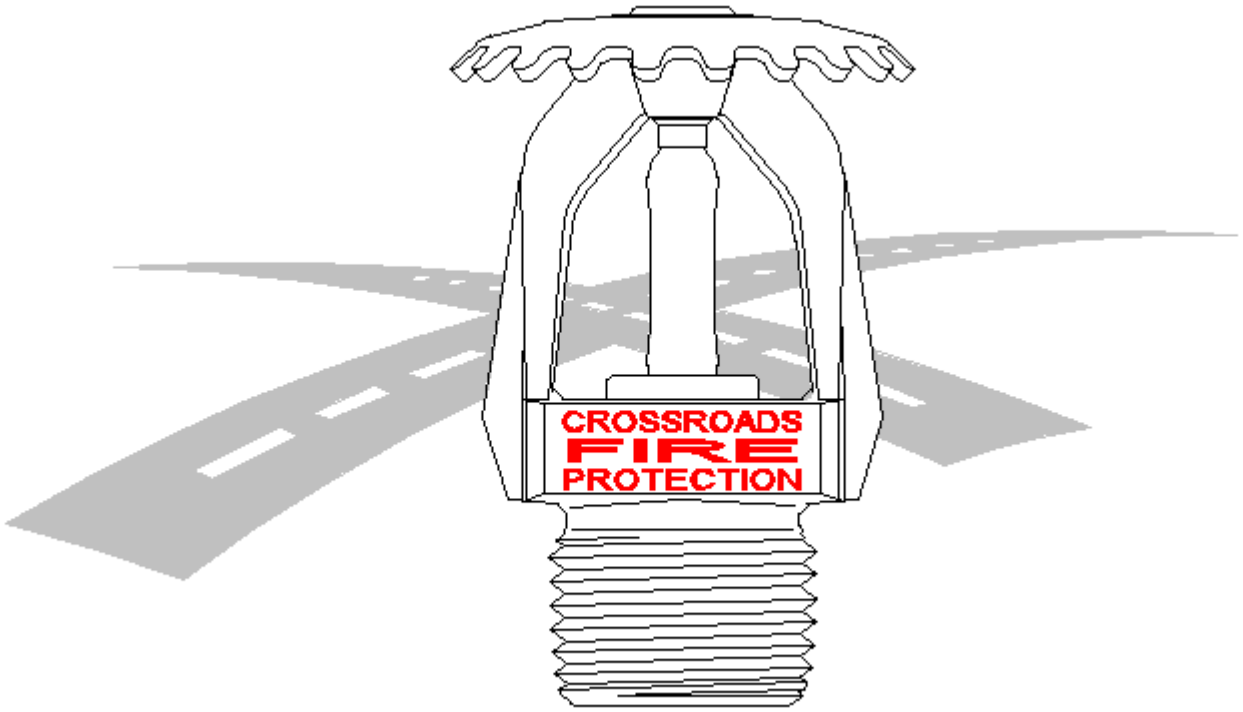
Hydraulic Calculations

Benhaven Emergency Services

13151 NC 27

Broadway, NC 27505

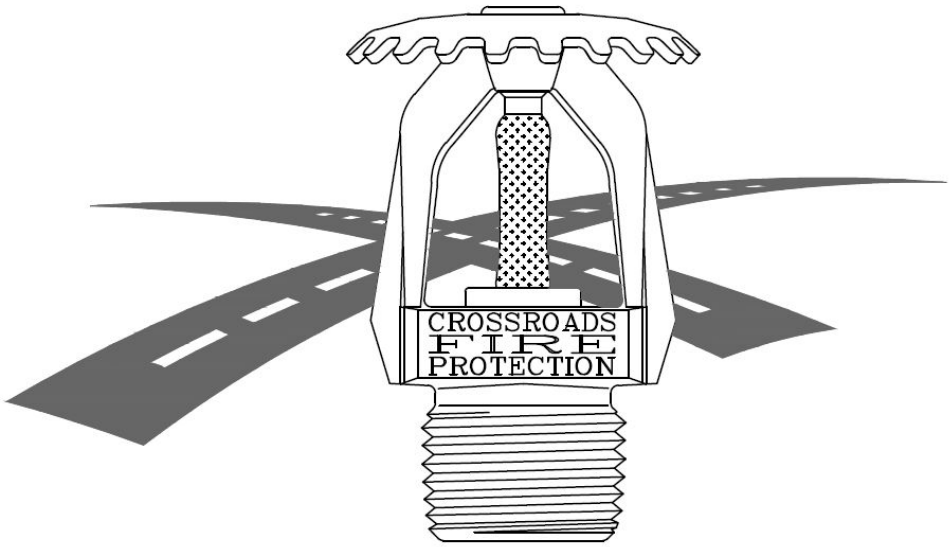


CROSSROADS FIRE PROTECTION

BENSON, NC

919-207-3855

dnelson@crossroadsfire.net



Crossroads Fire Protection
809 South Market Street
P.O. Box 926
Benson, NC 27504
919-207-3855

Job Name	:	Benhaven Emergency Services
Drawing	:	FP1
Location	:	13151 NC 27
Remote Area	:	1
Contract	:	CC-9906
Data File	:	Benhaven Area 1.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME Benhaven Emergency Services
Location 13151 NC 27
Drawing # FP1
Contract # CC-9906
Date 12-12-2022

DESIGN

Remote area # 1
Remote area location Fitness 130
Occupancy classification Light
Density .1 - Gpm/SqFt
Area of application 945 - SqFt
Coverage/sprinkler 225 - SqFt
Type of sprinkler calculated 5.6K QR PD
 # Sprinklers calculated 8
In-rack demand N/A - GPM
Hose streams 100 - GPM
Total water required (including hose streams) 284.062 - GPM @ 57.3012 - Psi
Type of system Wet Grid
Volume of system (dry or pre-action) N/A - Gal

WATER SUPPLY INFORMATION

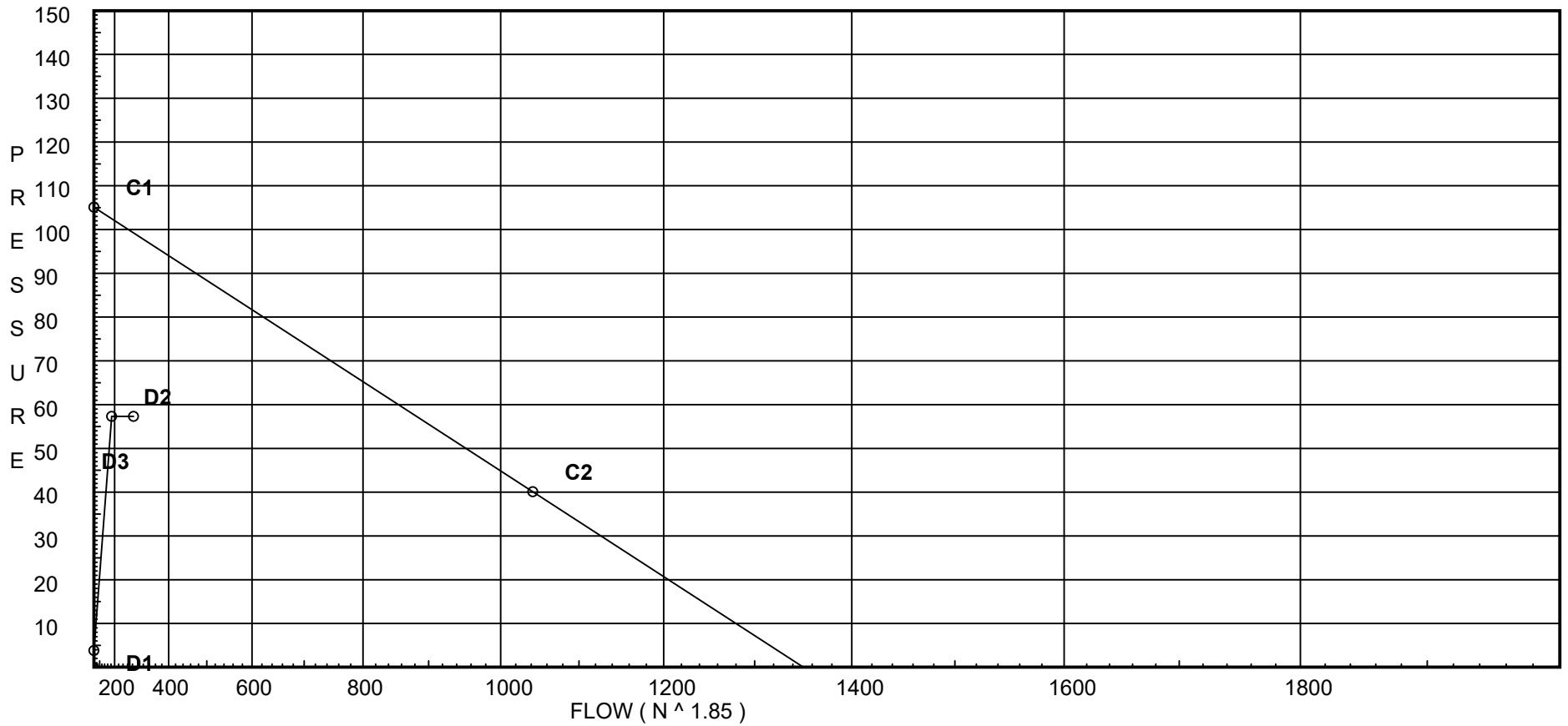
Test date 6-30-2022
Location 13151 NC 27
Source of info EPM

CONTRACTOR INFO Crossroads Fire Protection
Address 809 South Market Street / P.O. Box 926 / Benson, NC 27504
Phone # 919-207-3855
Name of designer DLN
Authority having jurisdiction Harnett County
NOTES:

text1(35) - invisible

City Water Supply:
- C1 - Static Pressure : 105.1
- C2 - Residual Pressure: 40.1
- C2 - Residual Flow : 1042

Demand:
- D1 - Elevation : 3.826
- D2 - System Flow : 184.062
- D2 - System Pressure : 57.301
- Hose (Demand) : 100
- D3 - System Demand : 284.062
- Safety Margin : 41.928



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Zim	Wilkins 375ADA	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
H1	9.833	5.6	16.81	na	22.96	0.1	225	7.0
H2	9.833	5.6	16.64	na	22.84	0.1	225	7.0
H3	11.833	5.6	16.14	na	22.5	0.1	225	7.0
H4	11.833	5.6	16.3	na	22.61	0.1	225	7.0
H5	9.833	5.6	17.6	na	23.49	0.1	225	7.0
H6	9.833	5.6	17.58	na	23.48	0.1	225	7.0
H7	11.833	5.6	17.07	na	23.14	0.1	225	7.0
H8	11.833	5.6	16.94	na	23.05	0.1	225	7.0
201	12.25		18.96	na				
1	12.25		17.79	na				
2	12.25		17.6	na				
3	12.25		17.6	na				
4	12.25		17.77	na				
202	12.25		19.13	na				
5	12.25		18.62	na				
6	12.25		18.61	na				
202B	12.25		18.71	na				
7	12.25		18.61	na				
8	12.25		18.67	na				
203	12.25		20.45	na				
204	12.25		21.25	na				
205	15.0		22.7	na				
H10	18.75		21.05	na				
H11	20.25		20.4	na				
H12	21.75		19.74	na				
H13	23.25		19.08	na				
H14	21.75		19.72	na				
H15	21.25		19.93	na				
206	15.0		23.45	na				
H16	18.75		21.82	na				
H17	20.25		21.18	na				
H18	21.75		20.53	na				
H19	23.25		19.88	na				
H20	21.75		20.53	na				
H21	21.25		20.75	na				
H22	23.25		19.88	na				
H23	21.25		20.75	na				
207	15.0		24.06	na				
208	15.0		24.52	na				
209	15.0		24.87	na				
210	15.0		25.08	na				
211	15.0		25.18	na				
201A	12.25		18.98	na				
202A	12.25		19.7	na				
101	12.25		19.87	na				
102	12.25		20.08	na				
103	12.25		20.85	na				
104	12.25		21.57	na				
105	17.0		21.74	na				
106	17.0		22.59	na				
107	17.0		23.36	na				
108	17.0		24.1	na				
109	17.0		24.96	na				
110	17.0		26.04	na				
111	17.0		27.88	na				
112	17.0		30.61	na				
TOR	11.0		34.62	na				
BOR	1.5		45.28	na				
BF	-3.0		47.33	na				
UG1	-3.0		59.66	na				
UG2	-3.0		59.8	na				

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TEST	3.0		57.3	na	100.0			

The maximum velocity is 16.16 and it occurs in the pipe between nodes 111 and 112

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
*HEADS										
H1	9.833	5.60	22.96	1	2E	4.0	3.083	120	16.809	
to					T	5.0	9.000		-1.047	
1	12.250		22.96	1.049			12.083	0.1680	2.030	Vel = 8.52
			0.0							
1			22.96						17.792	K Factor = 5.44
H2	9.833	5.60	22.84	1	2E	4.0	3.083	120	16.639	
to					T	5.0	9.000		-1.047	
2	12.250		22.84	1.049			12.083	0.1664	2.011	Vel = 8.48
			0.0							
2			22.84						17.603	K Factor = 5.44
H3	11.833	5.60	22.50	1	2E	4.0	1.125	120	16.143	
to					T	5.0	9.000		-0.181	
3	12.250		22.5	1.049			10.125	0.1619	1.639	Vel = 8.35
			0.0							
3			22.50						17.601	K Factor = 5.36
H4	11.833	5.60	22.61	1	2E	4.0	1.125	120	16.298	
to					T	5.0	9.000		-0.181	
4	12.250		22.61	1.049			10.125	0.1634	1.654	Vel = 8.39
			0.0							
4			22.61						17.771	K Factor = 5.36
H5	9.833	5.60	23.49	1	2E	4.0	2.833	120	17.596	
to					T	5.0	9.000		-1.047	
5	12.250		23.49	1.049			11.833	0.1753	2.074	Vel = 8.72
			0.0							
5			23.49						18.623	K Factor = 5.44
H6	9.833	5.60	23.48	1	2E	4.0	2.833	120	17.580	
to					T	5.0	9.000		-1.047	
6	12.250		23.48	1.049			11.833	0.1752	2.073	Vel = 8.72
			0.0							
6			23.48						18.606	K Factor = 5.44
H7	11.833	5.60	23.14	1	2E	4.0	1.125	120	17.067	
to					T	5.0	9.000		-0.181	
7	12.250		23.14	1.049			10.125	0.1705	1.726	Vel = 8.59
			0.0							
7			23.14						18.612	K Factor = 5.36
H8	11.833	5.60	23.05	1	2E	4.0	2.334	120	16.936	
to					T	5.0	9.000		-0.181	
8	12.250		23.05	1.049			11.334	0.1692	1.918	Vel = 8.56
			0.0							
8			23.05						18.673	K Factor = 5.33
*LINES										
201	12.250		-47.42	1.5	T	9.9	8.167	120	18.957	
to							9.900		0.0	
1	12.250		-47.42	1.682			18.067	-0.0645	-1.165	Vel = 6.85
1	12.250		22.96	1.5			10.000	120	17.792	
to									0.0	
2	12.250		-24.46	1.682			10.000	-0.0189	-0.189	Vel = 3.53

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
2	12.250		22.84	1.5			14.167	120	17.603	
to									0.0	
3	12.250		-1.62	1.682			14.167	-0.0001	-0.002	Vel = 0.23
3	12.250		22.50	1.5			12.000	120	17.601	
to									0.0	
4	12.250		20.88	1.682			12.000	0.0142	0.170	Vel = 3.01
4	12.250		22.61	1.5	T	9.9	28.292	120	17.771	
to							9.900		0.0	
101	12.250		43.49	1.682			38.192	0.0549	2.098	Vel = 6.28
			0.0							
101			43.49						19.869	K Factor = 9.76
202	12.250		-30.13	1.5	T	9.9	8.167	120	19.126	
to							9.900		0.0	
5	12.250		-30.13	1.682			18.067	-0.0278	-0.503	Vel = 4.35
5	12.250		23.49	1.5			10.000	120	18.623	
to									0.0	
6	12.250		-6.64	1.682			10.000	-0.0017	-0.017	Vel = 0.96
6	12.250		23.48	1.5	E	4.95	6.333	120	18.606	
to							4.950		0.0	
202B	12.250		16.84	1.682			11.283	0.0095	0.107	Vel = 2.43
202B	12.250		11.09	1.5	E	4.95	25.917	120	18.713	
to					T	9.9	14.850		0.0	
202A	12.250		27.93	1.682			40.767	0.0242	0.987	Vel = 4.03
			0.0							
202A			27.93						19.700	K Factor = 6.29
202B	12.250		-11.09	1.5	T	9.9	13.167	120	18.713	
to							9.900		0.0	
7	12.250		-11.09	1.682			23.067	-0.0044	-0.101	Vel = 1.60
7	12.250		23.13	1.5			12.000	120	18.612	
to									0.0	
8	12.250		12.04	1.682			12.000	0.0051	0.061	Vel = 1.74
8	12.250		23.05	1.5	T	9.9	28.292	120	18.673	
to							9.900		0.0	
102	12.250		35.09	1.682			38.192	0.0369	1.411	Vel = 5.07
			0.0							
102			35.09						20.084	K Factor = 7.83
203	12.250		10.97	1.5	2T	19.799	72.625	120	20.448	
to							19.799		0.0	
103	12.250		10.97	1.682			92.424	0.0043	0.397	Vel = 1.58
			0.0							
103			10.97						20.845	K Factor = 2.40
204	12.250		9.82	1.5	2T	19.799	72.625	120	21.251	
to							19.799		0.0	
104	12.250		9.82	1.682			92.424	0.0035	0.323	Vel = 1.42
			0.0							
104			9.82						21.574	K Factor = 2.11
205	15		-4.31	1.5	E	4.95	12.333	120	22.698	
to					T	9.9	14.850		-1.624	
H10	18.750		-4.31	1.682			27.183	-0.0008	-0.021	Vel = 0.62

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
H10	18.750		0.0	1.5			9.125	120	21.053	
to									-0.650	
H11	20.250		-4.31	1.682			9.125	-0.0008	-0.007	Vel = 0.62
H11	20.250		0.0	1.5			9.125	120	20.396	
to									-0.650	
H12	21.750		-4.31	1.682			9.125	-0.0007	-0.006	Vel = 0.62
H12	21.750		0.0	1.5			9.125	120	19.740	
to									-0.650	
H13	23.250		-4.31	1.682			9.125	-0.0008	-0.007	Vel = 0.62
H13	23.250		0.0	1.5	2E	9.9	9.125	120	19.083	
to							9.900		0.650	
H14	21.750		-4.31	1.682			19.025	-0.0008	-0.015	Vel = 0.62
H14	21.750		0.0	1.5			9.125	120	19.718	
to									0.217	
H15	21.250		-4.31	1.682			9.125	-0.0008	-0.007	Vel = 0.62
H15	21.250		0.0	1.5	2T	19.799	12.167	120	19.928	
to							19.799		1.841	
105	17		-4.31	1.682			31.966	-0.0008	-0.025	Vel = 0.62
			0.0							
105			-4.31						21.744	K Factor = -0.92
206	15		1.31	1.5	E	4.95	12.333	120	23.446	
to					T	9.9	14.850		-1.624	
H16	18.750		1.31	1.682			27.183	0.0001	0.003	Vel = 0.19
H16	18.750		0.0	1.5			9.125	120	21.825	
to									-0.650	
H17	20.250		1.31	1.682			9.125	0.0001	0.001	Vel = 0.19
H17	20.250		0.0	1.5			9.125	120	21.176	
to									-0.650	
H18	21.750		1.31	1.682			9.125	0.0001	0.001	Vel = 0.19
H18	21.750		0.0	1.5			9.125	120	20.527	
to									-0.650	
H19	23.250		1.31	1.682			9.125	0.0001	0.001	Vel = 0.19
H19	23.250		0.0	1.5	2E	9.9	9.125	120	19.878	
to							9.900		0.650	
H20	21.750		1.31	1.682			19.025	0.0001	0.001	Vel = 0.19
H20	21.750		0.0	1.5			9.125	120	20.529	
to									0.217	
H21	21.250		1.31	1.682			9.125	0.0001	0.001	Vel = 0.19
H21	21.250		0.0	1.5	2T	19.799	12.330	120	20.747	
to							19.799		1.841	
106	17		1.31	1.682			32.129	0.0001	0.002	Vel = 0.19
			0.0							
106			1.31						22.590	K Factor = 0.28
206	15		1.31	1.5	E	4.95	39.710	120	23.446	
to					T	9.9	14.850		-3.573	
H22	23.250		1.31	1.682			54.560	0.0001	0.005	Vel = 0.19
H22	23.250		0.0	1.5	2E	9.9	12.167	120	19.878	
to							9.900		0.866	
H23	21.250		1.31	1.682			22.067	0.0001	0.002	Vel = 0.19

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
H23	21.250		0.0	1.5	2T	19.799	18.413	120	20.746	
to							19.799		1.841	
106	17		1.31	1.682			38.212	0.0001	0.003	Vel = 0.19
			0.0							
106			1.31						22.590	K Factor = 0.28
207	15		6.11	1.5	3E	14.849	70.288	120	24.063	
to					3T	29.699	44.548		-0.866	
107	17		6.11	1.682			114.836	0.0015	0.167	Vel = 0.88
			0.0							
107			6.11						23.364	K Factor = 1.26
208	15		10.39	1.5	3E	14.849	70.288	120	24.520	
to					3T	29.699	44.548		-0.866	
108	17		10.39	1.682			114.836	0.0039	0.446	Vel = 1.50
			0.0							
108			10.39						24.100	K Factor = 2.12
209	15		15.73	1.5	3E	14.849	70.288	120	24.867	
to					3T	29.699	44.548		-0.866	
109	17		15.73	1.682			114.836	0.0084	0.961	Vel = 2.27
			0.0							
109			15.73						24.962	K Factor = 3.15
210	15		22.22	1.5	3E	14.849	70.288	120	25.080	
to					3T	29.699	44.548		-0.866	
110	17		22.22	1.682			114.836	0.0159	1.822	Vel = 3.21
			0.0							
110			22.22						26.036	K Factor = 4.35
211	15		31.92	1.5	3E	14.849	70.288	120	25.182	
to					3T	29.699	44.548		-0.866	
111	17		31.92	1.682			114.836	0.0310	3.560	Vel = 4.61
			0.0							
111			31.92						27.876	K Factor = 6.05
*MAINS										
201	12.250		47.42	2			1.000	120	18.957	
to									0.0	
201A	12.250		47.42	2.157			1.000	0.0190	0.019	Vel = 4.16
201A	12.250		0.0	2			7.792	120	18.976	
to									0.0	
202	12.250		47.42	2.157			7.792	0.0193	0.150	Vel = 4.16
202	12.250		30.13	2			12.042	120	19.126	
to									0.0	
202A	12.250		77.55	2.157			12.042	0.0477	0.574	Vel = 6.81
202A	12.250		27.93	2			8.875	120	19.700	
to									0.0	
203	12.250		105.48	2.157			8.875	0.0843	0.748	Vel = 9.26
203	12.250		-10.97	2			11.667	120	20.448	
to									0.0	
204	12.250		94.51	2.157			11.667	0.0688	0.803	Vel = 8.30
204	12.250		-9.82	2	4E	24.613	22.375	120	21.251	
to							24.613		-1.191	
205	15		84.69	2.157			46.988	0.0561	2.638	Vel = 7.44

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
205	15		4.31	2			12.167	120	22.698	
to									0.0	
206	15		89.0	2.157			12.167	0.0615	0.748	Vel = 7.81
206	15		-2.63	2			10.583	120	23.446	
to									0.0	
207	15		86.37	2.157			10.583	0.0583	0.617	Vel = 7.58
207	15		-6.11	2			9.000	120	24.063	
to									0.0	
208	15		80.26	2.157			9.000	0.0508	0.457	Vel = 7.05
208	15		-10.39	2			8.833	120	24.520	
to									0.0	
209	15		69.87	2.157			8.833	0.0393	0.347	Vel = 6.13
209	15		-15.73	2			8.667	120	24.867	
to									0.0	
210	15		54.14	2.157			8.667	0.0246	0.213	Vel = 4.75
210	15		-22.22	2			11.083	120	25.080	
to									0.0	
211	15		31.92	2.157			11.083	0.0092	0.102	Vel = 2.80
			0.0							
211			31.92						25.182	K Factor = 6.36
101	12.250		43.49	2			13.125	120	19.869	
to									0.0	
102	12.250		43.49	2.157			13.125	0.0164	0.215	Vel = 3.82
102	12.250		35.09	2			15.583	120	20.084	
to									0.0	
103	12.250		78.58	2.157			15.583	0.0488	0.761	Vel = 6.90
103	12.250		10.97	2			11.709	120	20.845	
to									0.0	
104	12.250		89.55	2.157			11.709	0.0623	0.729	Vel = 7.86
104	12.250		9.82	2	2E	12.307	17.205	120	21.574	
to							12.307		-2.057	
105	17		99.37	2.157			29.512	0.0755	2.227	Vel = 8.72
105	17		-4.31	2			12.167	120	21.744	
to									0.0	
106	17		95.06	2.157			12.167	0.0695	0.846	Vel = 8.35
106	17		2.63	2			10.583	120	22.590	
to									0.0	
107	17		97.69	2.157			10.583	0.0731	0.774	Vel = 8.58
107	17		6.12	2			9.000	120	23.364	
to									0.0	
108	17		103.81	2.157			9.000	0.0818	0.736	Vel = 9.11
108	17		10.39	2			8.833	120	24.100	
to									0.0	
109	17		114.2	2.157			8.833	0.0976	0.862	Vel = 10.03
109	17		15.72	2			8.667	120	24.962	
to									0.0	
110	17		129.92	2.157			8.667	0.1239	1.074	Vel = 11.41
110	17		22.23	2			11.083	120	26.036	
to									0.0	
111	17		152.15	2.157			11.083	0.1660	1.840	Vel = 13.36

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
111	17		31.91	2	E	6.153	5.417	120	27.876	
to							6.153		0.0	
112	17		184.06	2.157			11.570	0.2360	2.730	Vel = 16.16
112	17		0.0	2			6.000	120	30.606	
to									2.599	
TOR	11		184.06	2.157			6.000	0.2360	1.416	Vel = 16.16
TOR	11		0.0	2.5	Fsp	0.0	11.000	120	34.621	
to					B	9.61	28.830		7.114	* * Fixed Loss = 3
BOR	1.500		184.06	2.635	S	19.22	39.830	0.0891	3.548	Vel = 10.83
BOR	1.500		0.0	6	E	25.457	64.166	150	45.283	
to					2F	25.457	50.914		1.949	
BF	-3		184.06	6.3			115.080	0.0008	0.097	Vel = 1.89
BF	-3		0.0	8	4E	130.138	84.833	150	47.329	
to					T	63.262	200.629		12.270	* * Fixed Loss = 12.27
UG1	-3		184.06	8.28	Zim	0.0	285.462	0.0002	0.063	Vel = 1.10
					G	7.23				
UG1	-3		0.0	8	4F	65.069	493.000	150	59.662	
to					2G	14.46	142.790		0.0	
UG2	-3		184.06	8.28	T	63.262	635.790	0.0002	0.142	Vel = 1.10
UG2	-3		0.0	6	T	54.552	27.708	150	59.804	
to					G	5.455	85.464		-2.599	
TEST	3		184.06	6.3	E	25.457	113.172	0.0008	0.096	Vel = 1.89
			100.00							Qa = 100.00
TEST			284.06						57.301	K Factor = 37.53

Auto Peaking Summary - List of Pipes for Area Calculated

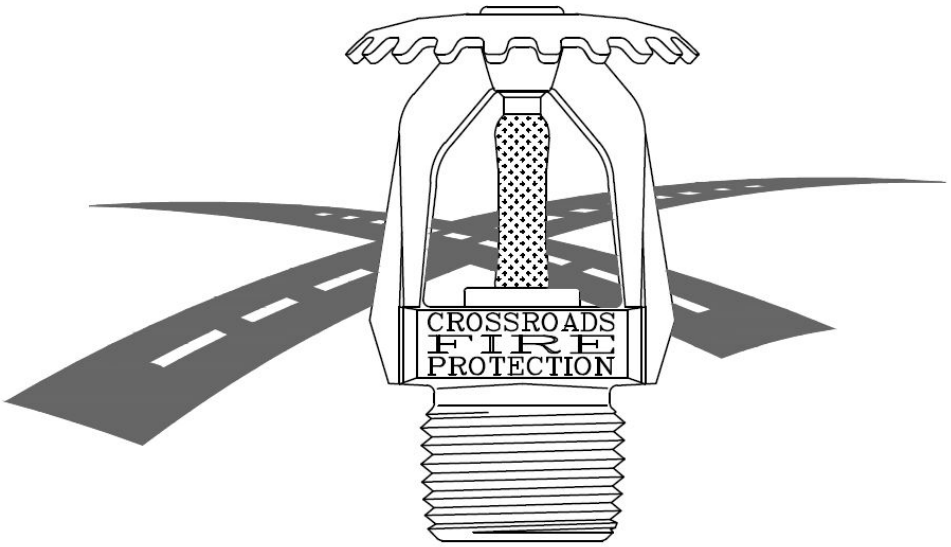
Left Side			Right Side		
From	To	Length	From	To	Length
201	1	20.167	4	101	16.292
202	5	20.167	8	102	16.292
201	1	8.167	4	101	28.292
202	5	8.167	8	102	28.292

			Flow Required	Safety Margin	Pressure Differential
Area Calculated		|	284.062	41.928	-0.067
Right	12.000	|	284.364	41.861	0.000
Right	24.000	|	284.183	42.125	-0.264

Typical Distance Between Heads = 12.000

Split Point Used in Worst Area Peaked = H3

Split Point Used in Area Calculated = H3



Crossroads Fire Protection
809 South Market Street
P.O. Box 926
Benson, NC 27504
919-207-3855

Job Name	:	Benhaven Emergency Services
Drawing	:	FP1
Location	:	13151 NC 27
Remote Area	:	2
Contract	:	CC-9906
Data File	:	Benhaven Area 2.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME Benhaven Emergency Services
Location 13151 NC 27
Drawing # FP1
Contract # CC-9906
Date 12-12-2022

DESIGN

Remote area # 2
Remote area location Apparatus
Occupancy classification Ordinary I
Density .15 - Gpm/SqFt
Area of application 1500 - SqFt
Coverage/sprinkler 225 - SqFt
Type of sprinkler calculated 5.6K QR Uprights
 # Sprinklers calculated 14
In-rack demand N/A - GPM
Hose streams 250 - GPM
Total water required (including hose streams) 540.835 - GPM @ 71.2243 - Psi
Type of system Wet Grid
Volume of system (dry or pre-action) N/A - Gal

WATER SUPPLY INFORMATION

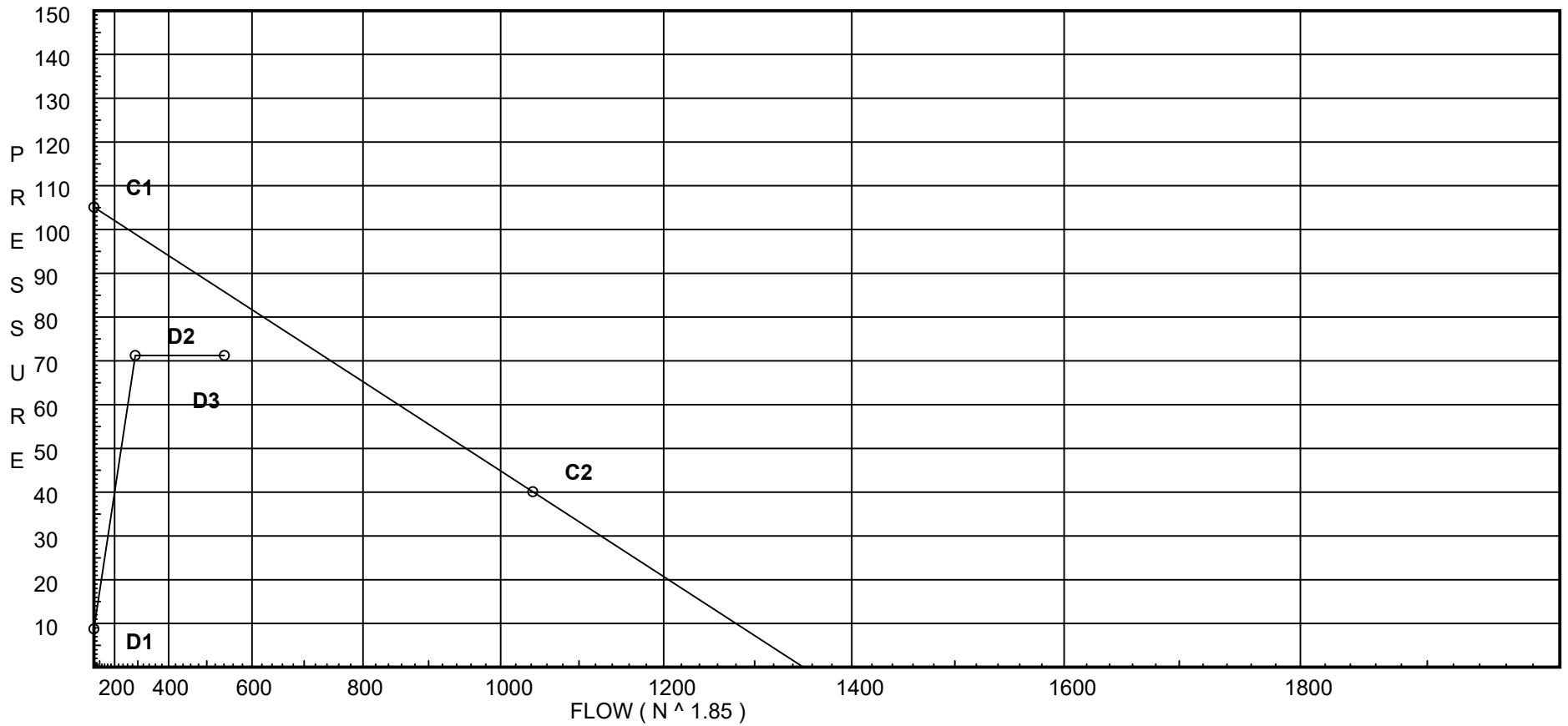
Test date 6-30-2022
Location 13151 NC 27
Source of info EPM

CONTRACTOR INFO Crossroads Fire Protection
Address 809 South Market Street / P.O. Box 926 / Benson, NC 27504
Phone # 919-207-3855
Name of designer DLN
Authority having jurisdiction Harnett County
NOTES:

text1(35) - invisible

City Water Supply:
- C1 - Static Pressure : 105.1
- C2 - Residual Pressure: 40.1
- C2 - Residual Flow : 1042

Demand:
- D1 - Elevation : 8.770
- D2 - System Flow : 290.835
- D2 - System Pressure : 71.224
- Hose (Demand) : 250
- D3 - System Demand : 540.835
- Safety Margin : 14.555



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Zim	Wilkins 375ADA	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
201	12.25		20.54	na				
1	12.25		20.54	na				
2	12.25		20.54	na				
3	12.25		20.54	na				
4	12.25		20.54	na				
202	12.25		20.54	na				
5	12.25		20.54	na				
6	12.25		20.54	na				
202B	12.25		20.54	na				
7	12.25		20.54	na				
8	12.25		20.54	na				
203	12.25		20.54	na				
204	12.25		20.53	na				
205	15.0		19.31	na				
H10	18.75	5.6	14.68	na	21.46	0.15	130	7.0
H11	20.25	5.6	13.56	na	20.62	0.15	130	7.0
H12	21.75	5.6	12.78	na	20.02	0.15	130	7.0
H13	23.25	5.6	12.13	na	19.5	0.15	130	7.0
H14	21.75	5.6	12.98	na	20.18	0.15	130	7.0
H15	21.25	5.6	13.59	na	20.65	0.15	130	7.0
206	15.0		19.63	na				
H16	18.75	5.6	14.98	na	21.67	0.15	130	7.0
H17	20.25	5.6	13.85	na	20.84	0.15	130	7.0
H18	21.75	5.6	13.07	na	20.25	0.15	130	7.0
H19	23.25	5.6	12.42	na	19.74	0.15	130	7.0
H20	21.75	5.6	13.29	na	20.42	0.15	130	7.0
H21	21.25	5.6	13.92	na	20.89	0.15	130	7.0
H22	23.25	5.6	15.43	na	22.0	0.15	130	7.0
H23	21.25	5.6	16.31	na	22.61	0.15	130	7.0
207	15.0		21.1	na				
208	15.0		22.19	na				
209	15.0		23.0	na				
210	15.0		23.5	na				
211	15.0		23.74	na				
201A	12.25		20.54	na				
202A	12.25		20.54	na				
101	12.25		20.55	na				
102	12.25		20.55	na				
103	12.25		20.55	na				
104	12.25		20.56	na				
105	17.0		18.52	na				
106	17.0		18.95	na				
107	17.0		20.71	na				
108	17.0		22.41	na				
109	17.0		24.41	na				
110	17.0		26.91	na				
111	17.0		31.2	na				
112	17.0		37.56	na				
TOR	11.0		43.46	na				
BOR	1.5		58.84	na				
BF	-3.0		61.02	na				
UG1	-3.0		73.27	na				
UG2	-3.0		73.6	na				
TEST	3.0		71.22	na	250.0			

The maximum velocity is 25.53 and it occurs in the pipe between nodes 111 and 112

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
*LINES										
201	12.250		1.54	1.5	T	9.9	8.167	120	20.538	
to							9.900		0.0	
1	12.250		1.54	1.682			18.067	0.0001	0.002	Vel = 0.22
1	12.250		0.0	1.5			10.000	120	20.540	
to									0.0	
2	12.250		1.54	1.682			10.000	0.0002	0.002	Vel = 0.22
2	12.250		0.0	1.5			14.167	120	20.542	
to									0.0	
3	12.250		1.54	1.682			14.167	0.0001	0.001	Vel = 0.22
3	12.250		0.0	1.5			12.000	120	20.543	
to									0.0	
4	12.250		1.54	1.682			12.000	0.0001	0.001	Vel = 0.22
4	12.250		0.0	1.5	T	9.9	28.292	120	20.544	
to							9.900		0.0	
101	12.250		1.54	1.682			38.192	0.0001	0.005	Vel = 0.22
			0.0							
101			1.54						20.549	K Factor = 0.34
202	12.250		0.74	1.5	T	9.9	8.167	120	20.538	
to							9.900		0.0	
5	12.250		0.74	1.682			18.067	0.0001	0.001	Vel = 0.11
5	12.250		0.0	1.5			10.000	120	20.539	
to									0.0	
6	12.250		0.74	1.682			10.000	0	0.0	Vel = 0.11
6	12.250		0.0	1.5	E	4.95	6.333	120	20.539	
to							4.950		0.0	
202B	12.250		0.74	1.682			11.283	0	0.0	Vel = 0.11
202B	12.250		-1.71	1.5	E	4.95	25.917	120	20.539	
to					T	9.9	14.850		0.0	
202A	12.250		-0.97	1.682			40.767	0	-0.002	Vel = 0.14
			0.0							
202A			-0.97						20.537	K Factor = -0.21
202B	12.250		1.71	1.5	T	9.9	13.167	120	20.539	
to							9.900		0.0	
7	12.250		1.71	1.682			23.067	0.0001	0.003	Vel = 0.25
7	12.250		0.0	1.5			12.000	120	20.542	
to									0.0	
8	12.250		1.71	1.682			12.000	0.0002	0.002	Vel = 0.25
8	12.250		0.0	1.5	T	9.9	28.292	120	20.544	
to							9.900		0.0	
102	12.250		1.71	1.682			38.192	0.0001	0.005	Vel = 0.25
			0.0							
102			1.71						20.549	K Factor = 0.38
203	12.250		1.89	1.5	2T	19.799	72.625	120	20.536	
to							19.799		0.0	
103	12.250		1.89	1.682			92.424	0.0002	0.015	Vel = 0.27
			0.0							
103			1.89						20.551	K Factor = 0.42

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
204	12.250		2.33	1.5	2T	19.799	72.625	120	20.532	
to							19.799		0.0	
104	12.250		2.33	1.682			92.424	0.0002	0.023	Vel = 0.34
			0.0							
104			2.33						20.555	K Factor = 0.51
205	15		-63.48	1.5	E	4.95	12.333	120	19.312	
to					T	9.9	14.850		-1.624	
H10	18.750		-63.48	1.682			27.183	-0.1106	-3.007	Vel = 9.17
H10	18.750	5.60	21.45	1.5			9.125	120	14.681	
to									-0.650	
H11	20.250		-42.03	1.682			9.125	-0.0515	-0.470	Vel = 6.07
H11	20.250	5.60	20.62	1.5			9.125	120	13.561	
to									-0.650	
H12	21.750		-21.41	1.682			9.125	-0.0148	-0.135	Vel = 3.09
H12	21.750	5.60	20.02	1.5			9.125	120	12.776	
to									-0.650	
H13	23.250		-1.39	1.682			9.125	-0.0001	-0.001	Vel = 0.20
H13	23.250	5.60	19.50	1.5	2E	9.9	9.125	120	12.125	
to							9.900		0.650	
H14	21.750		18.11	1.682			19.025	0.0109	0.207	Vel = 2.61
H14	21.750	5.60	20.18	1.5			9.125	120	12.982	
to									0.217	
H15	21.250		38.29	1.682			9.125	0.0433	0.395	Vel = 5.53
H15	21.250	5.60	20.64	1.5	2T	19.799	12.167	120	13.594	
to							19.799		1.841	
105	17		58.93	1.682			31.966	0.0964	3.081	Vel = 8.51
			0.0							
105			58.93						18.516	K Factor = 13.70
206	15		-63.75	1.5	E	4.95	12.333	120	19.630	
to					T	9.9	14.850		-1.624	
H16	18.750		-63.75	1.682			27.183	-0.1115	-3.031	Vel = 9.20
H16	18.750	5.60	21.67	1.5			9.125	120	14.975	
to									-0.650	
H17	20.250		-42.08	1.682			9.125	-0.0516	-0.471	Vel = 6.08
H17	20.250	5.60	20.84	1.5			9.125	120	13.854	
to									-0.650	
H18	21.750		-21.24	1.682			9.125	-0.0146	-0.133	Vel = 3.07
H18	21.750	5.60	20.25	1.5			9.125	120	13.071	
to									-0.650	
H19	23.250		-0.99	1.682			9.125	0	0.0	Vel = 0.14
H19	23.250	5.60	19.74	1.5	2E	9.9	9.125	120	12.421	
to							9.900		0.650	
H20	21.750		18.75	1.682			19.025	0.0116	0.220	Vel = 2.71
H20	21.750	5.60	20.41	1.5			9.125	120	13.291	
to									0.217	
H21	21.250		39.16	1.682			9.125	0.0453	0.413	Vel = 5.65
H21	21.250	5.60	20.90	1.5	2T	19.799	12.167	120	13.921	
to							19.799		1.841	
106	17		60.06	1.682			31.966	0.0998	3.190	Vel = 8.67

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
			0.0							
106			60.06						18.952	K Factor = 13.80
206	15		-18.68	1.5	E	4.95	39.710	120	19.630	
to					T	9.9	14.850		-3.573	
H22	23.250		-18.68	1.682			54.560	-0.0115	-0.628	Vel = 2.70
H22	23.250	5.60	21.99	1.5	2E	9.9	12.167	120	15.429	
to							9.900		0.866	
H23	21.250		3.31	1.682			22.067	0.0005	0.010	Vel = 0.48
H23	21.250	5.60	22.61	1.5	2T	19.799	18.413	120	16.305	
to							19.799		1.841	
106	17		25.92	1.682			38.212	0.0211	0.806	Vel = 3.74
			0.0							
106			25.92						18.952	K Factor = 5.95
207	15		10.74	1.5	3E	14.849	70.288	120	21.105	
to					3T	29.699	44.548		-0.866	
107	17		10.74	1.682			114.836	0.0041	0.474	Vel = 1.55
			0.0							
107			10.74						20.713	K Factor = 2.36
208	15		16.86	1.5	3E	14.849	70.288	120	22.185	
to					3T	29.699	44.548		-0.866	
108	17		16.86	1.682			114.836	0.0095	1.093	Vel = 2.43
			0.0							
108			16.86						22.412	K Factor = 3.56
209	15		25.08	1.5	3E	14.849	70.288	120	23.001	
to					3T	29.699	44.548		-0.866	
109	17		25.08	1.682			114.836	0.0198	2.278	Vel = 3.62
			0.0							
109			25.08						24.413	K Factor = 5.08
210	15		35.25	1.5	3E	14.849	70.288	120	23.499	
to					3T	29.699	44.548		-0.866	
110	17		35.25	1.682			114.836	0.0373	4.278	Vel = 5.09
			0.0							
110			35.25						26.911	K Factor = 6.80
211	15		50.52	1.5	3E	14.849	70.288	120	23.738	
to					3T	29.699	44.548		-0.866	
111	17		50.52	1.682			114.836	0.0725	8.324	Vel = 7.29
			0.0							
111			50.52						31.196	K Factor = 9.05
*MAINS										
201	12.250		-1.54	2			1.000	120	20.538	
to									0.0	
201A	12.250		-1.54	2.157			1.000	0	0.0	Vel = 0.14
201A	12.250		0.0	2			7.792	120	20.538	
to									0.0	
202	12.250		-1.54	2.157			7.792	0	0.0	Vel = 0.14
202	12.250		-0.73	2			12.042	120	20.538	
to									0.0	
202A	12.250		-2.27	2.157			12.042	-0.0001	-0.001	Vel = 0.20

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
202A	12.250		-0.98	2			8.875	120	20.537	
to									0.0	
203	12.250		-3.25	2.157			8.875	-0.0001	-0.001	Vel = 0.29
203	12.250		-1.89	2			11.667	120	20.536	
to									0.0	
204	12.250		-5.14	2.157			11.667	-0.0003	-0.004	Vel = 0.45
204	12.250		-2.33	2	4E	24.613	22.375	120	20.532	
to							24.613		-1.191	
205	15		-7.47	2.157			46.988	-0.0006	-0.029	Vel = 0.66
205	15		63.48	2			12.167	120	19.312	
to									0.0	
206	15		56.01	2.157			12.167	0.0261	0.318	Vel = 4.92
206	15		82.44	2			10.583	120	19.630	
to									0.0	
207	15		138.45	2.157			10.583	0.1394	1.475	Vel = 12.16
207	15		-10.74	2			9.000	120	21.105	
to									0.0	
208	15		127.71	2.157			9.000	0.1200	1.080	Vel = 11.21
208	15		-16.87	2			8.833	120	22.185	
to									0.0	
209	15		110.84	2.157			8.833	0.0924	0.816	Vel = 9.73
209	15		-25.07	2			8.667	120	23.001	
to									0.0	
210	15		85.77	2.157			8.667	0.0575	0.498	Vel = 7.53
210	15		-35.25	2			11.083	120	23.499	
to									0.0	
211	15		50.52	2.157			11.083	0.0216	0.239	Vel = 4.44
			0.0							
211			50.52						23.738	K Factor = 10.37
101	12.250		1.54	2			13.125	120	20.549	
to									0.0	
102	12.250		1.54	2.157			13.125	0	0.0	Vel = 0.14
102	12.250		1.71	2			15.583	120	20.549	
to									0.0	
103	12.250		3.25	2.157			15.583	0.0001	0.002	Vel = 0.29
103	12.250		1.89	2			11.709	120	20.551	
to									0.0	
104	12.250		5.14	2.157			11.709	0.0003	0.004	Vel = 0.45
104	12.250		2.33	2	2E	12.307	17.205	120	20.555	
to							12.307		-2.057	
105	17		7.47	2.157			29.512	0.0006	0.018	Vel = 0.66
105	17		58.93	2			12.167	120	18.516	
to									0.0	
106	17		66.4	2.157			12.167	0.0358	0.436	Vel = 5.83
106	17		85.98	2			10.583	120	18.952	
to									0.0	
107	17		152.38	2.157			10.583	0.1664	1.761	Vel = 13.38
107	17		10.75	2			9.000	120	20.713	
to									0.0	
108	17		163.13	2.157			9.000	0.1888	1.699	Vel = 14.32

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
108	17		16.86	2			8.833	120	22.412	
to									0.0	
109	17		179.99	2.157			8.833	0.2265	2.001	Vel = 15.80
109	17		25.07	2			8.667	120	24.413	
to									0.0	
110	17		205.06	2.157			8.667	0.2882	2.498	Vel = 18.00
110	17		35.26	2			11.083	120	26.911	
to									0.0	
111	17		240.32	2.157			11.083	0.3866	4.285	Vel = 21.10
111	17		50.51	2	E	6.153	5.417	120	31.196	
to							6.153		0.0	
112	17		290.83	2.157			11.570	0.5502	6.366	Vel = 25.53
112	17		0.0	2			6.000	120	37.562	
to									2.599	
TOR	11		290.83	2.157			6.000	0.5502	3.301	Vel = 25.53
TOR	11		0.0	2.5	Fsp	0.0	11.000	120	43.462	
to					B	9.61	28.830		7.114	* * Fixed Loss = 3
BOR	1.500		290.83	2.635	S	19.22	39.830	0.2076	8.269	Vel = 17.11
BOR	1.500		0.0	6	E	25.457	64.166	150	58.845	
to					2F	25.457	50.914		1.949	
BF	-3		290.83	6.3			115.080	0.0020	0.226	Vel = 2.99
BF	-3		0.0	8	4E	130.138	84.833	150	61.020	
to					T	63.262	200.629		12.100	* * Fixed Loss = 12.1
UG1	-3		290.83	8.28	Zim	0.0	285.462	0.0005	0.149	Vel = 1.73
					G	7.23				
UG1	-3		0.0	8	4F	65.069	493.000	150	73.269	
to					2G	14.46	142.790		0.0	
UG2	-3		290.83	8.28	T	63.262	635.790	0.0005	0.331	Vel = 1.73
UG2	-3		0.0	6	T	54.552	27.708	150	73.600	
to					G	5.455	85.464		-2.599	
TEST	3		290.83	6.3	E	25.457	113.172	0.0020	0.223	Vel = 2.99
			250.00							Qa = 250.00
TEST			540.83						71.224	K Factor = 64.08

Auto Peaking Summary - List of Pipes for Area Calculated

Left Side			Right Side		
From	To	Length	From	To	Length
201	1	17.292	4	101	19.167
202	5	17.292	8	102	19.167
205	H10	21.458	H15	105	12.167
206	H16	12.333	H21	106	12.167
206	H22	39.710	H23	106	18.413
201	1	8.167	4	101	28.292
202	5	8.167	8	102	28.292
205	H10	12.333	H15	105	12.167
206	H16	12.333	H21	106	12.167
206	H22	39.710	H23	106	18.413

			Flow Required	Safety Margin	Pressure Differential
Area Calculated		|	540.835	14.555	-0.038
Right	9.125	|	541.157	14.517	0.000

Typical Distance Between Heads = 9.125

Split Point Used in Worst Area Peaked = H13

Split Point Used in Area Calculated = H13

EPM an ONET company
Engineering Planning and Management, Inc.

TEST LOCATION

Address/Location Description: 13151 NC HWY 27, Broadway - Test 2
Test hydrant Facility ID WHYD: (see Pg. 2)
Flow hydrant Facility ID WHYD: (see Pg. 2)

APPLICATION INFORMATION

Name: Bobbitt Design-Build
Address: 600 Germantown Road, Raleigh NC 27607
Contact Person: Brian Griffith Phone: 919.227.0230
Email: bgriffith@bobbitt.com

SYSTEM INFORMATION

Test Date: 06/30/2022
Time of Test: 1:20
Test Hydrant Elevation: +/- 268.38'
Main Size: 8"

RESULTS

Static Pressure: 105.1 psi
Residual Pressure: 40.1 psi
Outlet Diameter: 2 1/2 inches
Orifice Coefficient: 1.38

Number of Outlets Flowing: 2
Flow Hydrant Discharge Pressure: 10, 10 psi
Volume of Discharge: 521 + 521 = 1,042 gpm
Water usage during test: 2,000 Total Gal

Test Completed by: Eiji Fujino and Michael Williams
Testing Company: Engineering Planning and Management

Testing Equipment: HydroFlow Hose Monster
(Make and Model)

SEAL (if applicable)

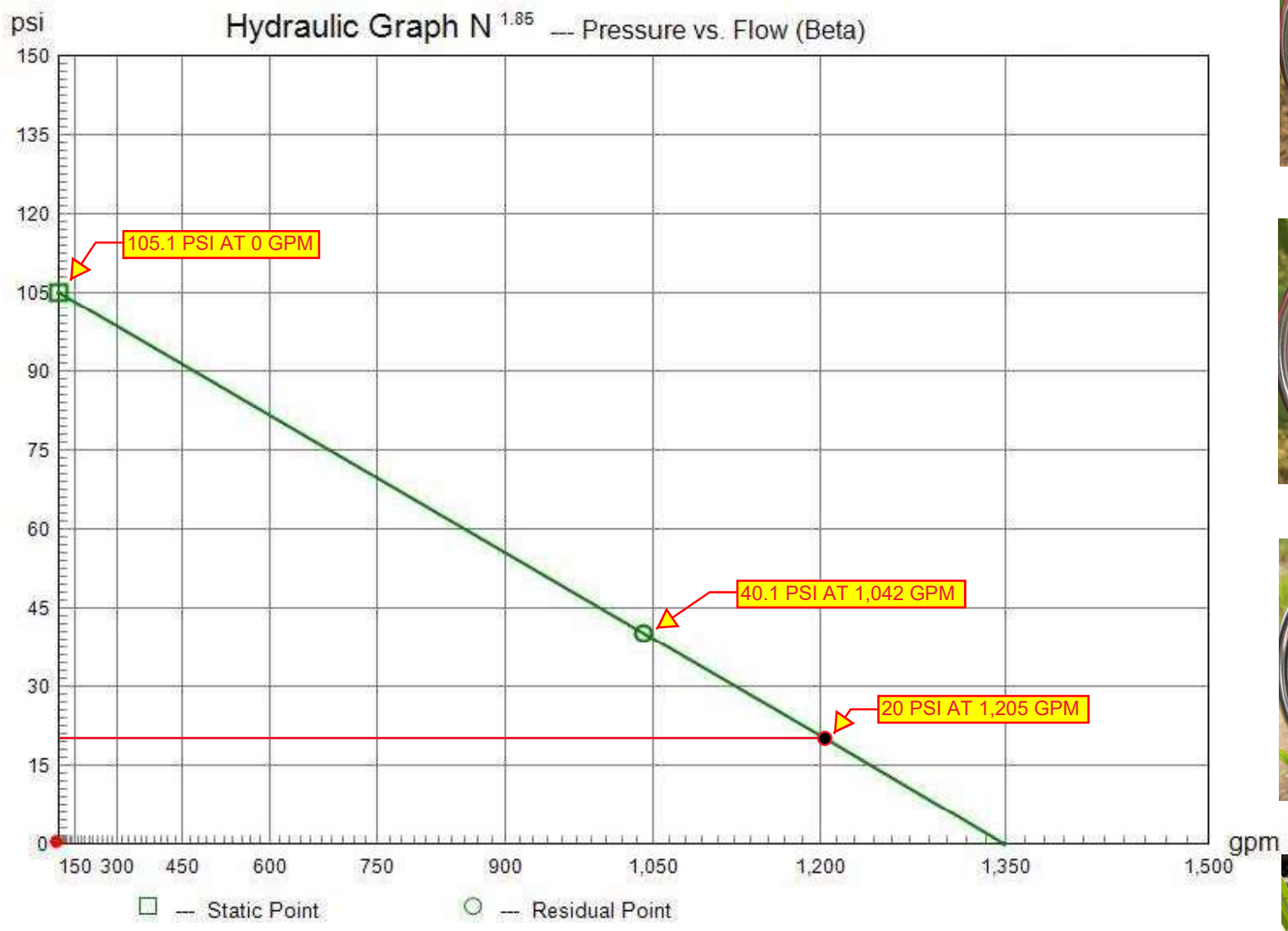
Notes:

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.
See NFPA 291 for additional information about completing fire hydrant flow tests
*To maintain system water quality, storage tanks may be maintained as low as 20' below overflow.

updated November 2021

13151 NC-27 W, Broadway

MARK-UP OF SITE PLAN
BY MICHAEL WILIAMS
BASED ON CONDITIONS AT
SITE ON 06/30/2022

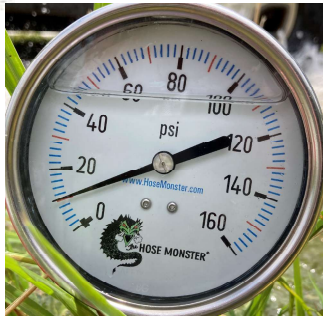


STATIC PRESSURE:
105.1 PSI

RESIDUAL PRESSURE:
40.1 PSI

FLOW:
10 PSI PITOT

FLOW:
10 PSI PITOT



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	
2X	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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Service@FlowTest.com EMAIL
www.HoseMonster.com

U. S. Patent # 6,874,375

Pitotless Nozzle™ Threaded

INSTRUCTIONS

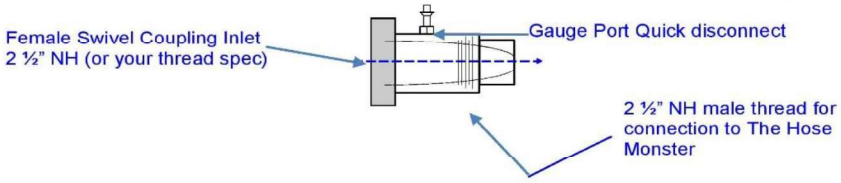
US Patent 6,874,375

The Pitotless Nozzle Threaded (PN#THD) must be used with the 2 ½" Hose Monster Model II (HM2H, HM2HF) **or** attached directly to a hydrant or test header valve discharging into open atmosphere. *Note: If you intend to use the Pitotless Nozzle with the Little Hose Monster (HML), then a Pitotless Nozzle Grooved (PN#GRV) is required. Do not use the Pitotless Nozzle Threaded (PN#THD) with the Little Hose Monster. Call us if you are considering a configuration not listed here.*

SETUP

The gauge connection on the Pitotless Nozzle is a factory-installed male end of a quick disconnect coupling. One female counterpart is included and additional ones can be purchased separately. Attach the female end of the quick disconnect coupling directly to the gauge or remote reader adapter and use the quick disconnect feature to attach and remove. Do not remove the male quick disconnect from the Pitotless Nozzle as it will damage the threads on the Pitotless Nozzle.

We recommend a gauge with an accuracy rating of ½% or better and of a suitable range.



Using the Pitotless Nozzle with the 2 ½" Hose Monster® or Flusher

Insert the male outlet end of the Pitotless Nozzle into the swivel coupling of the Hose Monster. Hand-tighten plus about a quarter turn using a common rocker lug spanner wrench on the swivel coupling and a hole type spanner wrench (WSPA104) for a holdback. Attach the male end of a hose into the swivel coupling on the Pitotless Nozzle, hand-tighten plus about a quarter turn using spanner wrenches. The pitot/flow splitter must be installed on either unit in order to collect accurate flow rates.

If using the Pitotless Nozzle without the Hose Monster

The Pitotless Nozzle must be attached securely to a pump test header valve or hydrant. Secure the female swivel coupling of the Pitotless Nozzle directly to a hydrant nozzle or test header valve. The Pitotless Nozzle points in the direction the water will flow. Clear water discharge path.

Flow Charts

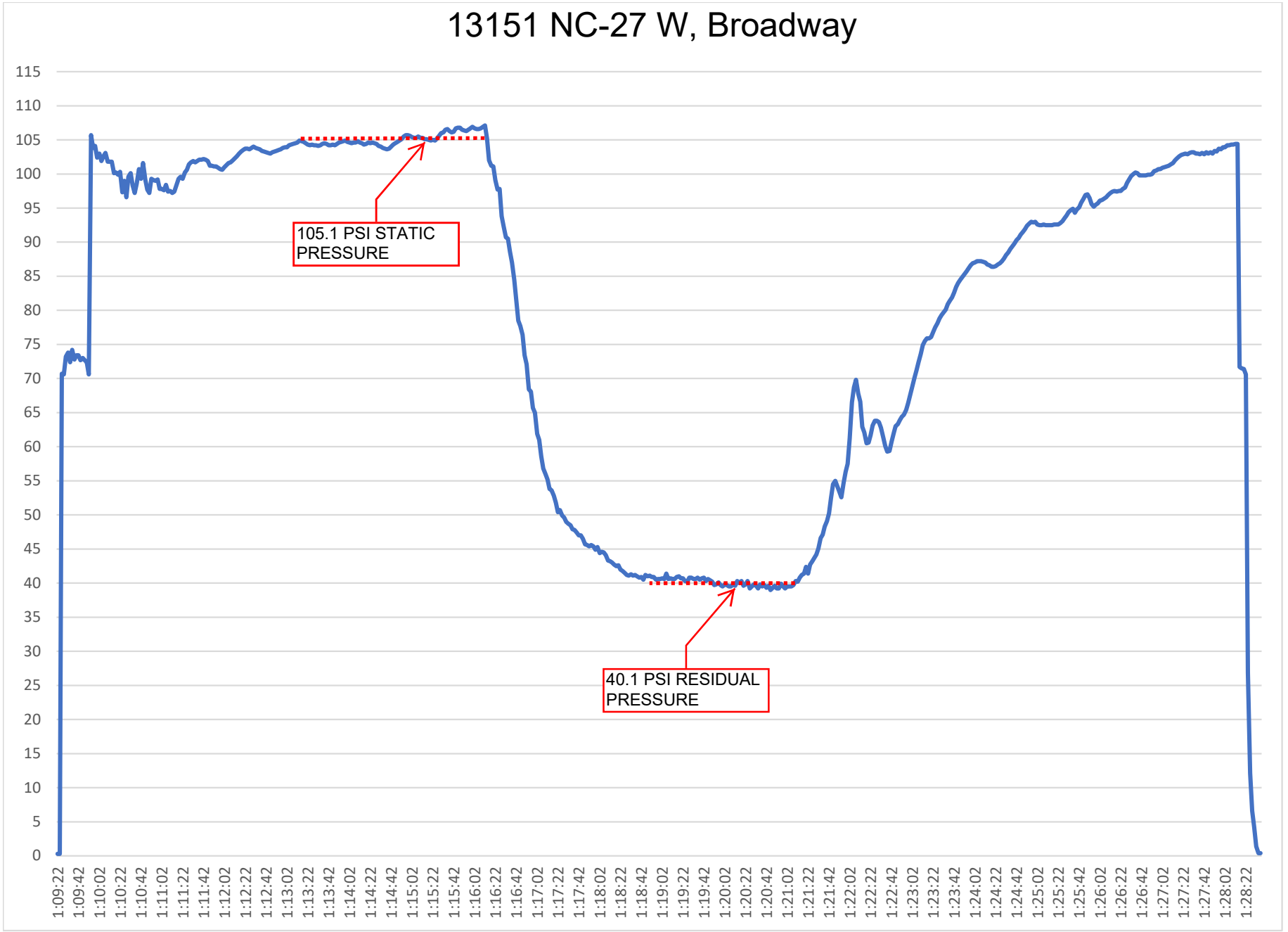
Pitotless Nozzle flow charts must be used to determine discharge flow rate. The use of flow charts of a different device or size will result in incorrect readings. Within the flow chart is a column for "2 ½" Hose Monster Model II" and for "Open Atmosphere". Use the "2 ½" Hose Monster Model II" flows if the Pitotless Nozzle is attached to a 2 ½" Hose Monster Model II. Use the "Open Atmosphere" flows if the Pitotless Nozzle is attached directly on a hydrant or test header valve discharging out into the open. Flow charts are provided with the Pitotless Nozzle and additional copies are available on our website at **www.HoseMonster.com/literature.html**

WARNING:

- **Do not** attach the Pitotless Nozzle to the end of a hose unless the Hose Monster is attached to it or unless it is permanently secured.
- **Do not** attach a hose to the male outlet end of the Pitotless Nozzle under any circumstance. The resulting backpressure will distort flow rate measurement.
- **Do not** remove the quick disconnect gauge port fitting. The aluminum threads will be damaged. Contact Hydro Flow Products directly for any repairs.

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

MANUFACTURED BY:
Hydro Flow Products, Inc.
(888) 202-9987 Toll Free
(847) 434-0073 Fax
Service@FlowTest.com
www.HoseMonster.com


13151 NC-27 W, Broadway
105.1 PSI STATIC PRESSURE
40.1 PSI RESIDUAL PRESSURE
115
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