

. . . Fire Protection by Computer Design

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

Job Name : MARGINAL WAY #5378 BUILDING B
Drawing : 1 OF 1
Location : MARGINAL WAY., PORTLAND, MAINE
Remote Area : BUILDING B
Contract : 5378
Data File : MARGINAL WAY #5378 Area 1.WXF

HYDRAULIC CALCULATIONS
for

Project name: MARGINAL WAY #5378 BUILDING B
Location: MARGINAL WAY., PORTLAND, MAINE
Drawing no: 1 OF 1
Date: 10/29/15

Design

Remote area number: BUILDING B
Remote area location: TENANT SPACE 1, BUILDING B
Occupancy classification: ORDINARY HAZARD II
Density: .2 - Gpm/SqFt
Area of application: 1040 - SqFt
Coverage per sprinkler: 123 - SqFt
Type of sprinklers calculated: RELIABLE F1FR 3/4" K=8.0
No. of sprinklers calculated: 10
In-rack demand: - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 542.82 - GPM @ 74.87 - Psi
Type of system: WET
Volume of dry or preaction system: NA - Gal

Water supply information

Date: 09/13/2011
Location: HYDRANT LOCATED ON KENNEBEC STREET
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 (2007)SECTION 11.2.3.2.3.1

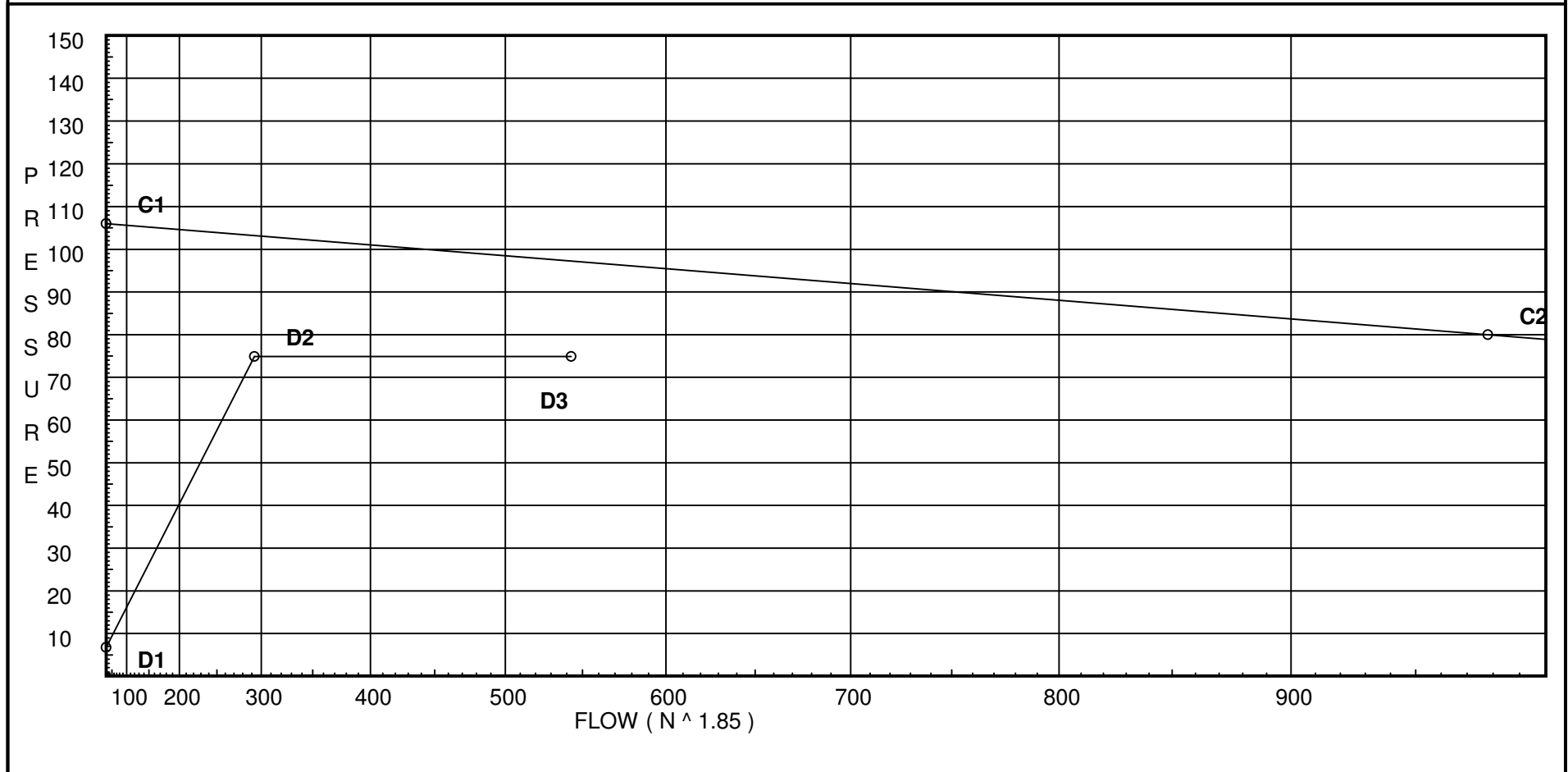
Water Supply Curve C

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City Water Supply:
C1 - Static Pressure : 106
C2 - Residual Pressure: 80
C2 - Residual Flow : 978

Demand:
D1 - Elevation : 6.787
D2 - System Flow : 292.82
D2 - System Pressure : 74.870
Hose (Demand) : 250
D3 - System Demand : 542.82
Safety Margin : 22.380



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																					
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	
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.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	106.0	80	978.0	97.251	542.82	74.87

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
1	125.67	8	9.46	24.6	
2	125.17		10.72		
3	125.17		10.93		
4	125.17		11.46		
5	125.17		14.5		
6	125.17		16.39		
7	125.17		24.73		
8	123.62		30.32		
9	123.62		31.69		
10	123.62		45.23		
TOR	123.62		59.17		
BASE	113.0		73.32		
TEST	110.0		74.87	250.0	
13	125.67	8	9.64	24.84	
14	125.67	8	10.13	25.46	
15	125.67	8	12.77	28.59	
16	125.17		14.37		
17	125.17		14.64		
18	125.17		15.7		
19	125.17		18.0		
20	125.17		21.39		
21	123.62		29.81		
22	125.67	8	12.02	27.74	
23	125.17		12.83		
24	125.67	8	13.02	28.86	
25	125.67	8	13.98	29.91	
26	125.67	8	13.63	29.53	
27	125.17		14.51		
28	125.67	8	16.07	32.07	
29	125.67	8	26.56	41.23	
30	125.17		29.5		
31	125.17		30.47		

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	*****
*EQUIVALENT K'S												
*REMOTE HEAD TO SUPPLY												
1	125.670	8.00	24.60	1	T	5.0	0.500	120	9.456			
to						0.0	5.000		0.217			
2	125.170		24.6	1.049		0.0	5.500	0.1907	1.049	Vel =	9.13	
2	125.170		0.0	1.5		0.0	10.750	120	10.722			
to						0.0	0.0		0.0			
3	125.170		24.6	1.682		0.0	10.750	0.0192	0.206	Vel =	3.55	
3	125.170		24.84	1.5		0.0	7.670	120	10.928			
to						0.0	0.0		0.0			
4	125.170		49.44	1.682		0.0	7.670	0.0696	0.534	Vel =	7.14	
4	125.170		25.46	1.5	2E	9.9	10.340	120	11.462			
to						0.0	9.900		0.0			
5	125.170		74.9	1.682		0.0	20.240	0.1502	3.040	Vel =	10.81	
5	125.170		27.74	1.5		0.0	7.000	120	14.502			
to						0.0	0.0		0.0			
6	125.170		102.64	1.682		0.0	7.000	0.2690	1.883	Vel =	14.82	
6	125.170		29.53	1.5	T	9.9	9.530	120	16.385			
to						0.0	9.900		0.0			
7	125.170		132.17	1.682		0.0	19.430	0.4295	8.345	Vel =	19.08	
7	125.170		0.0	1.5	T	9.9	1.540	120	24.730			
to						0.0	9.900		0.671			
8	123.620		132.17	1.682		0.0	11.440	0.4295	4.914	Vel =	19.08	
8	123.620		119.42	2.5		0.0	8.670	120	30.315			
to						0.0	0.0		0.0			
9	123.620		251.59	2.635		0.0	8.670	0.1588	1.377	Vel =	14.80	
9	123.620		41.23	2.5	T	16.474	47.920	120	31.692			
to						0.0	16.474		0.0			
10	123.620		292.82	2.635		0.0	64.394	0.2102	13.536	Vel =	17.23	
10	123.620		0.0	2.5	2T	32.948	16.890	120	45.228			
to					2I	16.474	49.422		0.0			
TOR	123.620		292.82	2.635		0.0	66.312	0.2102	13.940	Vel =	17.23	
TOR	123.620		0.0	2.5	Zcb	0.0	10.620	120	59.168			
to						0.0	0.0		11.917	** Fixed Loss =	7.318	
BASE	113		292.82	2.635		0.0	10.620	0.2103	2.233	Vel =	17.23	
BASE	113		0.0	6	L	12.911	40.000	140	73.318			
to					G	4.304	60.252		1.299			
TEST	110		292.82	6.16	T	43.037	100.252	0.0025	0.253	Vel =	3.15	
TEST			250.00							Qa =	250.00	
TEST			542.82						74.870	K Factor =	62.73	
*NEW PATH												
13	125.670	8.00	24.84	1	T	5.0	0.500	120	9.642			
to						0.0	5.000		0.217			
3	125.170		24.84	1.049		0.0	5.500	0.1944	1.069	Vel =	9.22	
			0.0									

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	*****
3			24.84						10.928		K Factor = 7.51	
*NEW PATH												
14 to 4	125.670 125.170	8.00	25.46	1	T	5.0 0.0	0.500 5.000	120	10.127 0.217			
			25.46	1.049		0.0	5.500	0.2033	1.118		Vel = 9.45	
4			0.0 25.46						11.462		K Factor = 7.52	
*NEW PATH												
15 to 16	125.670 125.170	8.00	28.59	1	T	5.0 0.0	0.500 5.000	120	12.769 0.217			
			28.59	1.049		0.0	5.500	0.2520	1.386		Vel = 10.61	
16 to 17	125.170 125.170		0.0	1.5		0.0 0.0	10.750 0.0	120	14.372 0.0			
			28.59	1.682		0.0	10.750	0.0252	0.271		Vel = 4.13	
17 to 18	125.170 125.170		28.86	1.5		0.0 0.0	11.500 0.0	120	14.643 0.0			
			57.45	1.682		0.0	11.500	0.0920	1.058		Vel = 8.30	
18 to 19	125.170 125.170		29.91	1.5		0.0 0.0	11.500 0.0	120	15.701 0.0			
			87.36	1.682		0.0	11.500	0.1997	2.296		Vel = 12.61	
19 to 20	125.170 125.170		32.06	1.5		0.0 0.0	9.530 0.0	120	17.997 0.0			
			119.42	1.682		0.0	9.530	0.3560	3.393		Vel = 17.24	
20 to 21	125.170 123.620		0.0	1.5	2T	19.799 0.0	1.960 19.799	120	21.390 0.671			
			119.42	1.682		0.0	21.759	0.3560	7.747		Vel = 17.24	
21 to 8	123.620 123.620		0.0	2.5		0.0 0.0	12.670 0.0	120	29.808 0.0			
			119.42	2.635		0.0	12.670	0.0400	0.507		Vel = 7.03	
8			0.0 119.42						30.315		K Factor = 21.69	
*NEW PATH												
22 to 23	125.670 125.170	8.00	27.74	1	E	2.0 0.0	0.500 2.000	120	12.022 0.217			
			27.74	1.049		0.0	2.500	0.2380	0.595		Vel = 10.30	
23 to 5	125.170 125.170		0.0	1	T	5.0 0.0	2.000 5.000	120	12.834 0.0			
			27.74	1.049		0.0	7.000	0.2383	1.668		Vel = 10.30	
5			0.0 27.74						14.502		K Factor = 7.28	
*NEW PATH												
24 to 17	125.670 125.170	8.00	28.86	1	T	5.0 0.0	0.500 5.000	120	13.016 0.217			
			28.86	1.049		0.0	5.500	0.2564	1.410		Vel = 10.71	

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	*****
17			0.0 28.86						14.643		K Factor = 7.54	
*NEW PATH												
25 to 18	125.670 125.170	8.00	29.91	1	T	5.0 0.0	0.500 5.000	120	13.977 0.217			
			29.91	1.049		0.0	5.500	0.2740	1.507		Vel = 11.10	
18			0.0 29.91						15.701		K Factor = 7.55	
*NEW PATH												
26 to 27	125.670 125.170	8.00	29.53	1	E	2.0 0.0	0.500 2.000	120	13.626 0.217			
			29.53	1.049		0.0	2.500	0.2676	0.669		Vel = 10.96	
27 to 6	125.170 125.170		0.0	1	T	5.0 0.0	2.000 5.000	120	14.512 0.0			
			29.53	1.049		0.0	7.000	0.2676	1.873		Vel = 10.96	
6			0.0 29.53						16.385		K Factor = 7.30	
*NEW PATH												
28 to 19	125.670 125.170	8.00	32.07	1	T	5.0 0.0	0.500 5.000	120	16.066 0.217			
			32.07	1.049		0.0	5.500	0.3116	1.714		Vel = 11.91	
19			0.0 32.07						17.997		K Factor = 7.56	
*NEW PATH												
29 to 30	125.670 125.170	8.00	41.23	1	T	5.0 0.0	0.500 5.000	120	26.557 0.217			
			41.23	1.049		0.0	5.500	0.4960	2.728		Vel = 15.31	
30 to 31	125.170 125.170		0.0	1.5	T	9.9 0.0	9.540 9.900	120	29.502 0.0			
			41.23	1.682		0.0	19.440	0.0498	0.968		Vel = 5.95	
31 to 9	125.170 123.620		0.0	1.5	T	9.9 0.0	1.170 9.900	120	30.470 0.671			
			41.23	1.682		0.0	11.070	0.0498	0.551		Vel = 5.95	
9			0.0 41.23						31.692		K Factor = 7.32	