

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

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

Job Name : BAYSIDE ANCHOR 4TH APARTMENT LARGEST ROOM  
Drawing : 2 OF 2  
Location : 81 EAST OXFORD ST., PORTLAND, MAINE  
Remote Area : TWO  
Contract :  
Data File : 1-5444REMOTE4TH.WXF

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**HYDRAULIC CALCULATIONS**  
**for**

**Project name:** BAYSIDE ANCHOR FOURTH FLOOR APARTMENT  
**Location:** 81 EAST OXFORD ST., PORTLAND, MAINE  
**Drawing no:** 2 OF 2  
**Date:** 05/02/16

**Design**

**Remote area number:** TWO  
**Remote area location:** FOURTH FLOOR APARTMENT LARGEST ROOM  
**Occupancy classification:** LIGHT  
**Density:** .10 - Gpm/SqFt  
**Area of application:** 966 - SqFt  
**Coverage per sprinkler:** 152 - SqFt  
**Type of sprinklers calculated:** RELIABLE F1FR56 K=5.6 PENDENT  
**No. of sprinklers calculated:** 10  
**In-rack demand:** 0 - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 271.7 - GPM @ 78.1 - Psi  
**Type of system:** WET  
**Volume of dry or preaction system:** NA - Gal

**Water supply information**

**Date:** 06/20/12  
**Location:** 12: CIRCULATING MAIN IN OXFORD ST.  
**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:** JWD  
**Authority having jurisdiction:** STATE FIRE MARSHAL  
**Notes:** (Include peaking information or gridded systems here.)

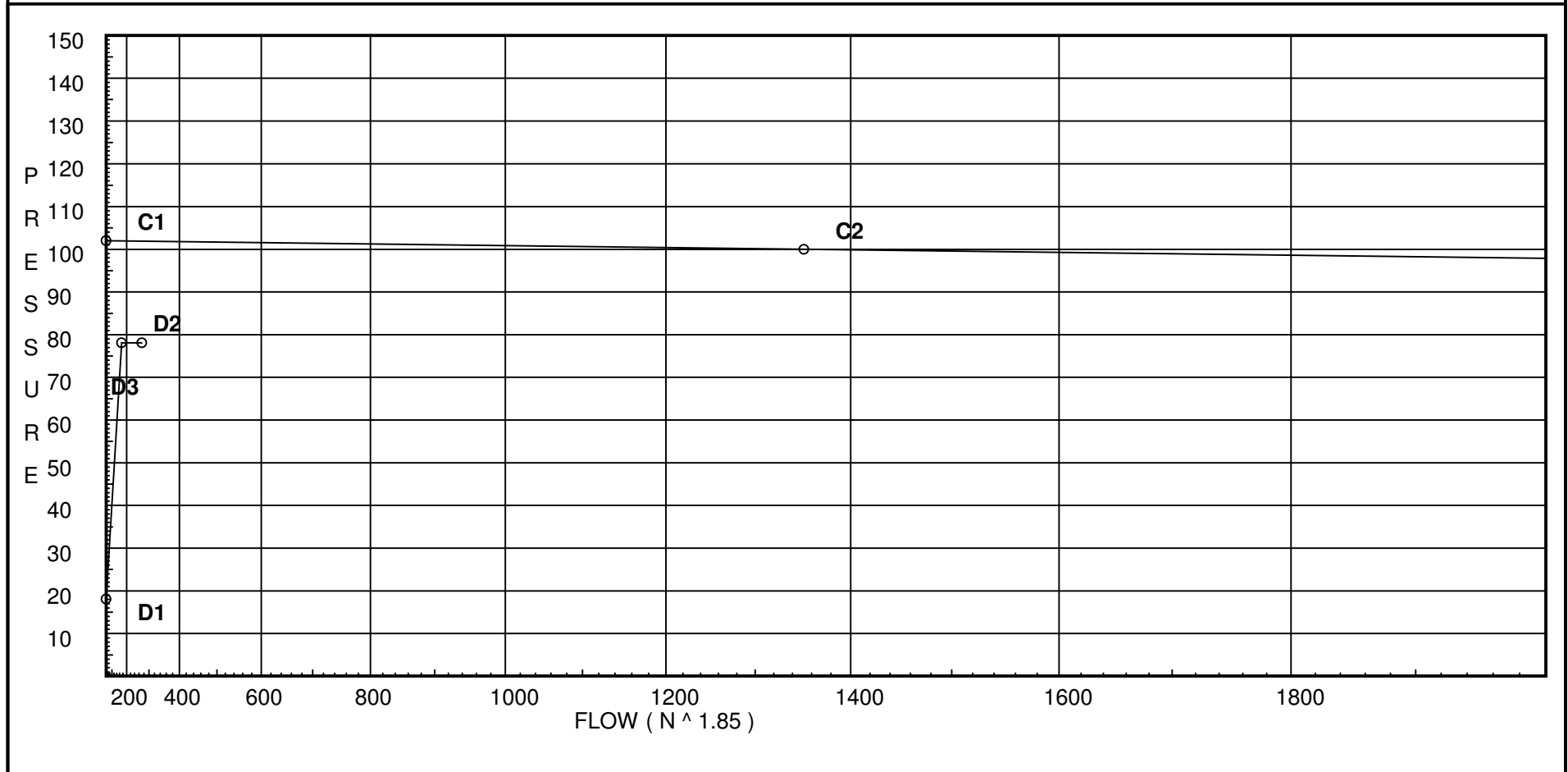
# Water Supply Curve C

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BAYSIDE ANCHOR 4TH APARTMENT LARGEST ROOM

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City Water Supply:  
C1 - Static Pressure : 102  
C2 - Residual Pressure: 100  
C2 - Residual Flow : 1352

Demand:  
D1 - Elevation : 18.047  
D2 - System Flow : 171.734  
D2 - System Pressure : 78.096  
Hose ( Demand ) : 100  
D3 - System Demand : 271.734  
Safety Margin : 23.801



# 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
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
N*	CPVC 90'ElI Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O*	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
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
U	45' ElI Firelock #003	0	0	0	0	0	1.8	2.2	2.6	0	3.4	4.2	5	5	0	0	0	0	0	0	0
V	90' ElI Firelock #001	0	0	0	0	0	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0
X	90'Tee-BranchFirelock002	0	0	0	0	0	8.5	10.8	13	0	16	21	25	33	0	0	0	0	0	0	0
Zca	Colt C200 Horz 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**

<b>Node at Source</b>	<b>Static Pressure</b>	<b>Residual Pressure</b>	<b>Flow</b>	<b>Available Pressure</b>	<b>Total Demand</b>	<b>Required Pressure</b>
TEST	102.0	100	1352.0	101.897	271.73	78.096

**NODE ANALYSIS**

<b>Node Tag</b>	<b>Elevation</b>	<b>Node Type</b>	<b>Pressure at Node</b>	<b>Discharge at Node</b>	<b>Notes</b>
D101	63.25	5.6	7.37	15.2	
D102	63.25	5.6	7.37	15.2	
D103	63.25	5.6	7.37	15.2	
7	63.25	4.57	14.04	17.13	K=K @ EQ03
8	63.25	4.57	14.75	17.56	K=K @ EQ03
8B	63.25		17.39		
3A	63.25	5.48	11.39	18.49	K=K @ EQ02
9A	63.25	5.48	7.69	15.2	K=K @ EQ02
10A	63.25	5.48	7.98	15.48	K=K @ EQ02
12A	63.25	5.48	9.48	16.87	K=K @ EQ02
13A	63.25	5.48	10.46	17.72	K=K @ EQ02
9	63.25		7.94		
10	63.25		8.27		
11	63.25	5.51	9.54	17.02	K=K @ EQ01
12	63.25		9.9		
13	63.25		10.88		
1	63.25	5.51	10.52	17.86	K=K @ EQ01
2	63.25	5.51	11.15	18.4	K=K @ EQ01
2B	63.25		11.53		
3	63.25		11.78		
4	63.25		13.52		
5	63.25		13.76		
6	63.25		17.43		
20	63.25		19.64		
2M	63.25		44.86		
4M	63.25		51.0		
TOR	31.08		66.83		
FLG	23.0		77.38		
TEST	21.58		78.1	100.0	

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	*****
D101 to EQ01	63.250 63.250	5.60	15.20 15.2	1 1.101	O 0.0	5.0 5.000 6.000	150 0.0410	7.367 0.0 0.246		Vel = 5.12	
EQ01			0.0 15.20					7.613		K Factor = 5.51	
D102 to EQ02	63.250 63.250	5.60	15.20 15.2	1 1.101	N 0.0	7.0 7.000 8.000	150 0.0410	7.367 0.0 0.328		Vel = 5.12	
EQ02			0.0 15.20					7.695		K Factor = 5.48	
D103 to EQ03	63.250 63.250	5.60	15.20 15.2	1 1.101	N O 0.0	7.0 5.0 90.000	150 0.0410	7.367 0.0 3.686		Vel = 5.12	
EQ03			0.0 15.20					11.053		K Factor = 4.57	
7 to 8	63.25 63.250	4.57	17.13 17.13	1 1.101	0.0 0.0 0.0	14.000 0.0 14.000	150 0.0511	14.038 0.0 0.716		K = K @ EQ03 Vel = 5.77	
8 to 8B	63.250 63.25	4.57	17.56 34.69	1 1.101	0.0 0.0 0.0	14.000 0.0 14.000	150 0.1884	14.754 0.0 2.638		K = K @ EQ03 Vel = 11.69	
8B to 6	63.25 63.250		0.0 34.69	1.25 1.394	0.0 0.0 0.0	0.710 0.0 0.710	150 0.0606	17.392 0.0 0.043		Vel = 7.29	
6			0.0 34.69					17.435		K Factor = 8.31	
3A to 3	63.25 63.250	5.48	18.49 18.49	1 1.101	O 0.0 0.0	5.0 5.000 6.670	150 0.0588	11.390 0.0 0.392		K = K @ EQ02 Vel = 6.23	
3			0.0 18.49					11.782		K Factor = 5.39	
9A to 9	63.25 63.25	5.48	15.20 15.2	1 1.101	O 0.0 0.0	5.0 5.000 6.000	150 0.0410	7.695 0.0 0.246		K = K @ EQ02 Vel = 5.12	
9			0.0 15.20					7.941		K Factor = 5.39	
10A to 10	63.25 63.25	5.48	15.48 15.48	1 1.101	O 0.0 0.0	5.0 5.000 6.790	150 0.0423	7.981 0.0 0.287		K = K @ EQ02 Vel = 5.22	
10			0.0 15.48					8.268		K Factor = 5.38	
12A to 12	63.25 63.25	5.48	16.87 16.87	1 1.101	O 0.0 0.0	5.0 5.000 8.500	150 0.0496	9.481 0.0 0.422		K = K @ EQ02 Vel = 5.68	
			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	*****
12			16.87						9.903		K Factor = 5.36	
13A to 13	63.25 63.25	5.48	17.72	1	O	5.0 0.0	2.710 5.000	150	10.458 0.0		K = K @ EQ02	
			17.72	1.101		0.0	7.710	0.0545	0.420		Vel = 5.97	
13			0.0 17.72						10.878		K Factor = 5.37	
9 to 10	63.25 63.25		15.20	1		0.0 0.0	8.000 0.0	150	7.941 0.0			
			15.2	1.101		0.0	8.000	0.0409	0.327		Vel = 5.12	
10 to 11	63.25 63.25		15.48	1		0.0 0.0	8.500 0.0	150	8.268 0.0			
			30.68	1.101		0.0	8.500	0.1502	1.277		Vel = 10.34	
11 to 12	63.25 63.25	5.51	17.02	1.25		0.0 0.0	3.330 0.0	150	9.545 0.0		K = K @ EQ01	
			47.7	1.394		0.0	3.330	0.1075	0.358		Vel = 10.03	
12 to 13	63.25 63.25		16.87	1.25		0.0 0.0	5.170 0.0	150	9.903 0.0			
			64.57	1.394		0.0	5.170	0.1886	0.975		Vel = 13.57	
13 to 5	63.25 63.250		17.72	1.25	O	6.0 0.0	3.750 6.000	150	10.878 0.0			
			82.29	1.394		0.0	9.750	0.2953	2.879		Vel = 17.30	
5			0.0 82.29						13.757		K Factor = 22.19	
1 to 2	63.250 63.250	5.51	17.86	1		0.0 0.0	11.500 0.0	150	10.515 0.0		K = K @ EQ01	
			17.86	1.101		0.0	11.500	0.0552	0.635		Vel = 6.02	
2 to 2B	63.250 63.250	5.51	18.40	1.25		0.0 0.0	5.920 0.0	150	11.150 0.0		K = K @ EQ01	
			36.26	1.394		0.0	5.920	0.0649	0.384		Vel = 7.62	
2B to 3	63.250 63.250		0.0	1.25		0.0 0.0	3.830 0.0	150	11.534 0.0			
			36.26	1.394		0.0	3.830	0.0648	0.248		Vel = 7.62	
3 to 4	63.250 63.250		18.49	1.25	O	6.0 0.0	6.500 6.000	150	11.782 0.0			
			54.75	1.394		0.0	12.500	0.1390	1.737		Vel = 11.51	
4 to 5	63.250 63.250		0.0	2		0.0 0.0	10.000 0.0	150	13.519 0.0			
			54.75	2.003		0.0	10.000	0.0238	0.238		Vel = 5.57	
5 to 6	63.250 63.250		82.29	2	N O	11.0 10.0	7.330 21.000	150	13.757 0.0			
			137.04	2.003		0.0	28.330	0.1298	3.678		Vel = 13.95	
6 to 20	63.250 63.250		34.69	2		0.0 0.0	11.170 0.0	150	17.435 0.0			
			171.73	2.003		0.0	11.170	0.1970	2.201		Vel = 17.49	
20 to 2M	63.250 63.250		0.0	2	3N O	33.0 10.0	85.000 43.000	150	19.636 0.0			
			171.73	2.003		0.0	128.000	0.1971	25.228		Vel = 17.49	

# 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	*****
2M to 4M	63.250 63.250		0.0 171.73	2.5 2.635	2V 2X S B 11.807 29.654 19.22 9.61	8.000 70.291 78.291	120 0.0783	44.864 0.0 6.132		Vel = 10.10	
4M to TOR	63.250 31.080		0.0 171.73	4 4.26	U 8V 2X B 4.477 71.629 42.135 15.8	118.000 134.041 252.041	120 0.0076	50.996 13.933 1.903		Vel = 3.87	
TOR to FLG	31.080 23		0.0 171.73	2.5 2.635	3V Zca 0.0 0.0 17.71 17.710	14.000 17.710 31.710	120 0.0783	66.832 8.067 2.483		* * Fixed Loss = 4.567 Vel = 10.10	
FLG to TEST	23 21.580		0.0 171.73	6 6.16	L 2G T 12.911 8.607 43.037	40.000 64.555 104.555	140 0.0009	77.382 0.615 0.099		Vel = 1.85	
TEST			100.00 271.73					78.096		Qa = 100.00 K Factor = 30.75	