



. . . Fire Protection by Computer Design

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

Job Name : C171418 1576 Forest Ave
Drawing : 1 of 2
Location : 1576 Forest Avenue
Remote Area : Area 2
Contract : C171418
Data File : Wet System - Area 2.WXF

HYDRAULIC CALCULATIONS
for

Project name: Moran's Market Renovations

Location: 1576 Forest Avenue

Drawing no: 1 of 2

Date: 11/14/2017

Design

Remote area number: Area 2

Remote area location: First Floor Retail

Occupancy classification: Ordinary Hazard Group II

Density: 0.20 - Gpm/SqFt

Area of application: 960 - SqFt

Coverage per sprinkler: 130 - SqFt

Type of sprinklers calculated: Reliable F1FR56 Pendent

No. of sprinklers calculated: 10

In-rack demand: - GPM

Hose streams: 250 - GPM

Total water required (including hose streams): 518.637 - GPM @ 59.03 - Psi

Type of system: Wet

Volume of dry or preaction system: N/A - Gal

Water supply information

Date: 10/14/2016

Location: Forest Avenue - Hydrant #01652

Source: Portland Water District

Name of contractor: Dean & Allyn, Inc.

Address: 116 Lewiston Road / / Gray, ME 04039

Phone number: (207) 657-5646

Name of designer: Chris Stewart

Authority having jurisdiction:

Notes: (Include peaking information or gridded systems here.)

Water Supply Curve C

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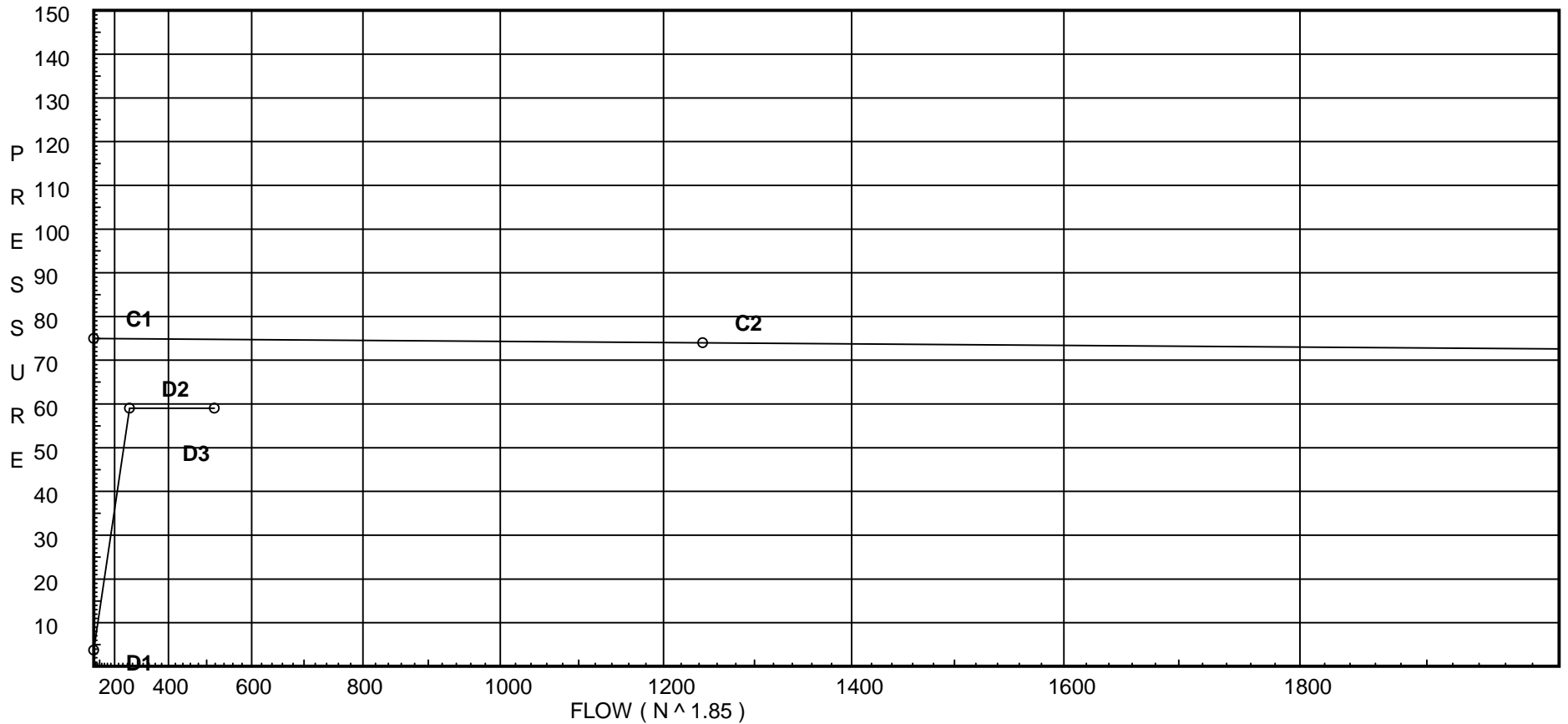
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City Water Supply:

C1 - Static Pressure : 75
C2 - Residual Pressure: 74
C2 - Residual Flow : 1244

Demand:

D1 - Elevation : 3.716
D2 - System Flow : 268.637
D2 - System Pressure : 59.031
Hose (Demand) : 250
D3 - System Demand : 518.637
Safety Margin : 15.771



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
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
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
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
J	90'Tee-Branch Grv Vic #20	0	0	4.5	6	8	8.5	10.8	13	17	16	21	25	33	41	50	65	78	88	98	120
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																			

Unit 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.
A	15.37	5.6	18.37	na	24.0	0.2	120	7.0
B	16.08		18.77	na				
C	15.37	5.6	18.37	na	24.0	0.2	120	7.0
D	16.08		19.31	na				
100	16.08	K = K @ B	18.77	na	24.0			
101	16.08	K = K @ D	20.59	na	24.78			
102	16.08	K = K @ D	22.01	na	25.62			
103	16.08	K = K @ D	25.9	na	27.8			
104	16.08	K = K @ D	29.21	na	29.51			
104A	16.08		34.49	na				
105	16.08	K = K @ B	20.3	na	24.96			
106	16.08	K = K @ D	22.26	na	25.77			
107	16.08	K = K @ D	23.8	na	26.64			
108	16.08	K = K @ D	27.98	na	28.89			
109	16.08	K = K @ D	31.53	na	30.66			
109A	16.08		37.2	na				
10	16.08		37.12	na				
11	16.08		40.03	na				
12	16.08		45.92	na				
TR2	4.0		53.11	na				
BR2	1.5		58.5	na				
FF	1.5		61.4	na				
UG1	1.5		61.62	na				
TEST	7.5		59.03	na	250.0			

The maximum velocity is 21.58 and it occurs in the pipe between nodes 109 and 109A

EOD

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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	*****
A to B	15.370 16.080	5.60	24.00 24.0	1 1.049	E	2.0 0.0 0.0	1.870 2.000 3.870	120 0.1827	18.367 -0.308 0.707		Vel = 8.91	
B			0.0 24.00						18.766		K Factor = 5.54	
C to D	15.370 16.080	5.60	24.00 24.0	1 1.049	T	5.0 0.0 0.0	1.870 5.000 6.870	120 0.1824	18.367 -0.308 1.253		Vel = 8.91	
D			0.0 24.00						19.312		K Factor = 5.46	
100 to 101	16.080 16.080	5.54	24.00 24.0	1 1.049		0.0 0.0 0.0	10.000 0.0 10.000	120 0.1823	18.766 0.0 1.823		K = K @ B Vel = 8.91	
101 to 102	16.080 16.080	5.46	24.78 48.78	1.25 1.38		0.0 0.0 0.0	8.000 0.0 8.000	120 0.1781	20.589 0.0 1.425		K = K @ D Vel = 10.46	
102 to 103	16.080 16.080	5.46	25.62 74.4	1.25 1.38		0.0 0.0 0.0	10.000 0.0 10.000	120 0.3889	22.014 0.0 3.889		K = K @ D Vel = 15.96	
103 to 104	16.080 16.080	5.46	27.80 102.2	1.5 1.61		0.0 0.0 0.0	10.000 0.0 10.000	120 0.3303	25.903 0.0 3.303		K = K @ D Vel = 16.11	
104 to 104A	16.080 16.080	5.46	29.51 131.71	1.5 1.61		0.0 0.0 0.0	10.000 0.0 10.000	120 0.5281	29.206 0.0 5.281		K = K @ D Vel = 20.76	
104A to 10	16.080 16.080		0.0 131.71	2 2.067	T	10.0 0.0 0.0	6.850 10.000 16.850	120 0.1564	34.487 0.0 2.636		Vel = 12.59	
10			0.0 131.71						37.123		K Factor = 21.62	
105 to 106	16.080 16.080	5.54	24.96 24.96	1 1.049		0.0 0.0 0.0	10.000 0.0 10.000	120 0.1961	20.303 0.0 1.961		K = K @ B Vel = 9.27	
106 to 107	16.080 16.080	5.46	25.77 50.73	1.25 1.38		0.0 0.0 0.0	8.000 0.0 8.000	120 0.1915	22.264 0.0 1.532		K = K @ D Vel = 10.88	
107 to 108	16.080 16.080	5.46	26.64 77.37	1.25 1.38		0.0 0.0 0.0	10.000 0.0 10.000	120 0.4181	23.796 0.0 4.181		K = K @ D Vel = 16.60	
108 to 109	16.080 16.080	5.46	28.89 106.26	1.5 1.61		0.0 0.0 0.0	10.000 0.0 10.000	120 0.3550	27.977 0.0 3.550		K = K @ D Vel = 16.75	
109 to 109A	16.080 16.080	5.46	30.66 136.92	1.5 1.61		0.0 0.0 0.0	10.000 0.0 10.000	120 0.5674	31.527 0.0 5.674		K = K @ D Vel = 21.58	
109A to 11	16.080 16.080		0.0 136.92	2 2.067	T	10.0 0.0 0.0	6.850 10.000 16.850	120 0.1681	37.201 0.0 2.832		Vel = 13.09	

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	*****
			0.0 136.92					40.033		K Factor = 21.64	
10 to 11	16.080 16.080		131.71	2.5 2.635	4I J	32.948 14.827 0.0	12.920 47.775	120	37.123 0.0		
						60.695	0.0479	2.910		Vel = 7.75	
11 to 12	16.080 16.080		136.93	3 3.26	6I J	40.319 17.471 0.0	34.830 57.790	120	40.033 0.0		
						92.620	0.0636	5.887		Vel = 10.33	
12 to TR2	16.080 4		0.0	4 4.26	6I J	55.302 21.067 0.0	36.830 76.369	120	45.920 5.232		
						113.199	0.0173	1.956		Vel = 6.05	
TR2 to BR2	4 1.500		0.0	4 4.26	B S Fsp T	15.8 28.968 0.0 26.334	5.000 71.102	120	53.108 4.083		* Fixed Loss = 3
						76.102	0.0173	1.314		Vel = 6.05	
BR2 to FF	1.500 1.500		0.0	6 6.357	2E Zca	35.205 0.0 0.0	8.000 35.205	120	58.505 2.788		* Fixed Loss = 2.788
						43.205	0.0025	0.106		Vel = 2.72	
FF to UG1	1.500 1.500		0.0	6 6.16	E T	20.084 43.037 0.0	40.000 63.121	140	61.399 0.0		
						103.121	0.0022	0.223		Vel = 2.89	
UG1 to TEST	1.500 7.500		0.0	16 16.41	E T G	82.4 166.859 16.48	175.000 265.740	140	61.622 -2.599		
						440.740	0	0.008		Vel = 0.41	
TEST			250.00 518.64							Qa = 250.00 K Factor = 67.50	