

. . . Fire Protection by Computer Design

ACCENDO FIRE PROTECTION LLC
38 ADDITON RD
GREENE, MAINE 04236
207-946-6182

Job Name : CPORT FIRST FLOOR OFFICES
Drawing : 1 OF 2
Location : PORTLAND, MAINE
Remote Area : 1
Contract : 1020
Data File : CPORT FIRST FLOOR OFFICES.WXF

HYDRAULIC CALCULATIONS
for

Project name: CPORT CREDIT UNION FIRST FLOOR
Location: PORTLAND, MAINE
Drawing no: 1 OF 2
Date: 1/8/18

Design

Remote area number: 1
Remote area location: FIRST FLOOR
Occupancy classification: LIGHT HAZARD
Density: .1 - Gpm/SqFt
Area of application: 977 - SqFt
Coverage per sprinkler: 148 - SqFt
Type of sprinklers calculated: 1/2" 5.6K 200DEG. CONCEALED PENDENTS
No. of sprinklers calculated: 10
In-rack demand: - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 293.0 - GPM @ 77.9 - Psi
Type of system: WET
Volume of dry or preaction system: N/A - Gal

Water supply information

Date: 7-6-2016
Location: CORNER OF HAMPSHIRE AND NEWBURY
Source: PORTLAND WATER DISTRICT

Name of contractor: ACCENDO FIRE PROTECTION LLC
Address: 38 ADDITON RD / / GREENE, MAINE 04236
Phone number: 207-946-6182
Name of designer: JWD
Authority having jurisdiction: SFMO, PORTLAND FIRE
Notes: (Include peaking information or gridded systems here.) HYDRAULICALLY REMOTE AREA
REVISED PER NFPA 13 2016 ED. SEC. 11.2.3.2.3.1

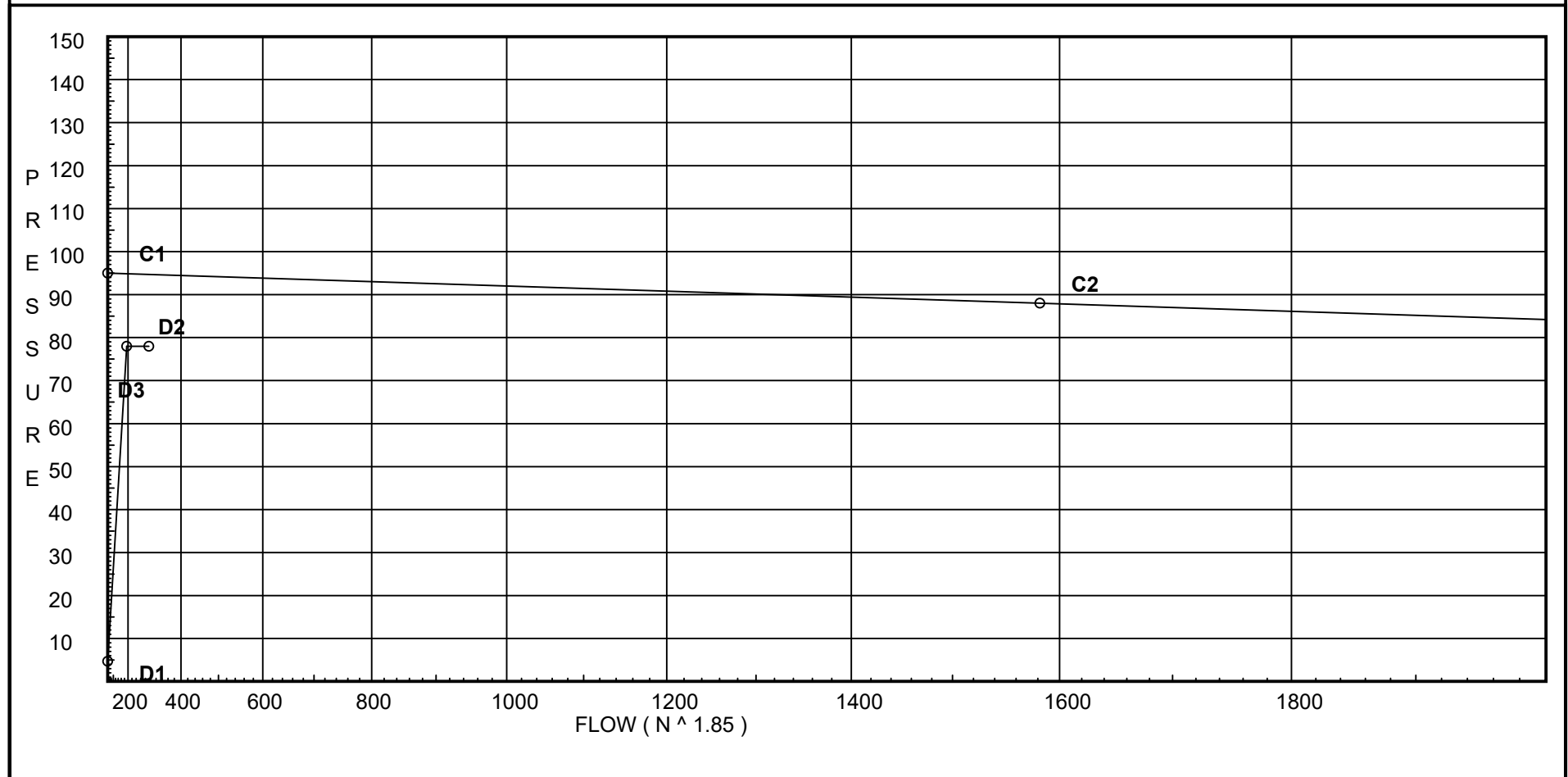
Water Supply Curve C

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City Water Supply:
C1 - Static Pressure : 95
C2 - Residual Pressure: 88
C2 - Residual Flow : 1582

Demand:
D1 - Elevation : 4.690
D2 - System Flow : 193.009
D2 - System Pressure : 77.973
Hose (Demand) : 100
D3 - System Demand : 293.009
Safety Margin : 16.718



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	
Ball	B Ball Milw BB-SC100			2.25	2	2.5	2.25	10														
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	
L	NFPA 13 Long Turn Elbow	0.5	1	2	2	2	3	4	5	5	6	8	9	13	16	18	24	27	30	34	40	
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	
Zcb	Colt C200 Vert 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.
DROP	0.0	5.6	7.0	na	14.82	0.1	148	7.0
DR2	0.0	5.6	7.0	na	14.82	0.1	148	7.0
70	110.83	K = K @ LINE	8.86	na	15.96			
71	110.83	K = K @ LINE	9.75	na	16.74			
72	110.83	K = K @ LINE	14.14	na	20.16			
73	110.83	K = K @ LINE	21.81	na	25.04			
74	110.83	K = K @ LN2	30.06	na	22.11			
75	110.83	K = K @ LINE	7.63	na	14.82			
76	110.83	K = K @ LINE	8.34	na	15.49			
77	110.83	K = K @ LINE	12.13	na	18.68			
78	110.83	K = K @ LINE	18.78	na	23.24			
79	110.83	K = K @ LN2	26.53	na	20.77			
80	110.83		27.81	na				
81	110.83		27.82	na				
82	110.83		31.49	na				
83	110.83		32.21	na				
84	110.83		46.93	na				
20B	110.83		58.26	na				
20	111.75		66.75	na				
TOW	111.75		67.64	na				
BFP	111.75		67.77	na				
BASE	101.0		77.35	na				
TEST	100.0		77.97	na	100.0			

The maximum velocity is 30.42 and it occurs in the pipe between nodes 83 and 84

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	*****
DROP to LINE	0 0	5.60	14.82 14.82	1 1.049	E T 0.0	2.0 5.0 0.0	1.500 7.000 8.500	120	7.000 0.0 0.635	Vel = 5.50	
LINE			0.0 14.82						7.635	K Factor = 5.36	
DR2 to LN2	0 0	5.60	14.82 14.82	1 1.049	E 0.0	2.0 0.0 0.0	85.000 2.000 87.000	120	7.000 0.0 6.499	Vel = 5.50	
LN2			0.0 14.82						13.499	K Factor = 4.03	
70 to 71	110.830 110.830	5.36	15.96 15.96	1 1.049	E 0.0	2.0 0.0 0.0	8.375 2.000 10.375	120	8.862 0.0 0.890	K = K @ LINE Vel = 5.92	
71 to 72	110.830 110.830	5.36	16.75 32.71	1 1.049	0.0 0.0	0.0 0.0 0.0	13.580 0.0 13.580	120	9.752 0.0 4.390	K = K @ LINE Vel = 12.14	
72 to 73	110.830 110.830	5.36	20.16 52.87	1 1.049	0.0 0.0	0.0 0.0 0.0	9.750 0.0 9.750	120	14.142 0.0 7.663	K = K @ LINE Vel = 19.63	
73 to 83	110.830 110.830	5.36	25.04 77.91	1 1.049	T 0.0	5.0 0.0 0.0	1.460 5.000 6.460	120	21.805 0.0 10.403	K = K @ LINE Vel = 28.92	
83			0.0 77.91						32.208	K Factor = 13.73	
74 to 82	110.830 110.830	4.03	22.11 22.11	1 1.049	T 0.0	5.0 0.0 0.0	4.125 5.000 9.125	120	30.059 0.0 1.429	K = K @ LN2 Vel = 8.21	
82			0.0 22.11						31.488	K Factor = 3.94	
75 to 76	110.830 110.830	5.36	14.82 14.82	1 1.049	0.0 0.0	0.0 0.0 0.0	9.460 0.0 9.460	120	7.635 0.0 0.707	K = K @ LINE Vel = 5.50	
76 to 77	110.830 110.830	5.36	15.48 30.3	1 1.049	2E 0.0	4.0 0.0 0.0	9.500 4.000 13.500	120	8.342 0.0 3.789	K = K @ LINE Vel = 11.25	
77 to 78	110.830 110.830	5.36	18.68 48.98	1 1.049	0.0 0.0	0.0 0.0 0.0	9.750 0.0 9.750	120	12.131 0.0 6.653	K = K @ LINE Vel = 18.18	
78 to 81	110.830 110.830	5.36	23.24 72.22	1 1.049	T 0.0	5.0 0.0 0.0	1.460 5.000 6.460	120	18.784 0.0 9.040	K = K @ LINE Vel = 26.81	
81			0.0 72.22						27.824	K Factor = 13.69	
79 to 80	110.830 110.830	4.03	20.77 20.77	1 1.049	T 0.0	5.0 0.0 0.0	4.125 5.000 9.125	120	26.533 0.0 1.274	K = K @ LN2 Vel = 7.71	
80 to 81	110.830 110.830		0.0 20.77	1.5 1.61	0.0 0.0	0.0 0.0 0.0	1.000 0.0 1.000	120	27.807 0.0 0.017	Vel = 3.27	

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	*****
81 to 82	110.830 110.830		72.22 92.99	1.5 1.61	0.0 0.0	13.210 0.0	120 0.2774	27.824 0.0			
									Vel = 14.65		
82 to 83	110.830 110.830		22.11 115.1	1.5 1.61	0.0 0.0	1.750 0.0	120 0.4114	31.488 0.0			
									Vel = 18.14		
83 to 84	110.830 110.830		77.91 193.01	1.5 1.61	T 0.0	8.0 8.000	120 1.0708	32.208 0.0			
									Vel = 30.42		
84 to 20B	110.830 110.830		0.0 193.01	2 2.067	2E T	10.0 10.0	15.710 20.000	120 0.0	46.932 0.0		
									Vel = 18.45		
20B to 20	110.830 111.750		0.0 193.01	2 2.067	T Ball Fsp	10.0 2.25 0.0	6.330 12.250 18.580	120 0.3171	58.258 2.602 5.892	** Fixed Loss = 3	
									Vel = 18.45		
20 to TOW	111.750 111.750		0.0 193.01	4 4.26	3L T	23.701 26.334	45.000 50.035	120 0.0094	66.752 0.0		
									Vel = 4.34		
TOW to BFP	111.750 111.750		0.0 193.01	4 4.26	I	9.217 0.0	4.000 9.217	120 0.0093	67.643 0.0		
									Vel = 4.34		
BFP to BASE	111.750 101		0.0 193.01	4 4.26	7I Zcb	64.519 0.0	40.000 64.519	120 0.0094	67.766 8.607	** Fixed Loss = 3.951	
									Vel = 4.34		
BASE to TEST	101 100		0.0 193.01	6 6.16	L T G	12.911 43.037 4.304	100.000 60.252 160.252	140 0.0012	77.353 0.433 0.187		
									Vel = 2.08		
TEST			100.00 293.01						77.973	Qa = 100.00 K Factor = 33.18	