

. . . Fire Protection by Computer Design

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

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

HYDRAULIC CALCULATIONS
for

Project name: CPORT CREDIT UNION SECOND FLOOR

Location: PORTLAND, MAINE

Drawing no: 1 OF 2

Date: 1/8/18

Design

Remote area number: 2

Remote area location: THIRD FLOOR

Occupancy classification: LIGHT HAZARD

Density: .1 - Gpm/SqFt

Area of application: 900 - SqFt

Coverage per sprinkler: 148 - SqFt

Type of sprinklers calculated: 1/2" 5.6K 200DEG. CONCEALED PENDENTS

No. of sprinklers calculated: 8

In-rack demand: - GPM

Hose streams: 100 - GPM

Total water required (including hose streams): 240.3 - GPM @ 85.5 - 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

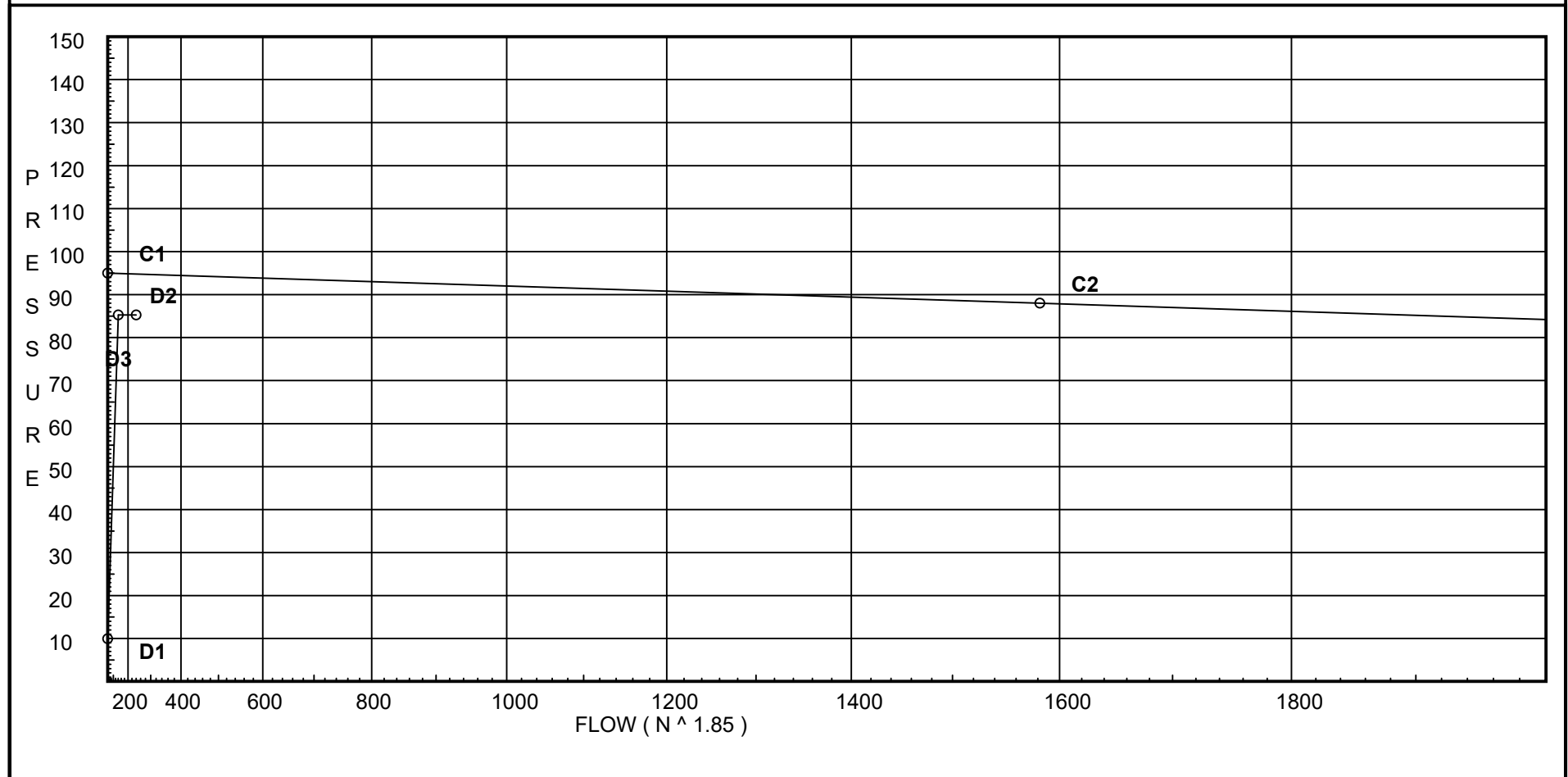
Water Supply Curve C

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

Demand:
D1 - Elevation : 9.961
D2 - System Flow : 140.363
D2 - System Pressure : 85.267
Hose (Demand) : 100
D3 - System Demand : 240.363
Safety Margin : 9.519



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													
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
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
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
20A	123.0	K = K @ LINE	19.26	na	17.55			
21	123.0	K = K @ LINE	19.39	na	17.61			
22	123.0		20.37	na				
23	123.0	K = K @ LINE	24.67	na	19.87			
24	123.0	K = K @ LINE	22.37	na	18.92			
25	123.0	K = K @ LINE	13.72	na	14.82			
26	123.0	K = K @ LINE	14.37	na	15.16			
27	123.0	K = K @ LINE	17.06	na	16.52			
28	123.0		23.52	na				
29	123.0	K = K @ LINE	24.8	na	19.92			
30	123.0		25.93	na				
31	123.0		26.28	na				
32	123.0		33.41	na				
33	123.0		35.81	na				
34	123.0		51.9	na				
18	123.0		67.97	na				
19	111.75		72.92	na				
20	111.75		73.02	na				
TOW	111.75		73.51	na				
BFP	111.75		73.58	na				
BASE	101.0		84.73	na				
TEST	100.0		85.27	na	100.0			

The maximum velocity is 22.12 and it occurs in the pipe between nodes 31 and 32

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	T 0.0	5.0 0.0 90.000	120 0.0747	7.000 0.0 6.723		Vel = 5.50	
LINE			0.0 14.82					13.723		K Factor = 4.00	
20A to 22	123 123	4.0	17.55 17.55	1 1.049	0.0 0.0	10.830 0.0 10.830	120 0.1022	19.261 0.0 1.107		K = K @ LINE Vel = 6.52	
22			0.0 17.55					20.368		K Factor = 3.89	
21 to 22	123 123	4.0	17.61 17.61	1 1.049	T 0.0	5.0 0.0 9.500	120 0.1028	19.391 0.0 0.977		K = K @ LINE Vel = 6.54	
22 to 31	123 123		17.56 35.17	1 1.049	T 0.0	5.0 0.0 16.000	120 0.3697	20.368 0.0 5.915		Vel = 13.06	
31			0.0 35.17					26.283		K Factor = 6.86	
23 to 30	123 123	4.0	19.87 19.87	1 1.049	T 0.0	5.0 0.0 9.830	120 0.1285	24.671 0.0 1.263		K = K @ LINE Vel = 7.38	
30			0.0 19.87					25.934		K Factor = 3.90	
24 to 28	123 123	4.0	18.92 18.92	1 1.049	T 0.0	5.0 0.0 9.790	120 0.1175	22.374 0.0 1.150		K = K @ LINE Vel = 7.02	
28			0.0 18.92					23.524		K Factor = 3.90	
25 to 26	123 123	4.0	14.82 14.82	1 1.049	0.0 0.0	8.625 0.0 8.625	120 0.0748	13.723 0.0 0.645		K = K @ LINE Vel = 5.50	
26 to 27	123 123	4.0	15.16 29.98	1 1.049	0.0 0.0	9.790 0.0 9.790	120 0.2751	14.368 0.0 2.693		K = K @ LINE Vel = 11.13	
27 to 28	123 123	4.0	16.52 46.5	1 1.097	T 0.0	6.217 0.0 12.967	120 0.4984	17.061 0.0 6.463		K = K @ LINE Vel = 15.78	
28 to 29	123 123		18.91 65.41	1.5 1.61	0.0 0.0	8.830 0.0 8.830	120 0.1446	23.524 0.0 1.277		Vel = 10.31	
29 to 30	123 123	4.0	19.92 85.33	1.5 1.61	0.0 0.0	4.790 0.0 4.790	120 0.2365	24.801 0.0 1.133		K = K @ LINE Vel = 13.45	
30 to 31	123 123		19.87 105.2	1.5 1.61	0.0 0.0	1.000 0.0 1.000	120 0.3490	25.934 0.0 0.349		Vel = 16.58	
31 to 32	123 123		35.16 140.36	1.5 1.61	T 0.0	8.0 0.0 12.000	120 0.5941	26.283 0.0 7.129		Vel = 22.12	

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	*****
32 to 33	123 123		0.0 140.36	1.5 1.61	0.0 0.0	4.040 0.0	120 0.5941	33.412 0.0			
									Vel = 22.12		
33 to 34	123 123		0.0 140.36	1.5 1.61	2I 0.0	8.0 8.000	120 0.5941	35.812 0.0			
									Vel = 22.12		
34 to 18	123 123		0.0 140.36	1.5 1.61	Fsp Ball S T	0.0 2.5 9.0 8.0	120 19.500 22.000	51.899 3.000 13.069		** Fixed Loss = 3	
									Vel = 22.12		
18 to 19	123 111.750		0.0 140.36	4 4.26	0.0 0.0	15.000 0.0	120 0.0052	67.968 4.872			
									Vel = 3.16		
19 to 20	111.750 111.750		0.0 140.36	4 4.26	2L 0.0	15.8 15.800	120 0.0052	72.918 0.0			
									Vel = 3.16		
20 to TOW	111.750 111.750		0.0 140.36	4 4.26	3L T	23.701 26.334	45.000 50.035	120 0.0	73.016 0.0		
									Vel = 3.16		
TOW to BFP	111.750 111.750		0.0 140.36	4 4.26	I 0.0	9.217 9.217	120 0.0052	73.510 0.0			
									Vel = 3.16		
BFP to BASE	111.750 101		0.0 140.36	4 4.26	7I Zcb	64.519 0.0	40.000 64.519	120 10.608	73.579 10.608		** Fixed Loss = 5.952
									Vel = 3.16		
BASE to TEST	101 100		0.0 140.36	6 6.16	L T G	12.911 43.037 4.304	100.000 60.252 160.252	140 0.433 0.104	84.730 0.433 0.104		
									Vel = 1.51		
TEST			100.00 240.36						85.267	Qa = 100.00 K Factor = 26.03	