

HILLSIDE GROVE

FIRE FLOW

DESIGN REPORT

FOR

Meritage Homes
5337 Millenia Lakes Blvd, Ste. 235
Orlando, Florida 32839
Phone: (407) 284-4152

PREPARED BY:



Connelly & Wicker | PrimeAE

10060 Skinner Lake Drive, Suite 500
Jacksonville, Florida 32246
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DATE: April 18, 2025
CWI Project No.: 24-01-0079

Connelly & Wicker | PrimeAE

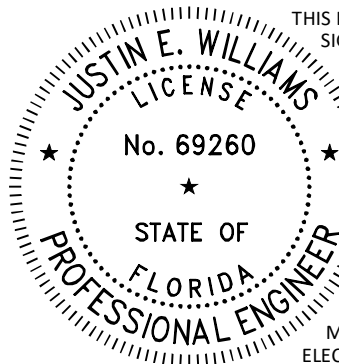
HILLSIDE GROVE

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THIS ITEM HAS BEEN DIGITALLY
SIGNED AND SEALED BY
JUSTIN E. WILLIAMS

**Justin E
Williams**

Digitally signed by Justin E
Williams
DN: cn=Justin E Williams, c=US,
o=CONNELLY AND WICKER
INC.,
email=jwilliams@cwieg.com
Date: 2025.04.21 11:23:18 -04'00'

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Prepared under the direction of

Justin Williams, P.E.
PE # 69260

PROJECT SUMMARY

THE PROJECT

Hillside Groves is a 375.2-acre residential home project located north of State Road 19 and southwest of W. Central Ave. and S. Florida Ave. in Howey in the Hills, Lake County, Florida. It is situated in Section 35, Township 20S, Range 25E.

Hillside Groves is a large PUD with supporting roads and infrastructure. At buildout the project is proposed to include 728 single family and townhome units. The purpose of this report is to demonstrate the potable water system for phase 1 (which includes 215 single family units) is designed to meet the potable water demand for the proposed development.

WATER MAIN DESIGN

The Average Daily Flow (ADF) is calculated based on an average daily flow of 350 gallons per day per residential unit. A peaking factor of 2.06 is used for Maximum Daily Flow (MDF) and a peaking factor of 4.11 is used for Peak Hour Flow (PHF).

Fire protection regulations require that the water mains be designed to meet the needs of the greater of either: peak hour flow or maximum day + fire flow. The greater for this development is maximum day + fire flow. Howey in the Hills Land Development Code Section 8.05.02 requires fire flow design provide 500 gpm at 20 psi.

CONNECTION CONDITION

The project connection point will be to an 12" water main on Number 2 Road. The connection point is modeled as a pump with a pump curve matching the measured conditions during a fire flow test performed by Howey in the Hills Utility. Refer to the flow test results included in the appendix of this calculation booklet.

DESIGN ANALYSIS

The modeling for this system was accomplished using Bentley OpenFlows WaterCAD 2024.

[illegible]

Designed By: Justin Williams

Project No: 24-01-0079

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HILLSIDE GROVE

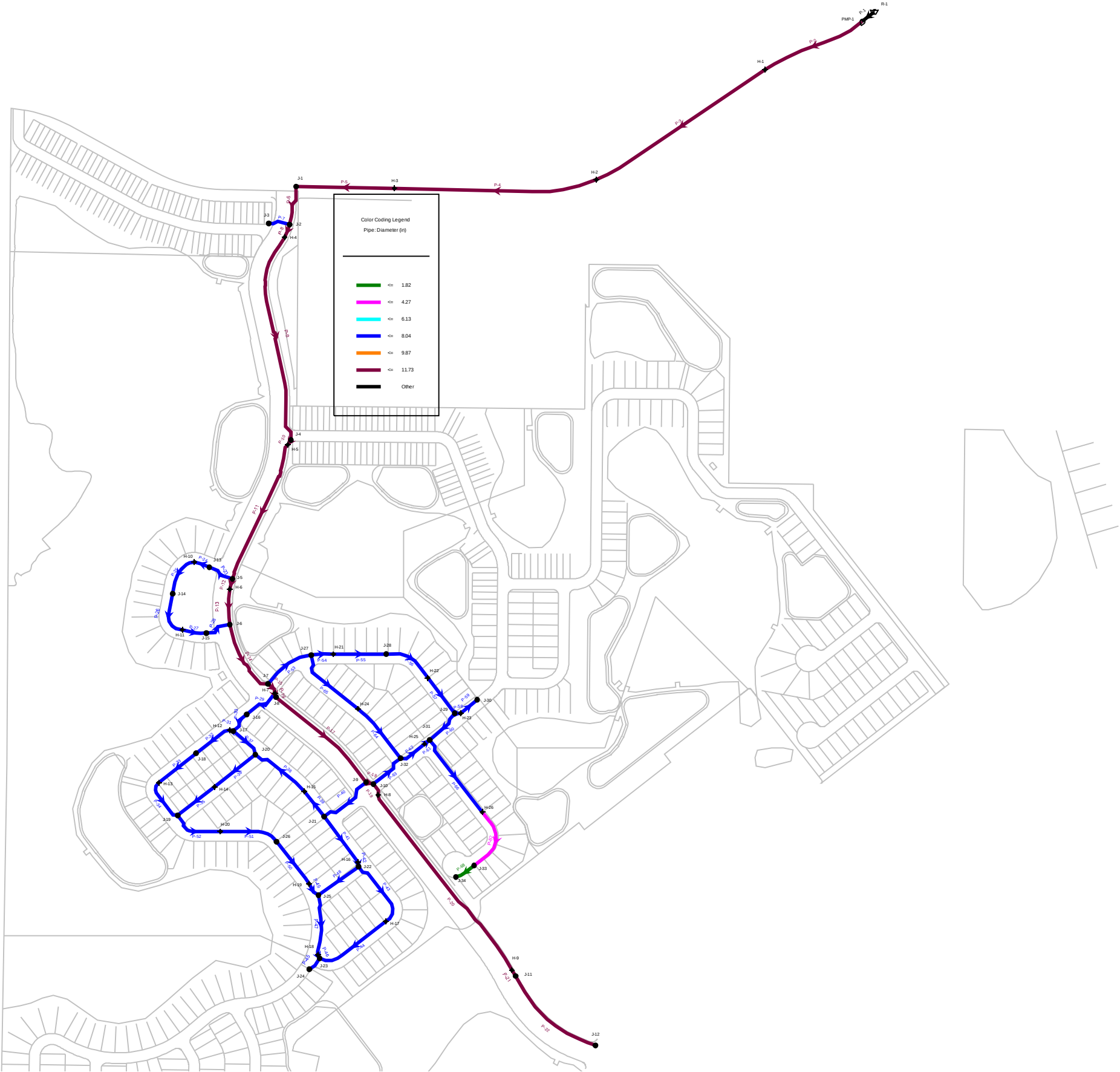
Pump Curve Data

Fire Flow Test		
Static (Head Psi)	75	
Fire (Head Psi)	20	
Residual (Head Psi)	30	
Design Head (Psi)	40	
Flow (Gpm)	750	
Fire Flow (Gpm)	836	
Design Head (ft)	173.1	
Max Operating Head (ft)	46.2	
Fire Flow (Gpm)	655	
Approximate Flow (Gpm) at 20 PSI	836	
Pump Curve Data	Discharge (Gpm)	Head (Ft)
Shutoff	0.0	173.1
Design	655	92.3
Flow at Test	750	69.2
Max Operating	836	46.2

Notes:

1. Fire Flow Test information and data provided by Howey in the Hills Utility Supervisor via email dated April 28, 2022.

Scenario: Base



FlexTable: Hydrant Table

Label	Elevation (ft)	Pressure (psi)	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Calculated Residual) (psi)	Satisfies Fire Flow Constraints?
H-1	83.80	73.7	500.00	725.73	20.0	True
H-2	85.20	73.1	500.00	714.86	20.0	True
H-3	84.50	73.4	500.00	711.47	20.0	True
H-4	87.50	72.1	500.00	696.02	20.0	True
H-5	86.90	72.3	500.00	691.11	20.0	True
H-6	87.10	72.2	500.00	685.18	20.0	True
H-7	87.00	72.3	500.00	681.90	20.0	True
H-8	86.40	72.5	500.00	682.19	20.0	True
H-9	87.70	72.0	500.00	672.83	20.1	True
H-10	87.00	72.3	500.00	682.60	20.0	True
H-11	87.00	72.3	500.00	682.07	20.0	True
H-12	87.60	72.0	500.00	674.09	20.1	True
H-13	87.40	72.1	500.00	672.72	20.1	True
H-14	88.60	71.6	500.00	669.10	20.1	True
H-15	88.10	71.8	500.00	671.92	20.1	True
H-16	90.00	71.0	500.00	663.06	20.0	True
H-17	96.70	68.1	500.00	636.31	20.0	True
H-18	93.60	69.4	500.00	647.16	20.0	True
H-19	92.60	69.8	500.00	652.81	20.0	True
H-20	88.80	71.5	500.00	666.59	20.1	True
H-21	86.90	72.3	500.00	677.05	20.1	True
H-22	86.10	72.6	500.00	677.19	20.1	True
H-23	85.30	73.0	500.00	678.61	20.1	True
H-24	87.00	72.3	500.00	676.23	20.1	True
H-25	86.10	72.6	500.00	679.51	20.0	True
H-26	89.40	71.2	500.00	655.17	20.0	True

FlexTable: Junction Table

Label	Demand (gpm)	Elevation (ft)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Pressure (Residual Lower Limit) (psi)
J-1	0.00	86.20	254.13	72.7	167.93	20.0
J-2	0.00	87.20	254.12	72.2	166.92	20.0
J-3	0.00	87.10	254.12	72.3	167.02	20.0
J-4	0.00	86.70	254.07	72.4	167.37	20.0
J-5	0.00	86.80	254.04	72.4	167.24	20.0
J-6	0.00	86.90	254.03	72.3	167.13	20.0
J-7	0.00	86.60	254.02	72.4	167.42	20.0
J-8	0.00	87.00	254.02	72.3	167.02	20.0
J-9	0.00	87.00	254.01	72.3	167.01	20.0
J-10	0.00	87.00	254.01	72.3	167.01	20.0
J-11	0.00	87.70	254.01	72.0	166.31	20.0
J-12	0.00	86.40	254.01	72.5	167.61	20.0
J-13	1.00	86.60	254.04	72.4	167.44	20.0
J-14	6.00	87.60	254.03	72.0	166.43	20.0
J-15	1.50	86.60	254.03	72.4	167.43	20.0
J-16	1.00	87.20	254.01	72.2	166.81	20.0
J-17	0.00	87.60	254.01	72.0	166.41	20.0
J-18	9.00	88.20	254.01	71.7	165.81	20.0
J-19	8.50	87.90	254.00	71.9	166.10	20.0
J-20	9.00	88.30	254.01	71.7	165.71	20.0
J-21	7.50	87.50	254.01	72.0	166.51	20.0
J-22	5.00	90.80	254.00	70.6	163.20	20.0
J-23	6.00	93.50	254.00	69.4	160.50	20.0
J-24	0.00	93.70	254.00	69.4	160.30	20.0
J-25	4.50	92.80	254.00	69.7	161.20	20.0
J-26	7.00	90.70	254.00	70.7	163.30	20.0
J-27	9.00	87.20	254.01	72.2	166.81	20.0
J-28	6.50	86.50	254.01	72.5	167.51	20.0
J-29	3.50	85.30	254.01	73.0	168.71	20.0
J-30	1.00	85.70	254.01	72.8	168.31	20.0
J-31	5.50	86.10	254.01	72.6	167.91	20.0
J-32	8.50	85.70	254.01	72.8	168.31	20.0
J-33	6.00	91.30	254.00	70.4	162.70	20.0
J-34	1.50	91.90	253.98	70.1	162.08	20.0

FlexTable: Pipe Table

Label	Diameter (in)	Has User Defined Length?	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Minor Loss Coefficient (Unified)	Headloss (Friction) (ft)	Headloss (Minor) (ft)	Headloss (ft)
P-1	999.00	True	1	PVC	140.0	107.50	0.00	0.000	0.00	0.00	0.00
P-2	11.73	False	497	PVC	140.0	107.50	0.32	0.780	0.02	0.00	0.02
P-3	11.73	False	921	PVC	140.0	107.50	0.32	0.740	0.04	0.00	0.04
P-4	11.73	False	932	PVC	140.0	107.50	0.32	0.740	0.04	0.00	0.04
P-5	11.73	False	449	PVC	140.0	107.50	0.32	0.740	0.02	0.00	0.02
P-6	11.73	False	183	PVC	140.0	107.50	0.32	1.180	0.01	0.00	0.01
P-7	8.04	False	100	PVC	140.0	0.00	0.00	2.070	0.00	0.00	0.00
P-8	11.73	False	61	PVC	140.0	107.50	0.32	0.740	0.00	0.00	0.00
P-9	11.73	False	976	PVC	140.0	107.50	0.32	3.580	0.04	0.01	0.04
P-10	11.73	False	26	PVC	140.0	107.50	0.32	0.550	0.00	0.00	0.00
P-11	11.73	False	672	PVC	140.0	107.50	0.32	3.770	0.03	0.01	0.03
P-12	11.73	False	49	PVC	140.0	88.13	0.26	0.390	0.00	0.00	0.00
P-13	11.73	False	162	PVC	140.0	88.13	0.26	0.390	0.00	0.00	0.00
P-14	11.73	False	347	PVC	140.0	99.00	0.29	2.380	0.01	0.00	0.01
P-15	11.73	False	57	PVC	140.0	71.73	0.21	0.550	0.00	0.00	0.00
P-16	11.73	False	18	PVC	140.0	39.76	0.12	0.350	0.00	0.00	0.00
P-17	11.73	False	569	PVC	140.0	39.76	0.12	0.980	0.00	0.00	0.00
P-18	11.73	False	35	PVC	140.0	14.23	0.04	0.750	0.00	0.00	0.00
P-19	11.73	False	58	PVC	140.0	0.00	0.00	0.940	0.00	0.00	0.00
P-20	11.73	False	1,012	PVC	140.0	0.00	0.00	1.580	0.00	0.00	0.00
P-21	11.73	False	31	PVC	140.0	0.00	0.00	0.390	0.00	0.00	0.00
P-22	11.73	False	499	PVC	140.0	0.00	0.00	1.480	0.00	0.00	0.00
P-23	8.04	False	123	PVC	140.0	19.37	0.12	2.070	0.00	0.00	0.00
P-24	8.04	False	72	PVC	140.0	18.37	0.12	0.050	0.00	0.00	0.00
P-25	8.04	False	191	PVC	140.0	18.37	0.12	1.190	0.00	0.00	0.00
P-26	8.04	False	205	PVC	140.0	12.37	0.08	0.400	0.00	0.00	0.00
P-27	8.04	False	112	PVC	140.0	12.37	0.08	0.350	0.00	0.00	0.00
P-28	8.04	False	125	PVC	140.0	10.87	0.07	2.070	0.00	0.00	0.00
P-29	8.04	False	173	PVC	140.0	31.97	0.20	2.320	0.00	0.00	0.01
P-30	8.04	False	105	PVC	140.0	30.97	0.20	0.790	0.00	0.00	0.00
P-31	8.04	False	17	PVC	140.0	16.14	0.10	1.480	0.00	0.00	0.00
P-32	8.04	False	190	PVC	140.0	16.14	0.10	0.590	0.00	0.00	0.00
P-33	8.04	False	217	PVC	140.0	7.14	0.05	0.390	0.00	0.00	0.00
P-34	8.04	False	199	PVC	140.0	7.14	0.05	1.190	0.00	0.00	0.00
P-35	8.04	False	213	PVC	140.0	-8.99	0.06	1.670	0.00	0.00	0.00
P-36	8.04	False	238	PVC	140.0	-8.99	0.06	1.720	0.00	0.00	0.00
P-37	8.04	False	152	PVC	140.0	14.83	0.09	2.460	0.00	0.00	0.00
P-38	8.04	False	288	PVC	140.0	-3.15	0.02	1.140	0.00	0.00	0.00
P-39	8.04	False	146	PVC	140.0	-3.15	0.02	1.670	0.00	0.00	0.00
P-40	8.04	False	265	PVC	140.0	-25.53	0.16	4.140	0.00	0.00	0.01
P-41	8.04	False	260	PVC	140.0	14.87	0.09	2.070	0.00	0.00	0.00
P-42	8.04	False	20	PVC	140.0	14.87	0.09	0.590	0.00	0.00	0.00
P-43	8.04	False	328	PVC	140.0	3.91	0.02	1.540	0.00	0.00	0.00
P-44	8.04	False	364	PVC	140.0	3.91	0.02	0.940	0.00	0.00	0.00
P-45	8.04	False	70	PVC	140.0	0.00	0.00	2.070	0.00	0.00	0.00
P-46	8.04	False	18	PVC	140.0	-2.09	0.01	0.740	0.00	0.00	0.00
P-47	8.04	False	277	PVC	140.0	-2.09	0.01	1.340	0.00	0.00	0.00
P-48	8.04	False	225	PVC	140.0	-5.96	0.04	3.390	0.00	0.00	0.00
P-49	8.04	False	69	PVC	140.0	-0.63	0.00	1.140	0.00	0.00	0.00
P-50	8.04	False	244	PVC	140.0	-0.63	0.00	0.390	0.00	0.00	0.00
P-51	8.04	False	272	PVC	140.0	-7.63	0.05	0.250	0.00	0.00	0.00
P-52	8.04	False	236	PVC	140.0	-7.63	0.05	1.440	0.00	0.00	0.00
P-53	8.04	False	245	PVC	140.0	27.27	0.17	2.210	0.00	0.00	0.01
P-54	8.04	False	101	PVC	140.0	11.68	0.07	0.790	0.00	0.00	0.00
P-55	8.04	False	241	PVC	140.0	11.68	0.07	0.500	0.00	0.00	0.00

FlexTable: Pipe Table

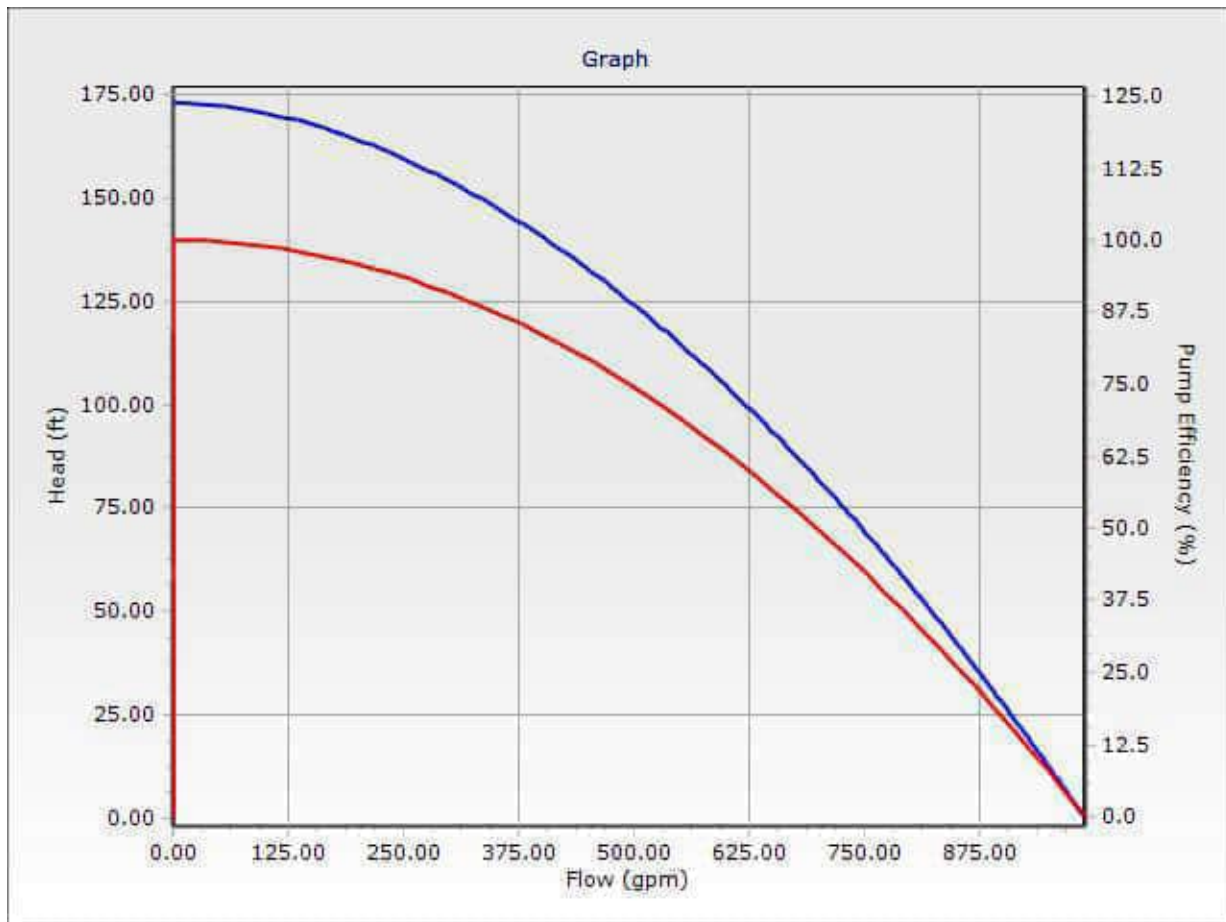
Label	Diameter (in)	Has User Defined Length?	Length (ft)	Material	Hazen- Williams C	Flow (gpm)	Velocity (ft/s)	Minor Loss Coefficient (Unified)	Headloss (Friction) (ft)	Headloss (Minor) (ft)	Headloss (ft)
P-56	8.04	False	237	PVC	140.0	5.18	0.03	0.100	0.00	0.00	0.00
P-57	8.04	False	203	PVC	140.0	5.18	0.03	1.670	0.00	0.00	0.00
P-58	8.04	False	27	PVC	140.0	1.00	0.01	0.940	0.00	0.00	0.00
P-59	8.04	False	98	PVC	140.0	1.00	0.01	0.200	0.00	0.00	0.00
P-60	8.04	False	171	PVC	140.0	0.68	0.00	1.530	0.00	0.00	0.00
P-61	8.04	False	30	PVC	140.0	-12.32	0.08	0.390	0.00	0.00	0.00
P-62	8.04	False	133	PVC	140.0	-12.32	0.08	1.530	0.00	0.00	0.00
P-63	8.04	False	180	PVC	140.0	-14.23	0.09	2.460	0.00	0.00	0.00
P-64	8.04	False	300	PVC	140.0	-6.58	0.04	1.720	0.00	0.00	0.00
P-65	8.04	False	349	PVC	140.0	-6.58	0.04	2.370	0.00	0.00	0.00
P-66	8.04	False	414	PVC	140.0	7.50	0.05	2.070	0.00	0.00	0.00
P-67	4.27	False	307	PVC	140.0	7.50	0.17	0.970	0.01	0.00	0.01
P-68	1.82	False	99	PVC	140.0	1.50	0.18	0.370	0.01	0.00	0.01

FlexTable: Pump Table

Label	Pump Definition	Elevation (ft)	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	No 2 Rd at Mare Ave	84.00	84.00	254.25	107.50	170.25

Pump Definition Detailed Report: No 2 Rd at Mare Ave

Element Details			
ID	259	Notes	
Label	No 2 Rd at Mare Ave		
Pump Definition Type			
Pump Definition Type	Standard (3 Point)	Design Head	92.30 ft
Shutoff Flow	0.00 gpm	Maximum Operating Flow	836.00 gpm
Shutoff Head	173.10 ft	Maximum Operating Head	46.20 ft
Design Flow	655.00 gpm		
Pump Efficiency Type			
Pump Efficiency Type	Best Efficiency Point	Motor Efficiency	100.0 %
BEP Efficiency	100.0 %	Is Variable Speed Drive?	False
BEP Flow	0.00 gpm		
Transient (Physical)			
Inertia (Pump and Motor)	0.000 lb·ft²	Specific Speed	SI=25, US=1280
Speed (Full)	0 rpm	Reverse Spin Allowed?	True



FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)
R-1	84.00	96.75

APPENDIX

Ryan Blaida

From: James Southall <jsouthall@howey.org>
Sent: Thursday, April 28, 2022 1:34 PM
To: Ryan Blaida
Cc: Don Griffey
Subject: Re: The Reserve at Howey

[EXTERNAL EMAIL]

Good Afternoon Ryan,

Per your request I had 3 hydrants retested,

Corner of Mare Hydrant
Static Pressure - 75
GPM - 750
Residual Pressure - 20

Central Ave in front of Citrus Plant
Static Pressure - 75
GPM - 750
Residual Pressure - 30

South Florida and State Road 19
Static Pressure - 70
GPM - 1250
Residual Pressure - 60

The static 20 psi on the Mare Hydrant could be low due to that being the dead end of that line at the Hydrant on the 6-inch main. From there it is reduced down to 2-inch line that feed the homes on Marilyn Ave.

If you have any other questions please feel free to reach out to me.

Thank you
JJ Southall
Utility Supervisor
Howey in the Hills

From: Ryan Blaida <rblaida@zwieng.com>
Sent: Monday, April 25, 2022 2:05 PM
To: James Southall <jsouthall@howey.org>
Cc: Don Griffey <dag@griffeyengineering.com>
Subject: RE: The Reserve at Howey

