

... Fire Protection by Computer Design

High Tech Fire Protection
PO Box 156
Minot, ME 04258
(207) 998-2551

Job Name : Third Floor Calc.
Building : 42 Lafayette Street
Location : 42 Lafayette Street
System : NFPA 13R
Contract : NA
Data File : Third Floor Calc.wxf

HYDRAULIC DESIGN INFORMATION SHEET

Name - Third Floor Calc. Date - 08/31/2017
Location - 42 Lafayette Street
Building - 42 Lafayette Street System No. - NFPA 13R
Contractor - High Tech Fire Protection Contract No. - NA
Calculated By - Jeremy A Foss Drawing No. - FP-1.1
Construction: (X) Combustible () Non-Combustible Ceiling Height Varies
OCCUPANCY - Residential - Apartment

S Type of Calculation: ()NFPA 13 Residential (X)NFPA 13R ()NFPA 13D
Y Number of Sprinklers Flowing: ()1 ()2 (X)4 ()
S ()Other
T ()Specific Ruling Made by Date
E
M Listed Flow at Start Point - 13 Gpm System Type
Listed Pres. at Start Point - 7 Psi (X) Wet () Dry
D MAXIMUM LISTED SPACING 16' x 16' () Deluge () PreAction
E Domestic Flow Added - Gpm Sprinkler or Nozzle
S Additional Flow Added - Gpm Make Reliable Model FlRes 49
I Elevation at Highest Outlet - 36 Feet Size 1/2" K-Factor 4.9
G Note: Temperature Rating 155
N

Calculation Gpm Required 55 Psi Required 45 At Test
Summary C-Factor Used: Overhead 120 Underground 150

W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - 06/09/2017 Rated Cap. Cap.
T Time of Test - @ Psi Elev.
E Static (Psi) - 51 Elev.
R Residual (Psi) - 48 Other Well
Flow (Gpm) - 838 Proof Flow Gpm
S Elevation - -6
P Location: Test Hydrant Located on Congress Street - 800' from Site
P
L Source of Information: Portland Water District
Y

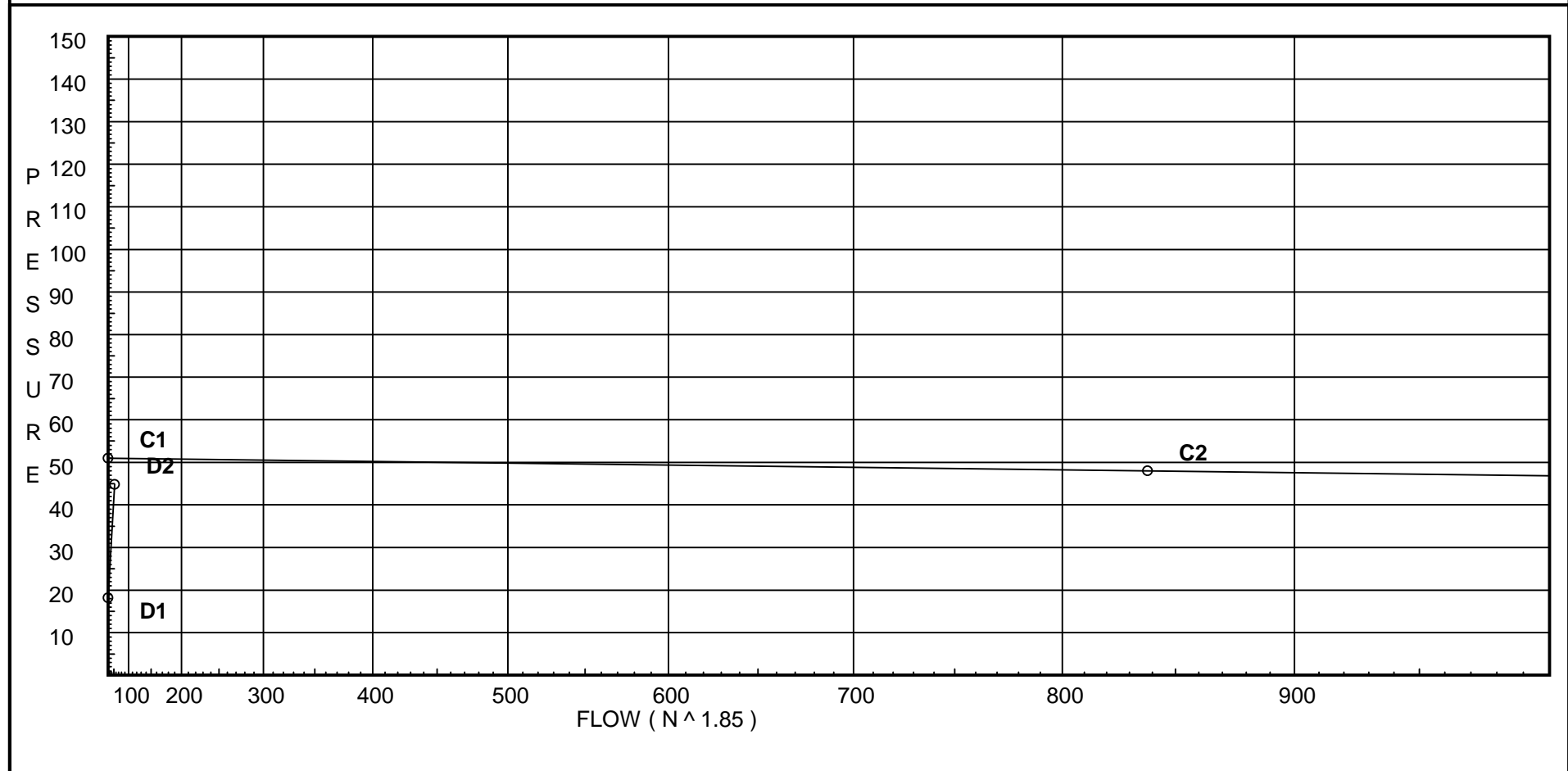
Water Supply Curve (C)

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City Water Supply:
C1 - Static Pressure : 51
C2 - Residual Pressure: 48
C2 - Residual Flow : 838

Demand:
D1 - Elevation : 18.190
D2 - System Flow : 54.206
D2 - System Pressure : 44.838
Hose (Demand) : _____
D3 - System Demand : 54.206
Safety Margin : 6.143



Fittings Used Summary

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Fitting Legend		½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24	
Abbrev.	Name																					
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	
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																				
G	NFPA 13 Gate Valve	0	0	1	1	1	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	
Zik	Wilkins 950XL	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

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
201	36.0	4.9	7.0	na	12.96	0.05	256	7.0
202	36.0	4.9	7.61	na	13.52	0.05	256	7.0
203	36.0	4.9	7.26	na	13.2	0.05	256	7.0
A1	36.0		7.99	na				
204	36.0	4.9	8.78	na	14.52	0.05	256	7.0
A2	36.0		16.48	na				
WF1	6.0		30.36	na				
TOR	6.0		31.28	na				
BOR	1.0		39.99	na				
H1	0.0		42.2	na				
H2	-3.0		43.53	na				
H3	-6.0		44.83	na				
TEST	-6.0		44.84	na				

The maximum velocity is 8.54 and it occurs in the pipe between nodes 204 and A2

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
201 to 202	12.96	1.049 120.0	1E	2.0 0.0	8.500 2.000	7.000 0.0			K Factor = 4.90	
202 to A1	12.96	0.0584		0.0	10.500	0.613			Vel = 4.81	
202 to A1	13.52	1.38 120.0		0.0 0.0	6.500 0.0	7.613 0.0			K Factor = 4.90	
	26.48	0.0575		0.0	6.500	0.374			Vel = 5.68	
	0.0 26.48					7.987			K Factor = 9.37	
203 to A1	13.20	1.049 120.0	1T	5.0 0.0	7.000 5.000	7.262 0.0			K Factor = 4.90	
A1 to 204	13.2	0.0604		0.0	12.000	0.725			Vel = 4.90	
A1 to 204	26.49	1.38 120.0		0.0 0.0	6.500 0.0	7.987 0.0				
204 to A2	39.69	0.1215		0.0	6.500	0.790			Vel = 8.51	
204 to A2	14.52	1.61 120.0	2E 1Fsp	8.0 0.0	28.000 18.000	8.777 3.000			K Factor = 4.90 * Fixed loss = 3	
	54.21	0.1022	1G 1S	1.0 9.0	46.000	4.701			Vel = 8.54	
A2 to WF1	0.0	2.157 120.0	1E	6.153 0.0	30.000 6.153	16.478 12.993				
WF1 to TOR	54.21	0.0246		0.0	36.153	0.889			Vel = 4.76	
WF1 to TOR	0.0	2.157 120.0	1E 1T	6.153 12.307	18.900 18.460	30.360 0.0				
TOR to BOR	54.21	0.0246		0.0	37.360	0.918			Vel = 4.76	
TOR to BOR	0.0	2.157 120.0	1Zik 1E	0.0 6.153	5.000 6.153	31.278 8.439			* Fixed loss = 6.273	
	54.21	0.0247		0.0	11.153	0.275			Vel = 4.76	
BOR to H1	0.0	1.917 150.0	1G 1T	1.047 10.47	50.000 11.517	39.992 0.433				
H1 to H2	54.21	0.0289		0.0	61.517	1.778			Vel = 6.03	
H1 to H2	0.0	8.23 100.0	1T	29.011 0.0	525.000 29.010	42.203 1.299				
H2 to H3	54.21	0.0001		0.0	554.010	0.028			Vel = 0.33	
H2 to H3	0.0	12.24 100.0	1T	48.362 0.0	275.000 48.362	43.530 1.299				
H3 to TEST	54.21	0.0		0.0	323.362	0.003			Vel = 0.15	
H3 to TEST	0.0	6.14 100.0	1E 1G	10.608 2.273	15.000 12.881	44.832 0.0				
	54.21	0.0002		0.0	27.881	0.006			Vel = 0.59	
	0.0 54.21					44.838			K Factor = 8.10	