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Engineering Report
Water and Sanitary Sewer

For

EXCELSIOR PARK
SPECIAL USE PERMIT

EXCELSIOR AVENUE
SARATOGA SPRINGS, NEW YORK

Planning Board #17.xxx

Prepared For

Excelsior Park LLC
563 North Broadway
Saratoga Springs, NY 12866
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Prepared By

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November 9, 2017

I. Introduction

The application is for securing a Special Use Permit for 39 acres of land on Excelsior Avenue and Ormandy Lane. The development is commonly referred to as Excelsior Park. The Special Use Permit will include a mix of residential and commercial uses, including a hotel, spa, community center and swimming pool.

Municipal water and sewer exists in Excelsior Avenue, Ormandy Lane, Whistler Court and Gibson Court within the boundary of the property. These utilities were constructed during phases one and two of the development.

Water will be supplied for domestic and fire protection from the 8-inch main on Excelsior Avenue, Ormandy Avenue and Whistler Court which loops through the development and eventually connects to 12-inch mains owned by the City of Saratoga Springs.

For sanitary sewer collection, new gravity sewer networks of pipes and manholes will connect to the existing 8-inch gravity sanitary sewer main in Excelsior Avenue. This existing main flows to a pump station that was designed and installed in phase one to serve the full development. The pump station is located at the intersection of Excelsior Avenue and Ormandy Drive and is owned and maintained by the City of Saratoga Springs. The pump station directs flows from the development through a 6-inch force main along Ormandy Drive to Excelsior Avenue and connects to an existing manhole at the intersection of Excelsior Avenue and Veterans Way. This manhole is owned by Saratoga County Sewer District No. 1.

II. Project Description

The remaining build-out covered by the Special Use Permit proposes to construct 62 three-bedroom townhouses, 76 two-bedroom apartment units, 15,640 square feet of commercial space, a community recreational facility with a swimming pool and a 60-room hotel that includes a 200-seat restaurant, banquet facility for 300 guests, spa and swimming pool. Sixteen of the townhouses include a one-bedroom apartment that could be sub-let. Included in the proposal are 6 short-term or guest room rentals.

A National Grid overhead electric power line support tower at the southwest corner of the site will need to be protected during construction. Proposed underground utilities will need to maintain a 50 foot minimum setback from the tower. National Grid prefers that water lines be placed outside their permanent easement.

III. Existing Water and Sanitary Sewer Utilities

Municipal water service is currently provided by the City of Saratoga Springs. A 12-inch diameter water main located in Excelsior Avenue tees off to another 12-inch diameter water main located in Ormandy Lane. From the current end of Ormandy Lane, the 12-inch water main continues easterly toward the Adirondack Northway (I-87). This 12-inch water main was tapped for the first phase of the development creating an 8-inch diameter loop from the intersection of Excelsior Avenue and Ormandy Lane to the entrance of the former Federal Express facility on Excelsior Avenue. The first phase included fire hydrants spaced approximately 400 feet apart and several 6-inch water service laterals that were stubbed for future connections. In phases 2 and 2A, the existing 8-inch water main in Excelsior Avenue provided combined fire protection and domestic service laterals to the buildings. Combined fire protection and domestic waterlines were brought to the end of Whistler Court and Gibson Court. A fire hydrant was installed at the end of each branch line to provide fire protection and to allow periodic flushing of the lines. The branch lines are privately owned and maintained.

Hydrant flow tests conducted between 1976 and 2014 indicate static pressures in the area of Excelsior Avenue of between 87 and 104 pounds per square inch (psi). During flow tests, hydrants running at approximately 1,200 gallons per minute caused the residual pressure at the test hydrant to drop less than 10 psi giving a theoretical available flow of approximately 4,600 gallons per minute at 20 pounds per square inch (psi). Refer to Attachment A for the Hydrant Fire Flow Test Summary provided by Northeast Fire Protection Systems, Inc.

Municipal sanitary sewer service is available from the City of Saratoga Springs at the sanitary sewer main in Excelsior Avenue, Ormandy Lane and Whistler Court. These portions of the municipal collection system were installed as part of original Excelsior Park mixed use development in 2004 and subsequent phases of development. The sewer main runs south on Excelsior Avenue to a municipal pump station near the intersection of Ormandy Lane and Excelsior Avenue. Wastewater is conveyed by this lift station to the Saratoga County Sewer District No. 1 (SCSD) collector at the intersection of Excelsior Avenue and Veteran's Way, and then by gravity to the SCSD Lift Station No. 1 at the intersection of High Rock Avenue and Warren Street. Ultimately the wastewater flows for conveyance and treatment at SCSD's wastewater treatment plant in Mechanicville.

IV. Projected Water and Wastewater Flows

The table below provides information on the anticipated wastewater flow rates for the entire development:

Description		Use Rate	Total Use (gpd)
Existing Condition:			
Hotel	103 rooms	110 gpd/ea[3]	11,330
Condominiums - 3 BR	30 units	330 gpd/ea[3]	9,900
Townhouses - 3 BR	18 units	330 gpd/ea[3]	5,940
Apartments	156 bedrooms	110 gpd/ea[3]	17,160
		Existing Sub-total	44,330
Proposed Condition:			
Hotel	60 rooms[1]	110 gpd/ea[3]	6,600
Restaurant	200 seats[1]	35 gpd/seat[2]	7,000
Banquet Facility	300 seats[1]	10 gpd/seat[2]	3,000
Hotel Pool	60 users[1]	10 gpd/ea[2]	600
Hotel Spa	60 users[1]	20 gpd/ea[2]	1,200
Community Pool	240 users[1]	10 gpd/ea[2]	2,400
Community Recreation	160 users[1]	20 gpd/ea[2]	3,200
Commercial/Retail	15,640 sf[1]	0.1 gpd/sf[2]	1,564
Apartments - 2 Bedrooms	76 units[1]	220 gpd/ea[3]	16,720
Townhouses - 3 Bedrooms	62 units[1]	330 gpd/ea[3]	20,460
Short-term Guest Rentals	6 rooms[1]	110 gpd/ea[3]	6,600
		Proposed Sub-total	63,404
		Grand Total	**107,734**

1. *Room counts, floor areas, restaurant seats, pool users, etc. are estimated based on provided data.*
2. *From Table B-3, NYSDEC 2014 Design Standards for Wastewater Treatment Systems.*
3. *From Table 1, NYSDOH Design Standards for Individual Wastewater Treatment Systems.*

Average daily flow for wastewater is estimated to be 75 gallons per minute (gpm) based on a 24 hour day. Estimated peak hourly flow is 290 gpm (3.69 x average).[2]

Average daily demand for water is estimated to be approximately equal to the wastewater flow or 75 gpm. Peak hourly demand is estimated to be approximately equal to the peak hourly wastewater flow or 290 gpm. Peak instantaneous demand is calculated at 1,240 gallons per

minute (gpm) based on hotel use of 2 gpm per room, restaurant use of 1 gpm per seat, commercial/retail use of 0.6 gpm per 100 sf, community recreation and swimming pool use of 0.6 gpm per user and residential use based on 317 condos, townhouses and apartments at 1.2 gpm per residence.

For the purposes of input into the City of Saratoga Springs water model, we offer the following estimated water demands for the project:

- Average Day Demand is 75 gallons per minute (GPM) over the 24 hour period.
- Max Day Demand is 150 gallons per minute (GPM) based on twice the average.
- Peak Hourly Flow is 290 gallons per minute (GPM) based on 3.69 times the average.
- Fire Flow Demand is 1,000 gallons per minute (GPM) per ISO guidelines.

V. Proposed Water and Wastewater Utilities

Proposed Water Utilities

To service the project, the existing 8-inch water mains in Excelsior Avenue and Whistler Court and the existing 12-inch water main in Ormandy Lane will provide combined fire protection and domestic service laterals to the proposed buildings. Most of the new buildings will be served directly from the existing water mains from either stubbed existing service laterals or new services. Two minor water main branches will provide individual water services to the townhouse units. The branch lines will be privately owned and maintained. The water services proposed for the residential buildings are 3/4-inches in diameter. Each privately owned townhouse unit will be metered separately.

A fire hydrant will be installed on the Ormandy Lane water main east of the Excelsior Avenue intersection.

Needed Fire Flow (NFF) calculations using the ISO Guide for Determination of Needed Fire Flow are presented in Attachment B. The calculation shows a NFF of 750 gallons per minute. This calculation is for a non-sprinklered building. For a building protected by an automatic fire sprinkler system, the ISO states:

> *"The NFF for residential occupancies (such as apartment buildings, lodgings and rooming houses, board and care facilities, hotels, motels and dormitories) protected by an automatic fire sprinkler system installed in accordance with the general criteria of NFPA 13R, Standard for the Installation of Sprinkler Systems in Residential Occupancies*

up to and including Four·Stories in Height, is the demand at the base of the automatic sprinkler riser".

"The minimum NFF is 1,000 gpm at 20 psi for a duration of 2 hours".

Using the minimum given by ISO, the NFF for this facility is 1,000 gpm.

The hydrant flow test data indicates approximately 4,600 gpm at 20 psi. Based on this information, there is adequate fire protection water supply available at the site.

Connections and appurtenances, including tapping sleeves and valves, mechanical joints, tees, isolation valves, fire hydrants, thrust blocks, trenching, bedding, service connections, as well as testing and disinfection will all be specified in accordance with City of Saratoga Springs standards. The applicant will offer the water system to the City of Saratoga Springs for ownership and maintenance. If accepted, utility easements will be provided as required.

Proposed Wastewater Utilities

Sanitary service will be provided by using existing sewer lateral stubs, installing new 6-inch PVC gravity sewer laterals and installing new 8-inch PVC gravity sewer mains and manholes. The new lines will be installed at a slope to provide adequate cleansing velocity in the pipe.

Manholes, pipe, trenching, bedding, service connections, and testing will be specified in accordance with City of Saratoga Springs and Saratoga County Sewer District minimum standards. The applicant will offer the sanitary sewer system to the City of Saratoga Springs for ownership and maintenance. If accepted, utility easements will be provided as required.

Existing Pump Station Capacity

The City Engineer will be contacted to verify if their system has adequate capacity to accommodate the project's sanitary flow. In addition, the pump station operator is looking into any concerns the City may have with the operation of the existing pump station.

The pump station was originally designed to handle design flows of 110,540 gpd. Peak hourly flow which the pump station was designed for is estimated at:

(110,540 gpd / 1,440 minutes per day) x 3.88 peaking factor^2 = 297.8 gpm. We will round up to 300 gpm for this analysis.

Total existing phase 1sanitary flows are estimated to be 21,230 gpd which is approximately 20% of the full build-out design flow. Adding the phase 2 and phase 2A projected flows of 23,100 gpd to the existing estimated flows of 21,230 gpd gives a total of 44,330 gpd after completion of phase 2A. This is approximately 40% of the full build-out design flow.

At full build-out, sanitary flows are estimated to be 107,734 gpd which is 2,806 gpd less than the original design and within a reasonable margin of error considering the broad nature of these flow estimates.

Peak hourly flow after completion of the full build-out is estimated to be 290 gpm using a peaking factor of 3.69. The original pump station was designed based on a peak hourly flow of approximately 300 gpm.

The pumps that were originally installed (Flygt CP3127 submersible with 484 impellers) discharge at a rate of approximately 300 gpm at a total dynamic head of 48 feet. This rate will provide a force main cleansing velocity of 3.4 feet per second. Pending verification from the City that the existing pump station is operating as originally designed; the additional daily and peak flows generated with the full build-out of Excelsior Park will be within an acceptable range for the municipal pump station.

Notes

4. *From Table 1, Appendix 75-A Wastewater Treatment Standards - Residential Onsite Systems (110 gallons per day per bedroom)*
5. *From Figure 1, GLUMRB Recommended Standards for Wastewater Facilities Q = (18 + P ½) ÷ (4 + P ½) where P = population in thousands*
3. *From Table XXI, Community Water Systems Source Book, Ameen.*

Attachments

Attachment A	Hydrant Flow Test Data
Attachment B	Needed Fire Flow (NFF) Calculations
Attachment C	Water Demand Calculations
Attachment D	Sanitary Sewer Use Calculations

ATTACHMENT A

HYDRANT FLOW TEST DATA

HYDRANT FIRE FLOW TESTS

LOCATION August 26, 2005	TEST DATE	NOZZLE (IN.)	PITOT (P.S.I.)	NOZZLE COEFF.	GPM	STATIC (P.S.I.)	RESID (P.S.I.)	RESID. FLOW AT 20 PSI (GPM)
EXCELSIOR - VAN RAALTE	4/7/1992	2.5	78		6043	101	95	
EXCELSIOR @ GICK RD	4/7/1992	2.5	58	0.90	1278	98	91	4698
EXCELSIOR @ LOUGHBERRY	4/7/1992	2.5	58		4698	98	91	
EXCELSIOR AVE - TARRANT MFG	6/9/1981	2.5	53	0.90	1222	103	96	4645
EXCELSIOR AVE (NEAR TARRANT MFG)	1/30/1992	2.5		0.90		87		
EXCELSIOR AVE (#264 MARRIOTT RESID. INN EXC. PARK)	8/12/2004	2.5	73	0.98	1553	93	82	
EXCELSIOR AVE (MARRIOTT NEAR WARREN ST)	5/8/2003	2.5	78	0.90	1491	104	95	
EXCELSIOR AVE @ GICK RD	4/7/1991				1278	98	91	4700
EXCELSIOR AVE @ GICK ROAD	3/23/1976				740	98	78	1550
EXCELSIOR AVE. & MARION	4/24/2014	2.5	87	0.90	1570	102	98	1570

ATTACHMENT B

NEEDED FIRE FLOW (NFF) CALCULATIONS

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PREPARED BY:	D. Desjardins	DATE	09/20/17
CHECKED BY:		DATE	
SUBJECT:	Excelsior Park SUP - ISO NFF Calculations		
PROJECT NUMBER:	2016046	SHEET	1 OF 1

Assumptions: **Building is 2 stories with basement.**
Wood frame construction.
Residential townhomes.
Largest townhouse unit is 24' x 40' or 960 SF.
Nonsprinklered building.

References: 1. Insurance Services Office (ISO) Guide for Determination of Needed Fire Flow Edition 06-2014

Needed Fire Flow Formula:

$$NFF_i = (C_i)(O_i)[1.0 + (X + P)_i]$$

where:

NFF = the needed fire flow in gallons per minute
C_i = a factor related to the type of construction and effective area
O_i = a factor related to the type of occupancy
X = a factor related to the exposure hazard of adjacent buildings
P = a factor related to the communication hazard with adjacent buildings

CONSTRUCTION TYPE

Construction Class 1 (wood frame construction)
Construction type coefficient (F) = 1.5 (Chapter 2, Reference 1)
Effective area (A) = 1,440 SF (960 + 960/2) (50% of each additional floor)

$C = 18F \times A^{1/2}$
C = 1,024.58 gpm
C = 1,000 gpm (rounded to nearest 250 gpm)

OCCUPANCY TYPE

Residential (townhomes)
Occupancy combustibility class C-2 (Limited Combustibility)
Occupancy Factor (O) = 0.85 (Chapter 3, Reference 1)

EXPOSURES AND COMMUNICATION

Exposure Factor (X) = none (Chapter 4, Reference 1, exception for habitational and sprinklered)
Exposure and Communication Factor (X + P) = 0.00

CALCULATION

NFF = (C)(O)(1+(X+P))
NFF = 850.00 gpm
NFF = 750 gpm (rounded to nearest 250 gpm)

ATTACHMENT C

WATER DEMAND CALCULATIONS

CALCULATIONS FOR FULL BUILD-OUT WATER DEMAND

DETERMINE DAILY AVERAGE AND PEAK HOURLY DEMAND

EXISTING CONDITION:

HOTEL:

NO. OF ROOMS		103	EA	
DESIGN FLOW =		110	GPD/EA	(NYSDEC)*
	Qa =	11,330	GPD	

CONDOMINIUMS:

NO. OF 3-BR UNITS		30	EA	
DESIGN FLOW =		330	GPD/EA	(NYSDEC)*
	Qb =	9,900	GPD	

APARTMENTS:

NO. OF BEDROOMS		156	EA	
DESIGN FLOW =		110	GPD/EA	(NYSDEC)*
	Qc =	17,160	GPD	

TOWNHOUSES:

NO. OF 3-BR UNITS		18	EA	
DESIGN FLOW =		330	GPD/EA	(NYSDEC)*
	Qd =	5,940	GPD	

EXISTING SUBTOTAL 44,330 GPD (Qa thru Qd)

PROPOSED DEVELOPMENT:

HOTEL:

NO. OF ROOMS		60	EA	
DESIGN FLOW =		110	GPD/EA	(NYSDEC)*
	Qe =	6,600	GPD	

RESTAURANT:

NO. OF SEATS		200	EA	
DESIGN FLOW =		35	GPD/EA	(NYSDEC)*
	Qf =	7,000	GPD	

BANQUET (WEDDING):

NO. OF SEATS		300	EA	
DESIGN FLOW =		10	GPD/EA	(NYSDEC)*
	Qg =	3,000	GPD	

HOTEL POOL:

NO. OF USERS		60	EA	(1 PER ROOM)
DESIGN FLOW =		10	GPD/EA	(NYSDEC)*
	Qh =	600	GPD	

HOTEL SPA:				
NO. OF USERS		60	EA	(1 PER ROOM)
DESIGN FLOW =		20	GPD/EA	(NYSDEC)*
	Qi =	1,200	GPD	
COMMUNITY POOL:				
NO. OF USERS		240	EA	(80 USERS x 3)
DESIGN FLOW =		10	GPD/EA	(NYSDEC)*
	Qj =	2,400	GPD	
COMMUNITY RECREATION:				
NO. OF USERS		160	EA	(1/2 PER DWELLING)
DESIGN FLOW =		20	GPD/EA	(NYSDEC)*
	Qk =	3,200	GPD	
COMMERCIAL/RETAIL:				
BUILDING AREA		19,200	SF	
DESIGN FLOW =		0.1	GPD/SF	(NYSDEC)*
	Ql =	1,920	GPD	
APARTMENTS:				
NO. OF 2-BR UNITS		59	EA	
DESIGN FLOW =		220	GPD/EA	(NYSDEC)*
	Qm =	12,980	GPD	
TOWNHOUSES:				
NO. OF 3-BR UNITS		62	EA	
DESIGN FLOW =		330	GPD/EA	(NYSDEC)*
	Qn =	20,460	GPD	
SHORT-TERM GUEST RENTALS:				
NO. OF ROOMS		6	EA	
DESIGN FLOW =		110	GPD/EA	(NYSDEC)*
	Qo =	660	GPD	
PROPOSED SUBTOTAL		60,020	GPD	(Qe thru Qo)
GRAND TOTAL		**104,350**	**GPD**	**(Qa thru Qo)**
AVG. DAILY DAMAND, Qav =		73	GPM	(24 HRS)
MAX. DAILY DAMAND, Qmax =		145	GPM	(TWICE THE AVG.)
POPULATION		1,400	EA	(10-STATE STDS. PAGE
PEAKING FACTOR, Qp/Qav		3.70		10-5, FIG. 1, BASED ON
PEAK HOURLY FLOW, Qp =		281.3	GPM	75 GPD/PERSON)

* NYSDEC 2014 DESIGN STANDARDS TABLE B-3 "Typical Per-Unit Loading Rates'

DETERMINE INSTANTANEOUS DEMAND

HOTELS:

NO. OF ROOMS		163	EA
DESIGN FLOW =		2	GPM/UNIT (AMEEN TABLE XV)**
	Qa =	326	GPM

RESTAURANT:

NO. OF SEATS		200	EA
DESIGN FLOW =		1	GPM/SEAT (AMEEN TABLE XV)**
	Qb =	200	GPM

COMMERCIAL/RETAIL:

BUILDING AREA		19,200	SF
DESIGN FLOW =		0.6	GPM/100 SF (AMEEN TABLE XV)**
	Qc =	115	GPM

COMMUNITY RECREATION:

NO. OF USERS		160	EA
DESIGN FLOW =		0.6	GPM/MEMBER (AMEEN TABLE XV)**
	Qd =	96	GPM

COMMUNITY POOL:

NO. OF USERS		240	EA
DESIGN FLOW =		0.6	GPM/MEMBER (AMEEN TABLE XV)**
	Qe =	144	GPM

RESIDENDIAL:

NO. OF RESIDENCES		300	EA
INSTANTANEOUS DEMAND =		1.2	GPM/RESIDENCE***
	Qf =	360	GPM

TOTAL INSTANTANEOUS	1,241	GPM (Qa thru Qf)

** AMEEN TABLE XV "Instantaneous Water Demands for Commercial Areas"
*** AMEEN TABLE XIV "Instantaneous Water Demands for Residential Areas"

ATTACHMENT D

SANITARY SEWER USE CALCULATIONS

CALCULATIONS FOR SANITARY SEWAGE CAPACITY

DETERMINE DAILY AVERAGE AND PEAK HOURLY FLOWS

EXISTING CONDITION:

HOTEL:

NO. OF ROOMS		103	EA	
DESIGN FLOW =		110	GPD/EA	(NYSDEC)
	Qa =	11,330	GPD	

CONDOMINIUMS:

NO. OF 3-BR UNITS		30	EA	
DESIGN FLOW =		330	GPD/EA	(NYSDEC)
	Qb =	9,900	GPD	

APARTMENTS:

NO. OF BEDROOMS		156	EA	
DESIGN FLOW =		110	GPD/EA	(NYSDEC)
	Qc =	17,160	GPD	

TOWNHOUSES:

NO. OF 3-BR UNITS		18	EA	
DESIGN FLOW =		330	GPD/EA	(NYSDEC)
	Qd =	5,940	GPD	

EXISTING SUBTOTAL 44,330 GPD (Qa thru Qd)

PROPOSED DEVELOPMENT:

HOTEL:

NO. OF ROOMS		60	EA	
DESIGN FLOW =		110	GPD/EA	(NYSDEC)
	Qe =	6,600	GPD	

RESTAURANT:

NO. OF SEATS		200	EA	
DESIGN FLOW =		35	GPD/EA	(NYSDEC)
	Qf =	7,000	GPD	

BANQUET (WEDDING):

NO. OF SEATS		300	EA	
DESIGN FLOW =		10	GPD/EA	(NYSDEC)
	Qg =	3,000	GPD	

HOTEL POOL:

NO. OF USERS		60	EA	(1 PER ROOM)
DESIGN FLOW =		10	GPD/EA	(NYSDEC)
	Qh =	600	GPD	

HOTEL SPA:				
NO. OF USERS		60	EA	(1 PER ROOM)
DESIGN FLOW =		20	GPD/EA	(NYSDEC)
	Qi =	1,200	GPD	
COMMUNITY POOL:				
NO. OF USERS		240	EA	(80 USERS x 3)
DESIGN FLOW =		10	GPD/EA	(NYSDEC)
	Qj =	2,400	GPD	
COMMUNITY RECREATION:				
NO. OF USERS		160	EA	(1/2 PER DWELLING)
DESIGN FLOW =		20	GPD/EA	(NYSDEC)
	Qk =	3,200	GPD	
COMMERCIAL/RETAIL:				
BUILDING AREA		19,200	SF	
DESIGN FLOW =		0.1	GPD/SF	(NYSDEC)
	Ql =	1,920	GPD	
APARTMENTS:				
NO. OF 2-BR UNITS		59	EA	
DESIGN FLOW =		220	GPD/EA	(NYSDEC)
	Qm =	12,980	GPD	
TOWNHOUSES:				
NO. OF 3-BR UNITS		62	EA	
DESIGN FLOW =		330	GPD/EA	(NYSDEC)
	Qn =	20,460	GPD	
SHORT-TERM GUEST RENTALS:				
NO. OF ROOMS		6	EA	
DESIGN FLOW =		110	GPD/EA	(NYSDEC)
	Qo =	660	GPD	
PROPOSED SUBTOTAL		60,020	GPD	(Qe thru Qo)
GRAND TOTAL		104,350	GPD	(Qa thru Qo)
MAX. DAILY FLOW, Q =		110,540	GPD	(Original Design)
AVG. DAILY FLOW, Qav =		73	GPM	(24 HRS)
POPULATION		1,400	EA	(10-STATE STDS. PAGE
PEAKING FACTOR, Qp/Qav		3.70		10-5, FIG. 1, BASED ON 75 GPD/PERSON)
PEAK HOURLY FLOW, Qp =		281.3	GPM	

WET WELL SIZING CALCULATIONS

MINIMUM VOLUME:

TWO MINUTE PUMP RUN TIME WITH	2	MIN
FM VELOCITY > 2.0 FPS	175	GPM
	350	GAL

OR

THREE MINUTE MINIMUM REST BETWEEN	3	MIN
PUMP STARTS AT PEAK FLOW	281	GPM
	844	GAL

MAXIMUM VOLUME:

THIRTY MINUTE DETENTION TIME AT	30	MIN
AVERAGE INFLOW	73	GPM
	2175	GAL

WET WELL INSIDE DIAMETER =	6	FT
NO. OF PUMP STARTS PER DAY =	260.1	
GALLONS PER PUMP START =	425	

HEIGHT BETWEEN ON-OFF LEVEL WITH 6 FT. DIA. WET WELL :

425 GAL/START/ 211.5 GAL/VLF = 2.01 FT

HEAD LOSS CALCULATIONS

MINOR LOSSES:

QTY	DESCRIPTION	SIZE (IN)	EQUIV LNGTH (LF)	TOTAL EQUIV. LENGTH (LF)
1	GATE VALVE	4	2.40	2.40
1	CHECK VALVE	4	31.00	31.00
1	TEE (THROUGH)	4	2.20	2.20
0	TEE (SIDE)	4	10.00	0.00
4	90 DEG. ELBOW	4	4.80	19.20
4	45 DEG. ELBOW	4	2.90	11.60
0	22.5 DEG. ELBOW	4	2.00	0.00
0	11.25 DEG. ELBOW	4	1.00	0.00
1	COUPLING/UNION	4	0.50	0.50
			SUB-TOTAL	66.90

PIPE FRICTION LOSSES:

6 - INCH HDPE DR-11 PIPE	2,373
TOTAL PIPE LENGTH	2,440

SAY 2,440 LF

SYSTEM HEAD LOSS TABLE

PIPE SIZE (I.D.)= 6 IN.
"C" = 120
"C" = 100

FLOW (GPM)	STC HEAD (FT.)*	FR HEAD (FT.)**	FR HEAD (FT)***	T.D.H. (FT)**	T.D.H. (FT)***
0	28.0	0.0	0.0	28.0	28.0
100	28.0	3.0	4.2	31.0	32.2
200	28.0	10.8	15.2	38.8	43.2
300	28.0	22.9	32.1	50.9	60.1
400	28.0	39.0	54.6	67.0	82.6
500	28.0	58.9	82.6	86.9	110.6
600	28.0	82.6	115.7	110.6	143.7
700	28.0	109.8	153.9	137.8	181.9
800	28.0	140.6	197.0	168.6	225.0
900	28.0	174.8	244.9	202.8	272.9
1000	28.0	212.4	297.6	240.4	325.6
1100	28.0	253.4	355.0	281.4	383.0
1200	28.0	297.6	417.1	325.6	445.1

*DISCHARGE ELEVATION = 280 +/- (HIGH POINT)
PUMP ELEVATION = 252 +/-
** BASED ON "C" = 120 & 6 " I.D. HDPE DR-11 PIPE
*** BASED ON "C" = 100 & 6 " I.D. HDPE DR-11 PIPE

USE FLYGT SUBMERSIBLE SEWAGE PUMP, MODEL NO. NP 3102 MT, 5 HP, THREE PHASE, 460 VAC, 60 HZ., 1745 RPM. PROGRAM THE VFD TO OPERATE THE PUMP AT 55HZ.

PUMP DELIVERY : 300 GPM @ TDH= 48 FT.

NOTE: FLYGT SYSTEM SPECIFIED PER SARATOGA CO. SEWER DISTRICT STANDARDS.

CHECK TOTAL TIME BETWEEN PUMP STARTS AT AVG. FLOW:

t = V/(D-Qav) + V/Qav where:

t =	(TOTAL TIME BTWN STARTS, MIN.)	
V =	425	GAL (VOLUME BTWN "OFF AND ON")
Qav =	72.5	GPM (AVG. DAILY FLOW)
D =	300	GPM (PUMP DELIVERY)

t = 7.7 MIN. < 30 MIN. ?

CHECK MINIMUM PUMP RUN TIME AT PEAK INFLOW:

t = V/(D-Qp) where:

t =	(PUMP RUN TIME, MIN.)	
V =	425	GAL (VOLUME BTWN "OFF AND ON")
Qp =	281.3	GPM (PEAK INFLOW)
D =	300	GPM (PUMP DELIVERY)

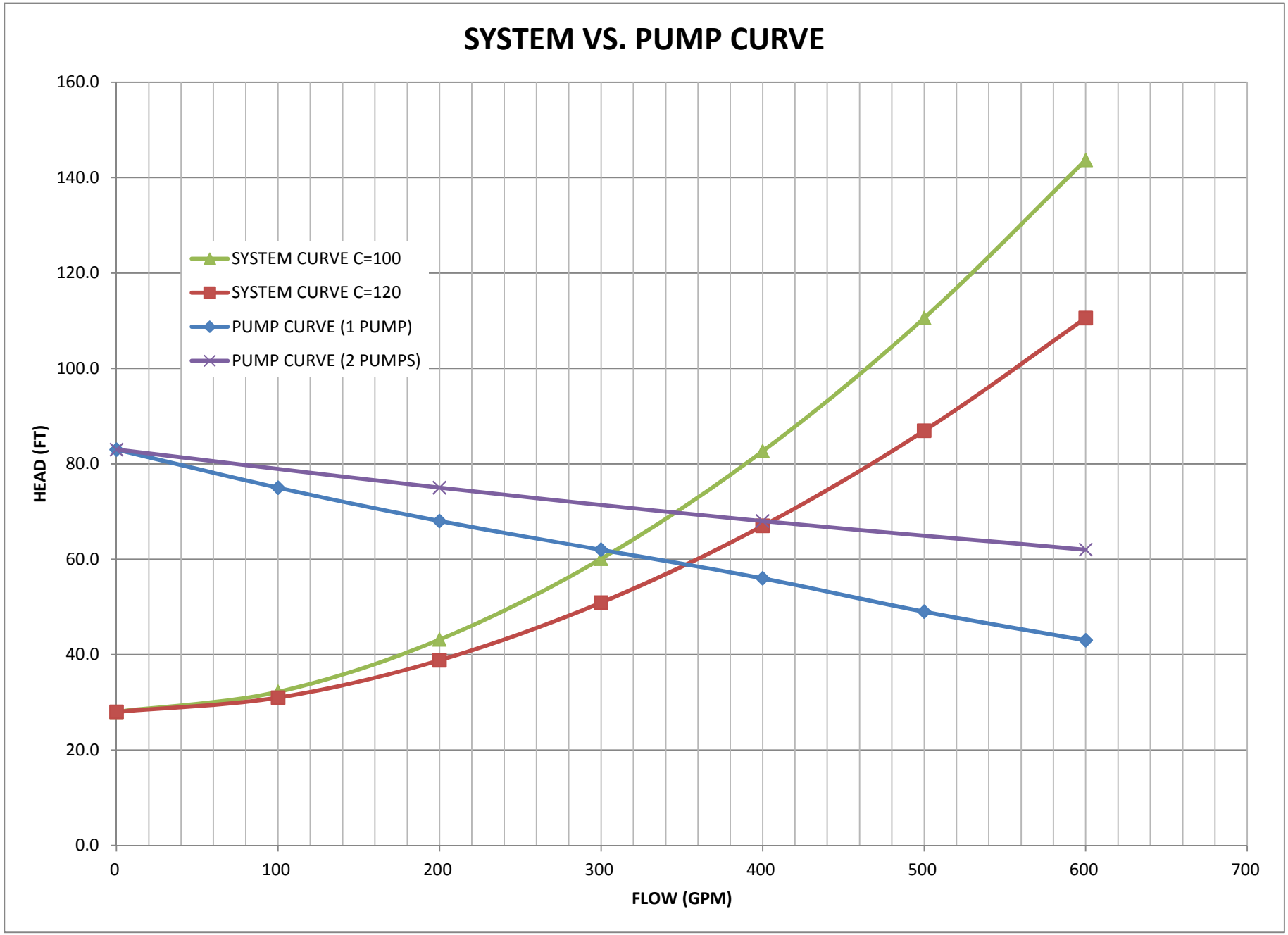
t = 22.7 MIN. >/= 2 MIN. ?

CHECK VELOCITY IN FORCE MAIN:

Velocity = (D/A)/448.8 GPM where:

A =	0.20	SF (PIPE X-SECT AREA)
D =	300	GPM (PUMP DELIVERY)

Velocity = 3.4 FPS > 2.0 FPS ?



Flygt Pump
Model CP 3127 MT

ATTACHMENT D