



... 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 : Basement
Contract : C161372
Data File : Basement.WXF

Hydraulic Design Information Sheet

Name - 96 Federal Street Date - 3/30/2017
 Location - 96 Federal Street, Portland, ME 04101
 Building - System No. - Basement
 Contractor - Dean & Allyn, Inc. Contract No. - C161372
 Calculated By - Chris Stewart Drawing No. - 1 of 1
 Construction: (X) Combustible () Non-Combustible Ceiling Height - ~7'-0"
 Occupancy - Residential

S (X) NFPA 13 (X) Lt. Haz. Ord.Haz.Gp. () 1 () 2 () 3 () Ex.Haz.
 Y () NFPA 231 () NFPA 231C () Figure Curve

S Other

T Specific Ruling Made By Date

M	Area of Sprinkler Operation	- 900	System Type	Sprinkler/Nozzle
	Density	- .01	(X) Wet	Make Reliable
D	Area Per Sprinkler	- 130	() Dry	Model F1FR56
E	Elevation at Highest Outlet	- 6	() Deluge	Size 1/2"
S	Hose Allowance - Inside	-	() Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance	-	() Other	Temp.Rat.155F
G	Hose Allowance - Outside	- 100		

N Note *32.40psi Safety Margin

Calculation Flow Required - 340.82 Press Required - 62.34 At Node TEST
 Summary C-Factor Used: 120 Overhead 140 Underground

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

U Location - 35' down street from 96 Federal Street

P Source of Information - Portland Water District
 L
 Y

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method:	%	Palletized % Rack
	() Single Row	() Conven. Pallet	() Auto. Storage () Encap.
S	() Double Row	() Slave Pallet	() Solid Shelf () Non
T	() Mult. Row		() Open Shelf

R K Flue Spacing Clearance:Storage to Ceiling
 A Longitudinal Transverse

G Horizontal Barriers Provided:
 E

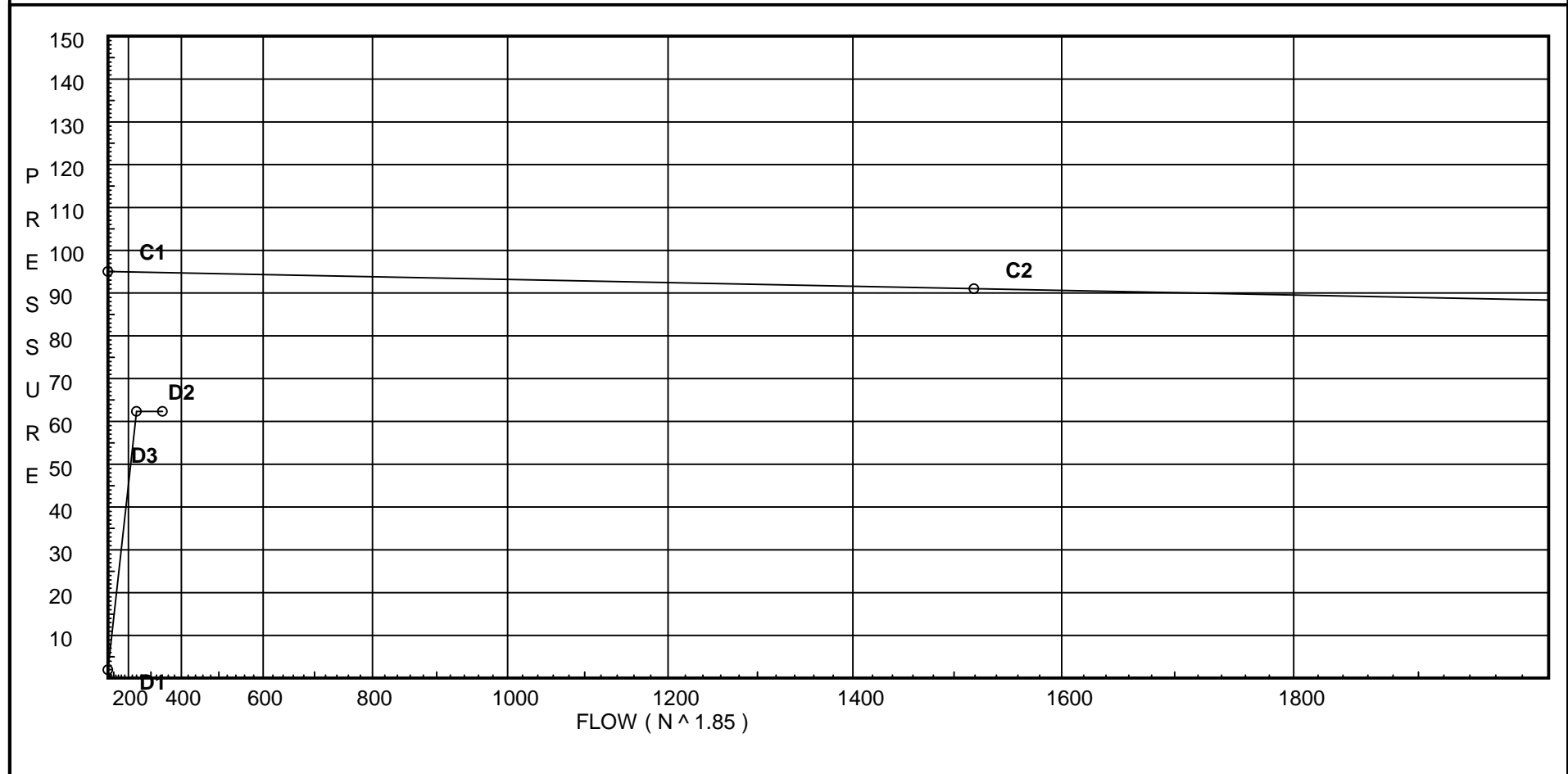
Water Supply Curve C

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

Demand:
D1 - Elevation : 1.949
D2 - System Flow : 240.825
D2 - System Pressure : 62.344
Hose (Demand) : 100
D3 - System Demand : 340.825
Safety Margin : 32.404



Fittings Used Summary

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Fitting Legend

Abbrev.	Name	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	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.
111	6.0	5.6	8.65	na	16.47	0.1	87	7.0
112	6.0	5.6	7.0	na	14.82	0.1	110	7.0
113	6.0	5.6	7.96	na	15.8	0.1	86	7.0
114	6.0	5.6	9.04	na	16.84	0.1	96	7.0
115	6.0	5.6	7.52	na	15.36	0.1	60	7.0
116	6.0	5.6	8.29	na	16.13	0.1	94	7.0
117	6.0	5.6	11.43	na	18.93	0.1	23	7.0
118	6.0	5.6	12.14	na	19.52	0.1	23	7.0
119	6.0	5.6	10.37	na	18.03	0.1	78	7.0
120	6.0	5.6	8.39	na	16.22	0.1	63	7.0
121	6.0	5.6	9.55	na	17.3	0.1	76	7.0
122	6.0	5.6	11.96	na	19.37	0.1	83	7.0
123	6.0	5.6	9.72	na	17.46	0.1	104	7.0
124	6.0	5.6	11.02	na	18.59	0.1	82	7.0
12A	6.0		9.84	na				
13A	6.0		10.28	na				
14A	6.0		12.96	na				
15A	6.0		11.77	na				
16A	6.0		13.57	na				
12	5.42		13.63	na				
13	5.42		14.24	na				
14	5.42		15.65	na				
15	5.42		16.21	na				
16	5.42		18.6	na				
17	5.42		35.46	na				
TR	5.42		42.62	na				
BR	1.0		53.99	na				
FF	-6.0		64.49	na				
UG1	-6.0		65.5	na				
TEST	1.5		62.34	na	100.0			

The maximum velocity is 23.03 and it occurs in the pipe between nodes 16 and 17

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	*****
111 to 12A	6 6	5.60	16.47 16.47	1 1.049	T	5.0 0.0 0.0	8.080 5.000 13.080	120 0.0909	8.652 0.0 1.189		Vel = 6.11	
12A			0.0 16.47						9.841		K Factor = 5.25	
112 to 113	6 6	5.60	14.82 14.82	1 1.049	E	2.0 0.0 0.0	10.830 2.000 12.830	120 0.0747	7.000 0.0 0.958		Vel = 5.50	
113 to 12A	6 6	5.60	15.79 30.61	1 1.049	T	5.0 0.0 0.0	1.580 5.000 6.580	120 0.2862	7.958 0.0 1.883		Vel = 11.36	
12A			0.0 30.61						9.841		K Factor = 9.76	
114 to 13A	6 6	5.60	16.84 16.84	1 1.049	T	5.0 0.0 0.0	8.080 5.000 13.080	120 0.0946	9.039 0.0 1.238		Vel = 6.25	
13A			0.0 16.84						10.277		K Factor = 5.25	
115 to 116	6 6	5.60	15.36 15.36	1 1.049		0.0 0.0 0.0	9.670 0.0 9.670	120 0.0798	7.522 0.0 0.772		Vel = 5.70	
116 to 13A	6 6	5.60	16.13 31.49	1 1.049	T	5.0 0.0 0.0	1.580 5.000 6.580	120 0.3014	8.294 0.0 1.983		Vel = 11.69	
13A			0.0 31.49						10.277		K Factor = 9.82	
117 to 14A	6 6	5.60	18.93 18.93	1 1.049	T	5.0 0.0 0.0	8.080 5.000 13.080	120 0.1175	11.426 0.0 1.537		Vel = 7.03	
14A			0.0 18.93						12.963		K Factor = 5.26	
118 to 14A	6 6	5.60	19.52 19.52	1 1.049	T	5.0 0.0 0.0	1.580 5.000 6.580	120 0.1243	12.145 0.0 0.818		Vel = 7.25	
14A			0.0 19.52						12.963		K Factor = 5.42	
119 to 15A	6 6	5.60	18.03 18.03	1 1.049	T	5.0 0.0 0.0	8.080 5.000 13.080	120 0.1075	10.368 0.0 1.406		Vel = 6.69	
15A			0.0 18.03						11.774		K Factor = 5.25	
120 to 121	6 6	5.60	16.22 16.22	1 1.049	E	2.0 0.0 0.0	11.160 2.000 13.160	120 0.0883	8.386 0.0 1.162		Vel = 6.02	
121 to 15A	6 6	5.60	17.30 33.52	1 1.049	T	5.0 0.0 0.0	1.580 5.000 6.580	120 0.3383	9.548 0.0 2.226		Vel = 12.44	

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	*****
15A			0.0 33.52					11.774		K Factor = 9.77	
122 to 16A	6 6	5.60	19.37	1	T 5.0	8.080 0.0	120 5.000	11.961 0.0			
16A			19.37	1.049	0.0	13.080	0.1226	1.604		Vel = 7.19	
16A			0.0 19.37					13.565		K Factor = 5.26	
123 to 124	6 6	5.60	17.46	1	E 2.0	10.790 0.0	120 2.000	9.724 0.0			
124			17.46	1.049	0.0	12.790	0.1012	1.294		Vel = 6.48	
124 to 16A	6 6	5.60	18.59	1	T 5.0	1.580 0.0	120 5.000	11.018 0.0			
16A			36.05	1.049	0.0	6.580	0.3871	2.547		Vel = 13.38	
16A			0.0 36.05					13.565		K Factor = 9.79	
12A to 12	6 5.420		47.09	1	T 5.0	0.580 0.0	120 5.000	9.841 0.251			
12			47.09	1.049	0.0	5.580	0.6344	3.540		Vel = 17.48	
12			0.0 47.09					13.632		K Factor = 12.75	
13A to 13	6 5.420		48.32	1	T 5.0	0.580 0.0	120 5.000	10.277 0.251			
13			48.32	1.049	0.0	5.580	0.6656	3.714		Vel = 17.94	
13			0.0 48.32					14.242		K Factor = 12.80	
14A to 14	6 5.420		38.44	1	T 5.0	0.580 0.0	120 5.000	12.963 0.251			
14			38.44	1.049	0.0	5.580	0.4360	2.433		Vel = 14.27	
14			0.0 38.44					15.647		K Factor = 9.72	
15A to 15	6 5.420		51.55	1	T 5.0	0.580 0.0	120 5.000	11.774 0.251			
15			51.55	1.049	0.0	5.580	0.7502	4.186		Vel = 19.14	
15			0.0 51.55					16.211		K Factor = 12.80	
16A to 16	6 5.420		55.42	1	T 5.0	0.580 0.0	120 5.000	13.565 0.251			
16			55.42	1.049	0.0	5.580	0.8575	4.785		Vel = 20.57	
16			0.0 55.42					18.601		K Factor = 12.85	
12 to 13	5.420 5.420		47.09	1.5	0.0	7.750 0.0	120 0.0	13.632 0.0			
13			47.09	1.61	0.0	7.750	0.0787	0.610		Vel = 7.42	
13 to 14	5.420 5.420		48.32	1.5	0.0	4.830 0.0	120 0.0	14.242 0.0			
14			95.41	1.61	0.0	4.830	0.2909	1.405		Vel = 15.04	
14 to 15	5.420 5.420		38.44	2	0.0	3.500 0.0	120 0.0	15.647 0.0			
15			133.85	2.067	0.0	3.500	0.1611	0.564		Vel = 12.80	

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	*****
15 to 16	5.420 5.420		51.56 185.41	2 2.067		8.120 0.0 8.120	120 0.2943	16.211 0.0 2.390		Vel = 17.73	
16 to 17	5.420 5.420		55.41 240.82	2 2.067	2E 10.0 0.0	25.290 10.000 35.290	120 0.4776	18.601 0.0 16.856		Vel = 23.03	
17 to TR	5.420 5.420		0.0 240.82	2 2.067	2E 10.0 0.0	5.000 10.000 15.000	120 0.4776	35.457 0.0 7.164		Vel = 23.03	
TR to BR	5.420 1		0.0 240.82	2.5 2.469	S Fsp I 6.0	14.0 0.0 20.000 23.000	120 0.2010	42.621 6.744 4.624		** Fixed Loss = 4.83 Vel = 16.14	
BR to FF	1 -6		0.0 240.82	2.5 2.469	Zca I 6.0	0.0 1.000 6.000 7.000	120 0.2010	53.989 9.089 1.407		** Fixed Loss = 6.058 Vel = 16.14	
FF to UG1	-6 -6		0.0 240.82	4 4.1	T 29.067 0.0	29.067 50.000 29.067 79.067	140 0.0128	64.485 0.0 1.011		Vel = 5.85	
UG1 to TEST	-6 1.5		0.0 240.82	8 8.27	3T E 166.063 28.468	35.000 194.531 229.531	140 0.0004	65.496 -3.248 0.096		Vel = 1.44	
TEST			100.00 340.82					62.344		Qa = 100.00 K Factor = 43.16	