

**. . . Fire Protection by Computer Design**

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

Job Name : CPORT CREDIT UNION FOURTH FLOOR  
Drawing : 2 OF 2  
Location : PORTLAND, MAINE  
Remote Area : 4  
Contract : 1020  
Data File : CPORT 4TH FLOOR SHELL.WXF

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**HYDRAULIC CALCULATIONS**  
*for*

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

**Design**

**Remote area number:** 4  
**Remote area location:** FOURTH 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. BRASS UPRIGHT  
**No. of sprinklers calculated:** 9  
**In-rack demand:** - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 258.2 - GPM @ 82.8 - 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

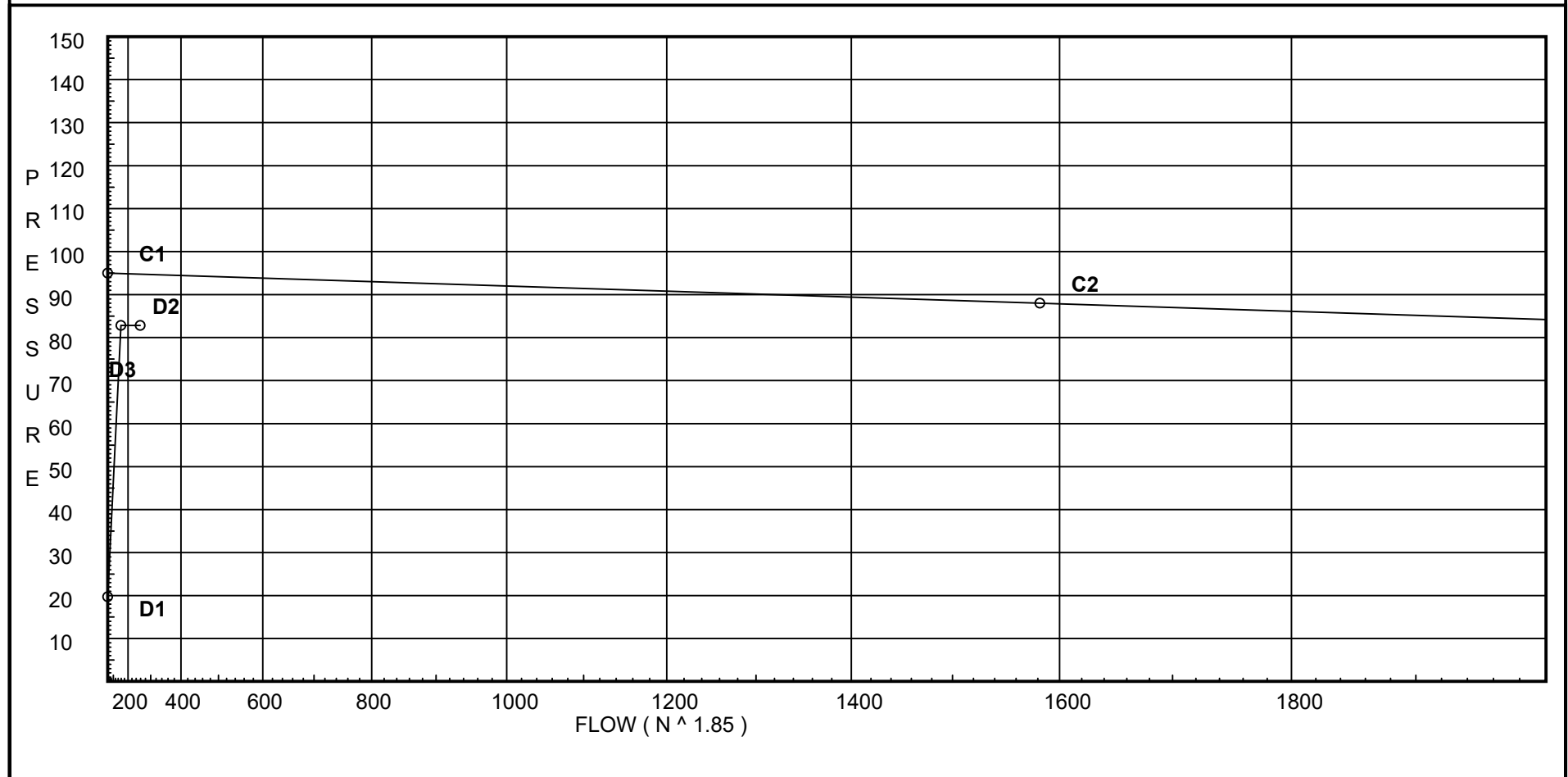
# Water Supply Curve C

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CPORT CREDIT UNION FOURTH FLOOR

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

Demand:  
D1 - Elevation : 19.706  
D2 - System Flow : 158.232  
D2 - System Pressure : 82.824  
Hose ( Demand ) : 100  
D3 - System Demand : 258.232  
Safety Margin : 11.931



# Fittings Used Summary

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 CPORT CREDIT UNION FOURTH FLOOR

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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
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.
SPRG	0.0	5.6	7.0	na	14.82	0.1	148	7.0
SP2	0.0	5.6	7.0	na	14.82	0.1	148	7.0
1	145.5	K = K @ UP	15.52	na	21.39			
2	145.5	K = K @ UP2	9.14	na	16.17			
3	145.5	K = K @ UP2	10.33	na	17.19			
5	145.5	K = K @ UP	7.45	na	14.82			
6	145.5	K = K @ UP2	8.23	na	15.34			
10	145.5	K = K @ UP	10.7	na	17.76			
11	145.5	K = K @ UP	11.77	na	18.63			
12	145.5		14.3	na				
4	145.5		15.05	na				
13	145.5		16.54	na				
7	145.5	K = K @ UP2	11.84	na	18.41			
8	145.5	K = K @ UP2	12.01	na	18.53			
14	145.5		18.32	na				
15	145.5		36.85	na				
16	145.5		55.8	na				
17	134.0		60.86	na				
18	122.0		66.29	na				
19	111.75		70.83	na				
20	111.75		70.95	na				
TOW	111.75		71.57	na				
BFP	111.75		71.66	na				
BASE	101.0		82.26	na				
TEST	100.0		82.82	na	100.0			

The maximum velocity is 24.94 and it occurs in the pipe between nodes 14 and 15

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	*****
SPRG to UP	0 0	5.60	14.82 14.82	1 1.049	T 0.0	5.0 0.0 6.000	120 0.0747	7.000 0.0 0.448		Vel = 5.50	
UP			0.0 14.82					7.448		K Factor = 5.43	
SP2 to UP2	0 0	5.60	14.82 14.82	1 1.049	E T 0.0	2.0 5.0 9.000	120 0.0747	7.000 0.0 0.672		Vel = 5.50	
UP2			0.0 14.82					7.672		K Factor = 5.35	
1 to 13	145.500 145.500	5.43	21.39 21.39	1 1.049	T 0.0	5.0 0.0 6.920	120 0.1473	15.519 0.0 1.019		K = K @ UP Vel = 7.94	
13			0.0 21.39					16.538		K Factor = 5.26	
2 to 3	145.500 145.500	5.35	16.17 16.17	1 1.049	0.0 0.0	13.500 0.0 13.500	120 0.0879	9.140 0.0 1.186		K = K @ UP2 Vel = 6.00	
3 to 4	145.500 145.500	5.35	17.19 33.36	1 1.049	E T 0.0	2.0 5.0 14.080	120 0.3353	10.326 0.0 4.721		K = K @ UP2 Vel = 12.38	
4			0.0 33.36					15.047		K Factor = 8.60	
5 to 6	145.500 145.500	5.43	14.82 14.82	1 1.049	0.0 0.0	10.420 0.0 10.420	120 0.0748	7.448 0.0 0.779		K = K @ UP Vel = 5.50	
6 to 12	145.500 145.500	5.35	15.34 30.16	1 1.049	3E T 0.0	6.0 5.0 21.830	120 0.2782	8.227 0.0 6.073		K = K @ UP2 Vel = 11.20	
12			0.0 30.16					14.300		K Factor = 7.98	
10 to 11	145.500 145.500	5.43	17.76 17.76	1 1.049	0.0 0.0	10.250 0.0 10.250	120 0.1044	10.702 0.0 1.070		K = K @ UP Vel = 6.59	
11 to 12	145.500 145.500	5.43	18.63 36.39	1 1.049	T 0.0	5.0 0.0 6.420	120 0.3938	11.772 0.0 2.528		K = K @ UP Vel = 13.51	
12 to 4	145.500 145.500		30.15 66.54	1.5 1.61	0.0 0.0	5.000 0.0 5.000	120 0.1494	14.300 0.0 0.747		Vel = 10.49	
4 to 13	145.500 145.500		33.36 99.9	1.5 1.61	0.0 0.0	4.710 0.0 4.710	120 0.3166	15.047 0.0 1.491		Vel = 15.74	
13 to 14	145.500 145.500		21.39 121.29	1.5 1.61	0.0 0.0	3.920 0.0 3.920	120 0.4536	16.538 0.0 1.778		Vel = 19.11	
14			0.0 121.29					18.316		K Factor = 28.34	

# 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	*****
7 to 8	145.500 145.500	5.35	18.41	1.5		0.0 0.0	12.000 0.0	120	11.841 0.0		K = K @ UP2	
8 to 14	145.500 145.500	5.35	18.53	1	E T	2.0 5.0	8.580 7.000	120	12.007 0.0		K = K @ UP2	
14 to 15	145.500 145.500		36.94	1.049		0.0	15.580	0.4049	6.309		Vel = 13.71	
14 to 15	145.500 145.500		121.29	1.5	2E	8.0 0.0	17.000 8.000	120	18.316 0.0			
15 to 16	145.500 145.500		158.23	1.61		0.0	25.000	0.7415	18.537		Vel = 24.94	
15 to 16	145.500 145.500		0.0	1.5	Ball Fsp	2.5 0.0	2.000 19.500	120	36.853 3.000		** Fixed Loss = 3	
16 to 17	145.500 134		158.23	4.026	S T	9.0 8.0	21.500	0.7415	15.942		Vel = 24.94	
16 to 17	145.500 134		0.0	4		0.0 0.0	10.000 0.0	120	55.795 4.981			
17 to 18	134 122		158.23	4.26		0.0	10.000	0.0085	0.085		Vel = 3.99	
17 to 18	134 122		0.0	4	T	26.334 0.0	10.000 26.334	120	60.861 5.197			
18 to 19	122 111.750		158.23	4.26		0.0	36.334	0.0065	0.236		Vel = 3.56	
18 to 19	122 111.750		0.0	4		0.0	15.000 0.0	120	66.294 4.439			
19 to 20	111.750 111.750		158.23	4.26		0.0	15.000	0.0065	0.098		Vel = 3.56	
19 to 20	111.750 111.750		0.0	4	2L	15.8 0.0	3.000 15.800	120	70.831 0.0			
20 to TOW	111.750 111.750		158.23	4.26		0.0	18.800	0.0065	0.122		Vel = 3.56	
20 to TOW	111.750 111.750		0.0	4	3L T	23.701 26.334	45.000 50.035	120	70.953 0.0			
TOW to BFP	111.750 111.750		158.23	4.26		0.0	95.035	0.0065	0.616		Vel = 3.56	
TOW to BFP	111.750 111.750		0.0	4	I	9.217 0.0	4.000 9.217	120	71.569 0.0			
BFP to BASE	111.750 101		158.23	4.26		0.0	13.217	0.0065	0.086		Vel = 3.56	
BFP to BASE	111.750 101		0.0	4	7I Zcb	64.519 0.0	40.000 64.519	120	71.655 9.928		** Fixed Loss = 5.272	
BASE to TEST	101 100		158.23	4.26		0.0	104.519	0.0065	0.679		Vel = 3.56	
BASE to TEST	101 100		0.0	6	L T	12.911 43.037	100.000 60.252	140	82.262 0.433			
TEST to TEST	100 100		158.23	6.16	G	4.304	160.252	0.0008	0.129		Vel = 1.70	
TEST to TEST	100 100		100.00								Qa = 100.00	
TEST to TEST	100 100		258.23						82.824		K Factor = 28.37	