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
(10)	(10)	PARKING COUNT
		TOPOGRAPHY
		INDEX CONTOUR
		INTERVAL CONTOUR
311.5 x	x[SPOT]	SPOT ELEVATION
311.5 TC x	x[TOP CURB]	TOP OF CURB ELEVATION
311.5 TW x	x[TOP WALL]	TOP OF WALL ELEVATION
311.5 BW x	x[BOT WALL]	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
X	X	FENCE
		UTILITY
		UTILITY POLE
		GUY WIRE
OHU	OHU	OVERHEAD UTILITY
UGU	UGU	UNDERGROUND UTILITY
		STORM
		STORM MANHOLE
		DROP INLET
		STORM SEWER
RD	RD	ROOF DRAIN
		SANITARY
		SANITARY MANHOLE
		SANITARY SEWER MAIN
S	S	SANITARY SEWER LATERAL
		WATER
W	W	WATER LINE
		WATER METER
		WATER METER VAULT
		FIRE HYDRANT
		FIRE DEPARTMENT CONNECTION
		GAS
GAS	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 and Trinity Church.

RELIABILITY CLASSIFICATION

Class 1

VICINITY MAP SCALE : 1"=1000'

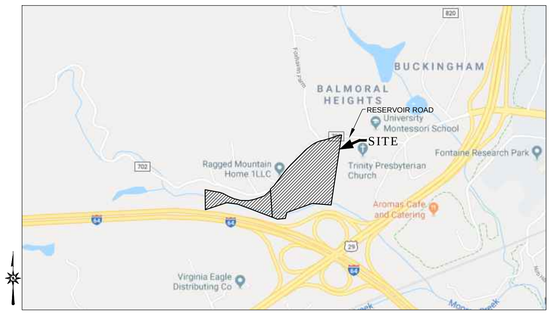

IMAGE PROVIDED BY GOOGLE MAPS

SHEET INDEX

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COMMONWEALTH OF VIRGINIA
JUSTIN M. SHIMP
Lic. No. 45183
11/10/20
PROFESSIONAL ENGINEER

PRELIMINARY CENTRAL
SEWAGE SYSTEM PLAN FOR:

REGENTS SCHOOL

ALBEMARLE COUNTY, VIRGINIA

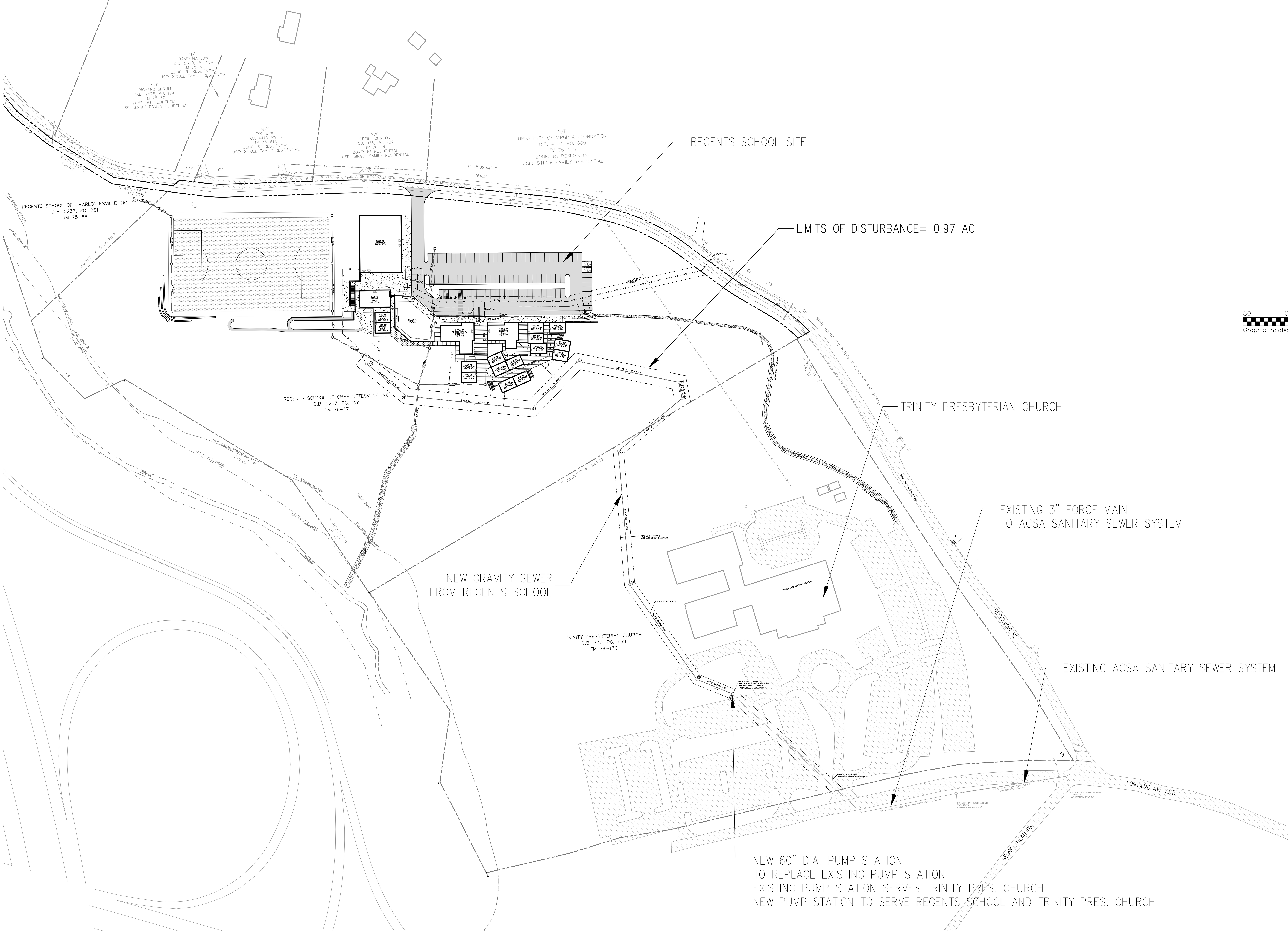
SUBMISSION:
2020.10.19

REVISION:
1. 2020.11.10

FILE NO.
18.020

COVER

C1



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SITE OVERVIEW

C2

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SANITARY SEWER GRAVITY FLOW PLAN

C3

NEW 8" SDR-26 PVC

NEW 20 FT PRIVATE
SANITARY SEWER EASEMENT

TRINITY PRESBYTERIAN CHURCH

S3

S3-S2 TO BE BORED

NEW 8" DUCTILE IRON

N CHURCH
459

S2

NEW 8" SDR-26 PVC

NEW PUMP STATION TO
REPLACE EXISTING SUMP PUMP
SERVING TRINITY CHURCH
(APPROXIMATE LOCATION)

S1

EX. 3" SANITARY SEWER FORCE MAIN (APPROXIMATE LOCATION)

NEW 20 FT PRIVATE
SANITARY SEWER EASEMENT

FONTAINE AVE EXT.

EX. 8" 211.06 LF SAN SEWER SDR-35
(APPROXIMATE LOCATION)

EX. ACSA SAN SEWER MANHOLE
TOP=492.52
(APPROXIMATE LOCATION)

EX. 3" SANITARY SEWER FORCE MAIN (APPROXIMATE LOCATION)

EX. ACSA SAN SEWER MANHOLE
TOP=501.79
(APPROXIMATE LOCATION)

GEORGE DEAN DR

RESERVOIR RD

30 0 30 60 90
Graphic Scale: 1"=30'

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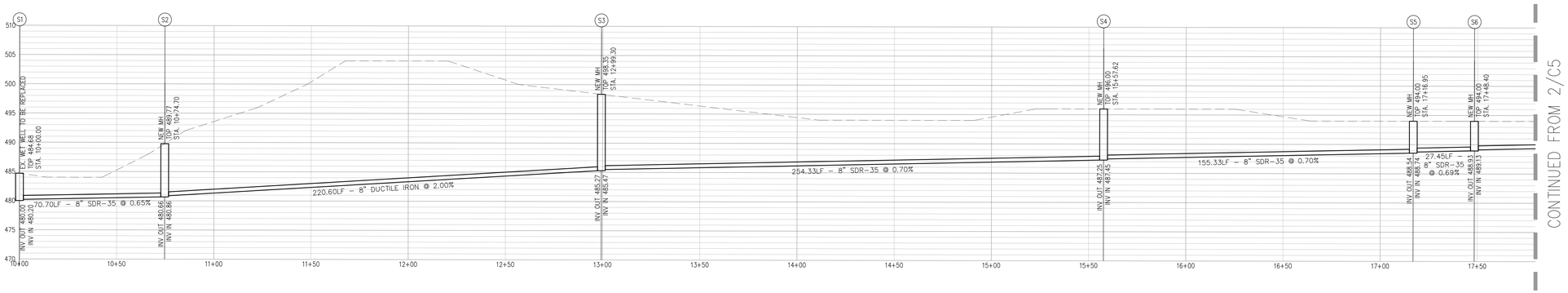
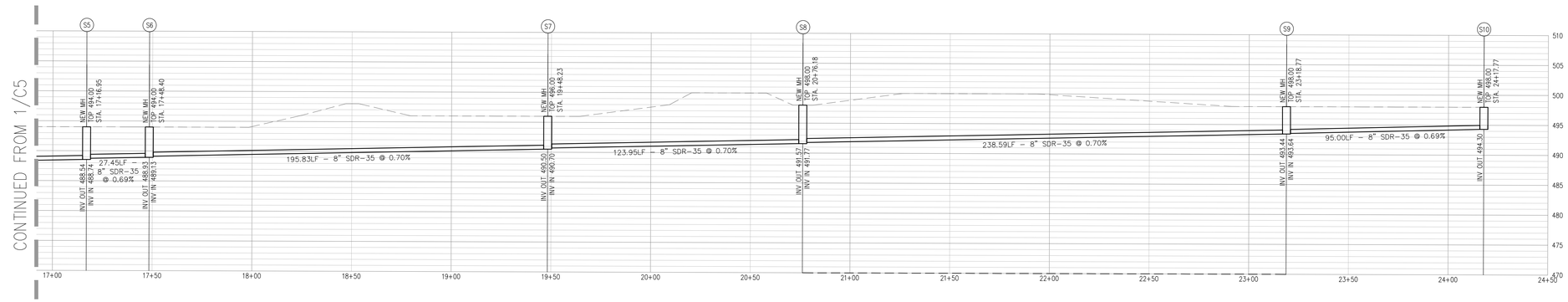
SANITARY SEWER FORCE MAIN PLAN

C4



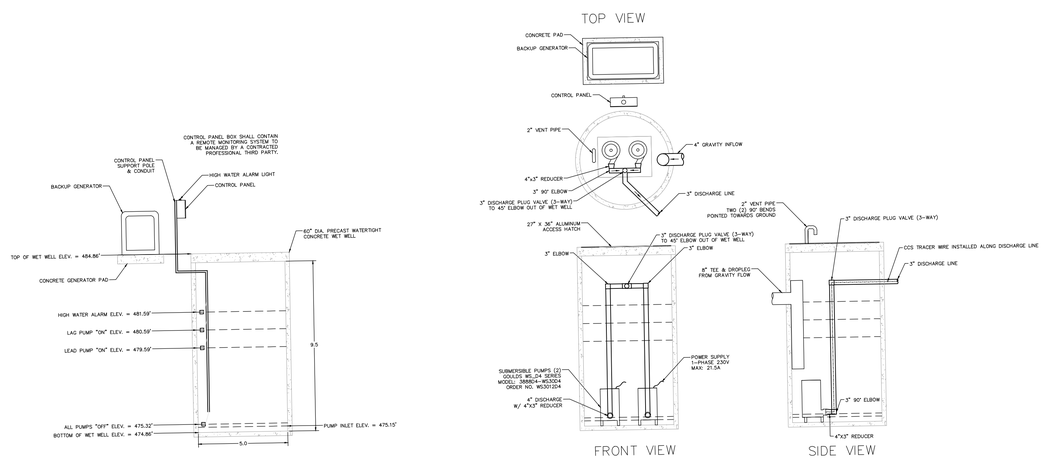
1 C5 SANITARY SEWER PROFILE (GRAVITY FLOW)

Scale: Horz: 1"=30', Vert: 1"=10'



2 C5 SANITARY SEWER PROFILE (GRAVITY FLOW)

Scale: Horz: 1"=30', Vert: 1"=10'



3 C5 SANITARY SEWER PUMP STATION DETAILS

Scale: 1"=5'

30 0 30 60 90

Graphic Scale: Horx: 1"=30' Vert: 1"=10

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SANITARY SEWER PROFILE & PUMP STATION DETAILS

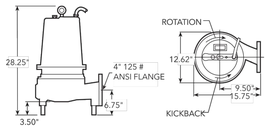
C5

APPLICATION DATA AND CONSTRUCTION DETAILS

Maximum Solid Size		3"
Minimum Casing Thickness		¼"
Casing Corrosion Allowance		⅛"
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 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 C87600
Motor Shaft		AISI 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	Carbon/Ceramic; Type 21
	Lower	Silicon Carbide/Silicon Carbide; Type 31
Mechanical Seals – Optional Lower		Silicon Carbide/Tungsten 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

Three Phase:

- 1.5 - 7.5 HP; 200, 230, 460 and 575 volts
- Class 10 overload protection must be provided in control panel

MOTORS

- Fully submerged in oil-filled chamber: High grade turbine oil surrounds motor for more efficient heat dissipation, permanent lubrication of bearings and mechanical seal for complete protection against outside environment.
- Class F insulation
- Designed for Continuous Operation: Pump ratings are within the motor manufacturer's recommended working limits and can be operated continuously without damage when fully submerged.
- Bearings: Upper and lower heavy duty ball bearing construction for precision positioning of parts and to carry thrust loads.
- Power Cable: Severe duty rated, oil and water resistant. Epoxy seal on motor end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking. 20 foot standard with optional lengths available.
- O-ring: Assures positive sealing against contaminants and oil leakage.

AGENCY LISTINGS

Tested to UL 778 and CSA 22.2 108 Standards
By Canadian Standards Association
File #LR38549

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	Resistance Line-Line	Wt. (lbs.)
WS1518D4M	1.5	1	208	1750	5.63	17.2	50.8	B	14/3	80	1.1	0.9	195
WS1512D4M			230			14.7	29.5	E		70	1.4	1.8	
WS1538D4M		3	200			11.5	40.9	H	14/4	81	NA	1.7	
WS1532D4M			230			10.0	40.0	F		83		2.3	
WS1534D4M			460			5.0	20.0	F		83		9.3	
WS1537D4M			575			4.0	14.4	H		74		14.8	
WS1518D4	1.5	1	208	1750	6.25	17.2	50.8	B	14/3	80	1.1	0.9	195
WS1512D4			230			14.7	29.5	E		70	1.4	1.8	
WS1538D4		3	200			11.5	40.9	H	14/4	81	NA	1.7	
WS1532D4			230			10.0	40.0	F		83		2.3	
WS1534D4			460			5.0	20.0	F		83		9.3	
WS1537D4			575			4.0	14.4	H		74		14.8	
WS2018D4	2	1	208	1750	6.63	20.3	50.8	B	14/3	80	1.1	0.9	200
WS2012D4			230			17.3	36.9	D		75	1.4	1.5	
WS2038D4		3	200			13.3	40.9	H	14/4	81	NA	1.7	
WS2032D4			230			11.6	40.0	F		83		2.3	
WS2034D4			460			5.8	20.0	F		83		9.3	
WS2037D4			575			4.6	14.4	H		74		14.8	
WS3018D4	3	1	208	1750	7.00	25.5	50.8	B	10/3	80	1.1	0.9	208
WS3012D4			230			21.5	46.4	C		79	1.0	1.0	
WS3038D4		3	200			16.6	53.8	G	10/4	85	NA	1.3	205
WS3032D4			230			14.4	49.5	H	14/4	83		1.9	
WS3034D4			460			7.2	24.8	H		83		7.5	
WS3037D4			575			5.8	17.3	G		78		11.4	
WS5012D4	5	1	230	1750	7.25	26.5	57.7	A	10/3	80	1.0	0.8	213
WS5038D4		3	200			19.1	73.9	F	10/4	84	NA	0.9	210
WS5032D4			230			16.6	63.6	E		85		1.2	
WS5034D4			460			8.3	31.8	E	14/4	85		4.8	
WS5037D4			575			6.6	22.8	E		80		7.4	
WS7532D4	7.5	3	230	1750	7.69	23.0	105.0	G	10/4	83	NA	0.7	225
WS7534D4			460			11.5	52.5	G		83		2.8	
WS7537D4			575			9.2	42.0	E		84		4.4	

2 C6 PUMP SPECIFICATIONS
Scale: N/A

Discharge Pipe Information		
Pipe 1	3" force main	
	Pipe 1	
Pipe length (feet)	450	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)	474.34	feet
Suction water surface elevation (B)	475.34	feet
Discharge water surface elevation	500.00	feet
Static head (A)	25.7	feet
Static head (B)	24.7	feet

Daily Average Flowrates

Type:	Unit:	Number of Units:	gpd/unit	Total (gpd)
Grade School w/ Showers	Each	468	16	7,488
*Church w/ Daycare	Each	50.68	25	1,267
			Total	8,755

*estimate based on water bill data average.

Daily Peak Flowrates

Type:	Unit:	Number of Units:
Daily Average Flow	gpd	8,755
Daily Average Flow	gpm	6.08
Peaking factor	n/a	2.5
Peak Daily Flow	gpm	15.20

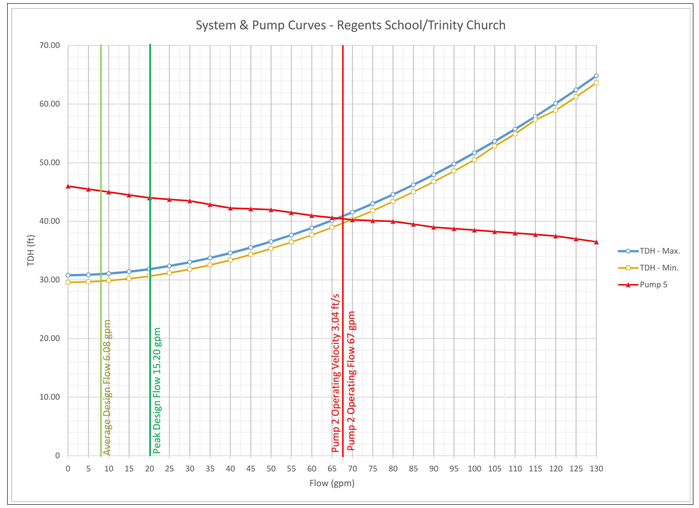
Wet Well Sizing

Type:	Unit:	Number of Units:
Diameter	ft	5
Volume per foot	gallons	100
Wet Working Depth	ft	4.73
Total Storage	gallons	1,422
Pumping Rate	gpm	67
Time to Empy	minutes	21

Design Pump Flow:		Ave. (gpm) 15
Duplex Pump (2 Pumps)	Parameter	Pressure
	Pipe Length, (ft)	450
	Pipe Dia., (in)	3
	Hazen-Williams Coeff. C	120

*Piping from pump basin to discharge point

Minor Losses		
Type	K-values	# Fittings
Gate Valve	0.19	0
Plug Valve (99% open)	0.86	1
Butterfly Valve	0.4	0
Swing Check Valve	2.5	1
90° Bend	0.25	0
45° Bend	0.2	0
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/Increaser	0.1	0
Discharge to air	1	1



1 C6 SYSTEM & PUMP CURVES
Scale: N/A

System Curve - Head Loss Calculations

Flowrate gpm	Flowrate cfs	Water Velocity In: Velocity ft/s	Dynamic Losses, ft: Minor Losses	Dynamic Losses, ft: Pipe Friction	Total Dynamic Head: Max. Lift (ft)	Total Dynamic Head: Min. Lift (ft)	Total Dynamic Head (+20%): Max. Lift (ft)	Total Dynamic Head (+20%): Min. Lift (ft)
0	0	0	0	0	25.66	24.66	30.79	29.59
5	0.01	0.23	0.00	0.06	25.73	24.73	30.87	29.67
10	0.02	0.45	0.01	0.23	25.90	24.90	31.08	29.88
15	0.03	0.68	0.03	0.48	26.17	25.17	31.40	30.20
20	0.04	0.91	0.06	0.82	26.53	25.53	31.84	30.64
25	0.06	1.13	0.09	1.23	26.98	25.98	32.37	31.17
30	0.07	1.36	0.13	1.73	27.51	26.51	33.01	31.81
35	0.08	1.59	0.17	2.30	28.13	27.13	33.75	32.55
40	0.09	1.82	0.22	2.94	28.82	27.82	34.59	33.39
45	0.10	2.04	0.28	3.65	29.60	28.60	35.52	34.32
50	0.11	2.27	0.35	4.44	30.45	29.45	36.54	35.34
55	0.12	2.50	0.42	5.30	31.38	30.38	37.65	36.45
60	0.13	2.72	0.50	6.22	32.38	31.38	38.86	37.66
65	0.14	2.95	0.59	7.21	33.46	32.46	40.16	38.96
70	0.16	3.18	0.68	8.27	34.62	33.62	41.54	40.34
75	0.17	3.40	0.78	9.40	35.85	34.85	43.02	41.82
80	0.18	3.63	0.89	10.59	37.15	36.15	44.58	43.38
85	0.19	3.86	1.01	11.85	38.52	37.52	46.22	45.02
90	0.20	4.08	1.13	13.17	39.96	38.96	47.96	46.76
95	0.21	4.31	1.26	14.56	41.48	40.48	49.77	48.57
100	0.22	4.54	1.39	16.01	43.06	42.06	51.68	50.48

Wet Well Calculations

Wet Well Diameter 5 ft
Wet Well Height 10 ft

Pump Rate 67 gpm
*Pump rate is where system curve and pump curve cross

Min active wet well volume :

1) Min of 1minute pump rate time — 67 gallons
2) 10 minutes pump cycle time (3 cycles/hr/pump) — 167.5 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 :

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

Wet Well

Inflow rate into Wet Well	Qin=	15.20 gpm	0.034 cfs
Discharge Flow Out of Wet Well	Qout=	67.00 gpm	0.149 cfs
	Tmin=	5 min	
Min Storage Volume of Well	Vmin=	83.75 gal	

Minimum Submergence Hx

Fd= 0.012
Hx= 0.172 ft
Hmin= 4.265 ft

Pump settings :

1) Bottom of wet well	474.86 ft	
2) Pump Inlet	475.15 ft	
3) All pumps off	475.32 ft	
3) Lead pump on	479.59 ft	(Condition A)
4) Lag pump on	480.59 ft	(Condition B)
5) High Water Alarm	481.59 ft	
6) Top of wet well	484.86 ft	

3 C6 PUMP STATION CALCULATIONS
Scale: N/A

Pump Selection

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

Flow (gpm)	Pump 5 TDH 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