Raleigh

TEST LOCATION

Address/Location Description 1208 Jones Dairy Road, Wake Forest
Test hydrant Facility ID WHYD 125123
Flow hydrant Facility ID WHYD 128077

APPLICATION INFORMATION

Name Rivercrest Realty Investors
Address 8816 Six Forks Road, Suite 201, Raleigh, NC 27615
Contact Person Brian Holder Phone 919.846.4046
Email bholder@rivercrestrealty.com

SYSTEM INFORMATION

Test Date March 1, 2023
Nearest Elevated Tank Friendship Chapel
Main Size 12"
Tank Hydraulic Grade 517.47'
Pump Info Forestville P2/P3

Time of Test 12:35 PM
Test Hydrant Elevation 390' +/-
Pressure Zone 523'
Use 20ft below pressure zone (tank overflow) for design*
Theoretical Pressure 55.2 psi

RESULTS

Static Pressure 57 psi
Residual Pressure 51 psi
Outlet Diameter 2 inches

Number of Outlets Flowing 2
Flow Hydrant Discharge Pressure 15.15 psi
Volume of Discharge 638 + 638 = 1,276 gpm
Water usage during test 3,000+/- Total Gal

Test Completed by: Drew King & Danny Wilder
Testing Company: Associated Fire Protection
Checked by: N/A
Date 3/1/2023

SEAL

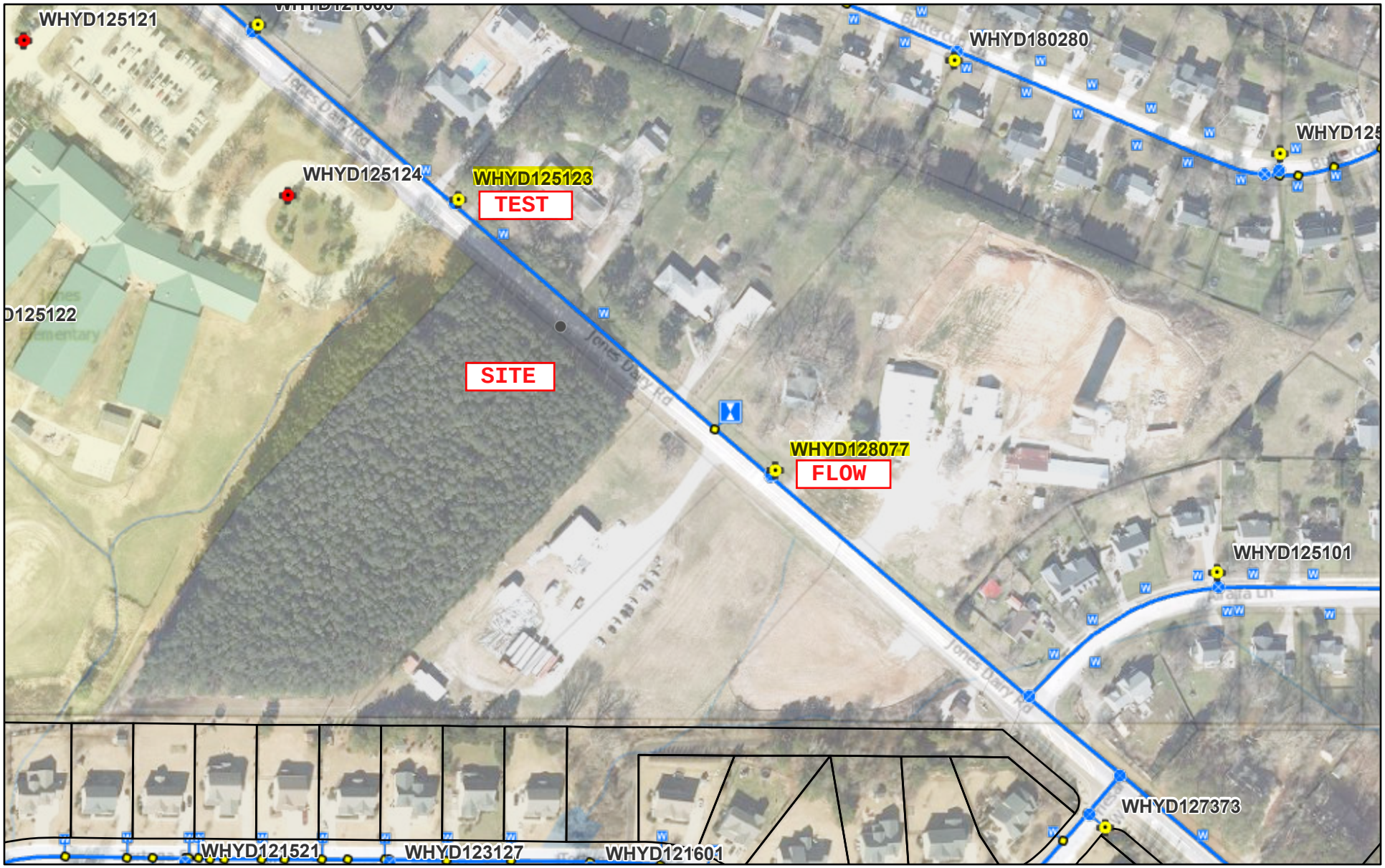
Notes: Flowed (2) 2-1/2" Hose Monster(s)
with 2" Pitotless Nozzle(s). C = 1.38

Please attach the following supporting documentation to this form;
Labeled map of location of test identifying test hydrant and flow hydrant
Calculation demonstrating how the discharge flow was determined
Calculation demonstrating the available fire flow at a residual pressure of 20 psi
Printout of any recorded data supporting the static and residual pressure at the test hydrant.
Printout of any recorded data supporting the discharge pressure of the flow hydrant.

*To maintain system water quality, storage tanks may be maintained as low as 20' below overflow.

updated February 2020

1208 Jones Dairy Rd



2/28/2023, 7:24:48 AM

1:2,400

0 0.02 0.04 0.08 mi

0 0.03 0.07 0.13 km

City of Raleigh GIS

Water Hydrants Labels
- COR
- Private
- Property- Raleigh

Backflows
- Backflows
- Water System Valves

Backflows
- Reduced Pressure

Water Lateral Lines
- Public

Water Pressure Mains
- COR

Water Fittings
- Fitting

Water Control Valves
- Air Release

Water Service Connections
- Water Meter

Water System Valves
- Gate

Hydrant Flow Test Report

Test Date 3/1/2023 **Test Time** 12:35 PM

Location

1208 Jones Dairy Road
Wake Forest, NC

Tested by

Associated Fire Protection, Inc.
PO Box 28022
Raleigh, NC 27611-28022
DKing@afp-nc.com
919-906-5236

Notes

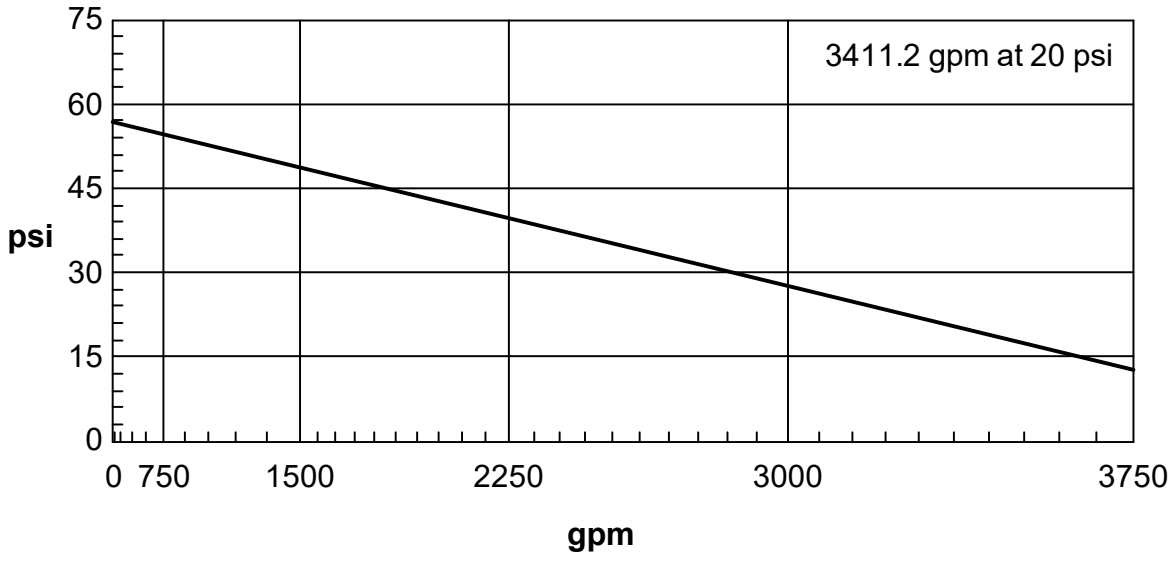
Read Hydrant

57 psi **static pressure**
51 psi **residual pressure**
390 ft **hydrant elevation**

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1	390	2	1.38	15	638 gpm
#2	390	2	1.38	15	638 gpm
				Total	1276 gpm

Flow Graph



2" PITOTLESS NOZZLE™

PN2THD

FLOW CHART

10 - 40 PSI	2 1/2" Hose Monster Model II	Open Atmosphere		41 - 70 PSI	2 1/2" Hose Monster Model II	Open Atmosphere			Key Flow Test Points	2 1/2" Hose Monster Model II	Open Atmosphere	
PSI	GPM	GPM		PSI	GPM	GPM			GPM	PSI	PSI	
10	521	529		41	1055	1071			500	9.5	9.1	
11	547	555		42	1068	1084			562.5	11.7	11.3	
12	571	579		43	1081	1096			750	20.7	20.1	
13	594	603		44	1093	1109			1000	36.8	35.8	
14	617	626		45	1106	1122			1125	46.6	45.3	
15	638	648		46	1118	1134			1500	82.8	80.5	
16	659	669		47	1130	1146						
17	679	689		48	1142	1158						
18	699	709		49	1154	1170						
19	718	729		50	1165	1182						
20	737	748		51	1177	1194						
21	755	766		52	1188	1206						
22	773	784		53	1200	1217						
23	790	802		54	1211	1229						
24	807	819		55	1222	1240						
25	824	836		56	1233	1251						
26	840	853		57	1244	1262						
27	856	869		58	1255	1273						
28	872	885		59	1266	1284						
29	887	900		60	1277	1295						
30	903	916		61	1287	1306						
31	918	931		62	1298	1317						
32	932	946		63	1308	1327						
33	947	960		64	1318	1338						
34	961	975		65	1329	1348						
35	975	989		66	1339	1358						
36	989	1003		67	1349	1369						
37	1002	1017		68	1359	1379						
38	1016	1031		69	1369	1389						
39	1029	1044		70	1379	1399						
40	1042	1057										

The readings on this chart are based on which device the Pitotless Nozzle is connected to.

It is the user's responsibility to verify that the correct chart and column is being used.

- **2 ½" Hose Monster Model II or Flusher with flow splitter (HM2H, HM2HF).** Use this column if the Pitotless Nozzle is connected to the 2 ½" Hose Monster or Flusher. The built-in pitot or flow splitter must be installed for accuracy. If you do not have the built-in pitot or flow splitter, please contact us.
- **Open Atmosphere.** Use this column when the Pitotless Nozzle is connected directly to a test header or hydrant flowing openly to atmosphere.

This chart is FM Approved for flow rate accuracy. Please call us or instruct the Authority Having Jurisdiction to call us if there are any questions. Additional copies of flow charts are available at:
www.hosemonster.com/literature.html

FM APPROVED

The HOSE MONSTER COMPANY
Division of Hydro Flow Products, Inc.

Updated Jun. 2015

MANUFACTURED BY:
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U. S. Patent # 6,874,375

Calculating Flow-rates

The flow charts we provide with the Pitotless Nozzle™, Hose Monster® and Nozzle Inserts are correct and should be referred to first. Our flow charts are calculated using K-Factors derived from testing performed at FM Approvals. It is common for third-party software to use the pitot formula to compute flow-rate. The 2½" Hose Monster uses a pitot to measure velocity pressure. The Pitotless Nozzle and 4" and 4½" Hose Monsters do not use a pitot, and the pitot formula has to be tricked into calculating correct flow-rates. Entering the coefficients into a program that uses orifice diameter, coefficient and velocity pressure should give relatively accurate flow-rates. Check results against our flow charts.

Here are the equations used for calculating flow-rates and predicting flow-rates. Use the orifice diameter, coefficient or K-factor found on the next page.

K-factor Formula

Computes a flow-rate in GPM given a psi and a K-factor of the flow device.

$$Q = \sqrt{P} \times K$$

Q = flow-rate in GPM, P = velocity pressure in psi, K = K-factor of flow device

Pitot Formula

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P} \times D^2 \times C$$

Q = flow-rate in GPM, P = velocity pressure in psi, D = orifice diameter in inches
C = coefficient of flow device

Equation for Determining Rated Capacity

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity).

The example below enables you to find the predicted flow-rate at 20 psi residual pressure.

$$Q_R = Q_F \times (H_R^{0.54} / H_F^{0.54})$$

Q_R = Flow-rate predicted at the desired residual pressure in GPM

Q_F = Total test flow-rate measured during test in GPM
(GPM measured from Hose Monster or Pitotless Nozzle)

H_R = Pressure drop from static pressure to desired residual pressure
(Static – 20 psi [if 20 psi is the desired residual pressure])

H_F = Actual pressure drop measured during the test (Static – Actual Residual)

(Source: NFPA 291, 2010)

Conversion Factors

Here are some conversion factors for switching between US and metric units:

Flow-rate:

US Gallons per Minute x 3.785 = Liters per Minute
Liters per Minute x 0.264 = US Gallons per Minute

US Gallons per Minute x 0.1337 = Cubic Feet per Minute
Cubic Feet per Minute x 7.481 = US Gallons per Minute

Volume:

US Gallons x 3.785 = Liters
Liters x 0.264 = US Gallons

US Gallons x 0.8327 = Imperial Gallons
Imperial Gallons x 1.201 = US Gallons

Cubic Feet x 7.48051945 = US Gallons
US Gallons x 0.1337 = Cubic Feet

Pressure:

psi x 0.0689 = Bars
Bars x 14.5038 = psi

psi x 6894.757 = Pascals
Pascals x 0.000145 = psi

Bars x 100,000 = Pascals
Pascals x 0.00001 = Bars

Weight of Water:

US Gallons of Water x 8.3454 = Pounds
Cubic Feet of Water x 62.42796 = Pounds

Length:

Meters x 3.2808 = Feet
Feet x 0.3048 = Meters

Coefficient and K-Factor Table for Various Flow Devices

last update: 2/14/2012

Pitotless Nozzle™

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
2" Pitotless Nozzle + Little Hose Monster™	156.0	1.31	2"	10–70	490–1300
2" Pitotless Nozzle + 2½" Hose Monster Steel	164.8	1.38	2"	10–80	520–1380
2" Pitotless Nozzle + Open Atmosphere	167.2	1.40	2"	10–70	530–1400
1¾" Pitotless Nozzle + Little Hose Monster	104.7	1.15	1.75"	10–90	330–1000
1¾" Pitotless Nozzle + 2½" Hose Monster Steel	106.6	1.17	1.75"	10–90	340–1010
1¾" Pitotless Nozzle + Open Atmosphere	109.7	1.20	1.75"	10–90	350–1040
1⅛" Pitotless Nozzle + Little Hose Monster	37.2	0.98	1.125"	5–90	80–350
1⅛" Pitotless Nozzle + 2½" Hose Monster Steel	37.4	0.99	1.125"	5–90	80–350
1⅛" Pitotless Nozzle + Open Atmosphere	37.0	0.98	1.125"	5–90	80–350
1" Pitotless Nozzle + Little Hose Monster	27.2	0.91	1"	3–90	50–260
1" Pitotless Nozzle + 2½" Hose Monster Steel	27.6	0.93	1"	3–90	50–260
1" Pitotless Nozzle + Open Atmosphere	27.7	0.93	1"	3–90	50–260

In-Line Pitotless Nozzle™

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
2" In-line Pitotless Nozzle	165.3	1.38	2"	10–75	530–1430
1¾" In-line Pitotless Nozzle	109.9	1.20	1.75"	5–80	250–980
1⅛" In-line Pitotless Nozzle	38.4	1.02	1.125"	5–70	90–320

BigBoy Hose Monster™

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
4 to 10 psi (BigBoy Hose Monster)	382.9	1.38	3.05"	4–10	766–1211
11 to 36 psi (BigBoy Hose Monster)	376.0	1.35	3.05"	11–36	1247–2256
37 to 53 psi (BigBoy Hose Monster)	372.0	1.34	3.05"	37–53	2263–2708

Note: Due to the shape and size of the BigBoy Pitotless Nozzle, the BigBoy Hose Monster uses three different k-factors over its operating range.

2½" Hose Monster®

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
2½" Hose Monster	168.67	0.906	2.5"	10–75	530–1460
1¾" Nozzle Insert	89.04	0.975	1.75"	10–75	280–770
1⅛" Nozzle Insert	37.36	0.99	1.125"	10–75	120–320

4" and 4½" Hose Monster®

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
4½" Hose Monster	331.07	0.548	4.5"	10–75	1050–2870
4" Hose Monster	339.65	0.712	4"	10–75	1070–2940

Using Software

Use the table below if you are using software that requires the coefficient input to be less than '1.0'. Notice that the orifice diameter must be changed from its true diameter in order to accommodate the lower coefficient. This is necessary only for the 2" Pitotless Nozzle and the ¾" Pitotless Nozzle.

Device	Coefficient	Orifice Diameter
2" Pitotless Nozzle + Little Hose Monster	0.99	2.30"
2" Pitotless Nozzle + 2½" Hose Monster Steel	0.99	2.36"
2" Pitotless Nozzle + Open Atmosphere	0.99	2.38"
1¾" Pitotless Nozzle + Little Hose Monster	0.99	1.88"
1¾" Pitotless Nozzle + 2½" Hose Monster Steel	0.99	1.90"
1¾" Pitotless Nozzle + Open Atmosphere	0.99	1.93"

Note: If your software uses the Theoretical Discharge Formula, found in NFPA 291, 4.7.3, the coefficient of discharge can be used to produce flow rates that will match our flow charts.

A hand-held pitot directly at a hydrant outlet

Outlet Type	Coefficient
Outlet smooth and rounded	0.9
Outlet square and sharp	0.8
Outlet square and projecting into barrel	0.7
If a stream straightener is used	0.95

Classifying and Marking of Hydrants

Rated Capacity at 20 psi	Class	Marking Color of Hydrant Tops and Nozzles
≥1500 GPM	AA	Light Blue
1000–1499 GPM	A	Green
500–999 GPM	B	Orange
≤499 GPM	C	Red

The above are the NFPA hydrant classifications and color markings for various rated capacities. Source: NFPA 291, 5.1, 2010.

1208 Jones Dairy Road, Wake Forest flow test - Wednesday, March 1, 2023