



5048 POINTE EMERALD LANE; BOCA RATON, FL
(p) 561.465.5949 | (e) nbarnett@bardezco.com

DATE: February 15, 2024

TO: Pasco County – Utilities Department

RE: Villa Richey - Fire Flow Calculations

To Whom it May Concern:

The applicant intends to develop the currently unoccupied property at 4206/4210 Madison Street into a multi-family residential community. The development, known as Villa Richey, is for a total of 73 new multi-family residential/townhouse units.

The water distribution system proposed for Villa Richey consists of nearly 1,100-lf of 8" pvc pipe and three fire hydrants. For analysis of the proposed water distribution system, anticipated flow demands for the Villa Richey development are calculated below. The calculations are prepared in accordance with the guidelines outlined under Section B1.8. of the Pasco County Utilities Departments Technical Manual:

Average Day Water Demand:

$$= 73 \text{ Multi-Family (Townhouse) units} \times 175 \text{ gpd/ERU}$$
$$= 12,775 \text{ gallons per day, } 12,775 \text{ gpd} / (24 \text{ hr/day} \times 60 \text{ min/hr}) =$$

8.87 gallons per minute

Maximum Day Water Demand:

$$= \text{Average Day Water Demand} \times 1.67$$
$$= 8.87 \text{ gpm} \times 1.67 =$$

14.81 gallons per minute

Peak Hour Demand:

$$= \text{Average Day Water Demand} \times 4.0$$
$$= 8.87 \times 4.0 =$$

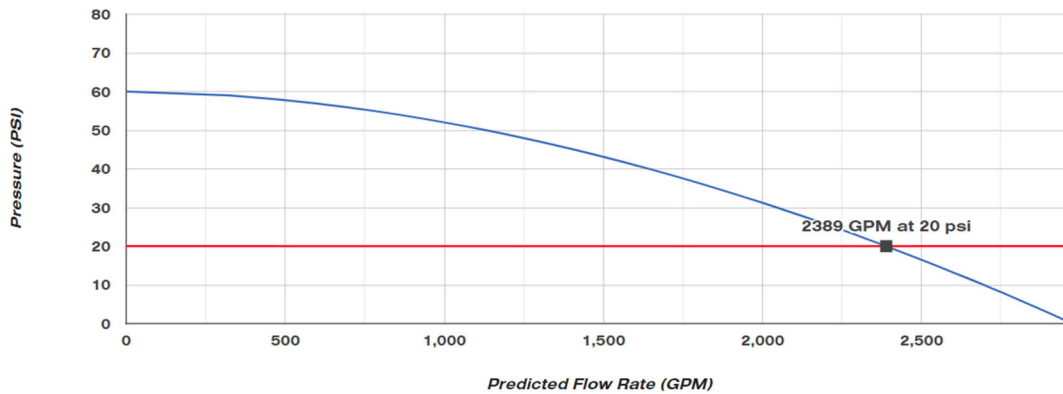
35.48 gallons per minute

Presented in the following table are results of hydrant flow testing performed and made available through the Pasco County Fire Department:

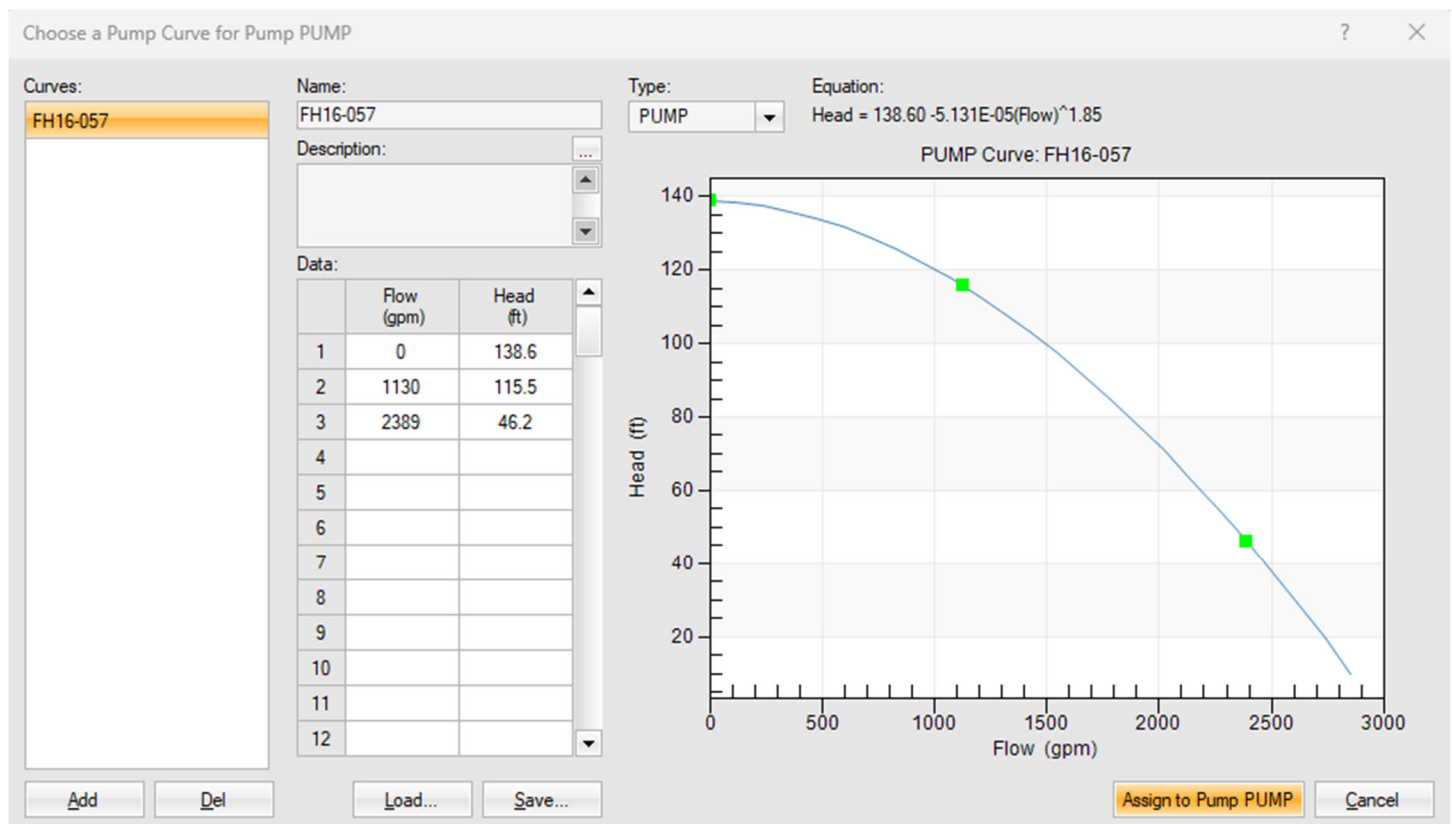
	DESCRIPTION	STATIC	RESIDUAL	FLOW
TEST HYDRANT	Map/Hydrant No. 057-16 Hydrant #3 on Map 40 4244 Madison Street	60 PSI	50 PSI	1,130 GPM



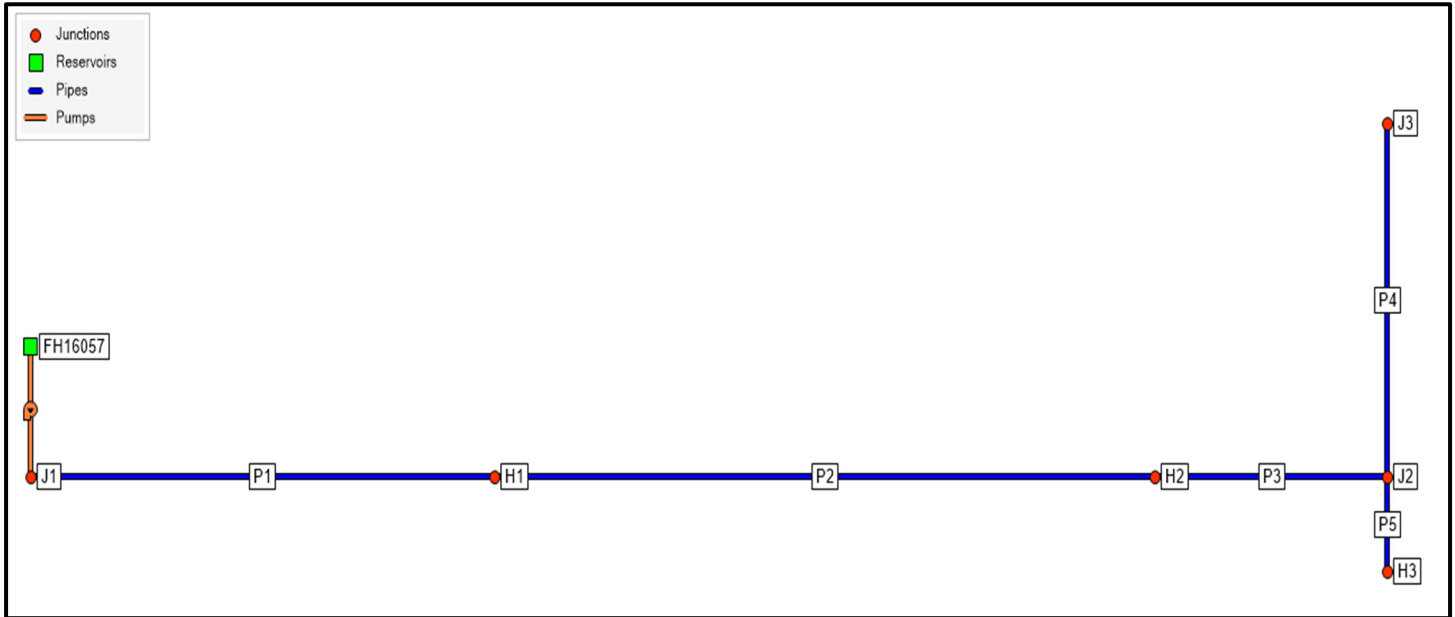
Based on the hydrant flow test results, an available fire flow of 2,389 GPM @ 20 psi residual is predicted at the Villa Richey point of connection:



As part of our analysis, the water pressures and flowrates available to the development are modeled as a pump curve at the point of connection. The following pump curve has been constructed utilizing the 2,389 gpm @ 20 psi/46.2ft-hd, a static flowrate of 0 gpm @ 60 psi/138.6ft-hd, and a residual flowrate of 1,130 gpm @ 50 psi/115.5ft-hd:



The following graphic is a plan view of the model used in our analysis. As shown in the graphic, our model consists of the pump described above ('FH16057'), the development's point of connection in Madison Street ('J1'), the proposed 8" PVC water pipe ('P1' through 'P5'), and the three proposed fire hydrants ('H1', 'H2', and 'H3').



Presented in the following tables are the peak hourly demand (17.74+17.74 = 35.48 gpm) analysis results:

Peak Hour Demand 50/50 @ J2/J3:

Table 1: Junctions					
Name	Elevation (ft)	Demand (gpm)	Head (FT)	Min. Pressure (psi)	Pattern
H1	48.25	0	138.5	39.1	-
H2	43.25	0	138.5	41.3	-
H3	42	0	138.5	41.8	-
J1	43.5	0	138.6	41.2	-
J2	42.25	17.74	138.5	41.7	constant
J3	41.25	17.74	138.5	42.1	constant

Table 2: Pipes					
Name	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (fps)
P1	340	8	100	35.5	0.23
P2	399	8	100	-35.5	0.23
P3	236	8	100	-35.5	0.23
P4	125	8	100	-17.7	0.11
P5	50	8	100	0.0	0.00

As demonstrated in the above junction table, system pressures are maintained above 35 psi while delivering the peak hourly flow demand which is consistent with the hydraulic calculations/modeling requirements outlined in Section A2.2.2.1. of the Pasco County Utilities Departments Technical Manual.

Presented in the following tables are the fire flow (1,000 gpm) + maximum daily demand (7.405 + 7.405 = 14.81 gpm) analysis results:

Fire Flow Scenario 1: 1,000 GPM @ H1, Max Day Demand 50/50 @ J2/J3

Table 1: Junctions					
Name	Elevation (ft)	Demand (gpm)	Head (FT)	Min. Pressure (psi)	Pattern
H1	48.25	1000	109.3	26.5	2hrFire
H2	43.25	0	109.3	28.6	-
H3	42	0	109.3	29.2	-
J1	43.5	0	119.7	33.0	-
J2	42.25	7.405	109.3	29.1	constant
J3	41.25	7.405	109.3	29.5	constant

Table 2: Pipes					
Name	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (fps)
P1	340	8	100	1014.8	6.48
P2	399	8	100	-14.8	0.10
P3	236	8	100	-14.8	0.10
P4	125	8	100	-7.4	0.05
P5	50	8	100	0.0	0.00

Fire Flow Scenario 2: 1,000 GPM @ H2, Max Day Demand 50/50 @ J2/J3

Table 1: Junctions					
Name	Elevation (ft)	Demand (gpm)	Head (FT)	Min. Pressure (psi)	Pattern
H1	48.25	0	109.3	26.5	-
H2	43.25	1000	97.1	23.3	2hrFire
H3	42	0	97.1	23.9	-
J1	43.5	0	119.7	33.0	-
J2	42.25	7.405	97.1	23.8	constant
J3	41.25	7.405	97.1	24.2	constant

Table 2: Pipes					
Name	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (fps)
P1	340	8	100	1014.8	6.48
P2	399	8	100	-1014.8	6.48
P3	236	8	100	-14.8	0.10
P4	125	8	100	-7.4	0.05
P5	50	8	100	0.0	0.00

Fire Flow Scenario 3: 1,000 GPM @ H3, Max Day Demand 50/50 @ J2/J3

Table 1: Junctions					
Name	Elevation (ft)	Demand (gpm)	Head (FT)	Min. Pressure (psi)	Pattern
H1	48.25	0	109.3	26.5	-
H2	43.25	0	97.1	23.3	-
H3	42	1000	88.4	20.1	2hrfire
J1	43.5	0	119.7	33.0	-
J2	42.25	7.405	89.9	20.7	constant
J3	41.25	7.405	89.9	21.1	constant

Table 2: Pipes					
Name	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (fps)
P1	340	8	100	1014.8	6.48
P2	399	8	100	-1014.8	6.48
P3	236	8	100	-1014.8	6.48
P4	125	8	100	-7.4	0.05
P5	50	8	100	1000.0	6.38

As demonstrated in the above junction tables, system pressures are maintained above 20 psi while delivering the maximum day demand plus fire flow which is consistent with the hydraulic calculations/modeling requirements outlined in Section A2.2.2.2. of the Pasco County Utilities Departments Technical Manual.

As demonstrated in the above pipe tables, pipe velocities are maintained below 6.5 fps while delivering the maximum day demand plus fire flow which is consistent with the minimum line sizing requirements outlined in Section B1.2.4. of the Pasco County Utilities Departments Technical Manual.

On Behalf of the Applicant,



Noel Barnett, PE, LEED AP
FL Professional Engineer No.: 72006

BARDEZ, LLC

FL Certificate of Auth. No.: 32223

This item has been digitally signed and sealed by Noel A. Barnett, PE on the date adjacent to the seal.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.



Digitally signed
by NOEL
BARNETT
Date:
2024.02.15
20:58:45 -05'00'



PASCO COUNTY FIRE HYDRANT REPORT

Flow tests should take place 6:00 AM to 8:00 AM & 5:00 PM to 8:00 PM to represent high demand periods

Work Order No: Date: Time:

Subdivision:

Line Type/Size: Map & Hydrant No: Traffic Model: Yes ☒ No ☐

Hydrant Location Where Residual PSI Taken:

Address:

Hydrant Manufacturer: Year and Model:

Barrel Size: 4 1/2 ☐ 5 1/4 ☒ Nozzles: 2 1/2 ☒ 4 1/2 ☒

Caps and Chains: Yes ☒ No ☐

Hydrant Height To C/L of 4 1/2 Nozzles:

Hydrant Valve Operations: Yes ☒ No ☐ Number Of Turns:

Hydrant Serviced and Lubricated: Yes ☐ No ☒

Physical Appearance: Good ☐ Fair ☒

Date PSI Gauge And Pitot tube Was Last Calibrated:

Replace Reflective Marker: Yes ☐ No ☒ Gasket Replacement: Yes ☐ No ☒

FLOW TEST RESULTS:

Static: Time: HR @ PER HOUR

Residual: Materials:

Flow: GPM: Est. Water Loss:

Calculated Fire Flow Rate:

Comments:

Inspected By: Timothy Chaban

Reviewed By: _____