

. . . Fire Protection by Computer Design

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

Job Name : CPORT CREDIT UNION THIRD FLOOR
Drawing : 2 OF 2
Location : PORTLAND, MAINE
Remote Area : 3
Contract : 1020
Data File : CPORT 3RD FLOOR SHELL.WXF

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: 3
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. BRASS UPRIGHT
No. of sprinklers calculated: 9
In-rack demand: - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 259.47 - GPM @ 74.43 - 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

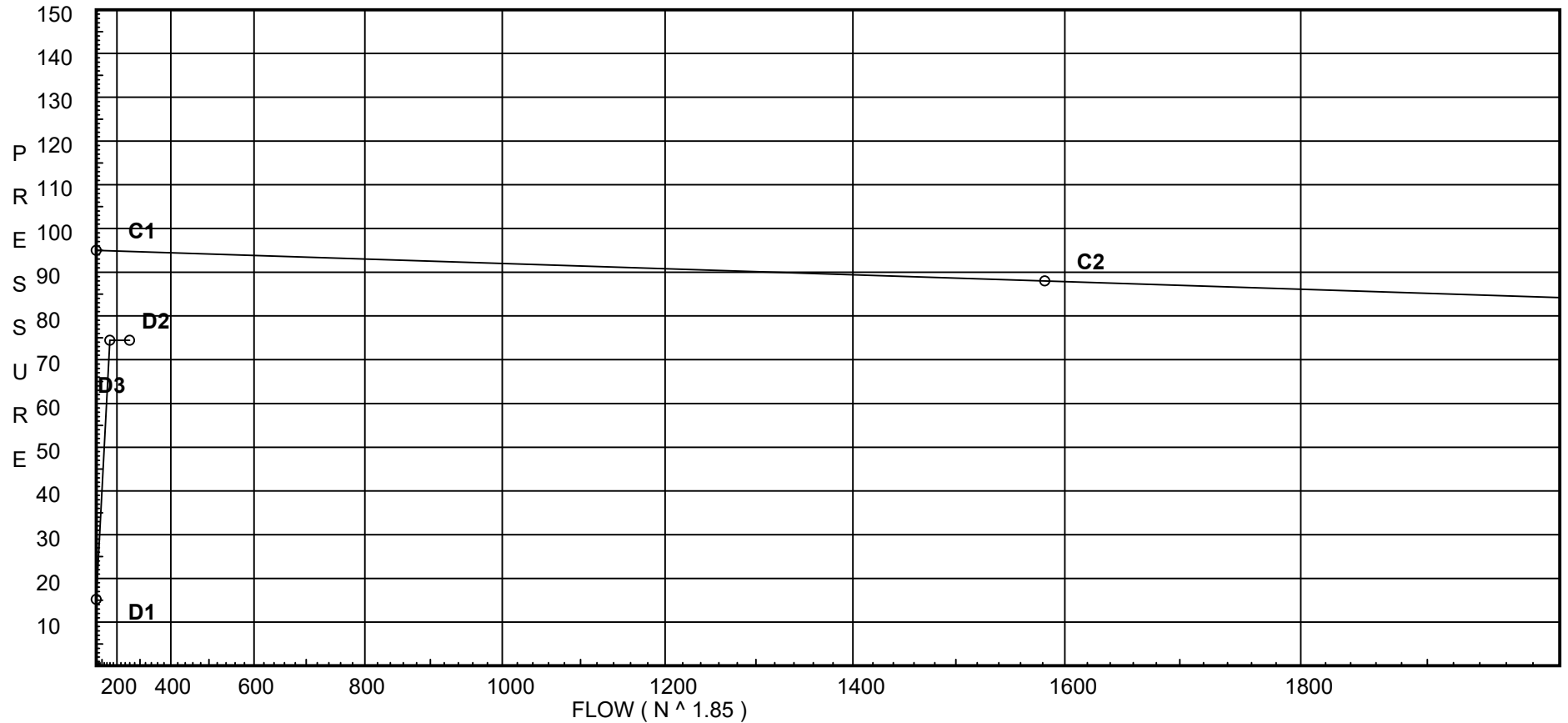
Water Supply Curve C

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

Demand:
D1 - Elevation : 15.210
D2 - System Flow : 159.479
D2 - System Pressure : 74.431
Hose (Demand) : 100
D3 - System Demand : 259.479
Safety Margin : 20.322



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.
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
300	135.12	K = K @ UP	20.34	na	24.48			
301	135.12	K = K @ UP	14.53	na	20.69			
302	135.12	K = K @ UP	16.19	na	21.84			
303	135.12	K = K @ UP	7.45	na	14.82			
304	135.12	K = K @ UP	7.9	na	15.26			
305	135.12	K = K @ UP	13.73	na	20.12			
306	135.12	K = K @ UP	14.51	na	20.68			
307	135.12	K = K @ UP	15.82	na	21.59			
308	135.12		20.15	na				
309	135.12		20.6	na				
310	135.12		21.92	na				
311	135.12		22.58	na				
312	145.5		25.8	na				
17	134.0		52.65	na				
18	122.0		57.91	na				
19	111.75		62.45	na				
20	111.75		62.57	na				
TOW	111.75		63.2	na				
BFP	111.75		63.29	na				
BASE	101.0		73.87	na				
TEST	100.0		74.43	na	100.0			

The maximum velocity is 25.13 and it occurs in the pipe between nodes 311 and 312

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	
300 to 310	135.120 135.120	5.43	24.48 24.48	1 1.049	T 0.0	5.0 0.0 5.000 8.330	120 0.1892	20.339 0.0 1.576		K = K @ UP Vel = 9.09	
310			0.0 24.48					21.915		K Factor = 5.23	
301 to 302	135.120 135.120	5.43	20.69	1 1.049	0.0 0.0	12.000 0.0 12.000	120 0.1386	14.526 0.0 1.663		K = K @ UP Vel = 7.68	
302 to 311	135.120 135.120	5.43	21.84 42.53	1 1.049	T 0.0	5.0 0.0 5.000 12.170	120 0.5256	16.189 0.0 6.396		K = K @ UP Vel = 15.79	
311			0.0 42.53					22.585		K Factor = 8.95	
303 to 304	135.120 135.120	5.43	14.82	1 1.049	0.0 0.0	6.000 0.0 6.000	120 0.0747	7.448 0.0 0.448		K = K @ UP Vel = 5.50	
304 to 305	135.120 135.120	5.43	15.25 30.07	1 1.049	2E 0.0	4.0 0.0 4.000 21.080	120 0.2768	7.896 0.0 5.834		K = K @ UP Vel = 11.16	
305 to 309	135.120 135.120	5.43	20.12 50.19	1 1.049	T 0.0	5.0 0.0 5.000 9.625	120 0.7139	13.730 0.0 6.871		K = K @ UP Vel = 18.63	
309			0.0 50.19					20.601		K Factor = 11.06	
306 to 307	135.120 135.120	5.43	20.68	1 1.049	0.0 0.0	9.420 0.0 9.420	120 0.1385	14.513 0.0 1.305		K = K @ UP Vel = 7.68	
307 to 308	135.120 135.120	5.43	21.59 42.27	1 1.049	T 0.0	5.0 0.0 5.000 8.330	120 0.5196	15.818 0.0 4.328		K = K @ UP Vel = 15.69	
308 to 309	135.120 135.120		0.0 42.27	1.5 1.61	0.0 0.0	7.040 0.0 7.040	120 0.0646	20.146 0.0 0.455		Vel = 6.66	
309 to 310	135.120 135.120		50.19 92.46	1.5 1.61	0.0 0.0	4.790 0.0 4.790	120 0.2743	20.601 0.0 1.314		Vel = 14.57	
310 to 311	135.120 135.120		24.48 116.94	1.5 1.61	0.0 0.0	1.580 0.0 1.580	120 0.4241	21.915 0.0 0.670		Vel = 18.43	

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	*****
311 to 312	135.120 145.500		42.54 159.48	1.5 1.61	0.0 0.0	10.250 0.0	120	22.585 -4.496			
									Vel = 25.13		
312 to 17	145.500 134		0.0 159.48	1.5 1.61	Ball Fsp T 2E 2.5 0.0 8.0 8.0	6.580 18.500 25.080	120	25.801 7.981 18.868		** Fixed Loss = 3	
									Vel = 25.13		
17 to 18	134 122		0.0 159.48	4 4.26	0.0 0.0	10.000 0.0	120	52.650 5.197			
									Vel = 3.59		
18 to 19	122 111.750		0.0 159.48	4 4.26	0.0 0.0	15.000 0.0	120	57.913 4.439			
									Vel = 3.59		
19 to 20	111.750 111.750		0.0 159.48	4 4.26	2L 15.8 0.0	3.000 15.800	120	62.451 0.0			
									Vel = 3.59		
20 to TOW	111.750 111.750		0.0 159.48	4 4.26	3L T 23.701 26.334	45.000 50.035	120	62.575 0.0			
									Vel = 3.59		
TOW to BFP	111.750 111.750		0.0 159.48	4 4.26	I 9.217 0.0	4.000 9.217	120	63.200 0.0			
									Vel = 3.59		
BFP to BASE	111.750 101		0.0 159.48	4 4.26	7I Zcb 64.519 0.0	40.000 64.519	120	63.287 9.891		** Fixed Loss = 5.235	
									Vel = 3.59		
BASE to TEST	101 100		0.0 159.48	6 6.16	L T G 12.911 43.037 4.304	100.000 60.252 160.252	140	73.866 0.433			
									Vel = 1.72		
TEST			100.00 259.48							Qa = 100.00 K Factor = 30.08	