.

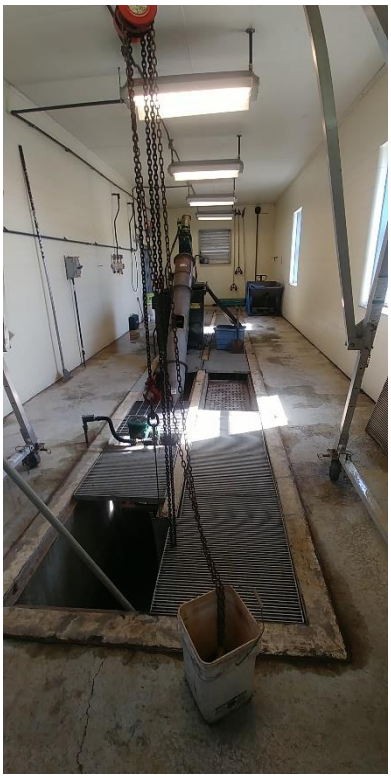


Figure 14 & 15: Headworks Building Influent Channel

There is no emergency backup power for the Headworks Building. Backup power should be considered to allow for operation of the grinder and screening equipment. In the

event of power failure, the influent flow is switched to the secondary channel and bar rack, which requires continuous oversight by District staff to manually clean.

Influent Flowmeter

The influent flowmeter and Parshall flume appear to be in fair condition. The ultrasonic level sensor is suspended over the Parshall flume and provides measurements of the depth of the influent flow which is converted to a flowrate. Level measurement checks should be performed annually to verify the depth of flow provided by the ultrasonic level sensor. The Parshall flume should be checked weekly for any build-up of solids and cleaned as necessary. The ultrasonic level sensor should be cleaned annually and if the flow surcharges and covers the sensor.

Figure 16: Headworks Building Influent Flowmeter

Grinder

The open-channel, electric grinder was recently replaced (August 2021) and appears in good condition.

Screening System

The District has recently replaced the screen and auger with a new unit in the fall of 2021. The District should reconnect the wash water for the new Auger Monster to aid in the removal of organic material from the screenings. This is an important process to extract the organic material from the screenings/grit and return it to the wastewater flow. This organic material can be useful in the treatment and nutrient removal process and will reduce the volume of screenings that need to be disposed of and will also reduce disposal cost.

Currently, the dewatered and compressed solids and debris from the Auger Monster are discharges into a three-yard dumpster. The dumpster is on casters and once full, District staff must manually roll the dumpster the across the concrete floor/channel grating to the loading dock. Provisions should be considered to extend the discharge auger to limit

the distance that the dumpster is manually rolled or install a new access to the headworks building so the dumpster can be removed without manually rolling to the loading dock.

Figure 17: Headworks Building Screening Discharge

Bar Rack

The bar rack is located the secondary channel of the headworks and is in fair condition. An automatic bar rack could be considered for this location; however, this is not an urgent need at the facility. The secondary channel is only used while maintenance is being performed on the grinder/screen system or when power is out at the facility as there is no provisions for backup power at the Headworks Building to operate the grinder/screen system.

Gas Detection

The existing gas monitoring equipment (Ultima) in the treatment area of the Headworks Building are used to continuously monitor hazardous locations. There are three gas detection units, Oxygen (O_2), Hydrogen Sulfide (H_2S), and Lower-Explosive-Limit (LEL) and they are mounted to the wall on the northern wall of the treatment area. Each gas detection units are comprised of a monitor unit with digital display and a gas sensor. The Oxygen unit is an Ultima XE unit and appears to be a newer unit and in good condition. The LEL and H_2S gas monitor units appear to be older models and do not appear to be operational. This should be corrected immediately. The Ultima Safety Manual indicate that the units should be calibrated to ensure accuracy and detect any sensor problems. This manual also states that the sensors have a limited lifetime and must be replaced periodically to ensure proper operation. Unless historical calibration records show that sensors consistently last longer Ultima recommends that oxygen (O_2) and toxic sensors (H_2S) should be replaced once per year and that the catalytic combustible sensors (LEL) should be replace every 18 months. The District should follow the manufacturers' recommendations and document when the units are periodically calibrated and when the sensors are replaced.

Figure 18: Headworks Building Gas Detection System

District staff indicated the gas detection system in the Headworks Building reports the conditions to the SCADA but does not provide notification on alarm conditions.

AERATED LAGOON SYSTEM

Lagoon #1

Overall Lagoon #1 appears to be in fair condition. The exposed portion of the existing HDPE liner appears in good condition with no observed cracks or breaks in the liner. The liner was installed as part of the 2001 upgrade project and is approximately 20 years old. The life expectancy of a HDPE liner depends on the environment, temperature and chemicals that it is exposed to. The use of UV inhibitors, such as carbon black, can extend the life expectancy of liners that are exposed to sunlight. In an exposed application, the life expectancy of HDPE liners can be 20+ years. The best way to determine if a liner needs to be replaced is to send a sample of the liner to a laboratory for testing. Based on laboratory testing, if the mechanical properties are at half the original values the liner should be replaced.

Figure 19: Lagoon #1

District staff indicated that the aeration diffusers are removed from the lagoon and cleaned every five years. This falls within the manufacturer's recommendation to clean and inspect the diffusers every 3-5 years. The floating laterals in the first cell of Lagoon #1 (complete mix cell) appear in fair condition and the aeration appears to be operating. The aeration in the second cell (partial mix) appears to be operating; however, along the southern lateral in this cell, several of the diffusers do not appear to be agitating the surface (similar to the other locations) which indicates that they may require cleaning or service. The aeration in the third cell (partial mix) appears to be operating.

There are nine four-inch isolation gate valves along the west side of the lagoon that control each aeration lateral into the lagoon. The valve boxes should be located and raised to grade to allow for easy access by District staff to isolate a lateral in the event of a failure.

There are two floating baffle walls in this lagoon that separate the cells and produce a "serpentine" flow pattern and minimize short circuiting of flow through the lagoon. District staff indicated that both of the baffle walls were replaced in 2014. The baffle floats appear to be in good condition with no low spots that could cause short circuiting of flow, however there are several small holes in the baffle near the floats. These holes should be repaired to prevent further enlargement of the holes and potential short circuiting in the lagoon. These baffles typically have a service life of 15-20 years. The District should repair the holes in the baffle and should plan for the replacement of these baffles within the next 7-10 years.

Figure 20: Lagoon #1 Baffle

The TLV #1 precast concrete structure, that is located in the southwestern corner of Lagoon #1 appear in fair condition. The level control valve actuator associated with this structure in in fair condition. All level control structures should be cleaned on an annual basis.

Figure 21: Lagoon #1 TLV Structures

There is a portion of an old floating mechanical surface aerator at the southern end of the lagoon that is no longer in service and should be removed.

Figure 22: Lagoon #1 Abandoned Equipment

Lagoon #2

Overall Lagoon #2 appears to be in fair condition. The exposed portion of the existing HDPE liner appears in good condition with no observed cracks or breaks in the liner. There is a section of the liner that is floating along the northwestern side of the lagoon. This is an indication of ground water beneath the liner. Similar to Lagoon #1, this liner was installed as part of the 2001 upgrade project and is approximately 20 years old.

Figure 23: Lagoon #2

Similar to Lagoon #1, District staff indicated that the aeration diffusers are removed from the lagoon and cleaned every five years. The aeration in the Lagoon #2 (partial mix) appears to be operating; however, the southern diffuser off the middle lateral does not appear to be agitating the surface (similar to the other locations) which indicates that it may require cleaning or service.

There are three three-inch isolation gate valves along the east side of the lagoon that control each aeration lateral into the lagoon. The valve boxes should be located and raised to grade to allow for easy access by District staff to isolate a lateral in the event of a failure.

The TLV #2 precast concrete structure, that is located in the southeastern corner of Lagoon #2 appears in fair condition. The level control valve actuator associated with this structure in in fair condition. All level control structures should be cleaned on an annual basis.

There is a portion of an old floating mechanical surface aerator in the southwestern corner of the lagoon that is no longer in service and should be removed.

Figure 24: Lagoon #2 Abandoned Equipment

Lagoon #3

Lagoon #3 appears to be in fair condition. There were no apparent breakouts in the bank around the lagoon which would indicate a failure. Vegetation on exterior banks of the lagoon should be removed to ensure that the berm is not compromised. Vegetation around the interior of the lagoon should also be removed.

The existing Lemna Corporation modular insulated floating cover appears in fair condition. This cover was installed as part of the 2001 upgrade. The manufacturer indicated that the typical life of these covers are 20-25 years depending on the quality of maintenance, and systems that are well cared for can have a longer service life. One of the main maintenance procedures is to remove vegetation that grows on the cover as the growing root structure of the plants can put excessive strain on the fasteners connecting the panels and can cause failure. There is currently a substantial amount of vegetation that is growing on the cover that should be removed. Regular maintenance to remove any vegetation from the cover should be established. Based on the

manufacturer's information the covers are designed to walk on for inspection, sampling and maintenance purposes.

Figure 25: Lagoon #3

There are also two openings, approximately 7.2 feet wide by 8 feet long, in the cover system that were used for floating mechanical aerator stations. These aeration stations are no longer used, and the aerators have been removed. The manufacturer indicated that panels could be provided to fill these openings. This would reduce the open area in the cover that supports algae growth.

There are probes to monitor dissolved oxygen in all three of the lagoons. This information is reported to the SCADA system; however, it is not used to control/optimize the aeration in the lagoons.

The TLV #3 precast concrete structure, that is located in the southwest corner of Lagoon #3 appears in fair condition. The level control valve actuator associated with this structure in in fair condition. All level control structures should be cleaned on an annual basis.

Sludge depth in the lagoons was not assessed as part of this evaluation. District staff indicated that the sludge had not been removed from the lagoons since the 2001 upgrade. An excessive buildup of sludge in the bottom of the lagoons reduces the available treatment volume and reduce treatment efficiency. District staff have measured the sludge volume at various locations in Lagoon #1 and Lagoon #2 and indicated that the sludge depth is between 1.5 feet to 3 feet deep. Providing proper mixing and aeration is a key factor in limiting sludge depth. A minimum liquid depth of approximately eight feet should be maintained and sludge should be removed if the minimum liquid depth cannot be maintained.

The District has contacted DEP to perform sludge depth measurements in the lagoons, however the DEP sonar depth unit is broken and they do not have a timeline for repair.

The District does have a Hummingbird fish finder that had been used in the past to measure the depth of the lagoon. The accuracy of a fish finder should be vetted to confirm the accuracy for this application. A relatively inexpensive and accurate option is to use a sludge judge to measure the liquid depth. This is a low-tech option that is more labor intensive than sonar depth measurements. We would recommend that the sludge depth be measured on a 25-foot grid and documented. Sludge depths should be recorded every 3-5 years to determine the reduction in lagoon capacity due to the sludge blanket and help determine when then sludge will need to be removed. This will also provide a good reference to calculate the volume of sludge, when removal is necessary.

Blower Building

Overall, the Blower Building is in poor condition. The wood frame structure appears to be in fair condition; however, the roofing and siding appear to be in poor condition. The roof is leaking in the blower room. The vinyl siding appears to be original from the 2001 upgrade and appears to be in poor condition. There are several broken pieces of siding and corner pieces that should be replaced.

Figure 26: Blower Building

The roofing appears to be in very poor condition as there is a leak in the roof above the blower area that has caused a section of the gypsum ceiling in this area to fall in. It is unknown what other water damage has been caused in the attic area of this building. The asphalt roof shingles appear to be in very poor condition. The singles appear to be original to the 2001 WWTP upgrade and are approximately 20 years old. Typical asphalt shingles have a service life of 20-30 years. The District should plan to replace the roofing and shingles immediately. Further investigation would be necessary to determine if/how much of the ceiling insulation would need to be replaced.

Figure 27: Blower Building Damaged Ceiling

There are two three-foot steel exterior doors that provide access to the garage area and blower room, which appear to be in fair conditions. The floors for the garage area and blower room are at two different levels. The garage floor is at grade with the exterior surface and the blower room is 18 inches higher. The entry door for the blower room has precast concrete steps. There are only two steps and therefore hand railing is not required. The steps should be releveled. There is a three-foot steel interior door that provides access between the garage area and the blower room. There is a nine-foot garage door in the garage area and appears in good condition.

Figure 28: Blower Building Access Stairs

There are gas fired unit heaters in both the blower room and garage area of the building. These units are Empire Model DU-40E-3. The unit heaters appear to be in fair condition; however, District staff indicated that they are not used as the underground gas line is leaking. There is a single 125-gallon propane tank behind the building that is approximately 25 feet away from the structure, and a gas line runs underground to the

building to serve both heaters. The propane tank could be relocated to adjacent to the building and a new gas line could be run along the building to the heater locations.

The lighting in both the garage area and blower room appears to be in good condition and adequate to light the areas. One of the lights in the blower area will need to be remounted. Emergency lighting is provided in both areas. There are four exterior lights that provide exterior lighting at the entry doors and garage door.

The walls in the blower room are covered in sound deadening material. The sound deadening appears to be in fair condition. All doors on the Blower Building indicate that ear protection is required inside the building, and as posted it is the District's responsibility to comply with this requirement. The District must also comply with the OSHA Hearing Conservation Program. Noise level in the blower building was not evaluated. Above 85 decibels hearing protection is required. Haley Ward can assist the District with measuring the noise level in the Blower Building and in other areas/activities and provide guidance for compliance with the OSHA standards.

There is an emergency eye wash station in the blower room, which is a single use, eye saline bottle. The saline bottle should be replaced per the manufacturers' recommendation.

There is a Hach Dissolved Oxygen (DO) probe readout in the blower room that appears to be in good condition and operational.

There is no emergency backup power for the Blower Building. Backup power should be considered to allow for operation of the aeration equipment. In the event of power failure there is no aeration provided in the lagoons.

Blowers

The blowers are United Blower, Inc. positive displacement units and appear to be the original to the 2001 upgrade. District staff indicate that the bearings and seals have been replaced several times, and this has been done internally using manufacture's supplied rebuild kits. Currently, blower B-1 and B-4 have been removed and sent to a local machine shop to be checked and rebuilt. The manufacture's sales rep. indicated that the typical life of the blower unit is 10-15 years. The District recently received pricing for a new blower unit which was slightly less than the cost of the recent rebuild.

Figure 29: Blowers

The electric motors appear to be original to the 2001 upgrade. Electric motors have a typical service life of between 15-25 years. The service life is highly dependent on environmental conditions, operating temperatures, and supply voltage. The VFDs for B-1, B-2 and B-4 appear to be original to the 2001 upgrade, and the VFD for B-3 appears to be a newer unit. The typical service life of a VFD is between 10-15 years.

The intake piping, accumulators, discharge piping, and valves all appear in good condition. There is adequate valving to allow each blower to discharge to either the partial mix header or the complete mix header. District staff indicated that the intake filters have not been replaced. The blower manufacturer's operation and maintenance manual (O&M) does not indicate the frequency that the air filter should be replaced. The blower O&M manual does recommend that the air filters be cleaned weekly. A clogged air filter can seriously affect the efficiency of the blower and cause overheating and oil usage. The rubber connectors that connect the blower unit to the intake and discharge piping are in poor condition and should be replaced. The blower manufacturer's O&M manual does not indicate the frequency that the connectors should be replaced, but at a minimum these connectors should be inspected monthly and replaced as necessary. This is an example of deferred maintenance by the District of operation until failure. The blower O&M Manual also recommends that the oil levels be checked every 24 hours of operation, the blower relief valve should be checked weekly for proper operation, and the oil condition should be checked monthly and changed if necessary. Pressure and temperature gauge readings should be checked daily and documented to ensure that the blower operating temperature and pressure remain within the allowed limits.

Maintenance logs should be kept for all equipment and components, to track repair and replacement. The maintenance logs should have a heading with general information regarding the equipment including name, manufacturer, model number, serial number, location, and installation date. The maintenance log should then have a list of all the maintenance activities performed on the equipment including date, action and person

performing the action. There are various examples of free maintenance log templates that are available to download from the internet. Without maintenance logs it is hard to determine if the District is performing the equipment maintenance at the intended frequency. Having maintenance logs, schedules and procedures in place for each piece of equipment is critical for long term success.

Figure 30 & 31: Blowers

There are likely newer and more efficient blower assemblies available (we are waiting on manufacture's data from the rep.). However, the current units are relatively simple and inexpensive assemblies, and the individual components can be replaced. Based on the indicated cost that the District was quoted, the cost of a new replacement blower is lower than the cost to rebuild the existing blower. Based on this information replacement appears to be more economical. In-house repairs to replace end seals or bearings should be continued.

Air Requirements

As noted earlier, the current and future considerations for flows and loading indicate that the existing scheme for treatment (complete mix/partial mix) will be adequate and is recommended moving forward for the next 20 years. Current and future projections for growth in Veazie are likely to be accommodated by the capacity already in place at the facility. If additional growth significantly exceeds that which has been planned, there is room for an additional blower and additional diffusers within the partial mix portions of Lagoons #1 and #2.

DISINFECTION SYSTEM

Disinfection Building

Overall the Disinfection Building is in fair condition. The building was part of the original WWTP construction. The cedar shake siding and asphalt shingles appear in fair condition. There are two three-foot steel exterior doors that provide access to the storage area and disinfection area, which appear to be in fair conditions.

The lighting in both sections of the building appears to be in good condition and adequate to light the areas. The lights for both sections are activated from outside of the area and the light switches are adjacent to the entry doors. There is no emergency lighting in either section of the building. We would recommend installing a combination emergency light and exit sign in both rooms of the Disinfection Building. There are two exterior lights that provide lighting at the entry doors.

Figure 32: Disinfection Building

There is ventilation provided for the disinfection area and it can be activated from outside of the building. The switch to activate the ventilation is adjacent to the entry door. The switch has become detached from the building and should be remounted. The ventilation fan provides minimal ventilation for the disinfection area of the building. The exhaust fan is concealed in the duct work and was not accessible to inspect and determine the capacity of the fan. A strong chlorine smell was still present after several minutes of fan operation. We would recommend replacing the ventilation system in the chlorination room. The ventilation system can be intermittent and activated when the space is occupied, however further system design would be necessary to determine the specific ventilation fan for this space. The TR-16 guidance indicates that in gas chlorination storage and treatment areas a mechanical ventilation system should provide a minimum of one complete air exchange per minute for the space. The guidance does not reference liquid chlorine however we would recommend that this guidance be used for this space.

Figure 33: Disinfection Room

There is an electric unit heater in the disinfection area and there is no heat in the storage area. The unit is a Chromalox Model CCR-007. The unit heater appears to be in good condition.

There is a Wallace & Tiernan Series 50-135 chlorine gas detection unit in the disinfection area; however, the detection unit and alarm system do not appear to be operational. It appears that this equipment was originally used when chlorine gas was used for disinfection. This unit should be removed and disposed of.

The digital display for the Siemens effluent flow meter is located in the disinfection area. This display is in good condition; however, the power supply for the unit is "jumper wired" from the adjacent electrical panel. This should be corrected immediately.

There is no potable water available at this building. OSHA Requires emergency showers and eye wash stations in areas where caustic or corrosive chemicals are handled and stored. There is a self-contained eye wash station in this room; however, there are numerous chemical barrels that are stored in front of the eyewash station that obstructs access. There is also a home-made emergency shower that does not appear to be adequate to meet OSHA requirements. OHSA requires emergency showers to provide a minimum supply of 20 gallons per minute at a pressure of 30 lbs. per square inch for at least 15 minutes. There are also numerous chemical barrels that are obstructing the access to the emergency shower. The chemical barrels should be removed to provide clear access to the emergency shower and eye wash station and potable water should be provided to this building to support the installation of an emergency shower that meets OSHA requirements.


Figure 34 & 35: Disinfection Room Emergency Shower and Eye Wash Station

There is no emergency backup power for the Disinfection Building. Backup power should be considered to allow for operation of the disinfection equipment to maintain compliance.

Injection System

The disinfection injection system for the sodium hypochlorite and the pH control injection system for the sodium hydroxide both use Stenner peristaltic pumps that are manually set to provide proper pH and disinfection. Manual controls are adequate for consistent flow and effluent quality. With variable flow and effluent quality that are seen at the WWTP this can require significate oversight by District staff to remain in compliance. A flow and quality paced system should be installed to reduce operator oversight and ensure that the facility remains in compliance with varying flows and quality. Th District has indicated that a flow paced chlorination system is being installed and will be used for the upcoming chlorination season.

Contact Tank

Overall, the contact chamber is in fair condition. The concrete structure appears to be original to the plant construction and is in good condition. The District has constructed pressure treated wood covers to protect the channels in the contact chamber from debris and UV degradation of the chlorine. These covers appear to be in fair condition. There are numerous trees adjacent to the contact chamber that could be removed to minimize the potential for debris to enter the channels.

Figure 36: Chlorine Contact Chamber

The Parshall flume for the effluent flow meter is located at the beginning of the contact chamber. The flume appears to be in good condition. The ultrasonic level sensor that is part of the effluent flowmeter is suspended above the flume. The support for the sensor is currently being held together with electrical tape and should be properly repaired. The Parshall flume should be checked weekly for any build-up of solids and cleaned as necessary. The ultrasonic level sensor should be cleaned annually and if the flow surcharges and covers the sensor.

Figure 37: Effluent Flow Meter

The effluent sampler is located in a plastic enclosure that is cabled to the contact chamber covers and the enclosure is tied closed. This should be relocated to the Disinfection Building to ease operation and better protect the sampler. Conduits would need to be run from the outlet of the chamber to the Disinfection Building for the sampler lines. The District has tried to relocate the sampler to the Disinfection building, however

the existing sampler was not able to properly operate at this location. A new sampler with a higher suction capacity would be needed if the sampler was relocated in the Disinfection Building.

There are two sections of security fence at the WWTP. The first section surrounds the Headworks, Lagoon #1, Lagoon #2 and Blower Building and the second section of security fence surrounds Lagoon #3, the Disinfection Building and contact chamber. Both sections of security fence appear to be in good condition. The access gates to each of these sections are swing gates and appear to be in good condition. Swing gates require more room to operate and are not suited for access roads on slopes, like the main access to the lagoons. The alternative is a sliding gate, which typically move horizontally instead of the inward/outward operation of a swing gate. The slide gates operate on a track or cantilever system to slide, and due to this slide gates can be more expensive.

ADMINISTRATION BUILDING

Administration Building

Overall, the Administration Building appears to be in fair condition. The building appears to be original to the construction of the WWTP. The exterior brick appears to be in good condition. The age of the asphalt shingles is not known; however District staff indicate that there are several areas where the shingles have been compromised and caused soft spots in the roof. The District should plan to repair these areas and replace these shingles within the next 5-10-years.

Figure 38: Administration Building

The access road and parking area around the Administration Building is paved. There are numerous cracks in the pavement and several potholes. The potholes should be repaired, and the entire paved area should be overlaid to extend the useful life of the pavement. If the pavement overlaid and the pavement continues the degrade, complete replacement of the pavement may be necessary, which is a much more

expensive project than an overlay. Overlaying the pavement will provide a smooth even surface for walking and plowing and will extend the service life of the existing pavement.

Figure 39: Access Road

There is limited site lighting throughout the WWTP. There are exterior lights on the Headworks Building, Blower Building, Disinfection Building and Administration Building but this only illuminates the area immediately adjacent to the buildings. Additional site lighting should be installed to illuminate the parking areas, buildings, security gates, access roads, lagoons and chlorine contact chamber to enhance operator safety at night and improve security. LED site lights should be used as they are energy efficient and have a longer lifespan over traditional lighting.

District staff indicated that the current SCADA system is only used for monitoring and does not allow remote control of the treatment equipment or pump stations. Alarm conditions are monitored but are not called out from the SCADA system. The current system could use a significant upgrade to allow for remote control and monitoring of systems and equipment and alarm conditions. The benefits of a well-executed SCADA system include quicker response to issues, remote control of equipment which could lead less off work-hour callings, and the trends generated by a SCADA system can be used to identify potential issue proactive maintenance. Operators can connect remotely to the SCADA system to monitor, control and review equipment status. The existing SCADA computer should be relocated from the office manager's office to the superintendent's office for ease of operation.

The Superintendent and office manager's computers should be replaced. Both desktop computers are old and utilize the Microsoft Office 7 operating platform. Given the age of the hardware and software, the District should upgrade these systems. The office computers should be replaced every 4-5 years. The Microsoft Office software (Word, Excel, Powerpoint, Outlook, Access, etc.) should also be upgraded. There are current subscriptions packages for approximately $12.50/month per computer to maintain this

software which will allow the District to use the most current version of the software moving forward.

Standby Generator

The emergency standby generator is a Cummings Power Generation Model DNAF-5738542. The generator uses diesel fuel and has a has a 40-gallon tank. The generator was not part of the 2001 upgrade and appears to have been manufactured in 2005. The unit is rated for 13.4 KVA single phase power and 25.0 KVA three phase power. District staff indicate that the generator is only connected to the Administration Building and does not power treatment components.

We would recommend replacing the generator with an adequately sized unit to operate the entire treatment system. At a minimum, the generator should be sized to run the Administration Building, Headworks and Disinfection Building. The District is required, at a minimum, to provide primary treatment and disinfection of the wastewater. In the event of a power failure at the WWTP the influent grinder and screen system are bypassed in the Headworks to the manually cleaned bar screen. This is a labor-intensive activity which could be eliminated if the Headworks is included in generator sizing. Primary treatment is facilitated by the lagoons and short interruptions in aeration should not upset the system. Continuous disinfection is necessary during the chlorination season. Further design would be necessary to properly size the generator unit and transfer switch.

Figure 40: Emergency Generator

One upgrade that could be considered to offset electrical costs at the WWTP would be installing solar panels. The area south of the Administration Building and east of Lagoon #3 could be cleared and leveled to be used for a solar panel field. This area is approximately 2 acres. The southern exposure, which is the direction that the solar panels would be pointed toward, is the power line. This would provide a buffer where no trees would grow to block the solar panels. Recent electrical bills provided by the District and information provided by Versant indicate that the peak demand at the WWTP is

approximately 70-kilowatts. Based on this a 91-kilowatt solar field would be sized to support the WWTP, which is approximately 215 4-foot by 8-foot solar panels. The typical cost for a solar field is approximately $2,500/kilowatt. Based on this, the cost of a solar field for the WWTP would be approximately $227,500. The recent bills indicate average electrical cost at the WWTP is approximately $2,580/month, which would indicate a simple return on investment in a little over 7 years. The typical warranty on solar equipment is approximately 25 year and the typical useful life of the solar equipment can be between 30-50 years. Additional investigation would be necessary for the design of a solar system.

Figure 41: Proposed Area for Solar Field

CONCLUSION

Overall, the facility is in fair condition; however, due to deferred maintenance over the years of operation there are numerous improvements that should be considered. These improvements will ensure proper operation which will allow for compliance with the facility's WDL. It is critical to establish maintenance logs, schedules and procedures for each piece of equipment, to ensure that the manufacture's recommended maintenance is performed at the intended frequency, for long term success. There are several safety improvements that should be considered to protect District staff. There are also several improvements that should be considered to ease operation for District staff, which will increase efficiencies.

This system evaluation is to provide an overview of the condition of the District's infrastructure and guidance for planning purposes. This evaluation is not intended to provide the specific design for components and equipment. Additional design investigation would be necessary to determine specific sizing/manufacturer/model of equipment and systems.

RECOMMENDATIONS

Prioritize

Improvements should be considered in the order:

1. Operator Safety
    a. Replace faulty gas detection system in Headworks Building.
    b. Clear area to allow access to the emergency shower and eyewash station in the Disinfection Building.
    c. Install potable water and OSHA compliant emergency shower in the Disinfection Building.
    d. Remove "jumper wire" from electrical panel to the effluent flowmeter controller in the disinfection room and provide a proper electrical connection to the flowmeter.
    e. Reinstall grating above the channels in the treatment area of the Headworks Building
    f. Replace existing chain that is used across the end of the Headworks Building loading dock, this should be replaced with either a removable handrail or a gate to provide fall protection when the loading dock is not in use.
    g. Install handrails along channel by the Auger Monster in the treatment area of the Headworks Building.
    h. Install arc-flash compliant control panel at the County Road Pump Station.
    i. Install arc-flash compliant control panel at the Buck Hill Pump Station.
    j. Repair spalling concrete on Headworks Building loading dock platform.
    k. Relevel exterior entry step to blower room in Blower Building.
    l. Replace ventilation system in disinfection area of Disinfection Building.
    m. Install a combination emergency light and exist sign in both rooms of the Disinfection Building.
    n. Install additional site lighting around the WWTP to enhance operator safety at night and improve security.
    o. Install additional exterior lighting at the County Road Pump Station to illuminate the area and provide safe work conditions during night repairs. This will also enhance security at the pump station.
    p. Install exterior lighting at the Buck Hill Pump Station to illuminate the area and provide safe work conditions during night repairs. This will also enhance security at the pump station.
    q. Upgrade SCADA system to call out all alarm conditions.
    r. Conduct noise level measurements to determine compliance OSHA Hearing Conservation Program. Areas/tasks to consider performing noise

level measurements should include, Blower Room, Treatment Area of Headworks, using chainsaw and using lawn mower.

2. Condition
    a. Blower Building repair/replace roofing and repair damage due to water leak.
    b. Repair gas line and restore heater operation in Blower Building.
    c. Establish equipment maintenance logs track all maintenance activities on specific equipment.
    d. Replace all blower assemblies, including blower units, electric motors and VFDs.
    e. Grout and seal joint between wall and foundation in Headworks Building.
    f. Replace ventilation system in treatment area of Headworks Building.
    g. Remove corrosion and paint doors and frames in Headworks Building. An alternative would be to replace the doors with composite doors.
    h. Repair the attachment of the handrail between the stairs and loading dock at the Headworks Building.
    i. Replace door hardware in the treatment area of the Headworks Building.
    j. Replace two broken windows in the treatment area of the Headworks Building.
    k. County Road Pump Station improvements including the replacement of the pumps and controls, adding a building to enclose the pump station.
    l. Buck Hill Pump Station improvements including replacement of the pumps and controls, adding a building to enclose the pump station, grading the area adjacent to the pump station to direct surface water away from the wet well.
    m. Remove and dispose of the remains of a mechanical aerator support structure from southern end of Lagoon #1.
    n. Remove and dispose of mechanical aerator support structure from the southwest corner of Lagoon #2.
    o. Remove vegetation from the cover of Lagoon #3.
    p. Replace blower rubber connectors.
    q. Remove and dispose of the Wallace & Tiernan Series 50-135 chlorine gas monitoring unit that was used when chlorine gas was used for disinfection in Disinfection Building.
    r. Repair support bracket for effluent flow meter ultrasonic sensor.
    s. Repair soft areas in roof and replace shingles on the Administration Building.
    t. Upgrade Superintendent and Office Manager computers.

3. Compliance
    a. Emergency Generator sized to power entire WWTP. At a minimum the generator should be sized to operate the Administration Building, Headworks and Disinfection Building.
    b. Continue to investigate and eliminate I/I in the collection system using dry weather/wet weather investigations, CCTV inspection, and flow

monitoring.

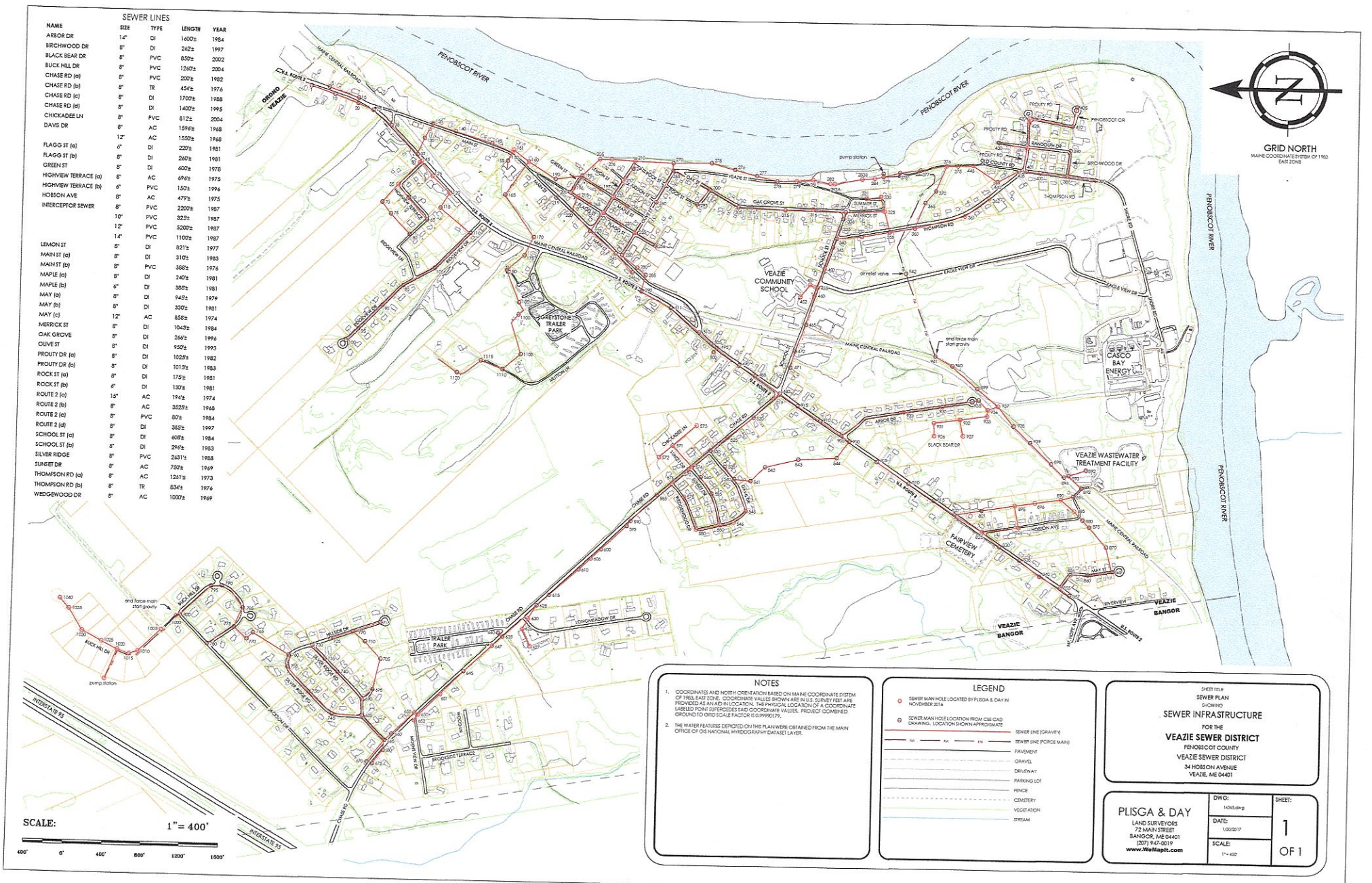
c. Fill in missing panels in Lagoon #3 cover.
d. Upgrade SCADA system to provide operators with remote control and monitoring of treatment equipment.
e. Collect influent and effluent O&M BOD_5 samples and compile data for potential parameter changes in future WDL.
f. Collect effluent O&M phosphorus samples and compile data for potential future discharge limits in future WDL.
g. Connect wash water system to Headworks Auger Monster to aid in the removal of organic material from the screenings.
h. Clean all lagoon TLV structures. TLV structure cleaning should be performed on an annual basis.
i. Repair holes in Lagoon #1 baffle walls.
j. Replace Lagoon #1 baffle walls.
k. Conduct sludge depth readings in all three lagoons. Sludge depth readings should be performed every 2-3 years to verify minimum liquid depth in the lagoons are maintained.
l. Install flowmeter at the Grey Stone Trailer Park for I/I investigation and billing.

4. Ease of Operation
    a. Relocate SCADA computer to the Superintendent's Office.
    b. Install additional auger/conveyor to transport screenings in Headworks and minimize operators pushing dumpsters.
    c. Locate and raise aeration system valves for Lagoon #1 and Lagoon #2.
    d. Overlay pavement in access road and parking area to extend the service life of the existing pavement.
    e. Install sliding gates in place of the current swing gate at the WWTP

See the prioritization and planning level construction cost estimates included in Appendix F.

APPENDIX A

VEAZIE SEWER DISTRICT SEWER INFRASTRUCTURE MAP, PLISGA & DAY, 1/30/2017



SEWER LINES

NAME	SIZE	TYPE	LENGTH	YEAR
ARBOR DR	14"	DI	1600±	1984
BIRCHWOOD DR	8"	DI	262±	1997
BLACK BEAR DR	8"	PVC	850±	2002
BUCK HILL DR	8"	PVC	1260±	2004
CHASE RD (a)	8"	PVC	200±	1982
CHASE RD (b)	8"	TR	456±	1976
CHASE RD (c)	8"	DI	1700±	1988
CHASE RD (d)	8"	DI	1400±	1995
CHICKADEE LN	8"	PVC	812±	2004
DAVIS DR	8"	AC	1596±	1968
	12"	AC	1550±	1968
FLAGG ST (a)	6"	DI	220±	1981
FLAGG ST (b)	8"	DI	260±	1981
GREEN ST	8"	DI	600±	1978
HIGHVIEW TERRACE (a)	8"	AC	696±	1975
HIGHVIEW TERRACE (b)	6"	PVC	150±	1996
HOBSON AVE	8"	AC	479±	1975
INTERCEPTOR SEWER	8"	PVC	2200±	1987
	10"	PVC	325±	1987
	12"	PVC	3200±	1987
	14"	PVC	1100±	1987
LEMON ST	6"	DI	821±	1977
MAIN ST (a)	8"	DI	310±	1983
MAIN ST (b)	8"	PVC	368±	1976
MAPLE (a)	6"	DI	240±	1981
MAPLE (b)	6"	DI	388±	1981
MAY (a)	6"	DI	945±	1979
MAY (b)	8"	DI	330±	1981
MAY (c)	12"	AC	858±	1974
MERRICK ST	6"	DI	1043±	1984
OAK GROVE	8"	DI	266±	1996
OLIVE ST	8"	DI	950±	1993
PROUTY DR (a)	8"	DI	1028±	1982
PROUTY DR (b)	8"	DI	1013±	1983
ROCK ST (a)	8"	DI	175±	1981
ROCK ST (b)	6"	DI	130±	1981
ROUTE 2 (a)	15"	AC	194±	1974
ROUTE 2 (b)	8"	AC	3525±	1968
ROUTE 2 (c)	8"	PVC	80±	1984
ROUTE 2 (d)	8"	DI	365±	1997
SCHOOL ST (a)	8"	DI	608±	1984
SCHOOL ST (b)	8"	DI	296±	1983
SILVER RIDGE	8"	PVC	2631±	1988
SUNSET DR	8"	AC	750±	1969
THOMPSON RD (a)	8"	AC	1261±	1973
THOMPSON RD (b)	8"	TR	834±	1976
WEDGEWOOD DR	8"	AC	1000±	1969

NOTES

1. COORDINATES AND NORTH ORIENTATION BASED ON MAINE COORDINATE SYSTEM OF 1983, EAST ZONE. COORDINATE VALUES SHOWN ARE IN U.S. SURVEY FEET ARE PROVIDED AS AN AID IN LOCATION. THE PHYSICAL LOCATION OF A COORDINATE LABELLED POINT SUPERCEDES SAID COORDINATE VALUES. PROJECT COMBINED GROUND TO GRID SCALE FACTOR IS 0.99990109.
2. THE WATER FEATURES DEPICTED ON THIS PLAN WERE OBTAINED FROM THE MAIN OFFICE OF GIS NATIONAL HYRDOGRAPHY DATASET LAYER.

LEGEND

- SEWER MAN HOLE LOCATED BY PLISGA & DAY IN NOVEMBER 2016
- SEWER MAN HOLE LOCATION FROM CSS CAD DRAWING. LOCATION SHOWN APPROXIMATE
- SEWER LINE (GRAVITY)
- SEWER LINE (FORCE MAIN)
- PAVEMENT
- GRAVEL
- DRIVEWAY
- PARKING LOT
- FENCE
- CEMETERY
- VEGETATION
- STREAM

SHEET TITLE
SEWER PLAN
SHOWING
SEWER INFRASTRUCTURE
FOR THE
VEAZIE SEWER DISTRICT
PENOBSCOT COUNTY
VEAZIE SEWER DISTRICT
34 HOBSON AVENUE
VEAZIE, ME 04401

PLISGA & DAY
LAND SURVEYORS
72 MAIN STREET
BANGOR, ME 04401
(207) 947-0019
www.WeMapIt.com

DWG: 16265.dwg
DATE: 1/20/2017
SCALE: 1"= 400'
SHEET: 1 OF 1

APPENDIX B

VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION PLAN SET, JANUARY 2001

VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION VEAZIE SEWER DISTRICT

Veazie, Maine

INDEX:

JANUARY 2001

ENGINEERS • SURVEYORS

465 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX 207-989-4881

GENERAL NOTES

1.) THE CONTRACTOR IS REFERRED TO THE SPECIFICATIONS REGARDING COORDINATION WITH OTHERS, INCLUDING RESPONSIBILITIES AND RELATED COSTS.

2.) BELOW GRADE UTILITY INFORMATION IS BASED ON INFORMATION AS SHOWN ON THE AS-BUILT PLANS OF THE SEWAGE TREATMENT PLANT, VEAZIE SEWER DISTRICT, VEAZIE MAINE, AS PREPARED BY WOODWARD AND CURRAN DATED FEBRUARY 1988. LOCATION OF UTILITIES SHOWN IS ONLY APPROXIMATE AND MAY NOT BE COMPLETE. THE CONTRACTOR SHALL ASCERTAIN THE LOCATION AND SIZE OF EXISTING UTILITIES IN THE FIELD PRIOR TO COMMENCING WORK. TEST PITS MAY BE REQUIRED.

3.) DO NOT SCALE DRAWINGS UNLESS OTHERWISE NOTED. WRITTEN DIMENSIONS AND STATIONING SHALL PREVAIL. TOPOGRAPHY BASED ON FIELD SURVEY BY CES INC.

4.) THE OWNER WILL BE RESPONSIBLE FOR OBTAINING THE PERMITS LISTED IN THE SUPPLEMENTARY CONDITIONS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BE FAMILIAR WITH THE APPLICABLE PROVISIONS OF EACH PERMIT AS THEY APPLY TO THE WORK PRIOR TO BIDDING AND ABIDE BY THOSE PROVISIONS DURING CONSTRUCTION. COPIES OF ALL OWNER OBTAINED PERMITS ARE AVAILABLE FOR REVIEW AT THE VEAZIE WASTEWATER TREATMENT FACILITY. ALL OTHER PERMITS ARE THE RESPONSIBILITY OF THE CONTRACTOR.

5.) THE OWNER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY RIGHTS OF WAY AND EASEMENTS. THE CONTRACTOR SHALL VERIFY THAT THE NECESSARY EASEMENTS HAVE BEEN SECURED BY THE OWNER. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BE FAMILIAR WITH THE APPLICABLE PROVISIONS OF EACH EASEMENT AS THEY APPLY TO THE WORK PRIOR TO BIDDING AND ABIDE BY THOSE PROVISIONS DURING CONSTRUCTION.

6.) THE CONTRACTOR SHALL BE REQUIRED TO FURNISH AND MAINTAIN A TELEPHONE NUMBER WHERE THE CONTRACTOR CAN BE REACHED 24 HOURS A DAY, 7 DAYS A WEEK, UNTIL PROJECT SUBSTANTIAL COMPLETION.

7.) THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE REGULATIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).

8.) EXISTING STREETS AND GRAVEL ACCESS ROADS DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AT NO ADDITIONAL COST TO THE OWNER.

9.) CONTRACTOR SHALL FURNISH AND INSTALL 3/4" CRUSHED STONE IN DISTURBED AREAS BELOW FOOTINGS AND STRUCTURES.

10.) STRUCTURAL FILL, PLACED IN NO GREATER THAN 12" LIFTS MEETING COMPACTION REQUIREMENTS SET FORTH IN SPECIFICATIONS, SHALL BE PLACED ABOVE ALL FOOTINGS.

11.) ALL PIPES ARE TO BE ADEQUATELY SUPPORTED.

12.) THE SECURITY FENCE SHALL BE CHAIN LINK FENCE AS INDICATED ON THE DRAWINGS.

13.) THE CONTRACTOR SHALL MAINTAIN ALL EXISTING WASTEWATER FLOWS AND PUMPING SYSTEMS DURING CONSTRUCTION AND UNTIL THE NEW FACILITIES ARE OPERATIONAL.

14.) ALL ITEMS SCHEDULED FOR REMOVAL SHALL BE DISPOSED OF AT NO ADDITIONAL COST TO THE OWNER.

15.) THE BLOWER BUILDING AND HEADWORKS BUILDING WILL BE SERVICED BY WATER. ALL INSTALLATION COSTS SHALL BE BORNE BY THE CONTRACTOR.

16.) NOTES SAYING "BY OTHERS" MEANS NOT TYPICALLY PROVIDED BY MANUFACTURER OF EQUIPMENT OR SYSTEMS, BUT REQUIRED UNDER THIS CONTRACT.

SITE GRADING NOTES

1.) STRIPPING OF TOPSOIL SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS. REFER TO THE DRAWINGS FOR LIMIT OF WORK AND STRIPPING.

2.) ALL ROAD AND PARKING AREA SURFACES SHALL PITCH 1/4 INCH PER FOOT MINIMUM UNLESS OTHERWISE NOTED.

3.) ALL AREAS THAT ARE EXCAVATED, FILLED, OR OTHERWISE DISTURBED BY THE CONTRACTOR SHALL BE LOAMED, GRADED, LIMED, FERTILIZED, SEEDED AND MULCHED AS NECESSARY TO ESTABLISH A GROWTH OF GRASS.

4.) THE CONTRACTOR SHALL PROVIDE PROPER EROSION CONTROL AND DRAINAGE MEASURES IN ALL AREAS OF WORK, AND CONFINE SOIL SEDIMENT TO WITHIN THE LIMITS OF EXCAVATION AND GRADING. PRIOR TO BEGINNING EXCAVATION WORK, EROSION CONTROL FENCE SHALL BE INSTALLED AT THE DOWN-GRADIENT PERIMETER OF THE ACTUAL LIMITS OF GRUBBING AND/OR GRADING, AND AS SHOWN ON THE DRAWINGS. EROSION CONTROL MEASURES SHOWN ON THE DRAWINGS ARE A MINIMUM, CONTRACTOR SHALL TAKE ALL OTHER NECESSARY MEASURES. EROSION CONTROL FENCE SHALL ALSO BE INSTALLED AT THE DOWN-GRADIENT PERIMETER OF THE TOPSOIL STOCKPILES. ALL DISTURBED EARTH SURFACES SHALL BE STABILIZED IN THE SHORTEST PRACTICAL TIME AND TEMPORARY EROSION CONTROL DEVICES SHALL BE EMPLOYED UNTIL SUCH TIME AS ADEQUATE SOIL STABILIZATION HAS BEEN ACHIEVED. TEMPORARY STORAGE OF EXCAVATED MATERIAL SHALL BE STABILIZED IN A MANNER THAT WILL MINIMIZE EROSION. ALL INSTALLED EROSION CONTROL FACILITIES SHALL BE REMOVED AT THE END OF THE PROJECT.

EROSION CONTROL NOTES:

1.) ALL SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE MAINE EROSION AND SEDIMENTATION CONTROL HANDBOOK FOR CONSTRUCTION: BEST MANAGEMENT PRACTICES, PUBLISHED BY THE C.C.S.W.C.D. AND DATED MARCH, 1991 (HEREINAFTER CALLED 1991 MAINE BMP HANDBOOK).

2.) SILT FENCE WILL BE INSPECTED, REPLACED AND/OR REPAIRED IMMEDIATELY FOLLOWING ANY SIGNIFICANT RAINFALL OR SNOW MELT OR LOSS OF SERVICEABILITY DUE TO SEDIMENT ACCUMULATION. AT A MINIMUM, ALL EROSION CONTROL DEVICES WILL BE OBSERVED WEEKLY.

3.) DURING THE CONSTRUCTION PHASE, INTERCEPTED SEDIMENT WILL BE RETURNED TO THE SITE AND REGRADED ONTO OPEN AREAS.

4.) SEDIMENT CONTROL DEVICES SHALL REMAIN IN PLACE AND BE MAINTAINED BY THE CONTRACTOR UNTIL AREAS UPSLOPE ARE STABILIZED BY A SUITABLE GROWTH OF GRASS. ONCE A SUITABLE GROWTH OF GRASS HAS BEEN OBTAINED, ALL TEMPORARY EROSION CONTROL ITEMS SHALL BE REMOVED BY THE CONTRACTOR. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THEY ARE REMOVED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED, SEEDED, AND MULCHED IMMEDIATELY.

5.) ALL DISTURBED AREAS WILL BE SEEDED AND MULCHED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

6.) A SUITABLE BINDER SUCH AS CURASOL OR TERRTACK WILL BE USED ON THE HAY MULCH FOR WIND CONTROL.

7.) IF FINAL SEEDING OF DISTURBED AREAS IS NOT COMPLETED BY SEPTEMBER 15th OF THE YEAR OF CONSTRUCTION, THEN ON THAT DATE THESE AREAS WILL BE GRADED AND SEEDED WITH WINTER RYE AT THE RATE OF 112 POUNDS PER ACRE OR 3 POUNDS PER 1000 SQUARE FEET. THE RYE SEEDING WILL BE PRECEDED BY AN APPLICATION OF 3 TONS OF LIME AND 800 LBS. OF 10-20-20 FERTILIZER OR ITS EQUIVALENT. MULCH WILL BE APPLIED AT A RATE OF 90 POUNDS PER 1000 SQUARE FEET.

8.) IF THE RYE SEEDING CANNOT BE COMPLETED BY OCTOBER 1st OR IF THE RYE DOES NOT MAKE ADEQUATE GROWTH BY DECEMBER 1st, THEN ON THOSE DATES, HAY MULCH WILL BE APPLIED AT 150 POUNDS PER 1000 SQUARE FEET.

9.) ALL EXISTING AND PROPOSED CATCH BASINS ARE TO BE PROTECTED BY STRAW BALE OR SILT FENCE IN ACCORDANCE WITH THE 1991 MAINE BMP HANDBOOK. SURROUNDING AREAS CAN BE EXCAVATED OR LEFT LOW AS A SEDIMENT TRAP.

10.) INTERIOR SILT FENCES ALONG CONTOUR DIVIDING FLAT AND STEEP SLOPES, AREAS WITH DIFFERENT DISTURBANCE SCHEDULES, AROUND TEMPORARY STOCKPILES OR IN OTHER UNSPECIFIED POSSIBLE CIRCUMSTANCES SHOULD BE CONSIDERED BY THE CONTRACTOR. THE INTENT OF SUCH INTERIOR SILT FENCES IS TO LIMIT SEDIMENT TRANSPORT WITHIN THE SITE TOWARD THE PROTECTED CATCH BASIN INLETS TO MINIMIZE SEDIMENT REMOVAL REQUIRED BY THE EROSION CONTROL NOTE 9 PROTECTIONS AND EXTEND LIFE OF SUCH DEVICES.

STRUCTURAL NOTES:

1. FOUNDATIONS TO BEAR ON NATURAL UNDISTURBED SOIL OR WELL GRADED GRAVEL. LOOSE SOIL SHALL BE OVER EXCAVATED TO UNDISTURBED SOIL AND REPLACED WITH WELL GRADED GRAVEL FILL COMPACTED TO 95 PERCENT MAXIMUM DENSITY. CONCRETE SHALL NOT BE PLACED IN WATER OR ON FROZEN GROUND.

2. WHERE LEDGE IS ENCOUNTERED, FOUNDATIONS SHALL BEAR DIRECTLY ON LEDGE. IN CASES OF PARTIAL LEDGE CONDITIONS, PROVIDE A MINIMUM OF 12 INCHES CRUSHED STONE BELOW FOUNDATION. IN NO CASE SHALL FOUNDATIONS BEAR PARTIALLY ON LEDGE AND PARTIALLY ON SOIL.

3. FROST DEPTH IS ASSUMED TO BE 4 FEET BELOW GRADE. CONSULT LOCAL CODES FOR FROST DEPTH REQUIREMENTS AT PROJECT SITE.

4. MAXIMUM PARTICLE SIZE OF CRUSHED STONE SHALL BE 1-1/2 INCHES.

5. ALL CONCRETE WORK AND REINFORCING DETAILS SHALL CONFORM TO THE FOLLOWING LATEST ACI STANDARDS:
ACI 301 SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS
ACI 304 RECOMMENDED PRACTICE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE
ACI 315 DETAILING REINFORCED CONCRETE STRUCTURES
ACI 305 HOT WEATHER CONCRETING
ACI 306 COLD WEATHER CONCRETING
ACI 318 BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE

6. ALL CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,000 PSI.

7. MAXIMUM AGGREGATE SIZE FOR CONCRETE MIX SHALL BE 3/4".

8. AIR ENTRAINMENT SHALL BE 6% ± 1%.

9. SLUMP SHALL BE 3" ± 1".

10. FLOOR SLAB SHALL HAVE A BROOM FINISH.

11. CONCRETE SHALL BE CONSOLIDATED WITH A VIBRATOR SO AS TO ELIMINATE HONEYCOMB AND BUGHOLES IN EXCESS OF 1/2".

12. CONCRETE SLAB SHALL BE MOIST CURED FOR SEVEN DAYS. IN LIEU OF MOST CURING A LIQUID MEMBRANE CURING COMPOUND CONFORMING WITH ASTM C 309 MAY BE USED. LIQUID MEMBRANE CURING COMPOUNDS SHALL BE CHECKED FOR COMPATIBILITY WITH FUEL RESISTANT SEALER-HARDENERS.

13. CONCRETE WALLS AND FOOTINGS SHALL BE CURED BY LEAVING FORMS IN PLACE FOR THREE DAYS AND COVERING TOPS OF WALLS WITH HAY OR POLYETHYLENE SHEETING. IN LIEU OF LEAVING FORMS IN PLACE, WALLS AND FOOTINGS MAY BE SPRAYED WITH A LIQUID MEMBRANE CURING COMPOUND, CONFORMING WITH ASTM C 309, IMMEDIATELY UPON STRIPPING OF THE FORMS. LIQUID MEMBRANE CURING COMPOUNDS SHALL BE CHECKED FOR COMPATIBILITY WITH FUEL RESISTANT SEALER-HARDENER.

14. 100% VIRGIN POLYPROPYLENE FIBRILLATED FIBERS SPECIFICALLY MANUFACTURED FOR USE IN CONCRETE REINFORCEMENT, CONTAINING NO PROCESSED OLEFIN MATERIALS AND CONFORMING WITH ASTM C-1116 ARE RECOMMENDED FOR CONTROL OF PLASTIC SHRINKAGE CRACKING IN THE WALLS AND THE SLAB. DOSAGE RATE SHALL BE MINIMUM 1-1/2 LB./CU.YD. OF CONCRETE.

15. REINFORCING STEEL SHALL CONFORM WITH ASTM A615, GRADE 60, FORMED BARS. FY=60,000 PSI

16. ANCHOR BOLTS SHALL BE ASTM A307.

SURVEY NOTES:

1.) THESE PLANS ARE THE RESULT OF A FIELD SURVEY CONDUCTED BY CES, INC. FROM NOVEMBER 1999 THROUGH JANUARY 2000.

2.) ELEVATIONS ARE BASED ON THE TOP SOUTHEAST CORNER OF THE HEADWORKS STRUCTURE AS SHOWN ON A PLAN ENTITLED "VEAZIE SEWER DISTRICT, HEADWORKS STRUCTURE". DATED FEBRUARY 1988, PREPARED BY WOODARD & CURRAN, INC. ELEV. = 72.5 FEET. SAID PLAN STAMPED RECORD DRAWING AND DATED MARCH 10, 1989.

SITE PIPING GENERAL NOTES:

1.) ALL PIPING AND CONDUIT INSTALLED BENEATH STRUCTURES SHALL BE ENCASED IN CONCRETE.

2.) ALL BURIED CONNECTIONS TO ALL BUILDINGS AND STRUCTURES SHALL HAVE A SLEEVE TYPE CONNECTIONS 4' ± FROM THE STRUCTURES.

3.) PROVIDE CAST IRON PIPE OR STEEL PIPE SLEEVE WITH RUBBER LINK SEAL FOR ALL PIPE PENETRATIONS MADE THROUGH CONCRETE FOUNDATIONS, WALLS AND SLABS. ALL WALL SLEEVES AND WALL CASTINGS SHALL HAVE WATERSTOPS.

4.) ALL LIQUID CARRYING PIPING SHALL HAVE A MINIMUM OF 5 FEET OF COVER.

5.) ALL PIPE LINES SHALL SLOPE UNIFORMLY BETWEEN ELEVATIONS INDICATED ON THE DRAWINGS. NO CRESTS IN PIPING WILL BE PERMITTED.

6.) PIPING LAYOUTS PROVIDED ON THE DRAWINGS ARE LOCATED BY STATION AND OFFSET AND ARE APPROXIMATE. ADJUSTMENTS TO THE LAYOUT MAY BE MADE IN THE FIELD, WITH REVIEW AND APPROVAL BY THE ENGINEER.

7.) BURIED VALVES SHALL BE FITTED WITH NON RISING STEM OPERATING NUTS AND SHALL BE INSTALLED WITH VALVE BOXES AS TYPICALLY USED FOR WATER SERVICES.

SITE LAYOUT NOTES

1.) THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LAYOUT OF ALL PROPOSED WORK AS SHOWN ON THE DRAWINGS. ALL STATIONS AND OFFSETS GIVEN ARE FROM THE CONSTRUCTION LAYOUT LINES. THE ENGINEER WILL ESTABLISH THE CONSTRUCTION BASELINE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THIS PROPOSED LAYOUT INFORMATION THROUGHOUT THE COURSE OF CONSTRUCTION. REPORT ANY LAYOUT DISCREPANCIES IMMEDIATELY TO THE ENGINEER.

2.) THE CONTRACTOR SHALL BE RESPONSIBLE FOR REESTABLISHING AND RESETTING ALL EXISTING PROPERTY MONUMENTATION DISTURBED BY HIS OPERATIONS. THIS WORK SHALL BE DONE BY A LAND SURVEYOR REGISTERED IN THE STATE OF MAINE, AT NO ADDITIONAL COST TO THE OWNER.

3.) STATIONS AND OFFSETS ARE GENERALLY SHOWN TO THE FRONT OF EACH STRUCTURE.

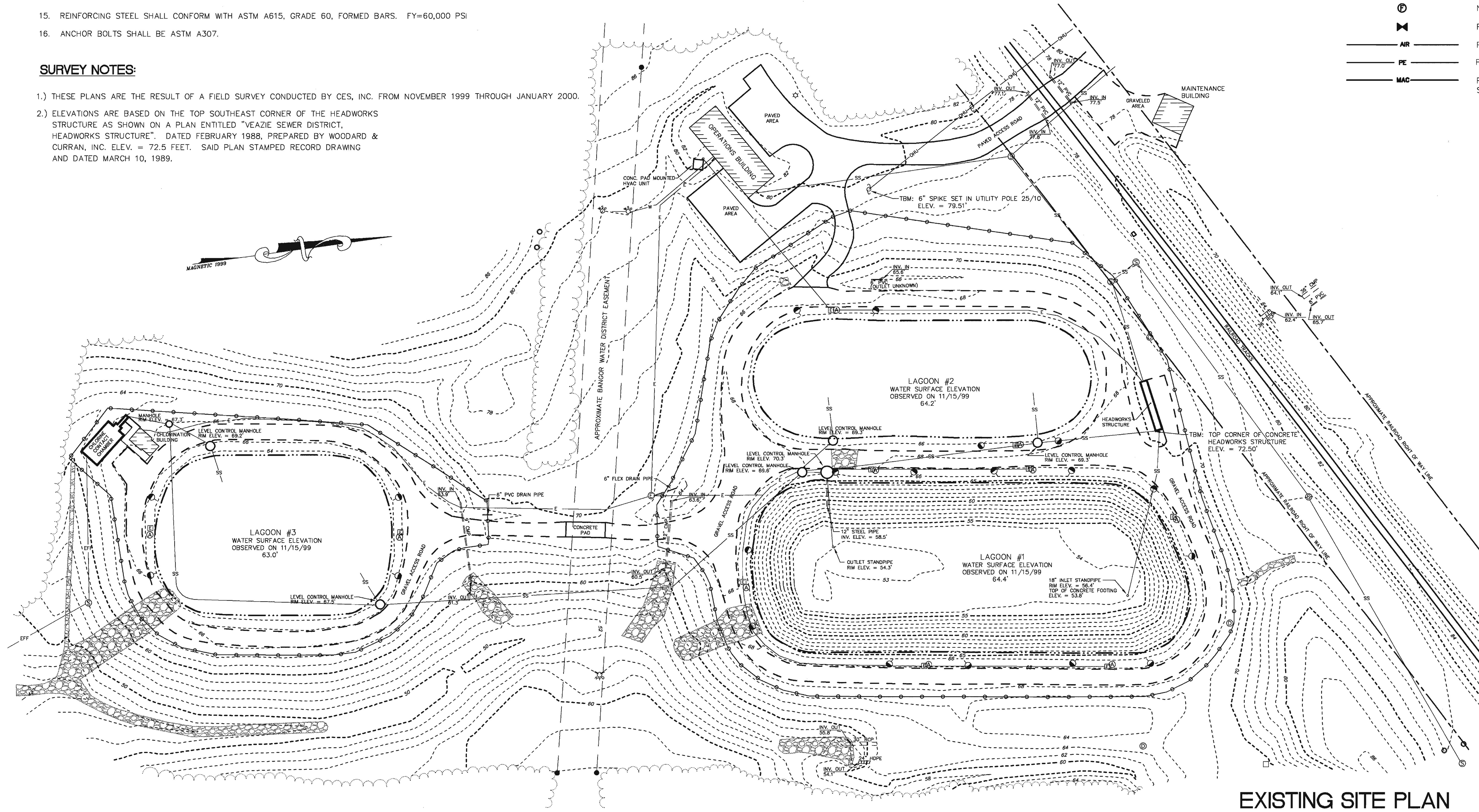
WATER NOTES

1.) CONTRACTOR SHALL INSTALL ONE AMTROL MODEL RF-25HP BOOSTER PUMP UNIT INSIDE, THE EXISTING OPERATIONS BUILDING, DOWNSTREAM FROM BACKFLOW PREVENTION DEVICE. CONTRACTOR SHALL COORDINATE INSTALLATION WITH OWNER AS TO MINIMIZE INTERFERENCE WITH OWNER'S DAY TO DAY OPERATIONS. DISCHARGE SIDE OF THE UNIT SHALL PROVIDE WATER TO THE HEADWORK'S, BLOWER AND OPERATION'S BUILDINGS.

LEGEND:

UTILITY POLE
SEWER MANHOLE
DRAINAGE MANHOLE
ELECTRICAL MANHOLE
ELECTRICAL CONTROL BOX
LIGHT POST
CATCH BASIN
MONITORING WELL
IRON ROD FOUND
WATER SHUTOFF
FIRE HYDRANT
CABLE ANCHOR POST FOR AERATOR ARM
ANCHOR POST FOR AERATOR ARM
AERATOR GUIDE CABLE ANCHOR

EDGE OF PAVEMENT
EDGE OF GRAVEL
CHAIN LINK FENCE
OHU — OVERHEAD UTILITIES
SS — EXISTING SEWER LINE
SD — EXISTING SEWER DRAIN
E — EXISTING ELECTRICAL LINE
W — EXISTING WATER LINE
APPROXIMATE EASEMENT LINE
TREELINE
RIP RAP
68 — EXISTING 2' CONTOUR
70 — EXISTING 10' CONTOUR
EXISTING CULVERT
69 — PROPOSED 2' CONTOUR
70 — PROPOSED 10' CONTOUR
x 72.5 — PROPOSED SPOT ELEVATIONS
PROPOSED CULVERT
PROPOSED EDGE OF GRAVEL
PROPOSED CHAIN LINK FENCE
PROPOSED GRAVEL
PW — PROPOSED WATER LINE
P-SD — PROPOSED SEWER DRAIN
NEW FLOTATION RING STATION
PROPOSED GATE VALVE
AIR — PROPOSED AERATION LINE
PE — PROPOSED ELECTRICAL LINE
MAC — PROPOSED MONITOR AND CONTROL SIGNAL CABLE



EXISTING SITE PLAN

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX 207-989-4881
CES INC. 1978

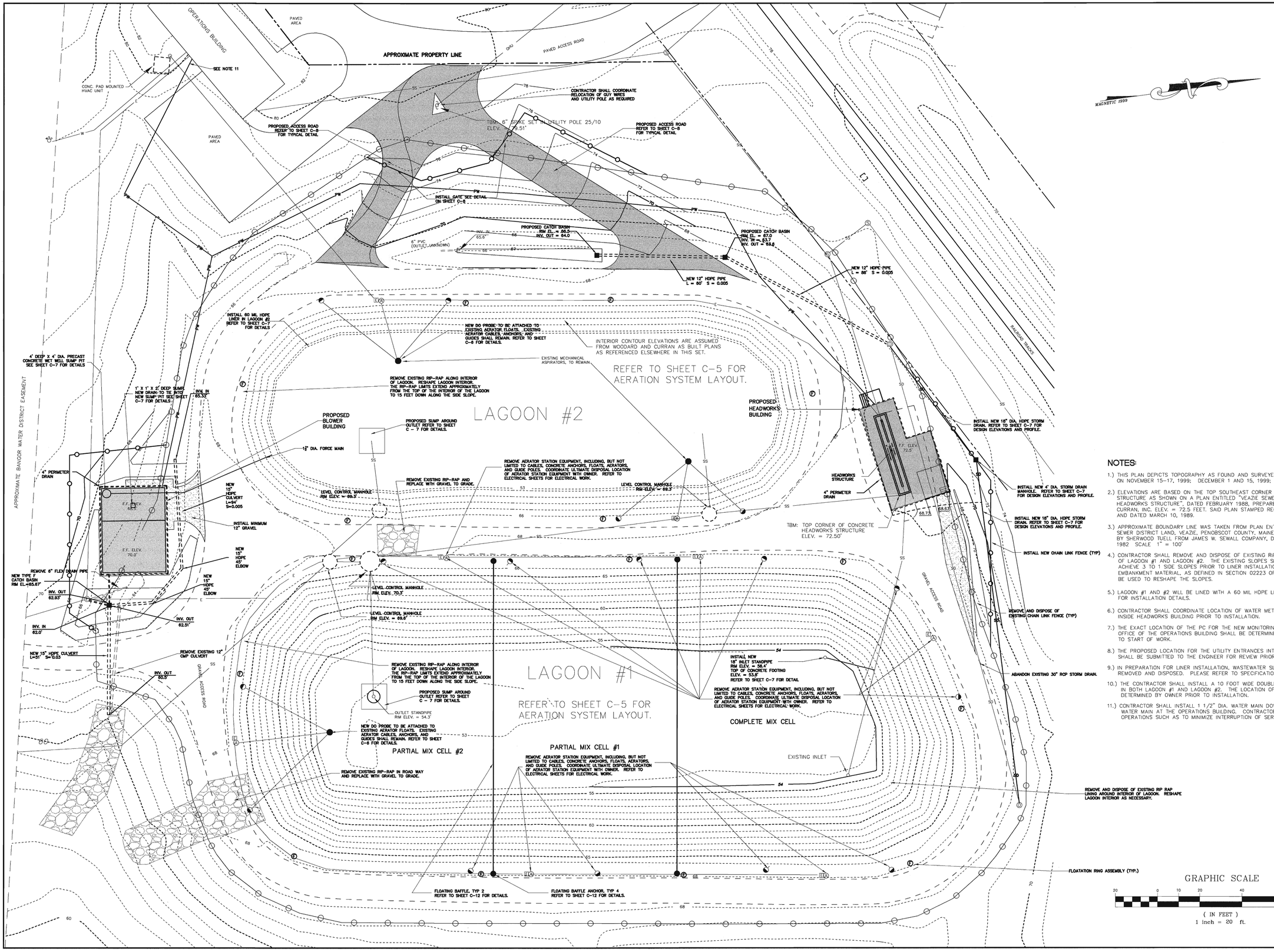
JOB TITLE: VEAZIE SEWAGE TREATMENT FACILITY, VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE: GENERAL NOTES AND EXISTING SITE PLAN

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE — ROBERT C. LARSEN 3389 — REGISTERED PROFESSIONAL ENGINEER

SCALE:	1" = 50'
DATE:	JANUARY 12, 2001
DRAWN BY	CWS
GRAPHICS CHECKED BY	
DESIGNED BY	TN
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	VZNOTES.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	C-1



NOTES:

1.) THIS PLAN DEPICTS TOPOGRAPHY AS FOUND AND SURVEYED BY CES, INC. ON NOVEMBER 15–17, 1999; DECEMBER 1 AND 15, 1999; AND JANUARY 19, 2000.

2.) ELEVATIONS ARE BASED ON THE TOP SOUTHEAST CORNER OF THE HEADWORKS STRUCTURE AS SHOWN ON A PLAN ENTITLED "VEAZIE SEWER DISTRICT, HEADWORKS STRUCTURE", DATED FEBRUARY 1988, PREPARED BY WOODARD & CURRAN, INC. ELEV. = 72.5 FEET. SAID PLAN STAMPED RECORD DRAWING AND DATED MARCH 10, 1989.

3.) APPROXIMATE BOUNDARY LINE WAS TAKEN FROM PLAN ENTITLED, "VEAZIE SEWER DISTRICT LAND, VEAZIE, PENOBSCOT COUNTY, MAINE", PREPARED BY SHERWOOD TUELL FROM JAMES W. SEWALL COMPANY, DATED MARCH 12, 1982 SCALE 1" = 100'

4.) CONTRACTOR SHALL REMOVE AND DISPOSE OF EXISTING RIP-RAP INSIDE THE INTERIOR OF LAGOON #1 AND LAGOON #2. THE EXISTING SLOPES SHALL BE SMOOTHED TO ACHIEVE 3 TO 1 SIDE SLOPES PRIOR TO LINER INSTALLATION. WHERE NECESSARY, EMBANKMENT MATERIAL, AS DEFINED IN SECTION 02223 OF THE SPECIFICATIONS SHALL BE USED TO RESHAPE THE SLOPES.

5.) LAGOON #1 AND #2 WILL BE LINED WITH A 60 MIL HDPE LINER. REFER TO SHEET C-7 FOR INSTALLATION DETAILS.

6.) CONTRACTOR SHALL COORDINATE LOCATION OF WATER METER AND SERVICE LOCATION INSIDE HEADWORKS BUILDING PRIOR TO INSTALLATION.

7.) THE EXACT LOCATION OF THE PC FOR THE NEW MONITORING SYSTEM WITHIN THE MAIN OFFICE OF THE OPERATIONS BUILDING SHALL BE DETERMINED BY THE OWNER PRIOR TO START OF WORK.

8.) THE PROPOSED LOCATION FOR THE UTILITY ENTRANCES INTO THE OPERATIONS BUILDING SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO THE START OF WORK.

9.) IN PREPARATION FOR LINER INSTALLATION, WASTEWATER SLUDGE WILL BE REMOVED AND DISPOSED. PLEASE REFER TO SPECIFICATION SECTION 01010.

10.) THE CONTRACTOR SHALL INSTALL A 10 FOOT WIDE DOUBLE LAYER OF LINER MATERIALS IN BOTH LAGOON #1 AND LAGOON #2. THE LOCATION OF THE LINERS WILL BE DETERMINED BY OWNER PRIOR TO INSTALLATION.

11.) CONTRACTOR SHALL INSTALL 1 1/2" DIA. WATER MAIN DOWNSTREAM FROM THE EXISTING WATER MAIN AT THE OPERATIONS BUILDING. CONTRACTOR SHALL COORDINATE OPERATIONS SUCH AS TO MINIMIZE INTERRUPTION OF SERVICE TO THE OPERATIONS BUILDING.

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

CES inc.
ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 539 Brewer, ME 04412 Tel: 207-989-4824 FAX: 207-989-4881

JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
SITE PIPING AND GRADING PLAN

UPPER SIDE OF BED

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE
ROBERT C. LARSEN
3339
REGISTERED PROFESSIONAL ENGINEER

SCALE:	1" = 20'
DATE:	JANUARY 12, 2001
DRAWN BY	GRAPHICS CHECKED BY
DESIGNED BY	CWS/TN
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	PDA.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	C - 2

MAGNETIC 1999

CONTRACTOR SHALL REMOVE EXISTING EFFLUENT ULTRASONIC FLOW METER AND REPLACE WITH MILLTRONICS OCM-III ULTRASONIC FLOW METER. REFER TO SPECIFICATIONS.

MANHOLE
RIM ELEV. = 67.3'

CHLORINE CONTACT CHAMBER

CHLORINATION BUILDING

LEVEL CONTROL MANHOLE
RIM ELEV. = 69.2'

RELOCATED AERATOR STATION
NEW DO PROBE TO BE ATTACHED TO RELOCATED AERATOR FLOATS.

INSTALL 1/4" STAINLESS STEEL CABLE
SEE DETAIL ON SHEET C-13

LAGOON #3

REMOVE AND DISPOSE EXISTING AERATOR POSTS CABLES, AND ELECTRICAL POST

REMOVE AND DISPOSE EXISTING AERATOR POSTS CABLES, AND ELECTRICAL POST

REFER TO SHEETS C-9 AND C-10 FOR LEMNA COVER SYSTEM LAYOUT AND DETAILS.

REMOVE EXISTING RIP TO OUTSIDE EDGE OF ROADWAY. FILL TO GRADE.

RELOCATED AERATOR STATION

INSTALL NEW AERATOR STATION ANCHOR TYP. 4 SEE DETAIL ON SHEET C-13

LEVEL CONTROL MANHOLE
RIM ELEV. = 67.5'

INV. IN
63.9'

INV. OUT
61.3'

6" PVC DRAIN PIPE

9" CMP

CONCRETE PAD

GRAVEL ACCESS ROAD

APPROXIMATE BANGOR WATER DISTRICT EASEMENT

NOTES:

1.) THIS PLAN DEPICTS TOPOGRAPHY AS FOUND AND SURVEYED BY CES, INC. ON NOVEMBER 15-17, 1999.

2.) ELEVATIONS ARE BASED ON THE TOP SOUTHEAST CORNER OF THE HEADWORKS STRUCTURE AS SHOWN ON A PLAN ENTITLED "VEAZIE SEWER DISTRICT, HEADWORKS STRUCTURE", DATED FEBRUARY 1988, PREPARED BY WOODARD & CURRAN, INC. ELEV. = 72.5 FEET. SAID PLAN STAMPED RECORD DRAWING AND DATED MARCH 10, 1989.

3.) APPROXIMATE BOUNDARY LINE WAS TAKEN FROM PLAN ENTITLED, "VEAZIE SEWER DISTRICT LAND, VEAZIE, PENOBSCOT COUNTY, MAINE", PREPARED BY SHERWOOD TUELL FROM JAMES W. SEWALL COMPANY, DATED MARCH 12, 1982 SCALE: 1"=100'

4.) DISPOSE EXISTING AERATOR ANCHORS, ELECTRICAL POSTS, AND SWING ARM STEEL AS SHOWN ON THE SIDES OF LAGOON #3. INSTALL NEW AERATOR ANCHORS AND ELECTRICAL POSTS IN LOCATIONS SHOWN. PROVIDE TWO CABLES TO REPLACE THE SWING ARM STEEL. THE LOCATIONS AS SHOWN ARE APPROXIMATE. THE CONTRACTOR MUST COORDINATE INSTALLATION LOCATIONS WITH THE LEMNA COVER INSTALLATION. REFER TO SHEET C-13 FOR AERATOR ANCHOR, STEEL CABLE, AND ELECTRICAL POST DETAILS.

5.) REMOVE AND DISPOSE OF EXISTING RIP RAP LINING AROUND INTERIOR OF LAGOON. SHAPE LAGOON INTERIOR AS NECESSARY.

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

CES INC.
ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel. 207-989-4824 FAX 207-989-4881

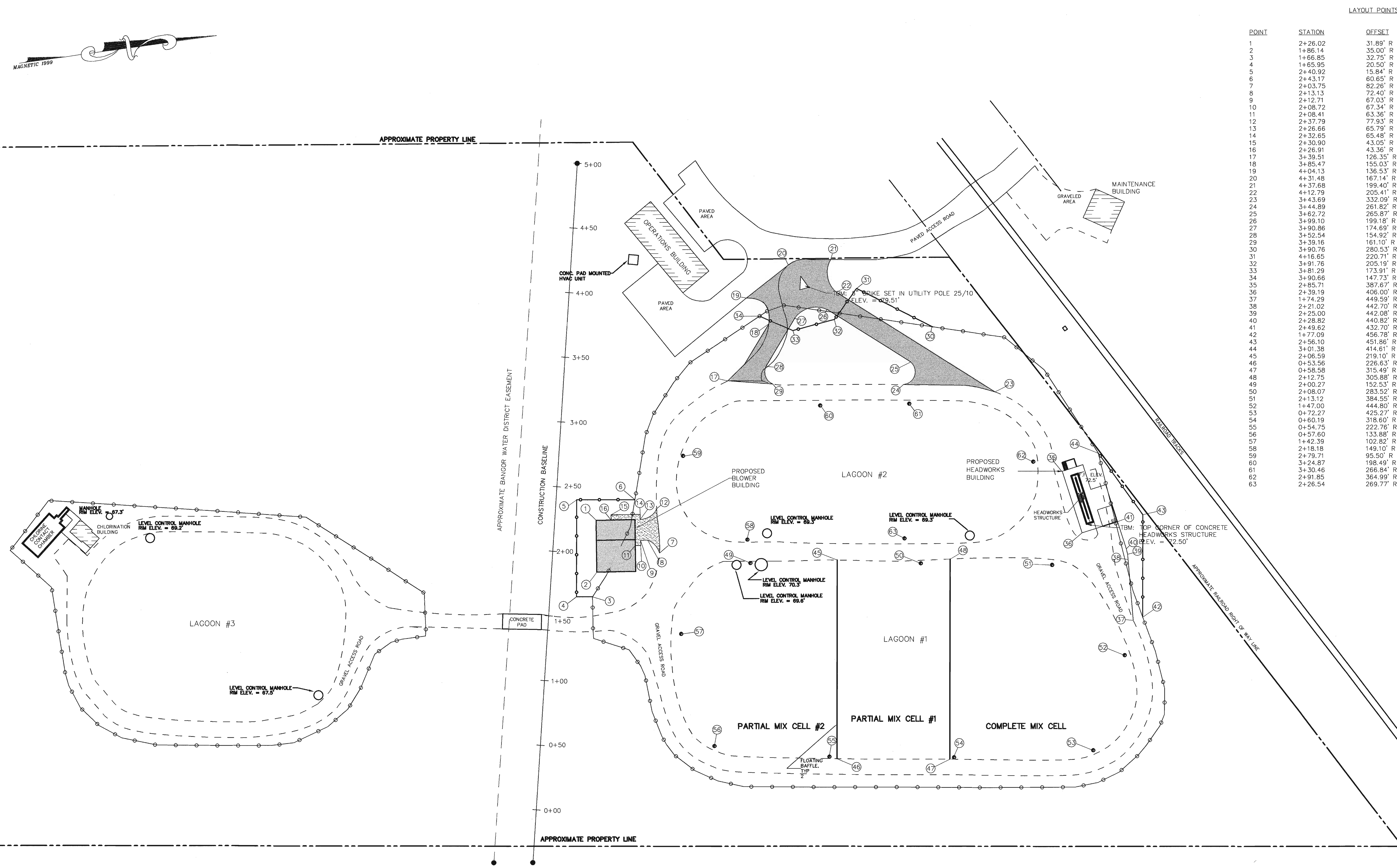
JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
LAGOON #3 SITE PLAN

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE
ROBERT C. LARSEN
3459
REGISTERED PROFESSIONAL ENGINEER

SCALE:	1" = 20'
DATE:	JANUARY 12, 2000
DRAWN BY: TEN	GRAPHICS CHECKED BY
DESIGNED BY	TN
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	LAGOON3.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	C - 3



LAYOUT POINTS

POINT	STATION	OFFSET	DESCRIPTION
1	2+26.02	31.89' R	CORNER OF BLOWER BUILDING
2	1+86.14	35.00' R	CORNER OF BLOWER BUILDING
3	1+66.85	32.75' R	FENCE
4	1+65.95	20.50' R	FENCE
5	2+40.92	15.84' R	FENCE
6	2+43.17	60.65' R	FENCE
7	2+03.75	82.26' R	DRIVEWAY
8	2+13.13	72.40' R	DRIVEWAY
9	2+12.71	67.03' R	DRIVEWAY
10	2+08.72	67.34' R	DRIVEWAY
11	2+08.41	63.36' R	DRIVEWAY
12	2+37.79	77.93' R	DRIVEWAY
13	2+26.66	65.79' R	DRIVEWAY
14	2+32.65	65.48' R	DRIVEWAY
15	2+30.90	43.05' R	DRIVEWAY
16	2+26.91	43.36' R	DRIVEWAY
17	3+39.51	126.35' R	ENTRANCE
18	3+85.47	155.03' R	ENTRANCE
19	4+04.13	136.53' R	ENTRANCE
20	4+31.48	167.14' R	ENTRANCE
21	4+37.68	199.40' R	ENTRANCE
22	4+12.79	205.41' R	ENTRANCE
23	3+43.69	332.09' R	ENTRANCE
24	3+44.89	261.82' R	ENTRANCE
25	3+62.72	265.87' R	ENTRANCE
26	3+99.10	199.18' R	ENTRANCE
27	3+90.86	174.69' R	ENTRANCE
28	3+52.54	154.92' R	ENTRANCE
29	3+39.16	161.10' R	ENTRANCE
30	3+90.76	280.53' R	FENCE
31	4+16.65	220.71' R	FENCE
32	3+91.76	205.19' R	FENCE
33	3+81.29	173.91' R	FENCE
34	3+90.66	147.73' R	FENCE
35	2+85.71	387.67' R	CORNER OF HEADWORKS BUILDING
36	2+39.19	406.00' R	CORNER OF HEADWORKS BUILDING
37	1+74.29	449.59' R	DRIVEWAY
38	2+21.02	442.70' R	DRIVEWAY
39	2+25.00	442.08' R	DRIVEWAY
40	2+28.82	440.82' R	DRIVEWAY
41	2+49.62	432.70' R	DRIVEWAY
42	1+77.09	456.78' R	FENCE
43	2+56.10	451.86' R	FENCE
44	3+01.38	414.61' R	FENCE
45	2+06.59	219.10' R	BAFFLE POST
46	0+53.56	226.63' R	BAFFLE POST
47	0+58.58	315.49' R	BAFFLE POST
48	2+12.75	305.88' R	BAFFLE POST
49	2+00.27	152.53' R	FLOTATION RING STATION
50	2+08.07	283.52' R	FLOTATION RING STATION
51	2+13.12	384.55' R	FLOTATION RING STATION
52	1+47.00	444.80' R	FLOTATION RING STATION
53	0+72.27	425.27' R	FLOTATION RING STATION
54	0+60.19	318.60' R	FLOTATION RING STATION
55	0+54.75	222.76' R	FLOTATION RING STATION
56	0+57.60	133.88' R	FLOTATION RING STATION
57	1+42.39	102.82' R	FLOTATION RING STATION
58	2+18.18	149.10' R	FLOTATION RING STATION
59	2+79.71	95.50' R	FLOTATION RING STATION
60	3+24.87	198.49' R	FLOTATION RING STATION
61	3+30.46	266.84' R	FLOTATION RING STATION
62	2+91.85	364.99' R	FLOTATION RING STATION
63	2+26.54	269.77' R	FLOTATION RING STATION

NOTES:

1.) THIS PLAN DEPICTS TOPOGRAPHY AS FOUND AND SURVEYED BY CES, INC. ON NOVEMBER 15–17, 1999.

2.) ELEVATIONS ARE BASED ON THE TOP SOUTHEAST CORNER OF THE HEADWORKS STRUCTURE AS SHOWN ON A PLAN ENTITLED "VEAZIE SEWER DISTRICT, HEADWORKS STRUCTURE", DATED FEBRUARY 1988, PREPARED BY WOODARD & CURRAN, INC. ELEV. = 72.5 FEET. SAID PLAN STAMPED RECORD DRAWING AND DATED MARCH 10, 1989.

3.) APPROXIMATE BOUNDARY LINE WAS TAKEN FROM PLAN ENTITLED, "VEAZIE SEWER DISTRICT LAND, VEAZIE, PENOBSCOT COUNTY, MAINE", PREPARED BY SHERWOOD TUELL FROM JAMES W. SEWALL COMPANY, DATED MARCH 12, 1982 SCALE: 1"=100'

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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ENGINEERS • SURVEYORS
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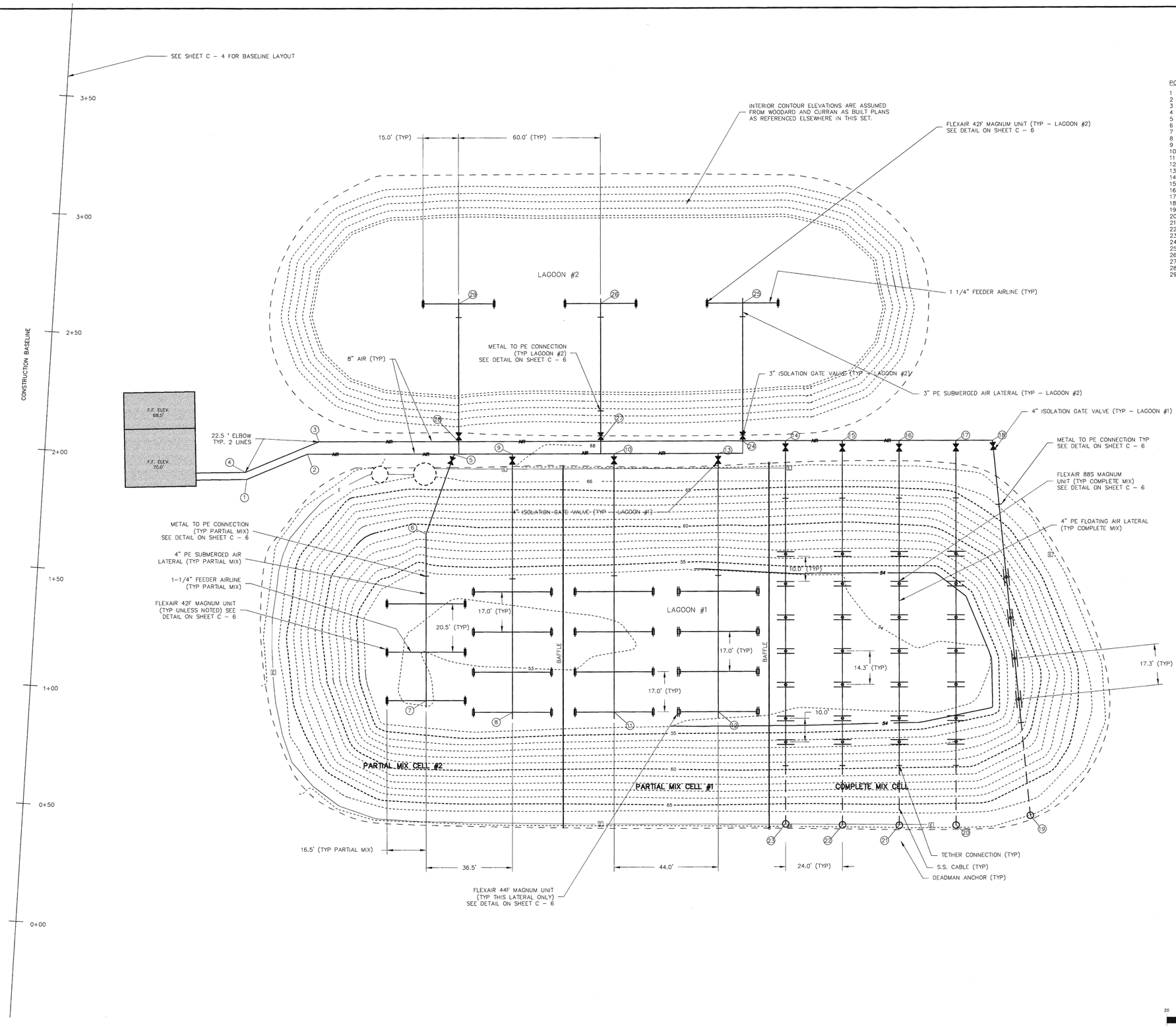
JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
SITE LAYOUT PLAN

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE
ROBERT C. LARSEN
3389
REGISTERED
PROFESSIONAL ENGINEER

SCALE: 1" = 40'	
DATE: JANUARY 12, 2001	
DRAWN BY CWS	GRAPHICS CHECKED BY
DESIGNED BY CWS / TN	
CHECKED BY RCL	
APPROVED BY RCL	
FILE NAME LAYOUT.DWG	
JOB NUMBER 2549.3	
DRAWING NUMBER C-4	



LAYOUT POINTS

POINT	STATION	OFFSET	DESCRIPTION
1	1+92.62	86.01' R	AIR MAIN @ 22.5° BEND
2	2+04.87	111.05' R	AIR MAIN @ 22.5° BEND
3	2+10.42	115.56' R	AIR MAIN @ 22.5° BEND
4	1+95.57	82.20' R	AIR MAIN @ 22.5° BEND
5	2+08.56	112.79' R	LATERAL END @ AIR MAIN
6	1+74.22	163.00' R	LATERAL BEND
7	1+03.81	167.39' R	LATERAL @ FEEDER LINE CONNECTION
8	1+01.09	204.13' R	LATERAL @ FEEDER LINE CONNECTION
9	2+10.25	197.33' R	LATERAL END @ AIR MAIN
10	2+12.92	240.25' R	LATERAL END @ AIR MAIN
11	1+03.76	247.05' R	LATERAL @ FEEDER LINE CONNECTION
12	1+06.50	290.96' R	LATERAL @ FEEDER LINE CONNECTION
13	2+15.65	284.16' R	LATERAL END @ AIR MAIN
14	2+22.67	312.28' R	LATERAL END @ AIR MAIN
15	2+24.16	336.24' R	LATERAL END @ AIR MAIN
16	2+25.65	360.19' R	LATERAL END @ AIR MAIN
17	2+27.14	384.14' R	LATERAL END @ AIR MAIN
18	2+28.10	399.57' R	LATERAL END @ AIR MAIN
19	0+70.56	425.32' R	DEADMAN ANCHOR
20	0+64.61	394.26' R	DEADMAN ANCHOR
21	0+63.10	370.31' R	DEADMAN ANCHOR
22	0+61.73	346.35' R	DEADMAN ANCHOR
23	0+60.77	322.36' R	DEADMAN ANCHOR
24	2+21.54	294.21' R	LATERAL END @ AIR MAIN
25	2+79.77	290.59' R	LATERAL @ FEEDER LINE CONNECTION
26	2+76.04	230.70' R	LATERAL @ FEEDER LINE CONNECTION
27	2+17.81	234.33' R	LATERAL END @ AIR MAIN
28	2+14.08	174.44' R	LATERAL END @ AIR MAIN
29	2+72.31	170.82' R	LATERAL @ FEEDER LINE CONNECTION

LAGOON #1 NOTES:
COMPLETE MIX CELL NOTES:
1. AERATION–MIXING BY EDI FLEXAIR 88S MAGNUM UNITS.
2. OPERATING LIQUID DEPTH WILL VARY:
   LOWER END = 11.0 FT.
   NORMAL = 11.0 FT.
   UPPER END = 13.0 FT.
3. FLOATING AIR LATERALS ARE 4" PE.
4. TOTAL= 32 FLEXAIR 88S MAGNUM UNITS.
5. FEEDER AIRLINES ARE 2"
6. BALLAST USES CONCRETE @ 145#/CU.FT. DENSITY.
7. MAIN AIR HEADER IS 8".

PARTIAL MIX CELL NOTES:
1. AERATION BY EDI FLEXAIR 44F AND 42F MAGNUM UNITS.
2. LIQUID DEPTH IS 11.0 FT, DIFFUSER DEPTH IS 10.5 FT.
3. SUBMERGED AIR LATERALS ARE 4" PE.
4. PARTIAL MIX CELL #1 TOTAL= 8 FLEXAIR 44F MAGNUM UNITS AND 8 FLEXAIR 42F MAGNUM UNITS.
   PARTIAL MIX CELL #2 TOTAL= 14 FLEXAIR 42F MAGNUM UNITS.
5. FEEDER AIRLINES ARE 1–1/4"
6. BALLAST USES CONCRETE @ 145#/CU.FT. DENSITY.

LAGOON #2 NOTES:
1. AERATION BY EDI FLEXAIR 42F MAGNUM UNITS.
2. LIQUID DEPTH IS 11.0 FT, DIFFUSER DEPTH IS 10.5 FT.
3. SUBMERGED AIR LATERALS ARE 3" PE.
4. TOTAL = 6 FLEXAIR 42F MAGNUM UNITS.
5. FEEDER AIRLINES ARE 1–1/4"
6. BALLAST USES CONCRETE @ 145#/CU.FT. DENSITY.
7. MAIN AIR HEADER IS 8".

NOTE:
MAIN AIR FEEDER LINE HAS A 6" ELEVATION DROP FROM THE BLOWER BUILDING TO POINT 18.

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

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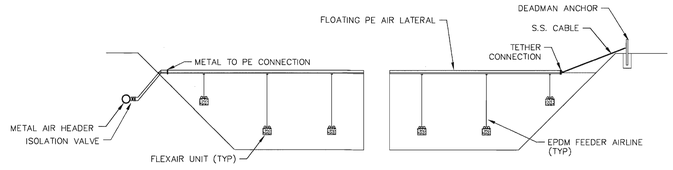
JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
AERATION SYSTEM PLAN

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

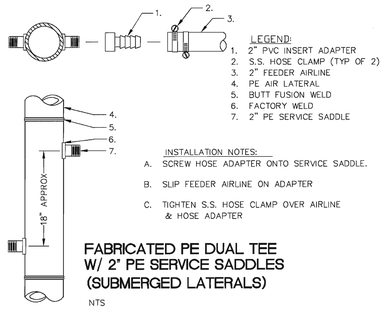
STATE OF MAINE
ROBERT C. LARSEN
7382
REGISTERED PROFESSIONAL ENGINEER

SCALE:	1" = 20'
DATE:	JANUARY 12, 2001
DRAWN BY	CWS
GRAPHICS CHECKED BY	
DESIGNED BY	TW
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	AERATION.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	C – 5



TYPICAL LAGOON SECTION COMPLETE MIX CELL - LAGOON #1

NTS

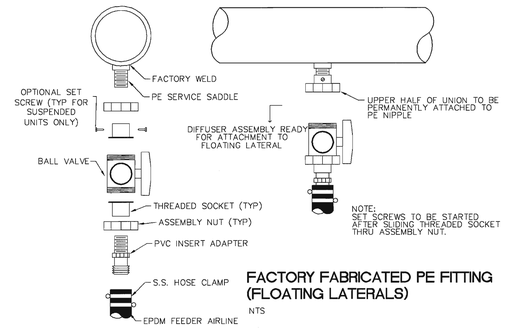


LEGEND:
1. 2" PVC INSERT ADAPTER
2. S.S. HOSE CLAMP (TYP OF 2)
3. 2" FEEDER AIRLINE
4. PE AIR LATERAL
5. BUTT FUSION WELD
6. FACTORY WELD
7. 2" PE SERVICE SADDLE

INSTALLATION NOTES:
A. SCREW HOSE ADAPTER ONTO SERVICE SADDLE.
B. SLIP FEEDER AIRLINE ON ADAPTER
C. TIGHTEN S.S. HOSE CLAMP OVER AIRLINE & HOSE ADAPTER

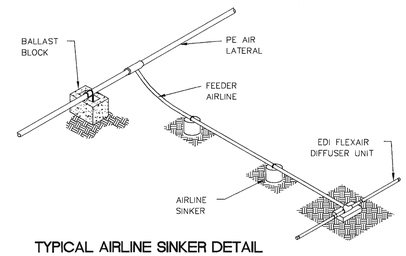
FABRICATED PE DUAL TEE W/ 2" PE SERVICE SADDLES (SUBMERGED LATERALS)

NTS



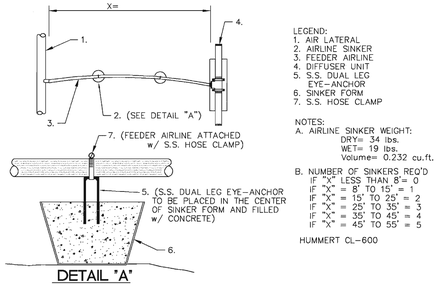
FACTORY FABRICATED PE FITTING (FLOATING LATERALS)

NTS



TYPICAL AIRLINE SINKER DETAIL

NTS



LEGEND:
1. AIR LATERAL
2. AIRLINE SINKER
3. FEEDER AIRLINE
4. DIFFUSER UNIT
5. S.S. DUAL LEG EYE-ANCHOR
6. SINKER FORM
7. S.S. HOSE CLAMP

NOTES:
A. AIRLINE SINKER WEIGHT:
DRY= 34 lbs.
WET= 19 lbs.
Volume= 0.232 cu.ft.

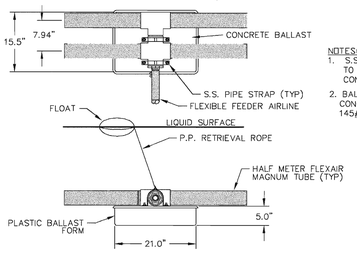
B. NUMBER OF SINKERS REQ'D
IF "X" LESS THAN 8'= 0
IF "X" = 8' TO 15' = 1
IF "X" = 15' TO 25' = 2
IF "X" = 25' TO 35' = 3
IF "X" = 35' TO 45' = 4
IF "X" = 45' TO 55' = 5

HUMMERT CL-600

DETAIL "A"

1 1/4" AIRLINE SINKER DETAIL

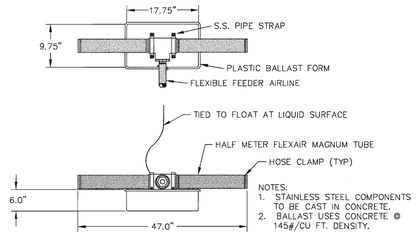
NTS



NOTES:
1. S.S. COMPONENTS TO BE CAST IN CONCRETE
2. BALLAST USES CONCRETE @ 145#/CU FT. DENSITY

FLEXAIR 44F MAGNUM DIFFUSER UNIT DETAIL

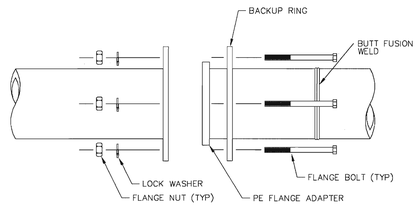
NTS



NOTES:
1. STAINLESS STEEL COMPONENTS TO BE CAST IN CONCRETE.
2. BALLAST USES CONCRETE @ 145#/CU FT. DENSITY.

FLEXAIR 42 F MAGNUM DIFFUSER UNIT DETAIL

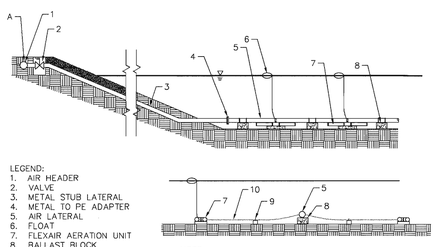
NTS



NOTES:
1. FLANGE CONNECTION TO BE LOCATED AT WATER LEVEL.
2. BACKUP RING MUST BE ON PE PIPE BEFORE FLANGE ADAPTER IS WELDED TO PE PIPE.

METAL TO PE FLANGE CONNECTION

NTS

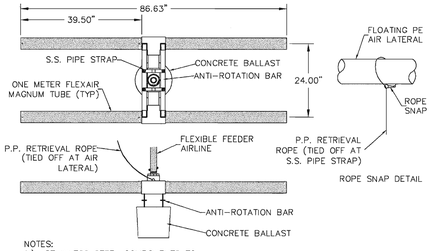


LEGEND:
1. AIR HEADER
2. VALVE
3. METAL STUB LATERAL
4. METAL TO PE ADAPTER
5. AIR LATERAL
6. FLOAT
7. FLEXAIR AERATION UNIT
8. BALLAST BLOCK
9. AIRLINE SINKER
10. FEEDER AIRLINE

NOTE:
A. HEADER INVERT ELEVATION MUST BE LOCATED ABOVE HIGH WATER LEVEL.

TYPICAL LAGOON SECTION PARTIAL MIX CELLS, LAGOON #1 AND LAGOON #2

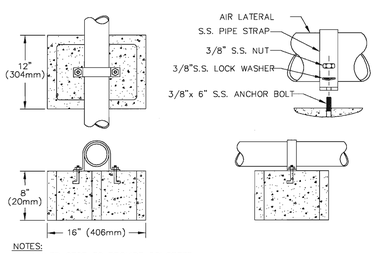
NTS



NOTES:
1.) STAINLESS STEEL COMPONENTS TO BE CAST IN CONCRETE
2.) BALLAST USES CONCRETE WITH A DENSITY OF 145 #/CU. FT.

FLEXAIR 88S MAGNUM DIFFUSER UNIT DETAIL

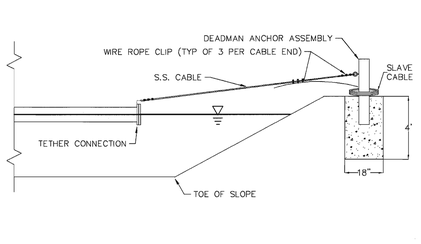
NTS



NOTES:
A. CONTRACTOR TO PROVIDE CONCRETE BLOCKS AND CONCRETE.
B. USE CONCRETE @ 145# /CU. FT. DENSITY
C. DOUBLE CORNER BLOCK REQUIRED.
D. MAXIMUM SPACING: 5.75' ON CENTERS

AIR LATERAL BALLAST BLOCK ASSEMBLY DETAIL

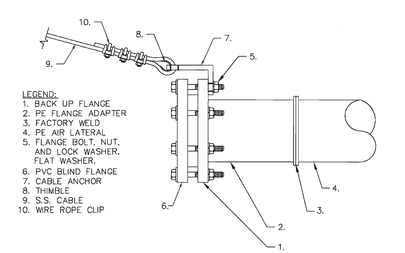
NTS



DEADMAN ANCHOR DETAIL

NTS

NOTE:
1. CONTRACTOR SHALL COORDINATE WITH EDI THE SIZE OF DEADMAN ANCHOR.
2. CONCRETE SHALL BE WRAPPED 3 TIMES WITH 6 MIL POLY.



LEGEND:
1. BACK UP FLANGE
2. PE FLANGE ADAPTER
3. FACTORY WELD
4. PE AIR LATERAL
5. FLANGE BOLT, NUT, AND LOCK WASHER, FLAT WASHER.
6. PVC BLIND FLANGE
7. CABLE ANCHOR
8. THIMBLE
9. S.S. CABLE
10. WIRE ROPE CLIP

FLOATING LATERAL TETHER CONNECTION

NTS

ENGINEERS • SURVEYORS
465 Sc. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX: 207-989-4881

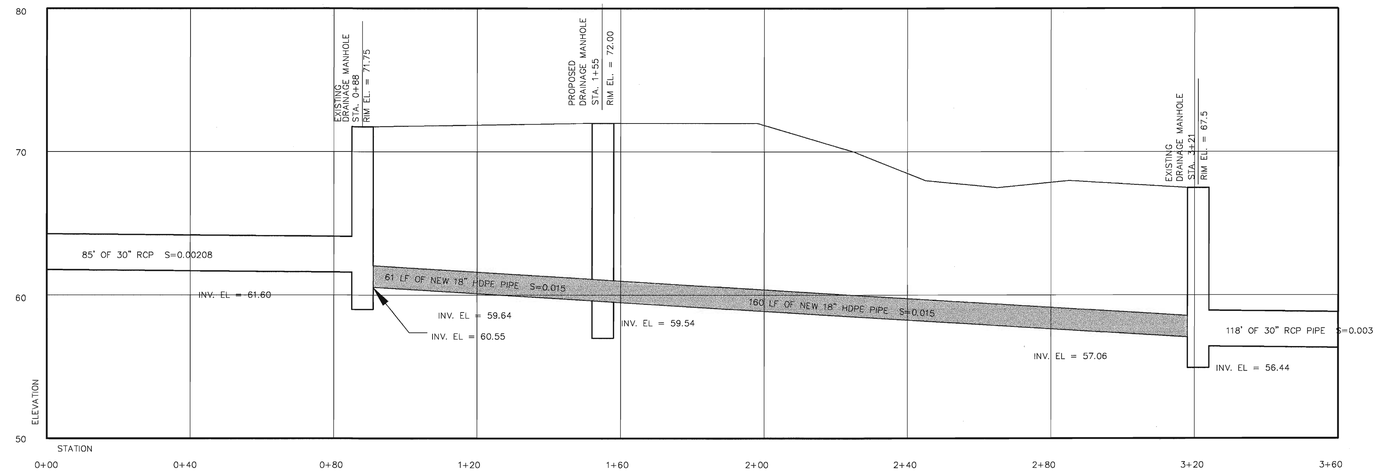
JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
AERATION DETAILS

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

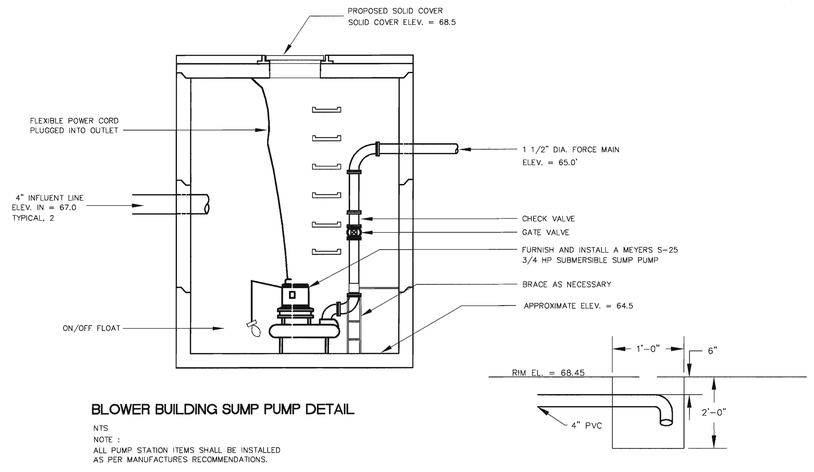
STATE OF MAINE
ROBERT C. LARSEN
8369
REGISTERED PROFESSIONAL ENGINEER

SCALE:	AS SHOWN
DATE:	JANUARY 12, 2001
DRAWN BY	CWS
GRAPHICS CHECKED BY	
DESIGNED BY	TW
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	AIRDETS.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	C - 6



STORM DRAIN PROFILE

SCALE: 1"=20' HORIZONTAL
1"=5' VERTICAL

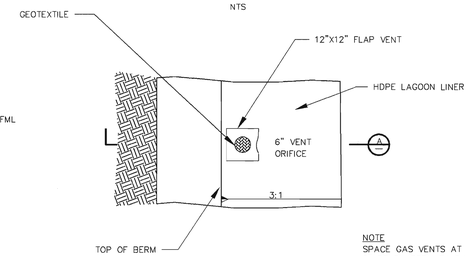


BLOWER BUILDING SUMP PUMP DETAIL

NTS
NOTE :
ALL PUMP STATION ITEMS SHALL BE INSTALLED AS PER MANUFACTURES RECOMMENDATIONS.

SUMP DETAIL

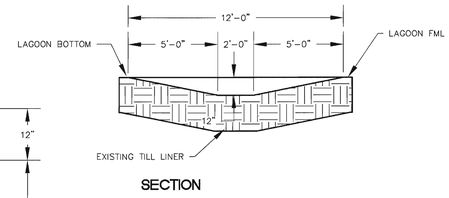
NTS



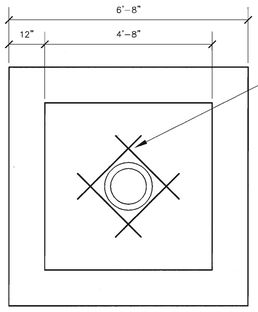
NOTE
SPACE GAS VENTS AT 2" BELOW BERM FINISH GRADES @ 50' O.C.

PLAN

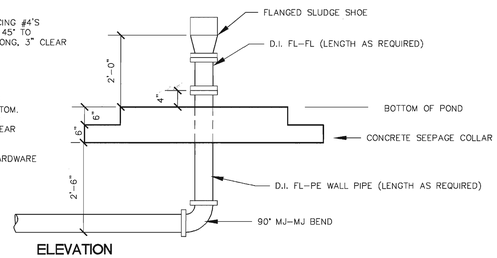
N.T.S.



SECTION



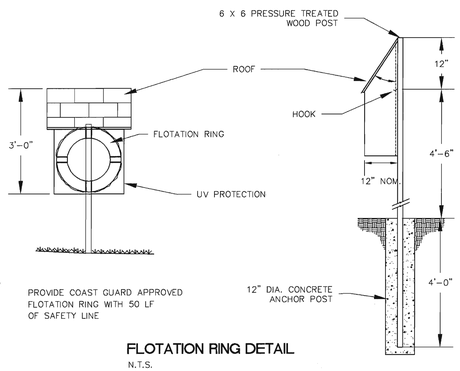
PLAN



ELEVATION

LAGOON INLET/DRAIN DETAIL

NTS

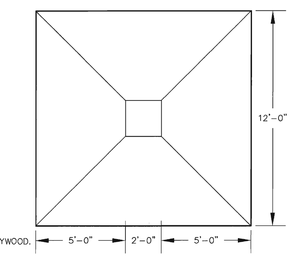


PROVIDE COAST GUARD APPROVED FLOTATION RING WITH 50 LF OF SAFETY LINE

FLOTATION RING DETAIL

N.T.S.

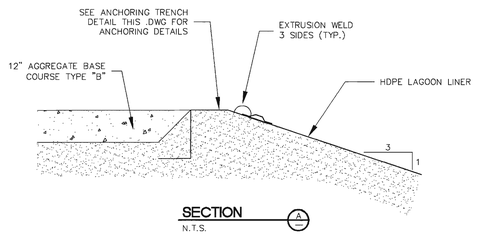
NOTE
1.) CONTRACTOR SHALL PROVIDE LIFE RINGS WITH 75 FEET OF FLOATING ROPE FOR EACH RING, AND SHALL SIZE THE SUPPORT ACCORDINGLY.
2.) INSTALL FLOTATION RINGS AS INDICATED ON THE DRAWINGS.
3.) ROOF AND SIDES ARE TO BE CONSTRUCTED OF 3/4" PRESSURE TREATED PLYWOOD.
4.) SET POSTS IN 3000 PSI CONCRETE. TROWEL AT GROUND SURFACE.
5.) ALL CONCRETE SHALL BE WRAPPED 3 TIMES WITH 6 MIL POLY.
6.) PROVIDE BOOT IN SECTIONS PENETRATING LINER.



PLAN

TYPICAL LAGOON SUMP

SCALE: 1/4" = 1'-0"

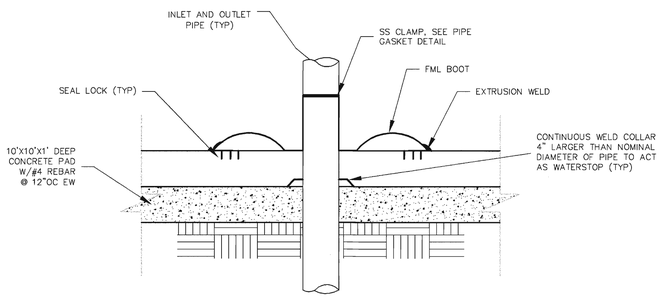


SECTION

N.T.S.

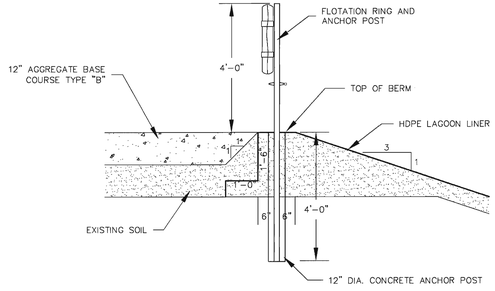
TYPICAL GAS VENT DETAIL

N.T.S.



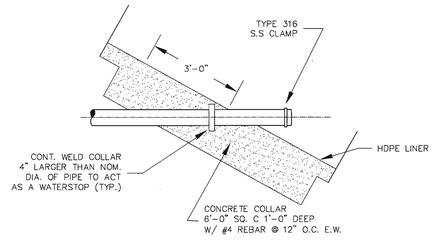
TYPICAL LAGOON BOTTOM VERTICAL PIPE PENETRATION DETAIL

NTS



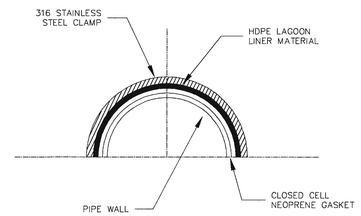
ANCHOR TRENCH DETAIL

N.T.S.



TYPICAL LAGOON SIDE SLOPE PIPE PENETRATION DETAIL

N.T.S.



PIPE GASKET DETAIL

N.T.S.

ENGINEERS • SURVEYORS
465 Sw. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX: 207-989-4881
CES inc.

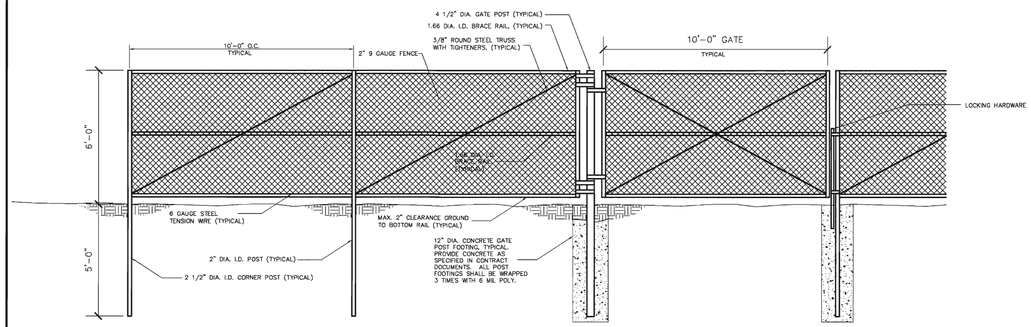
JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
CIVIL DETAILS SHEET 1

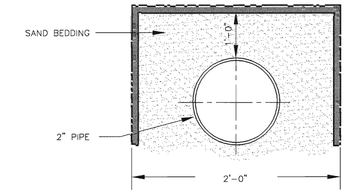
REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE
ROBERT C. LARSEN
3838
REGISTERED
PROFESSIONAL ENGINEER

SCALE:	AS SHOWN
DATE:	JANUARY 12, 2001
DRAWN BY	GRAPHICS CHECKED BY CWS
DESIGNED BY	TN
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	DETAILS1.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	C - 7



TYPICAL CHAIN LINK FENCE AND GATE DETAIL
NTS

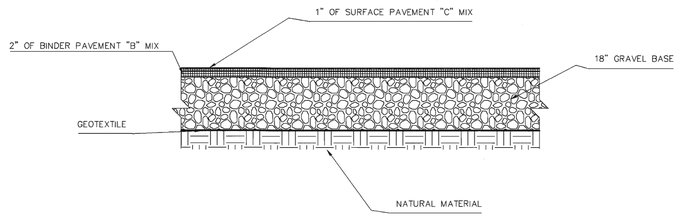


NOTE :

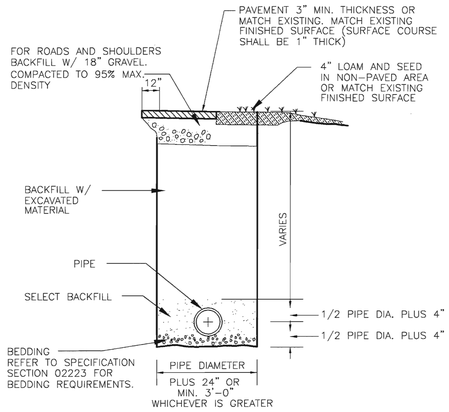
1. 2" RIGID INSULATION BLUE BOARD BY DOW CO. SM. EXTRUDED POLYSTYRENE, (OR APPROVED EQUAL) TO BE USED IF EARTHEN COVER IS LESS THAN 5'-0" OVER PROPOSED LIQUID CARRYING PIPE.
2. CONTRACTOR MAY HAVE TO SUPPLY MORE THAN ONE LAYER OF BLUE BOARD INSULATION, IN AREAS THAT HAVE MINIMAL EARTHEN COVER TO MAINTAIN THE INSULATION VALUE AS SPECIFIED. 2" BLUE BOARD INSULATION HAS THE INSULATION VALUE OF APPROXIMATELY 2'-0" OF EARTHEN COVER.
3. MAINTAIN A MINIMUM OF 12" OF EARTHEN COVER OVER INSULATION AS A MECHANICAL PROTECTION. LOAM AND SEED AS NECESSARY TO PREVENT EROSION.

TYPICAL TRENCH PIPE INSULATION DETAIL

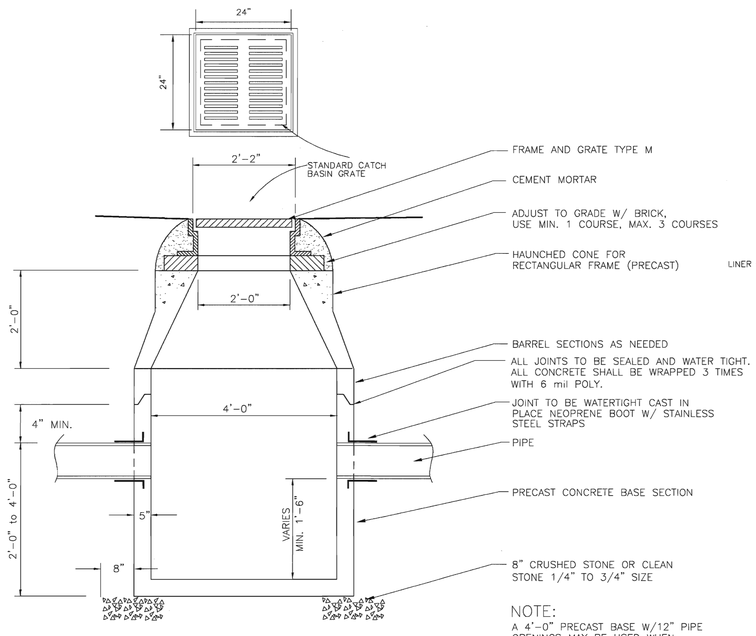
NTS



TYPICAL ACCESS ROAD SECTION
NTS

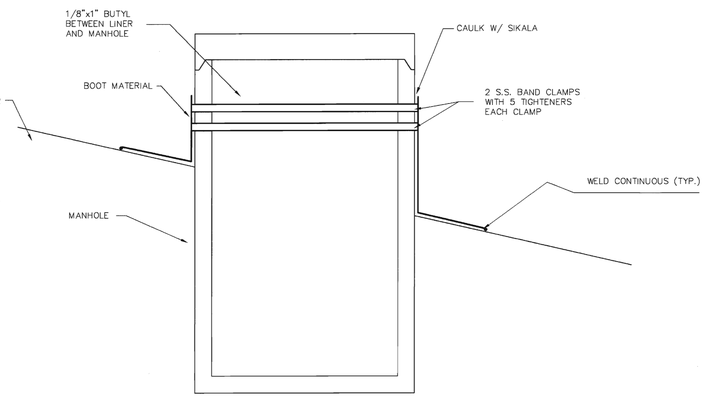


TYPICAL WATER, SEWER AND STORM TRENCH
NTS

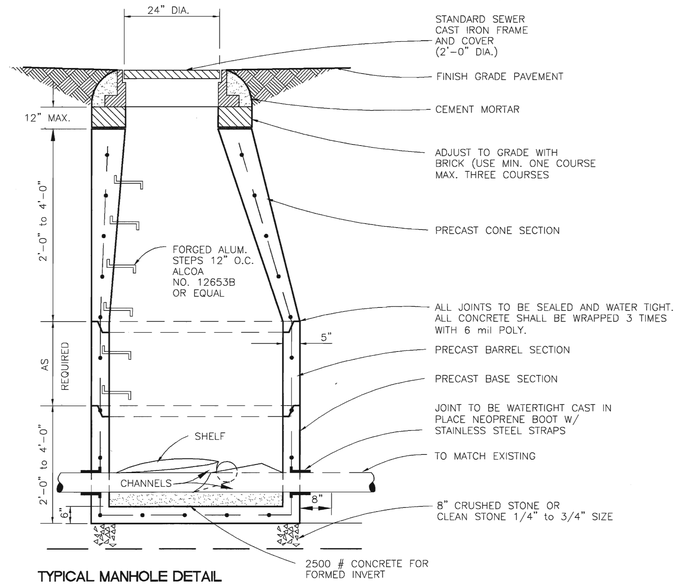


TYPICAL CATCH BASIN DETAIL
NTS

NOTE:
A 4'-0" PRECAST BASE W/12" PIPE OPENINGS MAY BE USED WHEN IT WILL PROVIDE A 2'-0" SUMP AND 12"± RING ABOVE ALL OPENINGS INTO THE BASE.



TYPICAL MANHOLE BOOT DETAIL
N.T.S.



TYPICAL MANHOLE DETAIL
NTS

ENGINEERS • SURVEYORS
CES inc.
465 Sw. Main Street P.O. Box 539 Brewer, ME 04412 Tel: 207-989-4824 FAX 207-989-4881

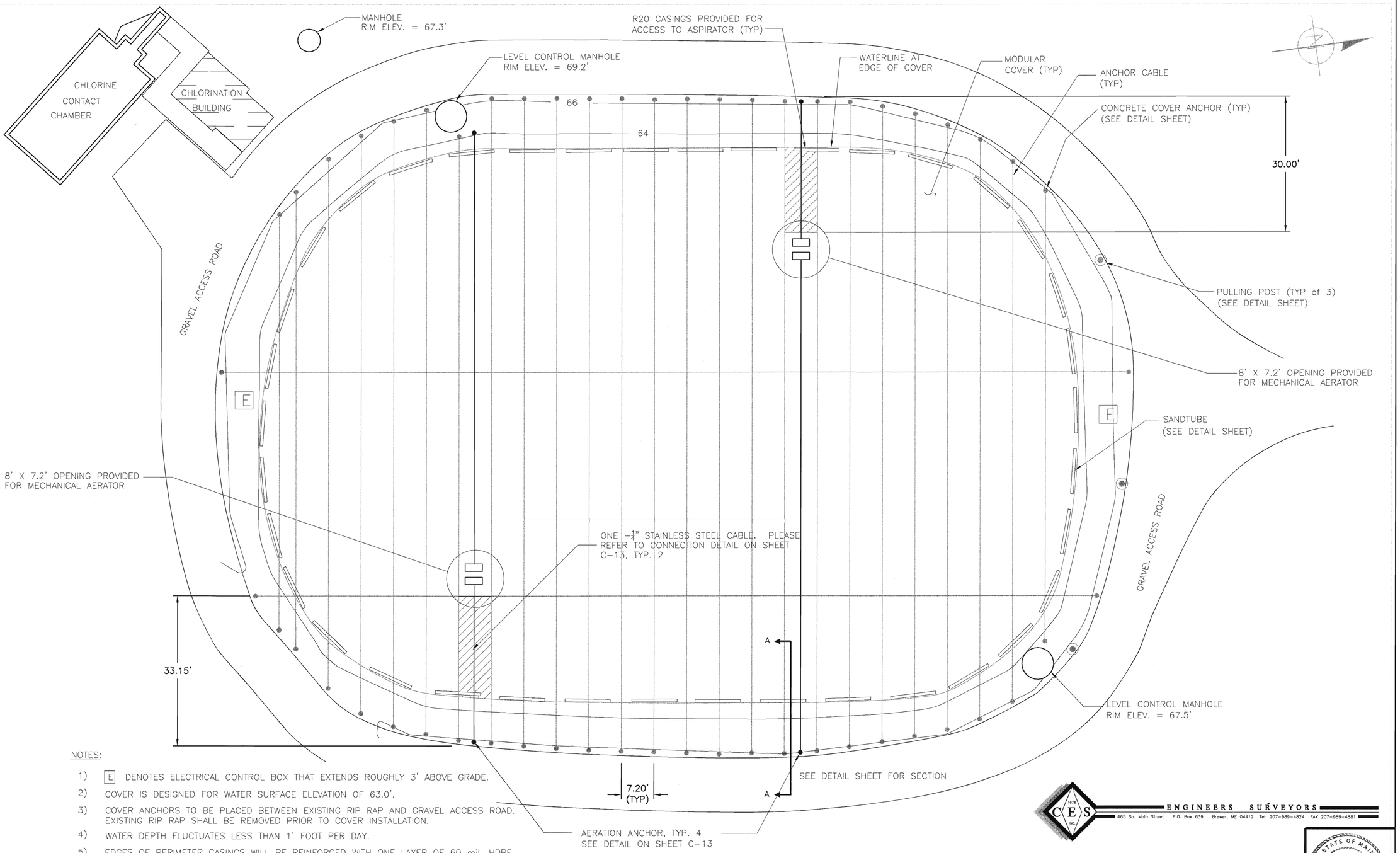
JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
CIVIL DETAILS SHEET 2

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE
ROBERT C. LARSEN
13397
REGISTERED PROFESSIONAL ENGINEER

SCALE:	AS SHOWN
DATE:	JANUARY 12, 2001
DRAWN BY: CWS	GRAPHICS CHECKED BY
DESIGNED BY	TJW
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	DETAILS2.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	C - 8



NOTES:

1) E DENOTES ELECTRICAL CONTROL BOX THAT EXTENDS ROUGHLY 3' ABOVE GRADE.
2) COVER IS DESIGNED FOR WATER SURFACE ELEVATION OF 63.0'.
3) COVER ANCHORS TO BE PLACED BETWEEN EXISTING RIP RAP AND GRAVEL ACCESS ROAD. EXISTING RIP RAP SHALL BE REMOVED PRIOR TO COVER INSTALLATION.
4) WATER DEPTH FLUCTUATES LESS THAN 1' FOOT PER DAY.
5) EDGES OF PERIMETER CASINGS WILL BE REINFORCED WITH ONE LAYER OF 60 mil. HDPE. THE WELDED LAYER SHALL HAVE A MINIMUM LENGTH OF 3' PERPENDICULAR TO THE CASING EDGE.
6) PLEASE REFER TO SHEET C-3 FOR ASSOCIATED SITE WORK.

CES INC. 1978 ENGINEERS SURVEYORS
465 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX 207-989-4881

STATE OF MAINE
ROBERT C. LARSEN
7005
REGISTERED PROFESSIONAL ENGINEER

D:\Maine\1\Veazie\CES\Cover Layout

No.	Revisions	Date	No.	Revisions	Date
1			6		
2			7		
3			8		
4			9		
5			10		

LEMTEC MODULAR COVER SYSTEM
VEAZIE, MAINE

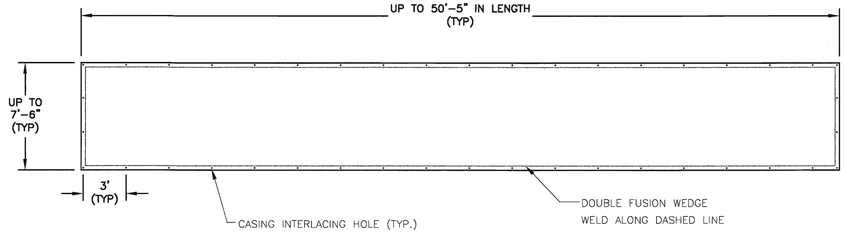
MODULAR COVER LAYOUT

LEMNA TECHNOLOGIES
2445 PARK AVENUE SOUTH
MINNEAPOLIS, MINNESOTA USA 55404-3790
TEL: 612-253-2002
FAX: 612-253-2003

Date: JANUARY 25 2000

Drawn: D.J.D.
Design: M.O.L.
Checked: D.W.A.
Project No: X
Scale: 1" = 10'

Sheet No: C-9



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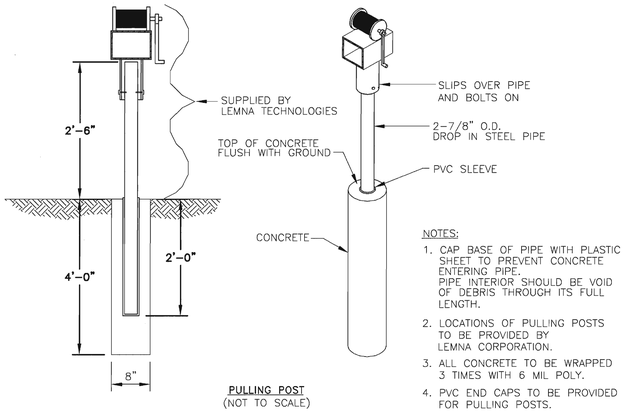
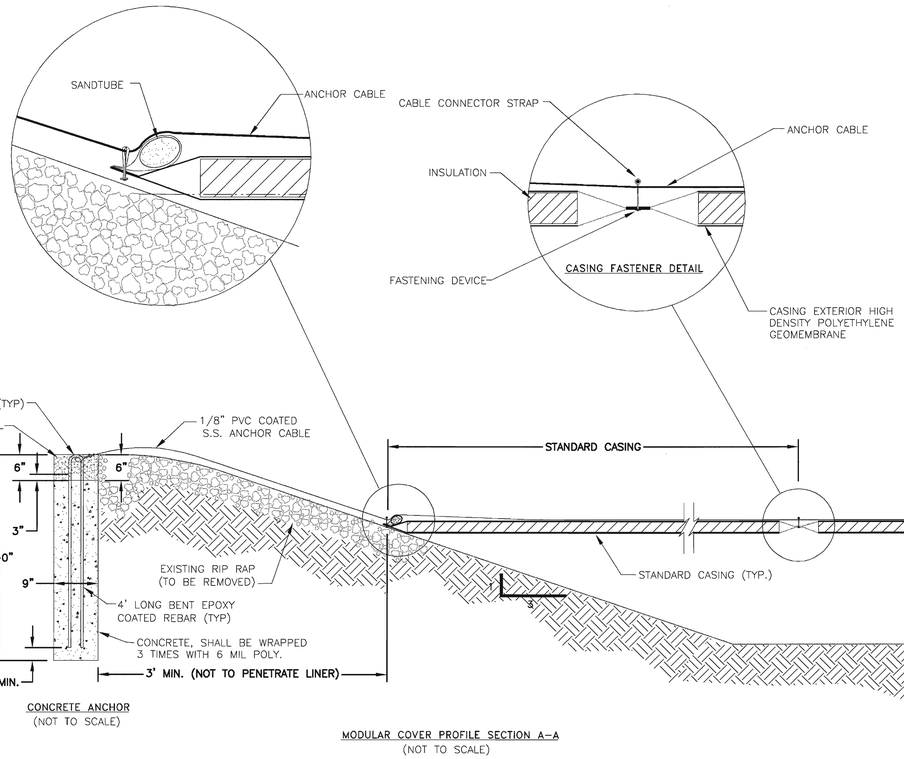


PULLING POST
(NOT TO SCALE)

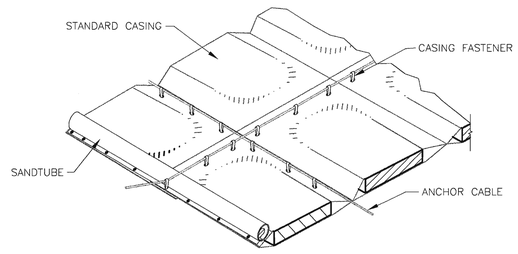
NOTES:

1. CAP BASE OF PIPE WITH PLASTIC SHEET TO PREVENT CONCRETE ENTERING PIPE. PIPE INTERIOR SHOULD BE VOID OF DEBRIS THROUGH ITS FULL LENGTH.
2. LOCATIONS OF PULLING POSTS TO BE PROVIDED BY LEMNA CORPORATION.
3. ALL CONCRETE TO BE WRAPPED 3 TIMES WITH 6 MIL POLY.
4. PVC END CAPS TO BE PROVIDED FOR PULLING POSTS.



CONCRETE ANCHOR
(NOT TO SCALE)

MODULAR COVER PROFILE SECTION A-A
(NOT TO SCALE)



MODULAR COVER ISOMETRIC W/SANDTUBE
(NOT TO SCALE)

CES, INC. 1979 — ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX 207-989-4881

STATE OF MAINE — ROBERT C. LARSEN — REGISTERED PROFESSIONAL ENGINEER

D:\Maine\1\Veazie\CES\Details

No.	Revisions	Date	No.	Revisions	Date
1			6		
2			7		
3			8		
4			9		
5			10		

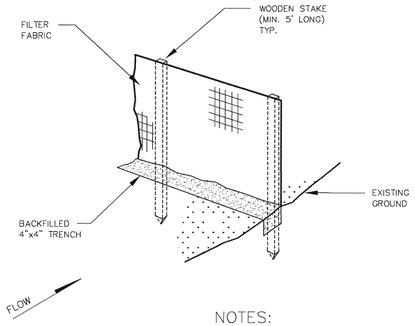
LEMTEC MODULAR COVER SYSTEM
VEAZIE, MAINE

MODULAR COVER SECTION AND DETAILS

LEMNA TECHNOLOGIES
2445 PARK AVENUE SOUTH
MINNEAPOLIS, MINNESOTA USA 55404-3790
TEL: 612-253-2002
FAX: 612-253-2003

Drawn: D.J.D.
Design: M.O.L.
Checked: D.W.A.
Project No: X
Scale: NOT TO SCALE
Date: JANUARY 25 2000

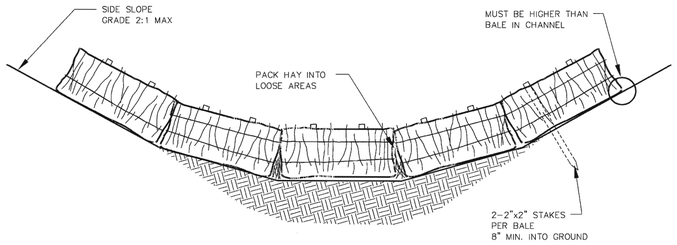
Sheet No: C - 10



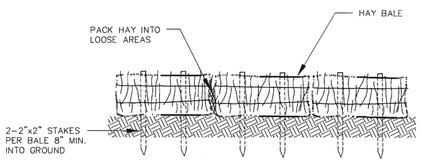
NOTES:
1.) KEY FABRIC IN A 4"x4" TRENCH W/BACKFILL

2. SILT FENCE SHALL BE A 3' FENCE WITH A MINIMUM GRAB TENSILE STRENGTH OF 120 LBS. WITH REINFORCED BACK OF 6" WIRE MESH, POSTS 10' APART OR A MINIMUM GRAB TENSILE STRENGTH OF 200 LBS W/O REINFORCING, POSTS 10' APART.

SILT FENCE
NTS



HAY BALE CHECK DAM
NTS



HAY BALE BARRIER DETAIL
NTS

CONSTRUCTION NOTES:

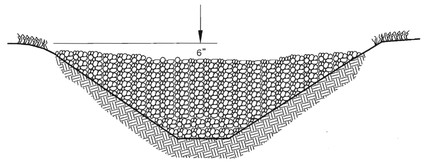
1.) BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.

2.) EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4".

3.) BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR REBARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.

4.) INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.

5.) BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.



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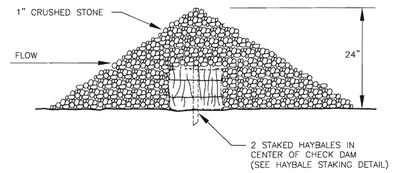
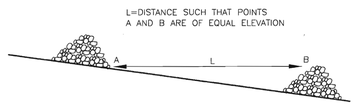
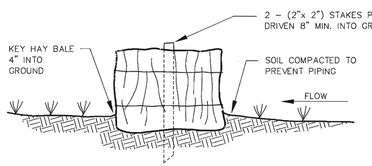


CROSS SECTION



SPACING

STONE CHECK DAM DETAIL
NTS



HAY BALE KEYING DETAIL
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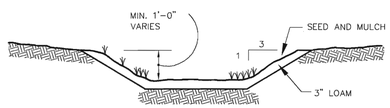
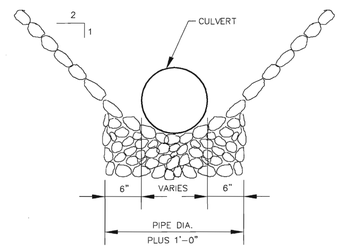
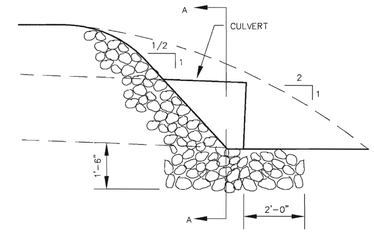


GRASS LINED DITCH
NTS

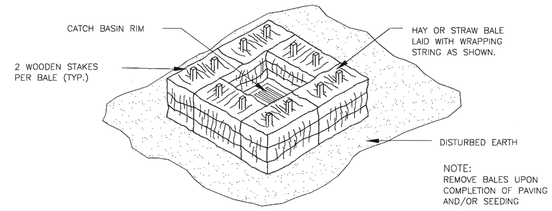


Section A-Z

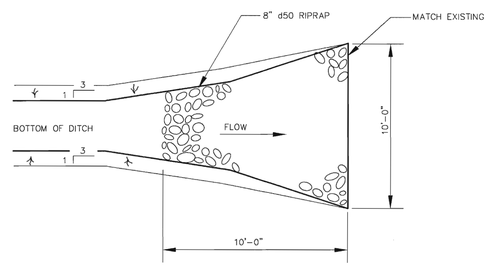


Side View

TYPICAL CULVERT END TREATMENT
NTS



LOW POINT SEDIMENTATION CONTROL BARRIER
N.T.S.



DITCH OUTLET PROTECTION DETAIL
N.T.S.

ENGINEERS • SURVEYORS
CES
465 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX 207-989-4881

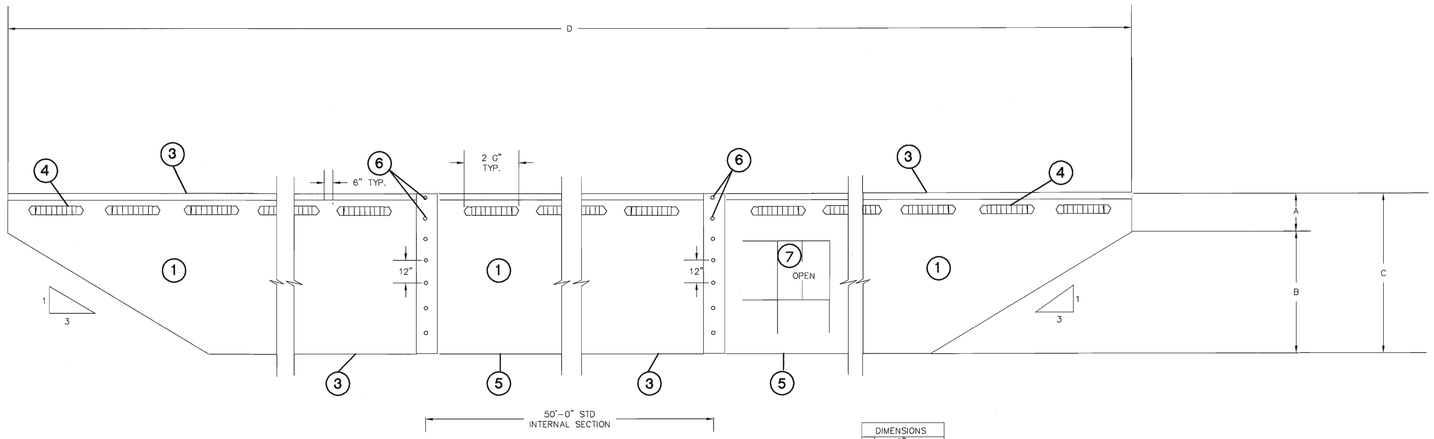
JOB TITLE: VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE: EROSION CONTROL DETAILS

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE
ROBERT C. LARSEN
3396
REGISTERED PROFESSIONAL ENGINEER

SCALE:	AS NOTED
DATE:	JANUARY 12, 2001
DRAWN BY: CWS	GRAPHICS CHECKED BY
DESIGNED BY: CWS/	
CHECKED BY: RCL	
APPROVED BY: RCL	
FILE NAME:	EROSDT.DWG
JOB NUMBER:	2549.3
DRAWING NUMBER:	C - 11

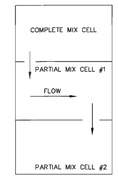


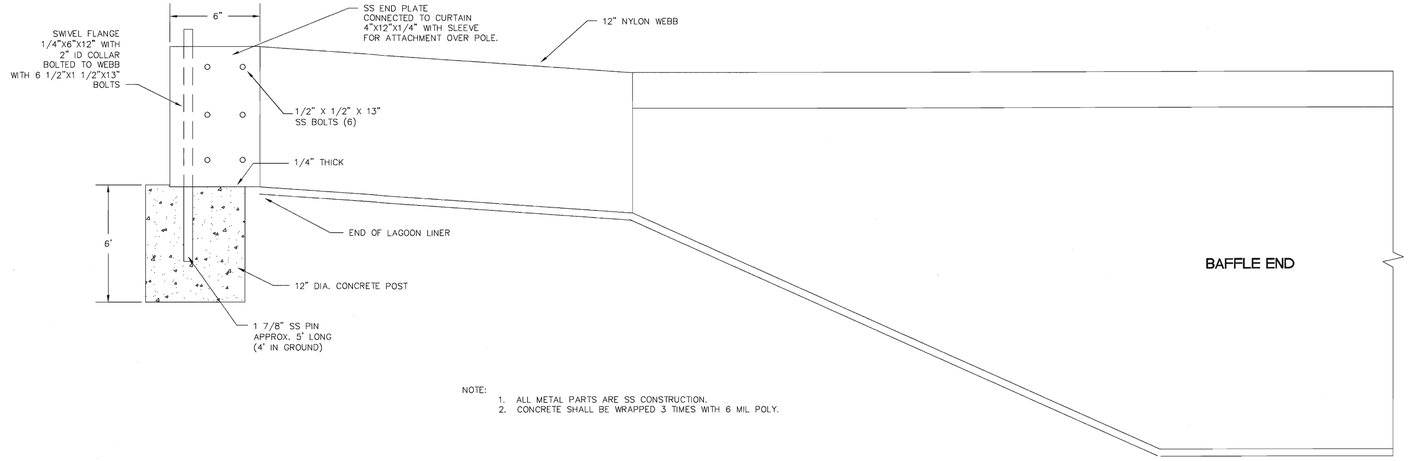
DIMENSIONS	
A	12"
B	14'
C	16'
D	154'

NO OF BAFFLE CURTAINS= 2
NO OF END SECTIONS= 4
NO OF INTERNAL SECTIONS= 4

BAFFLE SPECIFICATIONS

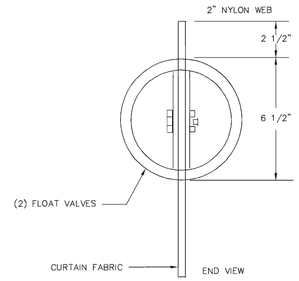
1. CURTAIN MATERIAL
   28 OZ./SQ. YD. INTERNATIONAL ORANGE, 2 WAY NYLON SCRIM WITH RIP STOPS EVERY 4TH FILAMENT, IMPREGNATED WITH XR-5 TENSILE GRAB 520 LB., ADHESION 10.5 LB./IN., MULLEN BURST 970 PSI, TREATED FOR UV PROTECTION
2. THREAD AND STITCH:
   TRIPLE STRAND, 1802 SILICON TREATED NYLON, LOCK STITCHED
3. NYLON WEBB TENSION MEMBERS:
   4 PLY SILICONE TREATED 12,000 LB. ALONG TOPS AND BOTTOMS OF CURTAIN PANELS 20,000 LB. AT ALL JOINTS
4. EXTERNAL FLOTATION:
   INJECTION MOLDED 365 GRAM HDPE, UNIT FLOTATION 25 LB. OR 12 LB./FT. BUOYANCY
5. AUXILIARY BALLASTS:
   5/8" HOT DIP GALVANIZED, PROOF COIL WORKING LOAD 1500 LB. SEWN INTO CURTAIN FOR POSITIVE BOTTOM SEAL; BALLAST WEIGHT 1.25 LB./FT.
6. HARDWARE:
   316 STAINLESS STEEL
7. FLOW THROUGH WINDOW:
   1.) FLOW WINDOW SIZE AND LOCATIONS WILL BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.
   2.) BAFFLES SHALL BE INSTALLED IN AN ATTEMPT TO PRODUCE A "SERPENTINE" FLOW PATTERN AS INDICATED BELOW.

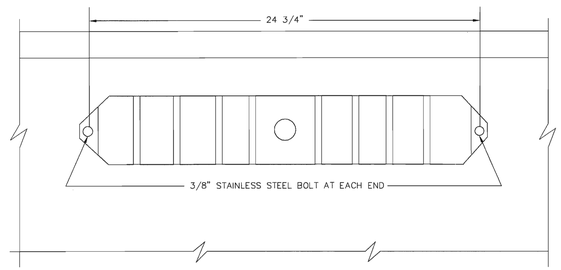




NOTE:
1. ALL METAL PARTS ARE SS CONSTRUCTION.
2. CONCRETE SHALL BE WRAPPED 3 TIMES WITH 6 MIL POLY.

END PLATE DETAIL





FLOTATION DETAIL

CES, Inc.
ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 839 Brewer, ME 04412 Tel: 207-989-4824 FAX 207-989-4881

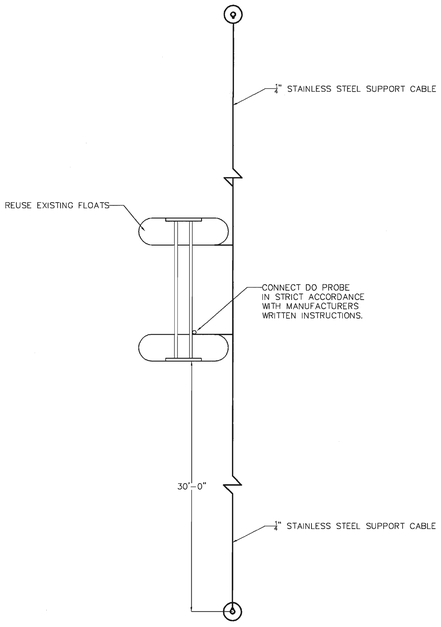
JOB TITLE: VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE: BAFFLE DETAILS

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

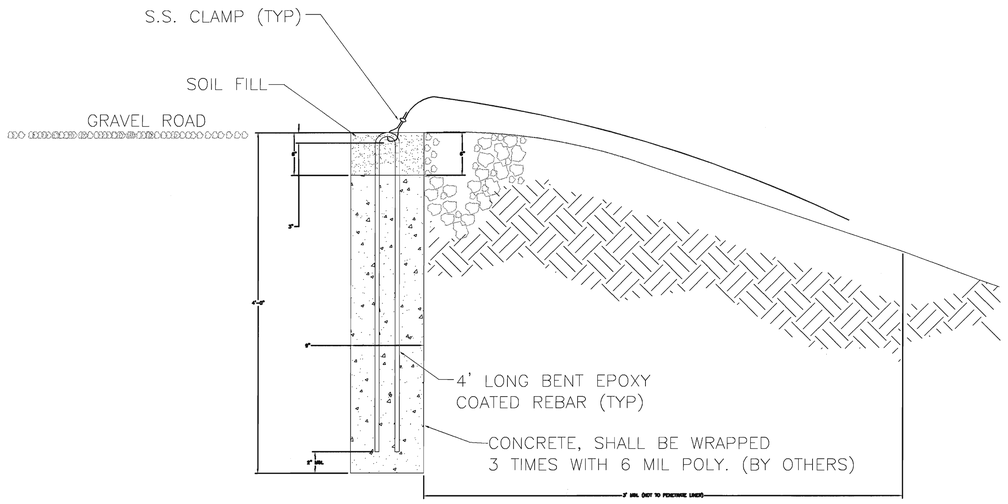
STATE OF MAINE
ROBERT C. LARSEN
3389
REGISTERED PROFESSIONAL ENGINEER

SCALE:	NOT TO SCALE
DATE:	JANUARY 12, 2001
DRAWN BY: CWS	GRAPHICS CHECKED BY:
DESIGNED BY:	TN
CHECKED BY:	RCL
APPROVED BY:	RCL
FILE NAME:	BAFFLE.DWG
JOB NUMBER:	2549.3
DRAWING NUMBER:	C - 12



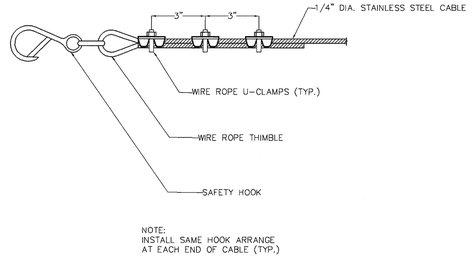
AERATOR FLOAT DETAIL - LAGOON NO. 3

SCALE: 1/4" = 1'-0"



CONCRETE ANCHOR - LAGOON NO. 3

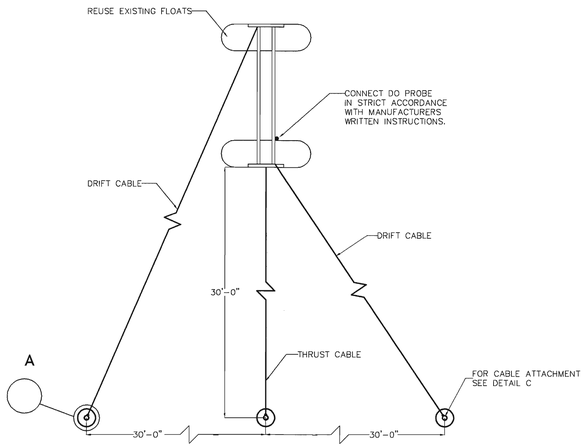
(NOT TO SCALE)



NOTE:
INSTALL SAME HOOK ARRANGE AT EACH END OF CABLE (TYP.)

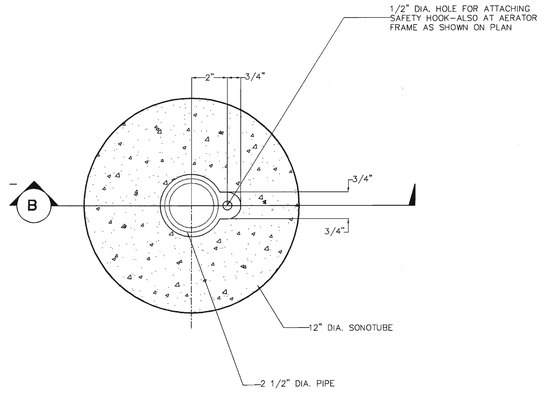
CONNECTION DETAIL

SCALE: 3" = 1'-0"



AERATOR FLOAT DETAIL - LAGOON NO.1 AND LAGOON NO. 2

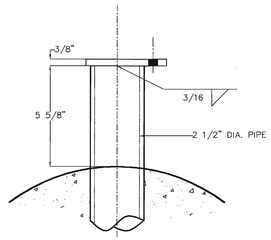
SCALE: 1/4" = 1'-0"



DETAIL A

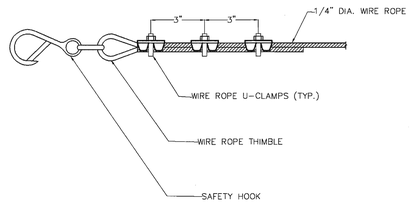
SCALE: 3" = 1'-0"

CONCRETE SHALL BE WRAPPED 3 TIMES WITH 6 MIL POLY.



SECTION B

SCALE: 3" = 1'-0"



NOTE:
INSTALL SAME HOOK ARRANGE AT EACH END OF CABLE (TYP.)

DETAIL C

SCALE: 3" = 1'-0"

ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 539 Brewer, ME 04412 Tel. 207-989-4824 FAX 207-989-4881

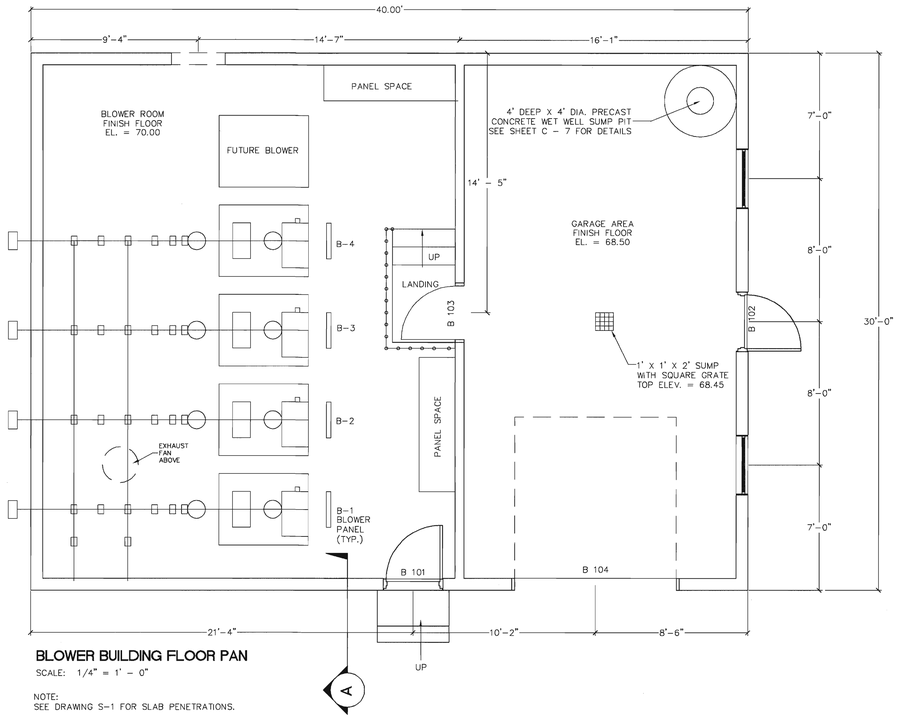
JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
AERATION ANCHOR DETAILS

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE
ROBERT C. LARSEN
3390
REGISTERED PROFESSIONAL ENGINEER

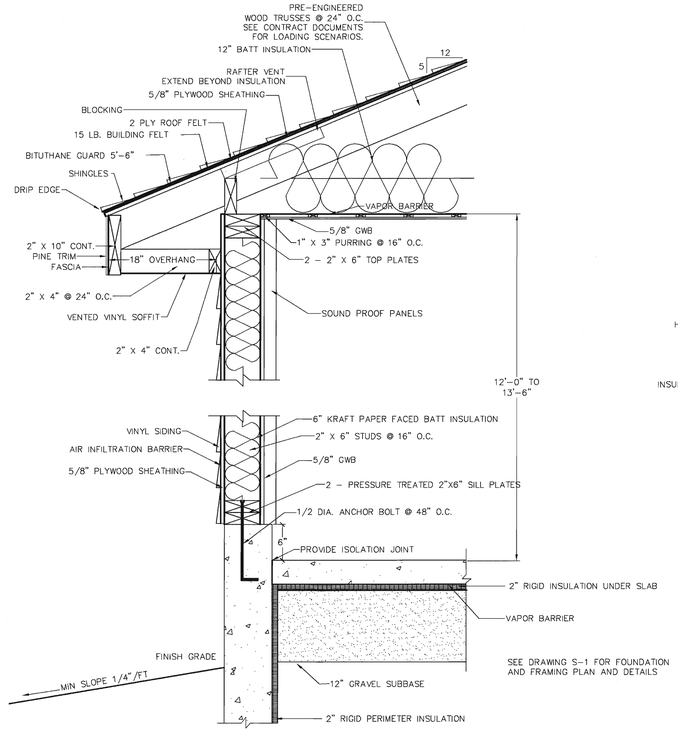
SCALE:	AS SHOWN
DATE:	JANUARY 12, 2001
DRAWN BY: CWS	GRAPHICS CHECKED BY:
DESIGNED BY	TJL
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	AIROETS2.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	C - 13



BLOWER BUILDING FLOOR PAN

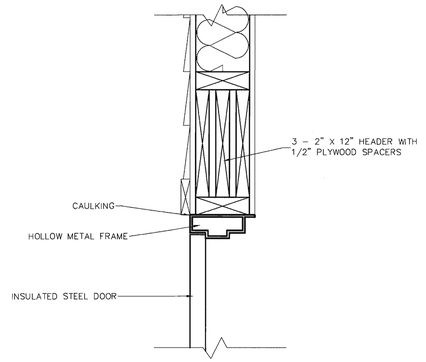
SCALE: 1/4" = 1' - 0"

NOTE:
SEE DRAWING S-1 FOR SLAB PENETRATIONS.



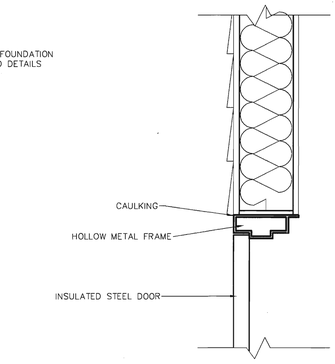
OUTSIDE WALL SECTION

SCALE: 1" = 1'-0"



HEAD DETAIL

SCALE: 1 1/2" = 1'-0"



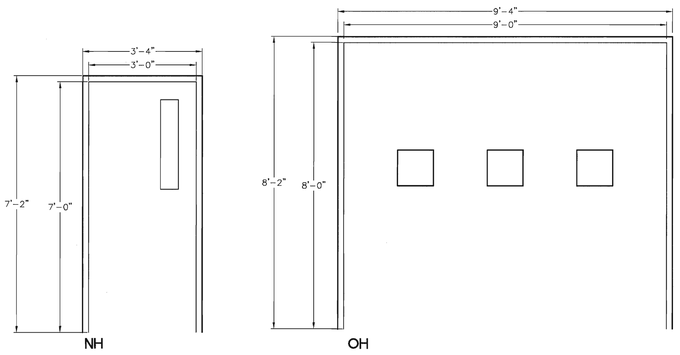
JAMB DETAIL

SCALE: 1 1/2" = 1'-0"

DOOR SCHEDULE

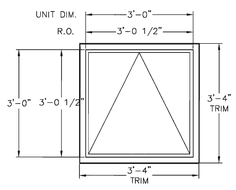
DOOR AND FRAME

NO.	DOOR SIZE	TYPE	MATERIAL	FINISH	GLASS	REMARKS AND COMMENTS
B 101	3'-0" X 7'-0"	NH	H.M.	PAINTED	INSUL.	OPENS IN
B 102	3'-0" X 7'-0"	NH	H.M.	PAINTED	INSUL.	
B 103	3'-0" X 7'-0"	NH	H.M.	PAINTED	INSUL.	OPENS IN
B 104	9'-0" X 7'-0"	OH	STEEL	PAINTED	TEMP.	



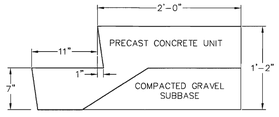
DOOR DETAILS

SCALE: 1/2" = 1'-0"



WINDOW DETAIL

SCALE: 1/2" = 1'-0"

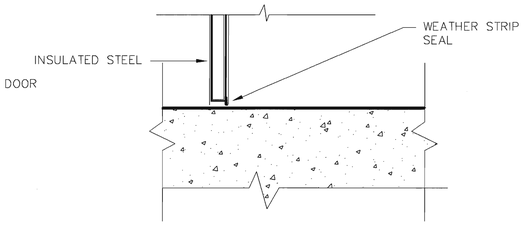


EXTERIOR STAIRS DETAIL

SCALE: 1" = 1'-0"

NOTE:
1.) TOP OF STAIR IS 4" BELOW FINISH FLOOR.

2.) CONCRETE STAIRS SHALL BE "7/11" STEP MANUFACTURED BY AMERICAN CONCRETE INDUSTRIES, VEAZIE, MAINE, OR APPROVED EQUAL.



SILL DETAIL

SCALE: 1 1/2" = 1'-0"

CES
ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX: 207-989-4881

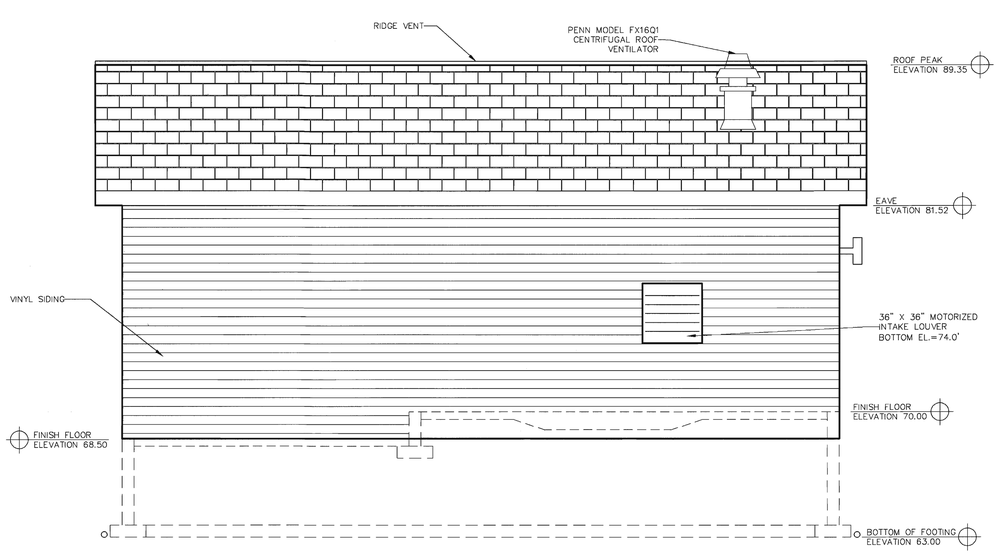
JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
BLOWER BUILDING
FLOOR PLAN AND DETAILS

REV	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

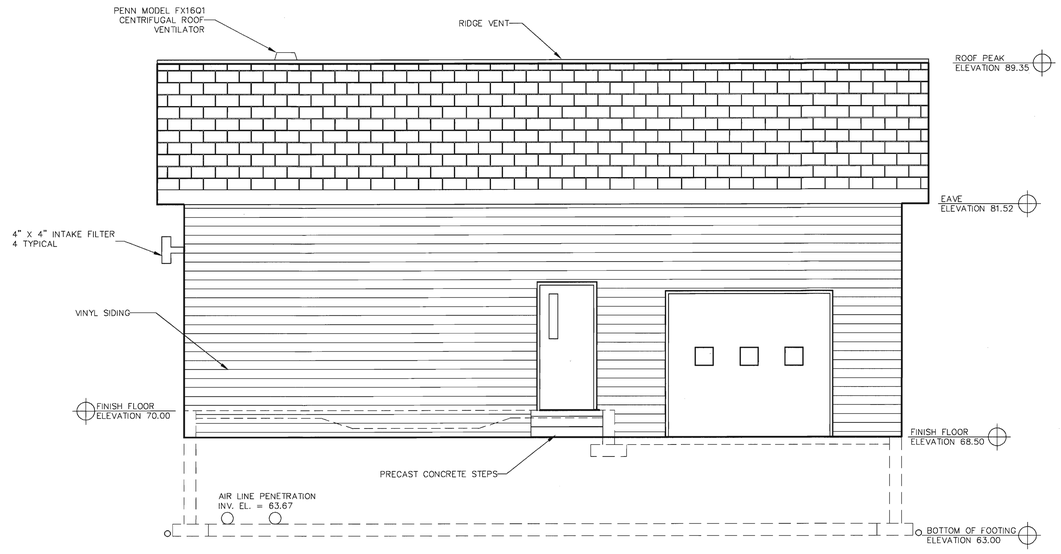
STATE OF MAINE
ROBERT C. LARSEN
13398
REGISTERED
PROFESSIONAL ENGINEER

SCALE:	AS SHOWN
DATE:	JANUARY 12, 2001
DRAWN BY: CWS	GRAPHICS CHECKED BY:
DESIGNED BY:	CWS
CHECKED BY:	RCL
APPROVED BY:	RCL
FILE NAME:	B-FLOOR.DWG
JOB NUMBER:	2549.3
DRAWING NUMBER:	B-1



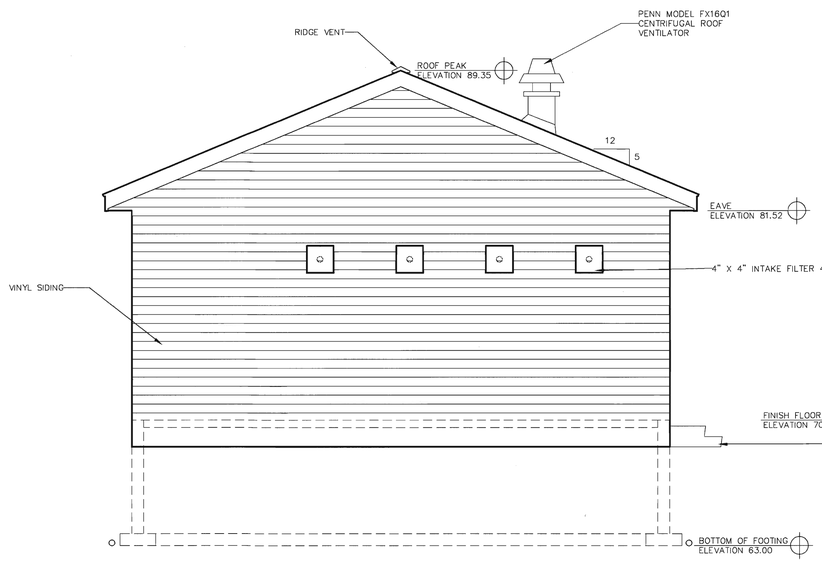
SOUTH ELEVATION

SCALE: 1/4" = 1' - 0"



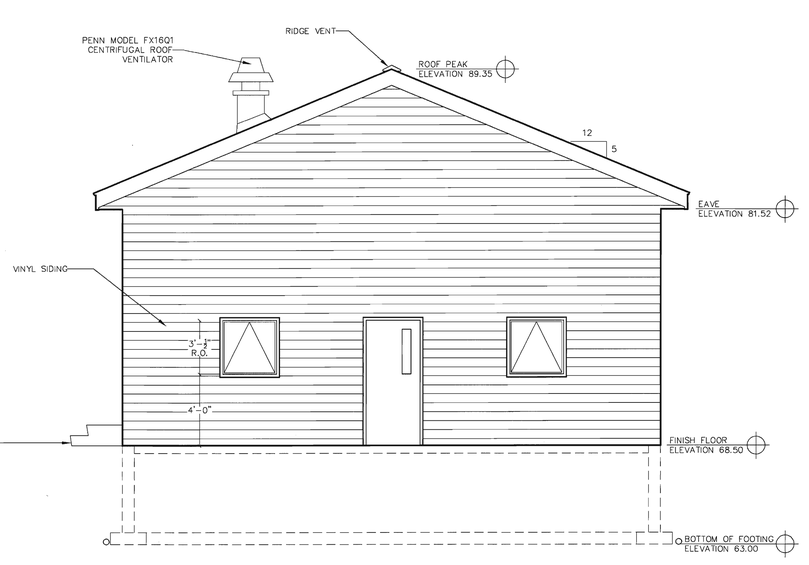
NORTH ELEVATION

SCALE: 1/4" = 1' - 0"



EAST ELEVATION

SCALE: 1/4" = 1' - 0"



WEST ELEVATION

SCALE: 1/4" = 1' - 0"

CES INC
ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 539 Brewer, ME 04412 Tel. 207-989-4824 FAX 207-989-4881

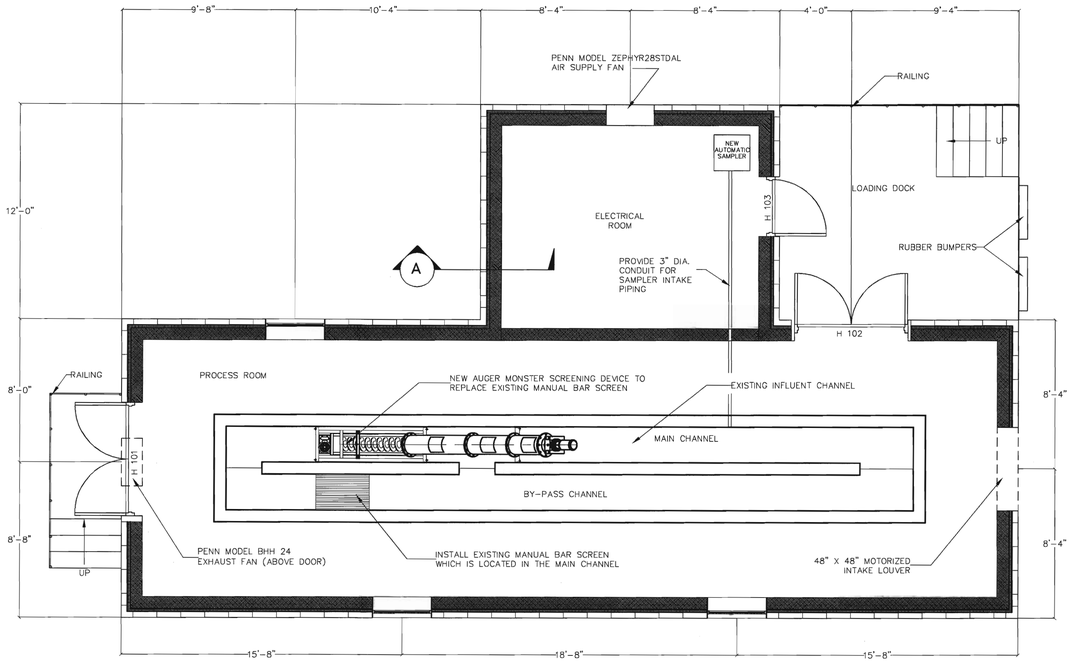
JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
BLOWER BUILDING ELEVATIONS

NO.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

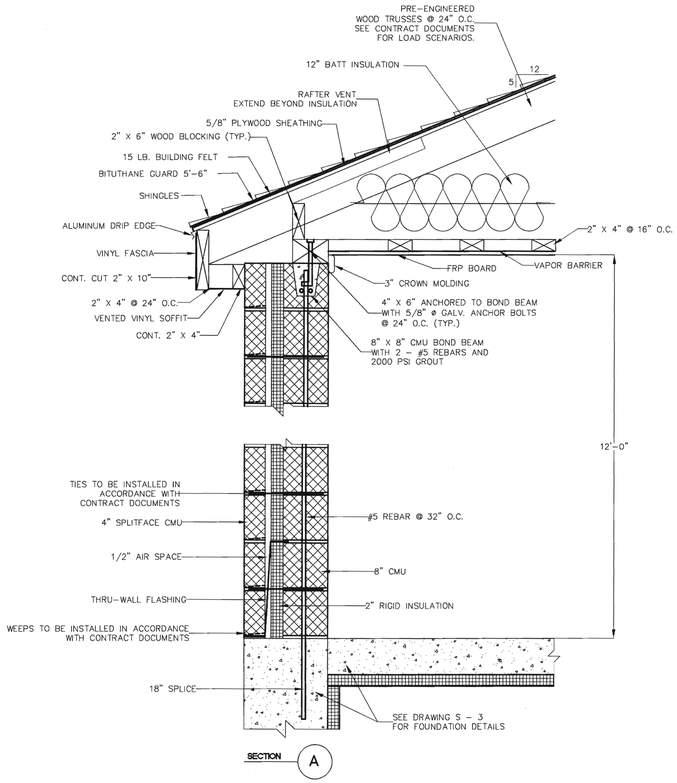
STATE OF MAINE
ROBERT C. LARSEN
3389
REGISTERED PROFESSIONAL ENGINEER

SCALE:	AS SHOWN
DATE:	JANUARY 12, 2001
DRAWN BY	GRAPHICS CHECKED BY
DESIGNED BY	CWS
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	B-ELEVATIONS.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	B - 2



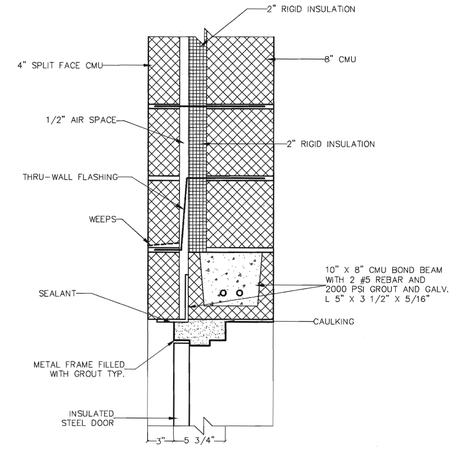
HEADWORKS BUILDING FLOOR PLAN

SCALE: 1/4" = 1'-0"



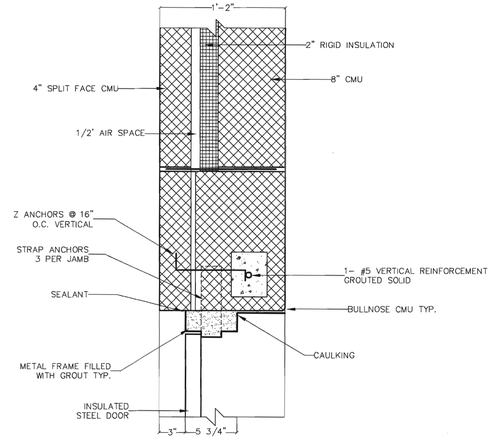
WALL SECTION TYP

SCALE: 1" = 1'-0"



HEAD DETAIL

SCALE: 1 1/2" = 1'-0"



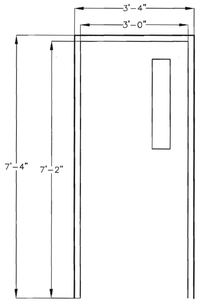
JAMB DETAIL

SCALE: 1 1/2" = 1'-0"

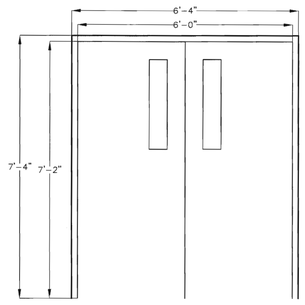
DOOR SCHEDULE

DOOR AND FRAME

NO.	DOOR SIZE	TYPE	MATERIAL	FINISH	GLASS	REMARKS AND COMMENTS
H 101	2 - 3'-0" X 7'-2"	NH	H.M.	PAINTED	INSUL.	
H 102	2 - 3'-0" X 7'-2"	NH	H.M.	PAINTED	INSUL.	
H 103	3'-0" X 7'-2"	NH	H.M.	PAINTED	INSUL.	



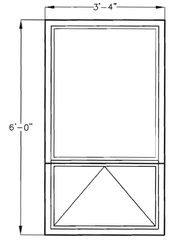
NH



2 - NH

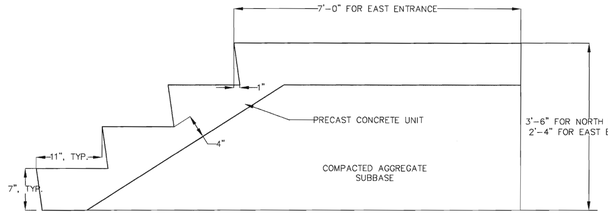
DOOR DETAILS

SCALE: 1/2" = 1'-0"



WINDOW DETAIL

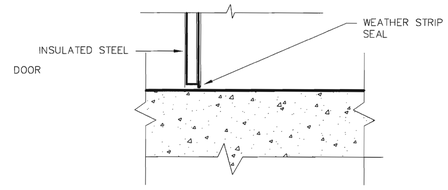
SCALE: 1/2" = 1'-0"



TYPICAL SIDE VIEW OF STAIRS

SCALE: 1" = 1'-0"

NOTE:
CONCRETE STAIRS SHALL BE "7/11" STEP AS MANUFACTURED BY AMERICAN CONCRETE INDUSTRIES, VEAZIE, MAINE, OR APPROVED EQUAL.



SILL DETAIL

SCALE: 1 1/2" = 1'-0"

ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 539 Brewer, ME 04412 Tel: 207-989-4824 FAX 207-989-4881
CES

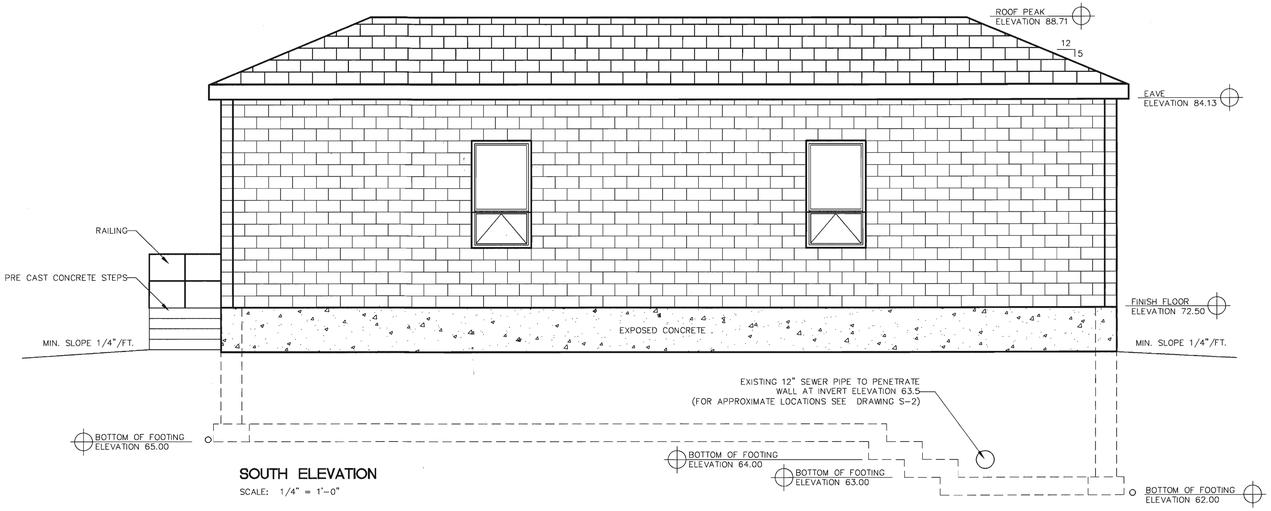
JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
HEADWORKS BUILDING
FLOOR PLAN AND DETAILS

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

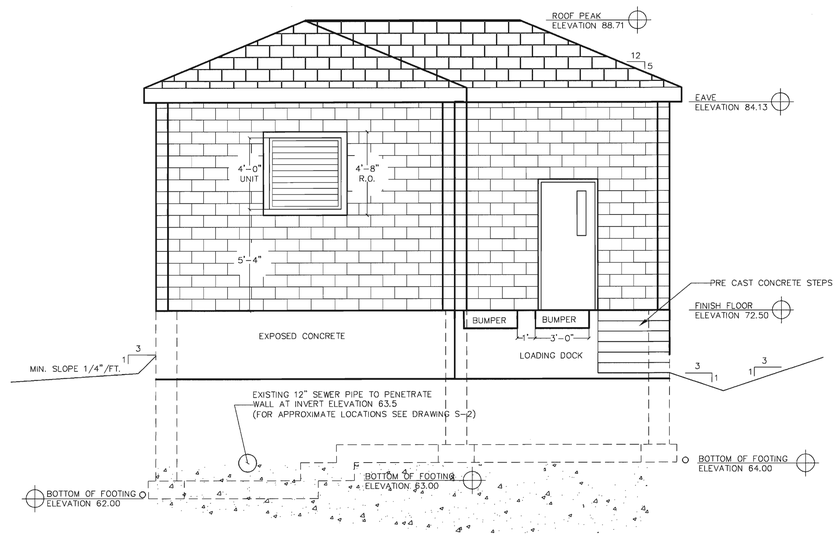
STATE OF MAINE
ROBERT C. LARSEN
13282
REGISTERED PROFESSIONAL ENGINEER

SCALE:	AS SHOWN
DATE:	JANUARY 12, 2001
DRAWN BY	GRAPHICS CHECKED BY
DESIGNED BY	CWS
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	H-FLOOR.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	B - 3



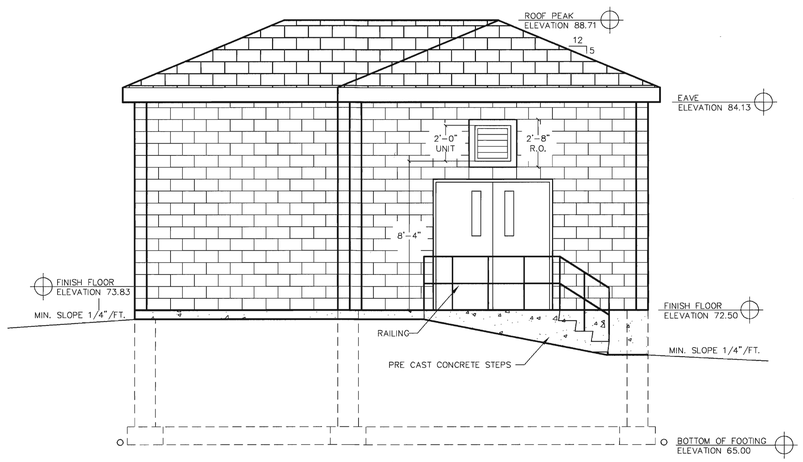
SOUTH ELEVATION

SCALE: 1/4" = 1'-0"



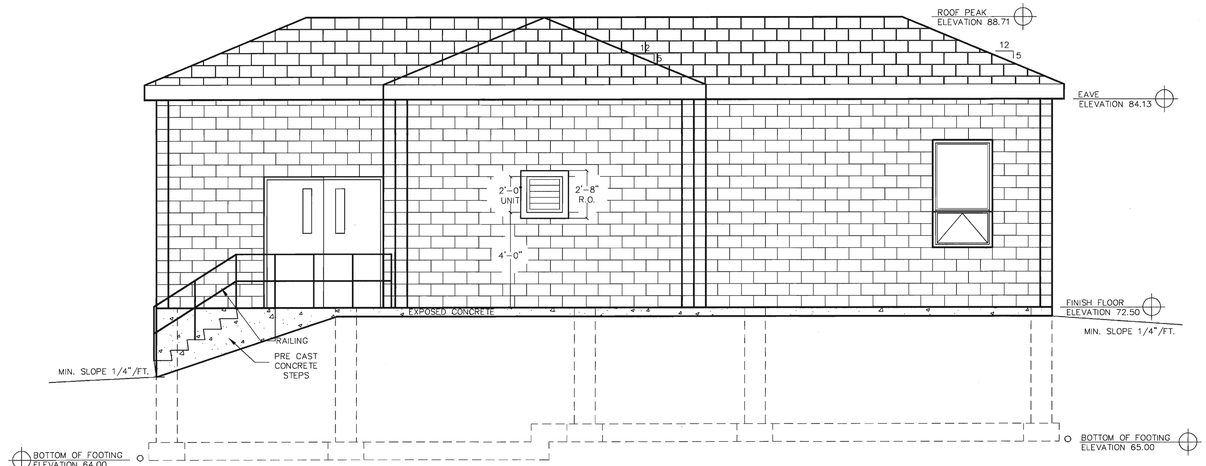
WEST ELEVATION

SCALE: 1/4" = 1'-0"



EAST ELEVATION

SCALE: 1/4" = 1'-0"



NORTH ELEVATION

SCALE: 1/4" = 1'-0"

ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX 207-989-4881
CES inc.

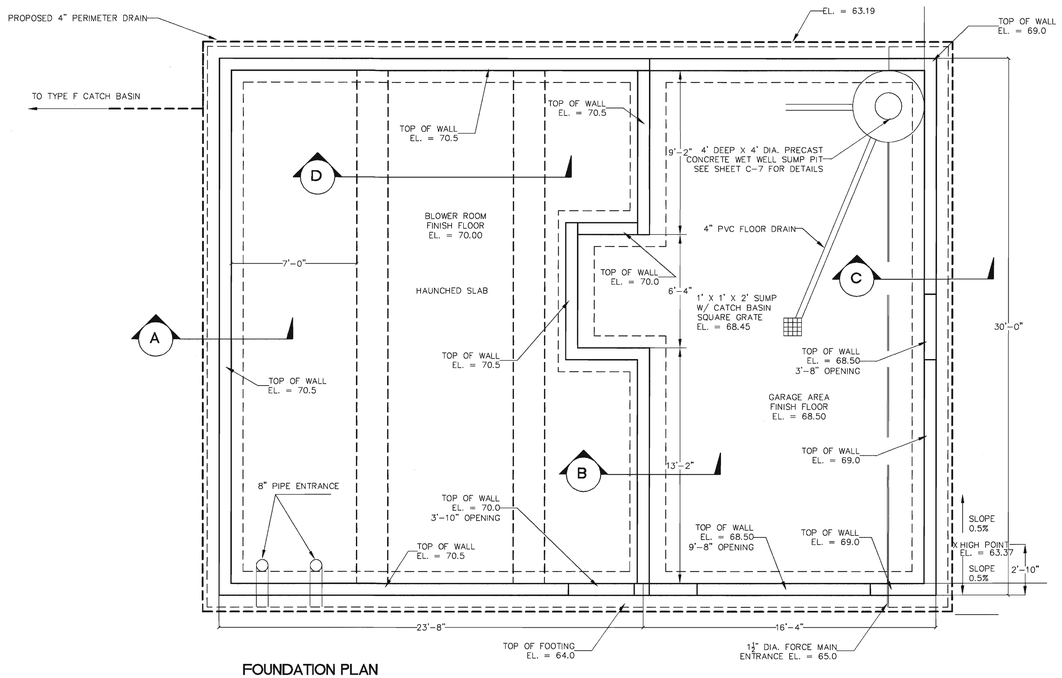
FOR TITLE:
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
HEADWORKS BUILDING ELEVATIONS

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

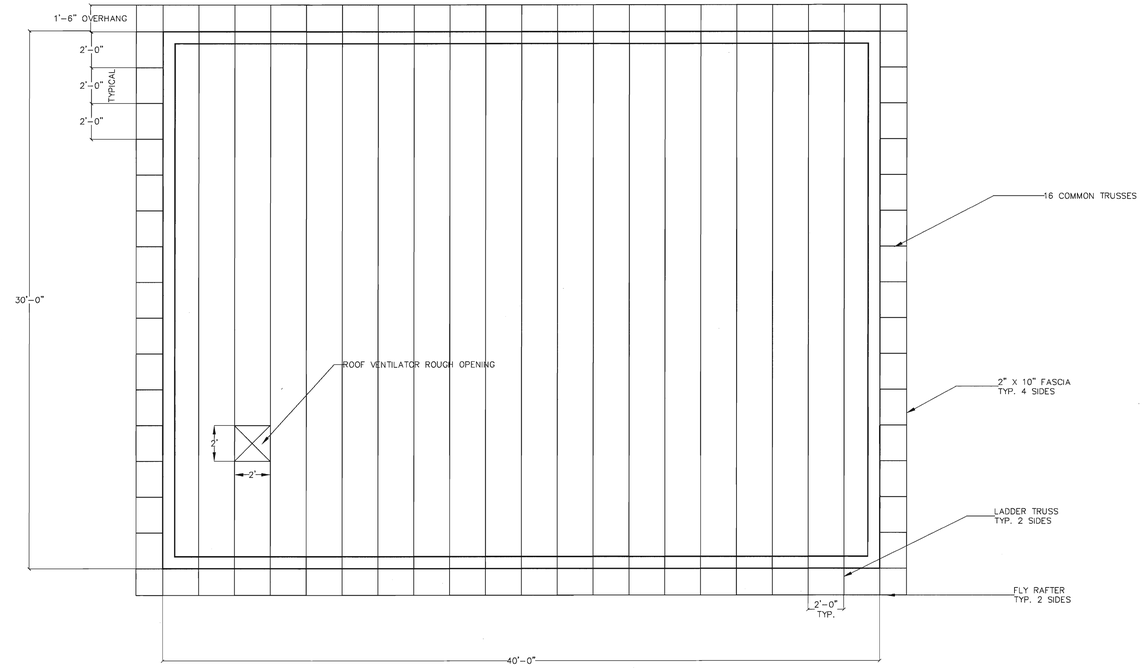
STATE OF MAINE
ROBERT C. LARSEN
3889
REGISTERED PROFESSIONAL ENGINEER

SCALE:	AS SHOWN
DATE:	JANUARY 12, 2001
DRAWN BY	GRAPHICS
CWS	CHECKED BY
DESIGNED BY	CWS
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	H-ELEVATIONS.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	B - 4



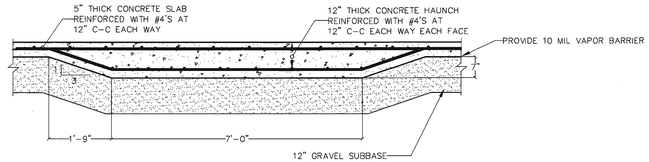
FOUNDATION PLAN

SCALE: 1/4" = 1'-0"



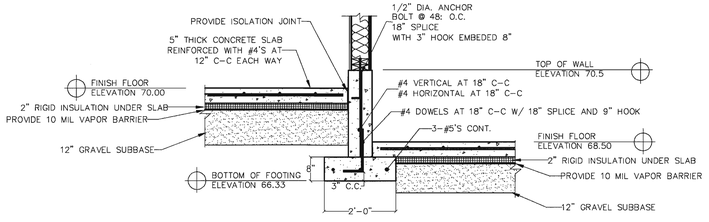
ROOF FRAMING PLAN

SCALE: 1/4" = 1'-0"



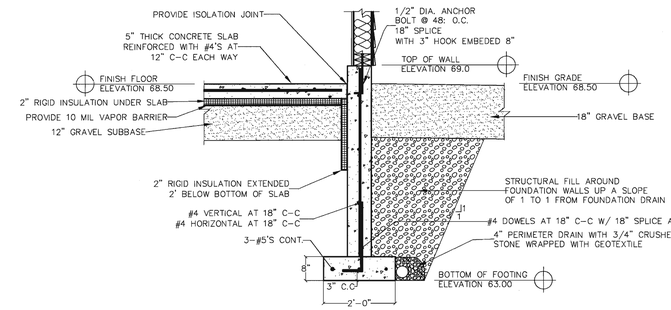
SECTION D

SCALE: 1/2" = 1'-0"



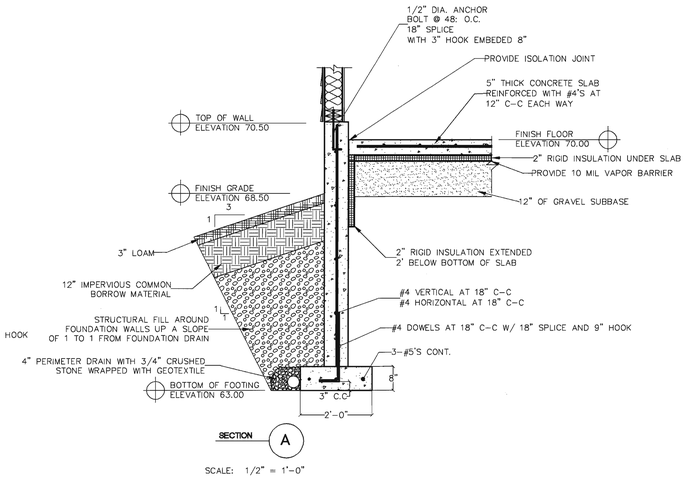
SECTION B

SCALE: 1/2" = 1'-0"



SECTION C

SCALE: 1/2" = 1'-0"



SECTION A

SCALE: 1/2" = 1'-0"

ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel. 207-989-4824 FAX 207-989-4881

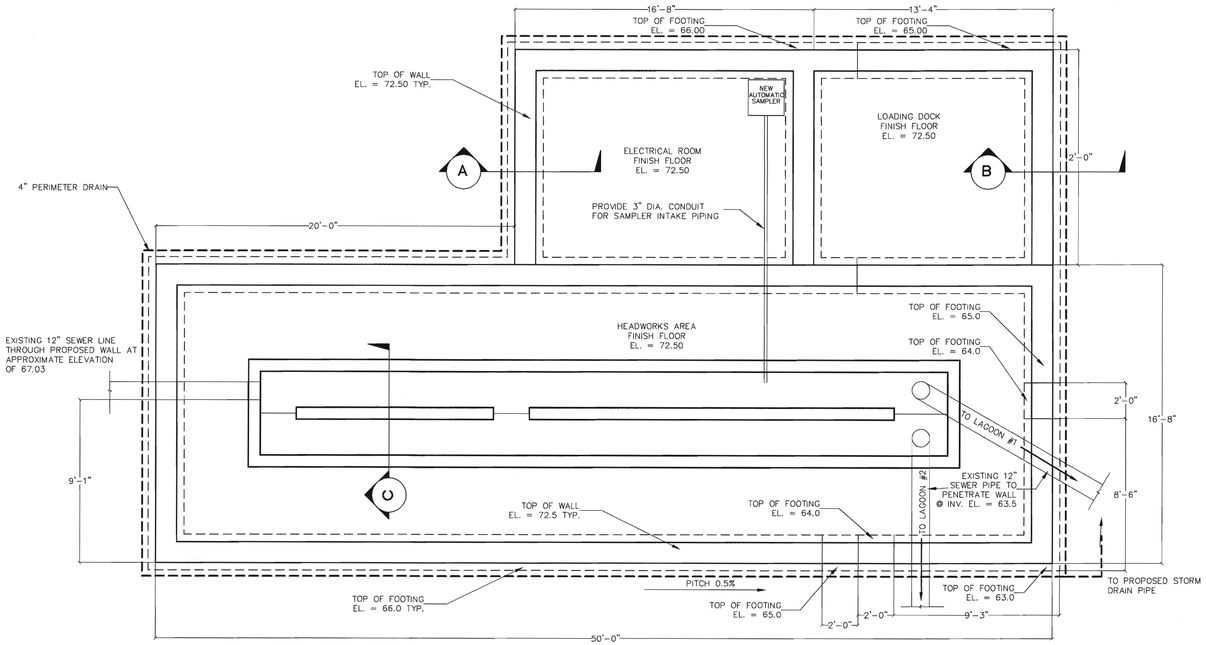
JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
BLOWER BUILDING
FOUNDATION AND FRAMING PLAN AND DETAILS

REV	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

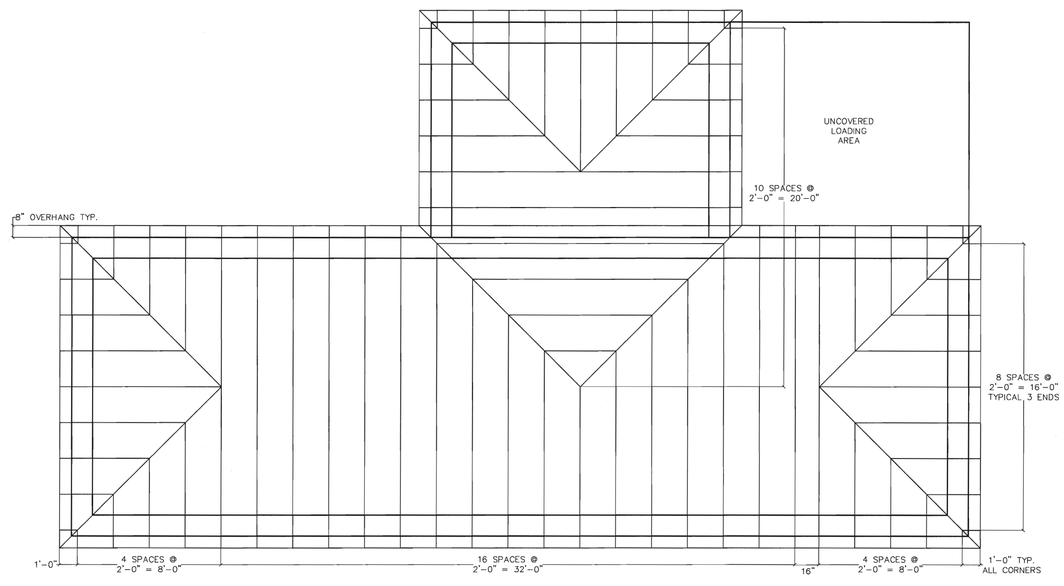
STATE OF MAINE
ROBERT C. LARSEN
6396
REGISTERED PROFESSIONAL ENGINEER

SCALE:	AS SHOWN
DATE:	JANUARY 12, 2001
DRAWN BY CWS	GRAPHICS CHECKED BY
DESIGNED BY	CWS
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	B-FOUND.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	S-1



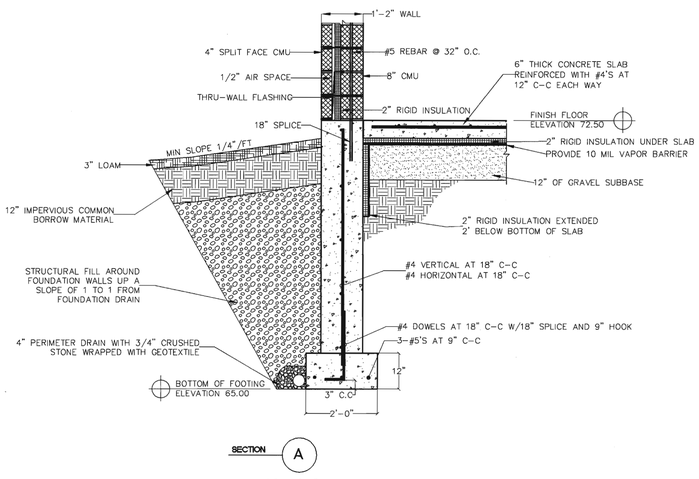
FOUNDATION PLAN

SCALE: 1/4" = 1'-0"



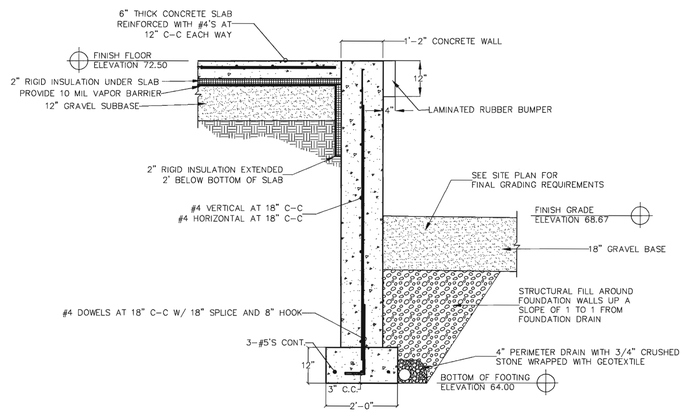
ROOF FRAMING PLAN

SCALE: 1/4" = 1'-0"



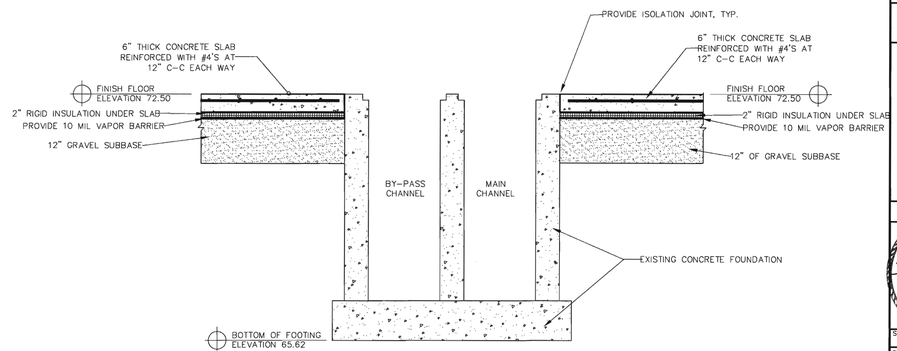
SECTION A

SCALE: 1/2" = 1'-0"



SECTION B

SCALE: 1/2" = 1'-0"



SECTION C

SCALE: 1/2" = 1'-0"

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JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
HEADWORKS BUILDING
FOUNDATION AND FRAMING PLAN AND DETAILS

DRAWN BY	CHECKED BY	DATE	DESCRIPTION	REV.

STATE OF MAINE
ROBERT C. LARSEN
8389
REGISTERED
PROFESSIONAL ENGINEER

SCALE:	AS SHOWN
DATE:	JANUARY 12, 2001
DRAWN BY	CWS
GRAPHICS CHECKED BY	
DESIGNED BY	CWS
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APPROVED BY	RCL
FILE NAME	H-FOUN.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	S-2

MAGNETIC 1999

THE LOCATION OF THE PC FOR THE NEW MONITORING SYSTEM SHALL BE IN THE MAIN OFFICE OF THE OPERATIONS BUILDING. THE EXACT LOCATION OF THE PC INSIDE THIS OFFICE SHALL BE DETERMINED BY THE OWNER.

MAIN OFFICE
MC
LAB
OFFICE
BATH
UTILITY
GARAGE

EXISTING OPERATIONS BUILDING SCHEMATIC NTS

OPERATIONS BUILDING

THE PROPOSED LOCATION FOR THE ENTRANCE INTO THE OPERATING BUILDING SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO START OF WORK.

MONITOR AND CONTROL SIGNAL VIA CABLE

MONITOR AND CONTROL SIGNAL VIA CABLE

SEWER

SEWER

EXISTING MAINTENANCE BUILDING

COMPOSITE SAMPLER

SEWER

PROPOSED AUGER MONSTER SCREENING DEVICE

PROPOSED HEADWORKS BUILDING SCHEMATIC NTS

SEWER

EXISTING MECHANICAL ASPIRATORS TO BE RELOCATED.

MANHOLE RIM ELEV. = 67.3'

LEVEL CONTROL MANHOLE RIM ELEV. = 69.2'

CHLORINE CONTACT CHAMBER

CHLORINATION BUILDING

OUTLET

DO

PROPOSED LEMNA COVER SYSTEM

LAGOON #3

INLET

LEVEL CONTROL MANHOLE RIM ELEV. = 67.5'

EFF

EFF

TO OUTFALL STRUCTURE

SEWER

SEWER

PROPOSED BLOWER BUILDING SCHEMATIC NTS

LEVEL CONTROL MANHOLE RIM ELEV. = 69.6'

EXISTING MECHANICAL ASPIRATOR, TO REMAIN

OUTLET

LAGOON #2

INLET

RELOCATED MANUAL BAR SCREEN IN BY PASS CHANNEL

LEVEL CONTROL MANHOLE RIM ELEV. = 69.3'

LEVEL CONTROL MANHOLE RIM ELEV. = 69.3'

AIR AIR AIR AIR AIR AIR

LEVEL CONTROL MANHOLE RIM ELEV. 70.3'

LAGOON #1

OUTLET

OUTLET STANDPIPE RIM ELEV. = 54.7'

18" INLET STANDPIPE RIM ELEV. = 56.4' TOP OF CONCRETE COATING ELEV. = 53.8'

INLET

PARTIAL MIX CELL #2

PARTIAL MIX CELL #1

COMPLETE MIX CELL

SUBMERGED TUBULAR MEMBRANE DIFFUSER, TYP. FOR LAGOON #1 PARTIAL MIX CELLS 1 AND 2, AND LAGOON #2

BAFFLE, TYP. 2

FLOATING TUBULAR MEMBRANE DIFFUSER, TYP. FOR LAGOON #1 COMPLETE MIX CELL

LEGEND:

S	SEWER MANHOLE
——▶——	WASTEWATER FLOW DIRECTION
—— AIR ——	AIR PIPING
	AIR INTAKE FILTER
	FLEXIBLE COUPLING
	BLOWER
	SILENCER
	PRESSURE RELIEF VALVE
	BUTTERFLY VALVE
	CHECK VALVE
	GATE VALVE
—— EFF ——	TREATED EFFLUENT PIPING
—— SEWER ——	SEWER PIPING
DO	DO METER
G	GAS MONITORING DEVICE
MC	MONITORING AND CONTROL CENTRAL TERMINAL (PC WORKSTATION)

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

ENGINEERS • SURVEYORS
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CES inc.

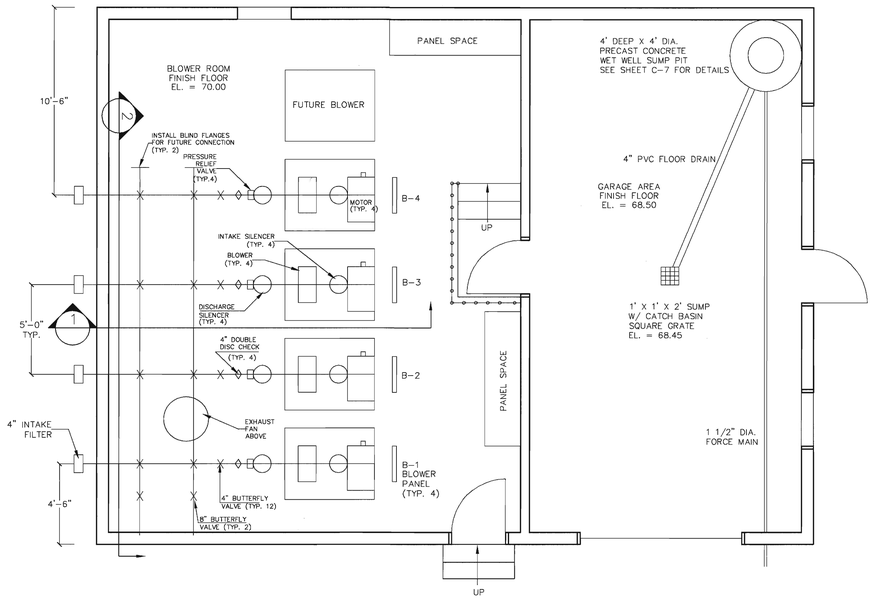
JOB TITLE: VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE: PROCESS FLOW DIAGRAM

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE
ROBERT C. LARSEN
3892
REGISTERED PROFESSIONAL ENGINEER

SCALE:	1" = 40'
DATE:	JANUARY 12, 2001
DRAWN BY	CWS
GRAPHICS CHECKED BY	
DESIGNED BY	TW
CHECKED BY	RCL
APPROVED BY	RCL
FILE NAME	PROCESS.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	M-1

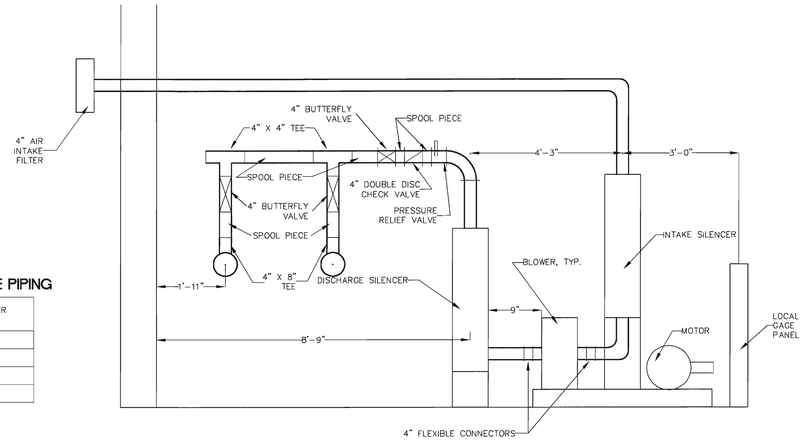


BLOWER BUILDING LAYOUT PLAN

SCALE: 1/4" = 1' - 0"

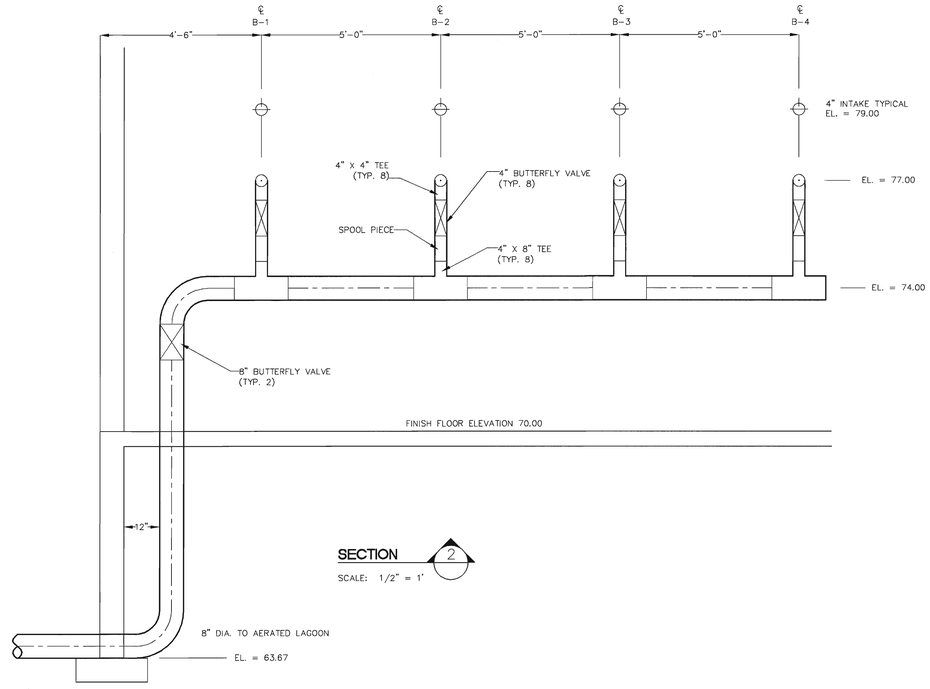
VALVE SCHEDULE - BLOWER DISCHARGE PIPING

VALVE TYPE	SIZE	NUMBER
PRESSURE RELIEF	4"	4
DOUBLE DISC SWING CHECK	4"	4
BUTTERFLY	4"	12
BUTTERFLY	8"	2



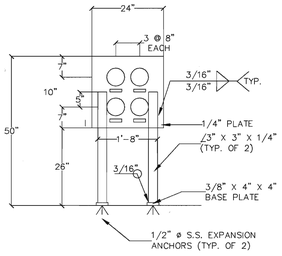
SECTION 1

SCALE: 1/2" = 1'



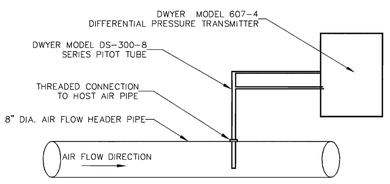
SECTION 2

SCALE: 1/2" = 1'



LOCAL GAGE PANEL DETAIL

NTS



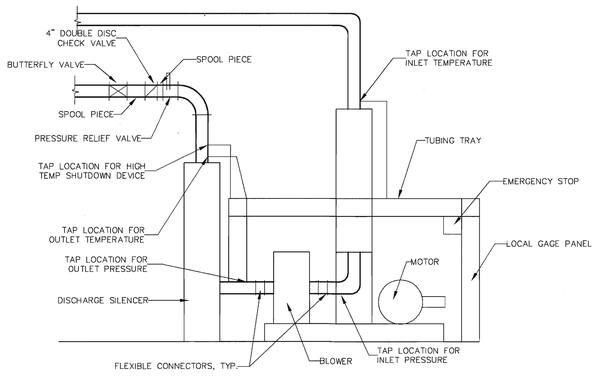
TYPICAL AIR FLOW METER INSTALLATION

NTS

1.) AIR METER GAGES SHALL BE CAPABLE OF SENDING A 4-20 mA OUTPUT SIGNAL TO A SQUARE ROOT INDICATOR AND THEN ON TO THE PC BASED MONITORING SYSTEM. THE AIR FLOW SHALL BE MEASURED IN CUBIC FEET PER MINUTE.

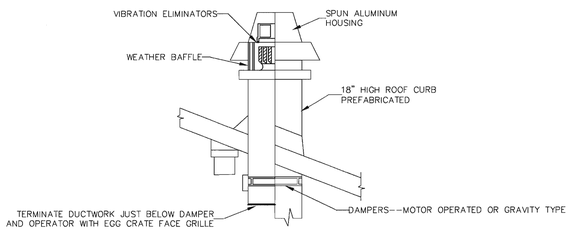
2.) EACH AIR FLOW HEADER EXITING THE BLOWER BUILDING SHALL BE METERED.

3.) PITOT TUBE AND DIFFERENTIAL PRESSURE TRANSMITTER LOCATIONS TO BE REVIEWED AND APPROVED BY ENGINEER PRIOR TO INSTALLATION.



BLOWER GAGE TAP LOCATIONS

NTS



CENTRIFUGAL ROOF VENTILATOR DETAIL

NTS

ENGINEERS • SURVEYORS
CES inc.
465 Sw. Main Street P.O. Box 539 Brewer, ME 04412 Tel: 207-989-4824 FAX: 207-989-4881

JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
BLOWER BUILDING DETAILS

RCN	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE
ROBERT C. LARSEN
3359
REGISTERED PROFESSIONAL ENGINEER

SCALE:	AS SHOWN
DATE:	JANUARY 12, 2001
DRAWN BY CWS	GRAPHICS CHECKED BY
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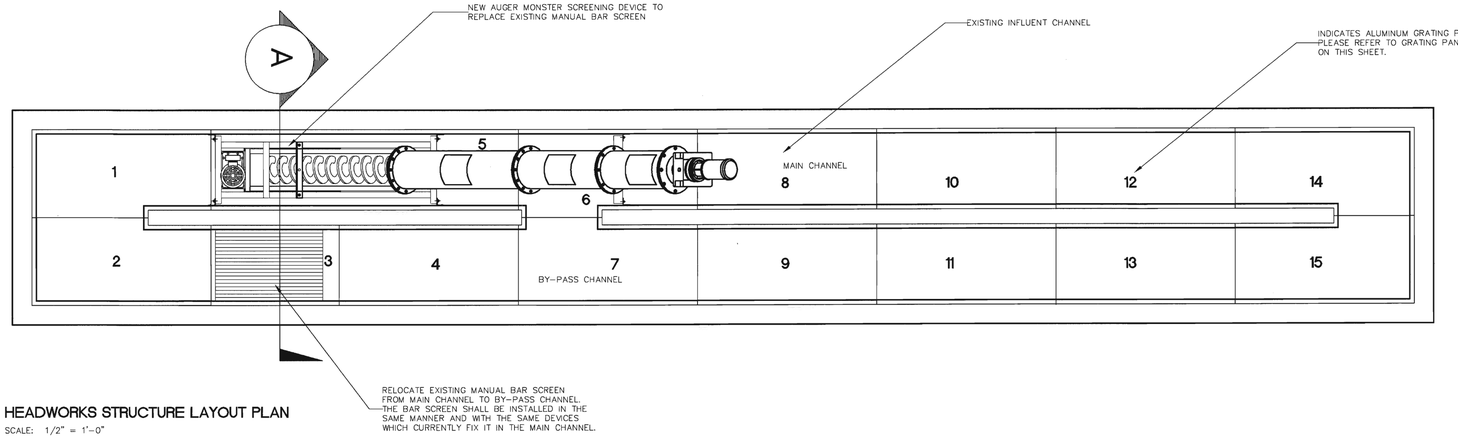
APPROVED BY	RCL
FILE NAME	B-DETAILS.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	M - 2

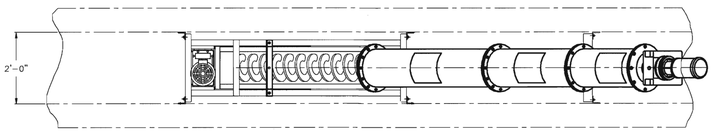


HEADWORKS STRUCTURE LAYOUT PLAN

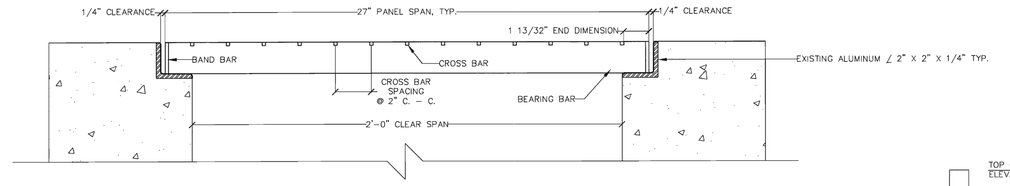
SCALE: 1/2" = 1'-0"

GRATING PANEL SCHEDULE

PANEL NO.	PANEL LENGTH (FEET)
1	5
2	5
3	3.5
4	5
5	2.5
6	5
7	5
8	5
9	5
10	5
11	5
12	5
13	5
14	5
15	5



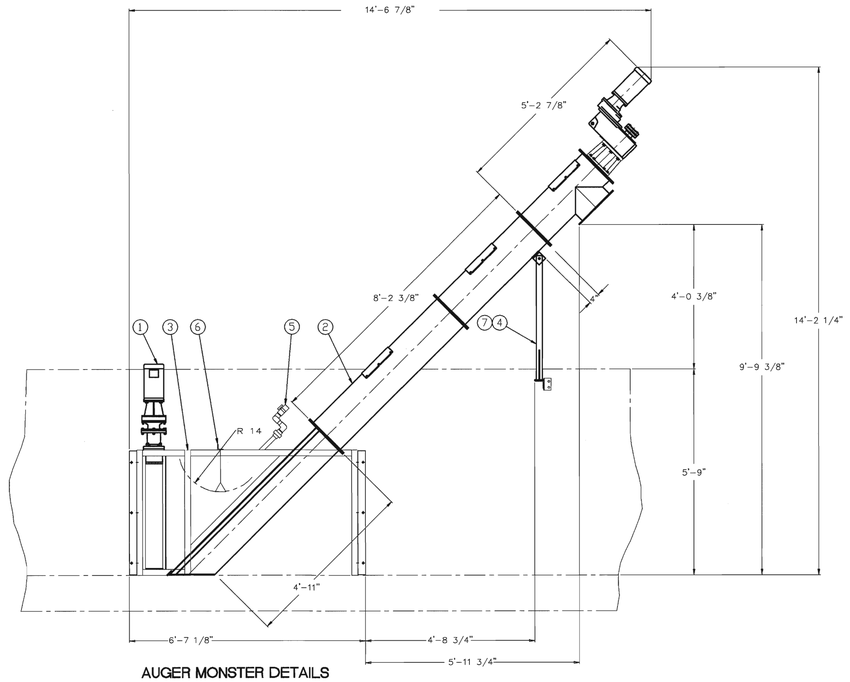
PLAN



GRATING DETAIL

SCALE: 3" = 1'-0"

NOTE:
GRATING TO BE OHIO ALUMINUM GRATING MODEL 11-SFG-2
DIMENSIONS 1 3/4" X 3/16" X 27" WDE, DURADEK FIBERGLASS GRATING AT THE SAME SIZES SPECIFIED, OR APPROVED EQUAL.



AUGER MONSTER DETAILS

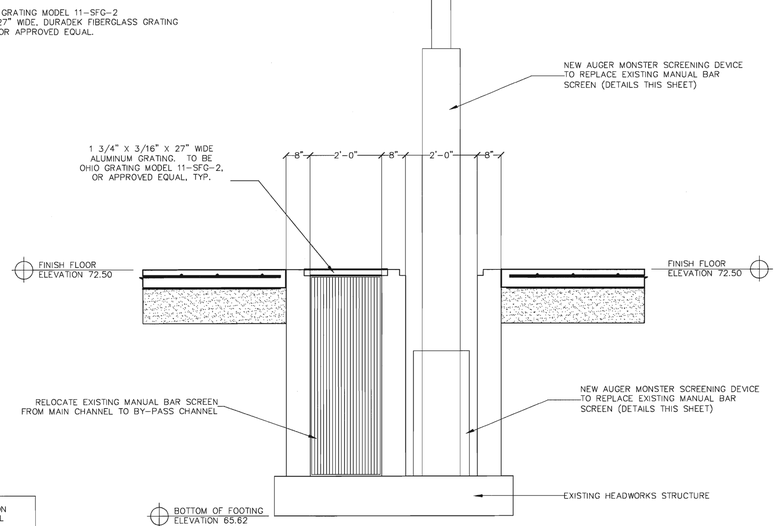
SCALE: 1/2" = 1'-0"

NOTES: UNLESS OTHERWISE SPECIFIED

1. CONTRACTOR MUST VERIFY SITE CONDITIONS AND FIELD MEASUREMENTS PRIOR TO INSTALLATION.
2. CHANNEL FRAME WIDTH SHALL BE 1/4" MINIMUM, LESS THAN CHANNEL WIDTH.
3. (16) ANCHOR BOLTS (1/2 DIA X 3 3/4) NOT PROVIDED BY DWS.
4. CONTRACTOR SHALL GROUT OR SEAL ANY GAPS BETWEEN FRONT LEGS OF FRAME AND CHANNEL TO PREVENT ANY LARGE PARTICLES FROM PASSING.
5. CONTRACTOR SHALL INSTALL AUGER MONSTER IN STRICT ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
6. CONTRACTOR SHALL FURNISH AND INSTALL ONE BE WALLACE MODEL NUMBER A2712-A1O ALUMINUM TRI ADJUSTABLE GANTRY CRANE, WITH A SPAN OF 10' AND A MAXIMUM HEIGHT OF 12'-6", WHICH SHALL HAVE A ONE TON CAPACITY. THE CRANE SHALL BE FURNISHED WITH A BE WALLACE MODEL NUMBER 70-1610 PUSH TROLLEY AND MODEL NUMBER 5-214-15 HAND CHAIN HOIST. THE HAND CHAIN HOIST SHALL BE CAPABLE OF A LIFT OF 20'. ALL ACCESSORIES SHALL ACCOMMODATE A ONE TON CAPACITY.
7. CONTRACTOR SHALL PROVIDE ONE RAND SUPPLIED STEEL SELF DUMPING HOPPER. THE HOPPER SHALL HAVE A CUBIC YARD VOLUMETRIC CAPACITY AND A ONE TON WEIGHT CAPACITY.
8. CONTRACTOR SHALL PROVIDE ONE RAND SUPPLIED DELUXE PALLET JACK, CAPABLE OF CARRYING THE SELF DUMPING HOPPER.
9. CONTRACTOR SHALL PROVIDE AN ALUMINUM SKID/RAMP PLATE TO BE USED FOR ROLLING THE PALLET JACK ONTO A TRUCK AT THE LOADING DOCK.

PARTS LIST

ITEM NO.	QTY REQD	PART NO.	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL
1	1	30005-32	CHANNEL MONSTER	DUCTILE IRON
2	1	AMA3200-2500	AUGER MONSTER-2500MM	SST/ALLOY
3	1	AGC1004-3223-MC	AUGER FRAME ASSEMBLY	A-36 STL
4	1	AMA1022-0042-MC	DRIVE SUPPORT - PEDESTAL	A-36 STL
5	1	AMA0500-3200-SS	SPRAY WASH ASSEMBLY	SST
6	1	AMA1051-0001-MC	FLOAT SWITCH SUPPORT ASSY	A-36 STL
7	1	AMA1021-2300-MC	DRIVE SUPPORT - HORIZONTAL	A-36 STL



SECTION

SCALE: 1/2" = 1'-0"

A

ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 539 Brewer, ME 04412 Tel: 207-989-4824 FAX: 207-989-4881
CES INC

JOB TITLE: VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE: HEADWORKS BUILDING DETAILS

REV	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE
ROBERT C. LARSEN
3338
REGISTERED PROFESSIONAL ENGINEER

SCALE:	AS SHOWN
DATE:	JANUARY 12, 2001
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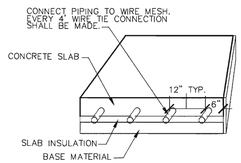
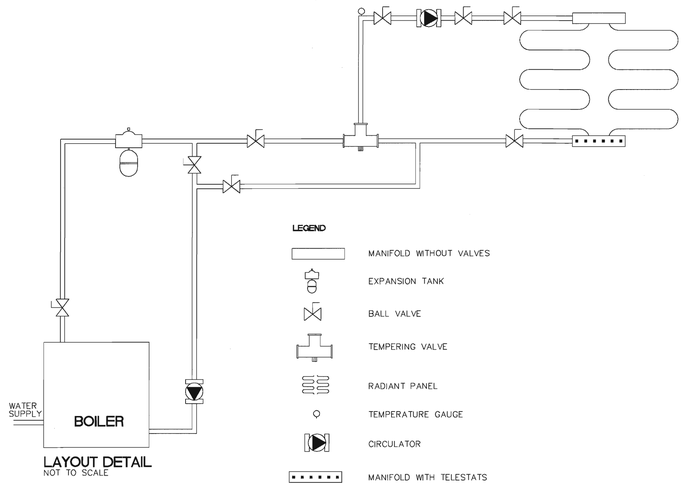
APPROVED BY	RCL
FILE NAME	H-DETAILS.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	M - 3



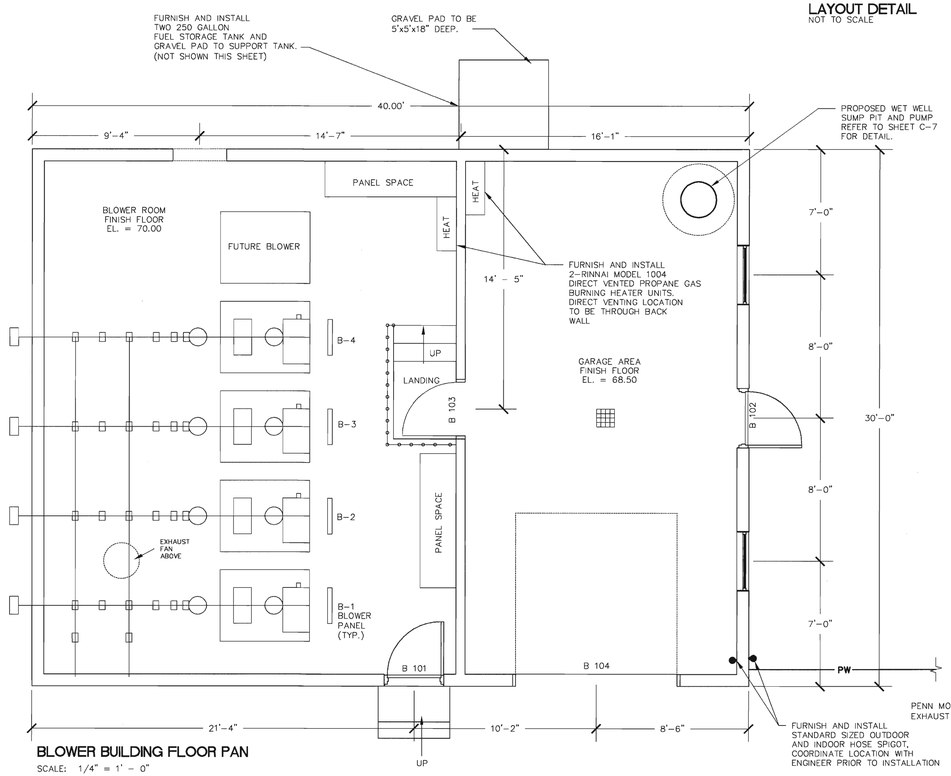
RADIANT FLOOR TUBING INSTALLATION DETAIL

NOT TO SCALE



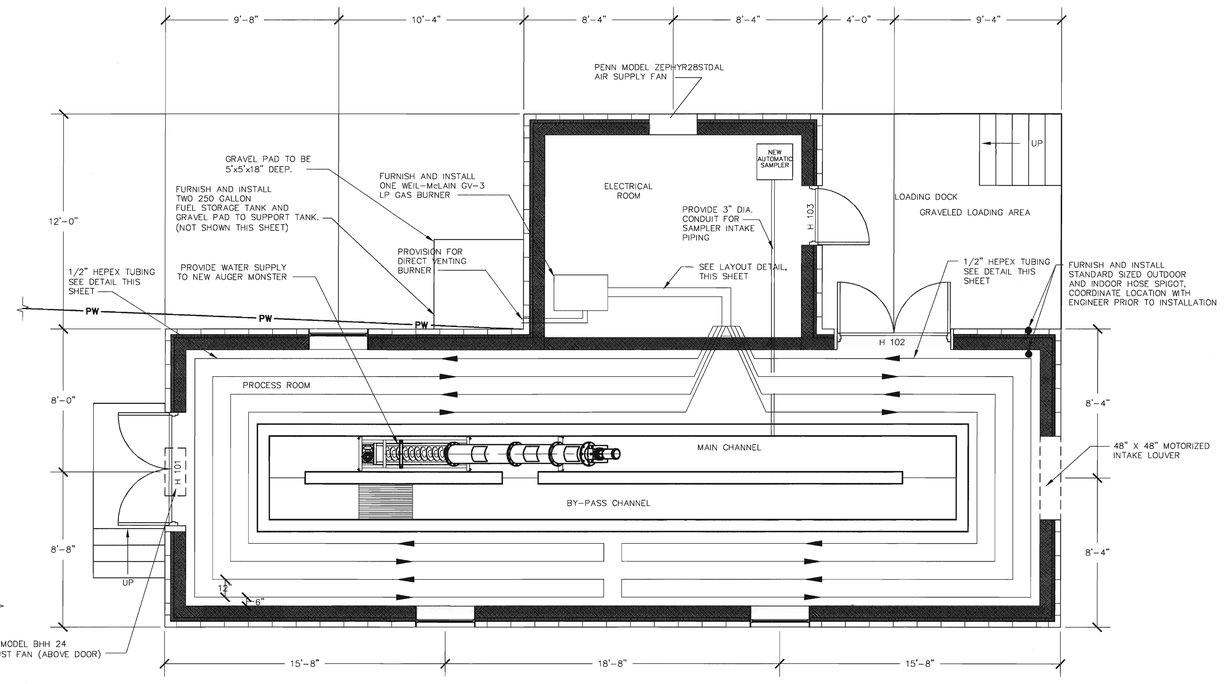
LAYOUT DETAIL

NOT TO SCALE



BLOWER BUILDING FLOOR PAN

SCALE: 1/4" = 1' - 0"



HEADWORK'S BUILDING FLOOR PLAN

SCALE: 1/4" = 1'-0"

WATER NOTES

1. CONTRACTOR SHALL PROVIDE WATER TO THE HEADWORK'S BUILDING, AS INDICATED ON CIVIL PLANS.
2. WATER SHALL BE PROVIDED FOR THE FOLLOWING ITEMS WITHIN THE HEADWORK'S BUILDING:
   A. STANDARD SIZED HOSE SPIGOT-OUTSIDE
   B. STANDARD SIZED HOSE SPIGOT-INSIDE
   C. NEW AUGER MONSTER DEVICE
   D. NEW WEIL-MCLEAN BURNER UNIT
3. THE CONTRACTOR SHALL COORDINATE WATER INSTALLATION WITH THE INSTALLATION OF ALL OTHER CONSTRUCTION WITHIN THE BUILDING
4. BACK FLOW PREVENTION SHALL BE PROVIDED WITHIN NEW BUILDING, AS INDICATED ON THE DETAIL. LOCATION TO BE DETERMINED PRIOR TO INSTALLATION.

HEATING NOTES

1. THE HEADWORK'S BUILDING WILL BE HEATED BY A HOT WATER/RADIANT FLOOR HEATING SYSTEM, AS INDICATED ON THIS PLAN. SPECIFIC ITEMS THAT ARE NECESSARY FOR A FULLY OPERATIONAL SYSTEM MAY HAVE BEEN LIFT OFF THIS PLAN, THEREFORE, THE CONTRACTOR SHALL FURNISH AND INSTALL A FULLY OPERATING SYSTEM, THAT WILL HEAT TO THE BUILDING AND MUST MEET THE DESIGN INTENT.
2. ANY CHANGES IN THE PIPING LAYOUT WHICH ARE PROPOSED BY THE CONTRACTOR SHALL BE APPROVED BY ENGINEER PRIOR TO INSTALLATION.
3. THE LAYOUT OF THE RADIANT FLOOR HEATING SYSTEM AS IDENTIFIED IN THE LAYOUT DETAIL IS SHOWN AS A GUIDE. THE CONTRACTOR SHALL INSTALL THE SYSTEM WITH ALL COMPONENTS SUCH THAT IT MEETS THE DESIGN INTENT, WHETHER IT HAS OR HAS NOT BEEN INDICATED ON THIS PLAN. THE DETAIL IS A GUIDE FOR INSTALLATION. CONTRACTOR SHALL INSTALL THE SYSTEM IN STRICT ACCORDANCE WITH THE MANUFACTURERS WRITTEN INSTRUCTIONS AND ALL APPLICABLE LOCAL STATE AND FEDERAL CODES.

NOTE:
CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH FUEL PIPING AND HOOKUP'S REQUIRED.

WATER NOTES

1. CONTRACTOR SHALL PROVIDE WATER TO THE BLOWER BUILDING, AS INDICATED ON CIVIL PLANS.
2. WATER SHALL BE PROVIDED FOR THE FOLLOWING ITEMS WITHIN THE HEADWORK'S BUILDING:
   A. STANDARD SIZED HOSE SPIGOT-OUTSIDE
   B. STANDARD SIZED HOSE SPIGOT-INSIDE
   C. PROVISION SHALL BE MADE FOR CLOTHES WASHER UNIT WITHIN BUILDING, LOCATION TO BE DETERMINED BY OWNER, PRIOR TO INSTALLATION.
3. THE CONTRACTOR SHALL COORDINATE WATER INSTALLATION WITH THE INSTALLATION OF ALL OTHER CONSTRUCTION WITHIN THE BUILDING
4. BACK FLOW PREVENTION SHALL BE PROVIDED WITHIN NEW BUILDING, AS INDICATED ON THE DETAIL. LOCATION TO BE DETERMINED PRIOR TO INSTALLATION.

HEATING NOTES

1. THE BLOWER BUILDING WILL BE HEATED BY 2-RINNAI MODEL 1004 PROPANE GAS BURNING HEATERS AS INDICATED ON PLANS. SPECIFIC ITEMS THAT ARE NECESSARY FOR A FULL OPERATING SYSTEM MAY HAVE BEEN LEFT OFF THIS PLAN, THEREFOR, THE CONTRACTOR SHALL FURNISH AND INSTALL A FULLY OPERATING SYSTEM THAT WILL PROVIDE HEAT TO THE BUILDING AND THAT WILL MEET THE DESIGN INTENT.
2. CONTRACTOR SHALL INSTALL THE SYSTEM IN STRICT ACCORDANCE WITH MANUFACTURERS WRITTEN INSTRUCTIONS AND ALL APPLICABLE LOCAL STATE AND FEDERAL CODES.

ENGINEERS • SURVEYORS
CES, Inc.
485 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX 207-989-4881

JOB TITLE
VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE
HEATING AND PLUMBING PLAN

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE
ROBERT C. LARSEN
6388
REGISTERED PROFESSIONAL ENGINEER

SCALE:	AS SHOWN
DATE:	JANUARY 12, 2000
DRAWN BY: BH	GRAPHICS CHECKED BY
DESIGNED BY	TW
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APPROVED BY	RCL
FILE NAME	2549.3B-HHEAT.DWG
JOB NUMBER	2549.3
DRAWING NUMBER	M - 4

ELECTRICAL SYMBOLS & INSTRUCTIONS

XXX	ROOM NUMBER.
X	EQUIPMENT NUMBER.
X	KEYED NOTE, SEE NOTE OF SAME LETTER ON SHEET.
X / EX	DETAIL DESIGNATION: UPPER FIELD IS DETAIL IDENTIFIER, LOWER FIELD IS SHEET NUMBER WHERE DETAIL IS SHOWN.
	INDICATES EXISTING DEVICE OR ITEM.
	BRANCH CIRCUIT WIRING CONCEALED IN CEILING OR WALL.
	BRANCH CIRCUIT WIRING CONCEALED IN FLOOR.
	EXPOSED WIRING.
	LOW-VOLTAGE OR SYSTEMS WIRING CONCEALED IN CEILING OR WALL.
	LOW-VOLTAGE OR SYSTEMS WIRING CONCEALED IN FLOOR.
	WIRING UP TO ABOVE.
	WIRING DOWN TO BELOW.
	MULTI-CONDUCTOR BRANCH CIRCUIT, NO. OF HASHMARKS IS NO. OF CIRCUIT CONDUCTORS, WITHOUT HASHMARKS TWO CIRCUIT CONDUCTORS. ALL CIRCUITS TO INCLUDE SEPARATE GREEN GROUNDING CONDUCTOR. FOR FLUORESCENT LIGHTING CIRCUITS, INCREASE NEUTRAL CONDUCTOR 1 SIZE OVER PHASE CONDUCTORS (#10 AWG FOR 20A CIRCUIT)
	HOMERUN TO CIRCUIT AND PANELBOARD INDICATED, NO. OF ARROWS IS NO. OF PHASE WIRES, NO. OF HASHMARKS INDICATE NO. OF CIRCUIT CONDUCTORS.
	TWISTED PAIR CABLE TWISTED PAIR WITH DRAIN CABLE
	DIRECTIVE ARROW.
	CIRCUIT BREAKER.
	GROUND.
J P	JUNCTION BOX, SPLICE BOX AND PULL BOX.
	FLUORESCENT LIGHTING FIXTURE & OUTLET, LETTER WITHIN IS TYPE, LOWER CASE LETTER IS CONTROL GROUP, RECTANGLES INDICATE NO. OF SECTIONS. SEE LIGHTING FIXTURE SCHEDULE FOR TYPES AND MOUNTING.
	CEILING MOUNTED LIGHTING FIXTURE, LETTER SUBSCRIPTS AS ABOVE.
	WALL MOUNTED LIGHTING FIXTURE, LETTER SUBSCRIPTS AS ABOVE.
	WALL MOUNTED LIGHTING FIXTURE WITH PHOTOCELL CONTROL, LETTER SUBSCRIPTS AS ABOVE.
	PHOTOCELL CONTROL.
	WALL MOUNT AND CEILING MOUNT EXIT LIGHTS. SEE FIXTURE SCHEDULE FOR TYPE(S).
S	SPST FLUSH WALL SWITCH 4'-0" UP ON CENTER ADJUSTED TO MINIMUM CUT OF BLOCK OR TILE, LOWER CASE LETTER IS CONTROL GROUP, WITH "H" 6' ABOVE FLOOR.
S2 S3 S4	DOUBLE POLE, THREE-WAY AND FOUR-WAY SWITCHES, SUBSCRIPTS AS ABOVE.
	120/208 VOLT PANELBOARD, FLUSH MOUNTED AND SURFACE MOUNTED.
	277/480 VOLT PANELBOARD, FLUSH MOUNTED AND SURFACE MOUNTED.
	UNIVERSAL PANEL OR CABINET, FLUSH MOUNTED AND SURFACE MOUNTED.
	TRANSFORMER.
	MOTOR OF SIZE SHOWN, WITH "F" FRACTIONAL HORSEPOWER MOTOR BELOW 1/20 HP OR 100 WATTS.
M	UTILITY POWER METER. MOUNT 5'-0" UP.
	ELECTRIC HEATING ELEMENT.
MOD	MOTOR OPERATED DAMPER.
GM	GAS MONITOR SENSOR
UH	UNIT HEATER.
T	THERMOSTAT CONTROL, 4'-0" ABOVE FINISH FLOOR OR AS NOTED ON DRAWINGS.
	DUPLEX GROUNDED POLARIZED 120 VOLT THREE-WIRE CONVENIENCE OUTLET 1'-6" UP VERTICALLY, WITH "U" 4'-0" AFF OR 0'-6" ABOVE COUNTER, ADJUST TO MINIMUM CUT OF BLOCK OR TILE, LETTER IS CIRCUIT GROUP, WITH "WP" WEATHERPROOF, WITH "G" FOR GROUND FAULT PROTECTED BY GFCI RECEPTACLE OR CIRCUIT BREAKER LOCATED UPSTREAM, WITH "H" MOUNT 7'-6" UP OR AS NOTE.
	QUADRUPLEX OUTLET IN ONE BOX, NOTES AND SUBSCRIPTS AS ABOVE.
	GROUND FAULT CIRCUIT INTERRUPTING (GFCI) DUPLEX RECEPTACLE, 120 VOLT THREE-WIRE 20 AMP, SUBSCRIPTS AND MOUNTING AS ABOVE.
	208 TO 480V OUTLET OF AMPACITY AS SHOWN 1'-6" UP VERTICALLY OR AS NOTED ON DRAWINGS.
	EQUIPMENT CONNECTION.
	SINGLE THROW HEAVY DUTY FUSED DISCONNECT SWITCH, NO. OF POLES AND SIZE AS REQUIRED FOR THE LOAD, "NF" NON FUSED, "WP" WEATHERPROOF.
	REMOTE CONTROL MAGNETIC STARTER OR CONTACTOR, WITH "MOA" MANUAL OFF AUTOMATIC SWITCH.
VFD	VARIABLE FREQUENCY DRIVE MOTOR CONTROL.
	COMBINATION STARTER, DISCONNECT TYPE.

GENERAL NOTES

1. THIS PLAN HAS BEEN COMPILED FROM CASUAL FIELD OBSERVATIONS AND RECORD DRAWINGS. FIELD VERIFY ALL CONDITIONS AND OBSERVE NECESSARY SAFETY PRECAUTIONS BEFORE DOING ANY WORK.
2. REMOVED AND RELOCATED ITEMS ARE INDICATED IN HIDDEN LINE TYPE (- - - -). ENTIRELY REMOVE ALL ELECTRICAL DEVICES, AND EQUIPMENT. REMOVE ALL RELATED WIRING BACK TO SOURCE. CONDUIT IN GOOD CONDITION AND PROPERLY LOCATED MAY BE REUSED.
3. WHERE REMOVED ITEMS/CIRCUITS AFFECT ITEMS/CIRCUITS THAT REMAIN, ADJUST WIRING AS NEEDED TO THOSE CIRCUITS REMAINING IN OPERATION.
4. DEVICES WITH AN "E" ARE EXISTING, "ER" REPLACE EXISTING, "RL" RELOCATE, "N" NEW, AND "R" REMOVE.
5. USE PVC COATED RSC FOR NEW UNDERGROUND CONTROLS.

KEYED NOTES

(A) NEW LOCATION FOR MC RELOCATED AERATORS AND AERATOR LOCATING POSTS. EC CONNECT RELOCATED AERATOR.

(B) EC INSTALL NEW AERATOR SWITCH/RECEPTACLE ASSY. VERIFY EXACT LOCATION WITH OWNER PRIOR TO INSTALLATION

(C) EXTEND EXISTING CONDUIT IN TRENCH TO NEW AERATOR SWITCH/RECEPTACLE ASSY. REFEED NEW SWITCH/RECEP ASSY FROM EXISTING MANHOLE. USE FEED FROM EXISTING MOTOR STARTER FOR POSITION 2 LAGOON 3 IN OPERATIONS BLDG. EXTEND FEED WITH SAME AWG AS EXISTING.

(D) BREAK INTO EXISTING CONDUIT RUN FEEDING POSITION 2, LAGOON 3. INSTALL UNDERGROUND SPLICE BOX AND RUN NEW CONDUIT IN TRENCH, DETAIL A, SHEET 4, TO NEW AERATOR SWITCH/RECEPTACLE ASSY. REFEED NEW SWITCH/RECEP ASSY FROM EXISTING MANHOLE. USE FEED FROM EXISTING MOTOR STARTER FOR POSITION 1 LAGOON 3 IN OPERATIONS BLDG. EXTEND FEED WITH SAME AWG AS EXISTING.

(E) REMOVE ABANDONED FEED TO POSITION 1, LAGOON 3, AND ABANDONED POST AND J-BOX ASSY.

(F) BREAK INTO EXISTING CONTROLS CONDUIT. INSTALL UNDERGROUND SPLICE BOX AND FEED NEW DISSOLVED OXYGEN SENSOR CONTROL CABLE THROUGH EXISTING CONTROLS CONDUIT TO OPS BLDG.

(G) INSTALL NEW CONTROLS CONDUIT TO NEW HANDHOLE FROM DOS POST.

(H) WHEN NEW HEADWORKS ASSY AND LEVEL SENSOR IS FUNCTIONAL, DISCONNECT, AT THE OPS BUILDING, THE SECONDARY FEED TO ORIGINAL SENSOR LOCATION.

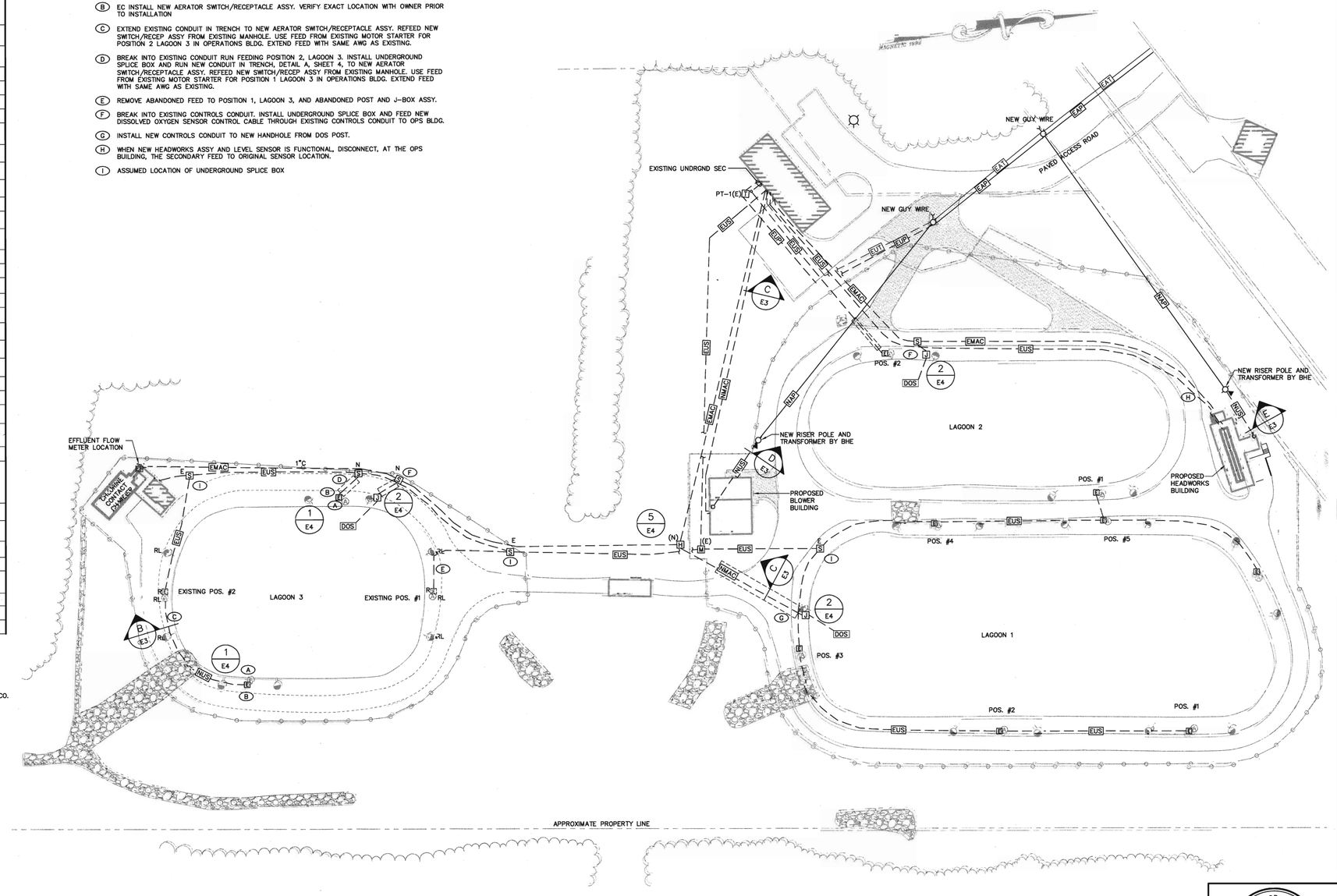
(I) ASSUMED LOCATION OF UNDERGROUND SPLICE BOX

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
BATT	BATTERY
B.H.E.	BANGOR HYDRO-ELECTRIC CO.
BKR	BREAKER
BLDG	BUILDING
C	CONDUIT, CONDUCTOR
CB	CIRCUIT BREAKER, CATCH BASIN
CKT	CIRCUIT
CLG	CEILING
COND	CONDUIT, CONDENSATE, CONDUCTOR
DISTRIB	DISTRIBUTION
DN	DOWN
DWG	DRAWING
E	EXISTING
EC	ELECTRICAL CONTRACTOR
ER	EXISTING REPLACE
ELECT	ELECTRIC, ELECTRICAL
ELEV	ELEVATION, ELEVATOR
EMERG	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
EQUIP	EQUIPMENT
EXIST'G	EXISTING
EXT	EXTERIOR
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FIN	FINISH, FINISHED
FLR	FLOOR
GND	GROUND
HP	HORSEPOWER, HEAT PUMP
J-BOX	JUNCTION BOX
KW	KILOWATT(S)
LGT	LIGHT
LTG	LIGHTING
MAX	MAXIMUM
MIN	MINIMUM
N	NEW
N.E.T.	NEW ENGLAND TELEPHONE CO.
NO	NUMBER
OC	ON CENTER
PB	PANELBOARD
PNL	PANEL
PVC	POLYVINYL CHLORIDE
PWR	POWER
R	REMOVE
RECEP	RECEPTACLE
RL	RELOCATE
RSC	RIGID STEEL CONDUIT
SW	SWITCH
TEL	TELEPHONE
TRANS	TRANSFORMER
TYP	TYPICAL
UG	UNDERGROUND
WM	WIREMOLD
WP	WEATHERPROOF

LEGEND:

	UTILITY POLE	PT-X(N) T	PAD MOUNTED TRANSFORMER, "X" – UNIT NO., "N" – NEW, "E" – EXISTING
M	ELECTRICAL MANHOLE	EAP	EXISTING AERIAL PRIMARY
H	CONTROLS HANDHOLE	EUP	EXISTING UNDERGROUND PRIMARY
	AERATOR SWITCH/RECEP BOX	EUS	EXISTING UNDERGROUND SECONDARY
R	AERATOR SWITCH/RECEP BOX (REMOVE)	NAP	NEW AERIAL PRIMARY
	AERATOR POSITIONING POST	NUS	NEW UNDERGROUND SECONDARY
RL	AERATOR POSITIONING POST (RELOCATE)	EAT	EXISTING AERIAL TELEPHONE
	AERATOR	EUT	EXISTING UNDERGROUND TELEPHONE
RL	AERATOR (RELOCATE)	EMAC	EXISTING MONITOR AND CONTROL
	LIGHT POST	NMAC	NEW MONITOR AND CONTROL
S	UNDERGROUND SPLICE BOX	DOS	DISSOLVED OXYGEN SENSOR
EF	EFFLUENT FLOW SENSOR	XXX	CONCRETE ENCASED UNDER PAVEMENT



ELECTRICAL SITE PLAN

SCALE: 1" = 40'-0"

ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX: 207-989-4881

JOB TITLE: VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE: SYMBOLS LIST, ELECTRICAL SITE PLAN

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE — ROBERT C. LARSEN 3288 — REGISTERED PROFESSIONAL ENGINEER

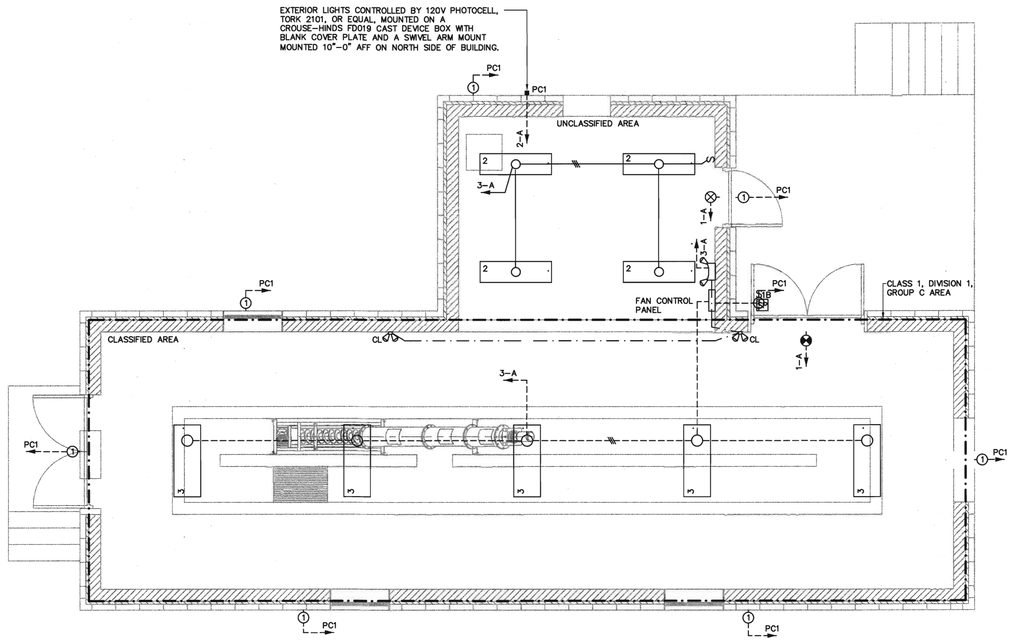
STATE OF MAINE — COLIN C. HEWETT 8374 — REGISTERED PROFESSIONAL ENGINEER

11/10/00

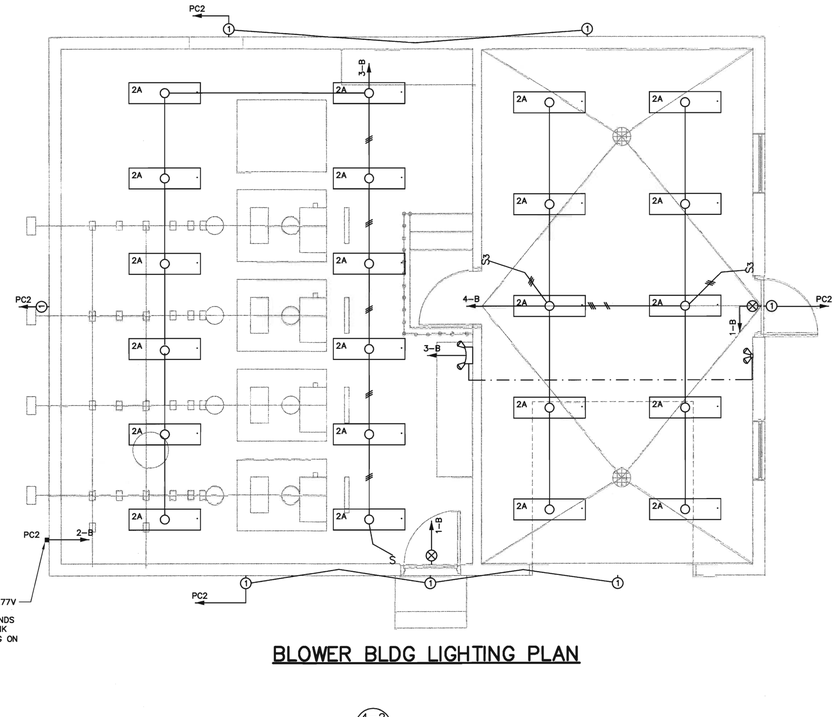
AMES & HEWETT ENGINEERS INC
53 MAIN STREET WINTHROP, MAINE

PLOT DATE: 11-10-00

SCALE:	1" = 40'-0"
DATE:	11-10-00
DRAWN BY	RWM
GRAPHICS CHECKED BY	
DESIGNED BY	RWM
CHECKED BY	CCH
APPROVED BY	
FILE NAME	00014\E1
JOB NUMBER	2549.3
DRAWING NUMBER	E1



HEADWORKS LIGHTING PLAN



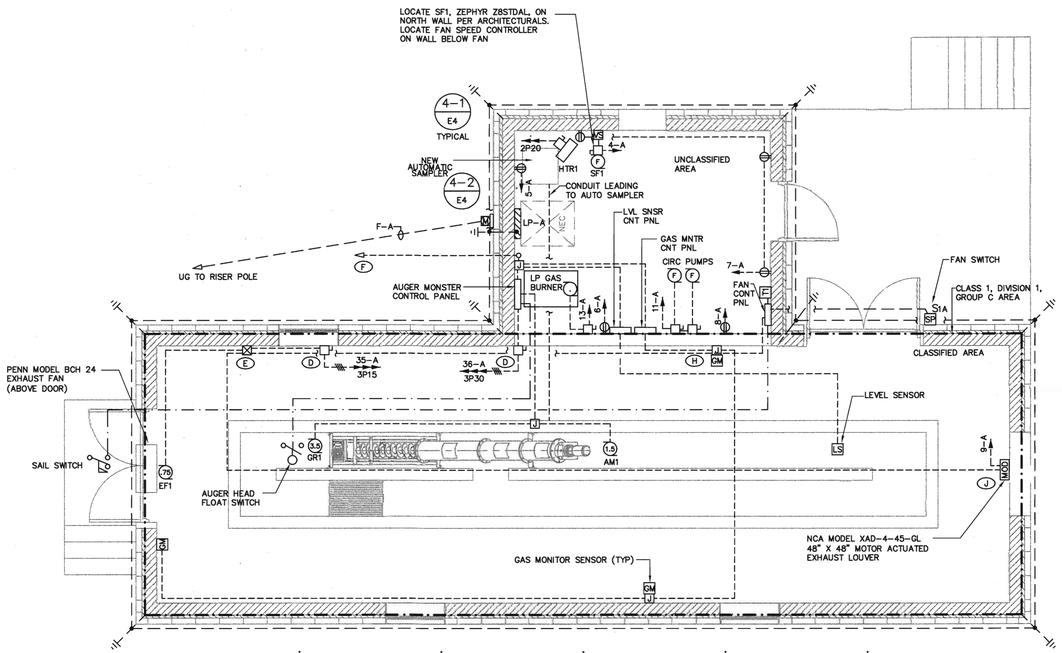
BLOWER BLDG LIGHTING PLAN

GENERAL NOTES

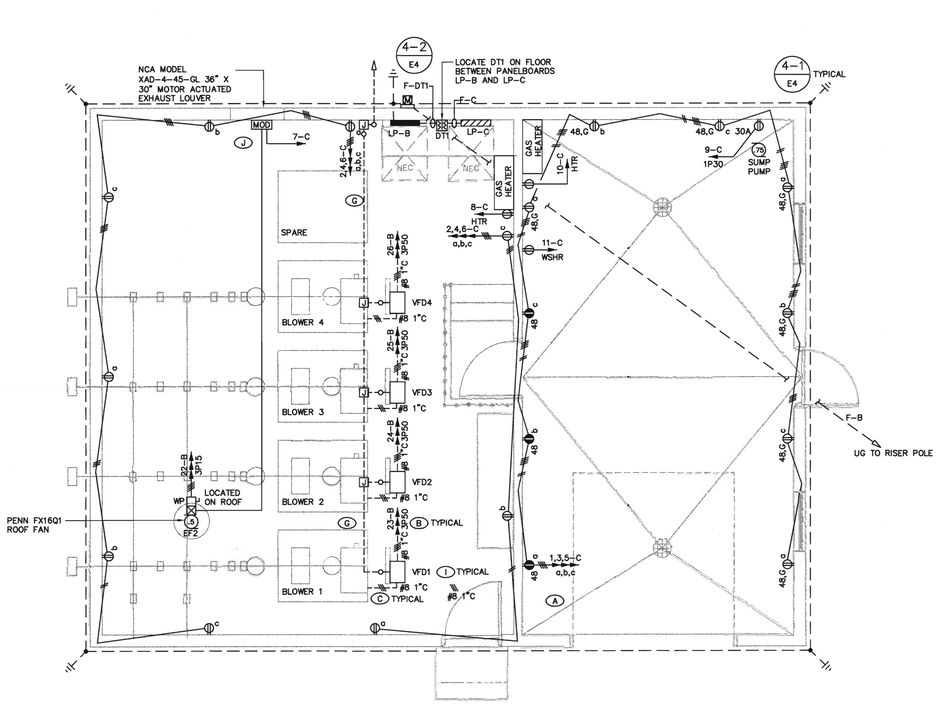
1. CONDUIT IN CLASSIFIED AREA TO BE 40 MIL PVC COATED RSC, ROBROY PLASTI-BOND REDHOT OR EQUAL.
2. ALL ELECTRICAL COMPONENTS AND DEVICES USED IN THE AUGER MONSTER ROOM SHALL BE DESIGNED FOR A CLASS 1, DIVISION 1, GROUP C ENVIRONMENT

KEYED NOTES

- (A) ALL WIRING IN GARAGE TO BE AT LEAST 18" AFF
- (B) RUN FEED FOR BLOWERS STRAIGHT UP TO CEILING VOID FROM LP-B,THROUGH CEILING VOID UNTIL DIRECTLY ABOVE THE APPROPRIATE VFD, THEN DOWN TO VFD
- (C) FEED FROM VFD TO BLOWER MOTOR TO BE FLEXIBLE LIQUID-TIGHT CONDUIT.
- (D) DISCONNECTS FOR AUGER MONSTER AND EXHAUST FAN, EF1, SHALL BE CROUSE-HINDS EBMBB FD W30361 30A FUSIBLE 3 POLE, OR EQUAL
- (E) MAGNETIC STARTER FOR EXHAUST FAN, EF1, SHALL BE CROUSE-HINDS EBMSOFA-AB643, OR EQUAL. EC TO SPECIFY CONTROL TRANSFORMER AND HEATERS APPROPRIATE FOR FAN MOTOR CURRENT. SHALL HAVE AUX CONTACTS TO CONTROL MOTOR OPERATED DAMPER.
- (F) EC EXTEND NEW CONTROLS CONDUIT TO EXISTING CONTROLS CONDUIT TO OPERATIONS BLDG. CONTROLS CONTRACTOR PULL IN NEW CONTROL CIRCUITS, CONNECT TO TRANSMITTING DEVICES IN HEADWORKS BLDG AND CONNECT TO ANALYSIS DEVICES IN OPERATIONS BLDG.
- (G) RUN CONTROL CONDUIT FROM VFD THROUGH CEILING VOID AND DOWN TO J-BOX. FROM J-BOX USE NEW 2" CONTROL CONDUIT TO OPERATIONS BLDG
- (H) CONTROLS CONDUIT BY EC. COORD LOCATION WITH CONTROL CONTRACTOR. WIRING AND DEVICE INTERCONNECTIONS BY CONTROLS CONTRACTOR.
- (I) VARIABLE FREQUENCY DRIVE, 25 HP, 480V 3PH. PROVIDE TWO 4-20ma MONITOR FUNCTIONS, USER SELECTABLE. CONTROLS CONTRACTOR ROUTE 2 CABLES FROM EACH VFD TO OPS BLDG FOR PERFORMANCE MONITORING.
- (J) MOTOR OPERATED DAMPER ACTUATORS SHALL BE SUITABLE FOR USE IN A CLASS 1, DIV. 1, GROUP C ENVIRONMENT. THEY SHALL BE ACTUATED BY AN AUX CONTACT IN THE MOTOR STARTER
- (K) 3KW, 208V, SINGLE PH, SURFACE MT FAN FORCED WALL HEATER WITH THERMOSTAT AND BUILT-IN DISCONNECT. BERKO FRA-4024 OR EQUAL.



HEADWORKS POWER & SYSTEMS PLAN



BLOWER BLDG POWER & SYSTEMS PLAN

2' 1' 0 2' 4' 8'
SCALE: 1/4" = 1'-0"

ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX 207-989-4881

JOB TITLE: VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE: HEADWORKS & BLOWER BUILDING ELECTRICAL PLANS

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE — ROBERT C. LARSEN 3388 REGISTERED PROFESSIONAL ENGINEER — 11/10/00

STATE OF MAINE — COLIN C. HEWETT 8374 REGISTERED PROFESSIONAL ENGINEER — 11/10/00

AMES & HEWETT ENGINEERS INC
53 MAIN STREET WINTHROP, MAINE

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JOB NUMBER	2549.3
DRAWING NUMBER	E2

LIGHTING FIXTURE & LAMPING SCHEDULE

TYPE	DESCRIPTION	VOLTS	VA	MOUNTING & INSTRUCTIONS	LAMPING
1	GE WALLMOUNT 175 LUMINAIRE CAT#WM7M17M0A1SN4DB 175 WATT METAL HALIDE WALLPACK	120/ 277	200	MOUNT 10'-6" AFF ON HEADWORKS BLDG MOUNT 12'-0" AFG ON BLOWER BLDG	1-M175/U
2	COLUMBIA DYNAMO CAT# KL4-232-EB8LH120-PAF 2 LAMP INDUSTRIAL FIXTURE, HIGH GLOSS BAKED WHITE ENAMEL LOW HARMONIC ELECTRONIC BALLAST	120	70	STEM SUSPEND FROM GYP BOARD CEILING USE COLUMBIA S18 STEM SUSPENSION KIT MTG HEIGHT 10'-6" AFF (USE 18" STEM)	2-F032T8/35
2A	COLUMBIA DYNAMO CAT# KL4-232-EB8LH277-PAF 2 LAMP INDUSTRIAL FIXTURE, HIGH GLOSS BAKED WHITE ENAMEL LOW HARMONIC ELECTRONIC BALLAST	277	70	STEM SUSPEND FROM GYP BOARD CEILING USE COLUMBIA S18 STEM SUSPENSION KIT MTG HEIGHT: 10'-6" AFF IN BLOWER ROOM, 12'-0" AFF IN GARAGE (USE 18" STEM)	2-F032T8/35
3	CROUSE-HINDS CAT# EVF23027S369 FACTORY SEALED FLUORESCENT LIGHTING FIXTURE FOR CLASS 1, DIV. 1, GROUP C LOCATIONS, WITH 45 DEG ANGLE REFLECTORS WITH WHITE EPOXY POWDER COAT.	277	105	MOUNT 11'-0" AFF, STEM SUSPEND USING 3/4" PVC COATED CONDUIT FROM CROUSE-HINDS GUA SERIES OUTLET BOXES WITH 3/4" HUB SIZE AND 3" COVER OPENING DIA., FIXTURE CANOPY COVER, C-H #GUA068 ON WIRING END AND FROM C-H EVF20 CEILING SADDLE FOR CONDUIT SUPPORT ON OTHER END. ADJUST CONDUIT SUPPORT LENGTH SO FIXTURE HANGS LEVEL. USE APPROPRIATE GUA BOX TO ENSURE NO PLUGGED OPENINGS.	3-F032T8/35
(symbol)	EXIDE ESBSPN14 POWER PACK WITH 1-SEA ELBOW ARM, 1-HAZPP7 7W CMPCT FLUOR FIXT, AND 1-EFK EXIT ACCESSORY FOR CLASS 1, DIV 1, GROUP C CORROSIVE APPLICATION	120/ 277	14	MOUNT WITH EXIT SIGN CENTERED ABOVE DOOR PER DRAWING, BOTTOM OF SIGN 7'-6"AFF	INCLUDED
(symbol)	EXIDE E803ASROT EXIT SIGN LED ILLUMINATION BLACK FRAME, BRUSHED ALUMINUM FACE, SINGLE FACE, RED LETTERS, SELF-TEST DIAGNOSTICS	120/ 277	10	WALL MOUNT ABOVE DOOR, 7'-6" AFF	INCLUDED
CL CL	CROUSE-HINDS CAT# EVLA12 EMERGENCY LIGHTING HEAD CLASS 1, DIV 1, GROUP C CORROSIVE APPLICATION, NEMA-3R #783, MINIATURE TUNGSTEN HALOGEN, G4,2-PIN, 12 WATT	12VDC	12	MOUNT SINGLY OR IN A PAIR, PER DRAWING, ON ROBROY EAB SERIES PLASTI-BOND COATED OUTLET BOXES, 7'-6" AFF	INCLUDED
(symbol)	EXIDE LIGHTGUARD #G12012G1PRLH12120T, 12V, 100WATT, LEAD CALCIUM BAT, SELF TEST DIAG, METAL CASED, PAR36 TUNGSTEN HALOGEN 12V, 12 WATT, TYPE 7557 LAMP	120/ 277	65	MOUNT FIXTURES ON WALL, 7'-6" AFF	12V,12W HALOGEN TYPE 7557
(symbol)	EXIDE LIGHTGUARD #G12012G2PRLH12120T, 12V, 100WATT, LEAD CALCIUM BAT, SELF TEST DIAG, METAL CASED, PAR36 TUNGSTEN HALOGEN 12V, 12 WATT, TYPE 7557 LAMP	120/ 277	65	MOUNT FIXTURES ON WALL, 7'-6" AFF	12V,12W HALOGEN TYPE 7557
(symbol)	EXIDE LIGHTGUARD #PRLH1212, METAL CHROME SEALED BEAM REMOTE FIXTURE,PAR36 TUNGSTEN HALOGEN 12V, 12 WATT, TYPE 7557 LAMP, WITH MP2 MOUNTING PLATE	12VDC	12	MOUNT DUAL REMOTE LAMPHEAD ON WALL, 7'-6" AFF	12V,12W HALOGEN TYPE 7557

TRANSFORMER SCHEDULE

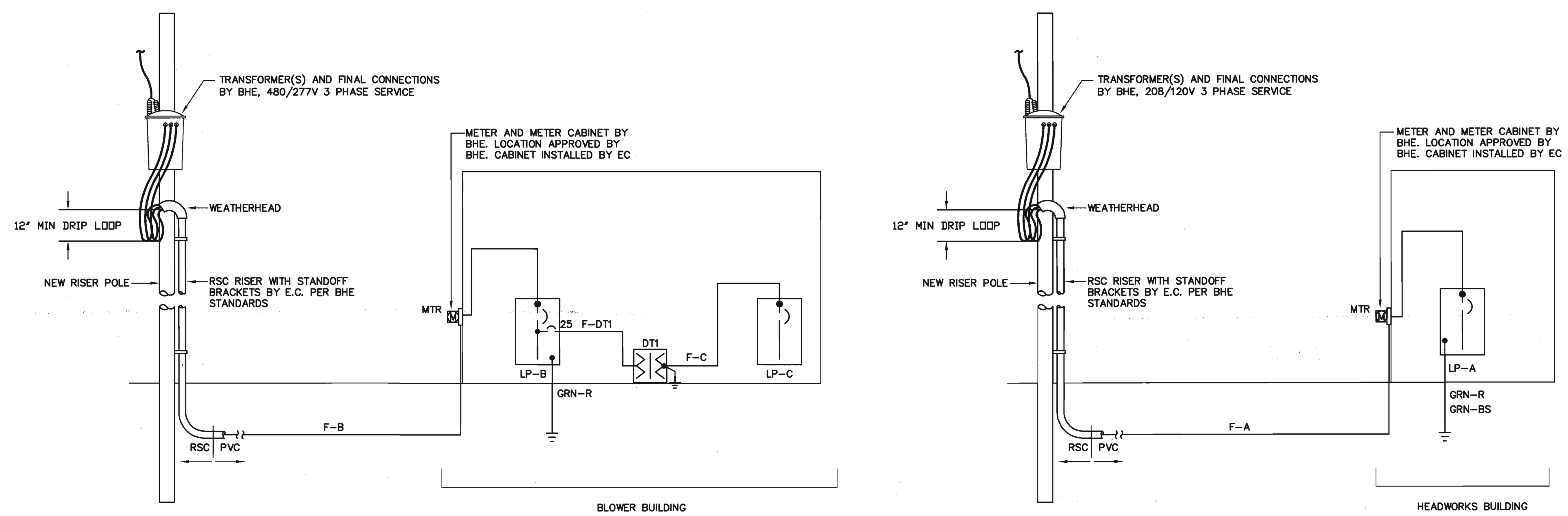
D'S'G'N	KVA	PH	TEMP RATE	PRIMARY VOLTS	PRIMARY CONN	SECONDARY VOLTS	SECONDARY CONN	REMARKS
DT1	15	3	150	480	△	208/120	Y	NEW DRY TRANSFORMER

SERVICE & DISTRIBUTION FEEDERS & PANELBOARD SCHEDULE

PANELBOARD		BRANCH CIRCUIT BREAKERS							MAINS					SUPPLY FEEDERS					SUB FEED LUGS	NOTES
D'S'G'N	MOUNT'G	USED	SPARE	SPACE	POLE	AMPS	TOTAL BKR'S	TOTAL POLES	AMPS	ENTRY	PHASE	WIRE	VOLTS	D'S'G'N	NO. WIRES	SIZE WIRE	INSUL'N	CONDUIT		
LP-A	SURF		SEE PANEL SCHEDULE						100	CB	3	4	208/ 120	F-A	4	#2	XHHW	1 1/2"	.	(1)
LP-B	SURF		SEE PANEL SCHEDULE						300	CB	3	4	480/ 277	F-B	4	300MCM	XHHW	2 1/2"	.	(2)
LP-C	SURF		SEE PANEL SCHEDULE						60	CB	3	4	208/ 120	F-C	4 1	#6 #10	XHHW THW	1 1/4"	.	(3)
														F-DT1	4 1	#10 #10	XHHW THW	3/4"	.	
														GRN-R	1	#2	ANY	3/4"	.	(4)
														GRN-BS	1	#2	ANY	3/4"	.	(5)

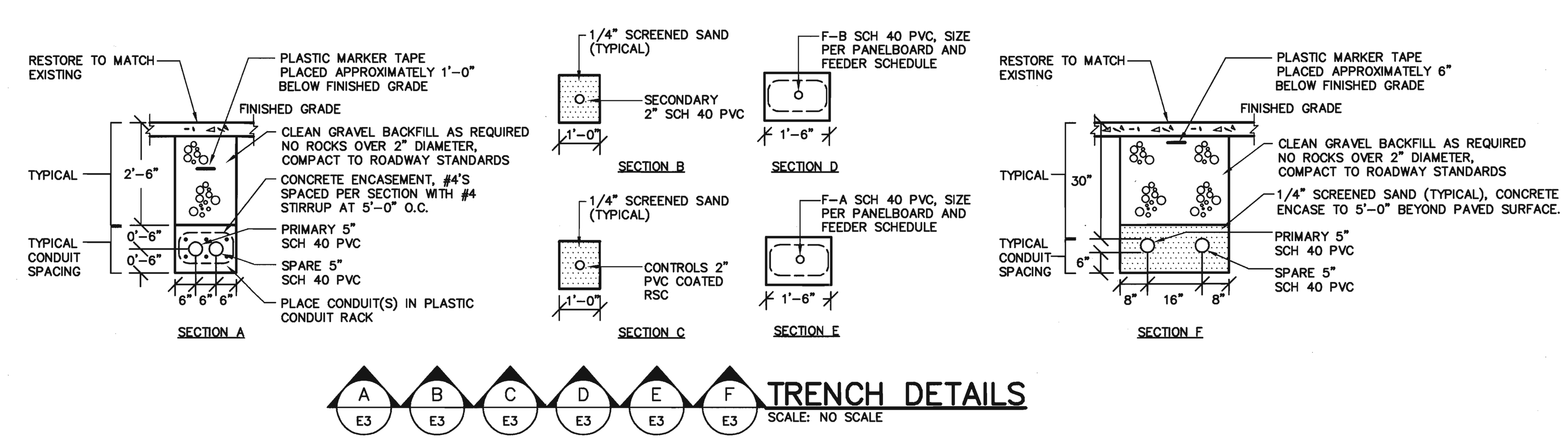
PANELBOARD NOTES

1. SERVICE RATED PANELBOARD, BOLT-ON BREAKERS, MINIMUM GUTTERS 5" SIDES AND DEPTH, 8" FEED END, 22,000 A.I.C.
2. SERVICE RATED DISTRIBUTION PANELBOARD MINIMUM GUTTERS 8" SIDES & DEPTH, 12" FEED END, 30,000 AIC.
3. BAB PANELBOARD, BOLT-ON BREAKERS, MINIMUM GUTTERS 5" SIDES AND DEPTH, 8" FEED END, 10,000 A.I.C.
4. 3/4"x10'-0" COPPERWELD GROUND ROD, DRIVE VERTICALLY TO 2'-0" BELOW FINISH GRADE, CADWELD GROUND CONDUCTOR AND BOND TO SERVICE NEUTRAL.
5. BOND BUILDING STEEL TO SERVICE NEUTRAL.



RISER DIAGRAM FOR NEW BUILDINGS

SCALE: NO SCALE



TRENCH DETAILS

SCALE: NO SCALE

PANEL SCHEDULE

PANEL ID: LP-A — TYPE: – — AMPS: – — MAIN: CB — MOUNTING: SURFACE — VOLTS L-L: 208 — PHASE: 3
LOCATION: HEADWORKS ELEC ROOM — VOLTS L-G: 120 — WIRE: 4

BRKR A	BRKR P	DESCRIPTION	CIR VA	TYPE	CIR NO.	LOAD A	LOAD B	LOAD C	CIR NO.	TYPE	CIR VA	DESCRIPTION	BRKR P	BRKR A
20	1	EXIT LIGHTS	24	L	1	1624			2	L	1600	LTG OUTSIDE WALLPAK	1	20
20	1	LTG AUG MON,ELEC RM,EGRES	800	L	3		1040		4	M	240	SUP FAN SF1-ELEC ROOM	1	15
20	1	REC-REFRIG SAMP MON	600	O	5			800	6	R	200	REC LEVEL SNSR CNTRL	1	20
20	1	REC-ELEC ROOM	600	R	7	800			8	R	200	REC GAS SENSOR CNTRL	1	20
20	1	MOTOR OPERATED DAMPER	250	M	9		250		10	S	0	SPARE	1	20
20	1	CIRC PUMPS	200	M	11			200	12	S	0	SPARE	1	20
20	1	BOILER	1500	O	13	1500			14	S	0	SPARE	1	20
20	1	SPARE	0	S	15		0		16	S	0	SPARE	1	20
20	1	SPARE	0	S	17			0	18	S	0	SPARE	1	20
20	1	SPARE	0	S	19	0			20	S	0	SPARE	1	20
20	1	SPARE	0	S	21		0		22	S	0	SPARE	1	20
20	1	SPARE	0	S	23			0	24	S	0	SPARE	1	20
–	1	PROVISION	0	O	25	0			26	O	0	PROVISION	1	–
–	1	–	0	O	27		0		28	O	0	–	1	–
–	1	–	0	O	29			0	30	O	0	–	1	–
–	1	–	0	O	31	0			32	O	0	–	1	–
20	2	HTR1	1500	H	33		1500		34	O	0	PROVISION	2	–
–	–	–	1500	H	–			1500	–	O	0	–	–	–
15	3	EX FAN EF1-AUG MNST RM	420	M	35	2620			36	M	2200	AUGER MONSTER	3	30
–	–	–	420	M	–		2620		–	M	2200	–	–	–
–	–	–	420	M	–			2620	–	M	2200	–	–	–
		PHASE TOTALS				6544	5410	5120				[X] NUMBER BY CIRCUIT		

CONNECTED VA : 17074 — CONNECTED AMPS : 47.4

CIRCUIT TYPE (CODE): LIGHTS (L) | RECEPTACLE (R) | MOTOR (M) | HEAT (H) | OTHER (O) | SPARE (S) | DISTRIB (D)

PANEL SCHEDULE

PANEL ID: LP-B — TYPE: – — AMPS: – — MAIN: CB — MOUNTING: SURFACE — VOLTS L-L: 480 — PHASE: 3
LOCATION: BLOWER BLDG ELEC ROOM — VOLTS L-G: 277 — WIRE: 4

BRKR A	BRKR P	DESCRIPTION	CIR VA	TYPE	CIR NO.	LOAD A	LOAD B	LOAD C	CIR NO.	TYPE	CIR VA	DESCRIPTION	BRKR P	BRKR A
20	1	EXIT LIGHTS	20	L	1	1420			2	L	1400	LGTS EXTERIOR	1	20
20	1	LGTS BLOWER ROOM, EGRESS	840	L	3		1540		4	L	700	LGTS GARAGE	1	20
20	1	SPARE	0	S	5			0	6	S	0	SPARE	1	20
20	1	SPARE	0	S	7	0			8	S	0	SPARE	1	20
20	1	SPARE	0	S	9		0		10	S	0	SPARE	1	20
20	1	SPARE	0	S	11			0	12	O	0	PROVISION	1	–
–	1	PROVISION	0	O	13	0			14	O	0	–	1	–
–	1	–	0	O	15		0		16	O	0	–	1	–
–	1	–	0	O	17			0	18	O	0	–	1	–
–	3	FUTURE BLOWER	9422	M	19	9422			20	O	0	PROVISION	3	–
–	–	–	9422	M	–		9422		–	O	0	–	–	–
–	–	–	9422	M	–			9422	–	O	0	–	–	–
25	3	DT1	2000	D	21	2582			22	M	582	EX FAN EF2-BLOWER ROOM	3	15
–	–	–	2000	D	–		2582		–	M	582	–	–	–
–	–	–	2000	D	–			2582	–	M	582	–	–	–
50	3	BLOWER 1	9422	M	23	18844			24	M	9422	BLOWER 2	3	50
–	–	–	9422	M	–		18844		–	M	9422	–	–	–
–	–	–	9422	M	–			18844	–	M	9422	–	–	–
50	3	BLOWER 3	9422	M	25	18844			26	M	9422	BLOWER 4	3	50
–	–	–	9422	M	–		18844		–	M	9422	–	–	–
–	–	–	9422	M	–			18844	–	M	9422	–	–	–
		PHASE TOTALS				51112	51232	49692				[X] NUMBER BY CIRCUIT		

CONNECTED VA : 152036 — CONNECTED AMPS : 182.9

CIRCUIT TYPE (CODE): LIGHTS (L) | RECEPTACLE (R) | MOTOR (M) | HEAT (H) | OTHER (O) | SPARE (S) | DISTRIB (D)

PANEL SCHEDULE

PANEL ID: LP-C — TYPE: – — AMPS: – — MAIN: CB — MOUNTING: SURFACE — VOLTS L-L: 208 — PHASE: 3
LOCATION: BLOWER BLDG ELEC ROOM — VOLTS L-G: 120 — WIRE: 4

BRKR A	BRKR P	DESCRIPTION	CIR VA	TYPE	CIR NO.	LOAD A	LOAD B	LOAD C	CIR NO.	TYPE	CIR VA	DESCRIPTION	BRKR P	BRKR A
20	1	RECEPS GARAGE-a	800	R	1	1400			2	R	600	RECEPS BLOWER RM – a	1	20
20	1	RECEPS GARAGE-b	600	R	3		1200		4	R	600	RECEPS BLOWER RM – b	1	20
20	1	RECEPS GARAGE-c	600	R	5			1200	6	R	600	RECEPS BLOWER RM – c	1	20
20	1	MOTOR OPERATED DAMPER	250	M	7	500			8	M	250	GAS HEATER BLR ROOM	1	20
30	1	SUMP PUMP	1660	M	9		1910		10	M	250	GAS HEATER GARAGE	1	20
20	1	WASHER	1600	M	11			1600	12	S	0	SPARE	1	20
20	1	SPARE	0	S	13	0			14	S	0	SPARE	1	20
20	1	SPARE	0	S	15		0		16	S	0	SPARE	1	20
–	1	SPARE	0	O	17			0	18	O	0	SPARE	1	–
–	1	SPARE	0	O	19	0			20	O	0	SPARE	1	–
–	1	SPARE	0	O	21		0		22	O	0	SPARE	1	–
–	1	SPARE	0	O	23			0	24	O	0	SPARE	1	–
		PHASE TOTALS				1900	3110	2800				[X] NUMBER BY CIRCUIT		

CONNECTED VA : 7810 — CONNECTED AMPS : 21.7

CIRCUIT TYPE (CODE): LIGHTS (L) | RECEPTACLE (R) | MOTOR (M) | HEAT (H) | OTHER (O) | SPARE (S) | DISTRIB (D)

STATE OF MAINE — COLIN C. HEWETT 8374 — REGISTERED PROFESSIONAL ENGINEER — 11/10/00

AMES & HEWETT ENGINEERS INC
53 MAIN STREET WINTHROP, MAINE

PLOT DATE: 11-10-00

S • SURVEYORS
P.O. Box 639 Brewer, ME 04412 Tel. 207-989-4824 FAX 207-989-4881

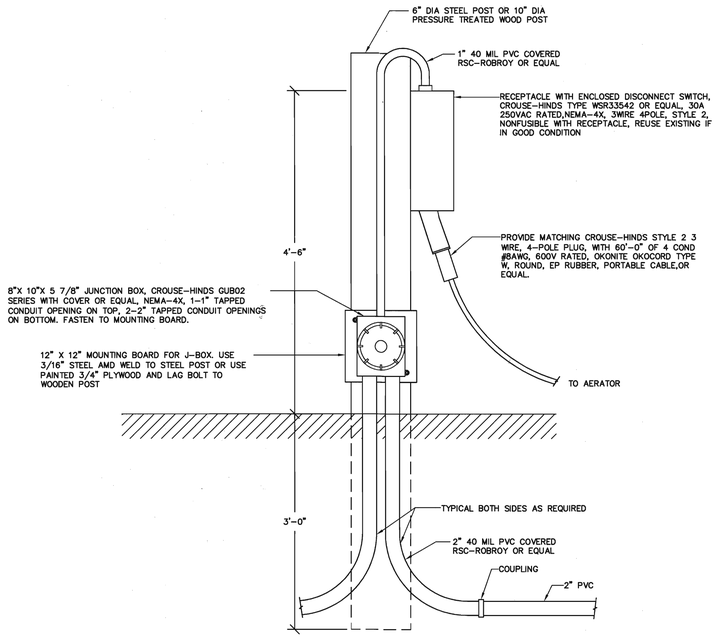
JOB TITLE: VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE: RISER DIAGRAM & SCHEDULES

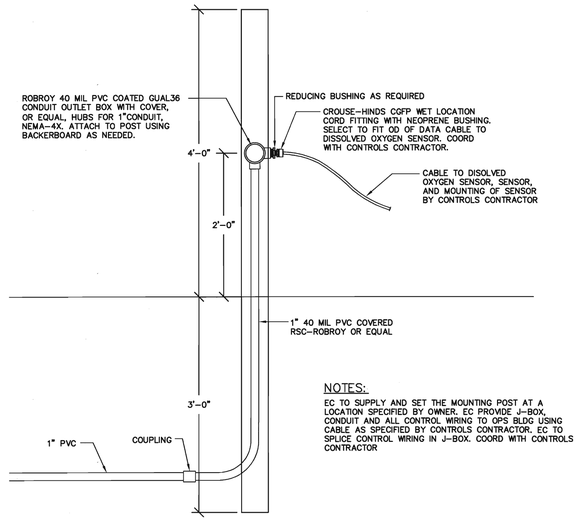
REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE — ROBERT C. LARSEN 3389 — REGISTERED PROFESSIONAL ENGINEER

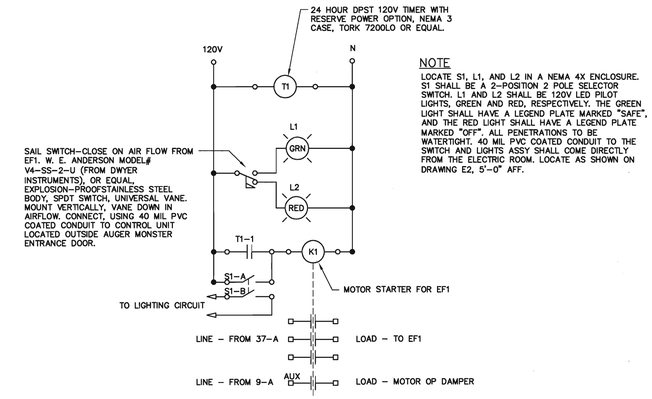
SCALE:	AS NOTED
DATE:	11-10-00
DRAWN BY	RWM
GRAPHICS CHECKED BY	
DESIGNED BY	RWM
CHECKED BY	CCH
APPROVED BY	RCL
FILE NAME	00014/E3
JOB NUMBER	2549.3
DRAWING NUMBER	E3



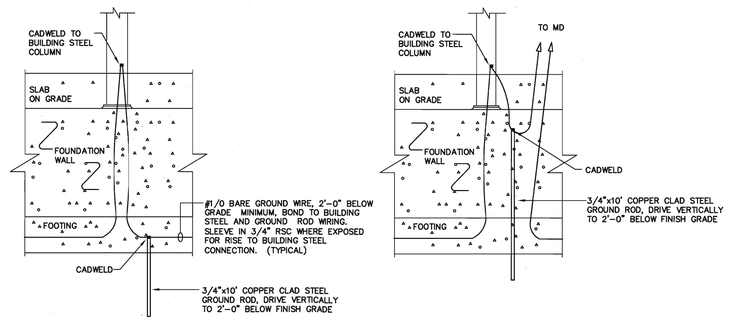
1 E4 AERATOR DISCONNECT SWITCH MOUNTING POST DETAIL
SCALE: 1" = 1'-0"



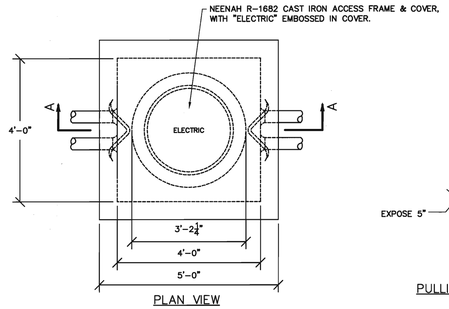
2 E4 DISOLVED OXYGEN SENSOR J-BOX MOUNTING DETAIL
SCALE: 1"=1'-0"

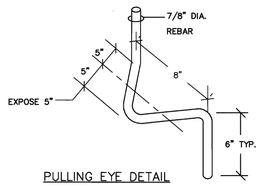


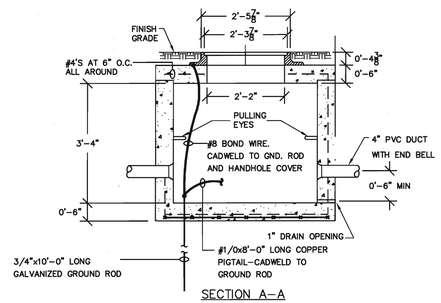
3 E4 EXHAUST FAN CONTROL DETAIL
SCALE: NO SCALE



4-1 E4 4-2 E4 FOUNDATION GROUND LOOP DETAIL
SCALE: NO SCALE







5 E4 HAND HOLE DETAIL
SCALE: 1/2" = 1'-0"

NOTES:

1. END BELL ALL DUCT OPENINGS
2. SEE PLANS AND TRENCH DETAIL FOR EXACT LOCATION AND NUMBER OF DUCT BOND-OUTS.
3. PROVIDE PULLING EYES OPPOSITE ALL NEW AND FUTURE DUCT BANKS
4. MOUNT LOADBREAK JUNCTIONS AS REQUIRED.

ENGINEERS • SURVEYORS
465 So. Main Street P.O. Box 639 Brewer, ME 04412 Tel: 207-989-4824 FAX 207-989-4881

JOB TITLE: VEAZIE WASTEWATER TREATMENT FACILITY UPGRADE/EXPANSION
VEAZIE, PENOBSCOT COUNTY, MAINE

SHEET TITLE: ELECTRICAL DETAILS ...

REV.	DESCRIPTION	DATE	CHECKED BY	DRAWN BY

STATE OF MAINE
ROBERT C. LARSEN
3389
REGISTERED PROFESSIONAL ENGINEER

STATE OF MAINE
COLIN C. HEWETT
8374
REGISTERED PROFESSIONAL ENGINEER
11/10/00

AMES & HEWETT ENGINEERS INC
53 MAIN STREET WINTHROP, MAINE

PLOT DATE: 11-10-00

SCALE:	AS NOTED
DATE:	11-10-00
DRAWN BY: RWM	GRAPHICS CHECKED BY
DESIGNED BY:	RWM
CHECKED BY:	CCH
APPROVED BY:	RCL
FILE NAME:	00014/E4
JOB NUMBER:	2549.3
DRAWING NUMBER:	E4

APPENDIX C

TOWN OF VEAZIE TAX MAP 1

TOWN OF
VEAZIE
PENOBSCOT COUNTY
MAINE

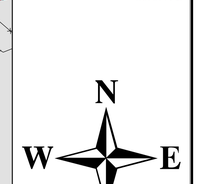
TOWN OF Veazie MAINE

N
W E
S

LEGEND

- Property Line
- Easement
- Right of Way
- Water
- Town Limit
- Private Road
- Proposed Road
- Disputed Area
- Original Parcel

100 50 0 100
Feet



Map 1

Printed 6/19/2020
Issued: 4/1/2018

APPENDIX D

CURRENT WASTE DISCHARGE LICENSE

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

IN THE MATTER OF

VEAZIE SEWER DISTRICT	)	MAINE POLLUTANT DISCHARGE
VEAZIE, PENOBSCOT COUNTY, MAINE	)	ELIMINATION SYSTEM PERMIT
PUBLICLY OWNED TREATMENT WORKS	)	AND
ME0100706	)	WASTE DISCHARGE LICENSE
W002754-6C-K-R **APPROVAL**	)	**RENEWAL**

In compliance with the applicable provisions of *Pollution Control*, 38 M.R.S. §§ 411 – 424-B, *Water Classification Program*, 38 M.R.S. §§ 464 – 470 and *Federal Water Pollution Control Act*, Title 33 U.S.C. § 1251, *et seq.*, and applicable rules of the Department of Environmental Protection (Department), the Department has considered the application of the VEAZIE SEWER DISTRICT (District/permittee), with its supportive data, agency review comments, and other related materials on file and FINDS THE FOLLOWING FACTS:

APPLICATION SUMMARY

On August 18, 2017, the Department accepted as complete for processing an application from the permittee for the renewal of combination Maine Pollutant Discharge Elimination System (MEPDES) permit #ME0100706 / Maine Waste Discharge License (WDL) #W002754-6C-H-R, which was issued by the Department on November 2, 2012 for a five-year term. The 11/2/12 permit authorized the monthly average discharge of 0.35 million gallons per day (MGD) of secondary treated wastewater from a publicly owned treatment works (POTW) to the Penobscot River, Class B, in Veazie, Maine.

PERMIT SUMMARY

This permitting action is different from the November 2, 2012 permit in that it:

1. Eliminates the waiver for percent removal requirements for carbonaceous biochemical oxygen demand ($CBOD_5$) and total suspended solids (TSS) when influent strength is less than 200 milligrams per liter (mg/L); and

2. Amends the monitoring and reporting frequencies for $CBOD_5$ and TSS to 2/Month.

CONCLUSIONS

BASED on the findings in the attached and incorporated Fact Sheet dated January 9, 2018, and subject to the Conditions listed below, the Department makes the following CONCLUSIONS:

1. The discharge, either by itself or in combination with other discharges, will not lower the quality of any classified body of water below such classification.

2. The discharge, either by itself or in combination with other discharges, will not lower the quality of any unclassified body of water below the classification which the Department expects to adopt in accordance with State law.

3. The provisions of the State's antidegradation policy, *Classification of Maine waters,* 38 M.R.S. §464(4)(F), will be met, in that:

   (a) Existing in-stream water uses and the level of water quality necessary to protect and maintain those existing uses will be maintained and protected;

   (b) Where high quality waters of the State constitute an outstanding national resource, that water quality will be maintained and protected;

   (c) Where the standards of classification of the receiving water body are not met, the discharge will not cause or contribute to the failure of the water body to meet the standards of classification;

   (d) Where the actual quality of any classified receiving water body exceeds the minimum standards of the next highest classification that higher water quality will be maintained and protected; and

   (e) Where a discharge will result in lowering the existing water quality of any water body, the Department has made the finding, following opportunity for public participation, that this action is necessary to achieve important economic or social benefits to the State.

4. The discharge will be subject to effluent limitations that require application of best practicable treatment as defined in *Conditions of licenses*, 38 M.R.S. § 414-A(1)(D).

ACTION

THEREFORE, the Department APPROVES the above noted application of the VEAZIE SEWER DISTRICT to discharge a monthly average flow of 0.35 million gallons per day of secondary treated wastewater to the Penobscot River, Class B, in Veazie, Maine, SUBJECT TO ALL APPLICABLE STANDARDS AND REGULATIONS AND THE FOLLOWING CONDITIONS:

1. "*Maine Pollutant Discharge Elimination System Permit Standard Conditions Applicable To All Permits*," revised July 1, 2002, copy attached.

2. The attached Special Conditions, including any effluent limitations and monitoring requirements.

3. This permit becomes effective upon the date of signature below and expires at midnight five (5) years after that date. If a renewal application is timely submitted and accepted as complete for processing prior to the expiration of this permit, the terms and conditions of this permit and all subsequent modifications and minor revisions thereto remain in effect until a final Department decision on the renewal application becomes effective. *Maine Administrative Procedure Act*, 5 M.R.S. § 10002 and *Rules Concerning the Processing of Applications and Other Administrative Matters*, 06-096 C.M.R. 2(21)(A) (amended October 19, 2015).

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

DONE AND DATED AT AUGUSTA, MAINE, THIS 9th DAY OF January 2018.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Michael Kuhns
for PAUL MERCER, Commissioner

Date of initial receipt of application: August 17, 2017
Date of application acceptance: August 18, 2017

Filed
JAN 09 2018
State of Maine
Board of Environmental Protection

Date filed with Board of Environmental Protection _____

This Order prepared by Cindy L. Dionne, Bureau of Water Quality

SPECIAL CONDITIONS

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. The permittee is authorized to discharge secondary treated municipal wastewater via **Outfall #001A** to the Penobscot River. Such discharges must be limited and monitored by the permittee as specified below[1]:

Effluent Characteristics	Discharge Limitations						Minimum Monitoring Requirements	
	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type
Flow *[50050]*	0.35 MGD *[03]*	—	Report MGD *[03]*	---	---	---	Continuous *[99/99]*	Recorder *[RC]*
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$) *[80082]*	73 lbs./day *[26]*	117 lbs./day *[26]*	131 lbs./day *[26]*	25 mg/L *[19]*	40 mg/L *[19]*	45 mg/L *[19]*	2/Month *[02/30]*	24-Hr. Composite *[24]*
$CBOD_5$ % Removal[2] *[80358]*	---	---	---	65% *[23]*	---	---	1/Month *[01/30]*	Calculate *[CA]*
TSS *[00530]*	88 lbs./day *[26]*	131 lbs./day *[26]*	146 lbs./day *[26]*	30 mg/L *[19]*	45 mg/L *[19]*	50 mg/L *[19]*	2/Month *[02/30]*	24-Hour Composite *[24]*
TSS % Removal[2] *[81011]*	---	---	---	85% *[23]*	---	---	1/Month *[01/30]*	Calculate *[CA]*
Settleable Solids *[00545]*	---	---	---	---	---	0.3 ml/L *[25]*	3/Week *[03/07]*	Grab *[GR]*
E. coli* Bacteria**[3] ***(May 15 – Sept. 30) *[31633]*	---	---	---	64/100 ml [4] *[13]*	---	427/100 ml *[13]*	1/Week *[01/07]*	Grab *[GR]*
Total Residual Chlorine[5] *[50060]*	---	---	---	---	---	1.0 mg/L *[19]*	5/Week *[05/07]*	Grab *[GR]*
pH [6] *[00400]*	---	---	---	---	---	6.0 – 9.0 SU *[12]*	3/Week *[03/07]*	Grab *[GR]*
Mercury [7] *[71900]*	---	---	---	6.3 ng/L *[3M]*	---	9.4 ng/L *[3M]*	1/Year *[01/YR]*	Grab *[GR]*

The italicized numeric values bracketed in the table and in subsequent text are code numbers that Department personnel utilize to code the monthly Discharge Monitoring Reports (DMRs).

Footnotes: See Pages 5 through 6 of this permit for applicable footnotes.

SPECIAL CONDITIONS

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (cont'd)

Footnotes:

1. **Sampling** – The permittee must conduct sampling and analysis in accordance with; a) methods approved by 40 Code of Federal Regulations (CFR) Part 136, b) alternative methods approved by the Department in accordance with the procedures in 40 CFR Part 136, or c) as otherwise specified by the Department. Samples that are sent out for analysis must be analyzed by a laboratory certified by the State of Maine's Department of Health and Human Services for wastewater. Samples that are analyzed by laboratories operated by waste discharge facilities licensed pursuant to *Waste discharge licenses*, 38 M.R.S. § 413 are subject to the provisions and restrictions of *Maine Comprehensive and Limited Environmental Laboratory Certification Rules*, 10-144 C.M.R. 263 (effective April 1, 2010). Laboratory facilities that analyze compliance samples in-house are subject to the provisions and restrictions of 10-144 CMR 263. If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the DMR.

   Any change in sampling location(s) must be reviewed and approved by the Department in writing.

   Influent sampling for $CBOD_5$ and TSS must be collected after the grit removal / screening processes at the headworks of the facility.

   Effluent sampling for all parameters must be collected after the chlorine contact chamber, the last treatment process prior to discharge to the receiving water.

2. **Percent Removal** – The treatment facility must maintain a minimum of 65% removal for $CBOD_5$ and an 85% removal for TSS for all flows receiving secondary treatment during all months that the facility discharges. Compliance with the limitations will be based on a twelve-month rolling average. Calendar monthly average percent removal values must be calculated based on influent and effluent concentrations. For the purposes of this permitting action, the twelve-month rolling average calculation is based on the most recent twelve-month period.

3. ***E. coli* bacteria** - *E. coli* bacteria limits and monitoring requirements are seasonal and apply between May 15th and September 30th of each year. In accordance with 38 M.R.S. § 414-A(5), the Department may, at any time and with notice to the permittee, modify this permit to establish bacteria limitations on a year-round basis to protect the health and welfare of the public.

SPECIAL CONDITIONS

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (cont'd)

Footnotes:

4. **Bacteria Reporting** – The monthly average *E. coli* bacteria limitation is a geometric mean value and sample results must be reported as such.

5. **Total residual chlorine (TRC)** – Limitations and monitoring requirements are applicable whenever elemental chlorine or chlorine based compounds are being used to disinfect the discharge. The permittee must utilize approved test methods that are capable of bracketing the limitations in this permit.

6. **pH** - The pH value of the effluent must not be lower than 6.0 SU nor higher than 9.0 SU at any time unless due to natural causes.

7. **Mercury** – The permittee must conduct all mercury monitoring required by this permit or required to determine compliance with interim limitations established pursuant to 06-096 CMR 519 in accordance with the U.S. Environmental Protection Agency's (USEPA) "clean sampling techniques" found in USEPA Method 1669, *Sampling Ambient Water For Trace Metals At EPA Water Quality Criteria Levels*. All mercury analysis must be conducted in accordance with USEPA Method 1631, *Determination of Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Fluorescence Spectrometry*. See **Attachment A** of this permit for a Department report form for mercury test results. Compliance with the monthly average limitation established in Special Condition A of this permit will be based on the cumulative arithmetic mean of all mercury tests results that were conducted utilizing sampling Method 1669 and analysis Method 1631E on file with the Department for this facility.

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SPECIAL CONDITIONS

B. NARRATIVE EFFLUENT LIMITATIONS

1. The permittee must not discharge effluent that contains a visible oil sheen, foam or floating solids at any time which would impair the uses designated for the classification of the receiving waters.

2. The permittee must not discharge effluent that contains materials in concentrations or combinations which are hazardous or toxic to aquatic life, or which would impair the uses designated for the classification of the receiving waters.

3. The permittee must not discharge effluent that causes visible discoloration or turbidity in the receiving waters or otherwise impairs the uses designated for the classification of the receiving waters.

4. The permittee must not discharge effluent that lowers the quality of any classified body of water below such classification, or lowers the existing quality of any body of water if the existing quality is higher than the classification.

C. TREATMENT PLANT OPERATOR

The person who has management responsibility over the treatment facility must hold a Maine **Grade II**, Biological Treatment certificate (or higher) or must be a Maine Registered Professional Engineer pursuant to *Sewage Treatment Operators*, 32 M.R.S. § 4171-4182 and *Regulations for Wastewater Operator Certification*, 06-096 CMR 531 (effective May 8, 2006). All proposed contracts for facility operation by any person must be approved by the Department before the permittee may engage the services of the contract operator.

D. LIMITATIONS FOR INDUSTRIAL USERS

Pollutants introduced into the wastewater collection and treatment system by a non-domestic source (user) must not pass through or interfere with the operation of the treatment system. The permittee must conduct an IWS any time a new industrial user proposes to discharge within its jurisdiction; an existing user proposes to make a significant change in its discharge; or at an alternative minimum, once every permit cycle, and submit the results to the Department. See **Attachment D** of the Fact Sheet for Department Guidance on conducting an IWS. The IWS must identify, in terms of character and volume of pollutants, any Significant Industrial Users discharging into the publicly-owned treatment works (POTW) subject to Pretreatment Standards under section 307(b) of the federal Clean Water Act, 40 CFR Part 403 (general pretreatment regulations) or *Pretreatment Program*, 06-096 CMR 528 (last amended March 17, 2008).

SPECIAL CONDITIONS

E. NOTIFICATION REQUIREMENTS

In accordance with Standard Condition D, the permittee must notify the Department of the following:

1. Any introduction of pollutants into the wastewater collection and treatment system from an indirect discharger in a primary industrial category discharging process wastewater; and;

2. Any substantial change (increase or decrease) in the volume or character of pollutants being introduced into the wastewater collection and treatment system by a source introducing pollutants into the system at the time of permit issuance.

3. For the purposes of this section, adequate notice must include information on:

   (a) The quality and quantity of wastewater introduced to the wastewater collection and treatment system; and

   (b) Any anticipated impact of the change in the quantity or quality of the wastewater to be discharged from the treatment system.

F. AUTHORIZED DISCHARGES

The permittee is authorized to discharge only in accordance with: 1) the permittee's General Application for Waste Discharge Permit, accepted for processing on August 18, 2017; 2) the terms and conditions of this permit; and 3) only from Outfall #001A. Discharges of wastewater from any other point source are not authorized under this permit, and must be reported in accordance with Standard Condition D(1)(f), *Twenty-four hour reporting* of this permit.

G. WET WEATHER MANAGEMENT PLAN

The treatment facility staff must have a current written Wet Weather Management Plan to direct the staff on how to operate the facility effectively during periods of high flow. The Department acknowledges that the existing collection system may deliver flows in excess of the monthly average design capacity of the treatment plant during periods of high infiltration and rainfall.

The plan must conform to Department guidelines for such plans and must include operating procedures for a range of intensities, address solids handling procedures (including septic waste and other high strength wastes if applicable) and provide written operating and maintenance procedures during the events.

SPECIAL CONDITIONS

G. WET WEATHER MANAGEMENT PLAN (cont'd)

The permittee must review their plan at least annually and record any necessary changes to keep the plan up to date. The Department may require review and update of the plan as it is determined to be necessary.

H. OPERATION & MAINTENANCE (O&M) PLAN

The permittee must maintain a current written comprehensive Operation & Maintenance (O&M) Plan for the facility. The plan must provide a systematic approach by which the permittee must at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit.

By December 31 of each year, or within 90 days of any process changes or minor equipment upgrades, the permittee must evaluate and modify the O&M Plan including site plan(s) and schematic(s) for the wastewater treatment facility to ensure that it is up-to-date. The O&M Plan must be kept on-site at all times and made available to Department and USEPA personnel upon request.

Within 90 days of completion of new and or substantial upgrades of the wastewater treatment facility, the permittee must submit the updated O&M Plan to their Department inspector for review and comment.

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SPECIAL CONDITIONS

I. 06-096 CMR 530(2)(D)(4) STATEMENT FOR REDUCED/WAIVED TOXICS TESTING

By December 31 of each calendar year, the permittee must provide the Department with a certification describing any of the following that have occurred since the effective date of this permit ***[ICIS Code 75305]***. See **Attachment C** of the Fact Sheet for an acceptable certification form to satisfy this Special Condition.

(a) Changes in the number or types of non-domestic wastes contributed directly or indirectly to the wastewater treatment works that may increase the toxicity of the discharge;

(b) Changes in the operation of the treatment works that may increase the toxicity of the discharge;

(c) Changes in industrial manufacturing processes contributing wastewater to the treatment works that may increase the toxicity of the discharge;

In addition, in the comments section of the certification form, the permittee must provide the Department with statements describing;

(d) Changes in stormwater collection or inflow/infiltration affecting the facility that may increase the toxicity of the discharge; and

(e) Increases in the type or volume of transported (hauled) wastes accepted by the facility.

The Department may require that annual testing be re-instated if it determines that there have been changes in the character of the discharge or if annual certifications described above are not submitted.

J. MONITORING AND REPORTING

Electronic Reporting

NPDES Electronic Reporting, 40 C.F.R. 127, requires MEPDES permit holders to submit monitoring results obtained during the previous month on an electronic discharge monitoring report to the regulatory agency utilizing the USEPA electronic system.

Electronic DMRs submitted using the USEPA NetDMR system, must be:

1. Submitted by a facility authorized signatory; and
2. Submitted no later than **midnight on the 15th day of the month** following the completed reporting period.

SPECIAL CONDITIONS

J. MONITORING AND REPORTING (cont'd)

Documentation submitted in support of the electronic DMR may be attached to the electronic DMR. Toxics reporting must be done using the Department toxsheet reporting form. An electronic copy of the Toxsheet reporting document must be submitted to your Department compliance inspector as an attachment to an email. In addition, a hardcopy form of this sheet must be signed and submitted to your compliance inspector, or a copy attached to your NetDMR submittal will suffice.

Documentation submitted electronically to the Department in support of the electronic DMR must be submitted no later than midnight on the 15th day of the month following the completed reporting period.

Non-electronic Reporting

If you have received a waiver from the Department concerning the USEPA electronic reporting rule, or are permitted to submit hardcopy DMR's to the Department, then your monitoring results obtained during the previous month must be summarized for each month and reported on separate Discharge Monitoring Report (DMR) forms provided by the Department and **postmarked on or before the thirteenth (13th) day of the month or hand-delivered to a Department Regional Office such that the DMR's are received by the Department on or before the fifteenth (15th) day of the month** following the completed reporting period.

Toxsheet reporting forms must be submitted electronically as an attachment to an email sent to your Department compliance inspector. In addition, a signed hardcopy of your toxsheet must also be submitted.

A signed copy of the DMR and all other reports required herein must be submitted to the Department assigned compliance inspector (unless otherwise specified) following address:

Department of Environmental Protection
Eastern Maine Regional Office
Bureau of Water Quality
Division of Water Quality Management
106 Hogan Road
Bangor, Maine 04401

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SPECIAL CONDITIONS

K. REOPENING OF PERMIT FOR MODIFICATION

In accordance with 38 M.R.S. § 414-A(5) and upon evaluation of the test results required by the Special Conditions of this permitting action, new site specific information, or any other pertinent test results or information obtained during the term of this permit, the Department may, at any time and with notice to the permittee, modify this permit to: (1) include effluent limitations necessary to control specific pollutants or whole effluent toxicity where there is a reasonable potential that the effluent may cause water quality criteria to be exceeded: (2) require additional monitoring if results on file are inconclusive; or (3) change monitoring requirements or limitations based on new information.

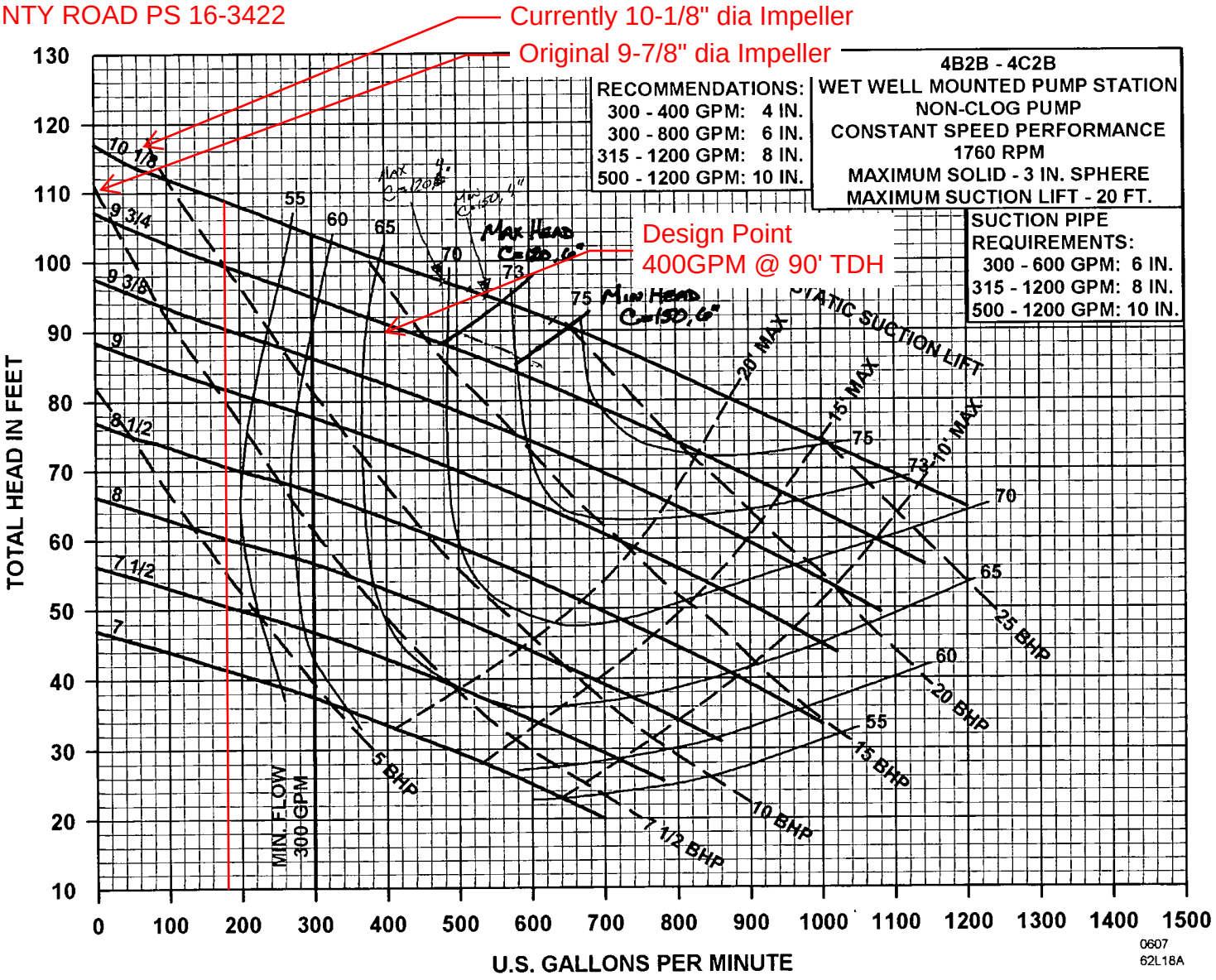
L. SEVERABILITY

In the event that any provision or part thereof, of this permit is declared to be unlawful by a reviewing court, the remainder of the permit must remain in full force and effect, and must be construed and enforced in all aspects as if such unlawful provision, or part thereof, had been omitted, unless otherwise ordered by the court.

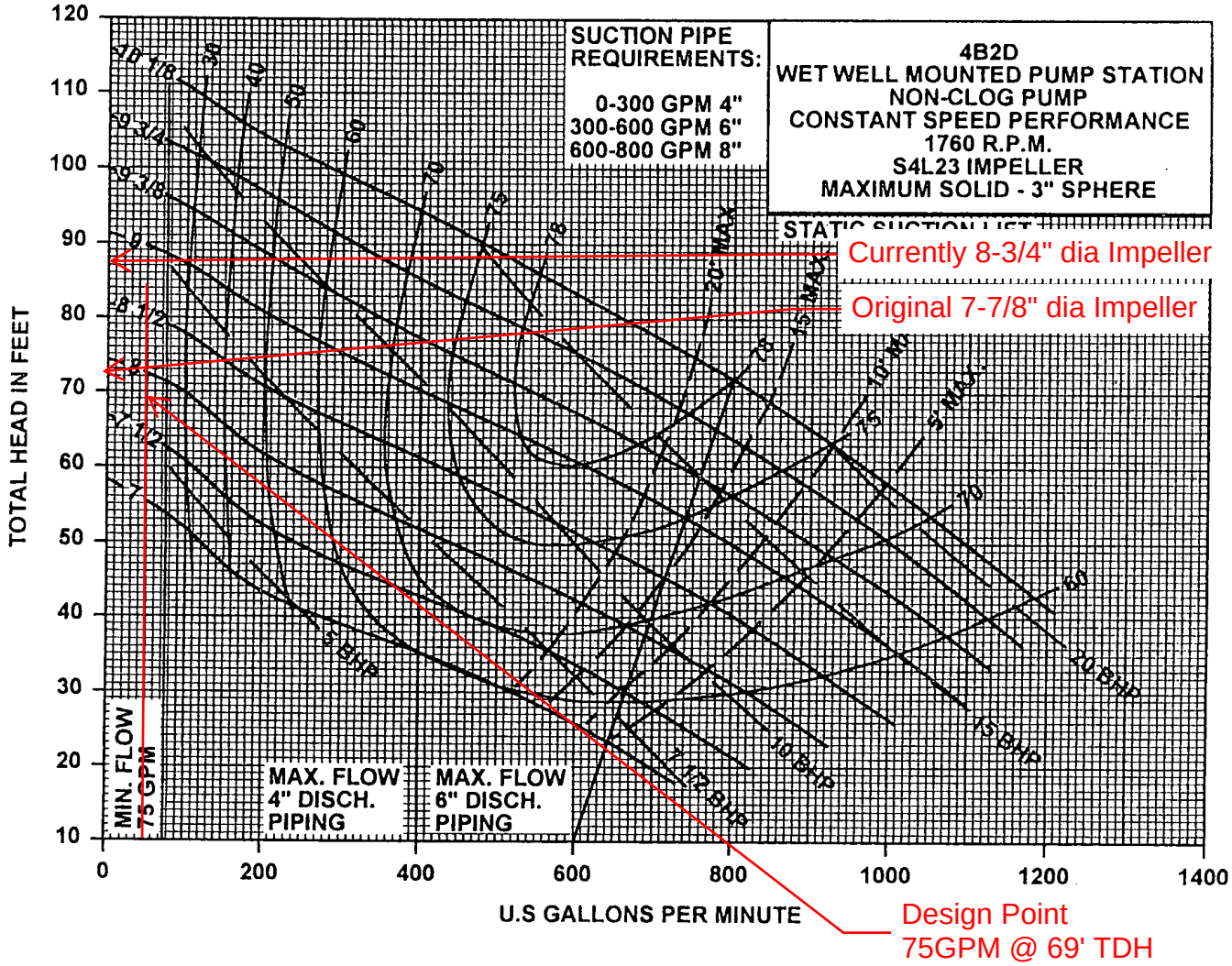
APPENDIX E

COUNTY ROAD AND BUCK HILL PUMP STATION CURVES

COUNTY ROAD PS 16-3422



Buck Hill PS FX01098



APPENDIX F

PLANNING LEVEL CONSTRUCTION COST ESTIMATES

VEAZIE SEWER DISTRICT
WASTEWATER COLLECTION AND TREATMENT SYSTEM EVALUATION
Planning Level Construction Cost Estimate
10243.006
2/22/2022

Item	Priority	Category	Description	Estimated Cost	Completion Date
1	1	Operator Safety	Replace faulty gas detection system in Headworks Building.	$ 10,000.00	
2	1	Operator Safety	Clear area to allow access to the emergency shower and eyewash station in the Disinfection Building.	VSD	
3	1	Operator Safety	Install potable water and OSHA compliant emergency shower in the Disinfection Building.	$ 27,000.00	
4	1	Operator Safety	Remove “jumper wire” from electrical panel to the effluent flowmeter controller in the disinfection room and provide a proper electrical connection to the flowmeter.	$ 1,000.00	
5	1	Operator Safety	Reinstall grating above the channels in the treatment area of the Headworks Building	VSD	
6	1	Operator Safety	Replace existing chain that is used across the end of the Headworks Building loading dock, this should be replaced with either a removable handrail or a gate to provide fall protection when the loading dock is not in use.	$ 2,500.00	
7	1	Operator Safety	Install handrails along channel by the Auger Monster in the treatment area of the Headworks Building.	$ 2,500.00	
8	1	Operator Safety	Install arc-flash compliant control panel at the County Road Pump Station.	$ 25,000.00	
9	1	Operator Safety	Install arc-flash compliant control panel at the Buck Hill Pump Station.	$ 25,000.00	
10	1	Operator Safety	Repair spalling concrete on Headworks Building loading dock platform.	$ 1,500.00	
11	1	Operator Safety	Relevel exterior entry step to blower room in Blower Building.	$ 1,000.00	
12	1	Operator Safety	Install a combination emergency light and exist sign in both rooms of the Disinfection Building.	$ 1,000.00	
13	1	Operator Safety	Upgrade SCADA system to call out all alarm conditions and provide operators with remote control	$ 30,000.00	
14	1	Condition	Blower Building repair/replace roofing and repair damage due to water leak.	$ 10,000.00	
15	1	Condition	Remove vegetation from the cover of Lagoon #3.	$ 7,500.00	
16	1	Condition	Repair gas line and restore heater operation in Blower Building.	$ 5,000.00	
17	1	Condition	Replace two broken windows in the treatment area of the Headworks Building.	$ 2,500.00	
18	1	Condition	Repair the attachment of the handrail between the stairs and loading dock at the Headworks Building.	$ 1,500.00	
19	1	Condition	Upgrade Superintendent and Office Manager computers.	$ 2,500.00	
20	1	Compliance	Emergency Generator sized to power entire WWTP. (At a minimum the generator should be sized to operate the Administration Building, Headworks and Disinfection Building)	$ 40,000.00	
21	1	Condition	County Road Pump Station improvements including the replacement of the pumps and controls, adding a building to enclose the pump station.	$ 250,000.00	
22	1	Condition	Buck Hill Pump Station improvements including replacement of the pumps and controls, adding a building to enclose the pump station, grading the area adjacent to the pump station to direct surface water away from the wet well.	$ 100,000.00	

23	1	Condition	Grout and seal joint between wall and foundation in Headworks Building.	$ 7,500.00	
24	1	Condition	Establish equipment maintenance logs track all maintenance activities on specific equipment.	VSD	
25	2	Ease of Operation	Relocate SCADA computer to the Superintendent's Office.	$ 2,500.00	
26	2	Operator Safety	Replace ventilation system in disinfection area of Disinfection Building.	$ 7,500.00	
27	2	Operator Safety	Install additional site lighting around the WWTP to enhance operator safety at night and improve security. (10 lights)	$ 30,000.00	
28	2	Operator Safety	Install additional exterior lighting at the County Road Pump Station to illuminate the area and provide safe work conditions during night repairs. This will also enhance security at the pump station.	$ 2,500.00	
29	2	Operator Safety	Install exterior lighting at the Buck Hill Pump Station to illuminate the area and provide safe work conditions during night repairs. This will also enhance security at the pump station.	$ 2,500.00	
30	2	Compliance	Connect wash water system to Headworks Auger Monster to aid in the removal of organic material from the screenings.	$ 2,500.00	
31	2	Condition	Repair support bracket for effluent flow meter ultrasonic sensor.	$ 250.00	
32	2	Compliance	Fill in missing panels in Lagoon #3 cover.	$ 10,000.00	
33	2	Condition	Replace door hardware in the treatment area of the Headworks Building.	$ 500.00	
34	2	Condition	Replace blower rubber connectors.	$ 500.00	
35	2	Condition	Replace all blower assemblies, including blower units, electric motors and VFDs.	$ 50,000.00	
36	2	Condition	Replace ventilation system in treatment area of Headworks Building.	$ 1,000.00	
37	2	Condition	Repair soft areas in roof and replace shingles on the Administration Building.	$ 15,000.00	
38	2	Compliance	Clean all lagoon TLV structures. (TLV structure cleaning should be performed on an annual basis)	$ 3,500.00	
39	2	Compliance	Repair Lagoon #1 baffle walls	$ 2,000.00	
40	2	Compliance	Replace Lagoon #1 baffle walls	$ 50,000.00	
41	2	Condition	Remove corrosion and paint doors and frames in Headworks Building. An alternative would be to replace the doors with composite doors.	$ 1,500.00	
42	2	Ease of Operation	Install additional auger/conveyor to transport screenings in Headworks and minimize operators pushing dumpsters.	$ 25,000.00	
43	2	Ease of Operation	Locate and raise aeration system valves for Lagoon #1 and Lagoon #2. (12 valves)	$ 2,400.00	
44	2	Ease of Operation	Overlay pavement in access road and parking area to extend the service life of the existing	$ 10,000.00	
45	2	Ease of Operation	Sliding access gates (3 gates)	$ 20,000.00	
46	2	Compliance	Collect influent and effluent O&M BOD5 samples and compile data for potential parameter changes in future WDL.	VSD	
47	2	Compliance	Collect effluent O&M phosphorus samples and compile data for potential future discharge limits in future WDL.	VSD	
48	2	Operator Safety	Conduct noise level measurements to determine compliance OSHA Hearing Conservation Program. Areas/tasks to consider performing noise level measurements should include, Blower Room, Treatment Area of Headworks, using chainsaw and using lawn mower.	$ 7,500.00	

49	2	Compliance	Investigate and eliminate I/I in the collection system using dry weather/wet weather investigations, CCTV inspection, manhole inspections and flow monitoring.	$ 10,000.00	
50	3	Condition	Remove and dispose of the remains of a mechanical aerator support structure from southern end of Lagoon #1.	$ 2,500.00	
51	3	Condition	Remove and dispose of mechanical aerator support structure from the southwest corner of Lagoon #2.	$ 2,500.00	
52	3	Condition	Remove and dispose of the Wallace & Tiernan Series 50-135 chlorine gas monitoring unit that was used when chlorine gas was used for disinfection in Disinfection Building.	$ 250.00	
53	3	Compliance	Conduct sludge depth readings in all three lagoons. (Sludge depth readings should be performed every 2-3 years to verify minimum liquid depth in the lagoons are maintained)	$ 5,000.00	
54	3	Compliance	Install flowmeter at the Grey Stone Trailer Park for I/I investigation and billing.	$ 15,000.00	
55	3	Compliance	Install Solar Panels to offset wwtp electrical cost	$ 227,500.00	
Construction Subtotal				**$ 1,062,400.00**	
Design and Bidding (Approx. 10% of construction estimate)				**$ 106,250.00**	
Construction Administration and Oversight (5% of construction estimate)				**$ 53,000.00**	
Legal and Interim Financing (10% of construction estimate)				**$ 106,250.00**	
20% Contingency				**$ 212,500.00**	
Total Improvements				**$ 1,540,400.00**	