verdantas

211 N. 13th Street, Suite 503
Philadelphia, PA 19107
215-545-7295

Attachment A

Pump Station Calculations and System Curve

SYSTEM HEAD CALCULATIONS

FOR PUMPING STATION DESIGN

1380 and 1390 RIVER ROAD, NEW CASTLE, DE 19720
BLUE DIAMOND PARK LOT 2 - PROPOSED PUMP STATION
PROJECT NO. 25449
BY: RKM, 05/06/2025

Design Flow			
Proposed Guard Shack Sewer Flow (SS-L-2)	=	350	GPD
Proposed Warehouse Sewer Flow (SS-L-1)	=	1050	GPD
Total Pump Station Proposed Sewer Flow	=	1,400	GPD
Peaking Factor	=	4.0	
Average Daily Flow	=	1,400	GPD
Peak Daily Flow	=	5,600	GPD
Average Hourly Flow	=	1	GPM
Peak Hourly Flow	=	3.9	GPM
Pump StationDesign Flow Rate			
Flow	=	27.5	GPM
Static Head	=	6.3	ft
Friction Head	=	14.6	ft
Total Dynamic Head	=	20.9	ft
Hydrualic HP	=	0.1	HP
hp= (Q*TDH)/3960			
Brake HP efficiency 50%	=	0.3	HP
Wet Well			
Diameter	=	3	FT
Capacity per Verfical foot	=	52.87	Gal/ft
Fill Time at Average Flow	=	54.38	Min/ft
Influent	=	1	GPM
Pump Design Flow	=	27.5	GPM
Pump Down Rate	=	26.5	GPM
Pump Operating Rage	=	0.5	ft
Pump Run Time	=	1.00	Min
Fill Time	=	27.19	Min
Starts per Hour	=	2.13	#
Force Main			
Nominal Pipe Size	=	2	in
Actual Pipe Size	=	1.92	in
Velocity	=	3.05	ft/s

SYSTEM HEAD CALCULATIONS

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PIPE DATA		**2-INCH PVC SCH80**	**2-INCH HDPE DR11**	**6-INCH PVC SDR 26**	
PIPE ID (IN)		1.91	1.92	6.12	
PIPE LENGTH (FT)		6.3	629.09	5	
HAZEN & WILLIAMS "C"		140	140	140	
FLOW MULTIPLIER		1.00	1.00	1.00	
VELOCITY (FT/S)		3.07	3.05	0.30	
VALVES/FITTINGS DATA	**Equiv Len**	**QUAN.**	**QUAN.**	**QUAN.**	**QUAN.**
90 DEGREE BENDS	30	1			
45 DEGREE BENDS	16				
TEES THROUGH RUN	20		2		
TEES THROUGH BRANCH	60	1			
GATE VALVES	8				
SWING CHECK VALVES	135	1			
PLUG VALVES	3				
REDUCER	33		1		
BALL VALVE	3	1			
VALVE/FITTING EQ. LNTH.		36	12	0	0
RUN EQUIVALENT LENGTH		43	641	5	0

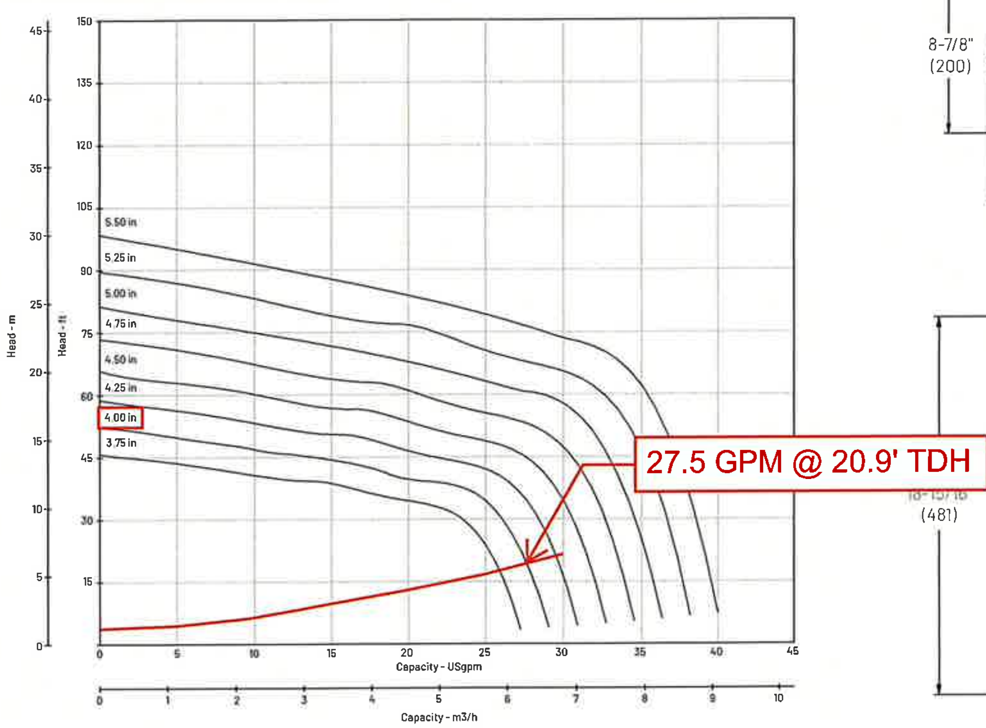
SYSTEM CURVE DATA H=(4.73L*Q^1.852)/(C^1.852*D^4.87)

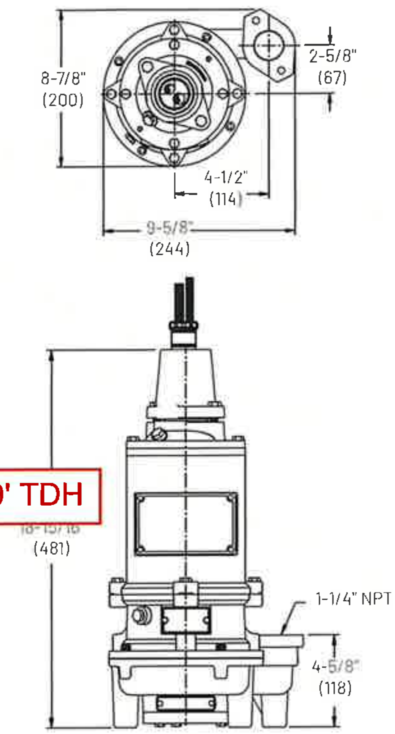
STATIC HEAD (FEET)	6.3
STARTING FLOW (GPM)	0
FLOW INTERVAL (GPM)	5

FLOW (GPM)	**2-INCH PVC SCH80**	**2-INCH HDPE DR 11**	**6-INCH PVC SDR 26**	**TOTAL DYNAMIC HEAD (FT)**
0	0.0	0.0	0.0	6.3
5	0.0	0.6	0.0	6.9
10	0.1	2.1	0.0	8.5
15	0.3	4.5	0.0	11.1
20	0.5	7.6	0.0	14.4
25	0.8	11.5	0.0	18.6
30	1.1	16.1	0.0	23.5
35	1.5	21.4	0.0	29.2
40	1.9	27.4	0.0	35.6
45	2.3	34.1	0.0	42.7
50	2.8	41.5	0.0	50.6
55	3.4	49.5	0.0	59.1
60	3.9	58.1	0.0	68.4

PERFORMANCE DATA AND DIMENSIONS

RPM: 3500 DISCHARGE: 1-1/4"





AVAILABLE MODELS		MOTOR ELECTRICAL DATA										
Standard	Hazardous Location	HP	Voltage	Phase	Hertz	RPM	Start Amps	FLA	Full Load KW	Start KVA	NEC Code Letter	Service Factor
WG20-01	WGX20-01	2	208	1	60	3500	52.9	15	2.6	11.0	F	1.25
WG20-03	WGX20-03	2	208	3	60	3500	34.7	9.5	2.5	12.5	F	1.25
WG20-21	WGX20-21	2	230	1	60	3500	61.5	13.5	3.0	14.1	F	1.25*
WG20-23	WGX20-23	2	230	3	60	3500	35	8.4	2.9	13.9	F	1.25
WG20-43	WGX20-43	2	460	3	60	3500	17.7	4.2	2.9	14.1	F	1.25
WG20-53	WGX20-53	2	575	3	60	3500	13.4	3.4	2.6	13.4	F	1.25

* 1.15 SF on WGX20-21 only

PENTAIR

1101 Myers Parkway | Ashland, OH 44805 | PH: 855.274.8948 | pentair.com/myers

FM APPROVED (WG(X)20 ONLY)

BOUYANCY CALCULATION
FOR PUMPING STATION DESIGN

BLUE DIAMOND PARK LOT 2
LOT 2 WAREHOUSE

PROJECT NO. 25449 BY: RKM, 05-06-2025

Inside Diameter	3.00	feet
Wall Thickness	0.38	inches
Outside Diameter	3.06	feet
Top of Barrel Elevation	31.00	feet
Bottom of Barrel Elevation	19.00	feet
Barrel Height	12.00	feet
Ground Elevation	30.50	feet
Fiberglass Weight	162	lbs/cu ft
Concrete Weight	150	lbs/cu ft
Barrel Weight	579	lbs
Base Slab Weight	15,000	lbs
Total Weight	15,579	lbs
Water table elevation [1]	30.50	feet
Water displaced by barrel	5,286	lbs
Water displaced by base	6,240	lbs
Total Bouyanacy	11,526	lbs
Safety factor	1.35	

Field investigations in 2024 and 2021 revealed an approximate groundwater elevation of 12.5'. For our analysis, a groundwater elevation of 30.5' was assumed.