



... Fire Protection by Computer Design

Dean & Allyn, Inc.
116 Lewiston Road
Gray, ME 04039
(207) 657-5646

Job Name : 96 Federal Street
Drawing :
Location : 96 Federal Street, Portland, ME 04101
Remote Area : Third Floor
Contract : C161372
Data File : Third Floor.WXF

HYDRAULIC DESIGN INFORMATION SHEET

Name - 96 FEDERAL STREET Date - 3/30/2017
Location - 96 Federal Street, Portland, ME 04101
Building - System No. - Third Floor
Contractor - Dean & Allyn, Inc. Contract No. - C161372
Calculated By - Chris Stewart Drawing No. - 1 of 1
Construction: (X) Combustible () Non-Combustible Ceiling Height ~9'-0"
OCCUPANCY - Residential

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 - 19 Gpm System Type
Listed Pres. at Start Point - 18.7 Psi (X) Wet () Dry
D MAXIMUM LISTED SPACING 18 x 18 () Deluge () PreAction
E Domestic Flow Added - Gpm Sprinkler or Nozzle
S Additional Flow Added - Gpm Make Reliable Model F1 RES 44
I Elevation at Highest Outlet - 35.62Feet Size 3/8" K-Factor 4.4
G Note:*12.8psi Safety Margin Temperature Rating 155F
N

Calculation Gpm Required 77.71 Psi Required 82.19 At Test
Summary C-Factor Used: Overhead 120 Underground 140

W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - OCT 2016 Rated Cap. Cap.
T Time of Test - @ Psi Elev.
E Static (Psi) - 95 Elev.
R Residual (Psi) - 91 Other Well
Flow (Gpm) - 1519 Proof Flow Gpm
S Elevation -

P Location: 35' down street from 96 Federal Street

P Source of Information: Portland Water District

Y

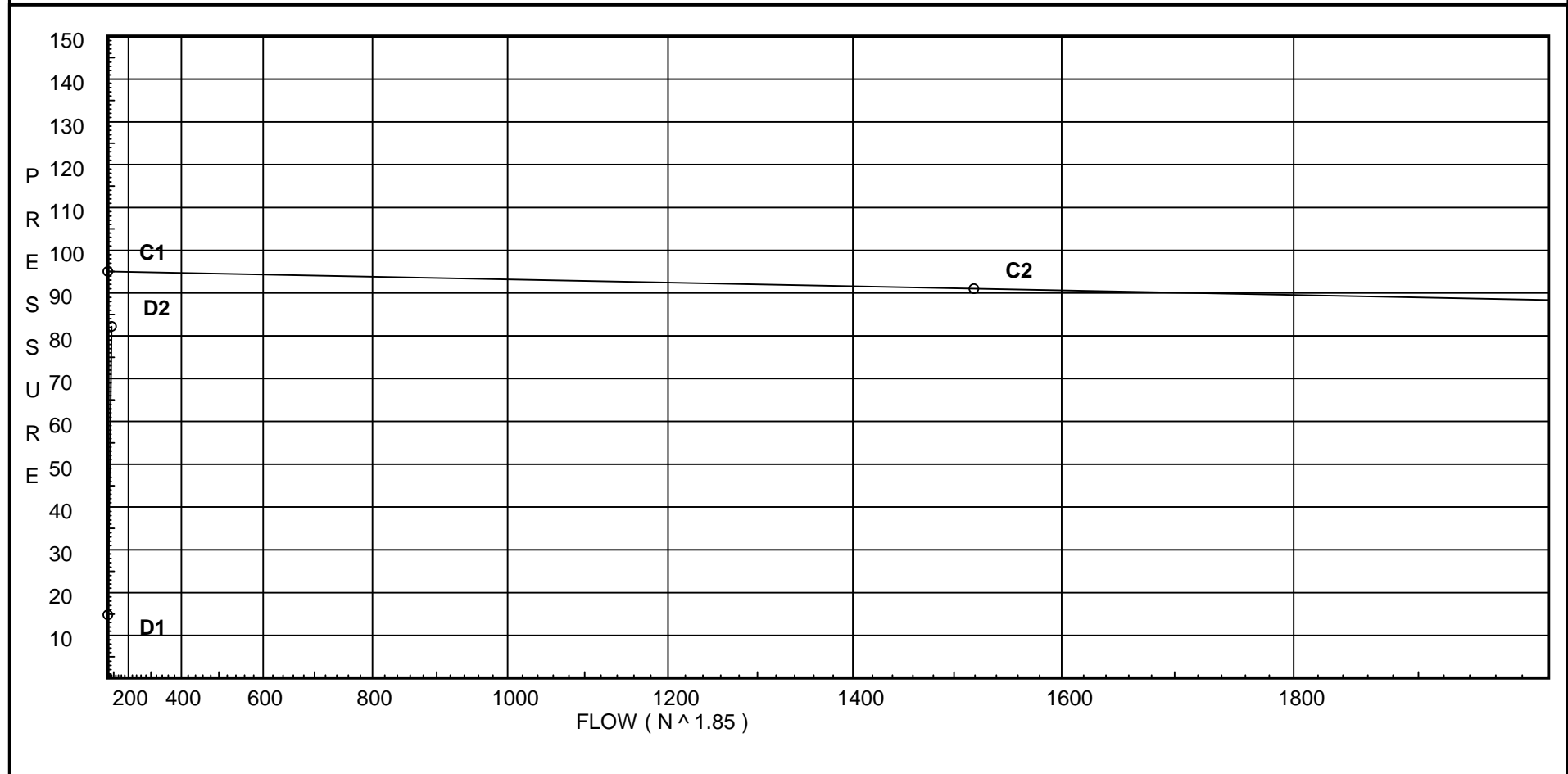
Water Supply Curve C

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City Water Supply:
C1 - Static Pressure : 95
C2 - Residual Pressure: 91
C2 - Residual Flow : 1519

Demand:
D1 - Elevation : 14.777
D2 - System Flow : 77.714
D2 - System Pressure : 82.187
Hose (Demand) : _____
D3 - System Demand : 77.714
Safety Margin : 12.796



Fittings Used Summary

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Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24	
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																				
I	90' Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40	
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	
Zca	Colt C200 Horz Butt	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.
301	35.62	4.4	18.15	na	18.74	0.05	320	13.3
302	35.62	4.4	18.7	na	19.03	0.05	380	18.7
303	35.62	4.4	19.32	na	19.34	0.05	380	18.7
304	35.62	4.4	21.92	na	20.6	0.05	360	16.8
20	26.64		23.89	na				
21	26.64		25.14	na				
203	26.35		25.32	na				
22	26.64		25.61	na				
204	26.35		27.07	na				
23	26.64		28.13	na				
24	26.64		38.74	na				
25	26.64		43.47	na				
13	5.42		64.92	na				
TR	5.42		67.51	na				
BR	1.0		74.82	na				
FF	-6.0		85.3	na				
UG1	-6.0		85.42	na				
TEST	1.5		82.19	na				

The maximum velocity is 16.67 and it occurs in the pipe between nodes 23 and 24

Final Calculations - Hazen-Williams - 2007

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
301 to 20	35.620 26.640	4.40	18.74 18.74	1 1.049	E T	2.0 5.0 0.0	9.000 7.000 16.000	120	18.149 3.889 1.848			Vel = 6.96
20			0.0 18.74						23.886		K Factor = 3.83	
302 to 303	35.620 35.620	4.40	19.03 19.03	1 1.049	T	5.0 0.0 0.0	0.250 5.000 5.250	120	18.700 0.0 0.623			Vel = 7.06
303 to 22	35.620 26.640	4.40	19.34 38.37	1.25 1.38	E T	3.0 6.0 0.0	12.000 9.000 21.000	120	19.323 3.889 2.399			Vel = 8.23
22			0.0 38.37						25.611		K Factor = 7.58	
304 to 23	35.620 26.640	4.40	20.60 20.6	1 1.049	E T	2.0 5.0 0.0	9.920 7.000 16.920	120	21.919 3.889 2.326			Vel = 7.65
23			0.0 20.60						28.134		K Factor = 3.88	
20 to 21	26.640 26.640		18.74 18.74	1 1.049	T	5.0 0.0 0.0	5.830 5.000 10.830	120	23.886 0.0 1.250			Vel = 6.96
21 to 203	26.640 26.350		0.0 18.74	1 1.049		0.0 0.0 0.0	0.500 0.0 0.500	120	25.136 0.126 0.057			Vel = 6.96
203 to 22	26.350 26.640		0.0 18.74	1 1.049		0.0 0.0 0.0	3.620 0.0 3.620	120	25.319 -0.126 0.418			Vel = 6.96
22 to 204	26.640 26.350		38.37 57.11	1.25 1.38		0.0 0.0 0.0	5.580 0.0 5.580	120	25.611 0.126 1.330			Vel = 12.25
204 to 23	26.350 26.640		0.0 57.11	1.25 1.38		0.0 0.0 0.0	5.000 0.0 5.000	120	27.067 -0.126 1.193			Vel = 12.25
23 to 24	26.640 26.640		20.60 77.71	1.25 1.38	T	6.0 0.0 0.0	19.160 6.000 25.160	120	28.134 0.0 10.606			Vel = 16.67
24 to 25	26.640 26.640		0.0 77.71	1.25 1.38	T	6.0 0.0 0.0	5.220 6.000 11.220	120	38.740 0.0 4.730			Vel = 16.67
25 to 13	26.640 5.420		0.0 77.71	1.5 1.61	2E 2T	8.0 16.0 0.0	37.600 24.000 61.600	120	43.470 9.190 12.258			Vel = 12.25
13 to TR	5.420 5.420		0.0 77.71	1.5 1.61	2E	8.0 0.0 0.0	5.000 8.000 13.000	120	64.918 0.0 2.587			Vel = 12.25
TR to BR	5.420 1		0.0 77.71	2.5 2.469	S Fsp I	14.0 0.0 6.0	3.000 20.000 23.000	120	67.505 6.744 0.571		** Fixed Loss = 4.83	Vel = 5.21

Final Calculations - Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	***** Notes *****
BR to FF	1 -6		0.0 77.71	2.5 2.469	Zca I	0.0 6.0 0.0	1.000 6.000 7.000	120 10.305 0.174	* * Fixed Loss = 7.274 Vel = 5.21
FF to UG1	-6 -6		0.0 77.71	4 4.1	T	29.067 0.0 0.0	50.000 29.067 79.067	140 0.0 0.125	Vel = 1.89
UG1 to TEST	-6 1.5		0.0 77.71	8 8.27	3T E	166.063 28.468 0.0	35.000 194.531 229.531	140 -3.248 0.011	Vel = 0.46
TEST			0.0 77.71					82.187	K Factor = 8.57