

. . . Fire Protection by Computer Design

Eastern Fire Protection
170 Kitty Hawk Ave.
P.O. Box 1390
Auburn, Maine, 04211
207-784-1507

Job Name : 118 MUNJOY HILL RETAIL
Drawing : 1 of 2
Location : 118 Congress St., Portland, Maine
Remote Area : TWO
Contract : 5174
Data File : 1-5174RETAILsubmittal.WXF

HYDRAULIC CALCULATIONS
for

Project name: 118 MUNJOY HILL RETAIL
Location: 118 Congress St., Portland, Maine
Drawing no: 1 of 2
Date: 080814

Design

Remote area number: TWO
Remote area location: First Floor Retail
Occupancy classification: Ordinary Hazard II
Density: .20 - Gpm/SqFt
Area of application: 967 - SqFt
Coverage per sprinkler: 90 - SqFt
Type of sprinklers calculated: Tyco TY-FRB Pendent
No. of sprinklers calculated: 13
In-rack demand: - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 501.5 - GPM @ 36.3 - Psi
Type of system: Wet
Volume of dry or preaction system: - Gal

Water supply information

Date: 04/30/14
Location: Hydrant on the corner of Congress and St. Lawrence
Source: Portland Water District

Name of contractor: Eastern Fire Protection
Address: 170 Kitty Hawk Ave. / P.O. Box 1390 / Auburn, Maine, 04211
Phone number: 207-784-1507
Name of designer: WAF
Authority having jurisdiction: State Fire Marshal
Notes: (Include peaking information or gridded systems here.)
Remote area reduced per NFPA 13 (2013) section 11.2.3.2.3.1

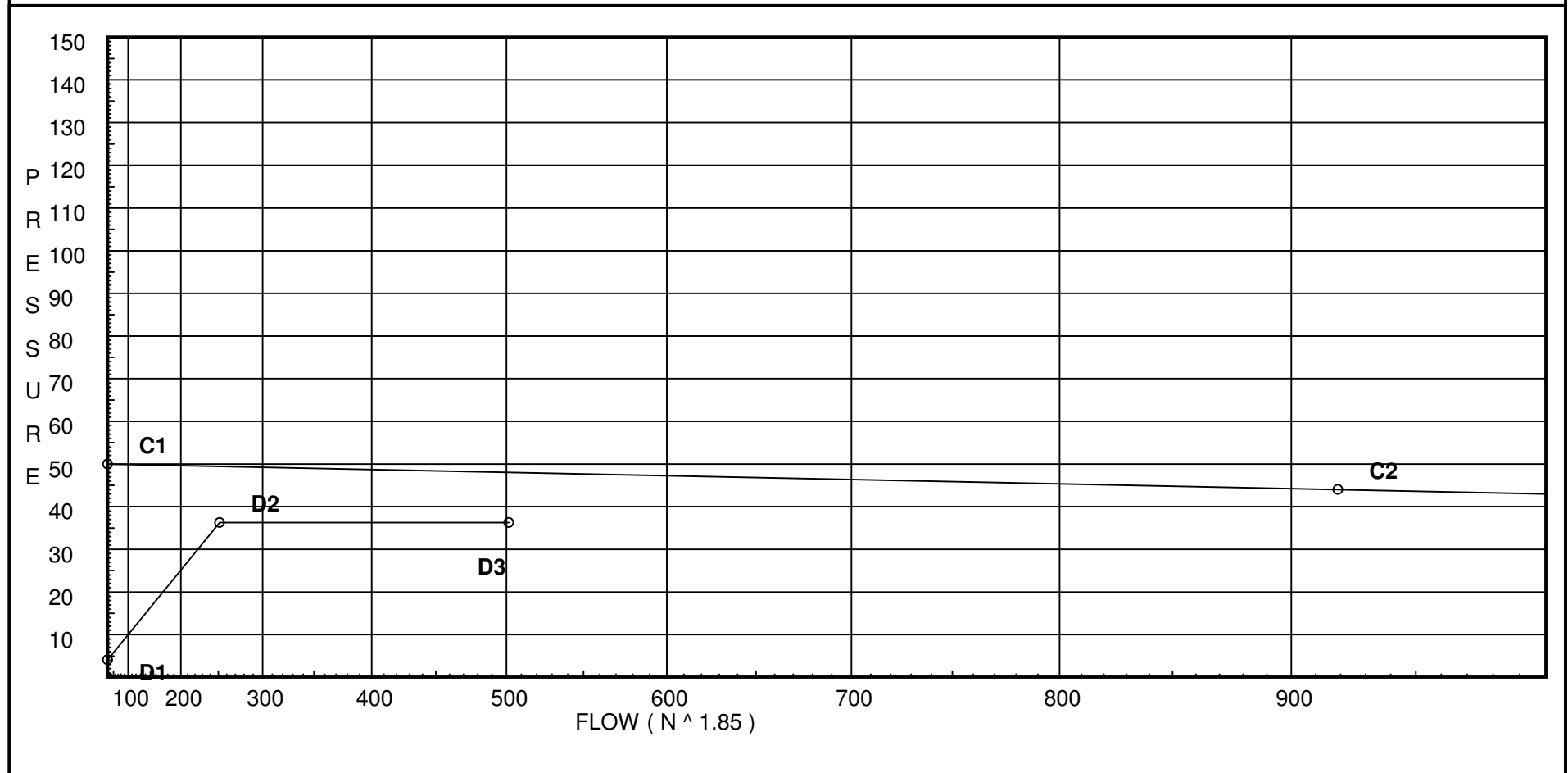
Water Supply Curve C

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City Water Supply:
C1 - Static Pressure : 50
C2 - Residual Pressure: 44
C2 - Residual Flow : 919

Demand:
D1 - Elevation : 4.114
D2 - System Flow : 251.519
D2 - System Pressure : 36.302
Hose (Demand) : 250
D3 - System Demand : 501.519
Safety Margin : 11.741



Fittings Used Summary

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Fitting Legend		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
Abbrev.	Name																				
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
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
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
Zcc	Colt C200N 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.

SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
TEST	50.0	44	919.0	48.043	501.52	36.302

NODE ANALYSIS

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
D001	158.5	5.6	10.8	18.4	
DO02	158.5	5.6	10.8	18.4	
44A	158.5	5.43	13.57	20.02	K=K @ EQ01
44	158.5	5.43	13.74	20.14	K=K @ EQ01
43	158.5	5.52	13.05	19.92	K=K @ EQ02
48	158.5	5.52	12.14	19.21	K=K @ EQ02
49	158.5	5.43	13.42	19.9	K=K @ EQ01
42	158.5	5.52	12.7	19.65	K=K @ EQ02
45	158.5	5.52	11.2	18.46	K=K @ EQ02
46	158.5	5.43	11.87	18.72	K=K @ EQ01
47	158.5	5.43	12.52	19.23	K=K @ EQ01
41	158.5	5.43	13.58	20.02	K=K @ EQ01
31	158.5	5.52	11.13	18.4	K=K @ EQ02
32	158.5	5.43	11.8	18.67	K=K @ EQ01
33	158.5	5.43	12.44	19.17	K=K @ EQ01
34	158.5		13.99		
35	158.5		14.07		
36	158.5		14.29		
37	158.5		14.66		
38	158.5		18.9		
39	158.5		23.97		
HDR1	151.5		30.57		
FLG	148.5		36.3		
TEST	149.0		36.3	250.0	

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	*****
D001 to EQ01	158.500 158.500	5.60	18.40 18.4	1 1.049	T 0.0	5.0 0.0 5.000 6.000	120 0.1115	10.796 0.0 0.669		Vel = 6.83	
EQ01			0.0 18.40					11.465		K Factor = 5.43	
DO02 to EQ02	158.500 158.500	5.60	18.40 18.4	1 1.049	E 0.0	2.0 0.0 2.000 3.000	120 0.1113	10.796 0.0 0.334		Vel = 6.83	
EQ02			0.0 18.40					11.130		K Factor = 5.52	
44A to 44	158.500 158.5	5.43	20.02 20.02	1.25 1.38		0.0 0.0 5.000 5.000	120 0.0342	13.568 0.0 0.171		K = K @ EQ01 Vel = 4.29	
44 to 37	158.5 158.5	5.43	20.14 40.16	1.25 1.38	T 0.0	6.0 0.0 1.370 6.000 7.370	120 0.1243	13.739 0.0 0.916		K = K @ EQ01 Vel = 8.61	
37			0.0 40.16					14.655		K Factor = 10.49	
43 to 36	158.5 158.5	5.52	19.92 19.92	1 1.049	T 0.0	5.0 0.0 4.620 5.000 9.620	120 0.1292	13.045 0.0 1.243		K = K @ EQ02 Vel = 7.39	
36			0.0 19.92					14.288		K Factor = 5.27	
48 to 49	158.5 158.5	5.52	19.21 19.21	1 1.049	E 0.0	2.0 0.0 8.600 2.000 10.600	120 0.1208	12.135 0.0 1.281		K = K @ EQ02 Vel = 7.13	
49 to 36	158.5 158.5	5.43	19.91 39.12	1.25 1.38	T 0.0	6.0 0.0 1.370 6.000 7.370	120 0.1183	13.416 0.0 0.872		K = K @ EQ01 Vel = 8.39	
36			0.0 39.12					14.288		K Factor = 10.35	
42 to 35	158.5 158.5	5.52	19.65 19.65	1 1.049	T 0.0	5.0 0.0 5.920 5.000 10.920	120 0.1260	12.699 0.0 1.376		K = K @ EQ02 Vel = 7.29	
35			0.0 19.65					14.075		K Factor = 5.24	
45 to 46	158.5 158.5	5.52	18.46 18.46	1 1.049		0.0 0.0 6.000 0.0 6.000	120 0.1123	11.200 0.0 0.674		K = K @ EQ02 Vel = 6.85	
46 to 47	158.5 158.5	5.43	18.72 37.18	1.25 1.38		0.0 0.0 6.000 0.0 6.000	120 0.1077	11.874 0.0 0.646		K = K @ EQ01 Vel = 7.98	
47 to 35	158.5 158.5	5.43	19.23 56.41	1.25 1.38	T 0.0	6.0 0.0 0.670 6.000 6.670	120 0.2331	12.520 0.0 1.555		K = K @ EQ01 Vel = 12.10	

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	*****
35			0.0 56.41					14.075		K Factor = 15.04	
41 to 34	158.5 158.5	5.43	20.02	1.25	T 6.0	5.920 0.0	120	13.579 0.0		K = K @ EQ01	
			20.02	1.38	0.0	11.920	0.0343	0.409		Vel = 4.29	
34			0.0 20.02					13.988		K Factor = 5.35	
31 to 32	158.5 158.5	5.52	18.40	1	0.0	6.000 0.0	120	11.130 0.0		K = K @ EQ02	
			18.4	1.049	0.0	6.000	0.1117	0.670		Vel = 6.83	
32 to 33	158.5 158.5	5.43	18.67	1.25	0.0	6.000 0.0	120	11.800 0.0		K = K @ EQ01	
			37.07	1.38	0.0	6.000	0.1072	0.643		Vel = 7.95	
33 to 34	158.5 158.5	5.43	19.17	1.25	T 6.0	0.670 0.0	120	12.443 0.0		K = K @ EQ01	
			56.24	1.38	0.0	6.670	0.2316	1.545		Vel = 12.06	
34 to 35	158.5 158.5		20.02	3	0.0	14.000 0.0	120	13.988 0.0			
			76.26	3.26	0.0	14.000	0.0062	0.087		Vel = 2.93	
35 to 36	158.5 158.5		76.06	3	0.0	9.580 0.0	120	14.075 0.0			
			152.32	3.26	0.0	9.580	0.0222	0.213		Vel = 5.85	
36 to 37	158.5 158.5		59.04	3	0.0	9.000 0.0	120	14.288 0.0			
			211.36	3.26	0.0	9.000	0.0408	0.367		Vel = 8.12	
37 to 38	158.5 158.5		40.16	3	6L 40.319	15.000 20.159	120	14.655 0.0			
			251.52	3.26	T 0.0	60.478 75.478	0.0563	4.248		Vel = 9.67	
38 to 39	158.5 158.500		0.0	3	2L 13.44	21.580 68.542	120	18.903 0.0			
			251.52	3.26	S 21.503	90.122	0.0563	5.072		Vel = 9.67	
					T 20.159						
39 to HDR1	158.500 151.500		0.0	4	2B 31.601	88.000 144.838	120	23.975 3.032			
			251.52	4.26	S 28.968	232.838	0.0153	3.560		Vel = 5.66	
					2T 52.668						
HDR1 to FLG	151.500 148.500		0.0	4	Zcc 0.0	1.500 0.0	120	30.567 5.712		* * Fixed Loss = 4.413	
			251.52	4.26	0.0	1.500	0.0160	0.024		Vel = 5.66	
FLG to TEST	148.500 149		0.0	6	2L 25.822	40.000 73.163	140	36.303 -0.217			
			251.52	6.16	T 43.037	113.163	0.0019	0.216		Vel = 2.71	
TEST			250.00 501.52					36.302		Qa = 250.00 K Factor = 83.24	