

PRELIMINARY CENTRAL SEWAGE SYSTEM PLAN FOR: REGENTS SCHOOL OF CHARLOTTESVILLE

SDP2020-010
TAX MAP 75, PARCEL 66
TAX MAP 76, PARCEL 17
ALBEMARLE COUNTY, VIRGINIA

LEGEND

EXISTING	NEW	DESCRIPTION
		BOUNDARIES
		BENCHMARK
		SITE PROPERTY LINE
		ADJACENT PROPERTY LINE
		BUILDING SETBACK
		PARKING SETBACK
		SITE TEXT
		PARKING COUNT
		TOPOGRAPHY
		INDEX CONTOUR
		INTERVAL CONTOUR
		SPOT ELEVATION
		TOP OF CURB ELEVATION
		TOP OF WALL ELEVATION
		BOTTOM OF WALL ELEVATION
		STREAM
		STREAM BUFFER
		100 YEAR FLOODPLAIN
		BUILDING
		BUILDING
		RETAINING WALL
		STAIRS
		EDGE OF PAVEMENT
		ROAD CENTERLINE
		FRONT OF CURB
		BACK OF CURB
		CG-12 TRUNCATED DOME
		SIDEWALK
		BIKE PARKING
		HANDICAP ACCESSIBLE AISLE
		HANDICAP PARKING
		MATERIAL
		CONCRETE
		RIPRAP
		ASPHALT
		EC-2 MATTING
		EC-3 MATTING
		WETLAND
		TREELINE
		FENCE
		UTILITY
		UTILITY POLE
		GUY WIRE
		OVERHEAD UTILITY
		UNDERGROUND UTILITY
		STORM
		STORM MANHOLE
		DROP INLET
		STORM SEWER
		ROOF DRAIN
		SANITARY
		SANITARY MANHOLE
		SANITARY SEWER MAIN
		SANITARY SEWER LATERAL
		WATER
		WATER LINE
		WATER METER
		WATER METER VAULT
		FIRE HYDRANT
		FIRE DEPARTMENT CONNECTION
		GAS
		GAS LINE
		EASEMENTS
		CONSTRUCTION
		GRADING
		ACCESS
		SIGHT DISTANCE
		UTILITY
		STORMWATER FACILITY MAINTENANCE
		STORMWATER ACCESS
		DRAINAGE
		SANITARY
		WATERLINE
		GASLINE

NOTE:
1. THE SIZE OF THE SYMBOLS MAY VARY FROM WHAT IS SHOWN.

OWNER/DEVELOPER

Regents School of Charlottesville Inc.
3045 Ivy Road
Charlottesville, Virginia 22903

PLAN PREPARATION

Shimp Engineering, P.C.
912 East High Street
Charlottesville, VA 22902
(434) 227-5140

ZONING

EC - Entrance Corridor
R1 - Residential
SP201800011 approved on September 18, 2019
permitting a private school use on the site

MAGISTERIAL DISTRICT

Samuel Miller

SOURCE OF TITLE

DB 5237 P 251
DB 660 P 780 (plat)

EXISTING USE

Vacant Land

PROPOSED USE

Private School (Grades K-12)
468 Students

NOTES

Regents School site plan improvements shown for reference only.
This plan only proposes the new sanitary sewer system to serve
Regents School.

RELIABILITY CLASSIFICATION

Class 1

SHEET INDEX

- C1 COVER
- C2 SITE OVERVIEW
- C3 SANITARY SEWER FORCE MAIN PLAN
- C4 SANITARY SEWER GRAVITY FLOW PLAN
- C5 FORCE MAIN PROFILE & SANITARY SEWER PUMP STATION DETAILS
- C6 SANITARY SEWER PUMP STATION CALCULATIONS

VICINITY MAP SCALE: 1"=1000'

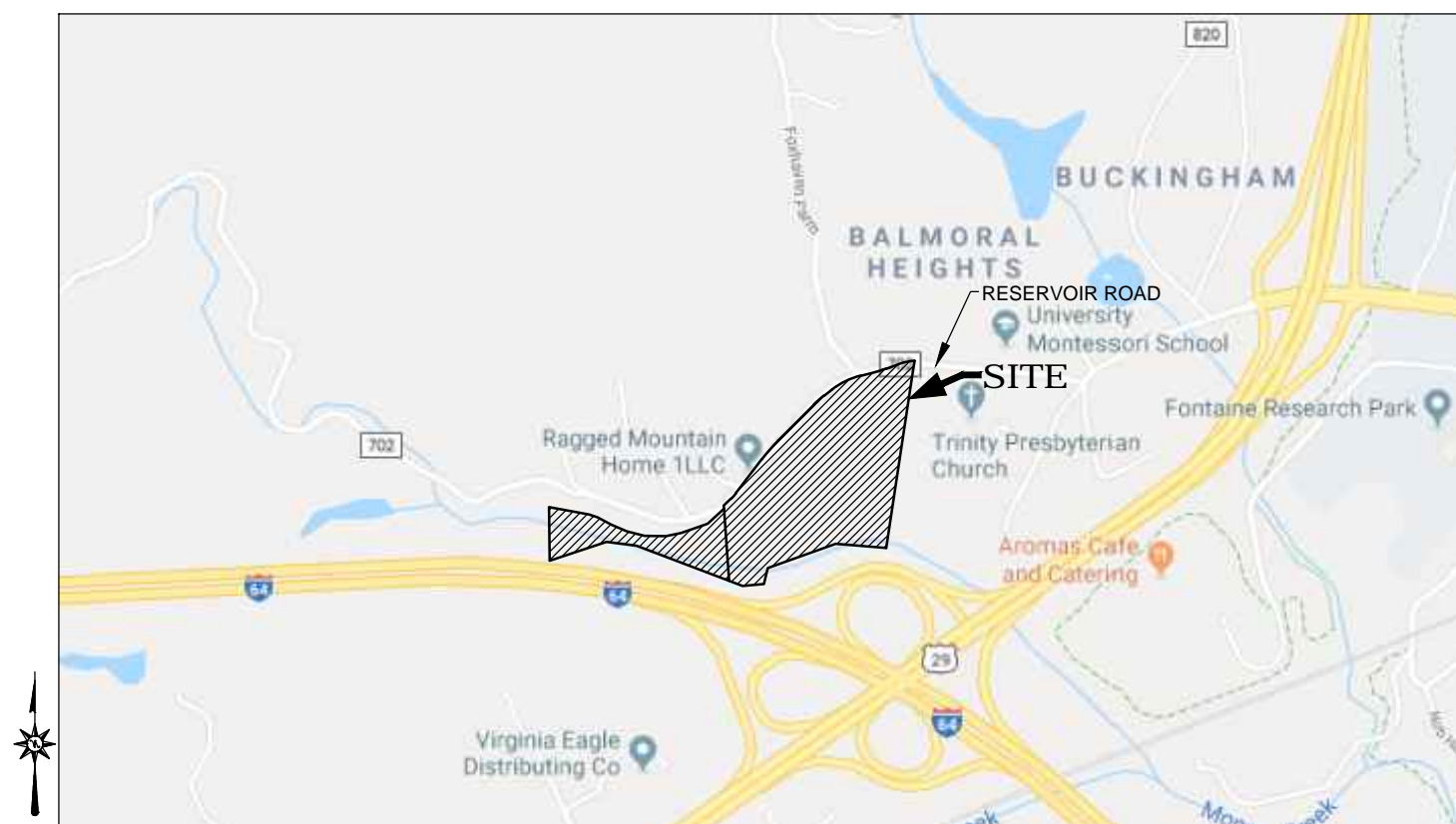
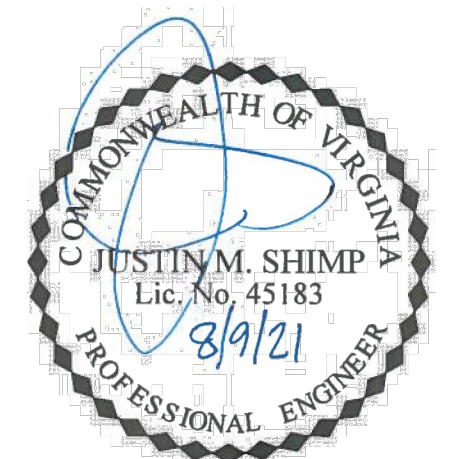


IMAGE PROVIDED BY GOOGLE MAPS



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CENTRAL SEWAGE SYSTEM PLAN

REGENTS SCHOOL

ALBEMARLE COUNTY, VIRGINIA

SUBMISSION:

2021.07.12

REVISION:

2021.08.09

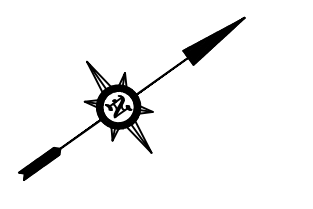
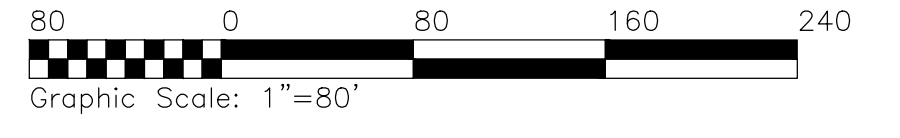
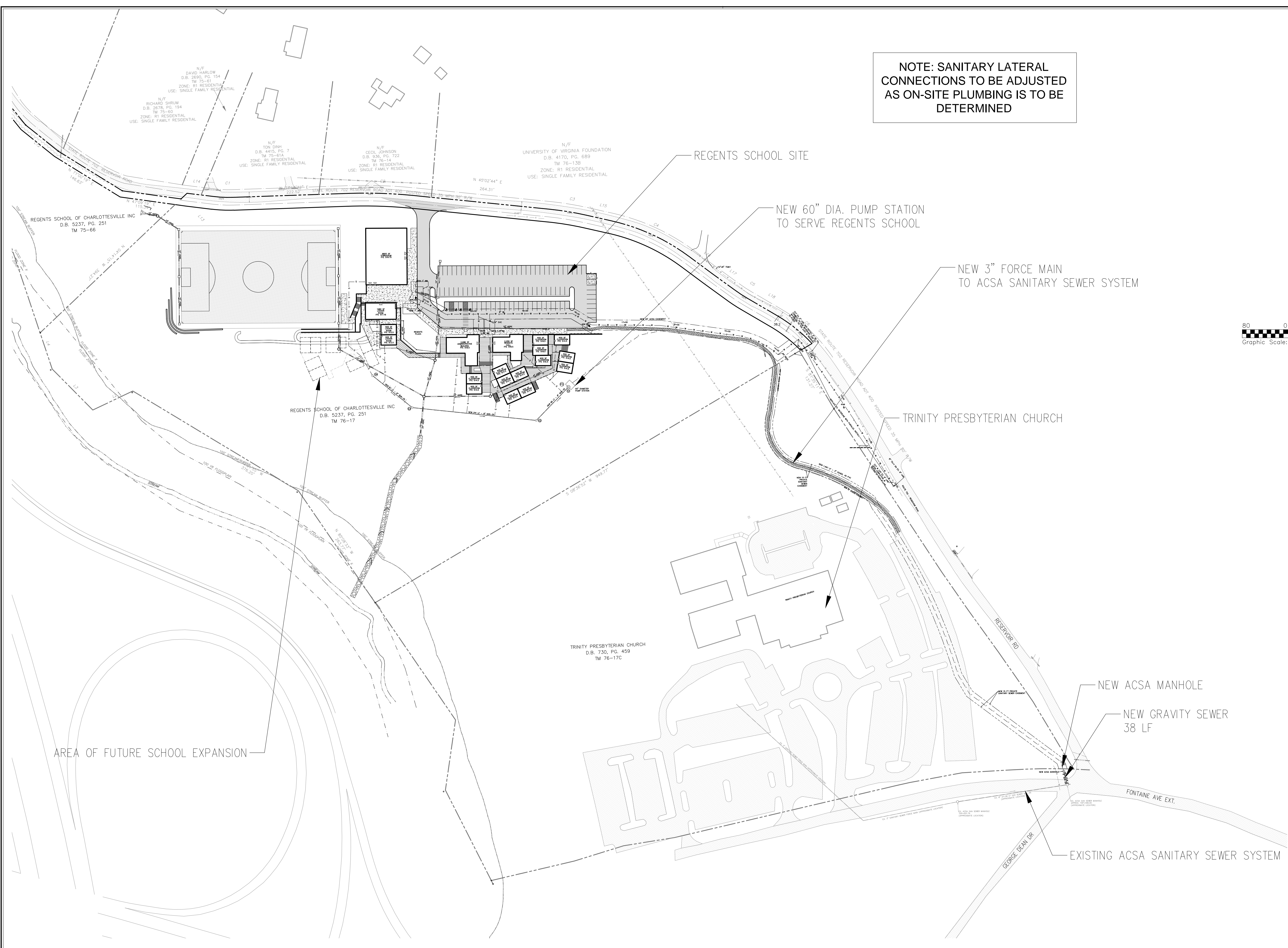
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COVER

C1

NOTE: SANITARY LATERAL CONNECTIONS TO BE ADJUSTED AS ON-SITE PLUMBING IS TO BE DETERMINED



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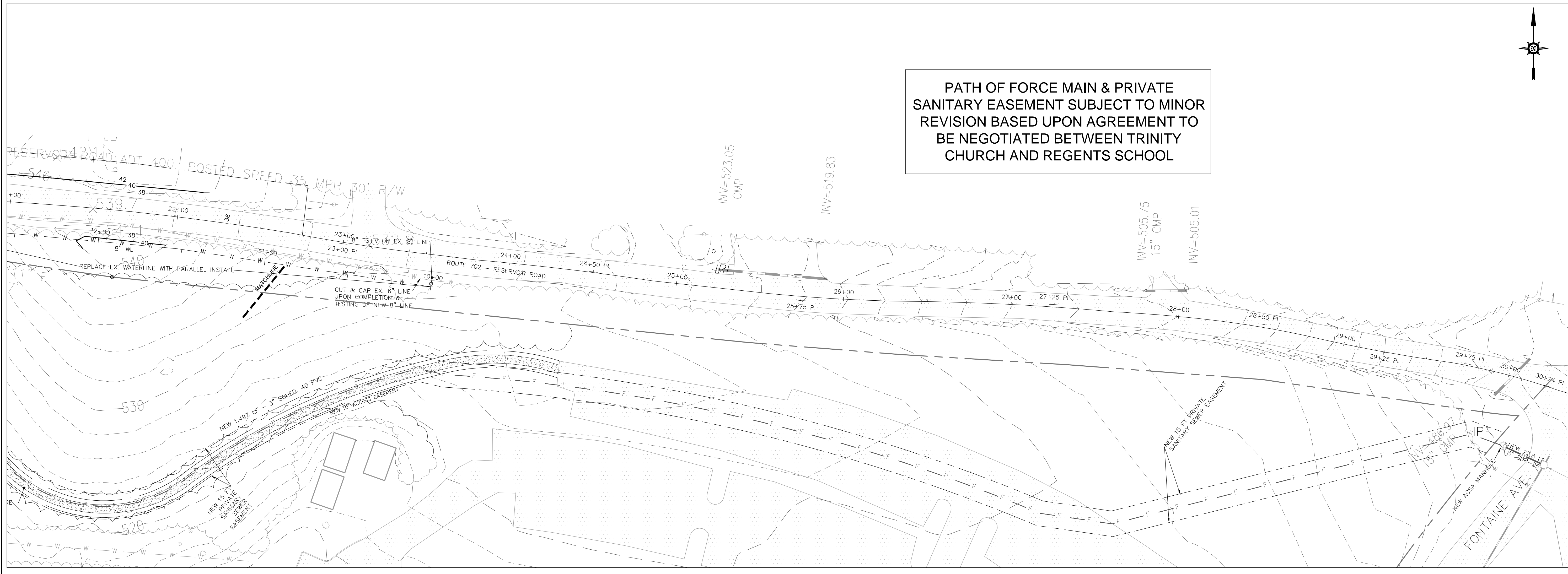


CENTRAL SEWER SYSTEM PLAN
REGENTS SCHOOL

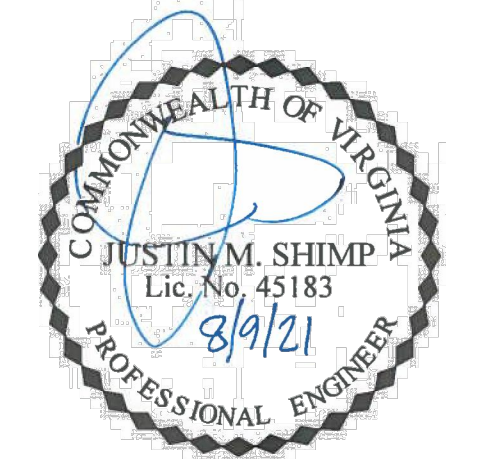
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CENTRAL SEWER OVERVIEW



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SANITARY SEWER FORCE MAIN PLAN



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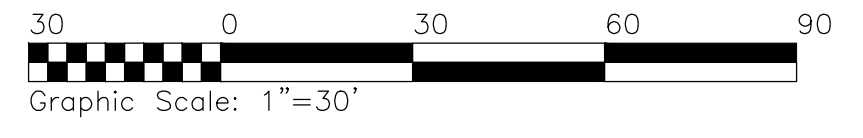


CENTRAL SEWAGE SYSTEM PLAN
REGENTS SCHOOL

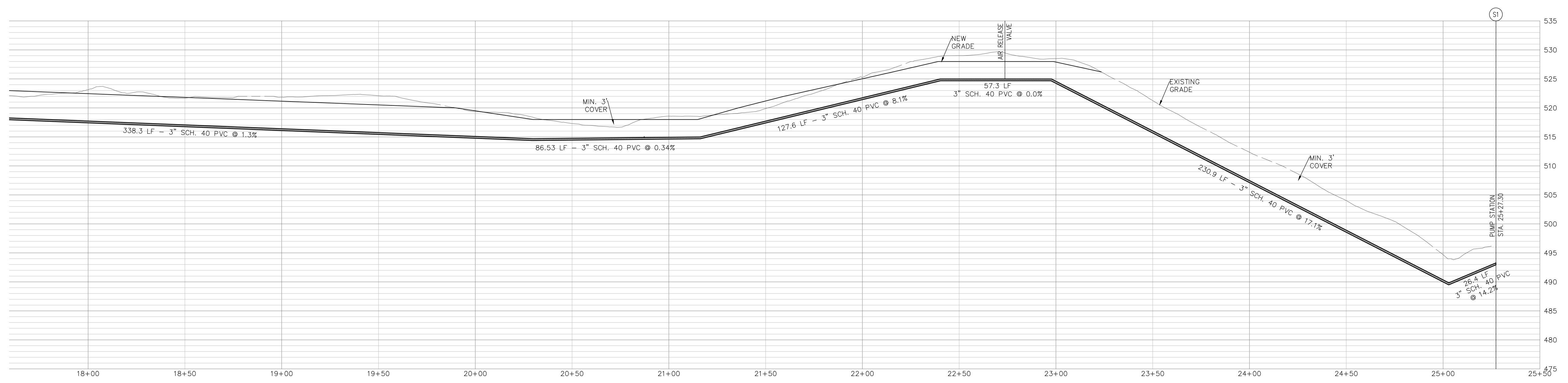
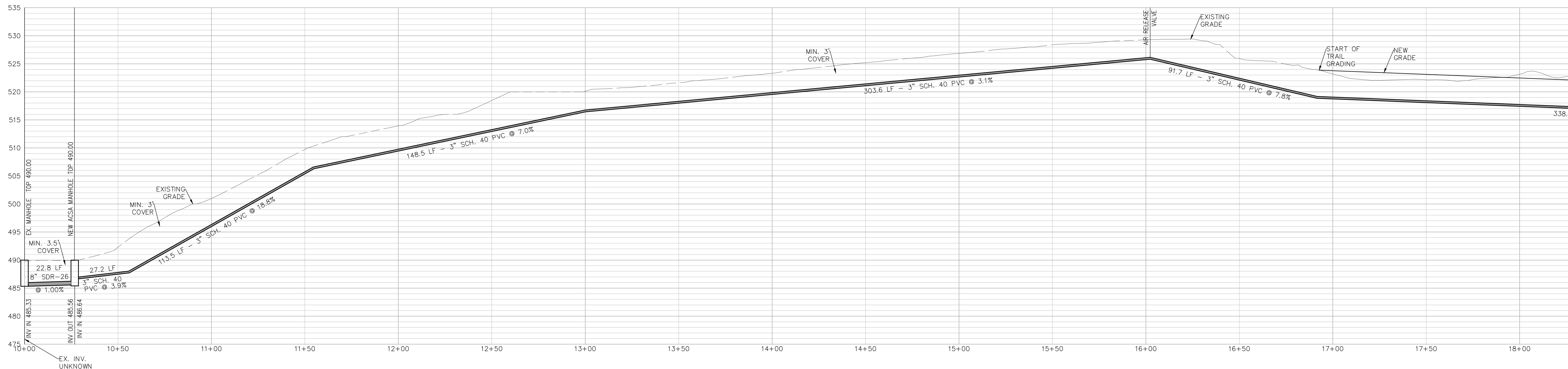
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SANITARY SEWER GRAVITY FLOW PLAN

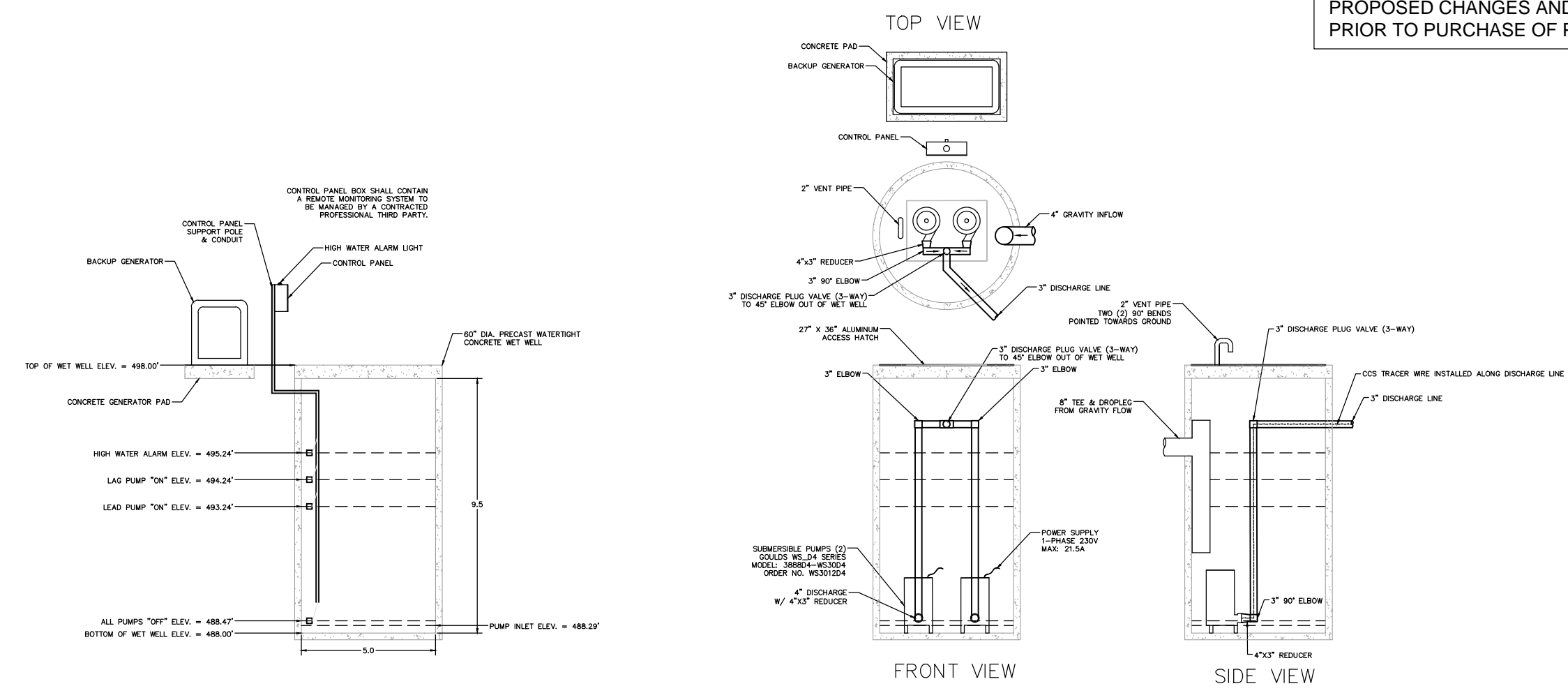


C4



1 FORCE MAIN PROFILE
C5 HORIZ: 1"=30'
 VERT: 1"=10'

CONTRACTOR SHALL OBTAIN SHOP DRAWINGS FROM VENDOR FOR PUMP ASSEMBLY, GENERATOR, AND CONTROL PANELS. SUBMIT SHOP DRAWINGS TO ENGINEER FOR REVIEW OF ANY PROPOSED CHANGES AND FINAL APPROVAL OF DRAWINGS PRIOR TO PURCHASE OF PUMP-RELATED EQUIPMENT.



2 SANITARY SEWER PUMP STATION DETAILS
C5 Scale: 1"=5'



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FORCE MAIN PROFILE & SANITARY SEWER PUMP STATION DETAILS

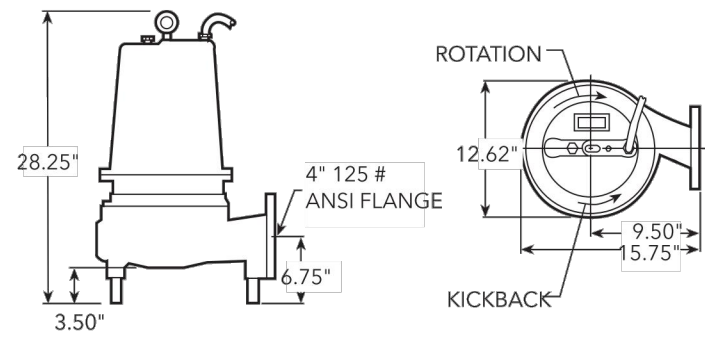
C5

APPLICATION DATA AND CONSTRUCTION DETAILS

Maximum Solid Size	3"
Minimum Casing Thickness	3/4"
Casing Corrosion Allowance	1/4"
Maximum Working Pressure	30 PSI
Maximum Submergence	50 feet
Minimum Submergence	Fully submerged for continuous operation 6" below top of motor for intermittent operation
Maximum Environmental Temperature	40° C (104° F) continuous operation, 60° C (140° F) intermittent operation
Power Cable - Type (See Motor Information for AWG data/size)	Type SJTOW: single phase, 1½ - 3 HP and 2 HP Type STOW: single phase, 1½ - 3 HP and 5 HP, 460 V Type STOW: single phase, 3 and 5 HP, three phase 5 HP, 230 V and 7½ HP
Motor Cover, Bearing Housing, Seal Housing, Casing	Gray Cast Iron - ASTM A48, Class 30
Impeller - Standard, Optional	Gray Cast Iron - ASTM A48 or Cast Bronze - ASTM B584 C67600
Motor Shaft	ANSI 300 Series Stainless Steel
Motor Design	NEMA 56 Frame, oil filled with Class F insulation
Motor Overload Protection	Single phase: on winding thermal overload protection auto reset Three phase: requires Class 10 overloads in control panel
External Hardware	300 Series Stainless Steel
Impeller Type	Semi-open with pump out vanes on back shroud
Oil Capacity - Seal Chamber	1.5 quarts
Oil Capacity - Motor Chamber	1½-5 HP single and three phase: 7 quarts 7½ HP three phase: 6.5 quarts
Mechanical Seals - Standard	Upper: Silicon Carbide/Silicon Carbide, Type 31 Lower: Silicon Carbide/Fungsten Carbide, Type 31
Mechanical Seals - Optional Lower	Silicon Carbide/Fungsten Carbide, Type 31

DIMENSIONS

(All dimensions are in inches. Do not use for construction purposes.)



APPLICATIONS

Used in a variety of residential, commercial and industrial applications such as:

- Sewage systems, Flood and Pollution Control, Dewatering/Effluent, Farms, Hospitals, Trailer Courts, Motels

SPECIFICATIONS

Pump:

- Maximum solid size: 3"
- Discharge size: 4", 125 # ANSI flange
- Maximum capacity: 620 GPM
- Maximum total head: 60 feet
- 300 Series stainless steel fasteners
- 20' Power cord
- Standard silicon carbide/silicon carbide outer seal

Motor:

- Maximum ambient temperature: 104° F (40° C) continuous duty, 140° F (60° C) intermittent duty
- Rated for continuous duty when fully submerged
- Insulation: Class F
- 60 Hertz
- Single row ball bearings
- 300 Series stainless steel keyed shaft

Single Phase:

- 1.5 - 5 HP; 208 and 230 volts
- Built-in thermal overloads with automatic reset
- Built-in capacitors

MODEL AND MOTOR INFORMATION

Order No.	HP	Phase	Volts	RPM	Impeller Dia. (in.)	Maximum Amps	L.R. Amps	KVA Code	Power Cable	F.L. Motor Efficiency %	Resistance Start Line-Line	Wt. (lbs.)
WS1518D4M	1.5	1	208	1750	5.63	17.2	50.8	B	14/3	80	1.1	0.9
WS1512D4M	1.5	1	230	1750	5.63	14.7	29.5	E	14/3	70	1.4	1.8
WS1538D4M	1.5	3	208	1750	5.63	11.5	40.9	H	14/4	81	1.4	1.7
WS1532D4M	1.5	3	230	1750	5.63	10.0	40.0	F	14/4	83	NA	2.3
WS1542D4M	1.5	3	230	1750	5.63	5.0	20.0	F	14/4	83	NA	9.3
WS1537D4M	1.5	3	230	1750	5.63	4.0	14.4	H	14/4	74	14.8	14.8
WS1518D4	1.5	1	208	1750	6.25	17.2	50.8	B	14/3	80	1.1	0.9
WS1512D4	1.5	1	230	1750	6.25	14.7	29.5	E	14/3	70	1.4	1.8
WS1538D4	1.5	3	208	1750	6.25	11.5	40.9	H	14/4	81	1.4	1.7
WS1532D4	1.5	3	230	1750	6.25	10.0	40.0	F	14/4	83	NA	2.3
WS1542D4	1.5	3	230	1750	6.25	5.0	20.0	F	14/4	83	NA	9.3
WS1537D4	1.5	3	230	1750	6.25	4.0	14.4	H	14/4	74	14.8	14.8
WS2018D4	2	1	208	1750	6.63	20.3	50.8	B	14/3	80	1.1	0.9
WS2012D4	2	1	230	1750	6.63	17.3	36.9	D	14/3	75	1.4	1.5
WS2038D4	2	3	208	1750	6.63	13.3	40.9	H	14/4	81	1.4	1.7
WS2032D4	2	3	230	1750	6.63	11.6	40.0	F	14/4	83	NA	2.3
WS2042D4	2	3	230	1750	6.63	5.8	20.0	F	14/4	83	NA	9.3
WS2037D4	2	3	230	1750	6.63	4.4	14.4	H	14/4	74	14.8	14.8
WS3018D4	3	1	208	1750	7.00	25.5	50.8	B	10/3	80	1.1	0.9
WS3012D4	3	1	230	1750	7.00	21.5	46.4	C	10/4	79	1.0	1.0
WS3038D4	3	3	208	1750	7.00	16.6	53.8	G	10/4	85	1.3	1.3
WS3032D4	3	3	230	1750	7.00	14.4	49.5	H	10/4	83	NA	1.9
WS3042D4	3	3	230	1750	7.00	7.2	24.8	H	10/4	83	NA	7.5
WS3037D4	3	3	230	1750	7.00	5.8	17.9	G	10/4	84	NA	11.6
WS5012D4	5	1	230	1750	7.25	26.5	57.7	A	10/3	80	1.0	0.8
WS5018D4	5	1	208	1750	7.25	19.1	73.9	F	10/4	84	0.9	0.9
WS5032D4	5	3	230	1750	7.25	16.6	63.6	E	10/4	85	NA	1.2
WS5038D4	5	3	208	1750	7.25	8.3	31.8	E	10/4	85	NA	4.8
WS5042D4	5	3	230	1750	7.25	6.6	22.8	E	10/4	80	NA	7.4
WS7532D4	7.5	3	230	1750	7.69	23.0	105.0	G	10/4	83	NA	0.7
WS7538D4	7.5	3	208	1750	7.69	11.5	32.5	G	10/4	83	NA	2.8
WS7542D4	7.5	3	230	1750	7.69	9.2	42.0	E	10/4	84	NA	4.4

2 PUMP SPECIFICATIONS
C6 Scale: N/A

Discharge Pipe Information

Pipe 1	3" force main
Pipe length (feet)	1500 ft
Pipe diameter (inches)	3 in
Pipe C-factor	120
Portion of Flow	1
Cross-sectional area (feet)	0.049 ft
Hydraulic radius	0.063 ft

Suction water surface elevation (A)	488.00 feet
Suction water surface elevation (B)	489.00 feet
Discharge water surface elevation	490.00 feet
Static head (A)	2.0 feet
Static head (B)	1.0 feet

Daily Average Flowrates

Type:	Unit:	Number of Units:	gpd/unit	Total (gpd)
Grade School w/ Showers	per student / staff	468	16	7,488
Total				7,488

Daily Peak Flowrates

Type:	Unit:	Number of Units:
Daily Average Flow	gpd (12-hr)	7,488
Daily Average Flow	gpm	10.40
Peaking Factor	n/a	2.5
Peak Daily Flow	gpm	26.01

Wet Well Sizing

Type:	Unit:	Number of Units:
Diameter	ft	5
Volume per foot	gallons	100
Wet Working Depth	ft	5.24
Wet Working Volume	gallons	5.95
Total Storage	gallons	1,422
Pumping Rate	gpm	75
Time to Empty	minutes	19

System Curve - Head Loss Calculations

Flowrate	Water Velocity In	Dynamic Losses, ft			Total Dynamic Head		Total Dynamic Head (+20%)		
		gpm	cfs	Velocity ft/s	Minor Losses	Pipe Friction	Max. Lift (ft)	Min. Lift (ft)	Max. Lift (ft)
0	0	0	0	0	0	2.00	1.00	2.40	1.20
5	0.01	0.23	0.00	0.21	2.21	1.21	2.66	1.46	
10	0.02	0.45	0.01	0.75	2.77	1.77	3.32	2.12	
15	0.03	0.68	0.03	1.60	3.63	2.63	4.35	3.15	
20	0.04	0.91	0.06	2.72	4.78	3.78	5.73	4.53	
25	0.06	1.13	0.09	4.11	6.20	5.20	7.44	6.24	
30	0.07	1.36	0.13	5.75	7.89	6.89	9.46	8.26	
35	0.08	1.59	0.18	7.65	9.83	8.83	11.80	10.60	
40	0.09	1.82	0.24	9.80	12.03	11.03	14.44	13.24	
45	0.10	2.04	0.30	12.18	14.48	13.48	17.37	16.17	
50	0.11	2.27	0.37	14.80	17.17	16.17	20.60	19.40	
55	0.12	2.50	0.45	17.66	20.10	19.10	24.12	22.92	
60	0.13	2.72	0.53	20.74	23.27	22.27	27.92	26.72	
65	0.14	2.95	0.62	24.05	26.67	25.67	32.01	30.81	
70	0.16	3.18	0.72	27.58	30.31	29.31	36.37	35.17	
75	0.17	3.40	0.83	31.34	34.17	33.17	41.00	39.80	
80	0.18	3.63	0.94	35.31	38.26	37.26	45.91	44.71	
85	0.19	3.86	1.07	39.50	42.57	41.57	51.08	49.88	
90	0.20	4.08	1.19	43.91	47.10	46.10	56.53	55.33	
95	0.21	4.31	1.33	48.53	51.86	50.86	62.23	61.03	
100	0.22	4.54	1.47	53.36	56.83	55.83	68.20	67.00	

Wet Well Calculations

Wet Well Diameter: 5 ft
Wet Well Height: 10 ft

Pump Rate: 75 gpm
*Pump rate is where system curve and pump curve cross

Min active wet well volume:
1) Min of 1 minute pump rate time: 75 gallons
2) 10 minutes pump cycle time (3 cycles/hr/pump): 187.5 gallons

Dimensions of sloped portion around base of wet well (ft):
height = 1.00 width = 1.00

Volume per foot of depth of wet well: 147 gal/ft

Depth (ft)	Volume (gal)
0	0
1	100
2	247
3	394
4	540
5	687
6	834
7	981
8	1128
9	1275
10	1422

3 PUMP STATION CALCULATIONS
C6 Scale: N/A

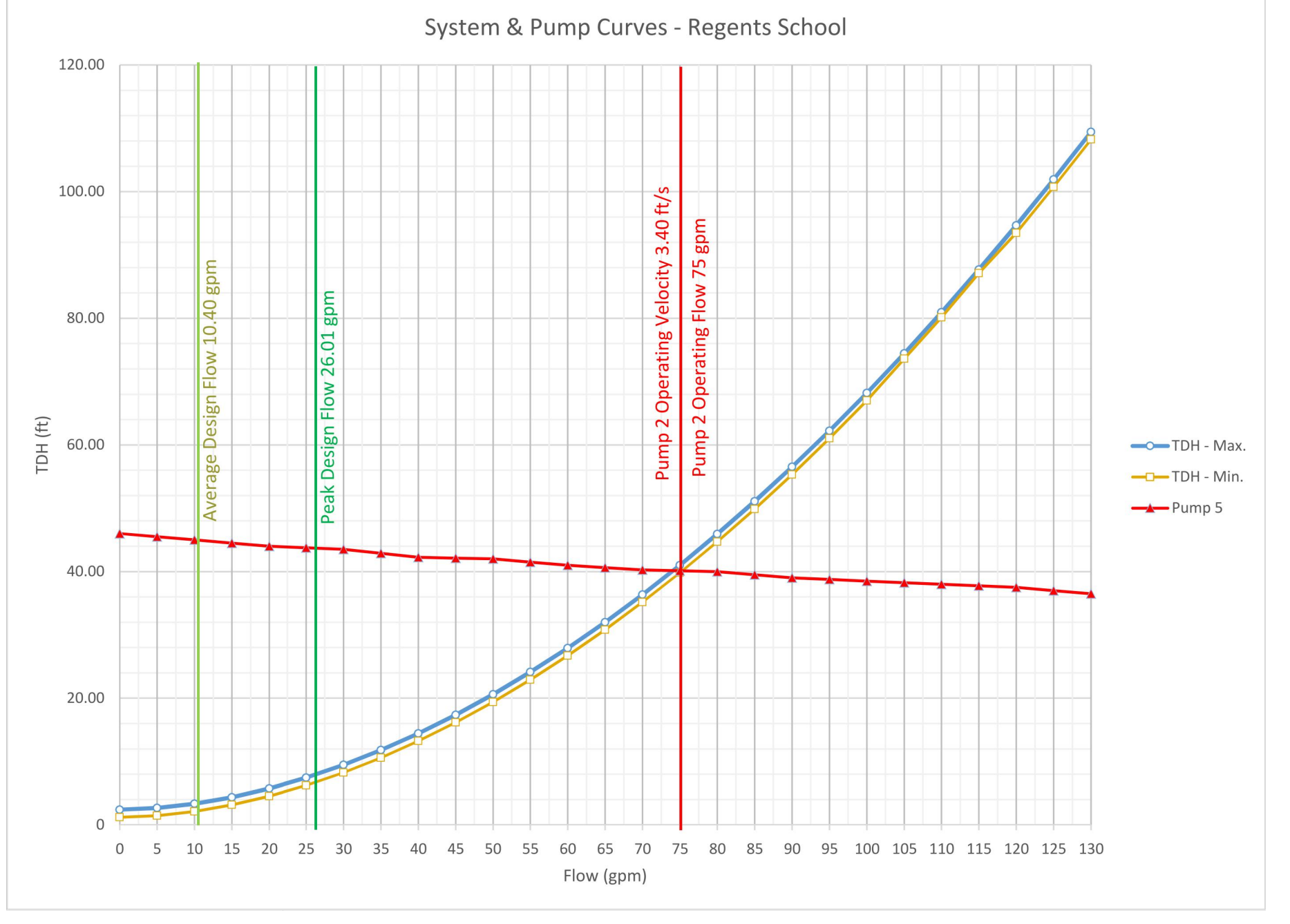
Duplex Pump (2 Pumps)

Parameter	Pressure
Pipe Length (ft)	1500
Pipe Dia. (in)	3
Hazen-Williams Coeff. C	120

*Piping from pump basin to discharge point

Minor Losses

Type	Kvalues	# Fittings
Gate Valve	0.19	0
Plug Valve (90°/open)	0.86	1
Butterfly Valve	0.4	0
Swing Check Valve	2.5	1
90° Bend	0.25	1
45° Bend	0.2	3
22.5° Bend	0.12	0
11.25° Bend	0.06	0
Tee (through)	0.6	0
Tee (side out)	1.8	0
Cross (through)	0.6	0
Cross (side out)	1.8	0
Reducer/Inverter	0.1	0
Discharge to air	1	1



1 SYSTEM & PUMP CURVES
C6 Scale: N/A

Pump Selection

Pump 5
Goulds
WS_D4 Series
Model: 3888D4
WS30D4
Order No. WS3012D4
3" (Solids)
4" Discharge Flange
1-Phase 230V
1750 RPM
Max Amps: 21.5

Flow (gpm)	Pump 5 TDH (ft)
0	46.00
5	45.50
10	45.00
15	44.50
20	44.00
25	43.75
30	43.50
35	42.88
40	42.25
45	42.13
50	42.00
55	41.50
60	41.00
65	40.63
70	40.25
75	40.13
80	40.00
85	39.50
90	39.00
95	38.75
100	38.50
105	38.25
110	38.00
115	37.75
120	37.50
125	37.00
130	36.50



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SANITARY SEWER PUMP STATION CALCULATIONS

C6