Sanitary Sewer Engineering Report

For

Proposed Hotel at

1 Hotel Way

Town of
North Greenbush, New York

October 2024

Applicant:

OM Hospitality, LLC
C/O Hiren Patel
256 Birchwood Hills Drive
Troy, NY 12180

Prepared by:

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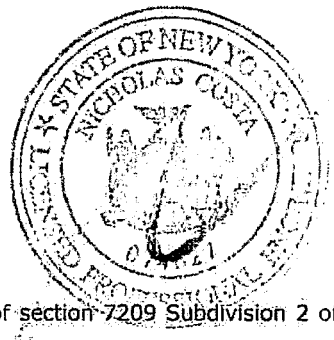
Latham, New York 12110



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INTRODUCTION

The purpose of this report is to describe the existing system conditions and proposed methods, which will be utilized to provide Sanitary Sewer Service to the proposed new hotel to be constructed at 1 Hotel Way in the Town of North Greenbush, County of Rensselaer. The subject parcel is located outside the North Greenbush Consolidated Sewer District and the District will have to be extended to include the subject parcel.

EXISTING CONDITIONS

The project site lies in the Quackenderry Commons Planned Development District (PDD) which is approved for the development of a four (4) story hotel for Parcel "B", the subject parcel which is composed of the parcel identified as tax map parcel 144.0-10-33.13. The subject property is vacant and encompasses approximately 3.894 acres and has frontage along Van Allen Way. The parcel is bound by the Van Allen Way, the National Grid parcel along the westerly boundary; the right-of way of the exit 8-I 90 Connector (Route 4 to I-90) corridor along the easterly and southerly boundaries; and on the northerly boundary by lands now or formerly of O'Brien developed as an automotive repair & sales (Volvo) facility. Municipal water & sanitary sewer systems are located and available along the Van Allen Way corridor. See Appendix A for the Site Location Map.

SITE TOPOGRAPHY, VEGETATION AND EXISTING SOILS

Vegetative Cover

Site vegetation consists of mostly brush and wooded areas. The area to be developed is dominated by overgrown brush with some trees located along the easterly and southerly portions of the proposed development area of the parcel. The existing trees located at the easterly side of the parcel provide a buffer to the exit 8 –I 90 Connector.

Topography

The site topography is generally gently sloped at the proposed location of the hotel development. The topography slopes becomes steeper towards the midpoint of the parcel as it approaches the existing wetlands.

Soils

According to United States Department of Agriculture Soil Survey for Rensselaer County, the primary soils found at the site may be classified as Hudson silt loam (HuC & HuE) with a small percentage of the site soils classified as Rhinebeck silt loam (RhB); these soils are all classified as hydrologic soil group C/D and are clay soils. Depth to Bedrock is more than 80 inches and the depth to groundwater ranges from 18 inches to 24 inches.

LAND USE AND ZONING

As noted above the parcel is part of the Quackenderry Commons Planned Development District (PDD) which is approved for the development of a four (4) story hotel for the subject parcel.

EXISTING UTILITIES

Water Supply: - The existing 8-inch diameter water main along Van Allen Way will be utilized to provide water service for the proposed project. This 8-inch water main runs along the entire frontage of the proposed development. Existing fire hydrants are adequately spaced along this corridor.

Sanitary Sewer: - A municipal sanitary sewer force main currently exists along the westerly side of Van Allen Way in front of the project site near the intersection of the proposed project entrance road. At this point the existing 6-inch sanitary sewer force main runs North along Van Allen Way to the intersection with Washington Avenue Extension. The force main then runs westerly along Washington Avenue Extension to the intersection with Van Alstyn Drive and then runs in a northerly direction along Van Alstyn Drive to its discharge point at an existing gravity sewer manhole owned by the Town of North Greenbush. The total length of the existing 6-inch force main from the project site to the discharge point is approximately 2,490 LF.
The route of the sanitary sewer force main from the project site to the force main discharge point is shown in Appendix B

Other Utilities: - The project owner is working with the utility companies to get required other utilities such as electric, telephone, CATV and gas service.

PROPOSED DEVELOPMENT

The applicant proposes to develop the project site with an approximately 17,270 square feet (SF) of building footprint area that will be have a total of four (4) stories and be occupied by a total of 99 hotel rooms. Associated access and circulation roadways along with the construction of 107 parking spaces are shown on the Site Plan to be developed to support the proposed hotel. The property is owned by the applicant.

The proposed site is located within the Quackenderry Commons PDD Zone which was approved for the proposed development and is part of the Town of North Greenbush Zoning Map and Code.

Total site coverage statistics for this new development are as follows and are shown on the Site Plan:

Site Coverage:	Existing Coverage:	Proposed Coverage:	Difference:
Building Coverage	0 ± S.F. or 0%	15,845 ± S.F. or 9.3%	+15,845± S.F. or +9.3%
Pavement, Sidewalk	0 ± S.F. or 0%	53,764± S.F. or 31.7%	+53,764 ± S.F. or +31.7%
Green Space:	169,608± S.F. or 100%	99,999 ± S.F. or 59.0%	-69,609± S.F. or - 41.0%

The parcel does contain Army Corps of Engineers (ACOE) jurisdictional wetlands near the areas of proposed for development, as shown on the Site Plan, but there will not be any wetlands disturbance.

Proposed Utilities

Water Service: An existing 8-inch DIP water main exists along Van Allen Way. A new 8-inch diameter water main is proposed to be connected to the existing 8-inch pipe, at the intersection of the proposed entrance roadway and Van Allen Way. Approximately 340 lineal feet (LF) of 8-inch diameter water main and related appurtenances will be required for this project. The new 8-inch water main will be service the proposed hotel and will be owned by the applicant.

Sanitary Sewer: As previously mentioned, a 6-inch diameter sanitary sewer force main currently exists along the west side of Van Allen Way at the intersection of the project entrance road with Van Allen Way. This force main currently services the Quackenderry Commons Apartments Sanitary Sewer Pumping Station. It is the intention of the project design to connect the proposed hotel site sewer force main to this existing sanitary sewer force main. The proposed on-site force main will consist of 4-inch diameter PVC SDR 21 pipe. All proposed new on-site gravity sewers will be gravity 6-inch diameter PVC SDR 26 sewer. This project will require the installation of approximately 500 lineal feet (LF) of 4-inch diameter PVC force main pipe and 250 LF of 6-inch diameter PVC gravity sewer mains.

The proposed sanitary sewer system will be owned and maintained by the applicant.

The proposed infrastructure described above is shown on site plans prepared by Advance Engineering & Surveying PLLC.

DESIGN STANDARDS ESTIMATED FLOW

Estimated Proposed Sanitary Sewage Hydraulic Loading:

Design Average Daily Flow:

Hotel Rooms to be connected to system: 99
99 hotel rooms x 110 GPD/hotel room = 10,890 gallons per day (GPD).
Design Average Daily Flow Total = 10,890 GPD

Design Peak hourly Flow:
Peak daily flows are estimated at approximately 4.0 times the average daily flow.

Average Daily Hydraulic Loading from above = 10,890 GPD = 7.56 gallons per minute (GPM) x 4 = 30.2 (GPM) peak

Total Estimated Average Yearly Flows = 10,890 gallons per day (GPD) x 365 days per year = 3.98 Million gallons per year

WASTEWATER COLLECTION AND TREATMENT

The proposed sanitary sewer service lateral and on-site gravity sewer will convey the wastewater generated from the proposed 99 room hotel to the proposed pump station which in turn will discharge the flows via the 4-inch diameter PVC force main into the existing 6-inch diameter PVC force main sewer pipe along Van Allen Way which is operated by the existing pump station that services the existing Van Allen Apartments located to the west of the subject project site. The existing 6-inch diameter force main conveys the wastewater flows to the existing gravity sewer manhole located at Van Alstyn Drive. Then the wastewater flow continues to the existing trunk sewer. The trunk sewer eventually discharges into the Rensselaer County Treatment Plant for treatment prior to discharge into the Hudson River.

The proposed sanitary sewer system will be constructed of pre-cast concrete manhole structures and Polyethylene Vinyl Chloride (PVC) pipe materials. The minimum cover for the proposed piping will be 5 feet. The proposed sanitary sewer piping will be pressure tested in accordance with ASTM Standards. The proposed work will be performed in accordance with the requirements and recommendations of the New York State Department of Environmental Conservation and The Town of North Greenbush.

PUMP STATION DESIGN AND ANALYSIS

System Design

The pumping station will be a duplex sewage pumping station with two (2) submersible HOMA Pumps. The wet well will be a 6-feet inside dimension (ID) concrete wet well as manufactured by "Fort Miller" Concrete Products. Based on the system operating conditions and the analysis presented in Appendix C. Each HOMA sewage pump will be a model AMS436-230 with a 9-1/16 inch diameter impeller and a 3.8 horsepower (HP) motor. The motors will be 3 phase, 230V and operate at 1,160 RPM. Each pump will be capable of handling the tributary peak flows generated

from the project. The pumps will alternate operation and discharge into an approximately 500 Lineal Feet (LF) 4-inch diameter PVC SDR 21 force main installed on the site. This force main will discharge into an existing 6-inch PVC force main located on Van Allen Way at the project site entrance.

The modeling of the proposed pump station that will handle the peak inflow from this project shows that the pumps have the following operating parameters:
Motor speed = 1,160 RPM
Motor efficiency = 48%
Pump Rate = 123 GPM
Total Dynamic Head = 34.4 feet
Velocity in 4-inch force main = 3.1 FPS
Minimum intake submergence required = 1.5 feet
Minimum intake submergence provided = 2.0 feet

The Pump Cycle Time calculations, shown in Appendix C, results in a minimum pump cycle time of 7.00 minutes which is above the required minimum cycle time of 5 minutes. The wet well fill time for design average flow is 27.97 minutes. The system curves, pump cycle time and detailed pumping calculations are included in a spreadsheet print out shown in Appendix C.

A stand-by generator will be provided to power the pump station during an emergency event.
The proposed sanitary sewer force main will be constructed of PVC SDR 21 pipe. The minimum cover for the proposed force main will be 5 feet. The proposed force main will be pressure tested in accordance with ASTM Standards. The proposed work will be performed in accordance with the requirements and recommendations of the New York State Department of Environmental Conservation and the Town of North Greenbush.

Impact on Downstream Sanitary Sewer Facilities

The route of the sanitary sewer from the project site to its discharge point is described above and is shown in Appendix B. As stated above a municipal sanitary sewer force main currently exists along Van Allen Way in front of the project site near the intersection of the proposed project entrance road. It is the intention of the project design to connect the proposed site sewer force main to this existing sanitary sewer force main. This force main also currently services the Quackenderry Commons Apartments Sanitary Sewer Pumping Station. Sewage is conveyed through this 6-inch diameter municipal force main and ultimately discharges into the Rensselaer County Wastewater Treatment Plant (WWTP) for treatment prior to discharge into the Hudson River.

Based on information supplied by the pump station's original pump supplier, the Quackenderry pumping station currently has two 15 HP pumps, each with a capacity of 185 GPM.

In order to determine the actual pumping capacity of these two pumps to evaluate the impact on this pumping station of adding a second pumping station onto the discharge force main, a drawdown test would be required. A draw down test has not been conducted.

A computer model was used to analyze any impacts on the Quackenderry pumping station. The analysis was completed using SewerCAD modeling software developed by Bentley. The following scenarios were analyzed and the results of these scenarios dictated the design and are shown in Appendix D:

- Quackenderry Pump Station running alone;
- Quackenderry Pump Station running simultaneously with the proposed project Pump Station;
- Proposed project pumping station running alone.
- Proposed project pumping station running simultaneously with Quackenderry Pump Station.

Quackenderry Pump Station running alone:

The modeling of Quackenderry pump station shows that when the pump station operates on its own it has the following operating parameters:

Pump Rate = 186 GPM

Total Dynamic Head = 68.5 feet

Velocity in 6-inch force main = 2.12 FPS

Quackenderry Pump Station running simultaneously with the proposed project pumping station:

The modeling of Quackenderry pump station shows that when the pump station is running simultaneously with the proposed project pumping station it has the following operating parameters:

Pump Rate = 164 GPM

Total Dynamic Head = 71.6 feet

Velocity in 6-inch force main = 2.61 FPS (flow from both PS combined 230 GPM)

Proposed project Pump Station running alone:

The modeling of project proposed pumping station shows that when the pump station operates on its own it has the following operating parameters:

Pump Rate = 123 GPM

Total Dynamic Head = 34.4 feet

Velocity in 4-inch force main = 3.1 FPS

Velocity in 6-inch force main = 1.48 FPS

The proposed project pumping station running simultaneously with Quackenderry Pump Station:

The modeling of proposed project pump station shows that when the pump station is running simultaneously with the Quackenderry Pump Station it has the following operating parameters:

Pump Rate = 66.2 GPM

Total Dynamic Head = 38 feet

Velocity in 4-inch force main = 1.65 FPS

Velocity in 6-inch force main = 2.61 FPS (flow from both PS combined 230 GPM)

In reviewing the results of the modeling, it can be stated that the Quackenderry pumping station will not be significantly impacted when the proposed project Pumping Station is also running simultaneously. The rate of discharge for the proposed project pumping station will be 66.2 GPM. The existing Quackenderry pumping station will still pump at a rate of 164 GPM. This is approximately 90% of the average pumping rate when running alone. Therefore, it does not appear that the existing Quackenderry pumping station will be adversely impacted and no improvements to the existing pump station are necessary as a result of adding the proposed project pumping station to the common 6-inch diameter force main.

The existing Rensselaer County WWTP has adequate capacity to handle the additional flows generated from this proposed project.

REGULATORY APPROVALS

The proposed project will require the following regulatory approvals prior to construction:

- NYSDEC
- Rensselaer County Sewer District
- Rensselaer County Health Department
  -Approvals of Plans
- Town of North Greenbush

-Sewer Permit

FINANCING

Installation of the proposed sanitary sewer improvements for the proposed hotel project will be performed by the applicant at his expense. The proposed system will remain privately owned and maintained by the applicant. An opinion of costs is included in Appendix E..

USER COSTS

The property will be assessed various costs for inclusion in the sewer district which include the prorated share of debt service and sewer fee.

Debt Service

Currently there is no charge for Debt Service in the North Greenbush Consolidated Sewer District. This figure can change annually depending upon the debt service the district may be responsible for.

Sewer Use

The current sewer use rate is $62.76 annually. As with debt service, the sewer rate fluctuates from year to year.

County Sewer District Use

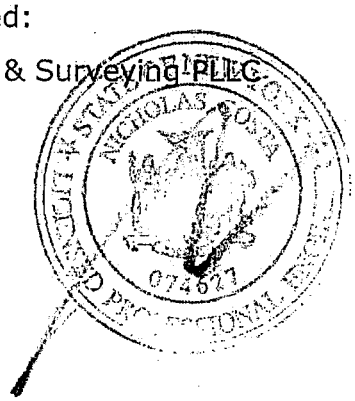
The County Sewer District No.1 charges based on water usage. The current rate is $3.82 per 1,000 gallons of water use. Based upon an estimated water use of approximately 3.98 million gallons per year per parcel, the annual cost is estimated to be $15,203.60.

CONCLUSION

It is our opinion, based on the enclosed analysis, that the proposed hotel project at 1 Hotel Way can be connected to the existing 6-inch diameter sanitary sewer force main along Van Allen Way. The existing sewer main and sewer system have sufficient capacity to manage the proposed project's sanitary sewage flows.

Respectfully submitted:

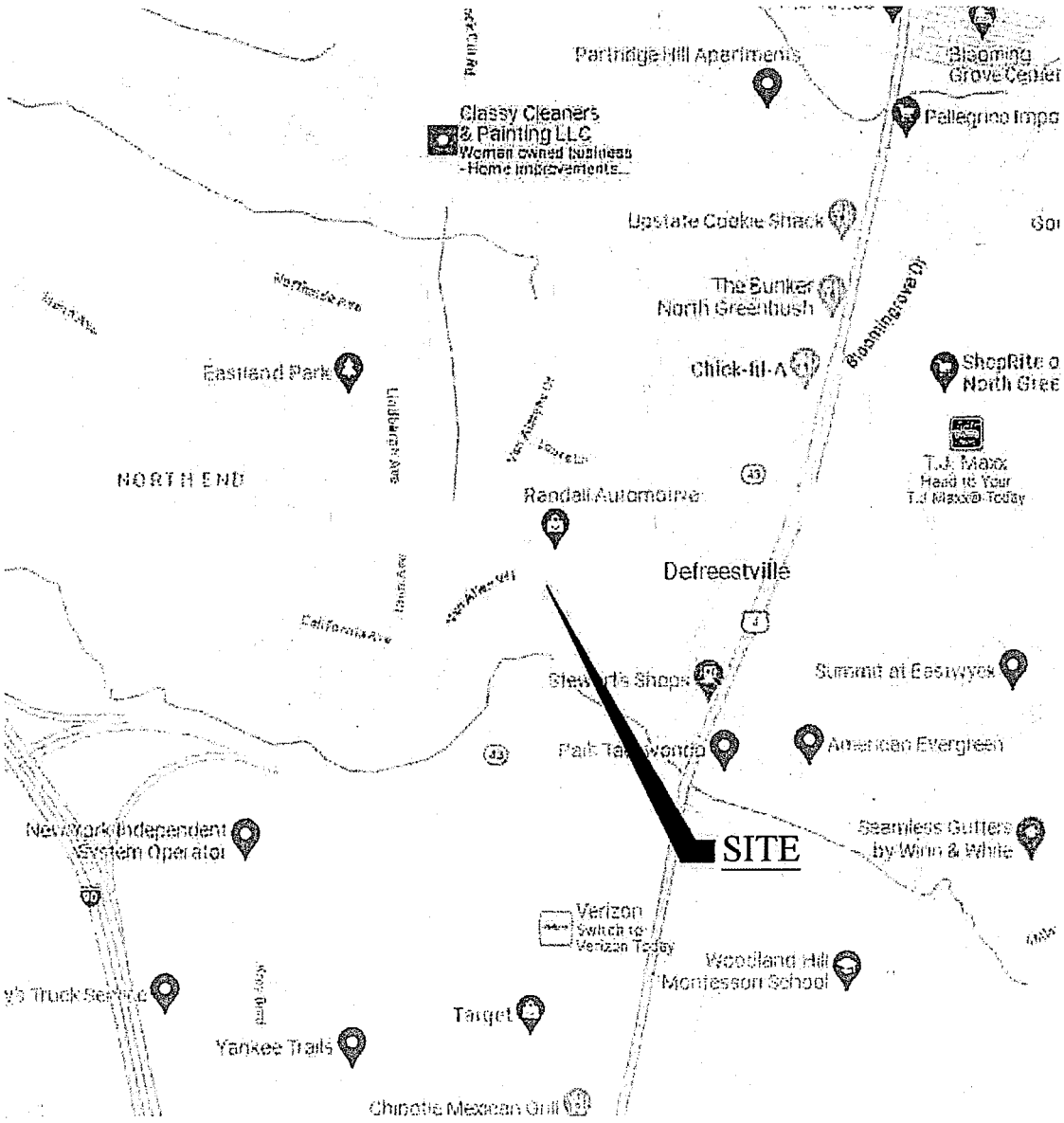
Advance Engineering & Surveying PLLC



Nicholas Costa, PE

Appendix A

Location Map



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SITE LOCATION
PROPOSED HOTEL

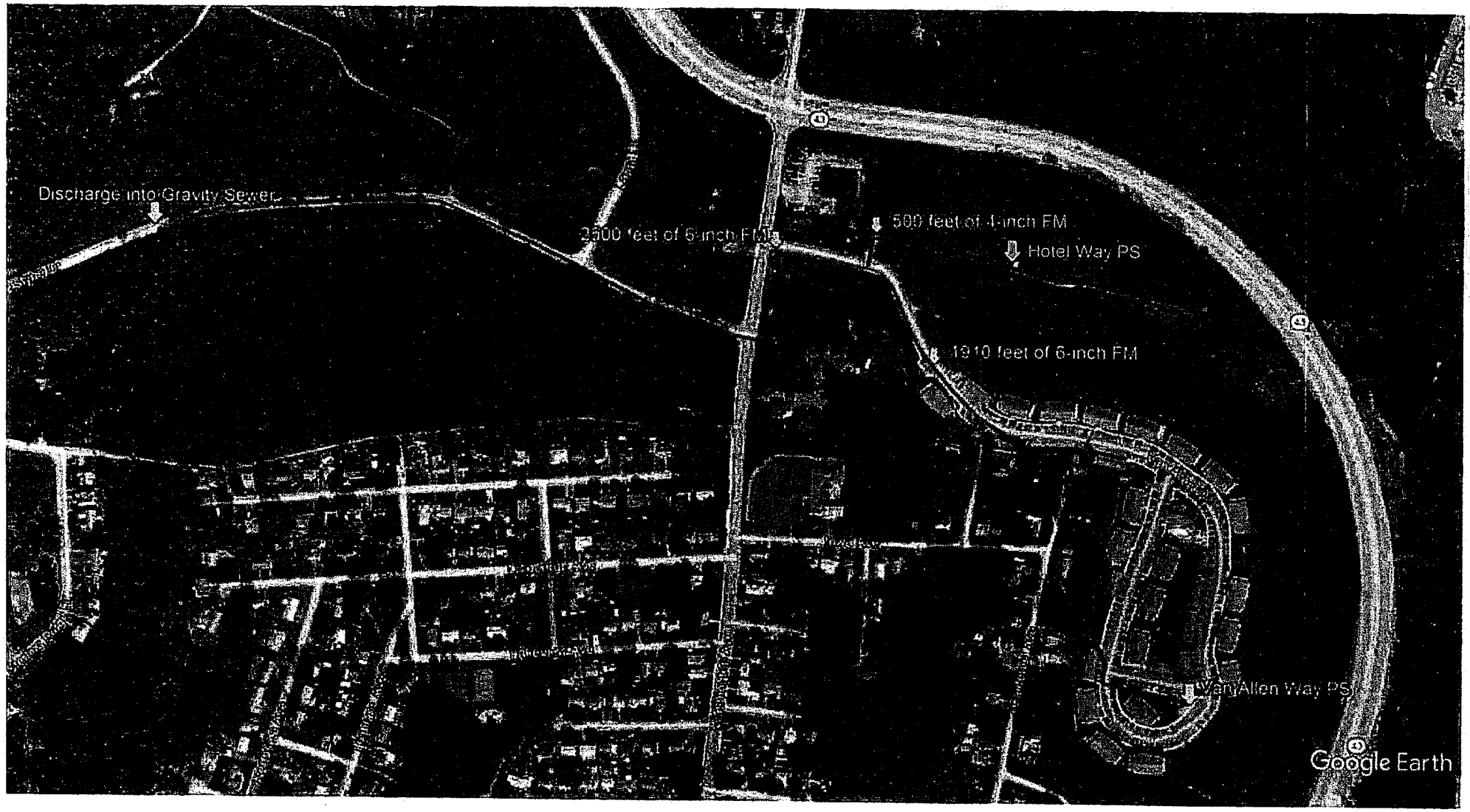
1 HOTEL WAY TOWN OF NORTH GREENBUSH
COUNTY OF RENSSELAER STATE OF NEW YORK

DATE: OCTOBER 14, 2024	NOT TO SCALE
	SHEET 1 OF 1

DRAWN BY:	RHD	CHECKED BY:	NC	MAP NO.	23132

Appendix B

Sewer Force Route Map


Discharge into Gravity Sewer
2500 feet of 6-inch FM
500 feet of 4-inch FM
Hotel Way PS
1910 feet of 6-inch FM
VanAllen Way PS
Google Earth

APPENDIX C

On-Site Pumping Station Modeling

Hotel Way Pumping Station

Project Name:	1 Hotel Way	**Designer:**	WJB
Project Number:	23132	**DATE:**	October 7, 2024

**********FLOW DATA**********

Design Flow (GPD) =	10,890	gpd
Design Operation Time (Hours per day) =	24	hrs/day
Avg Flow Rate (Design Flow/Design Time *60) =	**7.6**	gpm
Peaking Factor (average range 2 - 4) =	4.00	
Peak Flow =	**30.3**	gpm

Suction Lines, Length (Ft) / Pipe Type = 0 DIP (PC) 250

******* SYSTEM HEAD CURVE ******* Equiv length thru Station (Ft) = 102

Force Main Length (L) Ft = 500 +2490 LF of 6" PVC

Nominal Size of Force Main in Inches Discharge / Suction = 4 4

Actual ID of FM, (D) in Inches-(automatic or direct entry) 4.05

FM Discharge (Enter Pipe Type and SDR or DIP class)= PVC (IPS) SDR21

C Value = 120

Ck Impact of FM High Pt. - Static Hs 22.50 Static Head (Hs) in Feet = 22.50

FM HP Elev. Governs Use **22.50** ☐ Place "X" if HP Governs and vacumm release installed at HP

(see Note Static Head Tab) Lowest Pump Flow Rate, in GPM = 0

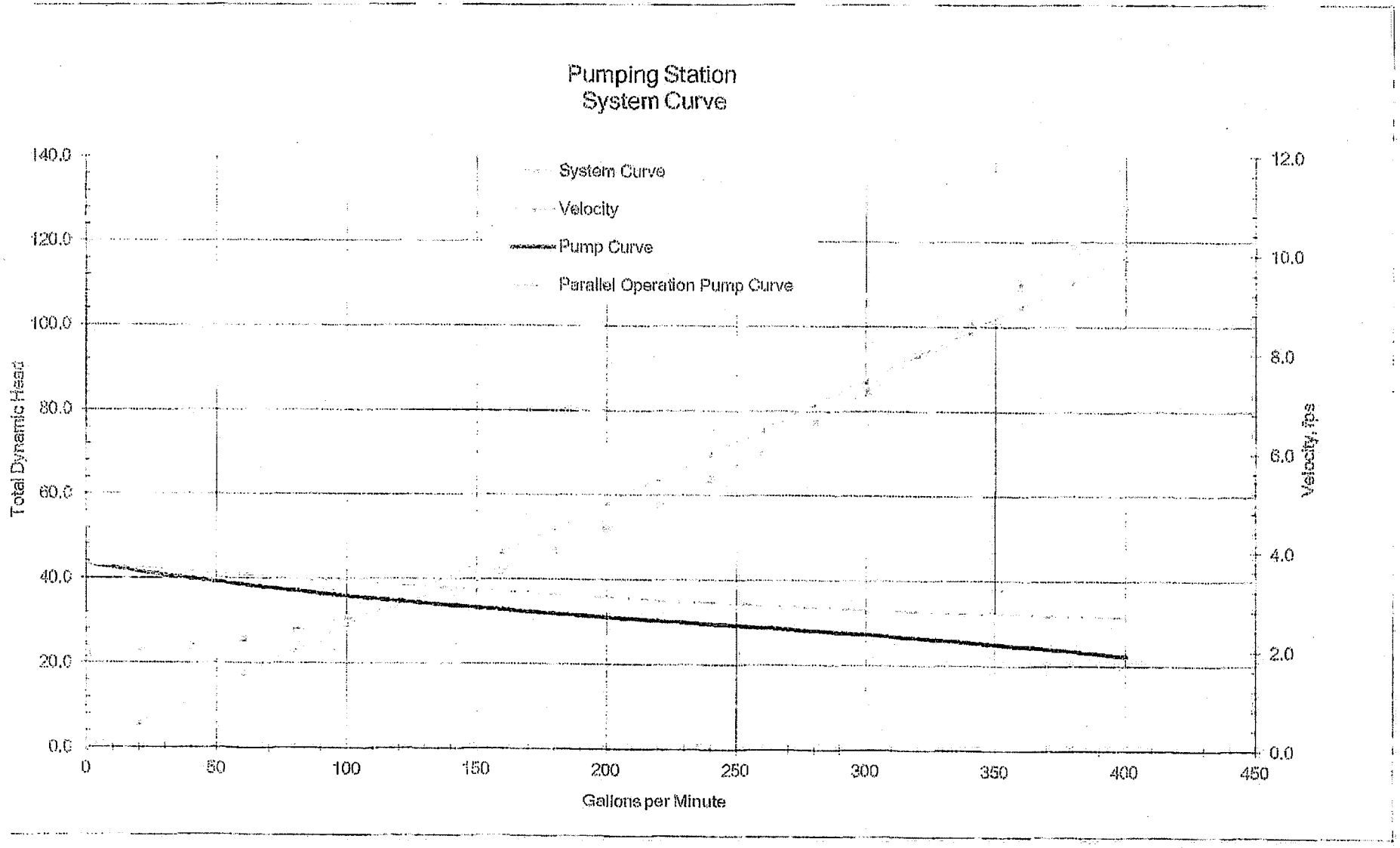
Incremental Increase, in GPM = 20

FM Discharge Elev =	243.60
FM Highest Elev =	269.00
PS Outlet Elev =	250.50
PS Inlet Elev =	250.40
Lag Pump on =	249.50
High Alarm =	249.00
Lead Pump on =	247.50
Pumps Off - Low Water Elev =	246.50
Low Level Alarm =	245.50
FM HP Distance From Pumps =	500
FM length =	500
Fittings in PS Equiv length (Discharge line dia.) =	102
Pump Suction invert =	244.50
High Ground Water Elev =	251.00
PS Top Elev =	256.50
PS Bottom Elev =	244.00
PS Depth =	12.50
Intake Submergence =	2.00
Actual Suction line Diameter =	4.30

Hazen Williams Equation
Hf=(L*10.44*Q^1.85)/((D^4.87)*C^1.85)
TDH=Hs+Hf
V=.40853*Q/D^2
Hv=V^2/2g

Pump Data: HOMA Sub. Pump AMS436-230/3.8T/C
1160 RPM, 230V, 3.8 HP, 3 phase

Flow Rate 1 Q, GPM	Total Flow Rate Q, GPM	Friction Head Hf, Feet 6"FM	4" Suc	4" FM	Static Head Hs, Feet	Total Dynamic Head TDH, Feet	Velocity FPS	Velocity Head Hv, Feet	Pump Curve Ft of Head	Parallel Curve Ft of Head	Duty Point
0	0	0.0	0.0	0.0	22.5	22.5	0.0	0.0	43.5	43.5	
20	20	0.2	0.0	0.3	22.5	22.9	0.5	0.0	41.5		
40	40	0.6	0.0	0.9	22.5	24.0	1.0	0.0	40.0	41.5	
60	60	1.2	0.0	1.9	22.5	25.7	1.5	0.0	38.5		
80	80	2.1	0.0	3.3	22.5	27.9	2.0	0.1	37.0	40.0	
100	100	3.2	0.0	5.0	22.5	30.7	2.5	0.1	36.0		
120	120	4.5	0.0	6.9	22.5	33.9	3.0	0.1	34.5	38.5	
140	140	6.0	0.0	9.2	22.5	37.7	3.5	0.2	33.5		
160	160	7.7	0.0	11.8	22.5	42.0	4.0	0.2	32.5	37.0	
180	180	9.5	0.0	14.7	22.5	46.7	4.5	0.3	32.0		
200	200	11.6	0.0	17.9	22.5	51.9	5.0	0.4	31.5	36.0	**122.3 GPM**
220	220	13.8	0.0	21.3	22.5	57.6	5.5	0.5	30.5		**34.4 TDH**
240	240	16.2	0.0	25.1	22.5	63.8	6.0	0.6	29.5	34.5	**3.1 FPS Disc**
260	260	18.8	0.0	29.0	22.5	70.3	6.5	0.7	29.0		**2.70 FPS Suct**
280	280	21.6	0.0	33.3	22.5	77.4	7.0	0.8	28.0	33.5	1.5 Ft Min.
300	300	24.5	0.0	37.9	22.5	84.8	7.5	0.9	27.0		Required Intake
320	320	27.6	0.0	42.7	22.5	92.7	8.0	1.0	26.5	32.5	Submergence
340	340	30.9	0.0	47.7	22.5	101.1	8.5	1.1	25.5		Submergence OK
360	360	34.3	0.0	53.0	22.5	109.8	9.0	1.3	24.5	32.0	
380	380	37.9	0.0	58.6	22.5	119.0	9.5	1.4	23.5		
400	400	41.7	0.0	64.5	22.5	128.6	10.0	1.5	22.5	31.5	


Pumping Station
System Curve
System Curve
Velocity
Pump Curve
Parallel Operation Pump Curve
Total Dynamic Head
Velocity, fps
Gallons per Minute
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0
50
100
150
200
250
300
350
400
450

Pump Cycle Time

Project Name:	**1 Hotel Way**	**Designer:**	**WJB**
Project Number:	**23132.00**	**DATE:**	**October 7, 2024**

PS Inlet Elev =	**250.40**	ft
Lag Pump on =	**249.50**	ft
High Water Alarm =	**249.00**	ft
Lead Pump on =	**247.50**	ft
(All Pumps Off) Low Water Elev =	**246.50**	ft

Qin (*min cycle time)=	**30.3**	gpm	*(Min. cycle time is when Q(in) = 1/2 Q(out),
Qin (avg)=	**7.5**	gpm	if Q(in) max is < 1/2 Q(out) use Q(in) max)
Qin (max)=	**30.3**	gpm	Peaking Factor = 4.00
Q out =	**122.3**	gpm	Pump Duty Point from System Curve Calcs

Volume of Wet Well:

wet well is round, yes / no: yes

Wet Well Diameter (ft) = 6

Wet well Dimensions = Width (ft) ____ Length (ft) ____

	Volume (Gal)	Water Depth (ft)	
(Operating Volume)	**211.5**	**1.00**	Between Lead Pump On & Pumps Off
	528.7	**2.50**	Between High Water Alarm & Pumps Off
	634.5	**3.00**	Between Lag Pump On & Pumps Off
	824.8	**3.90**	Between Pump Sta Inlet & Pumps Off
(Storage above High Water Alarm)	**296.1**	**1.40**	Between Pump Sta Inlet & High Water Alarm
(Storage above operating range)	**613.3**	**2.90**	Between Lead Pump on & Pump Sta Inlet

Drawdown Calculation:

For *Qin=1/2Qout Flow =	**2.30**	min.
For Average Flow =	**1.84**	min.
For Maximum Flow =	**2.30**	min.

Fill Time Calculations:

For *Qin=1/2Qout Flow =	**6.99**	min.
For Average Flow =	**27.97**	min.
For Maximum Flow =	**6.99**	min.

(Design Average Flow Fill Time < 30 min. - OK)

Cycle Time Calculation:

Cycle Time = $\frac{V}{Qo-Qi} \div \frac{V}{Qi}$ = **9.29** min or **6.5** per hour
*Min (Qin=1/2 Qout)
one pump running

(Minimum Cycle Time > 5 min. - OK)

Cycle Time = $\frac{V}{Qo-Qi} + \frac{V}{Qi}$ = **29.81** min or **2.0** per hour
Avg flow
one pump running

Cycle Time = $\frac{V}{Qo-Qi} \div \frac{V}{Qi}$ = **9.29** min or **6.5** per hour
Max flow
one pump running

Buoyancy Calculations

Project Name:	**1 Hotel Way**	**Designer:**	**WJB**
Project Number:	**23132.00**	**DATE:**	**October 7, 2024**

A) *Assumptions:*

- Water table elev. 251 If water table elev is unknown assume to be 1 ft below finished surface elev.
- Safety factor of 1.5 against flotation desired
- Up-lift force is the buoyant force on any body and is equal to the weight of fluid displaced by a submerged body
- The soil frictional force resisting up-lift is not taken into account in the calculations
- Material Unit weights:

Concrete	150	pcf (lbs per cubic feet)
Water	62.4	pcf
Saturated Soil	70.5	pcf

wet well is round, yes / no	yes
Wet Well Diameter (ft) =	6

	Width (ft)	Length (ft)
Wet well Dimensions =	0	0

B) *Pump Station Structure Dimensions:*

Pump Station	Inside Diameter (Feet)	Wall Thickness (FT)	Outside Diameter (Feet)	Wall Height / Slab Thickness (FT)	Top Slab opening (SF)	Vol. of Concrete (CF)
Top Slab	6	0.67	7.34	0.67	6	24.33
Pump Chamber	6	0.67	7.34	11.83		166.09
Bottom Slab	6	0.67	7.34	0.67		28.35
Bottom Slab Ext.		0.67	8.68	0.67		11.30
					Total	230.06

C) *Up-lift Force (Buoyant Force):*

Buoyant Force = Volume of Water Displaced by Pump Station (cf) x Unit Weight of Water (62.4 pcf)

Pump Station	Depth of Water Displaced (feet)	Inside Dia (feet)	Wall Thickness (feet)	Outside Diameter (feet)	Volume (cf)
Chamber	7.00	6.00	0.67	7.34	296.20
Bottom Slab	0.67	6.00	0.67	8.68	39.65
				TOTAL:	335.84

		(cf)		(pcf)			
Buoyant Force	**=**	**335.84**	**X**	**62.4**	**=**	**20,957**	**lbs**

Buoyancy Calculations

Project Name:	**1 Hotel Way**	**Designer:**	**WJB**
Project Number:	**23132.00**	**DATE:**	**October 7, 2024**

D) Down Force:

Down Force = Weight of Concrete Chamber (lbs) ÷ Weight of Soil Above Conc. Base Extension

Weight of Concrete Pump Station:

Pump Station	Vol. of Concrete (CF)	Weight of Concrete (lbs)
Top Slab*	24.33	3,650
Wall Section	166.09	24,913
Bottom Slab	28.35	4,253
Bottom Slab Ext.	11.30	1,694
Total	230.06	34,510

* subtracted access door opening

	(cf)		(pcf)		
Weight of Concrete =	**230.06**	**X**	**150**	**=**	**34,510 lbs**

Weight of Soil Above Base Extension:

Soil Column above base	Width (feet)	Diameter (feet)	Height (feet)	Length (feet)	Volume (cf)
extension	0.67	8.68	11.33	27.27	207.00

	(cf)		(pcf)		
Weight of soil =	**207.00**	**X**	**70.5**	**=**	**14,594 lbs**

Total Downward Force =	**34,510**	**+**	**14,593.6**	**=**	**49,103 lbs**

E) Safety Factor against Flotation

S.F. = Down Force = 49,103 / Up-Lift Force = 20,957

S.F. = **2.34** **No Additional Anti-flotation Measures Required**

APPENDIX D

Quackenderry Commons Pumping Station – Sewer Cad Modeling

1 Hotel Way

Quackenderry PS

164 GPM @ 71.6 FT

Hydromatic S4HV 5.63 inch Imp

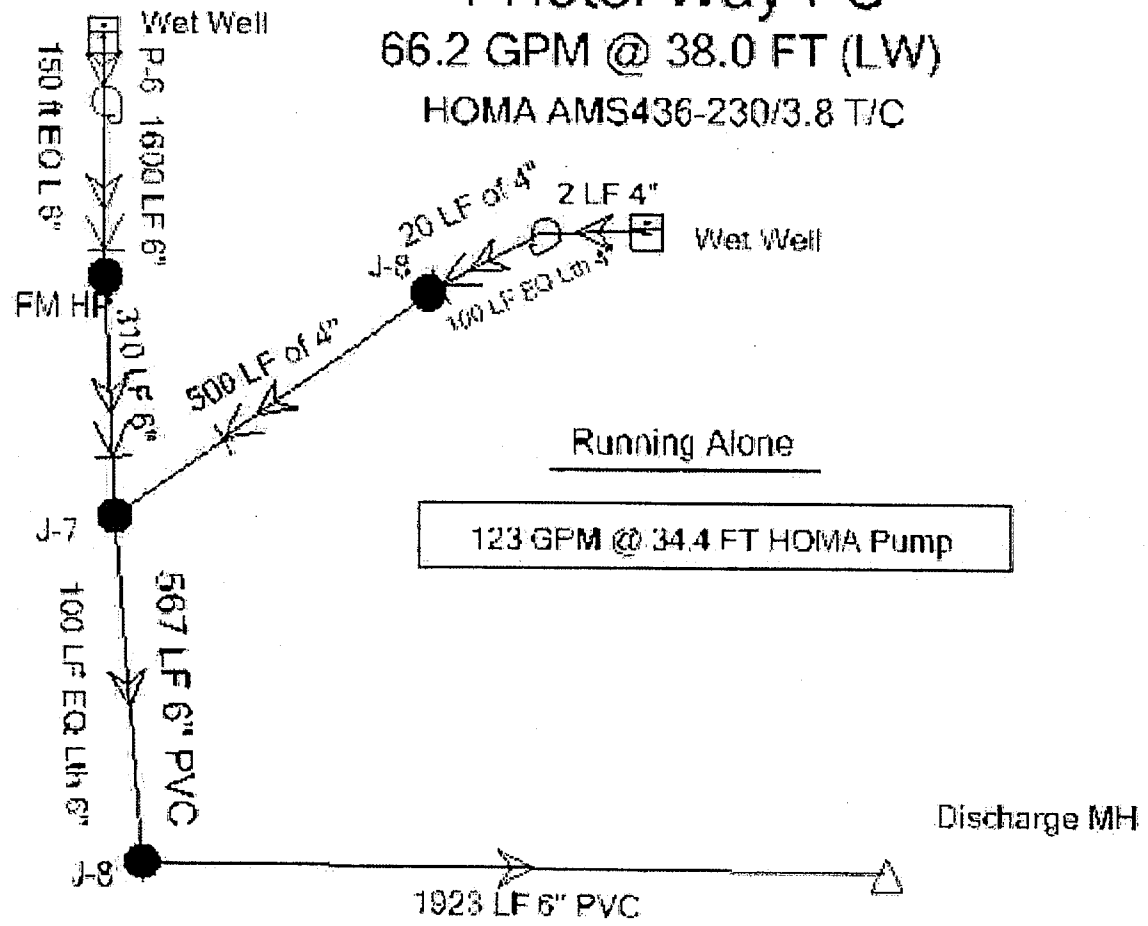
Running Alone

186 GPM @ 68.5 FT
Hydromatic S4HV 5.63" Imp

1 Hotel Way PS

66.2 GPM @ 38.0 FT (LW)

HOMA AMS436-230/3.8 T/C



Running Alone

123 GPM @ 34.4 FT HOMA Pump

FM High Point Elev. 269

Performance Curve

AMS436-220/3,8ETFM
230

Note! With PS

Impeller

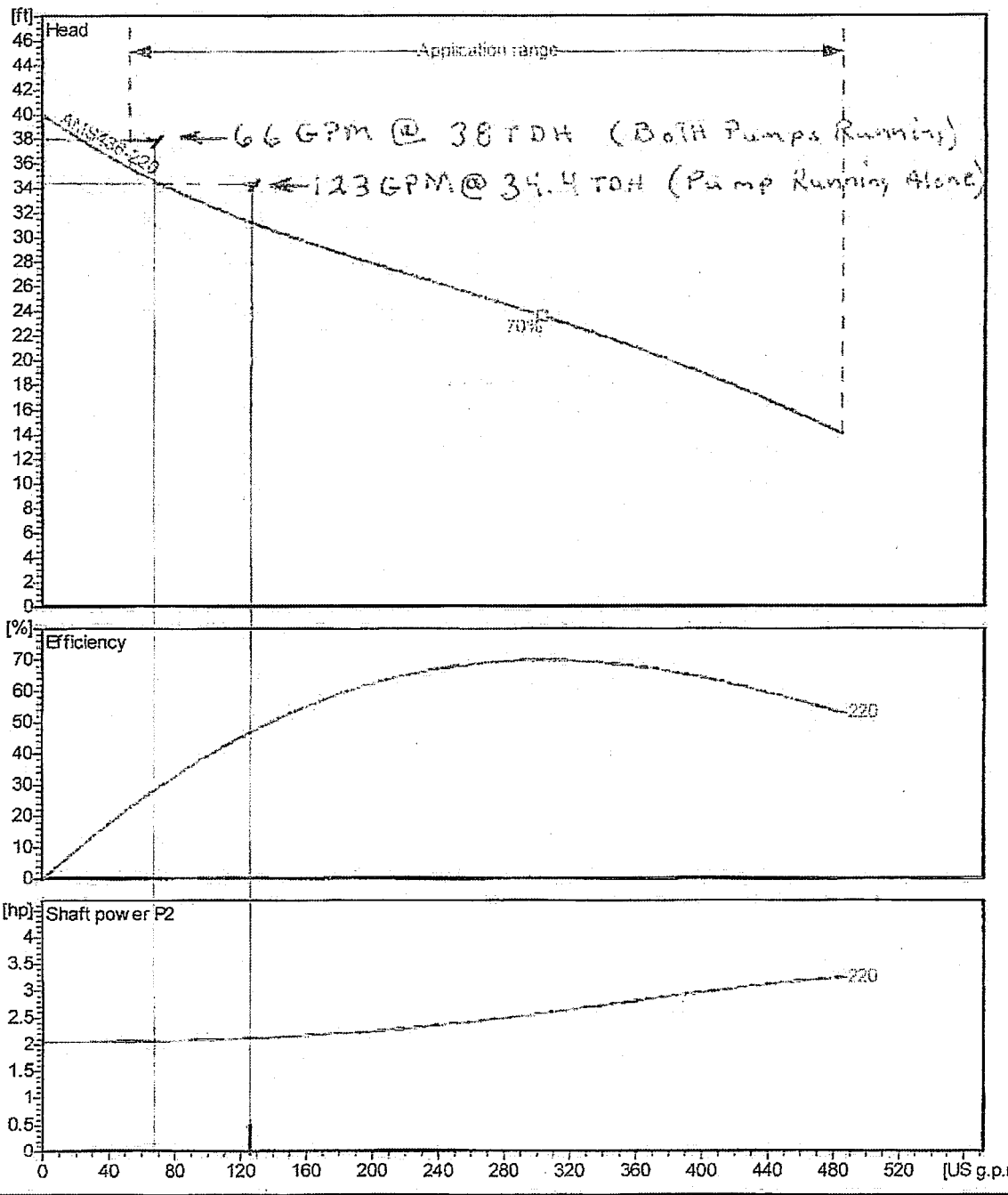
Impeller type:	Solid size Ø:	Max. Ø:	Min. Ø:	Sel. Ø:
Single channel impeller	3 inch	9 1/16"	7 1/2"	8 11/16"

Operating data

Speed:	Frequency:	Duty point:	Shaft power P2:	Discharge port:
1160 rpm	60 Hz	Q =0 US g.p.m. H =0 ft		4" ANSI

Power data referred to:
Water, clean [100%] ; 68°F; 62.322lb/ft³; 1.0818E-5ft²/s

Testnorm: HI Standard Sect. 11.6.5.4



2.0.1 - 17.01.2017 (Build 147)

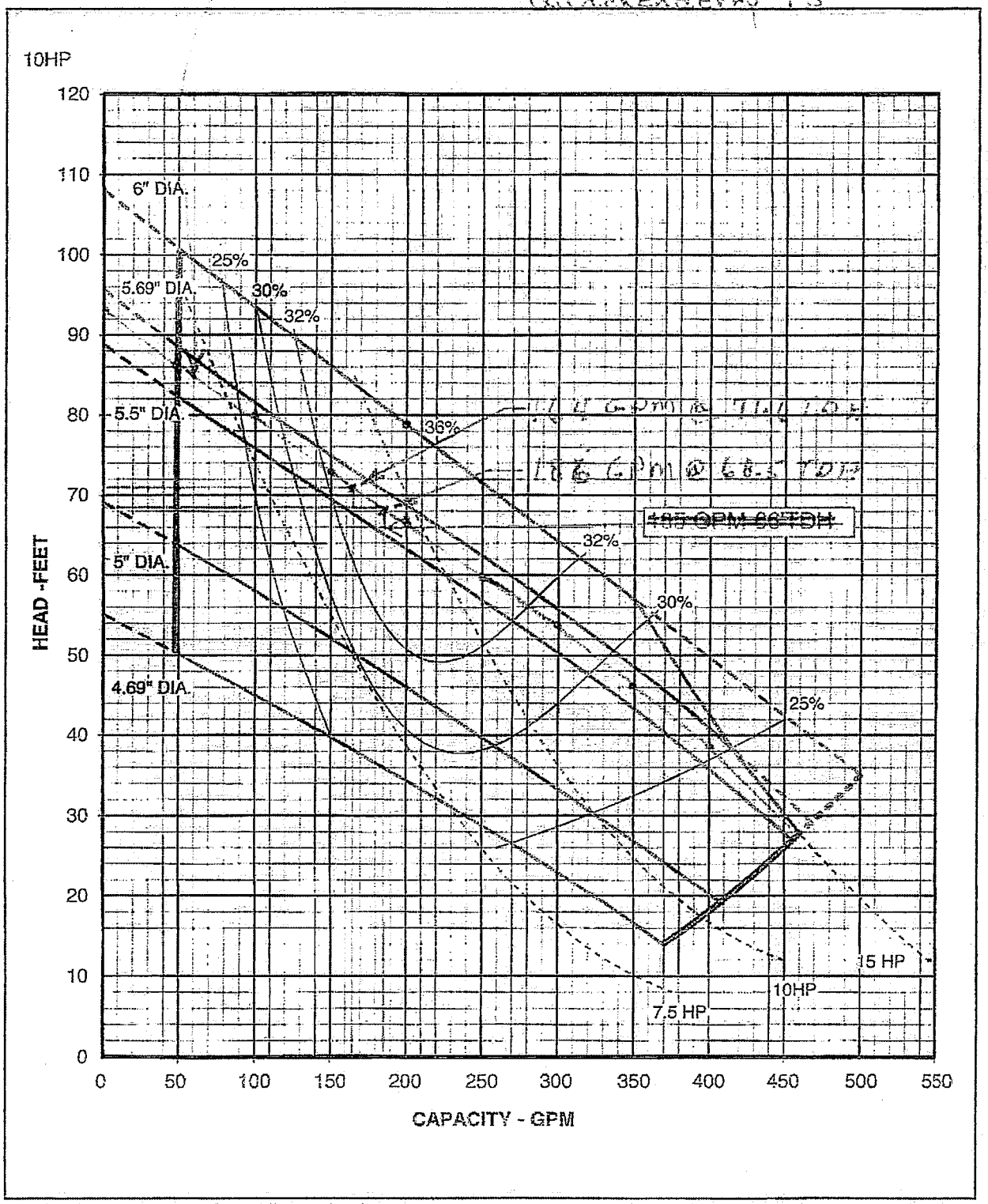
Project	Project no.:	Created by:	Page:	Date:
			2	2024-10-07

Performance Curve – S4HV(X)P

RPM: **3450** DISCHARGE: 4" SOLIDS: 3"

5.63" Imp

Quackenderry PS



APPENDIX E

Opinion of Costs

Sanitary Sewer Engineering Report-october 24.docx

Proposed Hotel

OPINION OF COSTS FOR SANITARY SEWER IMPROVEMENTS

CURRENT DATE: October 2024

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
SANITARY SEWER SYSTEM				
48" ID MANHOLES	2.0	EA	$2,000.00	$4,000
6" PVC SDR26 SEWER	250.0	LF	$25.00	$6,250
1,000 GAL GREASE TRAP	1.0	EA	$2,000.00	$2,000
CONNECTION TO EX. MH	1.0	EA	$1,500.00	$1,500
4" HDPE PRESSURE SEWER	500.0	LF	$30.00	$15,000
FLUSHING VAULTS	5.0	EA	$1,750.00	$8,750
PUMP STATION	1.0	EA	$95,000.00	$95,000
STAND-BY GENERATOR	1.0	EA	$20,000.00	$20,000
ELECTRICAL CONTROLS	1.0	EA	$25,000.00	$25,000
				$177,500
CONTINGENCIES(10%)				$17,750
			SUBTOTAL=	$195,250
TECHNICAL SERVICES(10%)				$19,525
RECORDING FEES				$140
LEGAL FEES(MINIMUM $1,000.00)				$1,738
			TOTAL PROJECT COST=	**$216,653**

PREPARED BY: Advance Engineering & Surveying PLLC