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Landscape Architecture, D.P.C.

WASTEWATER ENGINEER'S REPORT

Saratoga BioChar Solutions, LLC
Farnan Road
Town of Moreau, NY

March 30, 2022

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PROJECT DESCRIPTON

The proposed Saratoga Biochar Solutions carbon fertilizer manufacturing facility utilizes biosolids and wood waste feedstock to produce a marketable carbon fertilizer through lower temperature drying and pyrolysis processes. Process and domestic wastewater generated by the facility will be connected to the existing Town of Moreau sewer collection system located in Moreau Industrial Park. Proposed infrastructure and connection include the installation of a 6-inch diameter schedule 40 pvc pipe discharge line. This report summarizes the anticipated wastewater discharge volume, existing and proposed infrastructure required for the proposed development for consideration and review by the Town of Moreau.

DESCRIPTION OF EXISTING SITE

The project site is comprised of two parcels located at the terminus of Farnan Road within the Moreau Industrial Park (MIP) in the Town of Moreau, NY (Tax Map IDs 50.-4-22 and 50.-4-16). The site is approximately 5.89 ±acres of undeveloped land. The western portion of the site is currently wooded while the eastern extremities are primarily grassed with no existing development. Majority of the surrounding parcels are undeveloped with the exception of roads, a sanitary sewer pump station with perimeter fencing located at the southeast corner of the site, and a chemical manufacturing facility, Hexion, Inc., located across Farnan Road to the east of the project site.

The MIP is currently serviced by the Moreau sewer collection system via an 8-inch class 50 ductile iron sewer force main running along the east side of Farnan Road. A pump station (MIP pump station) exists on the west side of the cul-de-sac located at the terminus of Farnan Road. Per Laberge Group's Sewer District No. 1 Extension 5 Addendum 2 Report dated January 2021, the MIP pump station has a maximum 370 minutes per day operation with projected pumping at 2.75 minutes per cycle at 405 GPM. The current MIP activities are reported to be operating 30-40 minutes per day in the low to mid 300 GPM. The existing pump station has a 10-foot diameter wet will with a reported 1.9-foot-deep active volume. The Laberge Group Report is provided in Appendix B of this report.

DESCRIPTION OF PROPOSED DEVELOPMENT

Proposed site development includes the construction of a carbon fertilizer manufacturing facility (Facility), a parking lot and required stormwater management practices. The proposed Facility consists of a metal building constructed in three separate phases between 2022 and 2026. The Facility will manufacture a Class A carbon fertilizer from feedstock of primarily biosolids sourced from wastewater treatment plants. The manufacturing process implements drying and pyrolysis to produce the carbon fertilizer for use as soil fertilizer.

Proposed sewer infrastructure includes a 6-inch diameter schedule 40 pvc pipe. The discharge line will exit from the eastern most building and run through the eastern extremities of the site to an existing sanitary sewer manhole located on the west side of the Farnan Road cul-de-sac. The existing manhole currently has three inflow pipes and one outflow pipe that conveys wastewater to the MIP lift station.

ANTICIPATED WASTEWATER PRODUCTION

The anticipated wastewater discharge generated by activities at the proposed Facility is 29,456 gallons per day (GPD) after the buildout of Phase 3. The breakdown of wastewater production at each phase is provided below and in Appendix A of this report. It is anticipated that two to six employees will be tending operations on a daily basis. The anticipated volume of wastewater estimation provided below. The Facility is anticipated to operate 24 hours, 7 days a week, with operational uptime estimated at 95% and downtime anticipated at 5% for scheduled maintenance. As such, discharge of wastewater is assumed to be relatively continuous.

Anticipated Wastewater Flow Rates				
	Phase 1	Phase 2	Phase 3	Total
Hourly Demand (GPH)	422	402	402	1,227
Daily Demand (GPD)	10,139	9,659	9,659	29,456

Note: See Appendix A for breakdown of wastewater production within the proposed process line following the buildout of each phase.

AVAILABLE SEWER COLLECTION CAPACITY

The Town of Moreau sewer collection system currently has five sewer district extensions that ultimately discharge to the City of Glens Falls Wastewater Treatment Plant (WWTP). Wastewater must meet the Glens Falls City Code 177 Article VII Discharge Requirements prior to discharge to the municipal sewer system. As provided in letter composed by the chief operator of the City of Glens Falls WWTP, the Town of Moreau's discharge capacity is currently 190,000 GPD while reported discharge is presently 75,000 GPD. As such, remaining capacity is adequate to accommodate collection and treatment of wastewater discharge from the Saratoga Biochar Solutions Facility.

The existing MIP pump station has the capacity to run at 405 GPM at 2.75 minutes per cycle. The anticipated wastewater discharge rate after Phase 3 buildout is 21.4 GPM, far below the maximum pump capacity reported in the Laberge Group Report (Appendix B).

CONCLUSION

It is our opinion that the existing MIP sewer collection system infrastructure is capable of accommodating the connection and conveyance of wastewater generated by proposed development. Additionally, based on discharge capacity provided by the City of Glens Falls WWTP chief operator, the WWTP has adequate capacity to accommodate to manage the additional discharge produced by proposed development.

Water Engineer's Report Prepared by:

Matthew E. Huntington, PE
Principal
For
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APPENDIX A

SARATOGA BIOCHAR ESTIMATED WASTEWATER PRODUCTION

SARATOGA biochar solutions
a project of northeastern biochar solutions

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Providing Essential Services – Manufacturing Carbon Fertilizer – Benefiting Host Communities & Environment

SBS Water & Wastewater Requirements

Note: SBS intends to recycle the wastewater from the ammonia scrubber into the carbon fertilizer to avoid nutrient discharge to the sewer. The wastewater replaces water that would otherwise be consumed from the municipality to hydrate the carbon fertilizer.

SBS Water					
	Phase 1	**Phase 2**	**Phase 3**	**Total**	**Units**
Process	**368**	**368**	**368**	**1,103**	**GPH**
Venturi Scrubber	259	259	259	**778**	GPH
Sulfur Dioxide (SO2) Scrubber	74	74	74	**223**	GPH
Ammonia (NH4) Scrubber	13	13	13	**39**	GPH
Bioscrubber	21	21	21	**63**	GPH
Office	30	5	5	40	GPH
Truck Wash	60	25	25	110	GPH
Total, hourly	**458**	**398**	**398**	**1,253**	**GPH**
Total, daily	**10,986**	**9,546**	**9,546**	**30,079**	**GPD**

SBS Wastewater					
	Phase 1	**Phase 2**	**Phase 3**	**Total**	**Units**
Process	**391**	**391**	**391**	**1,174**	GPH
Venturi Scrubber					
Discharge	259	259	259	**778**	GPH
Dust (biosolids)	2.2	2.2	2.2	**6.7**	lbs/h
Sulfur Dioxide (SO2) Scrubber					
Discharge	92	92	92	**276**	GPH
Calcium Sulfite CaSO3·x(H2O)	147	147	147	**440**	lbs/h
Ammonia (NH4) Scrubber					
Discharge	19	19	19	**57**	GPH
Ammonium Sulfate $(NH_4)_2SO_4$	49	49	49	**146**	lbs/h
Bioscrubber					
Discharge	21	21	21	**64**	GPH
Office	25	5	5	**35**	GPH
Truck Wash	25	25	25	**75**	GPH
Total, hourly	**441**	**421**	**421**	**1,284**	**GPH**
Total, daily	**10,593**	**10,113**	**10,113**	**30,819**	**GPD**
Total, minus NH4 Scrubber, hourly	**422**	**402**	**402**	**1,227**	**GPH**
Total, minus NH4 Scrubber, daily	**10,139**	**9,659**	**9,659**	**29,456**	**GPD**

APPENDIX B

LABERGE GROUP

SEWER DISTRICT NO. 1 EXTENSION 5

ADDENDUM 2

REPORT

Town of Moreau
Saratoga County, New York
Map Plan and Report
Sewer District No. 1 Extension 5

ADDENDUM 2

January 2021

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Town of Moreau
Saratoga County, New York
Map Plan and Report
Sewer District No. 1 Extension 5

ADDENDUM 2

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Attachment D: Lift Station Design Basis
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Attachment F: System Schematic
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INTRODUCTION

This report is intended to supplement the previously submitted "Map, Plan and Report / Sewer District No. 1 / Extension 5" dated May 2018 and Report Addendum 1 dated November 2019, prepared by Laberge Group. This report provides the specific technical design information relating to the plans and specifications for the Town of Moreau's Sewer District No. 1, Extension No. 5 (the "Extension").

I. GENERAL

The project includes the installation of a low pressure sewer collection system and associated grinder pumps, central lift station and forcemain.

II. COLLECTION SYSTEM

The collection system will be of the low pressure type.

The E-One design report contained in **Attachment A** presents sizing information for of the low-pressure sewer. There are four generalized areas that contribute flow to the extension's central lift station:

A. West of the central Lift Station on Route 9: 37 grinder pump stations flow through pipe varying from 2-inch to 4-inch diameter.

B. East of the central Lift Station on Route 9: 16 grinder pump stations discharge through a pipe varying from 2-inch to 4-inch diameter.

C. Pines Trailer Park: 16 grinder pump stations with discharge through a pipe varying from 2-inch to a 3-inch diameter.

D. Lamplighter: 115 grinder pump stations and an additional 53 pumps on Route 9 discharge through pipe varying from 2-inch to 4-inch diameter.

The Central Lift Station discharges through a ten-inch HDPE force main that is discussed later in the report.

In addition to the above-noted grinder pumps, there are 11 grinder pumps to be installed at the Bluebird Terrace mobile home park. A small low pressure sewer collection system in this park is comprised of 2-inch diameter pipe. This low-pressure sewer system will extend toward the ten-inch force main at its alignment station 239+35, but it will not connect to that force main. Rather, the two-inch low-pressure sewer will be installed along-side the ten-inch line up to alignment station 274+10±, approximately 3,475 linear feet, to a point where it will connect to the 6-inch force main from Bluebird Village (not from the Central Lift Station) that runs parallel to the Central Lift Station's force main. The 6-inch force main connects to the Industrial Park force main, which discharges to the City of Glens Falls.

This approach is pursued for two reasons: first, the owner can pursue a separate funding opportunity for a separated new low-pressure sewer. Second, this presents an opportunity to connect Bluebird Terrace to the Glens Falls WWTP, sooner than other project components.

Low-Pressure Sewer System Design

Wherever possible, multiple dwellings on individual lots will be combined into common grinder pump stations. In the case of mobile homes, three or four residences will typically share a grinder pump, but no more than six residences per grinder pump station will be allowed. Businesses will each have their own grinder pump(s). In the case of where a single grinder pump station serves a single dwelling or mobile home, a simplex grinder pump station will be installed which provides 100-gallons of storage volume. In cases where a single grinder pump station serves multiple residences, a duplex grinder pump station will be provided with up to 476-gallons of storage volume.

For lodging establishments, there was an assessment of water meter data and existing septic tank capacity to tailor the grinder pump storage capacities to these individual businesses. As such, establishments will be provided one or more fiberglass tanks with volumes ranging from 630 gallons to 1,700 gallons. Basic sizing was specified based on the following:

- No less than 70 gallons storage will be provided for each equivalent dwelling unit.
- Commercial basin sizing used available drinking water meter data to establish equivalency based on 200 gallons per day (GPD) estimated dwelling usage.
- Where existing pump or holding tanks are in use, these tanks will be replaced with new matching sized tanks with formed inverts to convey flows to the pumps.
- Grinder pump control boxes will be supplied with power outlets capable of being energized by a portable generator during a prolonged power outage.

The proposed grinder pumps will have sufficient head capacity to meet the demand for this system. As demonstrated by the pump curve for the grinder pump units contained in **Attachment B** the pumps have a head capacity of 185 feet, more than sufficient for this application.

The low pressure sewers will contain flushing access at the terminal ends and on line depending upon length. Air release valves are located high points throughout the system.

III. FORCE MAIN

The central Lift Station is to be installed near station 64+50± on Route 9 with a 10-inch HDPE SDR 11 force main connecting to the existing 8-inch DIP Industrial Park force main in Sisson Road at approximately station 298+80±. There is a total of 23,580± feet of proposed 10-inch HDPE. The proposed 10-inch diameter HDPE force main is rated for 200 psi. Please refer to **Attachment C** for the force main hydraulic grade line.

The existing Industrial Park force main discharges to the existing Manhole 5 at the Glens Falls Waste Water Treatment Plant. The existing force main is generally lower in elevation than the proposed main, with a high point of 320 feet at an air valve that is upstream of where the profile sags significantly to cross the Hudson River. The overall length of new and existing force main is 35,510± feet.

The end-to-end elevation change on the overall force main is from 334± feet at the lift station to 297± feet at Manhole 5, with the highest elevation being 344± feet near stations 144+80 and 243+20 feet.

The proposed 10-inch force main shall be provided with air release valve structures at high points averaging about 3200 feet apart. These valves serve primarily to release air during force main pressurization, as vacuum pressure is less of a concern with the small pipe diameter, low pressures, and small elevation changes. The design basis for the air release valve is the Valmatic 48A for 150 psi cold pressure with a 3/16-inch orifice. Special attention is afforded to the air valves at STA 242+90±, which are at the top and bottom of a 25-foot net drop; there, the design basis is the Valmatic 801A single-body combination air valve with a 1-inch large outlet and a 1/8-inch small orifice. Each valve will have a ball valve in between the force main and the valve for the valve's isolation during maintenance or replacement. The new force main shall also be provided with flushing stations at no more than 1,000-foot intervals.

IV. CENTRAL LIFT STATION

A. General Description

This central Lift Station will be of the submersible duplex type. The pump operation will be controlled by a level transducer, with operating levels to trigger the low level pump off, lead pump on, lag pump on, and high water alarm. A redundant pump level control system using float switches is also incorporated into the design. The station will be fitted with a flushing valve or similar mechanisms to agitate the wet well sump to dislodge settled materials before discharge.

The station will also include:

- *Wet well*
  The wet well is to be a 10-foot diameter concrete structure. Sizing information is presented in Section G below.

- *Inlet manhole*
  The four-inch LPS pipeline terminates at the inlet manhole that will drain to the wet well through a 18-inch gravity sewer. There is a 6-inch stub also connected to this manhole for future expansion if required.

- *Valve / metering vault*
  The valve vault combines the pump discharges where they are connected to the force main and by-pass connection. Check valves and air release valve are provided on both discharge lines from the pumps and a magnetic flow meter is to be installed on the force main prior to exiting the vault. The vault will have a seven-foot interior ceiling height and be set below-grade with lighting, hatch access, retractable ladder, and sump pump for any seepage or released wastewater that may escape during any maintenance or repair. The sump pump discharges back into the wet well.

- *Control building*
  The control building will contain the electrical panels for pump control, main service, SCADA, automatic transfer switch, and appurtenant items. It will be heated, ventilated, and have interior lighting.

- *Emergency Standby Generator*
  The site shall have a stationary generator that is fueled by natural gas. The design basis is a Cummins RS80 3-phase 80kW generator set. The generator is protected behind bollards and fencing, and is set on an equipment pad that provides at least four feet clear for maintenance access.

- *Miscellaneous Site Improvements including*:
  - Fencing with a remotely-operated sliding gate and pedestrian pass gate.
  - Site lighting
  - Access drive and parking area
  - Landscaping
  - Stormwater detention and infiltration
  - Yard hydrant for wash water

B. Flow Estimates

Two methods were employed to estimate the flow to the lift station: an empirical analysis prepared by E-One and a typical water use analysis.

1. *Empirical Analysis*
   E-One has an empirical design analysis method, which uses the maximum discharge rate for a pump and applies a factor for how many pumps are expected to operate simultaneously which in turn identifies the peak flow anticipated at the lift station. Based on that analysis, areas A thru D identified in Section II Collection System are expected to have a maximum of nineteen (19) simultaneously operating pumps to produce as much as two hundred nine (209) gallons per minute (GPM). The E-One report is in **Attachment A**.

2. *Water Use Analysis*
   The water use analyzed in the Map, Plan and Report prepared by Laberge Group and dated May 2018, and Report Addendum 1 dated November 2019, used water meter data of the properties in the sewer district. The existing average daily flow is 55,000 GPD. The additional flow from build out of vacant parcels was estimated at 54,000 GPD for a projected average daily flow of 109,000 GPD or approximately 75 GPM. Using a peaking factor of four (4.0) results in a peak hour flow rate of 300 GPM.

C. Minimum Flow Rate

The ten-inch HDPE pipe has an average inside diameter of 8.68 inches. The existing Industrial Park 8-inch class 50 ductile iron pipe to which the HDPE pipe connects has an inside diameter of 8.5 inches. The 10-inch HDPE was selected to best fit the ductile iron pipe diameter.

The flow required to achieve a minimum velocity (V) of 2.0 feet per second, assuming that only the Extension lift station is operating is:

$$Q_{min} = VA = V\pi D^2/4 = (2.0 \text{ ft/s})(\pi)(8.68 \text{ in})^2(8.68/12)/4 = 0.82 \text{ ft}^3/\text{s} = \mathbf{369\ GPM}$$

D. Total Dynamic Head

1. *Elevation Head*
   - Pump elevation (pump-off) = 331.4 feet
   - Discharge elevation = 256 feet (Glens Falls MH 5)
   - Highest Points = 344 feet, at Stations 144+80± and 243+20±
   - Design High Point = 320 feet, at STA 366+60 (on the existing main)

   Elevation Head to Discharge = (75.4) ft
   Elevation Head to Highest Point = 12.6 ft
   Elevation Head to Design High Point = (11.4) ft

2. *Minor Losses (Equivalent Length)*

   Extension HDPE force main:

Fitting	Count	LF/ea	Sum
• Gate valves (at flush valves, etc.)	54	4.5	243 ft
• 90-degree bends (at the station)	2	20.0	40 ft
• 45-degree bends	8	10.0	80 ft
• Tee wye (as std. tee)	1	14.0	14 ft
• Swing check valve	1	50.0	50 ft
	Minor losses		427 ft
	Measured pipe length		23,580 ft
	Equivalent length		24,007 ft

   Existing DIP force main (counts are from Stearns & Wheeler's pipe layout plans, 1996):

Fitting	Count	LF/ea	Sum
• 90-degree bends	1	20.0	20 ft
• 45-degree bends	4	10.0	40 ft
	Minor losses		60 ft
	Measured pipe length		6,780 ft
	Equivalent length		6,840 ft

3. *Friction Losses*

   Pipe friction losses are calculated using the equation.

   $V = 1.318CR^{0.63}Hf^{0.54}$

	HDPE Pipe Section	DIP Pipe Section
Flow Rate (Q)	567 GPM (1.3cfs)	567 GPM (1.3cfs)
C-Value	120 110	
Inside diameter	8.68 inches (0.72 ft)	8.50 inches (0.71 ft)
Area (A)	0.41 sf	0.39 sf
Hydraulic Radius (R)	0.181 ft	0.177 ft
Velocity (V=Q/A)	3.07 fps	3.20 fps
Friction Loss (H_f)/ft	0.0050 ft/ft	0.0064 ft/ft
Equivalent Length	24,007 feet	6,360 feet
Friction Loss	118 feet	41 feet

Total Friction Loss = 118 feet + 41 feet= 159 feet

E. Computed Total Dynamic Head

The total dynamic head on the pump has been calculated using the design high point in the existing 8-inch DIP force main located just before the drop down the hill to the Hudson River. This point was selected since using the actual discharge elevation at Manhole 5 would induce a significant negative elevation head resulting in the main at the above referenced high point experiencing a negative pressure. To eliminate the negative pressure, the elevation head has been adjusted based on the design high point elevation and is reduced to negative 14 feet rather than negative 78 feet. The existing force main has an air valve at the design high point.

Total Dynamic Head, Design High Point

Elevation Head=		(11)
Friction/minor losses		
HDPE = 24,007 lf x 0.0050	=	118
DIP = 6,840 lf x 0.0064	=	41
TDH	=	148

F. Pump Selection

The pump selected for this application is the Xylem's Flygt NP3171 SH3 275, 35 HP, or the Landustrie DWP62-41LI, 52HP, or equal. See Attachment D for relevant pump curves.

G. Wet Well

Average Flow Rate	=	75 gpm
Fill time	=	20 minutes
Volume required = 75 gpm x 20 min.	=	1,500 gallons.

1,500 gallons (200.5 cubic feet) of active storage is to be provided by a ten-foot diameter wet well as calculated with the following equation:

$V = \pi D^2 h/4$
$200.5\ cf = \pi\ (10\ ft^2)\ h / 4$

H = 2.55 feet; USE 2.6 feet

Wet Well Elevations:

- Inlet invert Elevation 337.5
- High water alarm 335.5
- Lag pump on 334.5
- Lead pump on 334.0
- Pump off 331.4
- Low level alarm 331.0
- Floor elevation 329.4

H. Buoyancy

Both the wet well and valve vault were checked for buoyancy, with both structures being designed to resist buoyancy. Calculations for buoyancy are included in **Attachment E**. Please note however that boring results along the corridor found well drained sand and no groundwater at proposed improvements.

V. DOWNSTREAM CONSIDERATIONS

A. Down Stream Facilities

There are five privately owned and one municipal downstream pump stations that are potentially influenced by this Extension. A schematic diagram of the station locations and pumping characteristics is included as **Attachment F**. These stations include:

- Moreau Industrial Park (MIP)
- Bluebird Village Apartments
- Home of the Good Shepard
- Sisson Reserve Apartments
- Harrison Quarry / Bluebird Trace Apartments
- Harrison Place Apartments

In addition, there are four additional future developments seeking to connect to the existing 8-inch DIP forcemain. These include:

- Leonelli Apartments on Harrison Ave. (construction is in progress)
- Bluebird Trace Apartments (construction is in progress)
- Va-va-Voom mixed use development
- Sisson Grove Apartments

There are several restrictions on pumping operations at the privately owned pump stations, based upon the various design reports. The private pump stations receive communications from the MIP via licensed radio transmissions for a "passive interlock".

- Leonelli Apartments and Sisson Reserve pump station operations were initially restricted when the MIP station was operating. A subsequent design report indicated that Sisson Reserve would allow operation when the MIP station was operating in the event of a high water alarm. A revised Leonelli Apartments' design report (dated October 2020) indicated no operation when the MIP station was operating.

- Bluebird Village operation was to be restricted when any of MIP, Sisson Reserve, or Leonelli Apartments were operating.

- Harrison Quarry / Bluebird Trace operation was to be restricted when the MIP was operating.

- Harrison Place has no restrictions listed in the design report, but agreements with the Town require pumping to occur only when the MIP is idle.

B. Overview of Downstream Pump Stations

- Moreau Industrial Park (MIP)

Development: A partially developed industrial park.

Pump: In the report for the Harrison Avenue projects, the MIP pump station is reported to have a 370 minutes per day operation at maximum buildout, with a then projected pump operation of 30-40 minutes per day, citing Industrial Park pumping at 2.75 minutes per cycle at 405 GPM. Current industrial activity causes the pump to operate at less than 30 minutes per day and is reported by the Town to operate in the low-to-mid 300 GPM. Pump cycle timing will vary widely, depending upon the industrial operations.

The station has a 10-feet diameter wet well with the record drawing noting a 1.9 foot deep active volume. The Town reports having aggregate run time data but no cycle data. The pump is reportedly an ABS AFP (K) 1047.1 ME 185/4. 0018507, 24.8 hp, 460v, 3phase. There is no immediately available data for the pump with the town, online, or with the pump manufacturer. This is a long discontinued pump, showing its age, and the Town has discussed pump replacement.

- Leonelli's Apartments on Harrison Avenue (Ext. No. 1)

  Development: This project has two parts; the first part with 240 units of the Harrison Avenue project are still to be constructed, while the second part was replaced by the Sisson Reserve project and is now constructed. The latest informal design information lists a 36,000 GPD average flow with a 100 GPM peak hour flow.

  Piping: A 6-inch diameter, 1,300 lf± force main with an elevation gain of approximately 12 feet connects to the MIP force main.

  Pump and wet well: The pump station wet well was reportedly 9'-6" diameter with a 3.45-foot active volume (1829 gallons). With the restart of the project and a new design report, the wet well will have 745 gallons and a Landustrie DWP22-40DG pump. The minimum flow rate will be 180 GPM @ 20-23 feet TDH and the operating point will be 255 GPM at 30.8 feet TDH. Approval of the design report or pump station plans have not been granted by the Town and formal review is pending. For a conservative approach, this report assumes the system shown in the design report will be constructed even though additional wet well capacity will likely be required.

- Sisson Reserve (Replaced Leonelli's Sisson Road)

  Development: This development proposed 145 units and a 10% future expansion factor.

  Piping: The design report lists a four-inch diameter 1,127 lf of force main that connects to the MIP force main, with no indication of pipe materials.

  Pump: Pump performance is unclear in the report text, listing a 98-ft Total Dynamic Head and 133 GPM inflow to the existing pump station. The appendices list a 136 GPM peak hour inflow, a 6'-0" diameter wet well, and a pump start analysis using a 423-gallon wet well with 19 starts per hour. Four sets of curves are provided at the end of the report. It appears that the 98 ft TDH in the report refers to a combined flow with the MIP and is indicated to occur upon a high alarm condition at 155 GPM, and the Sisson Reserve flow alone would then be 250 GPM at 95 feet TDH.

- Bluebird Village (Ext. No. 2)

  Development: The development is comprised of 244 two and three bedroom apartments.

  Piping: The pipe system is reported to be 2,500 feet of six-inch diameter pipe. It is assumed that this is a PVC pipe with C = 120.

  Pump: The design report for this extension indicates a peak hour inflow of 82 GPM and a design discharge of 180 GPM for a 10-minute pumping cycle (200 GPM at 27 feet TDH, per the drawings). Record drawings indicate an 8-foot diameter wet well with a 2.2 foot depth from pump off to pump on, for a storage volume of 400 gallons. Per some record drawings, the pumps are Gorman-Rupp T3A-B. Building

Department records indicate a T3A-B-4 curve on a 7.5 HP T3A-B pump was originally used for the project; our office has been informed the pumps were changed out to Landustrie DWP42-43FE with 925mm impellers, which provide a maximum head of 31.5 feet. The Town reports that no high water alarms are reported with these new pumps over several months.

Coordinated Operation: By agreement this system was to be designed so that it operates only when other systems are not operating, with the other systems at that time (Leonelli projects on Harrison Avenue and Sisson Road and the industrial park) stated to be collectively pumping 490 minutes per day and 3 minutes per cycle at each station.

- Harrison Place

  Development: Twenty-six apartment units.

  Pipe: There is a two-inch force main that combines flow from the two grinder pump stations.

  Pumps: This system employs four grinder pumps split between two pump stations, and with an assertion that the cumulative flow is 9 GPM. Using the previously mentioned empirical model, three of the four pumps may operate simultaneously and inject approximately 33 GPM into the force main at potentially high head, so there should be no difficulty in overcoming flows in the current proposal. The 33 GPM is used for peak hour analyses.

- Harrison Quarry / Bluebird Trace

  Development: This development was proposed to contain 186 units.

  Pipe: The design report states that there is 2,300 linear feet of 6-inch pipe. For analysis, the pipe is assumed to be PVC, C=120.

  Pump: The design report lists an estimated peak hour flow of 68 GPM into a wet well that has a design discharge of 230 GPM. Data obtained from Smith & Loveless indicates each pump (Model 4B2D) was to have a design point of 230 GPM at 69 feet TDH.

- Home of the Good Shepard (a.k.a. Nest Phase 1)
  This development does not appear to have a design report, and is listed by Environmental Design Partnership as contributing 12 GPM to the system.

- The aggregate flow from the above pump stations is metered prior to discharge to the City of Glens Falls. The meter became operational in March of 2020. The aggregate discharge falls in the range of 2.2 MG to 2.4 MG in a month, which translates to an average daily flow of 73,300 to 80,000 GPD.

C. Coordination and Performance of the larger system

An analysis of the Extension lift station operating against other individual pump stations was performed, with pump operation frequencies in the range of 40 hz to 50 hz. Operating at 60 hz would further impede other pumps' discharge rates.

The table below presents the Extension lift station operating against each of the downstream pump stations including the resultant flow rate from each station, the TDH on each pump, velocity in the discharge main from each station and the pump run time to draw down the wet well.

Scenario	FLOW (GPM)	TDH (FT)	VEL. (FPS)	PK. HR. PUMPING (MIN.)
Extension	567	144	3.2	5.3
Extension (50 hz)	454	104	2.6	8.5
Leonelli Apts.	250	31	2.8	5.7
Extension (50 hz)	447	106	2.4	10.3
Harrison Quarry	210	75	2.4	(Note 1)
Extension (50 hz)	440	107	2.5	12.2
Sisson Reserve	215	97	5.5	3.6
Extension (45 hz)	567	144	3.1	5.6
Bluebird Village	-	31.5	-	(Note 2)
Extension (at 45 hz)	355	92	1.9	(Note 3)
MIP	315	164	1.8	-

(1) The wet well size is not identified in the Design Report for Harrison Quarry / Bluebird Trace
(2) Bluebird Village appears to be unable to pump against the head imposed by the Extension's pump and will need to be restricted from operation when the MIP or extension are pumping at full capacity.
(3) The operation of the Extension against the MIP noted above, with 1.9 FPS flow, is a transitory condition; when the MIP stops pumping, the Extension's pump will increase its flow rate to above 2 FPS flow.

D. Proposed Operation

1. The MIP and the Extension stations can operate at any time and will use the MIP's interlock signal to stop or hold operation of the other pump stations.

2. The Extension's pump will operate at a lower frequency of 45± hertz to allow the MIP's operation. If the MIP is not operating, then the Extension's pump will operate at 60 hertz.

If future development increases flows into the Extension, then the extension will simply pump more frequently, or the "pump on" level could also be raised to provide additional storage volume.

If there is an upgrade to the MIP, then the 45±% hertz frequency cap can be increased, to optimize the flow and to reduce overall cycle time.

Furthermore, if there is substantial development, then the proposed force main could be later extended along a path parallel to the existing force main. This project includes a dead-end force main stub past the connection to the existing force main, in order to allow such an extension while maintaining operation. Such a force main extension would provide either selective isolation of stations or additional peak hour capacity to optimize overall system capacity.

E. Communication

In the near term, to transmit signals and data between the Extension and the MIP, it is proposed to install radio transmission/reception equipment that is compatible with the MIP's existing control equipment and modify the existing signal algorithm.

F. Operations and Maintenance

The proposed system will be operated and maintained by the Town of Moreau Water and Sewer Department.

J:\2018107\Reports\lift station\2018107 lift station 2021-01-15.doc

ATTACHMENT

A

E-ONE DESIGN REPORT

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Environment One Corporation

Pressure Sewer Preliminary Cost and Design Analysis For Moreau, NY rev. 2 opt. 1

Prepared For:
Laberge Group
4 Computer Drive West
Albany NY 12205 US
Tel: (518) 458-7112 x171
Fax:
Prepared By: N. Shafarzek
April 29, 2020

Moreau, NY
rev. 2 opt. 1

Prepared by : N. Shafarzek **On:** April 29, 2020

Notes :
Station recommendations preliminary. Analysis based on drawings and data provided.

GPD values effect retention times only, not line sizing or hydraulics.

DH151-93 standard in this analysis unles otherwise noted.

rev. 1 - added ~33 stations to main rd. per Laberge Group. Advise that you add new line for western sewer extension if looking to maintain scouring velocity. Eastern Sewer Extension (possible 15 add'l pumps) may be workable with proposed 2"-3" (zones 7-9) depending on how far the stations are from this system.

rev. 2 - updated layout per Christopher Wren. added lift station.

opt. 1 - lift station to the south of lamplighter acres. additional stations cannot be accommodated with this lift station location without compromising design prior to buildout.

<<<<< E N D O F N O T E S >>>>>

April 29, 2020

Budgetary Low Pressure Sewer System Costs

Moreau, NY
rev. 2 opt. 1

	Quantity	Description	Unit Cost	Installation	Sub Total
Valves	4	Air/Vacuum Release Valve	$0.00	0.00	$0.00
	30	Clean Out	$0.00	0.00	$0.00
					$0.00
Pumps	436	DH071-93	$0.00	0.00	$0.00
	32	WH472-92	$0.00	0.00	$0.00
	468	Pump/Panel Installation	$0.00	0.00	$0.00
	468	Lateral (Boundary) Kits	$0.00	0.00	$0.00
	468	Lateral (Boundary) Installation	$0.00	0.00	$0.00
	23,400	linear feet of 1-1/4" lateral pipe	$0.00	0.00	$0.00
					$0.00
Piping	7,656	2.00" Pipe	$0.00	0.00	$0.00
	14,338	3.00" Pipe	$0.00	0.00	$0.00
	3,538	4.00" Pipe	$0.00	0.00	$0.00
	20,255	6.00" Pipe	$0.00	0.00	$0.00
	7,700	8.00" Pipe	$0.00	0.00	$0.00
					$0.00

Number of Connections	**468**		
Total Per Connection	**$0.00**	**Total (w/o other)** >>>>>>>>>>>>>	**$0.00**
Grand Total Per Connection	**$0.00**	**Grand Total (including other)** >>>>>>>>>>>>>	**$0.00**

Note: The System Costs above are based on piping sized for, and Grinder Pumps manufactured by Environment One Corporation.

PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS

Prepared By:
N. Shafarzek

Moreau, NY
rev. 2 opt. 1

April 29, 2020

Zone Number	Connects to Zone	Number of Pumps in Zone	Accum Pumps in Zone	Gals/day per Pump	Max Flow Per Pump (gpm)	Max Sim Ops	Max Flow (GPM)	Pipe Size (inches)	Max Velocity (FPS)	Length of Main this Zone	Friction Loss Factor (ft/100 ft)	Friction Loss This Zone	Accum Fric Loss (feet)	Max Main Elevation	Minimum Pump Elevation	Static Head (feet)	Total Dynamic Head (ft)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE											Friction loss calculations were based on a Constant for inside roughness "C" of: 150						
1.00	4.00	5	5	120	11.00	3	33.00	2.00	3.57	128.00	2.52	3.22	39.75	356.00	352.00	4.00	43.75
2.00	3.00	3	3	120	11.00	2	22.00	2.00	2.38	75.00	1.19	0.89	39.94	359.00	354.00	5.00	44.94
3.00	4.00	3	6	120	11.00	3	33.00	2.00	3.57	100.00	2.52	2.52	39.05	359.00	354.00	5.00	44.05
4.00	5.00	7	18	120	11.00	4	44.00	3.00	2.19	469.00	0.65	3.05	36.53	356.00	352.00	4.00	40.53
5.00	6.00	12	30	120	11.00	5	55.00	3.00	2.74	790.00	0.98	7.76	33.48	354.00	351.00	3.00	36.48
6.00	8.00	4	34	120	11.00	6	66.00	3.00	3.29	216.00	1.38	2.97	25.72	352.00	350.00	2.00	27.72
7.00	8.00	4	4	120	11.00	3	33.00	2.00	3.57	91.00	2.52	2.29	25.04	351.00	348.00	3.00	28.04
8.00	9.00	12	50	120	11.00	6	66.00	3.00	3.29	367.00	1.38	5.05	22.75	351.00	348.00	3.00	25.75
9.00	11.00	1	51	120	11.00	7	77.00	4.00	2.32	99.00	0.54	0.53	17.70	351.00	348.00	3.00	20.70
10.00	11.00	3	3	120	11.00	2	22.00	2.00	2.38	60.00	1.19	0.71	17.88	351.00	348.00	3.00	20.88
11.00	13.00	6	60	120	11.00	7	77.00	4.00	2.32	324.00	0.54	1.75	17.17	351.00	348.00	3.00	20.17
12.00	13.00	6	6	120	11.00	3	33.00	2.00	3.57	310.00	2.52	7.81	23.23	351.00	350.00	1.00	24.23
13.00	15.00	2	68	120	11.00	7	77.00	4.00	2.32	106.00	0.54	0.57	15.42	351.00	349.00	2.00	17.42
14.00	15.00	4	4	120	11.00	3	33.00	2.00	3.57	85.00	2.52	2.14	16.99	351.00	349.00	2.00	18.99
15.00	17.00	3	75	120	11.00	7	77.00	4.00	2.32	246.00	0.54	1.33	14.85	351.00	349.00	2.00	16.85
16.00	17.00	3	3	120	11.00	2	22.00	2.00	2.38	90.00	1.19	1.07	14.59	351.00	350.00	1.00	15.59
17.00	65.00	2	80	120	11.00	7	77.00	4.00	2.32	113.00	0.54	0.61	13.52	351.00	350.00	1.00	14.52
18.00	19.00	3	3	120	11.00	2	22.00	2.00	2.38	166.00	1.19	1.97	38.97	358.00	354.00	4.00	42.97
19.00	22.00	2	5	120	11.00	3	33.00	2.00	3.57	126.00	2.52	3.17	37.00	355.00	352.00	3.00	40.00
20.00	21.00	9	9	120	11.00	3	33.00	2.00	3.57	204.00	2.52	5.14	40.48	355.00	351.00	4.00	44.48
21.00	22.00	5	14	120	11.00	4	44.00	3.00	2.19	232.00	0.65	1.51	35.34	355.00	352.00	3.00	38.34
22.00	43.00	7	26	120	11.00	5	55.00	3.00	2.74	387.00	0.98	3.80	33.83	355.00	351.00	4.00	37.83
23.00	24.00	3	3	120	11.00	2	22.00	2.00	2.38	77.00	1.19	0.92	43.13	355.00	351.00	4.00	47.13
24.00	25.00	6	9	120	11.00	3	33.00	2.00	3.57	166.00	2.52	4.18	42.21	355.00	352.00	3.00	45.21
25.00	26.00	9	18	120	11.00	4	44.00	3.00	2.19	314.00	0.65	2.04	38.03	355.00	348.00	7.00	45.03
26.00	27.00	9	27	120	11.00	5	55.00	3.00	2.74	295.00	0.98	2.90	35.99	355.00	348.00	7.00	42.99
27.00	33.00	2	29	120	11.00	5	55.00	3.00	2.74	58.00	0.98	0.57	33.09	355.00	350.00	5.00	38.09
28.00	29.00	3	3	120	11.00	2	22.00	2.00	2.38	85.00	1.19	1.01	42.46	355.00	350.00	5.00	47.46
29.00	30.00	6	9	120	11.00	3	33.00	2.00	3.57	196.00	2.52	4.94	41.45	355.00	350.00	5.00	46.45
30.00	31.00	9	18	120	11.00	4	44.00	3.00	2.19	248.00	0.65	1.61	36.51	355.00	349.00	6.00	42.51
31.00	33.00	7	25	120	11.00	5	55.00	3.00	2.74	242.00	0.98	2.38	34.90	355.00	350.00	5.00	39.90
32.00	33.00	8	8	120	11.00	3	33.00	2.00	3.57	231.00	2.52	5.82	38.34	355.00	350.00	5.00	43.34
33.00	37.00	0	62	120	11.00	7	77.00	4.00	2.32	234.00	0.54	1.26	32.52	355.00	351.00	4.00	36.52
34.00	35.00	9	9	120	11.00	3	33.00	2.00	3.57	347.00	2.52	8.74	46.19	355.00	350.00	5.00	51.19
35.00	36.00	9	18	120	11.00	4	44.00	3.00	2.19	335.00	0.65	2.18	37.45	355.00	349.00	6.00	43.45

Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One.

PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS

Prepared By:
N. Shafarzek

Moreau, NY
rev. 2 opt. 1

April 29, 2020

Zone Number	Connects to Zone	Number of Pumps in Zone	Accum Pumps in Zone	Gals/day per Pump	Max Flow Per Pump (gpm)	Max Sim Ops	Max Flow (GPM)	Pipe Size (inches)	Max Velocity (FPS)	Length of Main this Zone	Friction Loss Factor (ft/100 ft)	Friction Loss This Zone	Accum Fric Loss (feet)	Max Main Elevation	Minimum Pump Elevation	Static Head (feet)	Total Dynamic Head (ft)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE											Friction loss calculations were based on a Constant for inside roughness "C" of: 150						
36.00	37.00	10	28	120	11.00	5	55.00	3.00	2.74	408.00	0.98	4.01	35.27	355.00	351.00	4.00	39.27
37.00	42.00	0	90	120	11.00	8	88.00	4.00	2.65	53.00	0.69	0.37	31.26	355.00	351.00	4.00	35.26
38.00	39.00	9	9	120	11.00	3	33.00	2.00	3.57	242.00	2.52	6.10	51.36	355.00	350.00	5.00	56.36
39.00	40.00	9	18	120	11.00	4	44.00	3.00	2.19	301.00	0.65	1.96	45.26	355.00	347.00	8.00	53.26
40.00	41.00	12	30	120	11.00	5	55.00	3.00	2.74	430.00	0.98	4.22	43.30	355.00	348.00	7.00	50.30
41.00	42.00	14	44	120	11.00	6	66.00	3.00	3.29	595.00	1.38	8.19	39.08	355.00	349.00	6.00	45.08
42.00	43.00	0	134	120	11.00	9	99.00	4.00	2.98	100.00	0.86	0.86	30.89	355.00	349.00	6.00	36.89
43.00	44.00	4	164	120	11.00	10	110.00	4.00	3.31	243.00	1.04	2.54	30.03	355.00	350.00	5.00	35.03
44.00	64.00	11	175	120	11.00	10	110.00	4.00	3.31	1,305.00	1.04	13.63	27.49	355.00	350.00	5.00	32.49
45.00	64.00	4	4	120	11.00	3	33.00	2.00	3.57	112.00	2.52	2.82	16.68	355.00	350.00	5.00	21.68
46.00	47.00	3	3	120	11.00	2	22.00	2.00	2.38	102.00	1.19	1.21	43.20	356.00	352.00	4.00	47.20
47.00	48.00	6	9	120	11.00	3	33.00	2.00	3.57	431.00	2.52	10.86	41.99	356.00	350.00	6.00	47.99
48.00	49.00	9	18	120	11.00	4	44.00	3.00	2.19	266.00	0.65	1.73	31.13	356.00	350.00	6.00	37.13
49.00	50.00	12	30	120	11.00	5	55.00	3.00	2.74	690.00	0.98	6.78	29.40	356.00	351.00	5.00	34.40
50.00	53.00	2	32	120	11.00	6	66.00	3.00	3.29	63.00	1.38	0.87	22.62	356.00	355.00	1.00	23.62
51.00	52.00	9	9	120	11.00	3	33.00	2.00	3.57	326.00	2.52	8.21	30.48	356.00	349.00	7.00	37.48
52.00	53.00	2	11	120	11.00	4	44.00	3.00	2.19	80.00	0.65	0.52	22.27	356.00	350.00	6.00	28.27
53.00	57.00	4	47	120	11.00	6	66.00	3.00	3.29	242.00	1.38	3.33	21.75	356.00	350.00	6.00	27.75
54.00	55.00	3	3	120	11.00	2	22.00	2.00	2.38	82.00	1.19	0.97	25.28	356.00	350.00	6.00	31.28
55.00	56.00	6	9	120	11.00	3	33.00	2.00	3.57	169.00	2.52	4.26	24.31	356.00	350.00	6.00	30.31
56.00	57.00	7	16	120	11.00	4	44.00	3.00	2.19	251.00	0.65	1.63	20.05	356.00	349.00	7.00	27.05
57.00	62.00	2	65	120	11.00	7	77.00	4.00	2.32	257.00	0.54	1.39	18.42	356.00	348.00	8.00	26.42
58.00	59.00	3	3	120	11.00	2	22.00	2.00	2.38	107.00	1.19	1.27	27.89	356.00	351.00	5.00	32.89
59.00	60.00	6	9	120	11.00	3	33.00	2.00	3.57	242.00	2.52	6.10	26.62	356.00	350.00	6.00	32.62
60.00	61.00	9	18	120	11.00	4	44.00	3.00	2.19	339.00	0.65	2.20	20.52	356.00	349.00	7.00	27.52
61.00	62.00	5	23	120	11.00	5	55.00	3.00	2.74	131.00	0.98	1.29	18.32	356.00	348.00	8.00	26.32
62.00	63.00	2	90	120	11.00	8	88.00	4.00	2.65	147.00	0.69	1.02	17.03	356.00	347.00	9.00	26.03
63.00	64.00	7	97	120	11.00	8	88.00	4.00	2.65	311.00	0.69	2.15	16.01	356.00	347.00	9.00	25.01
64.00	65.00	4	280	120	11.00	14	154.00	6.00	2.14	319.00	0.30	0.95	13.86	355.00	350.00	5.00	18.86
65.00	75.00	2	362	1300	11.00	16	176.00	6.00	2.45	703.00	0.38	2.67	12.91	348.00	348.00	0.00	12.91
66.00	67.00	3	3	108	11.00	2	22.00	2.00	2.38	387.00	1.19	4.60	38.34	351.00	349.00	2.00	40.34
67.00	68.00	6	9	541	11.00	3	33.00	2.00	3.57	452.00	2.52	11.39	33.74	351.00	346.00	5.00	38.74
68.00	74.00	8	17	352	11.00	4	44.00	3.00	2.19	752.00	0.65	4.89	22.35	351.00	347.00	4.00	26.35
69.00	71.00	4	4	675	11.00	3	33.00	2.00	3.57	403.00	2.52	10.15	35.81	352.00	349.00	3.00	38.81
70.00	71.00	2	2	675	11.00	2	22.00	2.00	2.38	168.00	1.19	2.00	27.66	352.00	348.00	4.00	31.66

Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One.

PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS

Prepared By:
N. Shafarzek

Moreau, NY
rev. 2 opt. 1

April 29, 2020

Zone Number	Connects to Zone	Number of Pumps in Zone	Accum Pumps in Zone	Gals/day per Pump	Max Flow Per Pump (gpm)	Max Sim Ops	Max Flow (GPM)	Pipe Size (inches)	Max Velocity (FPS)	Length of Main this Zone	Friction Loss Factor (ft/100 ft)	Friction Loss This Zone	Accum Fric Loss (feet)	Max Main Elevation	Minimum Pump Elevation	Static Head (feet)	Total Dynamic Head (ft)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE											Friction loss calculations were based on a Constant for inside roughness "C" of: 150						
71.00	73.00	2	8	675	11.00	3	33.00	2.00	3.57	239.00	2.52	6.02	25.66	352.00	347.00	5.00	30.66
72.00	73.00	4	4	675	11.00	3	33.00	2.00	3.57	398.00	2.52	10.03	29.67	352.00	350.00	2.00	31.67
73.00	74.00	4	16	675	11.00	4	44.00	3.00	2.19	335.00	0.65	2.18	19.64	352.00	350.00	2.00	21.64
74.00	75.00	3	36	250	11.00	6	66.00	3.00	3.29	524.00	1.38	7.22	17.46	351.00	346.00	5.00	22.46
75.00	76.00	9	407	426	11.00	17	187.00	6.00	2.60	1,293.00	0.42	5.49	10.24	348.00	346.00	2.00	12.24
76.00	100.00	5	412	554	11.00	18	198.00	6.00	2.75	884.00	0.47	4.18	4.75	346.00	345.00	1.00	5.75
77.00	78.00	3	3	355	11.00	2	22.00	2.00	2.38	108.00	1.19	1.28	63.23	347.00	336.00	11.00	74.23
78.00	79.00	6	9	465	11.00	3	33.00	2.00	3.57	411.00	2.52	10.35	61.95	347.00	330.00	17.00	78.95
79.00	80.00	9	18	356	11.00	4	44.00	3.00	2.19	1,181.00	0.65	7.68	51.60	347.00	330.00	17.00	68.60
80.00	81.00	12	30	701	11.00	5	55.00	3.00	2.74	1,243.00	0.98	12.21	43.92	346.00	330.00	16.00	59.92
81.00	100.00	15	45	656	11.00	6	66.00	3.00	3.29	2,261.00	1.38	31.14	31.71	346.00	340.00	6.00	37.71
100.00	100.00	0	457	0	11.00	19	209.00	6.00	2.90	110.00	0.52	0.57	0.57	344.00	344.00	0.00	0.57
300.00	306.00	0	0	0	11.00	0	220.00	6.00	3.06	16,946.00	0.57	97.31	114.49	352.00	340.00	12.00	126.49
On	LS 300.00		GPD:	100,000.000		GPM:	220.00	Type:	C	Desc:							
301.00	302.00	3	3	675	11.00	2	22.00	2.00	2.38	296.00	1.19	3.52	29.40	351.00	344.00	7.00	36.40
302.00	305.00	3	6	675	11.00	3	33.00	2.00	3.57	270.00	2.52	6.80	25.88	351.00	336.00	15.00	40.88
303.00	304.00	3	3	675	11.00	2	22.00	2.00	2.38	125.00	1.19	1.49	21.80	351.00	343.00	8.00	29.80
304.00	305.00	1	4	675	11.00	3	33.00	2.00	3.57	49.00	2.52	1.23	20.31	351.00	347.00	4.00	24.31
305.00	306.00	1	11	675	11.00	4	44.00	3.00	2.19	293.00	0.65	1.90	19.08	351.00	345.00	6.00	25.08
306.00	306.00	0	11	0	11.00	4	264.00	8.00	2.17	7,700.00	0.22	17.18	17.18	351.00	351.00	0.00	17.18

Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One.

PRELIMINARY PRESSURE SEWER - ACCUMULATED RETENTION TIME(HR)

Prepared By:
N. Shafarzek

Moreau, NY
rev. 2 opt. 1

April 29, 2020

Zone Number	Connects to Zone	Accumulated Total of Pumps this Zone	Pipe Size (inches)	Gallons per 100 lineal feet	Length of Zone	Capacity of Zone	Average Daily Flow	Average Fluid Changes per Day	Average Retention Time (Hr)	Accumulated Retention Time (Hr)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE								Gals per Day per Dwelling		120
1.00	4.00	5	2.00	15.40	128.00	19.72	600	30.43	0.79	8.10
2.00	3.00	3	2.00	15.40	75.00	11.55	360	31.16	0.77	8.60
3.00	4.00	6	2.00	15.40	100.00	15.40	720	46.74	0.51	7.83
4.00	5.00	18	3.00	33.47	469.00	156.96	2,160	13.76	1.74	7.31
5.00	6.00	30	3.00	33.47	790.00	264.39	3,600	13.62	1.76	5.57
6.00	8.00	34	3.00	33.47	216.00	72.29	4,080	56.44	0.43	3.81
7.00	8.00	4	2.00	15.40	91.00	14.02	480	34.25	0.70	4.08
8.00	9.00	50	3.00	33.47	367.00	122.82	6,000	48.85	0.49	3.38
9.00	11.00	51	4.00	55.31	99.00	54.76	6,120	111.76	0.21	2.89
10.00	11.00	3	2.00	15.40	60.00	9.24	360	38.95	0.62	3.29
11.00	13.00	60	4.00	55.31	324.00	179.21	7,200	40.18	0.60	2.68
12.00	13.00	6	2.00	15.40	310.00	47.75	720	15.08	1.59	3.67
13.00	15.00	68	4.00	55.31	106.00	58.63	8,160	139.17	0.17	2.08
14.00	15.00	4	2.00	15.40	85.00	13.09	480	36.66	0.65	2.56
15.00	17.00	75	4.00	55.31	246.00	136.07	9,000	66.14	0.36	1.91
16.00	17.00	3	2.00	15.40	90.00	13.86	360	25.97	0.92	2.47
17.00	65.00	80	4.00	55.31	113.00	62.50	9,600	153.59	0.16	1.54
18.00	19.00	3	2.00	15.40	166.00	25.57	360	14.08	1.70	6.13
19.00	22.00	5	2.00	15.40	126.00	19.41	600	30.92	0.78	4.42
20.00	21.00	9	2.00	15.40	204.00	31.42	1,080	34.37	0.70	5.45
21.00	22.00	14	3.00	33.47	232.00	77.64	1,680	21.64	1.11	4.75
22.00	43.00	26	3.00	33.47	387.00	129.52	3,120	24.09	1.00	3.65
23.00	24.00	3	2.00	15.40	77.00	11.86	360	30.35	0.79	6.61
24.00	25.00	9	2.00	15.40	166.00	25.57	1,080	42.24	0.57	5.82
25.00	26.00	18	3.00	33.47	314.00	105.08	2,160	20.55	1.17	5.25
26.00	27.00	27	3.00	33.47	295.00	98.73	3,240	32.82	0.73	4.08
27.00	33.00	29	3.00	33.47	58.00	19.41	3,480	179.28	0.13	3.35
28.00	29.00	3	2.00	15.40	85.00	13.09	360	27.50	0.87	6.33
29.00	30.00	9	2.00	15.40	196.00	30.19	1,080	35.77	0.67	5.46
30.00	31.00	18	3.00	33.47	248.00	83.00	2,160	26.03	0.92	4.78
31.00	33.00	25	3.00	33.47	242.00	80.99	3,000	37.04	0.65	3.86
32.00	33.00	8	2.00	15.40	231.00	35.58	960	26.98	0.89	4.10
33.00	37.00	62	4.00	55.31	234.00	129.43	7,440	57.48	0.42	3.21
34.00	35.00	9	2.00	15.40	347.00	53.45	1,080	20.21	1.19	6.21
35.00	36.00	18	3.00	33.47	335.00	112.11	2,160	19.27	1.25	5.02

Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One

Prepared By:
N. Shafarzek

PRELIMINARY PRESSURE SEWER - ACCUMULATED RETENTION TIME (HR)
Moreau, NY
rev. 2 opt. 1

April 29, 2020

Zone Number	Connects to Zone	Accumulated Total of Pumps this Zone	Pipe Size (inches)	Gallons per 100 lineal feet	Length of Zone	Capacity of Zone	Average Daily Flow	Average Fluid Changes per Day	Average Retention Time (Hr)	Accumulated Retention Time (Hr)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE								Gals per Day per Dwelling		120
36.00	37.00	28	3.00	33.47	408.00	136.54	3,360	24.61	0.98	3.77
37.00	42.00	90	4.00	55.31	53.00	29.32	10,800	368.40	0.07	2.80
38.00	39.00	9	2.00	15.40	242.00	37.27	1,080	28.97	0.83	6.54
39.00	40.00	18	3.00	33.47	301.00	100.73	2,160	21.44	1.12	5.72
40.00	41.00	30	3.00	33.47	430.00	143.91	3,600	25.02	0.96	4.60
41.00	42.00	44	3.00	33.47	595.00	199.13	5,280	26.52	0.91	3.64
42.00	43.00	134	4.00	55.31	100.00	55.31	16,080	290.71	0.08	2.73
43.00	44.00	164	4.00	55.31	243.00	134.41	19,680	146.42	0.16	2.65
44.00	64.00	175	4.00	55.31	1,305.00	721.84	21,000	29.09	0.82	2.49
45.00	64.00	4	2.00	15.40	112.00	17.25	480	27.82	0.86	2.52
46.00	47.00	3	2.00	15.40	102.00	15.71	360	22.91	1.05	8.16
47.00	48.00	9	2.00	15.40	431.00	66.39	1,080	16.27	1.48	7.11
48.00	49.00	18	3.00	33.47	266.00	89.02	2,160	24.26	0.99	5.64
49.00	50.00	30	3.00	33.47	690.00	230.92	3,600	15.59	1.54	4.65
50.00	53.00	32	3.00	33.47	63.00	21.08	3,840	182.13	0.13	3.11
51.00	52.00	9	2.00	15.40	326.00	50.21	1,080	21.51	1.12	4.58
52.00	53.00	11	3.00	33.47	80.00	26.77	1,320	49.30	0.49	3.46
53.00	57.00	47	3.00	33.47	242.00	80.99	5,640	69.64	0.34	2.98
54.00	55.00	3	2.00	15.40	82.00	12.63	360	28.50	0.84	5.10
55.00	56.00	9	2.00	15.40	169.00	26.03	1,080	41.49	0.58	4.26
56.00	57.00	16	3.00	33.47	251.00	84.00	1,920	22.86	1.05	3.68
57.00	62.00	65	4.00	55.31	257.00	142.15	7,800	54.87	0.44	2.63
58.00	59.00	3	2.00	15.40	107.00	16.48	360	21.84	1.10	5.76
59.00	60.00	9	2.00	15.40	242.00	37.27	1,080	28.97	0.83	4.67
60.00	61.00	18	3.00	33.47	339.00	113.45	2,160	19.04	1.26	3.84
61.00	62.00	23	3.00	33.47	131.00	43.84	2,760	62.95	0.38	2.58
62.00	63.00	90	4.00	55.31	147.00	81.31	10,800	132.82	0.18	2.20
63.00	64.00	97	4.00	55.31	311.00	172.02	11,640	67.67	0.35	2.01
64.00	65.00	280	6.00	119.90	319.00	382.48	33,600	87.85	0.27	1.66
65.00	75.00	362	6.00	119.90	703.00	842.89	45,800	54.34	0.44	1.39
66.00	67.00	3	2.00	15.40	387.00	59.61	324	5.44	4.42	7.01
67.00	68.00	9	2.00	15.40	452.00	69.62	3,570	51.28	0.47	2.59
68.00	74.00	17	3.00	33.47	752.00	251.67	6,386	25.37	0.95	2.13
69.00	71.00	4	2.00	15.40	403.00	62.07	2,700	43.50	0.55	2.14
70.00	71.00	2	2.00	15.40	168.00	25.88	1,350	52.17	0.46	2.05

Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One

PRELIMINARY PRESSURE SEWER - ACCUMULATED RETENTION TIME (HR)

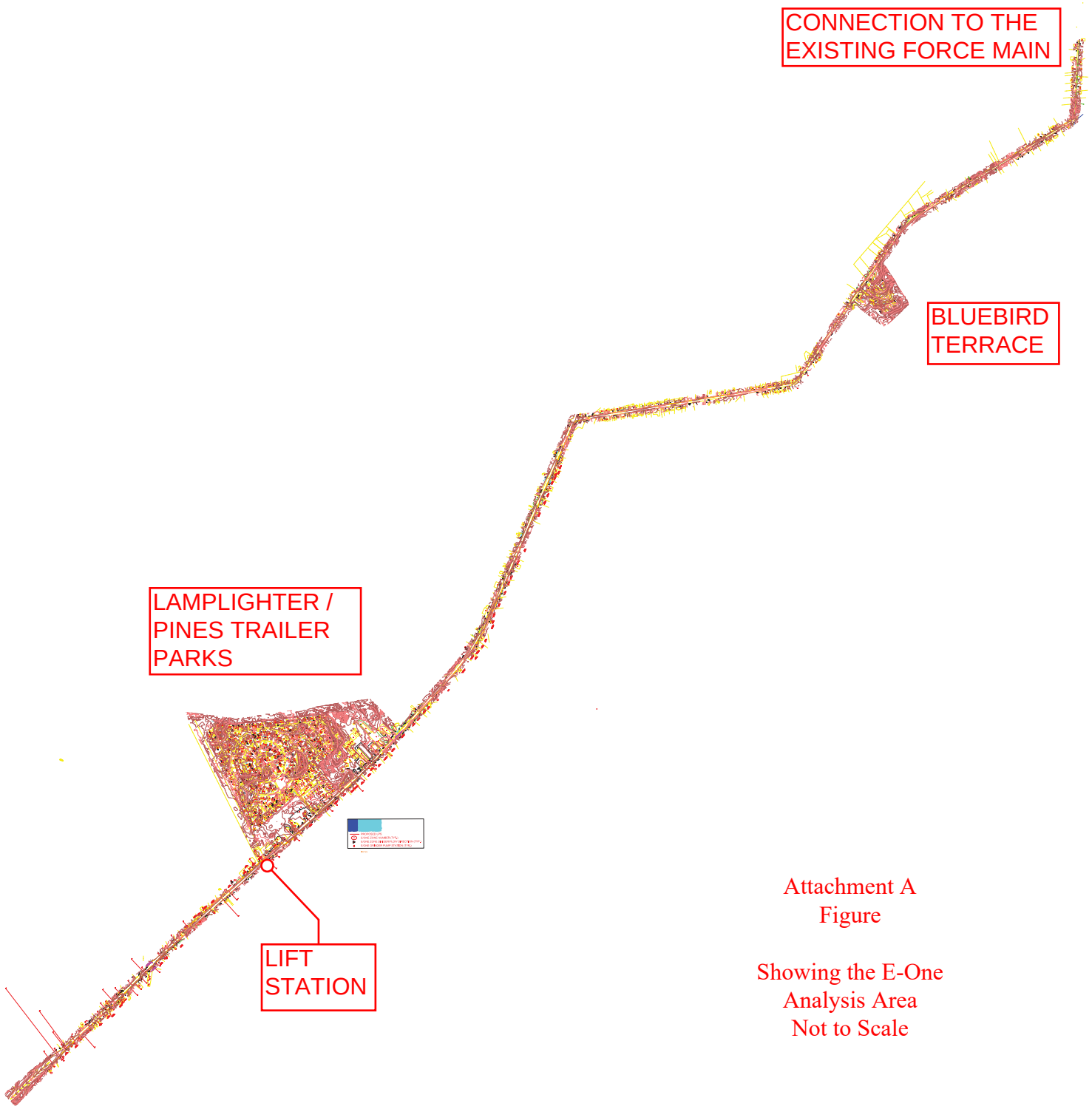
Prepared By:
N. Shafarzek

Moreau, NY
rev. 2 opt. 1

April 29, 2020

Zone Number	Connects to Zone	Accumulated Total of Pumps this Zone	Pipe Size (inches)	Gallons per 100 lineal feet	Length of Zone	Capacity of Zone	Average Daily Flow	Average Fluid Changes per Day	Average Retention Time (Hr)	Accumulated Retention Time (Hr)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE								Gals per Day per Dwelling		120
71.00	73.00	8	2.00	15.40	239.00	36.81	5,400	146.69	0.16	1.59
72.00	73.00	4	2.00	15.40	398.00	61.30	2,700	44.04	0.54	1.97
73.00	74.00	16	3.00	33.47	335.00	112.11	10,800	96.33	0.25	1.43
74.00	75.00	36	3.00	33.47	524.00	175.36	17,936	102.28	0.23	1.18
75.00	76.00	407	6.00	119.90	1,293.00	1,550.29	67,570	43.59	0.55	0.95
76.00	100.00	412	6.00	119.90	884.00	1,059.91	70,340	66.36	0.36	0.39
77.00	78.00	3	2.00	15.40	108.00	16.64	1,065	64.02	0.37	3.51
78.00	79.00	9	2.00	15.40	411.00	63.31	3,855	60.89	0.39	3.13
79.00	80.00	18	3.00	33.47	1,181.00	395.24	7,059	17.86	1.34	2.74
80.00	81.00	30	3.00	33.47	1,243.00	415.99	15,471	37.19	0.65	1.40
81.00	100.00	45	3.00	33.47	2,261.00	756.68	25,311	33.45	0.72	0.75
100.00	100.00	457	6.00	119.90	110.00	131.89	95,651	725.24	0.03	0.03
300.00	306.00	0	6.00	119.90	16,946.00	20,318.07	100,000	4.92	4.88	8.37
301.00	302.00	3	2.00	15.40	296.00	45.59	2,025	44.42	0.54	4.60
302.00	305.00	6	2.00	15.40	270.00	41.59	4,050	97.38	0.25	4.06
303.00	304.00	3	2.00	15.40	125.00	19.25	2,025	105.18	0.23	4.11
304.00	305.00	4	2.00	15.40	49.00	7.55	2,700	357.74	0.07	3.88
305.00	306.00	11	3.00	33.47	293.00	98.06	7,425	75.72	0.32	3.81
306.00	306.00	11	8.00	203.19	7,700.00	15,645.55	107,425	6.87	3.50	3.50

Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One



Attachment A
Figure

Showing the E-One
Analysis Area
Not to Scale

ATTACHMENT

B

PUMP PERFORMANCE CURVE

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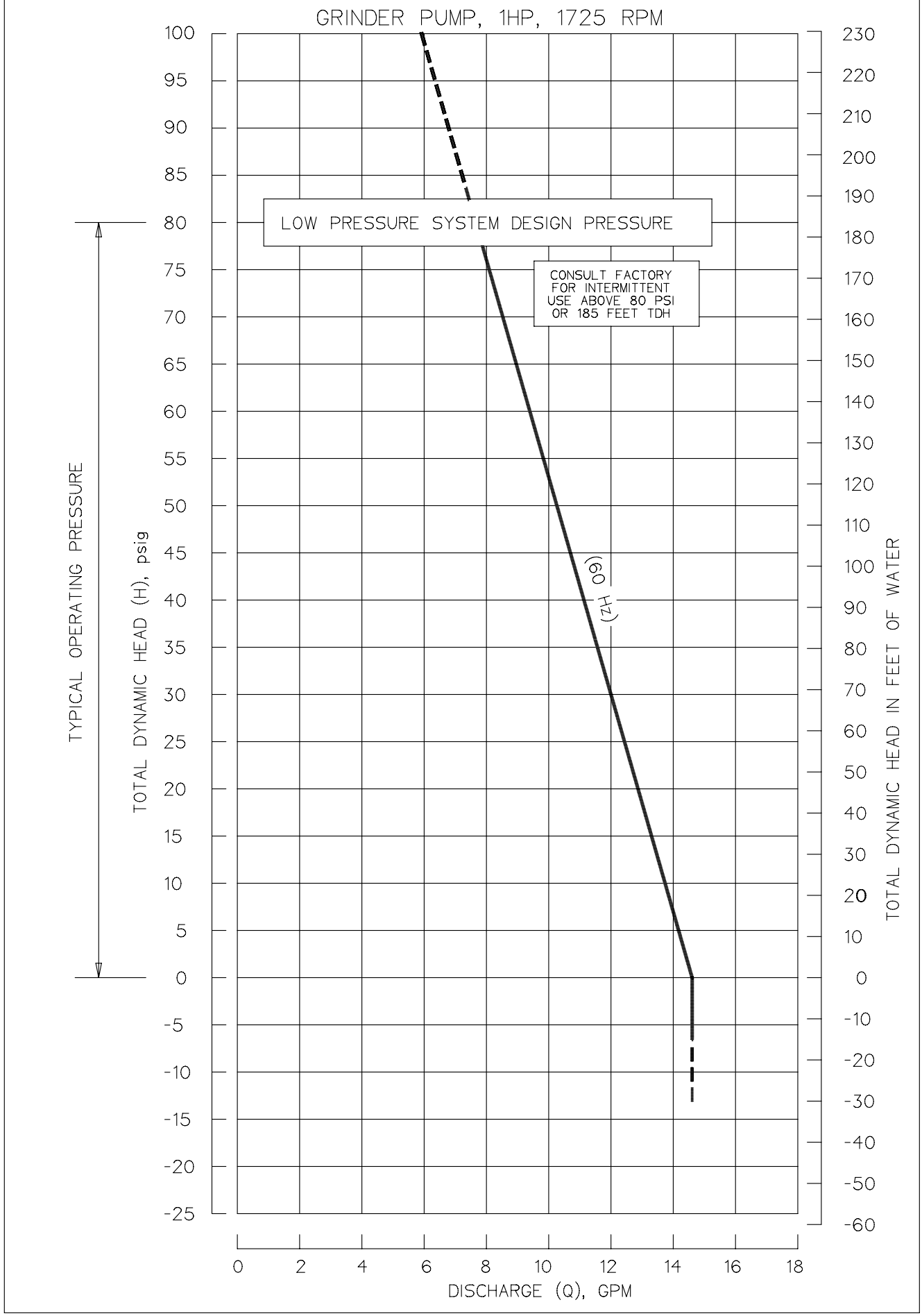
E|ONE SPD PUMP PERFORMANCE CURVE



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ATTACHMENT

C

HYDRAULIC GRADE LINE

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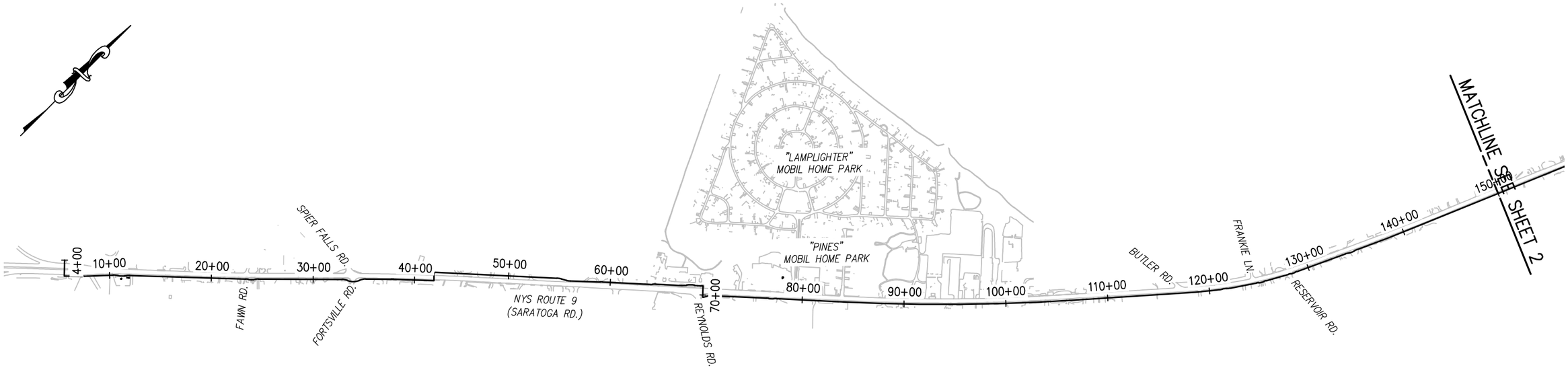
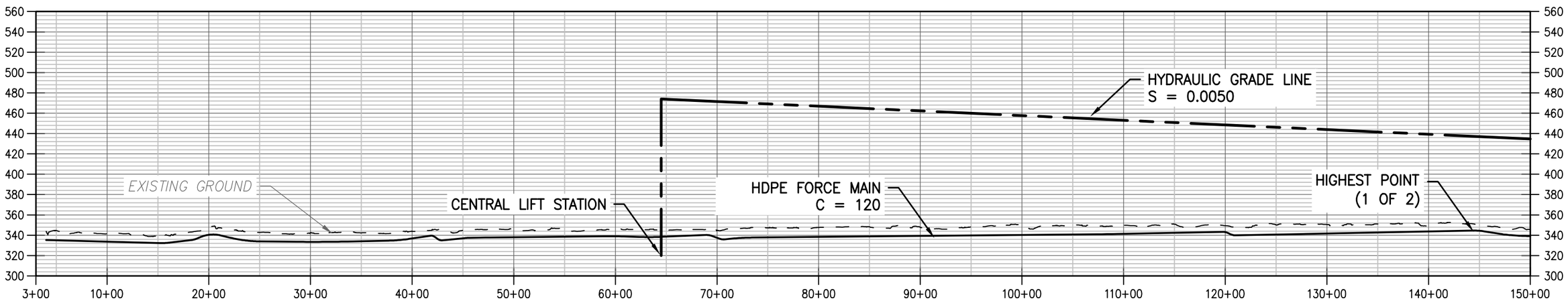




HORIZONTAL SCALE 1" = 1,000'

1,000 500 0 1,000 2,000 3,000

VERTICAL SCALE 1" = 100'

100 50 0 100 200 300

TOWN OF MOREAU
SARATOGA COUNTY * NEW YORK

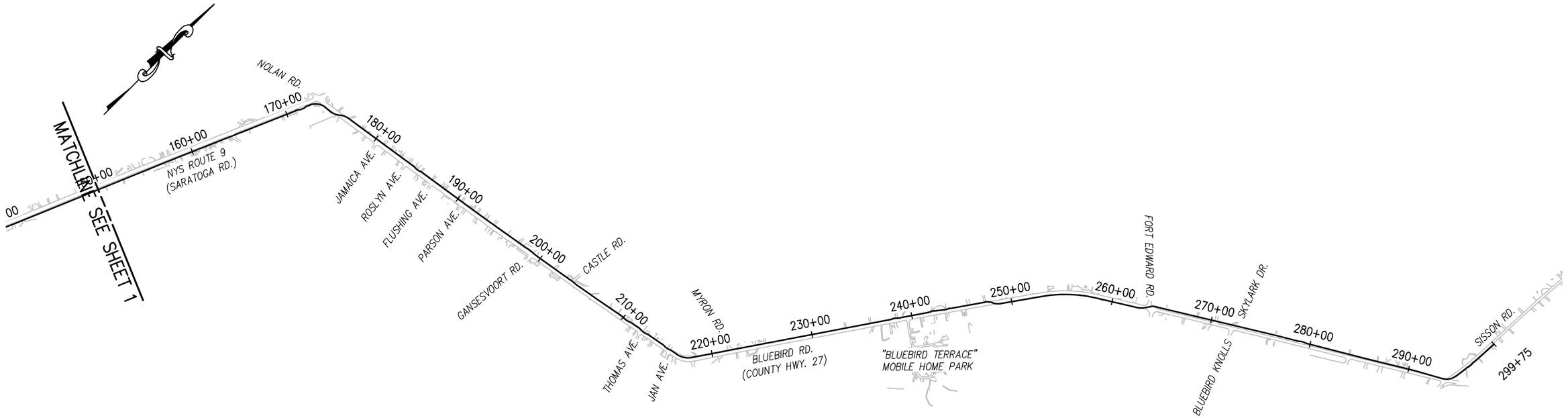
SEWER DISTRICT NO. 1 EXTENSION 5

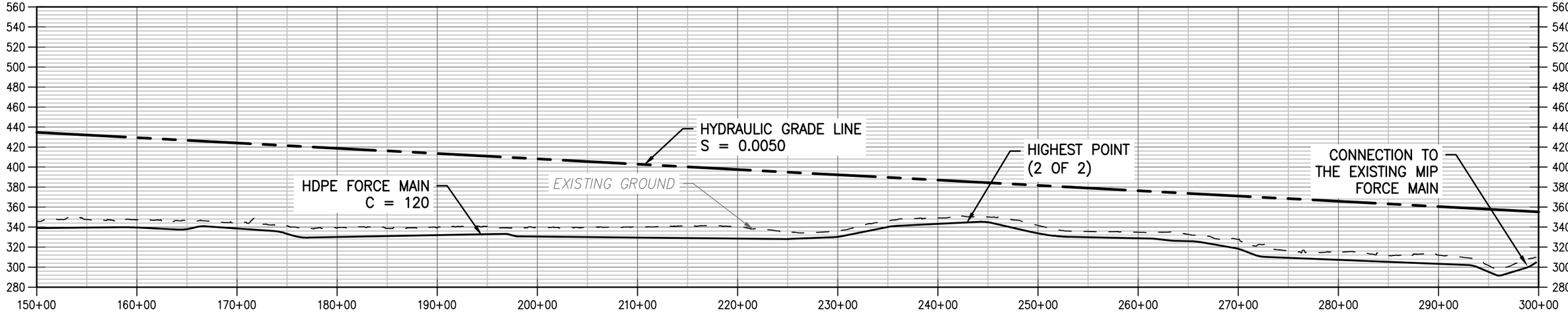
HYDRAULIC GRADE LINE

DESIGNED BY JAK
DRAWN BY WJB
REVIEWED BY

Laberge ENGINEERING ARCHITECTURE Group SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

DATE 09/24/20
SCALE AS NOTED
SHEET 1





HORIZONTAL SCALE 1" = 1,000'

1,000 500 0 1,000 2,000 3,000

VERTICAL SCALE 1" = 100'

100 50 0 100 200 300

TOWN OF MOREAU
SARATOGA COUNTY * NEW YORK

SEWER DISTRICT NO. 1
EXTENSION 5
HYDRAULIC GRADE LINE

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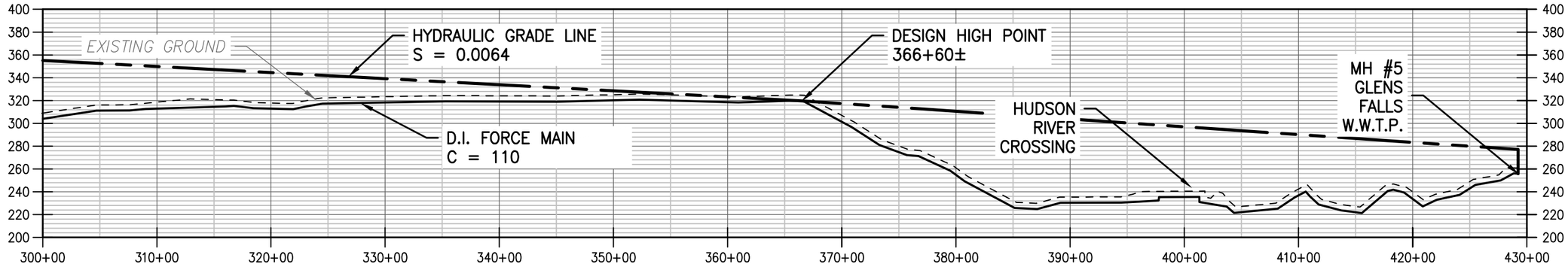
DATE 09/24/20
SCALE AS NOTED
SHEET 2



HORIZONTAL SCALE 1" = 1,000'

1,000 500 0 1,000 2,000 3,000

VERTICAL SCALE 1" = 100'

100 50 0 100 200 300

NOTES:

1. THIS PAGE'S PROFILE EXISTING GROUND DATA WAS SCALED FROM "MOREAU INDUSTRIAL PARK" BY STEARNS & WHELER; RECORD DRAWINGS STAMPED 1/31/96 BY HOWARD BENSON LaFEVER, NYS P.E.

TOWN OF MOREAU
SARATOGA COUNTY * NEW YORK

SEWER DISTRICT NO. 1
EXTENSION 5
HYDRAULIC GRADE LINE

DESIGNED BY JAK
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ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
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DATE 09/24/20
SCALE AS NOTED
SHEET 3

ATTACHMENT

D

LIFT STATION DESIGN BASIS PUMP

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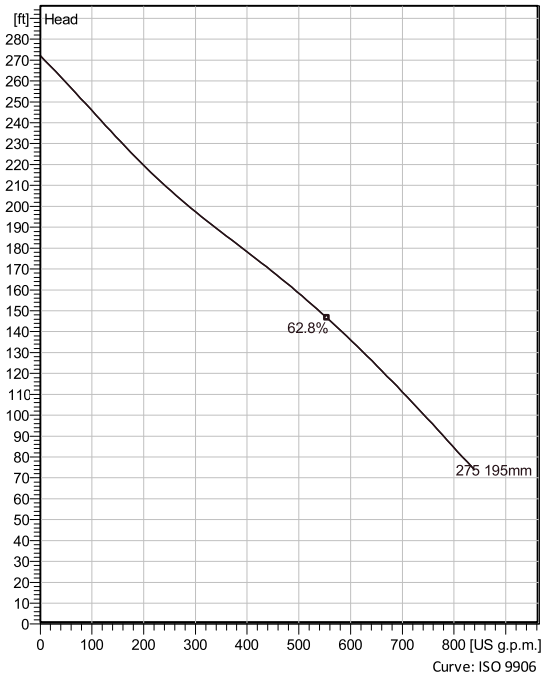
NP 3171 SH 3~ 275

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

Technical specification

Curves according to: Water, pure ,39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

Configuration

Motor number
N3171.095 25-18-2AA-W 35hp

Installation type
P - Semi permanent, Wet

Impeller diameter
195 mm

Discharge diameter
3 15/16 inch

Pump information

Impeller diameter
195 mm

Discharge diameter
3 15/16 inch

Inlet diameter
150 mm

Maximum operating speed
3530 rpm

Number of blades
2

Max. fluid temperature
40 °C

Materials

Impeller
Hard-Iron ™

Project		**Created by**	Ian Belczyk	**Last update**	11/6/2020
Block		**Created on**	11/6/2020		

NP 3171 SH 3~ 275

Technical specification

Motor - General

Motor number N3171.095 25-18-2AA-W 35hp	**Phases** 3~	**Rated speed** 3530 rpm	**Rated power** 35 hp
ATEX approved FM	**Number of poles** 2	**Rated current** 40 A	**Stator variant** 9
Frequency 60 Hz	**Rated voltage** 460 V	**Insulation class** H	**Type of Duty** S1
Version code 095			

Motor - Technical

Power factor - 1/1 Load 0.91	**Motor efficiency - 1/1 Load** 91.0 %	**Total moment of inertia** 1.77 lb ft²	**Starts per hour max.** 30
Power factor - 3/4 Load 0.89	**Motor efficiency - 3/4 Load** 91.5 %	**Starting current, direct starting** 292 A	
Power factor - 1/2 Load 0.82	**Motor efficiency - 1/2 Load** 92.0 %	**Starting current, star-delta** 97.3 A	

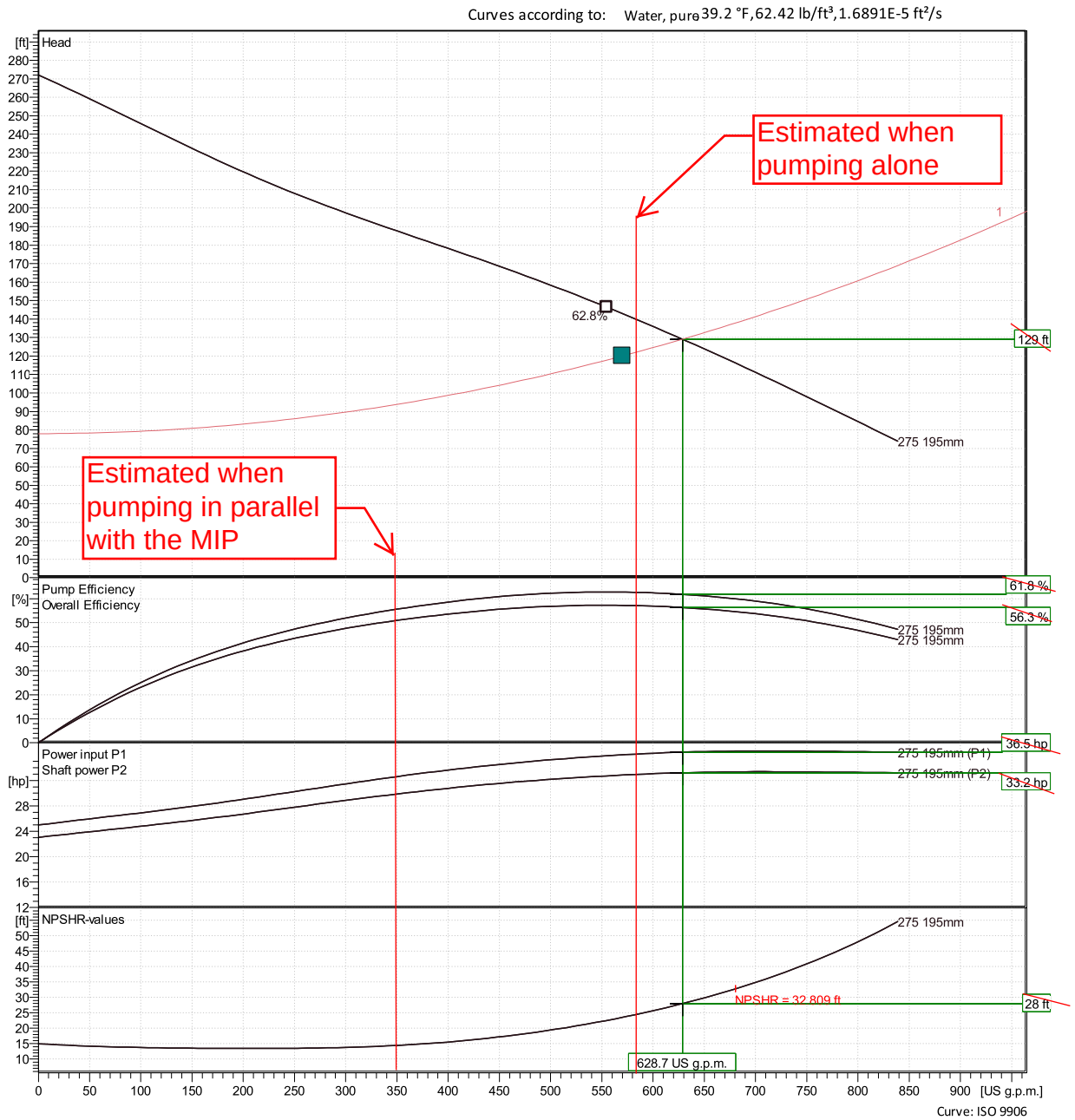
Project		**Created by**	Ian Belczyk	**Last update**	11/6/2020
Block		**Created on**	11/6/2020		

NP 3171 SH 3~ 275

Performance curve

Duty point

Flow	Head
629 US g.p.m.	129 ft

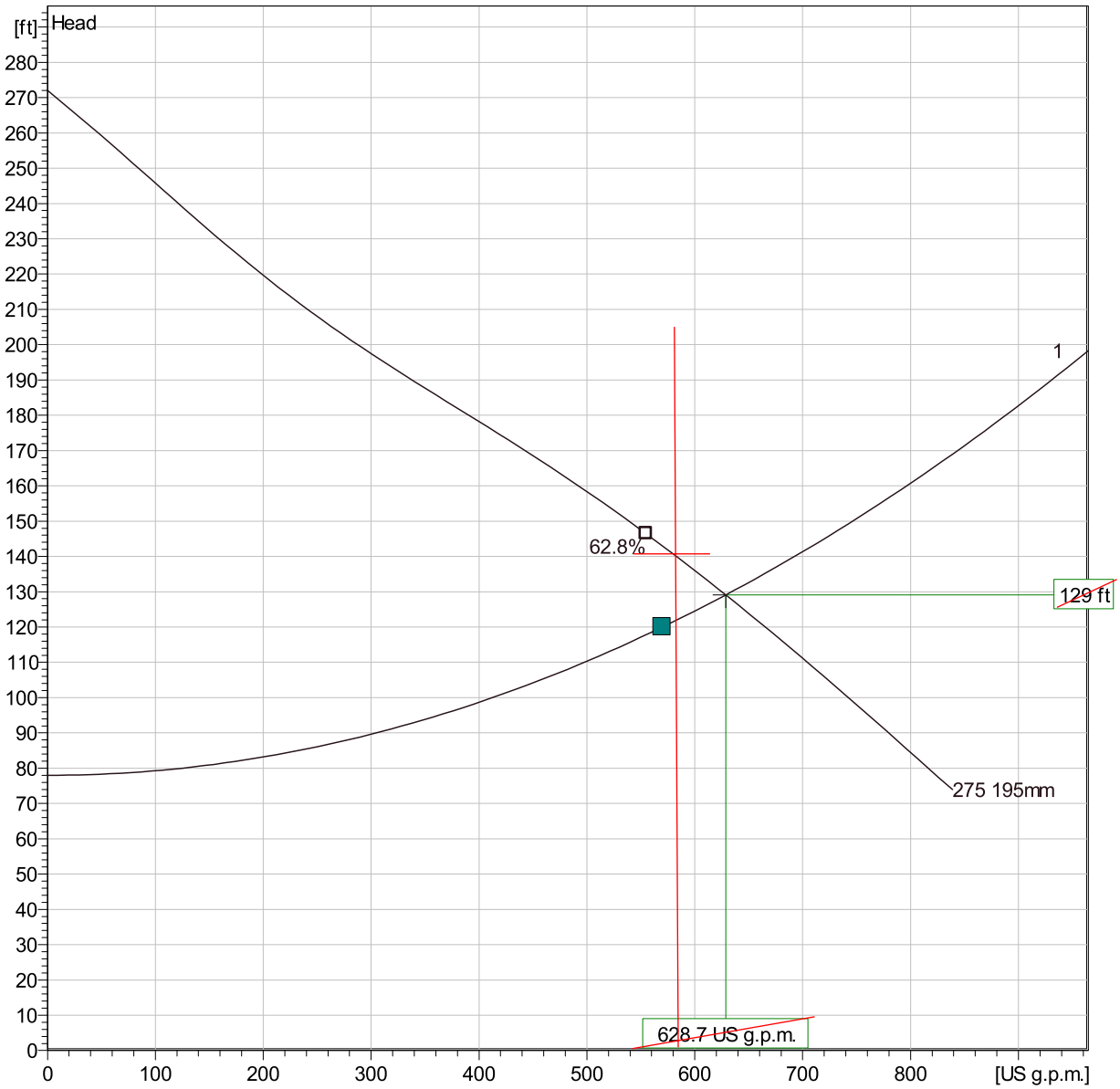


Project		**Created by**	Ian Belczyk	**Last update**	11/6/2020
Block		**Created on**	11/6/2020		

NP 3171 SH 3~ 275

Duty Analysis

Curves according to: Water, pure ,39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Operating characteristics

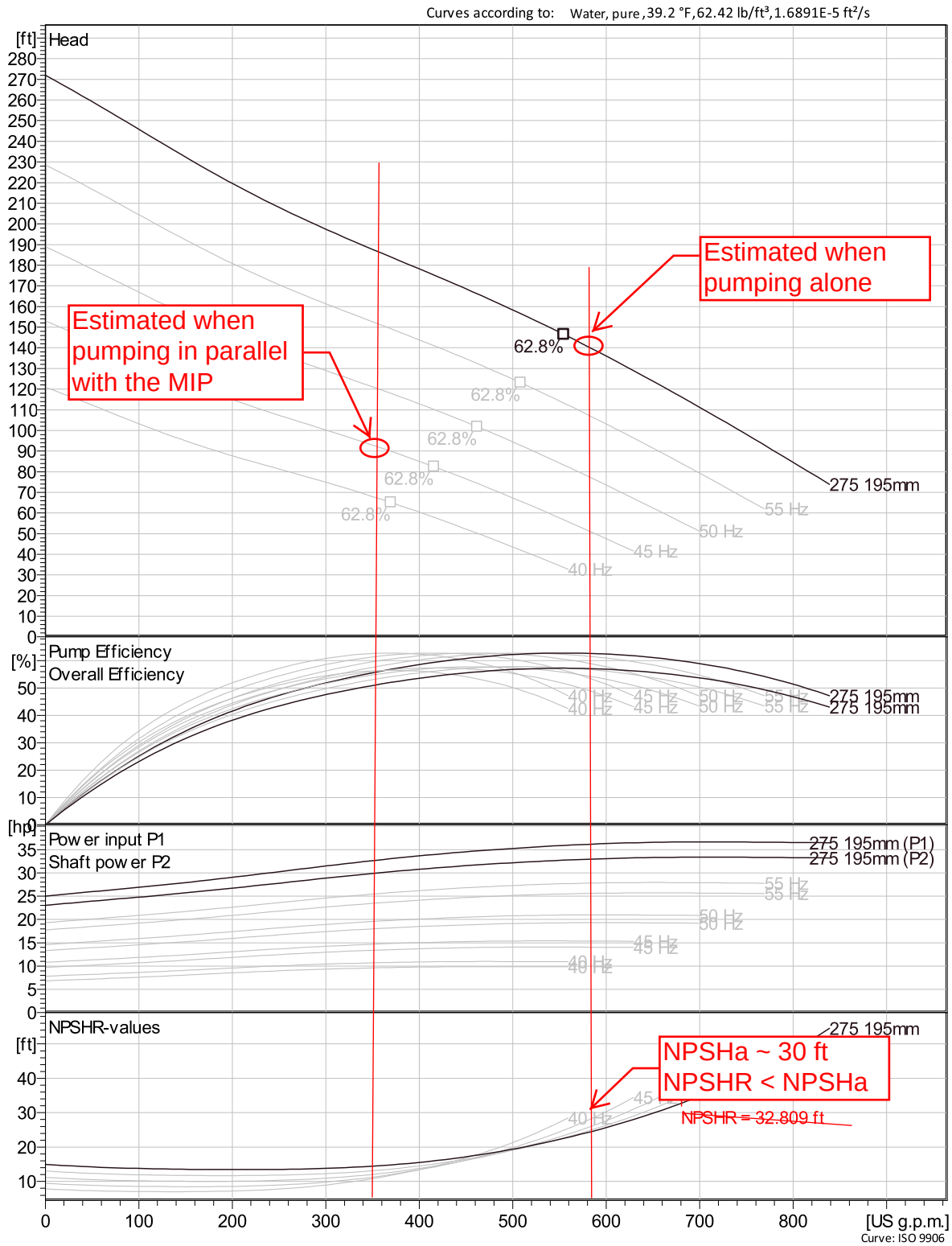
Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific Energy	NPSHre
1	629 US g.p.m.	129 ft	33.2 hp	629 US g.p.m.	129 ft	33.2 hp	61.8 %	721 kWh/US M(	28 ft

Project		**Created by**	Ian Belczyk	**Last update**	11/6/2020
Block		**Created on**	11/6/2020		

NP 3171 SH 3~ 275

VFD Curve

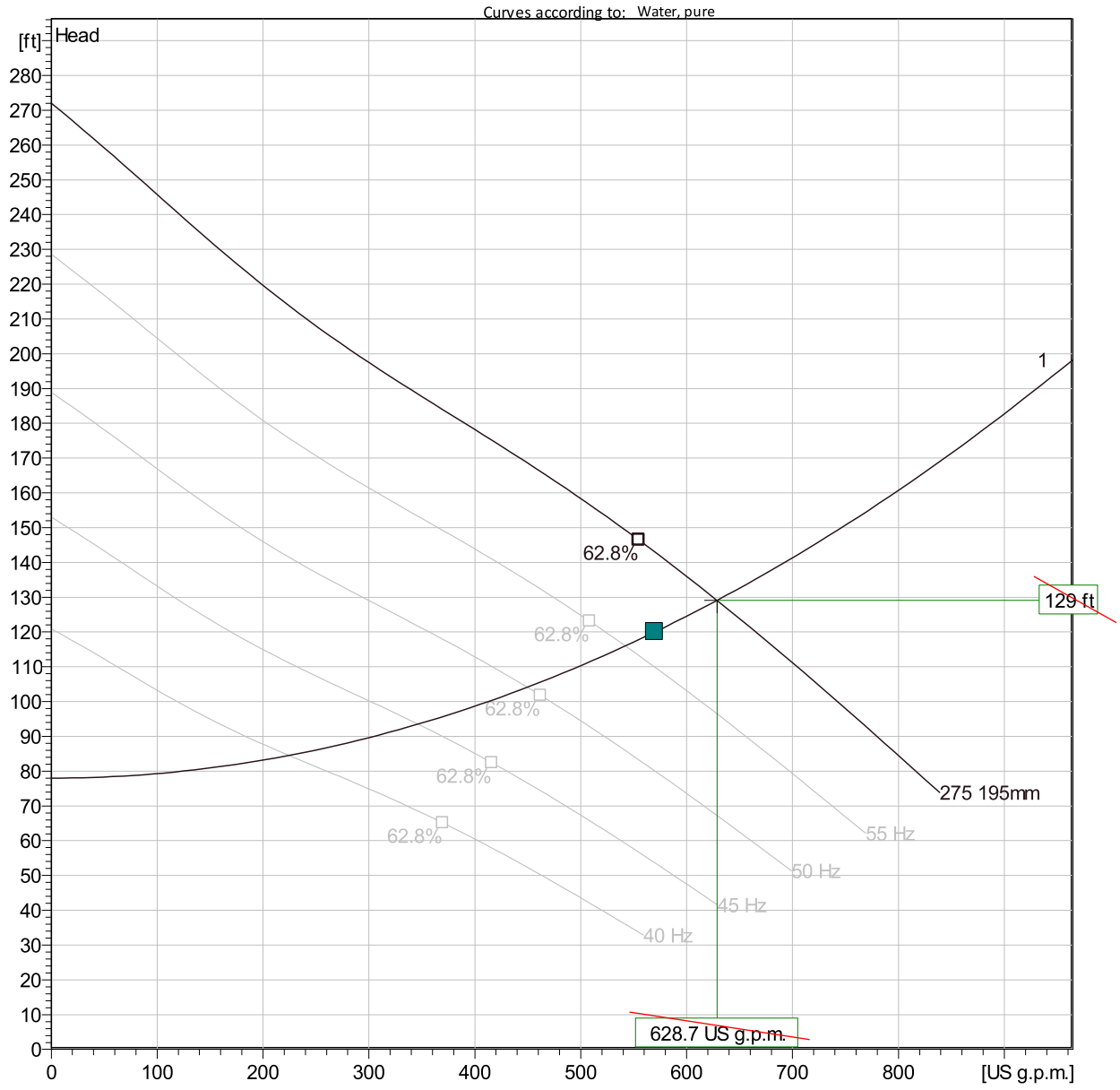
FLYGT
a xylem brand



Project		**Created by**	Ian Belczyk	**Last update**	11/6/2020
Block		**Created on**	11/6/2020		

NP 3171 SH 3~ 275

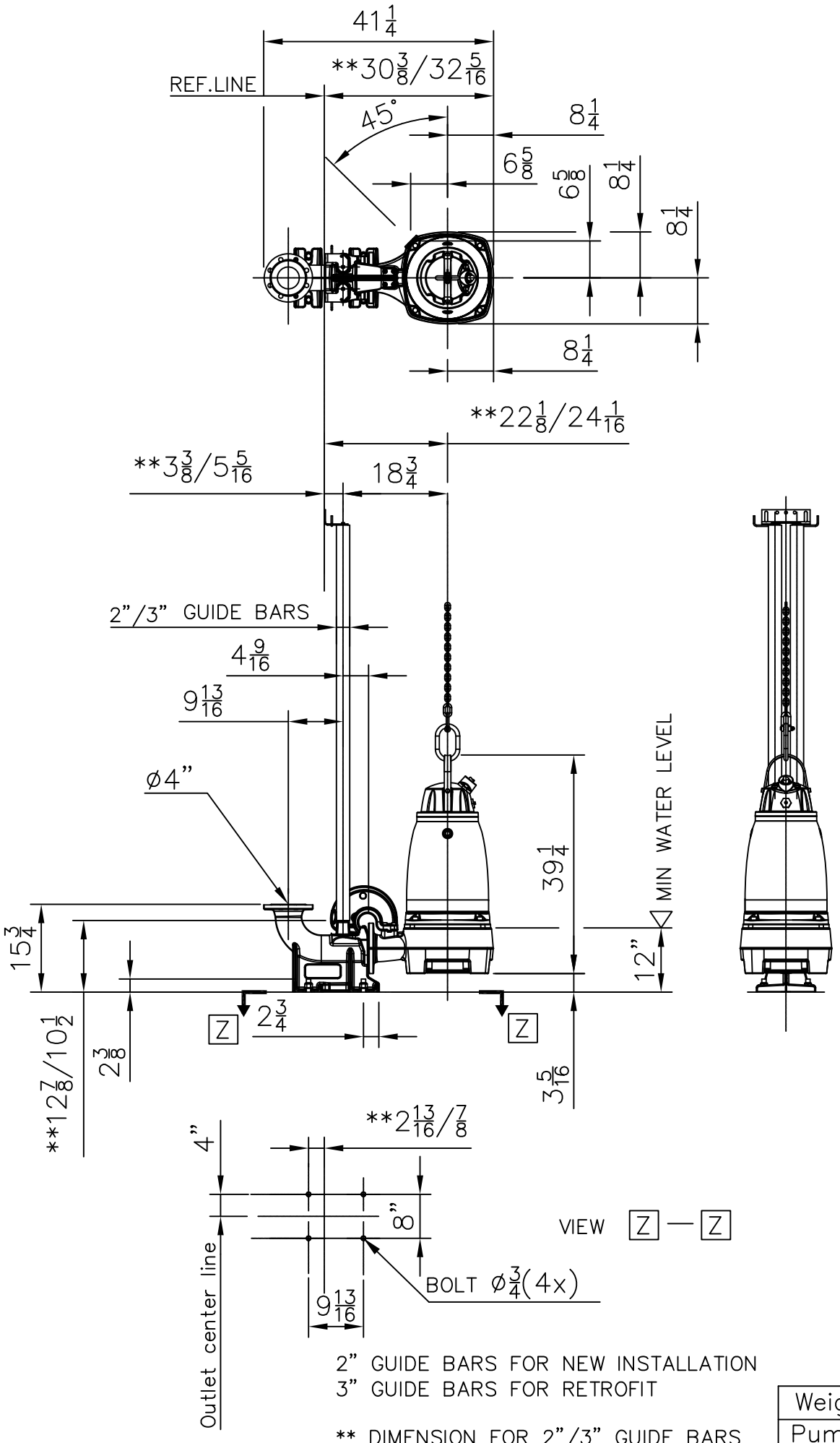
VFD Analysis



Operating characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific Energy	NPSHre
1	60 Hz	629 US g.p.m.	129 ft	33.2 hp	629 US g.p.m.	129 ft	33.2 hp	61.8 %	721 kWh/US M	28 ft
1	55 Hz	540 US g.p.m.	116 ft	25.3 hp	540 US g.p.m.	116 ft	25.3 hp	62.6 %	631 kWh/US M	21.7 ft
1	50 Hz	448 US g.p.m.	104 ft	18.8 hp	448 US g.p.m.	104 ft	18.8 hp	62.8 %	566 kWh/US M	16 ft
1	45 Hz	345 US g.p.m.	93.4 ft	13.3 hp	345 US g.p.m.	93.4 ft	13.3 hp	61.2 %	526 kWh/US M	11.1 ft
1	40 Hz	223 US g.p.m.	84.4 ft	8.73 hp	223 US g.p.m.	84.4 ft	8.73 hp	54.6 %	545 kWh/US M	7.41 ft

Project		**Created by**	Ian Belczyk	**Last update**	11/6/2020
Block		**Created on**	11/6/2020		



2" GUIDE BARS FOR NEW INSTALLATION
3" GUIDE BARS FOR RETROFIT

** DIMENSION FOR 2"/3" GUIDE BARS

Weight (lbs)	
Pump	Stand
765	95

FLYGT	NP,FP	3171	SH		Discharge outlet ø4"	Scale 1:25	Date 191216
					Pump outlet ø4"		
	091,095,181,185,350,390,660,670				Pump inlet	Drawing number 6926800	Revision 7
					Suction inlet		

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DWP62-41LI

Pump type:	Submersible sewage Pump
Application:	Waste water

Pump data

Solids passage	4”
Discharge/ Suction diameter	4”/ 5”
Impeller type:	Vortex
Impeller diameter	315 - 235
Recommended min. flow	95 USGPM
Weight	661 lbs

Motor

Mains:	60 c/s – 3 phase
Rated horse power	52.4 HP
Rated electrical power	45.3 kW
Rated kVA	52.9 kVA
Nominal speed	1730 rpm
Motor efficiency	86 %
Power factor (cos phi)	0.86
Degree of protection	IP 68
Isolation class	F (311°F)
Max. water temperature	104°F
Standard cable length	33 ft

Materials

Pump casing	Cast iron (ASTM A-48 class 35)
Impeller	S.g cast iron (ASTM A-445 Gr.60-46-18)
Motor unit	Cast iron (ASTM A-48 class 35)
Shaft	AISI 431 Alt: AISI 316
Bolts	AISI 316
Elastomers	Nitrile (NBR) or neoprene (CR) Alt: viton (FPM)
Electrical cable	Neoprene (CR)
Seal lubrication	Oil
Seal pump side	Silicon carbide – silicon carbide
Seal motor side	Carbon - Ceramic
Coating	Two components polyurethane

Installation options

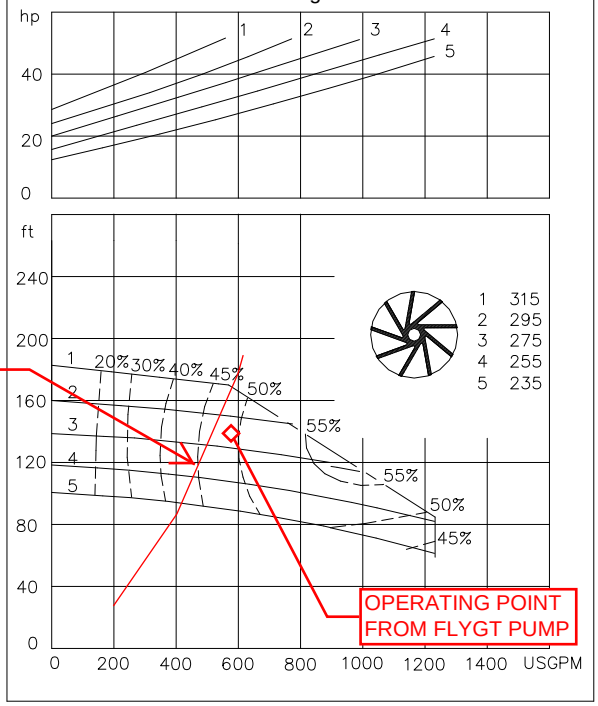
Guide bar coupling	OWK 100 or OWK 150
Freestanding Including support	4” hose connection or 4” NPT connection
Dry Installation Including cooling system	vertical or horizontal discharge 4” suction 5”

Options available

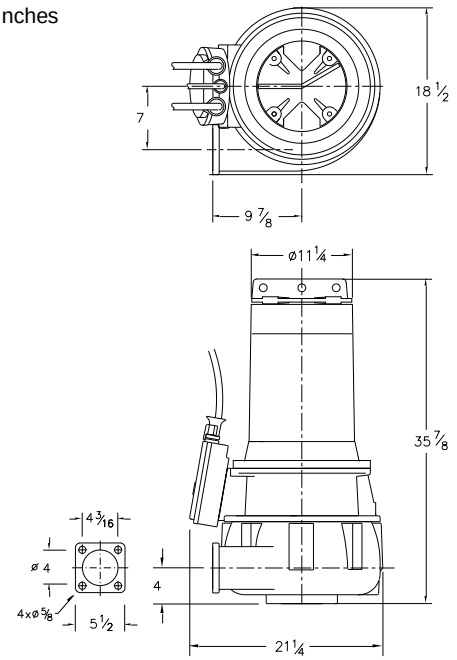
- Version with cooling system
- Cable protective sheathing (AISI 316)
- Water detector in motor and oil chamber

15.9 USGPM = 1l/s,1ft = 0.3m, 1hp = 0.746kW, 1lb = 0.45kg

ISO 9906 grade 2



Inches



Connections

		electrical cable size					
voltage	current	with motor protection and/or water detector					
[V]*	[A]	direct start	star delta start				
380	80.3	2x AWG 6/4 + AWG 14/4	-				
460	66.4	2x AWG 8/4 + AWG 14/4	2x AWG 6/4 + AWG 14/4				
575	53.1	2x AWG 8/4 + AWG 14/4	2x AWG 8/4 + AWG 14/4				
starting current DOL start : 4.5 x rated current							
starting current YD start: 1.5 x rated current						* other voltages on request	

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ATTACHMENT

E

BUOYANCY CALCULATIONS
WET WELL & VALVE VAULT

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COMP. BY JAK

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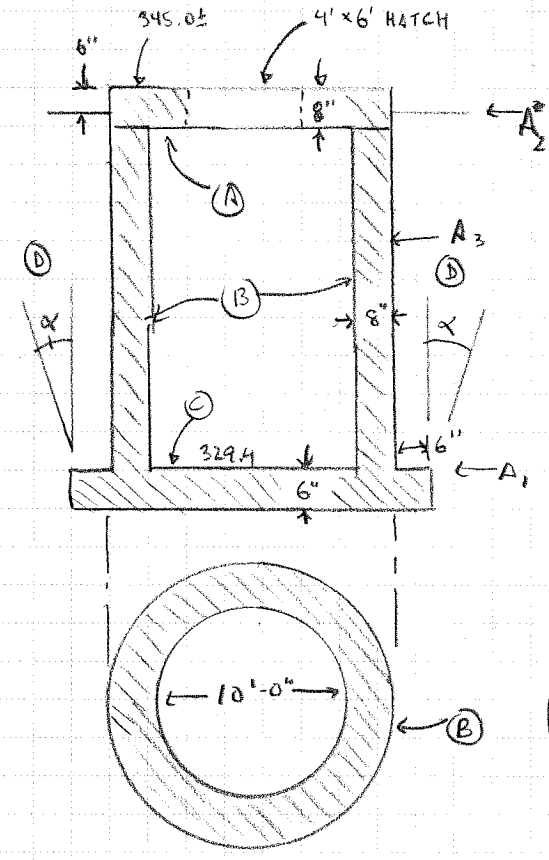
SHEET 1 OF 2

DATE 1/17/2021

CLIENT & PROJ. NAME MOREAU, NY – DISTRICT #1 EXT. #5

PROJ. NO. 2018107

BUOYANCY CALCULATION - WET WELL



WEIGHT OF COMPONENTS

(A) TOP SLAB

$\pi r^2 h = \pi (5.67\,FT)^2 (0.67\,FT) = 67.63\,FT^3$

– HATCH $= -(4.0\,FT)(6.0\,FT)(0.67\,FT) = -16.08\,FT^3$

(B) WALLS

$\pi h (r_o^2 - r_i^2) = \pi (15\,FT)[(5.67\,FT)^2 - (5.0\,FT)^2] = 336.7\,FT^3$

(C) FLOOR

$\pi r^2 h = \pi (6.17\,FT)^2 (0.67\,FT) = 80.1\,FT^3$

(D) SOILS (FRUSTRUM EQU.)

$\alpha = 30°$

$A_1 = \pi r^2 = \pi (6.17\,FT)^2 = 119.5\,FT^2$

$A_2 = \pi r^2 = \pi \left(6.17\,FT + \left(\frac{15.1\,FT}{2}\right)\right)^2 = 591.1\,FT^2$

13.72 FT

$$\forall = \frac{1}{3} h \left(A_1 + \sqrt{A_1 A_2} + A_2\right) - A_3$$

$$= \frac{1}{3}(15.1\,FT)\left(119.5\,FT^2 + \sqrt{119.5 \times 591.1}\,FT^2 + 591.1\,FT^2\right) - \pi (5.67\,FT)^2 (15.1\,FT)$$

$= 3{,}959\,FT^3 - 1524.3\,FT^3 = 2434.7\,FT^3$

DISPLACEMENT VOLUME

$\forall = \pi r^2 h = \pi (5.67\,FT)^2 (344.5\,FT - 329.4\,FT)$

$= 1524.3\,FT^3$ (WALLS)

$+ \pi r^2 h = \pi (6.17\,FT)^2 (0.67\,FT) = 80.1\,FT^3$ (FLOOR)

$= 1524.3\,FT^3 + 80.1\,FT^3 = 1604.4\,FT^3$.

ACCUMULATED FORCES:

$F_V = (1604.4\,FT^3)(62.4\,lb/FT^3) = 100{,}100\,lb$

$F_C =$ (A)+(B)+(C) @ $150\,lb/FT = (468.4\,FT^3)(150\,lb/FT^3) = 70{,}252\,lb$

$F_S =$ (D) @ $120\,lb/FT^3 = (2434.7\,FT^3)(120\,lb/FT^3) = 292{,}164\,lb$

SUMMARY

$$\frac{(F_C + F_S)}{F_V} = \frac{70\,KIP + 292\,KIP}{100.1\,KIP}$$

$$= \boxed{3.6 = FOS}$$

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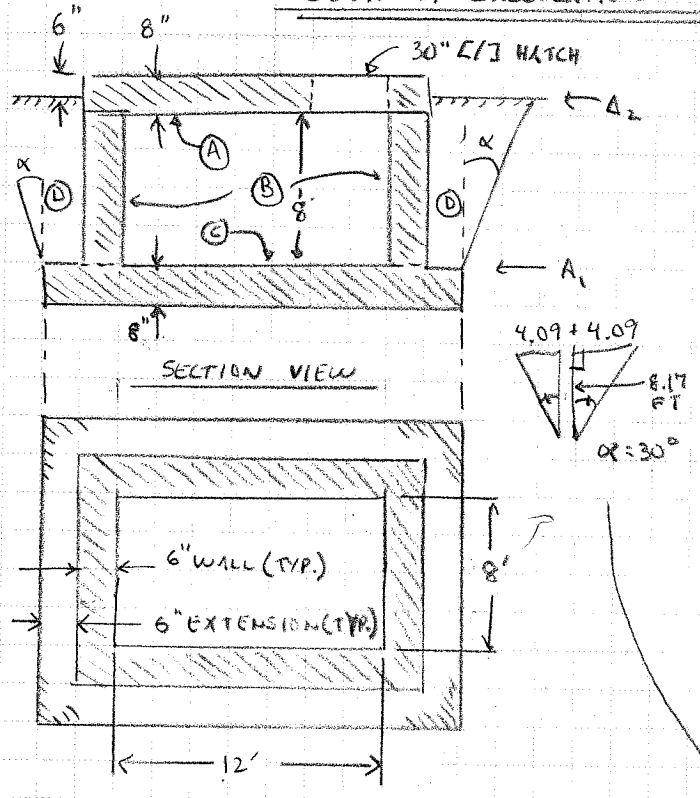
SHEET 2 OF 2

DATE 1/17/2021

CLIENT & PROJ. NAME MOREAU, NY - DISTRICT #1, EXT #5

PROJ. NO. 2018107

BUOYANCY CALCULATION - VALVE VAULT



DISPLACEMENT VOLUME

$$\forall = (8.17\,FT)(13.0\,FT)(9.0\,FT) = 955.89\,FT^3$$
$$+ (10.0\,FT)(14.0\,FT)(0.67\,FT) = 93.8\,FT^3$$
$$1049.69\,FT^3$$

WEIGHT OF COMPONENTS

(A) TOP SLAB
$(9.0\,FT)(13.0\,FT)(0.67\,FT) = 78.39\,FT^3$
(HATCH) $-4.19\,FT^3$

(B) WALLS
$[(2)(12.5\,FT)+(2)(8.5\,FT)](8\,FT)(0.5\,FT)$
$= 168.00\,FT^3$

(C) FLOOR
$(14.0\,FT)(10.0\,FT)(0.67\,FT) = 93.80\,FT^3$

(D) SOIL (FRUSTRUM EQU.)
$A_1 = (14.0\,FT)(10.0\,FT) = 140\,FT^2$
$A_2 [(14.0\,FT + 8.17\,FT) \times$
$(10.0\,FT + 8.17\,FT)] = 402.8\,FT^3$

$$\forall_s = \frac{1}{3}h\left(A_1 + \sqrt{A_1 A_2} + A_2\right)$$
$$= \frac{1}{3}(8.17\,FT)\left(140\,FT^2 + \sqrt{(140)(402.8)\,FT^4} + 402.8\,FT^2\right)$$
$$= 2125\,FT^3 - (13\,FT)(9\,FT)(8.17\,FT)$$
$$955.9$$
$$= 1169.1\,FT^3$$

ACCUMULATED FORCES

$F_\forall = (1049.69\,FT^3)(62.4\,LB/FT) = 65{,}500\,LB.$

F_C = (A) + (B) + (C) @ $150\,LB/FT^3$
$= (336.0\,FT^3)(150\,LB/FT^3) = 50{,}400\,LB$

F_S = (D) @ $120\,LB/FT^3$
$= (1169\,FT^3)(120\,LB/FT^3) = 140{,}300\,LB$

SUMMARY

$$\frac{(F_C + F_S)}{F_\forall} = \frac{(50.4\,KIP + 140\,KIP)}{65.5\,KIP} = 2.9$$

FOS = 2.9

ATTACHMENT

F

SYSTEM SCHEMATIC

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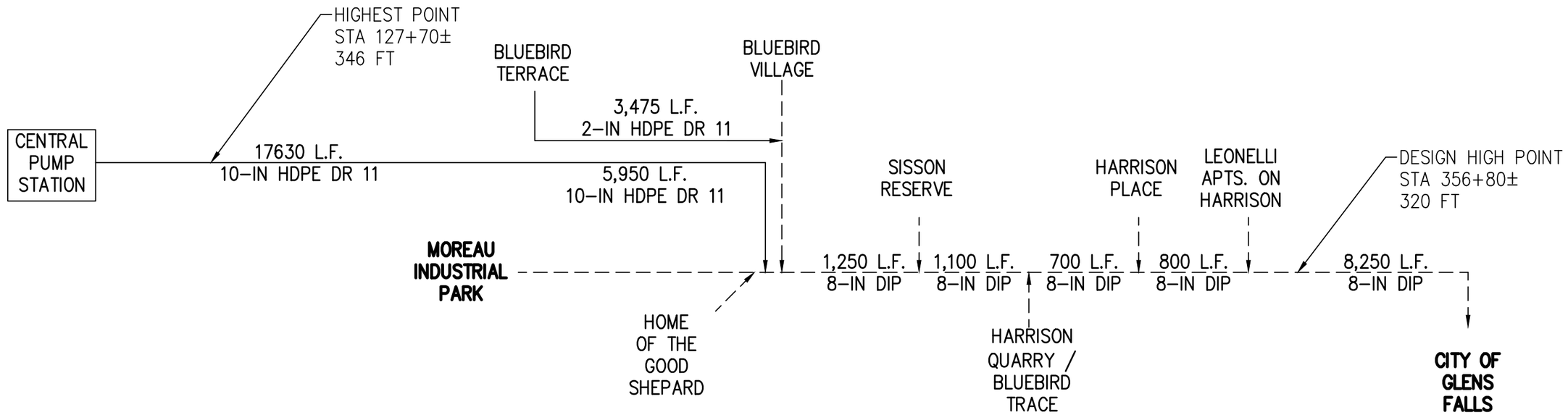

PROPOSED FORCE MAIN
EXISTING FORCE MAIN

TOWN OF MOREAU
SARATOGA COUNTY * NEW YORK

PROPOSED
SEWER DISTRICT NO.1 - EXT.5
SCHEMATIC FORCE MAIN/ EXTENSION 5 LAYOUT

DESIGNED BY JAK
DRAWN BY JAK
REVIEWED BY

Laberge ENGINEERING ARCHITECTURE Group SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

DATE 10/05/2020
SCALE NTS
SHEET 1

ATTACHMENT

G

SEWER MASTER METER READINGS

MARCH 2020 – DECEMBER 2020

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VAN BUREN - SEWER - MASTER METER READINGS					BEG. 3/2/2020
Date	Start Meter Reading	End Meter Reading	Gallons Pumped Per Day	Running Totals	Monthly Totals
3/2/2020	0	70,000	70,000	70,000	
3/3/2020	70000	143,850	73,850	143,850	
3/4/2020	143850	213,181	69,331	213,181	
3/5/2020	213181	291,035	77,854	291,035	
3/6/2020	291035	359,150	68,115	359,150	
3/7/2020	359150	427,900	68,750	427,900	
3/8/2020	427900	515,600	87,700	515,600	
3/9/2020	515600	600,800	85,200	600,800	
3/10/2020	600800	685,949	85,149	685,949	
3/11/2020	685949	754,135	68,186	754,135	
3/12/2020	754135	839,140	85,005	839,140	
3/13/2020	839140	909,000	69,860	909,000	
3/14/2020	909000	972,537	63,537	972,537	
3/15/2020	972537	1,056,100	83,563	1,056,100	
3/16/2020	1056100	1,123,296	67,196	1,123,296	
3/17/2020	1123296	1,183,200	59,904	1,183,200	
3/18/2020	1183200	1,258,900	75,700	1,258,900	
3/19/2020	1258900	1,343,722	84,822	1,343,722	
3/20/2020	1343722	1,427,350	83,628	1,427,350	
3/21/2020	1427350	1,500,000	72,650	1,500,000	
3/22/2020	1500000	1,582,500	82,500	1,582,500	
3/23/2020	1582500	1,678,370	95,870	1,678,370	
3/24/2020	1678370	1,752,540	74,170	1,752,540	
3/25/2020	1752540	1,824,550	72,010	1,824,550	
3/26/2020	1824550	1,914,830	90,280	1,914,830	
3/27/2020	1914830	1,984,870	70,040	1,984,870	
3/28/2020	1984870	2,050,900	66,030	2,050,900	
3/29/2020	2050900	2,125,250	74,350	2,125,250	
3/30/2020	2125250	2,210,140	84,890	2,210,140	
3/31/2020	2210140	2,278,580	68,440	2,278,580	2,278,580

VAN BUREN - SEWER - MASTER METER READINGS					BEG. 3/2/2020
4/1/2020	2278580	2,348,660	70,080		
4/2/2020	2348660	2,428,640	79,980		
4/3/2020	2428640	2,505,690	77,050		
4/4/2020	2505690	2,582,390	76,700		
4/5/2020	2582390	2,649,520	67,130		
4/6/2020	2649520	2,722,560	73,040		
4/7/2020	2722560	2,795,620	73,060		
4/8/2020	2795620	2,874,830	79,210		
4/9/2020	2874830	2,957,700	82,870		
4/10/2020	2957700	3,021,450	63,750		
4/11/2020	3021450	3,085,420	63,970		
4/12/2020	3085420	3,160,150	74,730		
4/13/2020	3160150	3,247,520	87,370		
4/14/2020	3247520	3,320,150	72,630		
4/15/2020	3320150	3,402,420	82,270		
4/16/2020	3402420	3,465,020	62,600		
4/17/2020	3465020	3,536,590	71,570		
4/18/2020	3536590	3,601,890	65,300		
4/19/2020	3601890	3,659,370	57,480		
4/20/2020	3659370	3,729,060	69,690		
4/21/2020	3729060	3,798,560	69,500		
4/22/2020	3798560	3,874,520	75,960		
4/23/2020	3874520	3,947,510	72,990		
4/24/2020	3947510	4,012,410	64,900		
4/25/2020	4012410	4,097,450	85,040		
4/26/2020	4097450	4,177,410	79,960		
4/27/2020	4177410	4,245,500	68,090		
4/28/2020	4245500	4,316,940	71,440		
4/29/2020	4316940	4,391,020	74,080		
4/30/2020	4391020	4,465,590	74,570		2,187,010

VAN BUREN - SEWER - MASTER METER READINGS					BEG. 3/2/2020
5/1/2020	4465590	4,556,710	91,120		
5/2/2020	4556710	4,637,070	80,360		
5/3/2020	4637070	4,718,590	81,520		
5/4/2020	4718590	4,799,340	80,750		
5/5/2020	4799340	4,864,350	65,010		
5/6/2020	4864350	4,944,000	79,650		
5/7/2020	4944000	5,013,630	69,630		
5/8/2020	5013630	5,083,570	69,940		
5/9/2020	5083570	5,150,470	66,900		
5/10/2020	5150470	5,233,360	82,890		
5/11/2020	5233360	5,308,360	75,000		
5/12/2020	5308360	5,386,990	78,630		
5/13/2020	5386990	5,449,050	62,060		
5/14/2020	5449050	5,529,520	80,470		
5/15/2020	5529520	5,599,390	69,870		
5/16/2020	5599390	5,659,810	60,420		
5/17/2020	5659810	5,761,500	101,690		
5/18/2020	5761500	5,826,600	65,100		
5/19/2020	5826600	5,901,900	75,300		
5/20/2020	5901900	5,965,120	63,220		
5/21/2020	5965120	6,030,820	65,700		
5/22/2020	6030820	6,118,770	87,950		
5/23/2020	6118770	6,192,520	73,750		
5/24/2020	6192520	6,268,940	76,420		
5/25/2020	6268940	6,345,110	76,170		
5/26/2020	6345110	6,408,300	63,190		
5/27/2020	6408300	6,500,400	92,100		
5/28/2020	6500400	6,594,880	94,480		
5/29/2020	6594880	6,673,080	78,200		
5/30/2020	6673080	6,759,120	86,040		
5/31/2020	6759120	6,832,780	73,660		2,359,190
6/1/2020	6832780	6,897,390	64,610		
6/2/2020	6897390	6,979,880	82,490		
6/3/2020	6979880	7,060,780	80,900		
6/4/2020	7060780	7,149,870	89,090		
6/5/2020	7147870	7,216,300	66,430		
6/6/2020	7216300	7,288,730	72,430		
6/7/2020	7288730	7,358,650	69,920		
6/8/2020	7358650	7,442,090	83,440		
6/9/2020	7442090	7,503,550	61,460		

VAN BUREN - SEWER - MASTER METER READINGS					BEG. 3/2/2020
6/10/2020	7503550	7,589,350	85,800		
6/11/2020	7589350	7,667,960	78,610		
6/12/2020	7667960	7,743,930	75,970		
6/13/2020	7743930	7,809,240	65,310		
6/14/2020	7809240	7,867,710	58,470		
6/15/2020	7867710	7,946,490	78,780		
6/16/2020	7946490	8,027,130	80,640		
6/17/2020	8027130	8,103,270	76,140		
6/18/2020	8103270	8,184,440	81,170		
6/19/2020	8184440	8,255,660	71,220		
6/20/2020	8255660	8,317,180	61,520		
6/21/2020	8317180	8,399,960	82,780		
6/22/2020	8399960	8,468,660	68,700		
6/23/2020	8468660	8,557,600	88,940		
6/24/2020	8557600	8,651,350	93,750		
6/25/2020	8651350	8,725,770	74,420		
6/26/2020	8725770	8,797,020	71,250		
6/27/2020	8797020	8,873,490	76,470		
6/28/2020	8873490	8,962,070	88,580		
6/29/2020	8962070	9,027,100	65,030		
6/30/2020	9027100	9,104,510	77,410		(2,367,190)
7/1/2020	9104510	9,174,010	69,500		
7/2/2020	9174010	9,247,790	73,780		
7/3/2020	9247790	9,321,770	73,980		
7/4/2020	9321770	9,395,550	73,780		
7/5/2020	9395550	9,477,500	81,950		
7/6/2020	9477500	9,557,900	80,400		
7/7/2020	9557900	9,637,560	79,660		
7/8/2020	9637560	9,709,200	71,640		
7/9/2020	9709200	9,791,790	82,590		
7/10/2020	9791790	9,873,240	81,450		
7/11/2020	9873240	9,948,590	75,350		
7/12/2020	9948590	10,022,490	73,900		
7/13/2020	10022490	10,101,500	79,010		
7/14/2020	10101500	10,178,000	76,500		
7/15/2020	10178000	10,239,300	61,300		
7/16/2020	10239300	10,320,800	81,500		
7/17/2020	10320800	10,384,230	63,430		
7/18/2020	10384230	10,466,400	82,170		
7/19/2020	10466400	10,551,100	84,700		

VAN BUREN - SEWER - MASTER METER READINGS					BEG. 3/2/2020
7/20/2020	10551100	10,626,900	75,800		
7/21/2020	10626900	10,701,790	74,890		
7/22/2020	10701790	10,772,750	70,960		
7/23/2020	10772750	10,852,150	79,400		
7/24/2020	10852150	10,936,680	84,530		
7/25/2020	10936680	11,014,110	77,430		
7/26/2020	11014110	11,073,040	58,930		
7/27/2020	11073040	11,143,170	70,130		
7/28/2020	11143170	11,227,435	84,265		
7/29/2020	11227435	11,304,700	77,265		
7/30/2020	11304700	11,374,370	69,670		
7/31/2020	11374370	11,443,300	68,930		2,338,790
8/1/2020	11443300	11,512,500	69,200		
8/2/2020	11512500	11,601,870	89,370		
8/3/2020	11601870	11,681,310	79,440		
8/4/2020	11681310	11,776,440	95,130		
8/5/2020	11776440	11,866,840	90,400		
8/6/2020	11866840	11,946,930	80,090		
8/7/2020	11946930	12,023,720	76,790		
8/8/2020	12023720	12,088,310	64,590		
8/9/2020	12088310	12,166,530	78,220		
8/10/2020	12166530	12,244,580	78,050		
8/11/2020	12244580	12,322,780	78,200		
8/12/2020	12322780	12,389,910	67,130		
8/13/2020	12389910	12,459,580	69,670		
8/14/2020	12459580	12,532,880	73,300		
8/15/2020	12532880	12,607,050	74,170		
8/16/2020	12607050	12,682,520	75,470		
8/17/2020	12682520	12,763,100	80,580		
8/18/2020	12763100	12,811,870	48,770		
8/19/2020	12811870	12,905,290	93,420		
8/20/2020	12905290	12,992,660	87,370		
8/21/2020	12992660	13,062,920	70,260		
8/22/2020	13062920	13,144,150	81,230		
8/23/2020	13144150	13,230,160	86,010		
8/24/2020	13230160	13,313,850	83,690		
8/25/2020	13313850	13,378,250	64,400		
8/26/2020	13378250	13,458,670	80,420		
8/27/2020	13458670	13,533,410	74,740		
8/28/2020	13533410	13,607,780	74,370		

VAN BUREN - SEWER - MASTER METER READINGS					BEG. 3/2/2020
8/29/2020	13607780	13,678,450	70,670		
8/30/2020	13678450	13,760,130	81,680		
8/31/2020	13760130	13,834,330	74,200		2,391,030
9/1/2020	13834330	13,907,990	73,660		
9/2/2020	13907990	13,992,340	84,350		
9/3/2020	13992340	14,067,440	75,100		
9/4/2020	14067440	14,140,600	73,160		
9/5/2020	14140600	14,199,780	59,180		
9/6/2020	14199780	14,284,250	84,470		
9/7/2020	14284250	14,355,780	71,530		
9/8/2020	14355780	14,428,210	72,430		
9/9/2020	14428210	14,515,560	87,350		
9/10/2020	14515560	14,597,100	81,540		
9/11/2020	14597100	14,668,380	71,280		
9/12/2020	14668380	14,733,390	65,010		
9/13/2020	14733390	14,804,070	70,680		
9/14/2020	14804070	14,882,750	78,680		
9/15/2020	14882750	14,946,620	63,870		
9/16/2020	14946620	15,022,850	76,230		
9/17/2020	15022850	15,105,210	82,360		
9/18/2020	15105210	15,182,640	77,430		
9/19/2020	15182640	15,249,250	66,610		
9/20/2020	15249250	15,341,020	91,770		
9/21/2020	15341020	15,420,170	79,150		
9/22/2020	15420170	15,500,550	80,380		
9/23/2020	15500550	15,582,550	82,000		
9/24/2020	15582550	15,657,230	74,680		
9/25/2020	15657230	15,733,550	76,320		
9/26/2020	15733550	15,793,850	60,300		
9/27/2020	15793850	15,890,230	96,380		
9/28/2020	15890230	15,973,400	83,170		
9/29/2020	15973400	16,063,550	90,150		
9/30/2020	16063550	16,144,610	81,060		2,310,280
10/1/2020	16144610	16,223,200	78,590		
10/2/2020	16223200	16,296,170	72,970		
10/3/2020	16296170	16,360,930	64,760		
10/4/2020	16360930	16,456,520	95,590		
10/5/2020	16456520	16,538,510	81,990		
10/6/2020	16538510	16,627,330	88,820		
10/7/2020	16627330	16,714,260	86,930		

VAN BUREN - SEWER - MASTER METER READINGS					BEG. 3/2/2020
10/8/2020	16714260	16,794,700	80,440		
10/9/2020	16794700	16,865,300	70,600		
10/10/2020	16865300	16,928,930	63,630		
10/11/2020	16928930	17,014,820	85,890		
10/12/2020	17014820	17,093,750	78,930		
10/13/2020	17093750	17,164,030	70,280		
10/14/2020	17164030	17,244,700	80,670		
10/15/2020	17244700	17,322,880	78,180		
10/16/2020	17322880	17,403,340	80,460		
10/17/2020	17403340	17,473,410	70,070		
10/18/2020	17473410	17,544,900	71,490		
10/19/2020	17544900	17,616,200	71,300		
10/20/2020	17616200	17,698,300	82,100		
10/21/2020	17698300	17,783,500	85,200		
10/22/2020	17783500	17,850,310	66,810		
10/23/2020	17850310	17,919,820	69,510		
10/24/2020	17919820	17,986,340	66,520		
10/25/2020	17986340	18,075,900	89,560		
10/26/2020	18075900	18,157,750	81,850		
10/27/2020	18157750	18,225,300	67,550		
10/28/2020	18225300	18,308,380	83,080		
10/29/2020	18308380	18,375,800	67,420		
10/30/2020	18375800	18,442,450	66,650		
10/31/2020	18442450	18,504,720	62,270		2,360,110
11/1/2020	18504720	18,606,400	101,680		
11/2/2020	18606400	18,686,070	79,670		
11/3/2020	18686070	18,758,770	72,700		
11/4/2020	18758770	18,842,240	83,470		
11/5/2020	18842240	18,924,000	81,760		
11/6/2020	18924000	18,997,750	73,750		
11/7/2020	18997750	19,068,240	70,490		
11/8/2020	19068240	19,145,880	77,640		
11/9/2020	19145880	19,227,620	81,740		
11/10/2020	19227620	19,300,880	73,260		
11/11/2020	19300880	19,380,480	79,600		
11/12/2020	19380480	19,458,560	78,080		
11/13/2020	19458560	19,529,020	70,460		
11/14/2020	19529020	19,597,730	68,710		
11/15/2020	19597730	19,693,680	95,950		
11/16/2020	19693680	19,770,670	76,990		

VAN BUREN - SEWER - MASTER METER READINGS					BEG. 3/2/2020
11/17/2020	19770670	19,849,670	79,000		
11/18/2020	19849670	19,922,470	72,800		
11/19/2020	19922470	19,987,510	65,040		
11/20/2020	19987510	20,056,840	69,330		
11/21/2020	20056840	20,126,180	69,340		
11/22/2020	20126180	20,203,740	77,560		
11/23/2020	20203740	20,287,640	83,900		
11/24/2020	20287640	20,367,080	79,440		
11/25/2020	20367080	20,447,060	79,980		
11/26/2020	20447060	20,525,600	78,540		
11/27/2020	20525600	20,571,460	45,860		
11/28/2020	20571460	20,655,750	84,290		
11/29/2020	20655750	20,740,260	84,510		
11/30/2020	20740260	20,824,900	84,640		2,320,180
12/1/2020	20824900	20,890,500	65,600		
12/2/2020	20890500	20,977,210	86,710		
12/3/2020	20977210	21,051,750	74,540		
12/4/2020	21051750	21,134,320	82,570		
12/5/2020	21134320	21,210,010	75,690		
12/6/2020	21210010	21,281,080	71,070		
12/7/2020	21281080	21,357,480	76,400		
12/8/2020	21357480	21,440,000	82,520		
12/9/2020	21440000	21,512,330	72,330		
12/10/2020	21512330	21,593,580	81,250		
12/11/2020	21593580	21,663,080	69,500		
12/12/2020	21663080	21,738,090	75,010		
12/13/2020	21738090	21,834,950	96,860		
12/14/2020	21834950	21,916,100	81,150		
12/15/2020	21916100	21,996,030	79,930		
12/16/2020	21996030	22,079,550	83,520		
12/17/2020	22079550	22,141,950	62,400		
12/18/2020	22141950	22,203,980	62,030		
12/19/2020	22203980	22,287,550	83,570		
12/20/2020	22287550	22,367,950	80,400		
12/21/2020	22367950	22,448,540	80,590		
12/22/2020	22448540	22,522,850	74,310		
12/23/2020	22522850	22,591,410	68,560		
12/24/2020	22591410	22,674,950	83,540		
12/25/2020	22674950	22,746,450	71,500		
12/26/2020	22746450	22,816,660	70,210		

VAN BUREN - SEWER - MASTER METER READINGS					BEG. 3/2/2020
12/27/2020	22816660	22,902,450	85,790		
12/28/2020	22902450	22,996,650	94,200		
12/29/2020	22996650	23,071,140	74,490		
12/30/2020	23071140	23,159,330	88,190		
12/31/2020	23159330	23,235,022	75,692		2,410,122
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TOWN OF MOREAU

VAN BUREN - SEWER - MASTER METER READINGS					BEG. 3/2/2020
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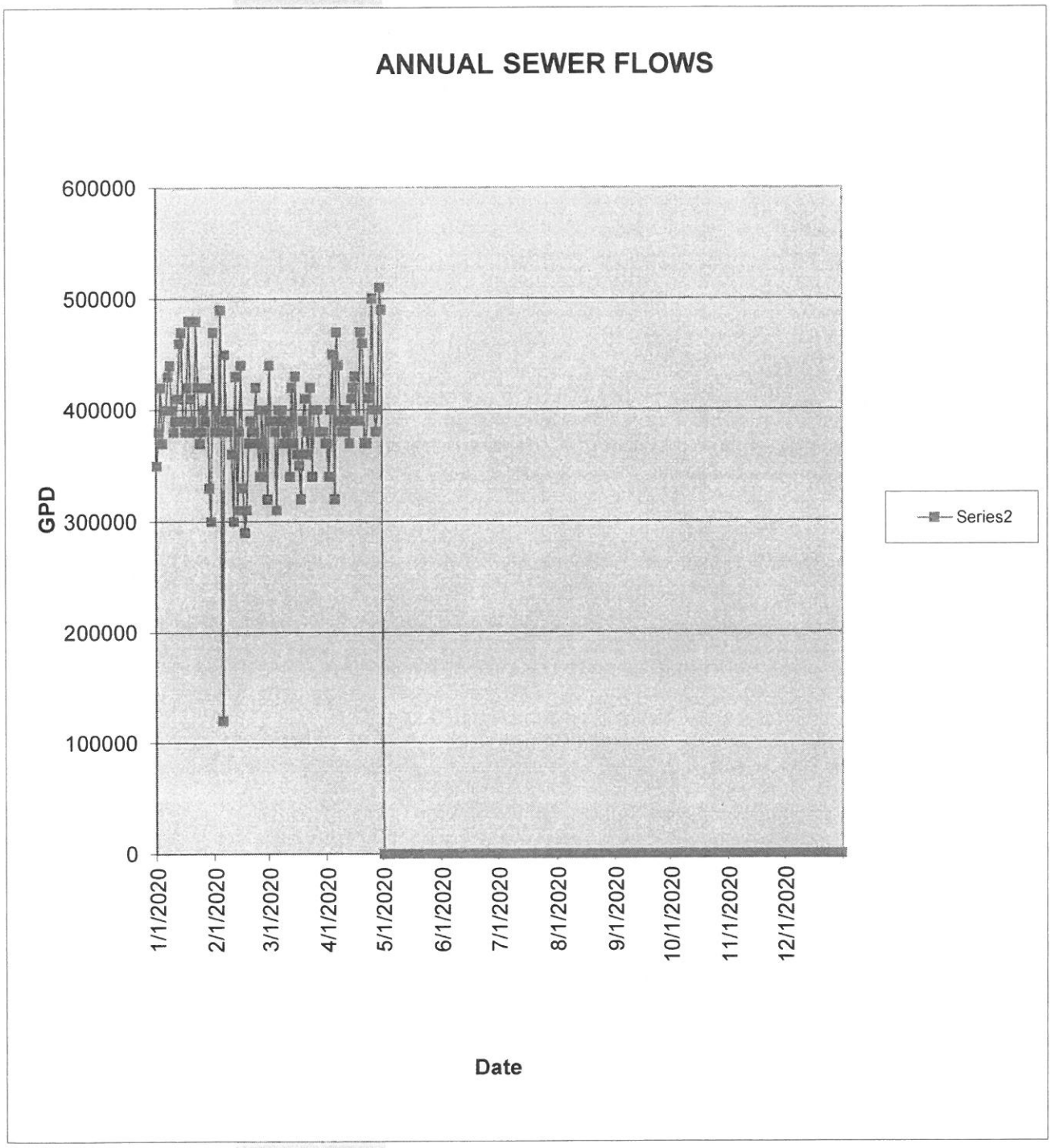
Annual Total		23,235,022	18,588,102
Leap Year			
January		Peak Month	
February		Peak Day	
March	2,278,580	Average Day	
April	2,187,010	Peak Ratio	
May	2,359,190		BEG. 3/2/2020
June	(2,367,190)		
July	2,338,790		
August	2,391,030		
September	2,310,280		
October	2,360,110		

VAN BUREN - SEWER - MASTER METER READINGS	BEG. 3/2/2020
November	2,320,180
December	2,410,122
	18,588,102



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APPENDIX C

CITY OF GLENS FALLS LETTER

City of Glens Falls

America's Hometown for the 21st Century ~ a City of Opportunity

Water & Sewer Department Telephone: [518] 761-3850 • Fax: [518] 761-3862
24 Hr. Water & Sewer Emergencies: [518] 761-3857 • www.cityofglensfalls.com

Feb. 18, 2022

Raymond Apy
Chief Executive Officer
Northeastern Biochar Solutions

Mr. Apy

Per our discussion on December 14, 2021, the City of Glens Falls Wastewater Treatment Plant can receive the profile and volume of wastewater as stated in said meeting.

At this time your facility would not be considered a categorical industrial user but as with all industrial customers that send wastewater to the City of Glens Falls Wastewater Treatment Plant, you will be required to meet the Glens Falls City Code 177 Article VII, Discharge Requirements. Pretreatment will not be necessary unless the profile of your wastewater does not meet the Glens Falls Local Limits or causes pass through or interference with the wastewater treatment plant process.

I would like to reiterate that based on the data we have; the Town of Moreau is presently discharging around 75,000 gpd to the City of Glens Falls WWTP and the Town of Moreau's purchased capacity is 190,000 gpd. However, I do not know how that capacity is allocated among Moreau's 5 sewer district extensions. That is a question that you would have to ask the folks in Moreau as it is the responsibility of the Town of Moreau to appoint capacity in each of their sewer districts.

If you have any questions or need clarification, please contact me.

Thank you,

Christopher S. Miller
Chief Operator
City of Glens Falls Wastewater Treatment Plant
2 Shermantown Rd.
Glens Falls, NY 12801
Phone: 518 761-3850 ext 119
Fax: 518 761-3862
cmiller@cityofglensfalls.com