Engineering Report

WATER AND SANITARY SEWER UTILITIES
THE RETREAT AT BUNN HILL
BUNN HILL ROAD

TOWN OF VESTAL
COUNTY OF BROOME
STATE OF NEW YORK

PREPARED FOR:
The Retreat At Bunn Hill
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315 Oconee Street
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Project No. 2983.08319

November 1, 2022

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1 Introduction

This report is prepared to address the basis of design for the water distribution system and the sanitary sewage collection system for the Retreat at Bunn Hill located on Bunn Hill Road, Vestal, New York. Refer to Figure No. 1, USGS Vicinity Map. The project is a student housing development and includes 64 cottage style buildings consisting of 161 units totaling 700 bedrooms, a clubhouse with outdoor amenities, maintenance building, booster pump station and sanitary pump. The total project is on approximately 42.37 acres with two access points from Bunn Hill Road and will also include asphalt drives and parking. Refer to Drawings on Sheet C100 – Layout Master Plan.

2 Water Distribution System

2.1 Water District

The Retreat at Bunn Hill project is outside the water district for the Town of Vestal; therefore a district extension will be required. A petition for establishment of consolidated Water District No. 1 Extension No. 204 Town of Vestal, New York has been submitted to the Town of Vestal Town Board, County of Broome, New York (Refer to Appendix A.1 – Extension No. 204). A public hearing is scheduled for November 9, 2022. The development will be a single user and The Retreat at Bunn Hill, LLC will bear all cost for the water extension.

2.2 Water Supply

Water supply for the project will be provided by the Town of Vestal from their Jensen Road tank. The tank was constructed in 1988 of prestressed concrete, 39 feet high and a diameter of 76.67 feet with a 1,000,000 gallon capacity. The water from the tank is currently underutilized and would benefit from the project flows. The floor elevation of the tank is 1,409 with the lowest operating level of approximately 1,423. The water pressure delivered to the project site is not satisfactory. Therefore, a water booster pump station will be required to produce the pressures and flows needed. A 10 inch DIP connection will be made at the tank by Town of Vestal workforces. The developer will continue the installation of the 10 inch DIP pipe supply line 1,400 linear feet along Jensen Road within the R.O.W. The line will be capped for future Town of Vestal use. The water line will turn and enter a water meter pit and the Town of Vestal will adopt this portion of the waterline. After the meter pit the line will transition to C900 PVC and continue approximately 700 feet through a 20 foot permanent easement on property Tax Map No. 174.11-1-3 to the west end of The Retreat at Bunn Hill property line. The 10 inch C900 PVC travels through the property to the Booster Pump Station totaling approximately 3,680 linear feet from the tank. Refer to Drawing Sheets C150-C152, Off-Site Utilities – Water.

2.3 Water Demands

The Retreat at Bunn Hill Development consists of 161 units with 700 bedrooms. The anticipated water demand is 77,000 gallons per day (gpd) (700 bedrooms x 110 gpd/bedroom). Average Daily Demand (ADD) = 77,000 gpd ÷ 24 hours/day ÷ 60 minutes/hour = 53.47 gallons per minute (gpm).

$$\text{Peaking Factor (PF)} = \frac{18 + \sqrt{\text{Population (Thousands)}}}{4 + \sqrt{\text{Population (Thousands)}}}$$

$$\text{Peaking Factor (PF)} = \frac{18 + \sqrt{0.7}}{4 + \sqrt{0.7}} = \frac{18.84}{4.84} = 3.89$$

Peak Hour Demand = 53.47 gpd x 3.89 = 208 gpm. The increased water demands from the development will easily be met by the Jensen Road water tank.

2.4 Water Distribution

The water distribution system within the development consists of approximately 3,700 linear feet of 8 inch C900 PVC with associated valves, 7 hydrants, service and sprinkler connections ranging from 1 inch to 2 inch pipe. Refer to Drawing Sheets C120-C125, Utility Plan and Profile. As mentioned above a water booster pump station is required to provide the flows and pressures for domestic use, building sprinkler systems and fire flows. There are four (4) pumps designed, a 100 gpm low flow (Jockey) pump, 400 gpm domestic pump plus one for backup and 1,000 gpm high service pump for fire flow. Refer to Drawing 94783-B-001.1 – Booster Pump Station and Appendix A.7 – Pump Performance Data Sheets. The fire hydrant at the highest point of the development is at elevation 1406.37 which is 56.37 feet higher than the finished floor elevation of the booster pump station. An analysis of the water system was performed utilizing WaterCAD software. The water mains were analyzed based on the required domestic flows and to determine the available fire flows. Calculations were performed to determine the pressure and head loss at many junctions. These pipes and junctions are identified on layout diagrams in Appendix A.2 – Master Water Supply System, Appendix A.3 – Master Distribution System and Appendix A.4 – Pump Station Layout. The calculation output is provided in Appendix A.5 – Domestic Water Model Information Pipe Report and A.6 – Domestic and Fire Water Model Information Pipe Report. Due to the pressure boost needed for the fire flow and sprinkler systems at the higher elevations the pressure well exceeds the NYS Code minimum. Units with pressures exceeding 80 psi will require pressure reducing valves on their service lines. With the booster pump station the system is capable of providing the required fire flow of 1,000 gpm plus daily consumption demand to meet the requirements of the insurance service office of New York (ISO). The minimum storage of 1,000 gpm for a duration of two hours is suggested for the water tank. Accordingly 1,000 gpm x 2 hours x 60 minutes/hour = 12,000 gallons, which represents approximately 12 percent of the volume of the Jensen Road tank.

3 Sanitary Sewer Collection System

3.1 Sanitary District

The Retreat at Bunn Hill project area is outside the sewer district for the Town of Vestal therefore a district extension is required. The nearest Town of Vestal sanitary sewer is located on Winding Lane. A petition for establishment of consolidated Sewer District No. 1 Extension No. 163 Town of Vestal, New York has been submitted to the Town of Vestal, Town Board, County of Broome, New York. Refer to Appendix B.1 – Extension No. 163. An application for new or modified sewer connection permit, accompanied by this report, will be submitted to accept flows greater than 2,500 gpd. A public hearing will be scheduled for November 9, 2022 for the extension. The Retreat at Bunn Hill LLC will bear all cost for the sanitary extension.

3.2 On-Site Sanitary Collection

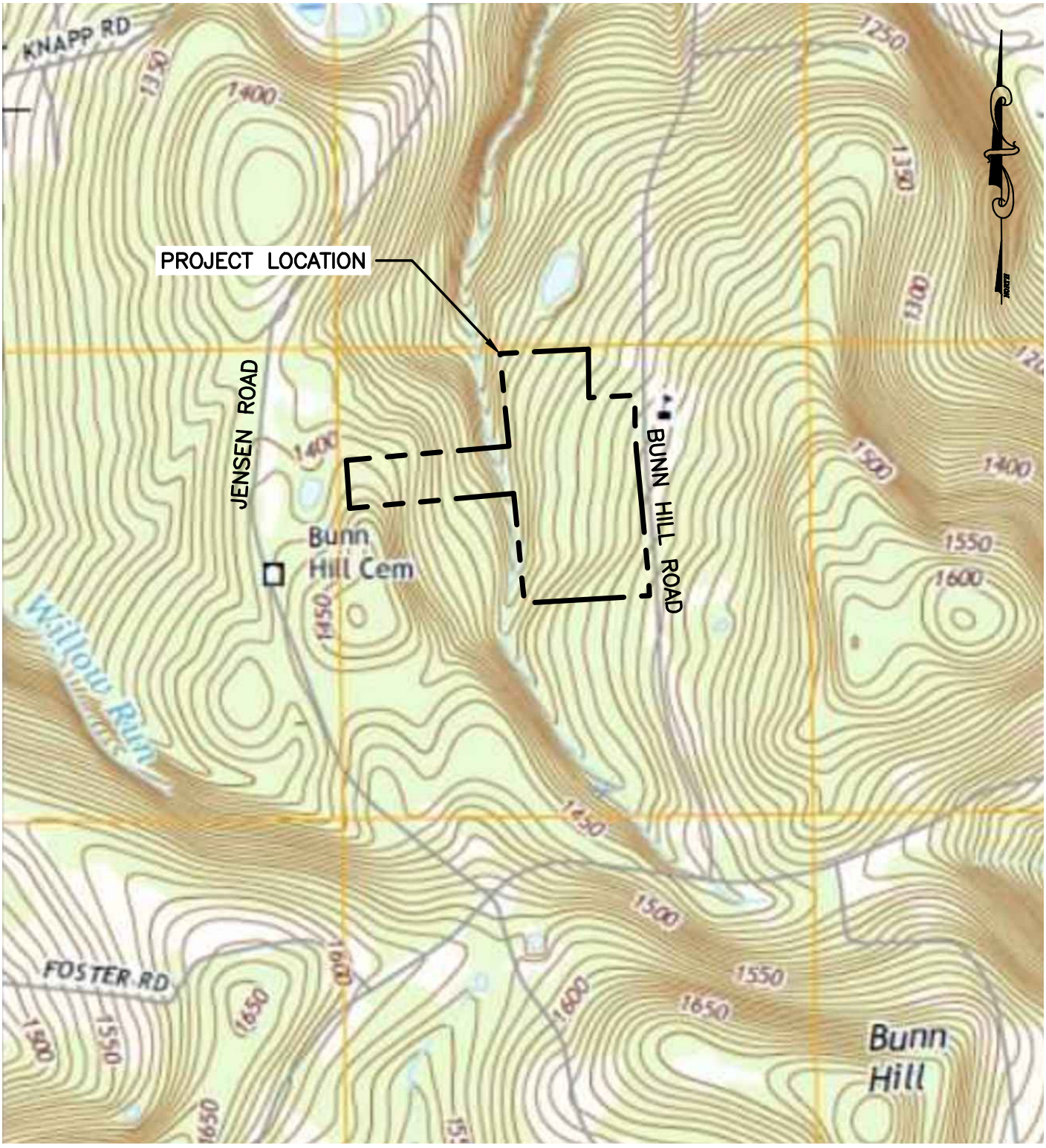
A sanitary sewer collection system is designed throughout the development to collect and convey the sewage by gravity from the housing units to a pump station. The pump station will pump the effluent to a gravity manhole on Bunn Hill Road. The anticipated average daily wastewater flow from the development is 77,000 gpd (700 bedrooms x 110 gpd/bedroom) or 53.47 gpm. Using a peaking factor, based on the 700 bed population of 3.89 the pump station will be designed for peak flow of 208 gpm. Refer to Appendix B.2 – Sanitary Pump Station and Force Main Design and Drawings Detail 3/C203. The collection system within the development will consist of approximately 3,400 linear feet of 8 inch SDR-35 PVC pipe, 3,200 linear feet of 4 inch SDR-35 PVC laterals, 14 precast concrete manholes, pump station and 930 linear feet of 6 inch SDR-21 PVC Force Main. Refer to Drawings C120-C125, Utility Plan and Profile.

3.3 Offsite Sanitary Conveyance

The effluent will continue by gravity down Bunn Hill Road to the tie in point to the Town of Vestal system on Winding Lane. Offsite sanitary will consist of approximately 5,700 linear feet of 8 inch SDR-35 pipe, and 26 precast concrete manholes. Sewer wye's will be installed and capped at property line to allow for future tie in. Refer to Drawing Sheet No.'s C153-C156, Offsite Utilities - Sanitary.

FIGURES

FIGURE NO. 1: USGS Vicinity Map



SCALE: 1" = 1,000'

QUAD NAME:
BINGHAMTON WEST, NY
2016

KEYSTONE ASSOCIATES
ARCHITECTS, ENGINEERS AND SURVEYORS, LLC

WATER AND SANITARY SEWER UTILITIES
THE RETREAT AT BUNN HILL
BUNN HILL ROAD

TOWN OF VESTAL
BROOME COUNTY NEW YORK STATE
KEYSTONE PROJECT #2983.08319

FIGURE NO. 1

USGS VICINITY MAP

APPENDICES

APPENDIX A – Water Distribution System

APPENDIX A.1 – Extension No. 204

PETITION FOR ESTABLISHMENT OF CONSOLIDATED WATER DISTRICT NO. 1 EXTENSION NO. 204 TOWN OF VESTAL, NEW YORK

TO THE TOWN BOARD OF THE TOWN OF VESTAL, COUNTY OF BROOME, NEW YORK:

WE the undersigned being the owners of taxable real property situate in the proposed Extension hereinafter described, and owning in the aggregate more than one-half of the assessed valuation of all taxable real property of the said proposed Extension, as shown upon the latest completed assessment roll of said Town, and owning in the aggregate more than one-half of the assessed valuation of all taxable real property owned by resident owners within the said proposed Extension as shown upon the latest completed assessment roll of the Town, DO HEREBY PETITION your Honorable Board to establish an Extension of Consolidated Water District to be hereinafter known as Consolidated Water District No. 1, EXTENSION NO .204 , Town of Vestal, in the territory hereinafter described, which is located entirely within your Town of Vestal, County of Broome and State of New York, and outside of any incorporated village, which proposed Extension is described as follows:

PETITIONER: ~~Retreat at Bunn Hill~~ BHL Ventures, LLC
B.C.T.M.P.: 174.12-1-4,5,6,7,8
ADDRESS: 813 Bunn Hill Rd.

That attached hereto is a map showing the boundaries of the proposed extension.

That no expenses occasioned by the creation of said Extension herein petitioned for and for the erection, construction and installation of facilities, if any, to serve the aforesaid Extension shall be levied and collected from the several lots and parcels of land within the said Extension by assessment or otherwise.

The aforesaid map set forth the manner in which said Extension will be served in and as a part of Consolidated Water District No. 1.

It is understood and agreed that the owner or owners of the land within the proposed Extension will be subject to annual assessments for maintenance of the improvements and facilities of Consolidated Water District No. 1 and for bond payments for district wide assessments and improvements to be paid by Consolidated Water District No. 1 and all extensions thereof in accordance with the applicable statutes made and provided thereof.

WHEREFORE your petitioners herein respectfully request that the Town Board of Vestal call the necessary public hearing in connection with this petition and take all other, further and necessary action as may be necessary so as to permit the progress of the construction of the Improvements as herein recited and set forth.

DATED: 8/22/2022

Diran Kradjian

STATE OF NEW YORK
COUNTY OF BROOME
TOWN OF VESTAL

On this 22nd day of 2022, before me, the subscriber personally appeared

Diran Kradjian

to me known and known to be the same person described in and who executed the within instrument, and they severally acknowledged to me they are executed the same.

SHAWN PETER BRENNAN
Notary Public, State of New York
NO. 01BR6398845
Qualified in Broome County
Commission Expires 10/07/2023

NOTARY PUBLIC

Retreat @ Bunn H.ll

813 Bunn H.ll Rd.

B.C.T.M.P. 174.12-1-4
-5
-6
-7
-8

42.373 Acres

Water Dist Ext 204

42.373 Acres x $315/Acres

= $13,347.45

APPENDIX A.2 – Master Water Supply System

NOT FOR CONSTRUCTION

WATER AND SNITARY SEWER UTILITIES
THE RETREAT AT BUNN HILL
BUNN HILL ROAD
TOWN OF VESTAL **BROOME COUNTY, NY**

MASTER WATER SUPPLY SYSTEM

SHEET NO. A.2
PROJECT NO. 2983.08319
DATE 11/01/2022
DRAWING NO. 2983SSSYS WATER REPORT FIGURES

NO.	REVISIONS AND DESCRIPTIONS	DATE

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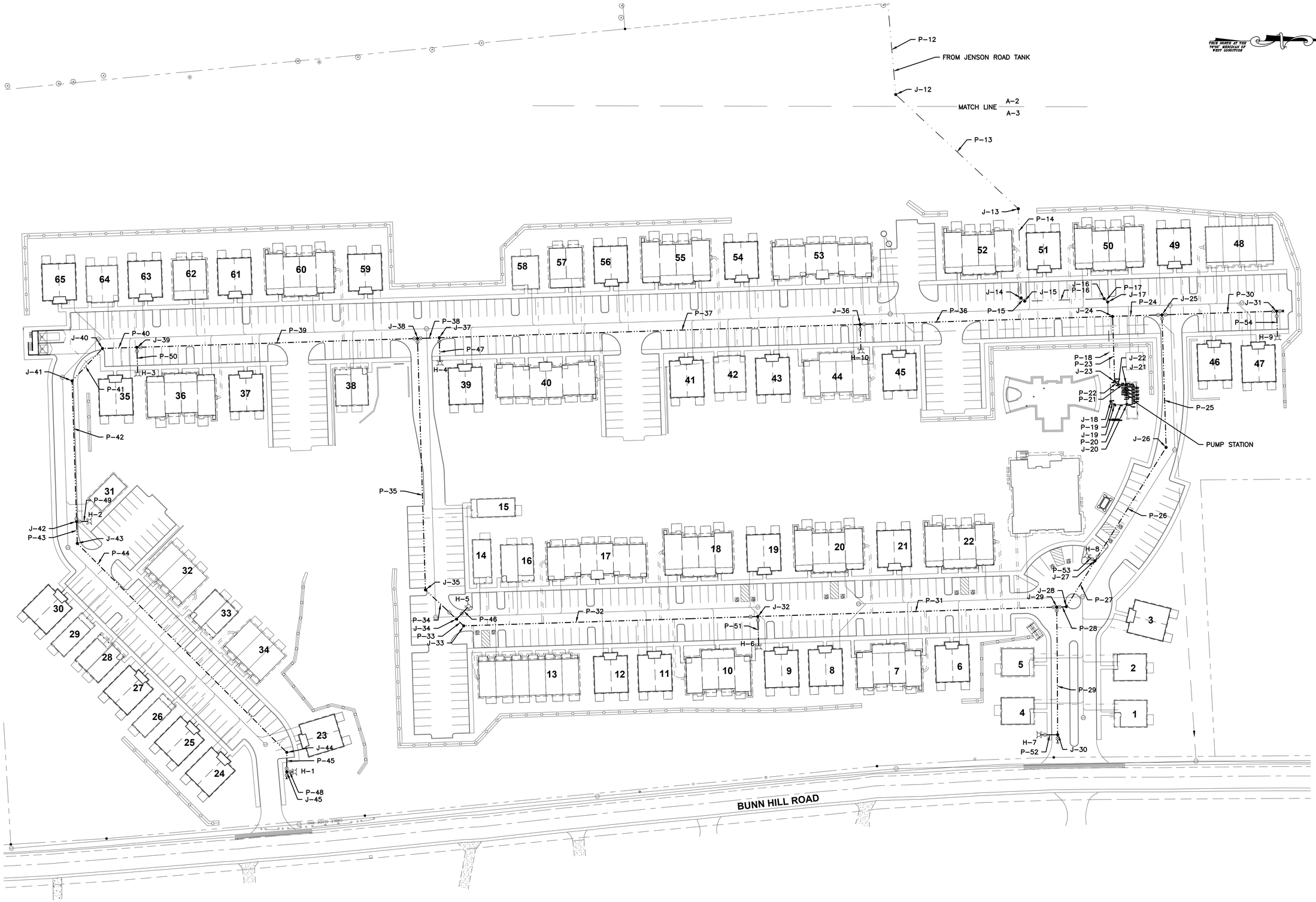
APPENDIX A.3 – Master Distribution System



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)

1 inch = 50 ft.

NOT FOR CONSTRUCTION

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KEYSTONE ASSOCIATES
ARCHITECTS, ENGINEERS AND SURVEYORS, LLC

NO.	REVISIONS AND DESCRIPTIONS	DATE

WATER AND SNITARY SEWER UTILITIES
THE RETREAT AT BUNN HILL
BUNN HILL ROAD
TOWN OF VESTAL
BROOME COUNTY, NY

MASTER WATER DISTRIBUTION SYSTEM

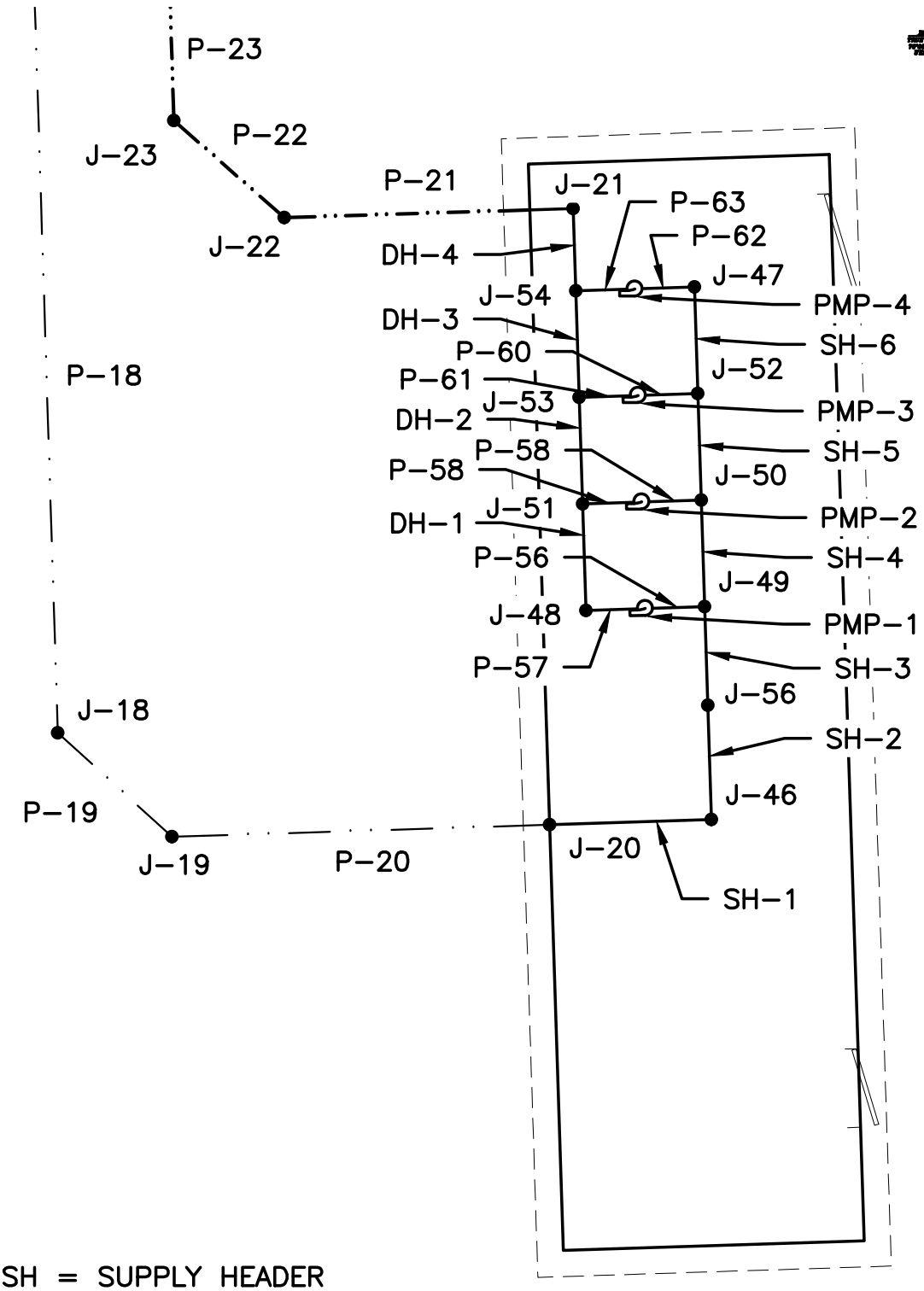
SHEET NO.
A.3

PROJECT NO.
2983.08319

DATE
11/01/2022

CAD FILE NO.
2983083I9-WATER REPORT FIGURES

APPENDIX A.4 – Pump Station Layout



SH = SUPPLY HEADER
DH = DISTRIBUTION HEADER

PUMP STATION LAYOUT

KEYSTONE ASSOCIATES
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WATER AND SANITARY SEWER UTILITIES
THE RETREAT AT BUNN HILL
BUNN HILL ROAD

TOWN OF VESTAL
BROOME COUNTY NEW YORK STATE
KEYSTONE PROJECT #2983.08319

A.4

APPENDIX A.5 – Domestic Water Model Information Pipe Report

Appendix A.5

The Retreat at Bunn Hill Domestic Water Model Information
Pipe Report

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
276	DH 1	3	J 48	J-51	10.0	Ductile Iron	130.0	0.000	0	0.00	0.000
284	DH 2	4	J-51	J-53	10.0	Ductile Iron	130.0	0.000	208	0.85	0.000
289	DH 3	3	J-53	J-54	10.0	Ductile Iron	130.0	0.000	208	0.85	0.000
288	DH 4	4	J-54	J-21	10.0	Ductile Iron	130.0	0.000	207	0.85	0.000
32	P-1	123	EX T-1	J-1	10.0	PVC	150.0	0.000	207	0.85	0.000
34	P-2	86	J-1	J-2	10.0	PVC	150.0	0.590	207	0.85	0.000
36	P-3	152	J-2	J-3	10.0	PVC	150.0	1.670	207	0.85	0.000
38	P-4	79	J-3	J-4	10.0	PVC	150.0	0.050	207	0.85	0.000
40	P-5	966	J-4	J-5	10.0	PVC	150.0	0.050	207	0.85	0.000
42	P-6	17	J-5	J-6	10.0	PVC	150.0	1.670	207	0.85	0.001
44	P-7	367	J-6	J-7	10.0	PVC	150.0	9.050	207	0.85	0.001
46	P-8	266	J-7	J-8	10.0	PVC	150.0	0.000	207	0.85	0.000
48	P-9	249	J-8	J-9	10.0	PVC	150.0	0.390	207	0.85	0.000
50	P-10	688	J-9	J-10	10.0	PVC	150.0	0.390	207	0.85	0.000
52	P-11	124	J-10	J-11	10.0	PVC	150.0	0.000	207	0.85	0.000
54	P-12	175	J-11	J-12	10.0	PVC	150.0	0.390	207	0.85	0.000
56	P-13	195	J-12	J-13	10.0	PVC	150.0	0.200	207	0.85	0.000
58	P-14	104	J-13	J-14	10.0	PVC	150.0	0.200	207	0.85	0.000
60	P-15	6	J-14	J-15	10.0	PVC	150.0	0.200	207	0.85	0.001
62	P-16	93	J-15	J-16	10.0	PVC	150.0	0.200	207	0.85	0.000
64	P-17	6	J-16	J-17	10.0	PVC	150.0	0.200	207	0.85	0.001
66	P-18	116	J-17	J-18	10.0	PVC	150.0	0.200	207	0.85	0.000
68	P-19	6	J-18	J-19	10.0	PVC	150.0	0.200	207	0.85	0.001
71	P-20	14	J-19	J-20	10.0	PVC	150.0	0.200	207	0.85	0.000
77	P-21	10	J-21	J-22	8.0	PVC	150.0	0.800	207	1.32	0.003
79	P-22	6	J-22	J-23	8.0	PVC	150.0	0.200	207	1.32	0.002
81	P-23	79	J-23	J-24	8.0	PVC	150.0	0.200	207	1.32	0.001
83	P-24	58	J-24	J-25	8.0	PVC	150.0	1.670	93	0.60	0.000
85	P-25	155	J-25	J-26	8.0	PVC	150.0	1.670	81	0.52	0.000
87	P-26	157	J-26	J-27	8.0	PVC	150.0	0.590	81	0.52	0.000
89	P-27	63	J-27	J-28	8.0	PVC	150.0	0.350	81	0.52	0.000
91	P-28	11	J-28	J-29	8.0	PVC	150.0	0.590	78	0.50	0.000
93	P-29	149	J-29	J-30	8.0	PVC	150.0	1.670	3	0.02	0.000
95	P-30	134	J-25	J-31	8.0	PVC	150.0	1.130	3	0.02	0.000
97	P-31	349	J-29	J-32	8.0	PVC	150.0	0.740	56	0.36	0.000
99	P-32	343	J-32	J-33	8.0	PVC	150.0	0.740	28	0.18	0.000
101	P-33	11	J-33	J-34	8.0	PVC	150.0	0.200	10	0.07	0.000
103	P-34	50	J-34	J-35	8.0	PVC	150.0	0.740	10	0.06	0.000
110	P-35	294	J-38	J-35	8.0	PVC	150.0	0.590	-8	0.05	0.000
105	P-36	295	J-24	J-36	8.0	PVC	150.0	0.740	100	0.64	0.000
107	P-37	491	J-36	J-37	8.0	PVC	150.0	0.350	70	0.44	0.000
109	P-38	26	J-37	J-38	8.0	PVC	150.0	0.740	53	0.34	0.000
112	P-39	328	J-38	J-39	8.0	PVC	150.0	1.130	51	0.33	0.000
114	P-40	40	J-39	J-40	8.0	PVC	150.0	0.350	35	0.22	0.000
116	P-41	52	J-40	J-41	8.0	PVC	150.0	0.200	29	0.18	0.000
118	P-42	165	J-41	J-42	8.0	PVC	150.0	0.590	28	0.18	0.000
120	P-43	25	J-42	J-43	8.0	PVC	150.0	0.350	27	0.18	0.000
122	P-44	345	J-43	J-44	8.0	PVC	150.0	0.200	12	0.08	0.000
124	P-45	23	J-44	J-45	8.0	PVC	150.0	0.590	0	0.00	0.000
136	P-46	21	J-34	H-5	6.0	PVC	150.0	1.670	0	0.00	0.000
137	P-47	30	J-37	H-4	6.0	PVC	150.0	1.670	0	0.00	0.000
138	P-48	9	J-45	H-1	6.0	PVC	150.0	1.670	0	0.00	0.000
139	P-49	15	J-42	H-2	6.0	PVC	150.0	1.670	0	0.00	0.000
140	P-50	31	J-39	H-3	6.0	PVC	150.0	1.670	0	0.00	0.000
141	P-51	36	J-32	H-6	6.0	PVC	150.0	1.670	0	0.00	0.000
142	P-52	22	J-30	H-7	6.0	PVC	150.0	1.670	0	0.00	0.000
143	P-53	11	J-27	H-8	6.0	PVC	150.0	1.670	0	0.00	0.000
144	P-54	31	J-31	H-9	6.0	PVC	150.0	1.670	0	0.00	0.000
145	P-55	31	J-36	H-10	6.0	PVC	150.0	1.670	0	0.00	0.000
268	P-56	3	PMP-1	J-49	4.0	Ductile Iron	130.0	0.000	0	0.00	0.000
269	P-57	3	PMP-1	J 48	4.0	Ductile Iron	130.0	0.000	0	0.00	0.000
273	P-58	3	PMP-2	J-50	6.0	Ductile Iron	130.0	0.000	-207	2.35	0.004
277	P-59	3	PMP-2	J-51	6.0	Ductile Iron	130.0	0.000	207	2.35	0.004
281	P-60	3	J-52	PMP-3	6.0	Ductile Iron	130.0	0.000	0	0.00	0.000
285	P-61	3	PMP-3	J-53	6.0	Ductile Iron	130.0	0.000	0	0.00	0.000
286	P-62	3	J-47	PMP-4	10.0	Ductile Iron	130.0	0.000	0	0.00	0.000
290	P-63	3	PMP-4	J-54	10.0	Ductile Iron	130.0	0.000	0	0.00	0.000
255	SH 1	7	J-20	J-46	10.0	Ductile Iron	130.0	0.000	207	0.85	0.000
294	SH 2	4	J-46	J-56	8.0	Ductile Iron	130.0	0.000	207	1.32	0.001
295	SH 3	3	J-56	J-49	10.0	Ductile Iron	130.0	0.000	207	0.85	0.000
271	SH 4	3	J-49	J-50	10.0	Ductile Iron	130.0	0.000	207	0.85	0.000
279	SH 5	4	J-50	J-52	10.0	Ductile Iron	130.0	0.000	0	0.00	0.000
280	SH 6	3	J-52	J-47	10.0	Ductile Iron	130.0	0.000	0	0.00	0.000

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The Retreat at Bunn Hill Domestic Water Model Information
Junction Report

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
31	J-1	1,398.00	0	1,437.88	17
33	J-2	1,392.00	0	1,437.85	20
35	J-3	1,392.00	0	1,437.79	20
37	J-4	1,389.00	0	1,437.77	21
39	J-5	1,397.00	0	1,437.52	18
41	J-6	1,398.00	0	1,437.50	17
43	J-7	1,392.00	0	1,437.30	20
45	J-8	1,404.00	0	1,437.24	14
47	J-9	1,393.00	0	1,437.17	19
49	J-10	1,269.00	0	1,436.99	73
51	J-11	1,268.00	0	1,436.96	73
53	J-12	1,310.00	0	1,436.91	55
55	J-13	1,327.00	0	1,436.85	48
57	J-14	1,327.00	0	1,436.82	48
59	J-15	1,327.00	0	1,436.82	48
61	J-16	1,331.00	0	1,436.79	46
63	J-17	1,331.00	0	1,436.79	46
65	J-18	1,344.00	0	1,436.76	40
67	J-19	1,344.00	0	1,436.76	40
70	J-20	1,344.00	0	1,436.75	40
74	J-21	1,344.00	0	1,684.12	147
76	J-22	1,344.00	0	1,684.09	147
78	J-23	1,344.00	0	1,684.08	147
80	J-24	1,332.00	15	1,684.01	152
82	J-25	1,334.00	10	1,683.99	151
84	J-26	1,348.00	0	1,683.97	145
86	J-27	1,356.00	0	1,683.94	142
88	J-28	1,359.00	3	1,683.93	141
90	J-29	1,359.00	20	1,683.93	141
92	J-30	1,371.00	3	1,683.93	135
94	J-31	1,314.00	3	1,683.99	160
96	J-32	1,355.00	28	1,683.90	142
98	J-33	1,359.00	18	1,683.90	141
100	J-34	1,359.00	1	1,683.90	141
102	J-35	1,359.00	2	1,683.90	141
104	J-36	1,324.00	30	1,683.95	156
106	J-37	1,344.00	16	1,683.90	147
108	J-38	1,345.00	10	1,683.90	147
111	J-39	1,361.00	16	1,683.88	140
113	J-40	1,363.00	6	1,683.87	139
115	J-41	1,366.00	1	1,683.87	138
117	J-42	1,382.00	1	1,683.87	131
119	J-43	1,383.00	15	1,683.87	130
121	J-44	1,399.00	13	1,683.87	123
123	J-45	1,401.00	0	1,683.87	122
254	J-46	1,353.00	0	1,436.75	36
256	J-47	1,353.00	0	1,436.74	36
258	J-48	1,356.00	0	1,684.12	142
265	J-49	1,353.00	0	1,436.74	36
270	J-50	1,353.00	0	1,436.74	36
274	J-51	1,356.00	0	1,684.12	142
278	J-52	1,353.00	0	1,436.74	36
282	J-53	1,356.00	0	1,684.12	142
287	J-54	1,356.00	0	1,684.12	142
293	J-56	1,353.00	0	1,436.74	36

The Retreat at Bunn Hill Domestic Water Model Information
Hydrant Report

ID	Label	Hydrant Status	Length (Hydrant Lateral) (ft)	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
125	H-1	Closed	20	1,406.00	0	1,683.87	120
127	H-2	Closed	20	1,388.00	0	1,683.87	128
128	H-3	Closed	20	1,367.00	0	1,683.88	137
129	H-4	Closed	20	1,350.00	0	1,683.90	144
130	H-5	Closed	20	1,364.00	0	1,683.90	138
131	H-6	Closed	20	1,361.00	0	1,683.90	140
132	H-7	Closed	20	1,375.00	0	1,683.93	134
133	H-8	Closed	20	1,362.00	0	1,683.94	139
134	H-9	Closed	20	1,335.00	0	1,683.99	151
135	H-10	Closed	20	1,341.00	0	1,683.95	148

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The Retreat at Bunn Hill Domestic Water Model Information
Customer Meter Report

ID	Label	Associated Element	Demand (Base) (gpm)
146	CU-1	P-29	1.25
147	CU-2	P-29	1.25
148	CU-3	P-27	2.50
149	CU-4	P-29	1.25
150	CU-5	P-29	1.25
151	CU-6	P-31	2.50
152	CU-7	P-31	5.00
153	CU-8	P-31	2.50
154	CU-9	P-31	2.50
155	CU-10	P-32	5.00
156	CU-11	P-32	2.50
157	CU-12	P-32	2.50
158	CU-13	P-32	7.50
159	CU-14	P-34	1.25
160	CU-15	P-35	1.25
161	CU-16	P-32	2.50
162	CU-17	P-32	7.50
163	CU-18	P-32	5.00
164	CU-19	J-32	2.50
165	CU-20	P-31	5.00
166	CU-21	P-31	2.50
167	CU-22	P-31	5.00
168	CU-23	J-44	2.50
169	CU-24	P-44	2.50
170	CU-25	P-44	2.50
171	CU-26	P-44	1.25
172	CU-27	P-44	2.50
173	CU-28	P-44	2.50
174	CU-29	P-44	1.25
175	CU-30	P-44	2.50
176	CU-31	P-42	1.25
177	CU-32	P-44	3.75
178	CU-33	P-44	2.50
179	CU-34	P-44	3.75
180	CU-35	P-40	2.50
181	CU-36	P-39	5.00
182	CU-37	P-39	2.50
183	CU-38	P-39	2.50
184	CU-39	P-37	2.50
185	CU-40	P-37	7.50
186	CU-41	P-37	2.50
187	CU-42	P-37	2.50
188	CU-43	P-37	2.50
189	CU-44	P-36	5.00
190	CU-45	P-36	2.50
191	CU-46	P-30	2.50
192	CU-47	P-30	2.50
193	CU-48	P-30	5.00
194	CU-49	P-30	2.50
195	CU-50	P-36	5.00
196	CU-51	P-36	2.50
197	CU-52	P-36	5.00
198	CU-53	P-36	7.50
199	CU-54	P-37	2.50
200	CU-55	P-37	5.00
201	CU-56	P-37	2.50

The Retreat at Bunn Hill Domestic Water Model Information
Customer Meter Report Continued

202	CU-57	P-37	2.50
203	CU-58	P-37	1.25
204	CU-59	P-39	2.50
205	CU-60	P-39	5.00
206	CU-61	P-39	2.50
207	CU-62	P-39	2.50
208	CU-63	J-39	2.50
209	CU-64	P-40	2.50
210	CU-65	J-40	2.50
211	CU-66	P-24	2.00
212	CU-67	P-31	3.00

The Retreat at Bunn Hill Domestic Water Model Information
Pump Report

ID	Label	Elevation (ft)	Pump Definition	Status (Initial)	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
264	PMP-1	1,351.00	Pump Definition - 1	Off	1,436.74	1,684.12	0	0.00
261	PMP-2	1,351.00	Pump Definition - 2 & 3	On	1,436.73	1,684.13	207	247.40
262	PMP-3	1,351.00	Pump Definition - 2 & 3	Off	1,436.74	1,684.12	0	0.00
263	PMP-4	1,351.00	Pump Definition - 4	Off	1,436.74	1,684.12	0	0.00

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APPENDIX A.6 – Domestic and Fire Water Model Information Pipe Report

Appendix A.6

The Retreat at Bunn Hill Domestic and Fire Water Model Information
Pipe Report

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
276	DH 1	3	J 48	J-51	10.0	Ductile Iron	130.0	0.000	104	0.43	0.000
284	DH 2	4	J-51	J-53	10.0	Ductile Iron	130.0	0.000	473	1.93	0.002
289	DH 3	3	J-53	J-54	10.0	Ductile Iron	130.0	0.000	473	1.93	0.002
288	DH 4	4	J-54	J-21	10.0	Ductile Iron	130.0	0.000	1,383	5.65	0.011
32	P-1	123	EX T-1	J-1	10.0	PVC	150.0	0.000	1,383	5.65	0.009
34	P-2	86	J-1	J-2	10.0	PVC	150.0	0.590	1,383	5.65	0.012
36	P-3	152	J-2	J-3	10.0	PVC	150.0	1.670	1,383	5.65	0.014
38	P-4	79	J-3	J-4	10.0	PVC	150.0	0.050	1,383	5.65	0.009
40	P-5	966	J-4	J-5	10.0	PVC	150.0	0.050	1,383	5.65	0.009
42	P-6	17	J-5	J-6	10.0	PVC	150.0	1.670	1,383	5.65	0.057
44	P-7	367	J-6	J-7	10.0	PVC	150.0	9.050	1,383	5.65	0.021
46	P-8	266	J-7	J-8	10.0	PVC	150.0	0.000	1,383	5.65	0.009
48	P-9	249	J-8	J-9	10.0	PVC	150.0	0.390	1,383	5.65	0.009
50	P-10	688	J-9	J-10	10.0	PVC	150.0	0.390	1,383	5.65	0.009
52	P-11	124	J-10	J-11	10.0	PVC	150.0	0.000	1,383	5.65	0.009
54	P-12	175	J-11	J-12	10.0	PVC	150.0	0.390	1,383	5.65	0.010
56	P-13	195	J-12	J-13	10.0	PVC	150.0	0.200	1,383	5.65	0.009
58	P-14	104	J-13	J-14	10.0	PVC	150.0	0.200	1,383	5.65	0.010
60	P-15	6	J-14	J-15	10.0	PVC	150.0	0.200	1,383	5.65	0.026
62	P-16	93	J-15	J-16	10.0	PVC	150.0	0.200	1,383	5.65	0.010
64	P-17	6	J-16	J-17	10.0	PVC	150.0	0.200	1,383	5.65	0.026
66	P-18	116	J-17	J-18	10.0	PVC	150.0	0.200	1,383	5.65	0.009
68	P-19	6	J-18	J-19	10.0	PVC	150.0	0.200	1,383	5.65	0.025
71	P-20	14	J-19	J-20	10.0	PVC	150.0	0.200	1,383	5.65	0.016
77	P-21	10	J-21	J-22	8.0	PVC	150.0	0.800	1,383	8.82	0.119
79	P-22	6	J-22	J-23	8.0	PVC	150.0	0.200	1,383	8.82	0.068
81	P-23	79	J-23	J-24	8.0	PVC	150.0	0.200	1,383	8.82	0.029
83	P-24	58	J-24	J-25	8.0	PVC	150.0	1.670	572	3.65	0.011
85	P-25	155	J-25	J-26	8.0	PVC	150.0	1.670	560	3.57	0.007
87	P-26	157	J-26	J-27	8.0	PVC	150.0	0.590	560	3.57	0.006
89	P-27	63	J-27	J-28	8.0	PVC	150.0	0.350	560	3.57	0.006
91	P-28	11	J-28	J-29	8.0	PVC	150.0	0.590	557	3.56	0.015
93	P-29	149	J-29	J-30	8.0	PVC	150.0	1.670	3	0.02	0.000
95	P-30	134	J-25	J-31	8.0	PVC	150.0	1.130	3	0.02	0.000
97	P-31	349	J-29	J-32	8.0	PVC	150.0	0.740	534	3.41	0.005
99	P-32	343	J-32	J-33	8.0	PVC	150.0	0.740	507	3.23	0.004
101	P-33	11	J-33	J-34	8.0	PVC	150.0	0.200	489	3.12	0.006
103	P-34	50	J-34	J-35	8.0	PVC	150.0	0.740	489	3.12	0.006
110	P-35	294	J-38	J-35	8.0	PVC	150.0	0.590	-487	3.11	0.004
105	P-36	295	J-24	J-36	8.0	PVC	150.0	0.740	796	5.08	0.010
107	P-37	491	J-36	J-37	8.0	PVC	150.0	0.350	766	4.89	0.009
109	P-38	26	J-37	J-38	8.0	PVC	150.0	0.740	750	4.78	0.019
112	P-39	328	J-38	J-39	8.0	PVC	150.0	1.130	1,226	7.83	0.024
114	P-40	40	J-39	J-40	8.0	PVC	150.0	0.350	1,210	7.72	0.028
116	P-41	52	J-40	J-41	8.0	PVC	150.0	0.200	1,204	7.68	0.023
118	P-42	165	J-41	J-42	8.0	PVC	150.0	0.590	1,203	7.68	0.023
120	P-43	25	J-42	J-43	8.0	PVC	150.0	0.350	1,203	7.68	0.032
311	P-44(1)	332	J-43	J-58	8.0	PVC	150.0	0.200	1,188	7.58	0.020
312	P-44(2)	14	J-58	J-44	8.0	PVC	150.0	0.200	1,002	6.40	0.023
124	P-45	23	J-44	J-45	8.0	PVC	150.0	0.590	1,000	6.38	0.030
136	P-46	21	J-34	H-5	6.0	PVC	150.0	1.670	0	0.00	0.000
137	P-47	30	J-37	H-4	6.0	PVC	150.0	1.670	0	0.00	0.000
138	P-48	9	J-45	H-1	6.0	PVC	150.0	1.670	1,000	11.35	0.418
139	P-49	15	J-42	H-2	6.0	PVC	150.0	1.670	0	0.00	0.000
140	P-50	31	J-39	H-3	6.0	PVC	150.0	1.670	0	0.00	0.000
141	P-51	36	J-32	H-6	6.0	PVC	150.0	1.670	0	0.00	0.000
142	P-52	22	J-30	H-7	6.0	PVC	150.0	1.670	0	0.00	0.000
143	P-53	11	J-27	H-8	6.0	PVC	150.0	1.670	0	0.00	0.000
144	P-54	31	J-31	H-9	6.0	PVC	150.0	1.670	0	0.00	0.000
145	P-55	31	J-36	H-10	6.0	PVC	150.0	1.670	0	0.00	0.000
268	P-56	3	PMP-1	J-49	4.0	Ductile Iron	130.0	0.000	-104	2.67	0.008
269	P-57	3	PMP-1	J 48	4.0	Ductile Iron	130.0	0.000	104	2.67	0.008
273	P-58	3	PMP-2	J-50	6.0	Ductile Iron	130.0	0.000	-368	4.18	0.012
277	P-59	3	PMP-2	J-51	6.0	Ductile Iron	130.0	0.000	368	4.18	0.012
281	P-60	3	J-52	PMP-3	6.0	Ductile Iron	130.0	0.000	0	0.00	0.000
285	P-61	3	PMP-3	J-53	6.0	Ductile Iron	130.0	0.000	0	0.00	0.000
286	P-62	3	J-47	PMP-4	10.0	Ductile Iron	130.0	0.000	910	3.72	0.005
290	P-63	3	PMP-4	J-54	10.0	Ductile Iron	130.0	0.000	910	3.72	0.005
314	P-73	8	J-58	J-59	1.5	Copper	135.0	0.000	175	31.77	2.348
316	P-74	23	J-59	J-60	1.5	Copper	135.0	0.000	175	31.77	2.348
255	SH 1	7	J-20	J-46	10.0	Ductile Iron	130.0	0.000	1,383	5.65	0.011
294	SH 2	4	J-46	J-56	8.0	Ductile Iron	130.0	0.000	1,383	8.82	0.033
295	SH 3	3	J-56	J-49	10.0	Ductile Iron	130.0	0.000	1,383	5.65	0.011
271	SH 4	3	J-49	J-50	10.0	Ductile Iron	130.0	0.000	1,278	5.22	0.010
279	SH 5	4	J-50	J-52	10.0	Ductile Iron	130.0	0.000	910	3.72	0.005
280	SH 6	3	J-52	J-47	10.0	Ductile Iron	130.0	0.000	910	3.72	0.005

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The Retreat at Bunn Hill Domestic and Fire Water Model Information
Junction Report

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
258	J 48	1,356.00	0	1,618.35	114
31	J-1	1,398.00	0	1,436.85	17
33	J-2	1,392.00	0	1,435.82	19
35	J-3	1,392.00	0	1,433.68	18
37	J-4	1,389.00	0	1,432.98	19
39	J-5	1,397.00	0	1,424.64	12
41	J-6	1,398.00	0	1,423.66	11
43	J-7	1,392.00	0	1,416.03	10
45	J-8	1,404.00	0	1,413.74	4
47	J-9	1,393.00	0	1,411.40	8
49	J-10	1,269.00	0	1,405.28	59
51	J-11	1,268.00	0	1,404.22	59
53	J-12	1,310.00	0	1,402.52	40
55	J-13	1,327.00	0	1,400.73	32
57	J-14	1,327.00	0	1,399.74	31
59	J-15	1,327.00	0	1,399.59	31
61	J-16	1,331.00	0	1,398.69	29
63	J-17	1,331.00	0	1,398.54	29
65	J-18	1,344.00	0	1,397.45	23
67	J-19	1,344.00	0	1,397.30	23
70	J-20	1,344.00	0	1,397.07	23
74	J-21	1,344.00	0	1,618.29	119
76	J-22	1,344.00	0	1,617.06	118
78	J-23	1,344.00	0	1,616.67	118
80	J-24	1,332.00	15	1,614.43	122
82	J-25	1,334.00	10	1,613.79	121
84	J-26	1,348.00	0	1,612.72	115
86	J-27	1,356.00	0	1,611.86	111
88	J-28	1,359.00	3	1,611.49	109
90	J-29	1,359.00	20	1,611.32	109
92	J-30	1,371.00	3	1,611.32	104
94	J-31	1,314.00	3	1,613.79	130
96	J-32	1,355.00	28	1,609.65	110
98	J-33	1,359.00	18	1,608.16	108
100	J-34	1,359.00	1	1,608.09	108
102	J-35	1,359.00	2	1,607.79	108
104	J-36	1,324.00	30	1,611.42	124
106	J-37	1,344.00	16	1,607.09	114
108	J-38	1,345.00	10	1,606.62	113
111	J-39	1,361.00	16	1,598.85	103
113	J-40	1,363.00	6	1,597.73	102
115	J-41	1,366.00	1	1,596.52	100
117	J-42	1,382.00	1	1,592.73	91
119	J-43	1,383.00	15	1,591.91	90
121	J-44	1,399.00	3	1,585.02	80
123	J-45	1,401.00	0	1,584.33	79
254	J-46	1,353.00	0	1,396.99	19
256	J-47	1,353.00	0	1,396.76	19
265	J-49	1,353.00	0	1,396.83	19
270	J-50	1,353.00	0	1,396.79	19
274	J-51	1,356.00	0	1,618.35	114
278	J-52	1,353.00	0	1,396.78	19
282	J-53	1,356.00	0	1,618.34	114
287	J-54	1,356.00	0	1,618.34	114
293	J-56	1,353.00	0	1,396.86	19
310	J-58	1,398.37	10	1,585.34	81
313	J-59	1,398.00	0	1,566.41	73
315	J-60	1,399.00	175	1,513.02	49

The Retreat at Bunn Hill Domestic and Fire Water Model Information
Hydrant Report

ID	Label	Hydrant Status	Length (Hydrant Lateral) (ft)	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
125	H-1	Closed	20	1,406.00	1,000	1,580.47	75
127	H-2	Closed	20	1,388.00	0	1,592.73	89
128	H-3	Closed	20	1,367.00	0	1,598.85	100
129	H-4	Closed	20	1,350.00	0	1,607.09	111
130	H-5	Closed	20	1,364.00	0	1,608.09	106
131	H-6	Closed	20	1,361.00	0	1,609.65	108
132	H-7	Closed	20	1,375.00	0	1,611.32	102
133	H-8	Closed	20	1,362.00	0	1,611.86	108
134	H-9	Closed	20	1,335.00	0	1,613.79	121
135	H-10	Closed	20	1,341.00	0	1,611.42	117

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The Retreat at Bunn Hill Domestic and Fire Water Model Information
Customer Meter Report

ID	Label	Associated Element	Demand (Base) (gpm)
146	CU-1	P-29	1.25
147	CU-2	P-29	1.25
148	CU-3	P-27	2.50
149	CU-4	P-29	1.25
150	CU-5	P-29	1.25
151	CU-6	P-31	2.50
152	CU-7	P-31	5.00
153	CU-8	P-31	2.50
154	CU-9	P-31	2.50
155	CU-10	P-32	5.00
156	CU-11	P-32	2.50
157	CU-12	P-32	2.50
158	CU-13	P-32	7.50
159	CU-14	P-34	1.25
160	CU-15	P-35	1.25
161	CU-16	P-32	2.50
162	CU-17	P-32	7.50
163	CU-18	P-32	5.00
164	CU-19	J-32	2.50
165	CU-20	P-31	5.00
166	CU-21	P-31	2.50
167	CU-22	P-31	5.00
168	CU-23	J-44	2.50
169	CU-24	P-44(1)	2.50
170	CU-25	P-44(1)	2.50
171	CU-26	P-44(1)	1.25
172	CU-27	P-44(1)	2.50
173	CU-28	P-44(1)	2.50
174	CU-29	P-44(1)	1.25
175	CU-30	P-44(1)	2.50
176	CU-31	P-42	1.25
177	CU-32	P-44(1)	3.75
178	CU-33	P-44(1)	2.50
179	CU-34	P-44(1)	3.75
180	CU-35	P-40	2.50
181	CU-36	P-39	5.00
182	CU-37	P-39	2.50
183	CU-38	P-39	2.50
184	CU-39	P-37	2.50
185	CU-40	P-37	7.50
186	CU-41	P-37	2.50
187	CU-42	P-37	2.50
188	CU-43	P-37	2.50
189	CU-44	P-36	5.00
190	CU-45	P-36	2.50
191	CU-46	P-30	2.50
192	CU-47	P-30	2.50
193	CU-48	P-30	5.00
194	CU-49	P-30	2.50
195	CU-50	P-36	5.00
196	CU-51	P-36	2.50
197	CU-52	P-36	5.00
198	CU-53	P-36	7.50
199	CU-54	P-37	2.50
200	CU-55	P-37	5.00
201	CU-56	P-37	2.50

The Retreat at Bunn Hill Domestic and Fire Water Model Information
Customer Meter Report Continued

202	CU-57	P-37	2.50
203	CU-58	P-37	1.25
204	CU-59	P-39	2.50
205	CU-60	P-39	5.00
206	CU-61	P-39	2.50
207	CU-62	P-39	2.50
208	CU-63	J-39	2.50
209	CU-64	P-40	2.50
210	CU-65	J-40	2.50
211	CU-66	P-24	2.00
212	CU-67	P-31	3.00

The Retreat at Bunn Hill Domestic and Fire Water Model Information
Pump Report

ID	Label	Elevation (ft)	Pump Definition	Status (Initial)	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
264	PMP-1	1,351.00	Pump Definition - 1	On	1,396.80	1,618.37	104	221.57
261	PMP-2	1,351.00	Pump Definition - 2 & 3	On	1,396.76	1,618.38	368	221.62
262	PMP-3	1,351.00	Pump Definition - 2 & 3	Off	1,396.78	1,618.34	0	0.00
263	PMP-4	1,351.00	Pump Definition - 4	On	1,396.75	1,618.35	910	221.61

P:\Projects\2019\2983\2983_08319\Civil\Drawings\Water Model\Bunn Hill Water Model (8 INCH FIRE FLOW).wtg

APPENDIX A.7 – Pump Performance Data Sheets

Pump Performance Datasheet

Customer	:	Project Number / ID	: 816160
Customer ref. / PO	: Jockey x1	Model	: CR 20-4-3ph
Tag Number	: 001	Stages	: 4
Service	:	Based on curve number	: CR 20-4_3Phase Rev June_2020
Quantity	: 1	Basic model number	: -
		Date last saved	: 10/10/2022 11:27 AM

Operating Conditions

Flow, rated	: 100.0 USgpm
Differential head / pressure, rated (requested)	: 213.0 ft
Differential head / pressure, rated (actual)	: 227.4 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

Performance

Speed, rated	: 3470 rpm
Efficiency	: 73.40 %
NPSH required / margin required	: 8.54 / 0.00 ft
Ns (imp. eye flow) / Nss (imp. eye flow)	: 1,781 / 6,657 US Units
MCSF	: 10.68 USgpm
Head, maximum, rated diameter	: 274.2 ft
Head rise to shutoff	: 20.58 %
Flow, best eff. point	: 106.8 USgpm
Flow ratio, rated / BEP	: 93.66 %
Diameter ratio (rated / max)	: 100.00 %
Head ratio (rated dia / max dia)	: 100.00 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Energy Indexes

PEI (CL)	: 0.91
ER (CL)	: 9

Liquid

Liquid type	: Cold Water
Additional liquid description	:
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

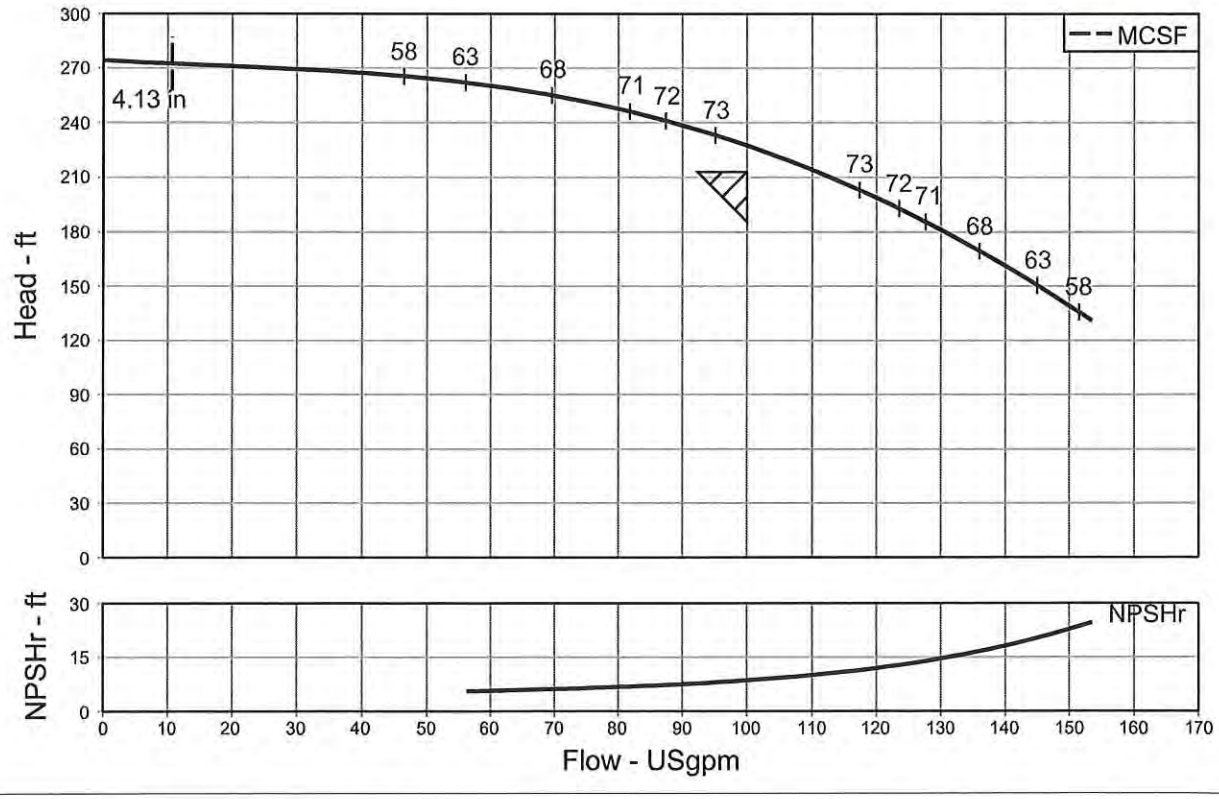
Material selected	: Standard - Cast Iron / 304 Stainless Steel

Pressure Data

Maximum working pressure	: 118.7 psi.g
Maximum allowable working pressure	: N/A
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data (@Max density)

Motor sizing specification	: Max power (non-overloading)
Margin over specification	: 0.00 %
Service factor	: 1.15 (used)
Power, hydraulic	: 5.74 hp
Rated power (based on duty point)	: 7.82 hp
Max power (non-overloading)	: 9.03 hp
Motor rating	: 10.00 hp / 7.46 kW (Fixed)
KVA Code	: -
Rated Current new	: 25.4 - 23.0 / 11.5 A



GRUNDFOS

Grundfos Quotation System 22.3.0

Pump Performance Datasheet

Customer	:	Project Number / ID	: 816160
Customer ref. / PO	:	Model	: 25957 LC
Tag Number	: 001 Domestic x2 qty	Stages	: 1
Service	:	Based on curve number	: RC9867-1-SS Rev 0
Quantity	: 1	Basic model number	: -
		Date last saved	: 10/10/2022 11:25 AM

Operating Conditions

Flow, rated	: 400.0 USgpm
Differential head / pressure, rated (requested)	: 213.0 ft
Differential head / pressure, rated (actual)	: 213.4 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

Performance

Speed, rated	: 3550 rpm
Impeller diameter, rated	: 7.67 in
Impeller diameter, maximum	: 9.60 in
Impeller diameter, minimum	: 6.50 in
Efficiency	: 75.34 %
NPSH required / margin required	: 18.94 / 0.00 ft
Ns (imp. eye flow) / Nss (imp. eye flow)	: 1,101 / 7,717 US Units
MCSF	: 118.8 USgpm
Head, maximum, rated diameter	: 254.1 ft
Head rise to shutoff	: 17.83 %
Flow, best eff. point	: 405.1 USgpm
Flow ratio, rated / BEP	: 98.74 %
Diameter ratio (rated / max)	: 79.90 %
Head ratio (rated dia / max dia)	: 55.68 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Energy Indexes

PEI (CL)	: 0.94
ER (CL)	: 6

Liquid

Liquid type	: Cold Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

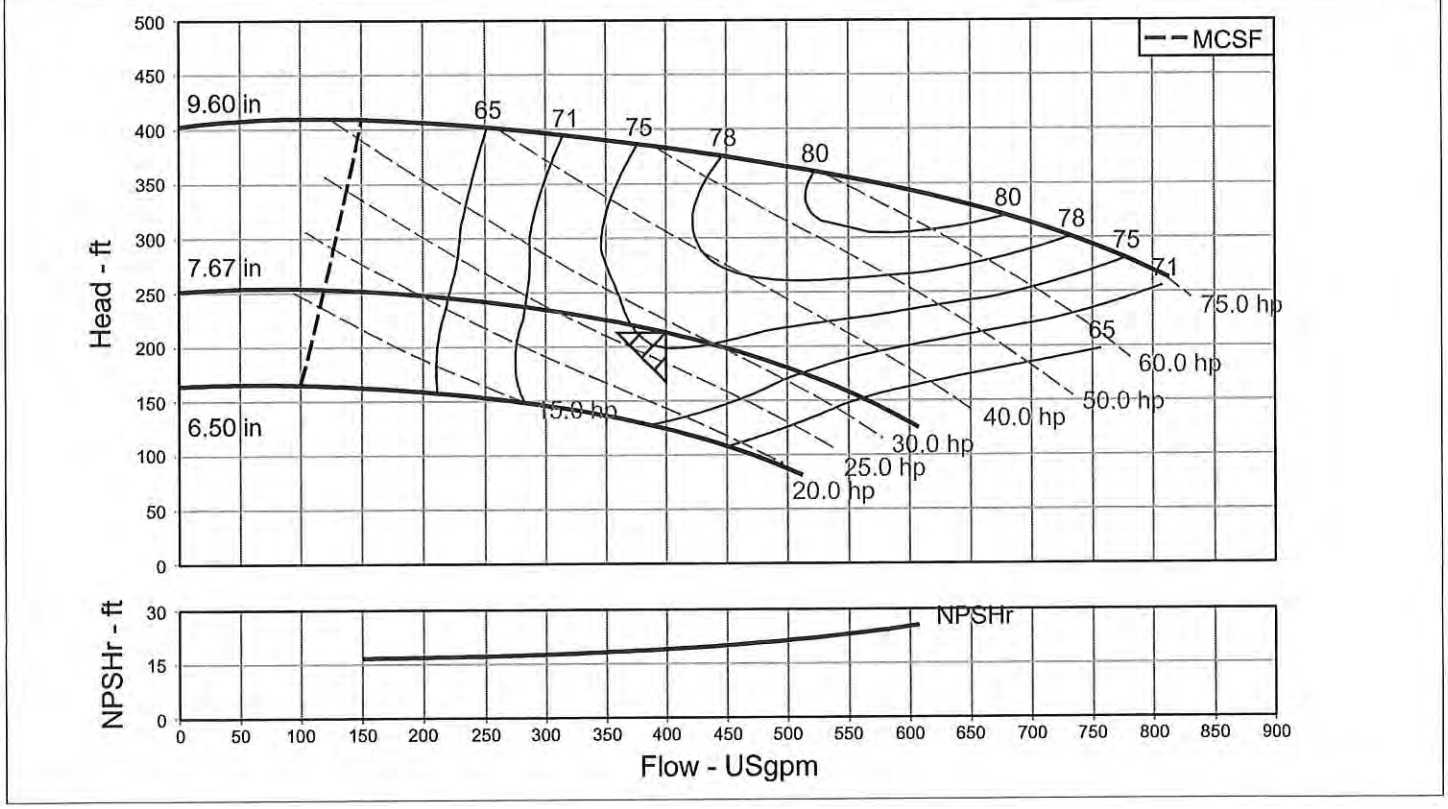
Material selected	: Cast iron

Pressure Data

Maximum working pressure	: 109.9 psi.g
Maximum allowable working pressure	: 175.0 psi.g
Maximum allowable suction pressure	: 175.0 psi.g
Hydrostatic test pressure	: 263.0 psi.g

Driver & Power Data (@Max density)

Motor sizing specification	: Max power (non-overloading)
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 21.51 hp
Rated power (based on duty point)	: 28.55 hp
Max power (non-overloading)	: 34.21 hp
Nameplate motor rating	: 40.00 hp / 29.83 kW



GRUNDFOS

Grundfos Quotation System 22.3.0

Pump Performance Datasheet

Customer	:	Project Number / ID	: 816160
Customer ref. / PO	:	Model	: 40959 LC
Tag Number	: 001 High Service x Zqty.	Stages	: 1
Service	:	Based on curve number	: RC1979-SS Rev 0
Quantity	: 1	Basic model number	: -
		Date last saved	: 10/10/2022 11:24 AM

Operating Conditions

Flow, rated	: 1,000.0 USgpm
Differential head / pressure, rated (requested)	: 213.0 ft
Differential head / pressure, rated (actual)	: 212.4 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

Performance

Speed, rated	: 3550 rpm
Impeller diameter, rated	: 7.89 in
Impeller diameter, maximum	: 9.60 in
Impeller diameter, minimum	: 7.50 in
Efficiency	: 82.74 %
NPSH required / margin required	: 22.75 / 0.00 ft
Ns (imp. eye flow) / Nss (imp. eye flow)	: 1,593 / 8,956 US Units
MCSF	: 405.6 USgpm
Head, maximum, rated diameter	: 255.3 ft
Head rise to shutoff	: 16.55 %
Flow, best eff. point	: 1,050.3 USgpm
Flow ratio, rated / BEP	: 95.21 %
Diameter ratio (rated / max)	: 82.19 %
Head ratio (rated dia / max dia)	: 57.49 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Energy Indexes

PEI (CL)	: 0.96
ER (CL)	: 4

Liquid

Liquid type	: Cold Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

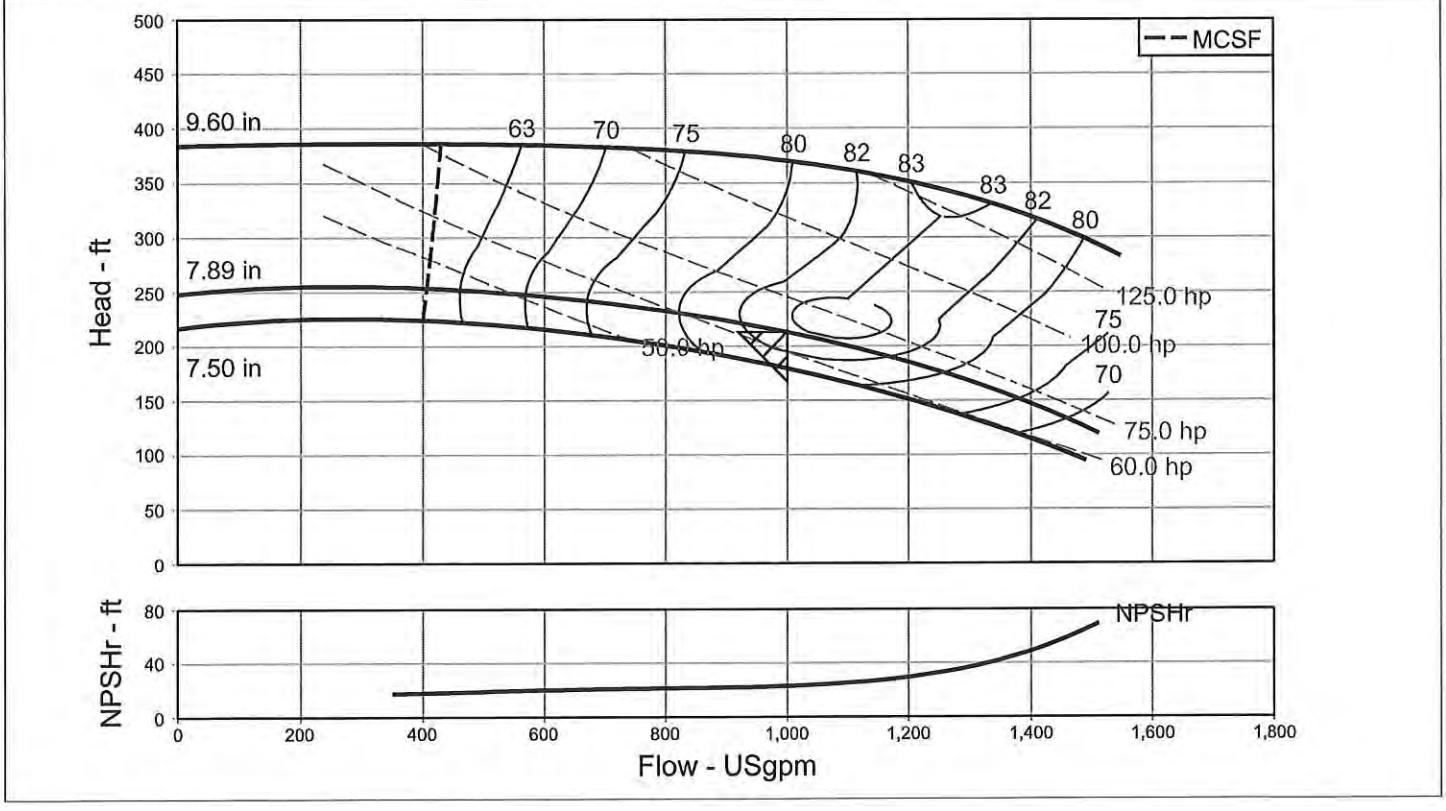
Material selected	: Cast iron

Pressure Data

Maximum working pressure	: 110.5 psi.g
Maximum allowable working pressure	: 175.0 psi.g
Maximum allowable suction pressure	: 175.0 psi.g
Hydrostatic test pressure	: 263.0 psi.g

Driver & Power Data (@Max density)

Motor sizing specification	: Max power (non-overloading)
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 53.71 hp
Rated power (based on duty point)	: 64.91 hp
Max power (non-overloading)	: 70.28 hp
Nameplate motor rating	: 75.00 hp / 55.93 kW



APPENDIX B – Sanitary Sewer Collection System

APPENDIX B.1 – Extension No. 163

PETITION FOR ESTABLISHMENT OF CONSOLIDATED SEWER DISTRICT NO. 1 EXTENSION NO. 163 TOWN OF VESTAL, NEW YORK

TO THE TOWN BOARD OF THE TOWN OF VESTAL, COUNTY OF BROOME, NEW YORK:

WE the undersigned being the owners of taxable real property situate in the proposed Extension hereinafter described, and owning in the aggregate more than one-half of the assessed valuation of all taxable real property of the said proposed Extension, as shown upon the latest completed assessment roll of said Town, and owning in the aggregate more than one-half of the assessed valuation of all taxable real property owned by resident owners within the said proposed Extension as shown upon the latest completed assessment roll of the Town, DO HEREBY PETITION your Honorable Board to establish an Extension of Consolidated Sewer District to be hereinafter known as Consolidated Sewer District No. 1, EXTENSION NO.163 , Town of Vestal, in the territory hereinafter described, which is located entirely within your Town of Vestal, County of Broome and State of New York, and outside of any incorporated village, which proposed Extension is described as follows:

PETITIONER: [redacted] BHL Ventures, LLC
B.C.T.M.P.: 174.12-1-4,5,6,7,8
ADDRESS: 813 Bunn Hill Rd.

That attached hereto is a map showing the boundaries of the proposed extension.

That no expenses occasioned by the creation of said Extension herein petitioned for and for the erection, construction and installation of facilities, if any, to serve the aforesaid Extension shall be levied and collected from the several lots and parcels of land within the said Extension by assessment or otherwise.

The aforesaid map set forth the manner in which said Extension will be served in and as a part of Consolidated Sewer District No. 1.

It is understood and agreed that the owner or owners of the land within the proposed Extension will be subject to annual assessments for maintenance of the improvements and facilities of Consolidated Sewer District No. 1 and for bond payments for district wide assessments and improvements to be paid by Consolidated Sewer District No. 1 and all extensions thereof in accordance with the applicable statutes made and provided thereof.

WHEREFORE your petitioners herein respectfully request that the Town Board of Vestal call the necessary public hearing in connection with this petition and take all other, further and necessary action as may be necessary so as to permit the progress of the construction of the improvements as herein recited and set forth.

DATED: 8/22/2022

Diran Kradjian

STATE OF NEW YORK
COUNTY OF BROOME
TOWN OF VESTAL

On this 22nd day of 2022, before me, the subscriber personally appeared

Diran Kradjian

to me known and known to be the same person described in and who executed the within instrument, and they severally acknowledged to me they are executed the same.

SHAWN PETER BRENNAN
Notary Public, State of New York
NO. 01BR6398845
Qualified in Broome County
Commission Expires 10/07/2023

NOTARY PUBLIC

Retreat @ Bunn Hill

813 Bunn Hill Rd,

B.C.T.M.P. 174.12-1-4
-5
-6
-7
-8

42,373 Acres

Sewer B.S.T. Ext. 163

42,373 Acres x $945.43/Acre

= $40,060.71

APPENDIX B.2 – Sanitary Pump Station and Force Main Design

SANITARY PUMP STATION AND FORCE MAIN DESIGN 2983.08319
Bunn Hill F: PmpStationCalculations KEYSTONE.xls
Town of Vestal October 27, 2022
Broome County, New York

PRELIMINARY

SANITARY PUMP STATION

A. DESIGN FLOWS AND PIPE CAPACITIES

1 Estimated Flows Proposed Flows

	700 BR's	@	110 gal/BR	=	77000	gpd
					53.5	gpm average
	Peaking Factor				3.9	
	Peak Flow				208.5	gpm
700 Bdrm Units @	110 gal/BR	=	77,000	gpd		
		=	3,208	gph =	53.5	gpm average
	Peaking Factor		3.9		3.9	
	Peak Flow		12,513	gph	208.5	gpm
					0.46	cfs

B. SANITARY PUMP STATION DESIGN

1 System Hydraulics

Q Pump Design Rate = 208.54 gpm minimum
To Improve Pump Design Efficiency Use **220 gpm** = 0.49 cfs

Min.Pump Cycle Volume (V) ir V = (Time)(Q)/4
Where Time = 10
Q = 220
Therefore V = 550 gallons

Required Height (H) between Low Water Level (LWL) and High Water Level (HWL) in feet Key
Diam of Wet Well = 6.0 feet A
H = V/UV
Where V= Min. Pump Cycle Volume
UV= Vol. Of Wet Well per foot of Height)
= 210 gal

Therefore H = 2.6 feet
However, use a minimum of H= 3.00 feet
Vtotal = HxV
= 629

Cycle Time (T) in Minutes (Discharge Time plus Refill Time)
T = V/(Qd -Qi) + V/Qi
= 57.5 minutes
= 1.04 cycles per hour

2 Static Head

	Elev. Diff. (ft)	Elevation		
High Point in Force Main		**1363.50**		
New Force Main Invert Elev. At Outlet in MH ___	**0.00**	**1363.50**		
Pump Station PS01 Top at Grade	36.00	1327.50		
Ground at Pump Station PS01	0.50	1327.00	C	
CL 4" Force Main Out	**4.50**	1322.50	L	
Invert 8" Gravity Main into Pump Station	**3.50**	**1319.00**	I	**8.00**
High Water Alarm	0.50	1318.50	F	
Lag Pump On	0.50	1318.00	G	
Lead Pump On (Initial)	0.50	1317.50	J	
Both Pumps Off (Minimum)	3.00	1314.50	I	
Low Water Alarm	1.00	1313.50	G	14.00
Base Invert	2.00	1311.50	E	16.00
Static Head (High Point - Base Invert)	**52.00**			

KEYSTONE ASSOCIATES
ARCHITECTS • ENGINEERS • SURVEYORS, LLC

SANITARY PUMP STATION AND FORCE MAIN DESIGN 2983.08319
Bunn Hill F: PmpStationCalculations KEYSTONE.xls
Town of Vestal October 27, 2022
Broome County, New York

PRELIMINARY

3 Equivalent Length **SANITARY PUMP STATION (continued)**

Force Main Length						**925**	feet
				factor for misc. fittings		1.1	
						1,018	feet
Force Main Cleanouts	0	MH's	at	35	EA =	0	feet
Pump Station						100	feet
Total Equivalent Length (EQ)						1,118	feet

4 Friction Head

Friction Head (hf) = 10.44 (EQ)QEE1.85/(CEE1.85)dEE4.8655)

Where **Q= 220 gpm**
C= 120
d= 6 inches force main inside diameter

Therefore: hf = 6.0

5 Total Design Head

Total Design Head (TDH) in feet = Static Head plus Friction Head

TDH = 52.0 feet + 6.0 feet
TDH = 58.0 feet

6 Design Pump Brake Horsepower

Design Pump Capacity = 220 gpm @ 58.0 feet TDH
Brake Horsepower (BHP) @ assumed efficiency (EFF) 55 percent

Where k = 3960

BHP = (Q)(TDH)/(k)(EFF)
BHP = 5.86 HP Minimum

7 Velocity in Force Main

Velocity in Force Main (v) in feet per second (fps)

v = (Q/(7.48gal/cf*60sec/min))/area fm
v = 2.50 fps

APPENDIX B.3 – Pump Performance Data Sheet

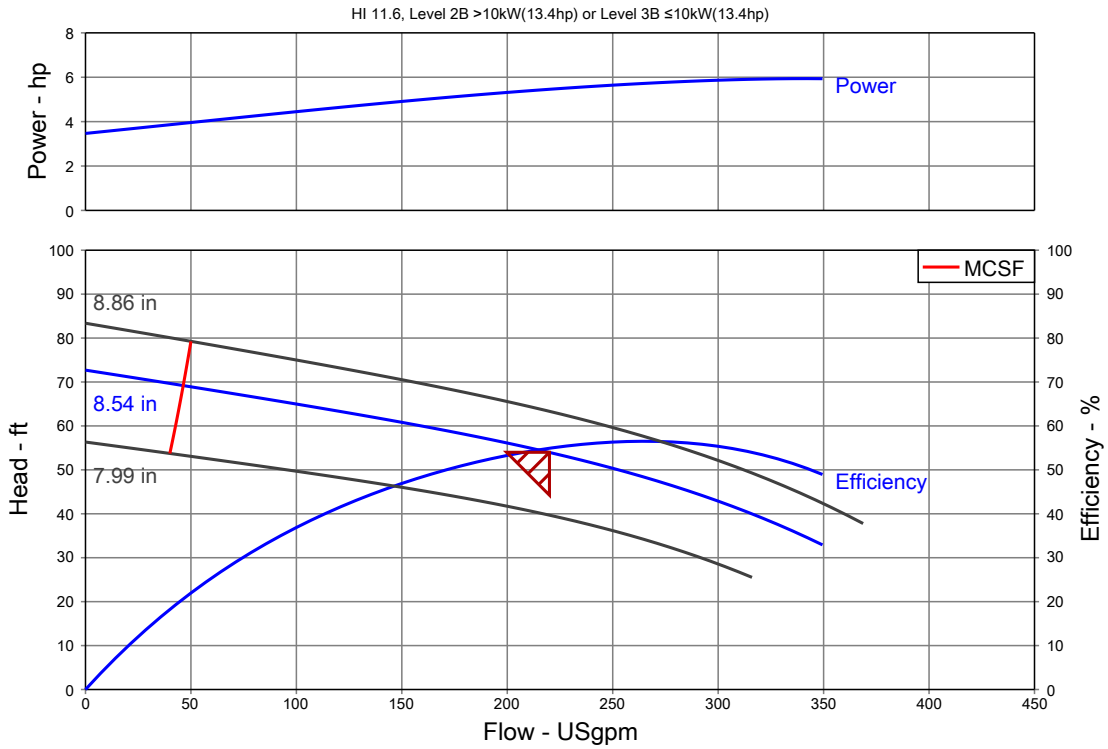
Customer :
Reference :

Pump Performance Datasheet

Ebara Quotation System 22.0.0

Item number	: 001	Product Description	: 80DLMKFU65.5
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: DLMK-C604-9203
Quote number	: 760619	Date last saved	: 14 Mar 2022 3:37 AM

Operating Conditions		**Liquid**	
Flow, rated	: 220.0 USgpm	Liquid type	: Cold Water
Differential head / pressure, rated (requested)	: 54.00 ft	Additional liquid description	:
Differential head / pressure, rated (actual)	: 54.02 ft	Solids diameter, max	: 0.00 in
Suction pressure, rated / max	: 0.00 / 0.00 psi.g	Solids concentration, by volume	: 0.00 %
NPSH available, rated	: Ample	Temperature, max	: 68.00 deg F
Site Supply Frequency	: 60 Hz	Fluid density, rated / max	: 1.000 / 1.000 SG
Performance		Viscosity, rated	: 1.00 cP
Speed criteria	: Synchronous	Vapor pressure, rated	: 0.34 psi.a
Speed, rated	: 1745 rpm	**Material**	
Impeller diameter, rated	: 8.54 in	Material selected	: Standard
Impeller diameter, maximum	: 8.86 in	**Pressure Data**	
Impeller diameter, minimum	: 7.99 in	Maximum working pressure	: 31.46 psi.g
Efficiency	: 54.92 %	Maximum allowable working pressure	: N/A
NPSH required / margin required	: - / 0.00 ft	Maximum allowable suction pressure	: N/A
Ns (imp. eye flow) / Nss (imp. eye flow)	: 1,438 / - US Units	Hydrostatic test pressure	: N/A
MCSF	: 46.34 USgpm	**Driver & Power Data (@Max density)**	
Head, maximum, rated diameter	: 72.70 ft	Driver sizing specification	: Rated power
Head rise to shutoff	: 34.71 %	Margin over specification	: 0.00 %
Flow, best eff. point	: 264.9 USgpm	Service factor	: 1.00
Flow ratio, rated / BEP	: 83.04 %	Power, hydraulic	: 3.00 hp
Diameter ratio (rated / max)	: 96.44 %	Power, rated	: 5.46 hp
Head ratio (rated dia / max dia)	: 85.22 %	Power, maximum, rated diameter	: 5.94 hp
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00	Motor rating	: 7.50 hp / 5.59 kW (Fixed)
Selection status	: Acceptable		

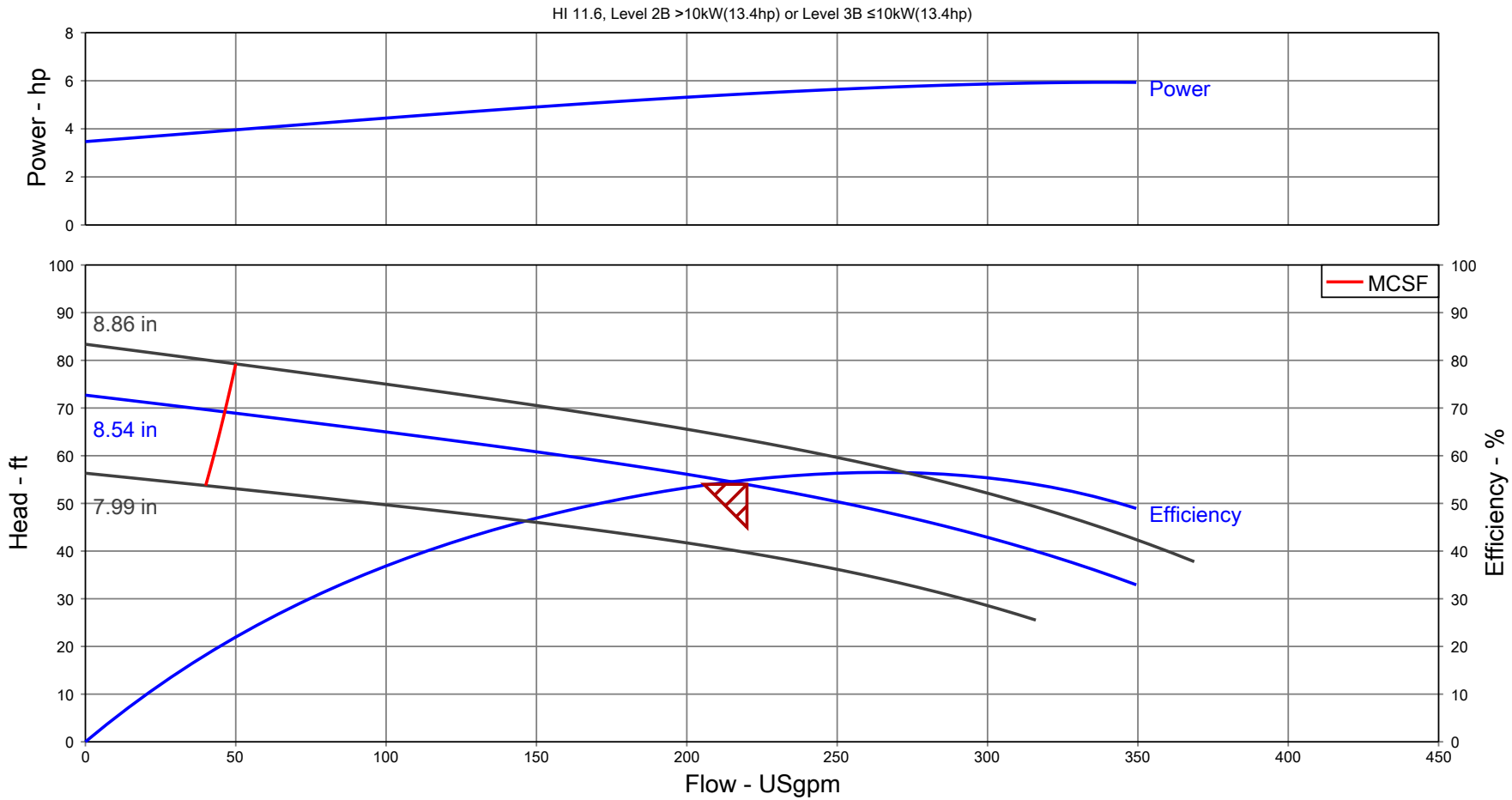


Siewert Equipment Co. Inc.
175 AKRON STREET, ROCHESTER, NY 14609 USA
Tel: 585-482-9640 Fax: 585-482-4149 siewertequipment.com

Customer :
Reference :

Pump Performance Curve

Ebara Quotation System 22.0.0



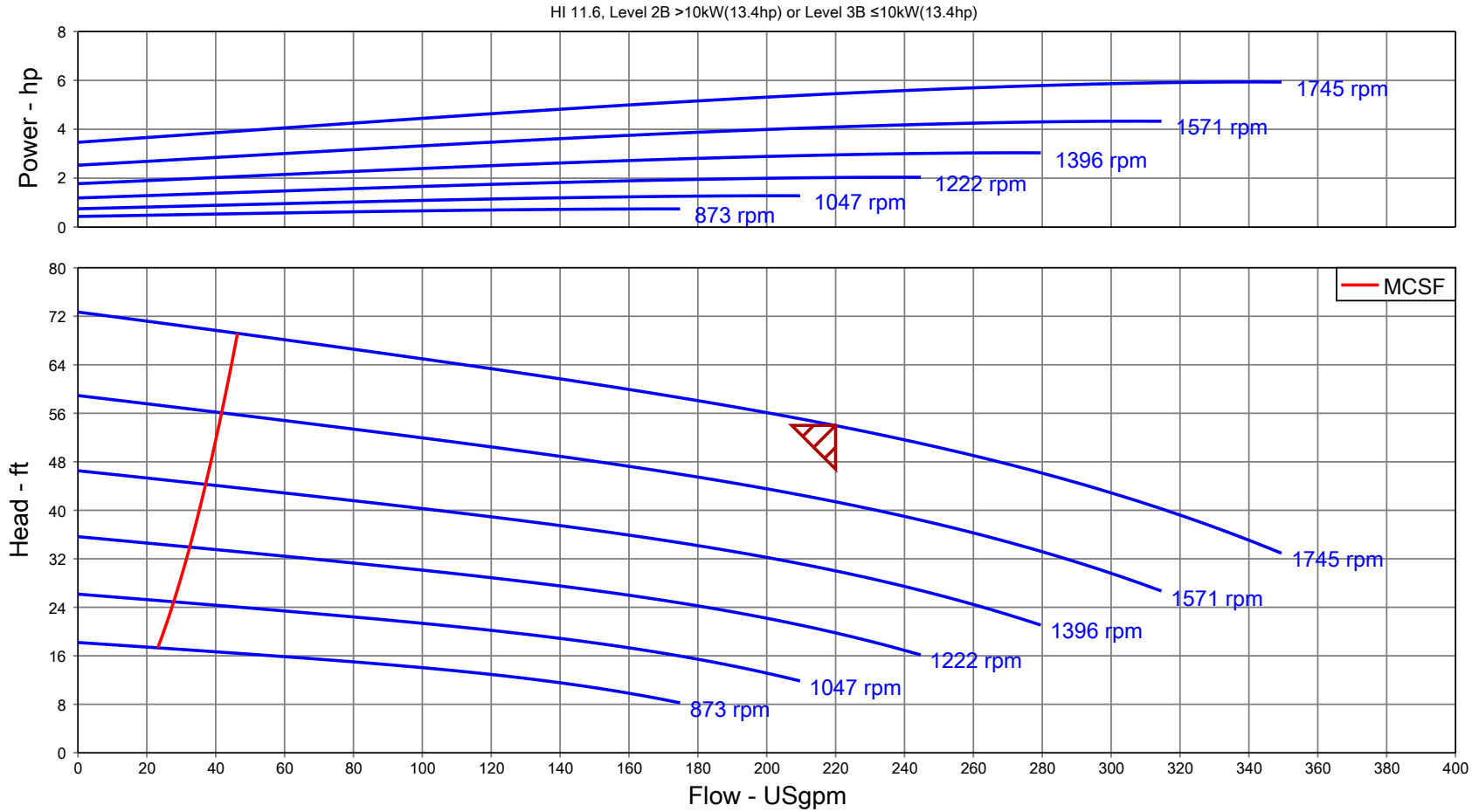
Item number	: 001	Product Description	: 80DLMKFU65.5	Flow, rated	: 220.0 USgpm
Service	:	Stages	: 1	Differential head / pressure, rated	: 54.00 ft
Quantity	: 1	Speed, rated	: 1745 rpm	NPSH required	: -
Quote number	: 760619	Based on curve number	: DLMK-C604-9203	Fluid density, rated / max	: 1.000 / 1.000 SG
Date last saved	: 14 Mar 2022 3:37 AM	Efficiency	: 54.92 %	Viscosity	: 1.00 cP
		Power, rated	: 5.46 hp	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

Siewert Equipment Co. Inc.
175 AKRON STREET, ROCHESTER, NY 14609 USA
Tel: 585-482-9640 Fax: 585-482-4149 siewertequipment.com

Customer :
Reference :

Multi-Speed Performance Curve

Ebara Quotation System 22.0.0



Item number	: 001	Product Description	: 80DLMKFU65.5	Flow, rated	: 220.0 USgpm
Service	:	Stages	: 1	Differential head / pressure, rated	: 54.00 ft
Quantity	: 1	Efficiency	: 54.92 %	Speed, rated	: 1745 rpm
Quote number	: 760619	Power, rated	: 5.46 hp	Impeller diameter, rated	: 8.54 in
Based on curve number	: DLMK-C604-9203	NPSH required	: -	Fluid density, rated / max	: 1.000 / 1.000 SG
		Site Supply Frequency	: 60 Hz	Viscosity	: 1.00 cP
Date last saved	: 14 Mar 2022 3:37 AM	Nominal speed	: 1760 rpm	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

Siewert Equipment Co. Inc.
175 AKRON STREET, ROCHESTER, NY 14609 USA
Tel: 585-482-9640 Fax: 585-482-4149 siewertequipment.com