



**. . . 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 CCS REMOTE  
Drawing : 2 OF 2  
Location : 81 EAST OXFORD ST., PORTLAND, MAINE  
Remote Area : ONE  
Contract :  
Data File : 1-5444CCSREMOTE.WXF

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**HYDRAULIC CALCULATIONS**  
**for**

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

**Design**

**Remote area number:** ONE  
**Remote area location:** FOURTH FLOOR CONCEALED SPACE  
**Occupancy classification:** LIGHT  
**Density:** .10 - Gpm/SqFt  
**Area of application:** 1110 - SqFt  
**Coverage per sprinkler:** 168 - SqFt  
**Type of sprinklers calculated:** RELIABLE KFR56-CCS  
**No. of sprinklers calculated:** 9  
**In-rack demand:** 0 - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 281.02 - GPM @ 89.938 - 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.)**  
DESIGN AREA PER RELIABLE BULLETIN 044, REV. C

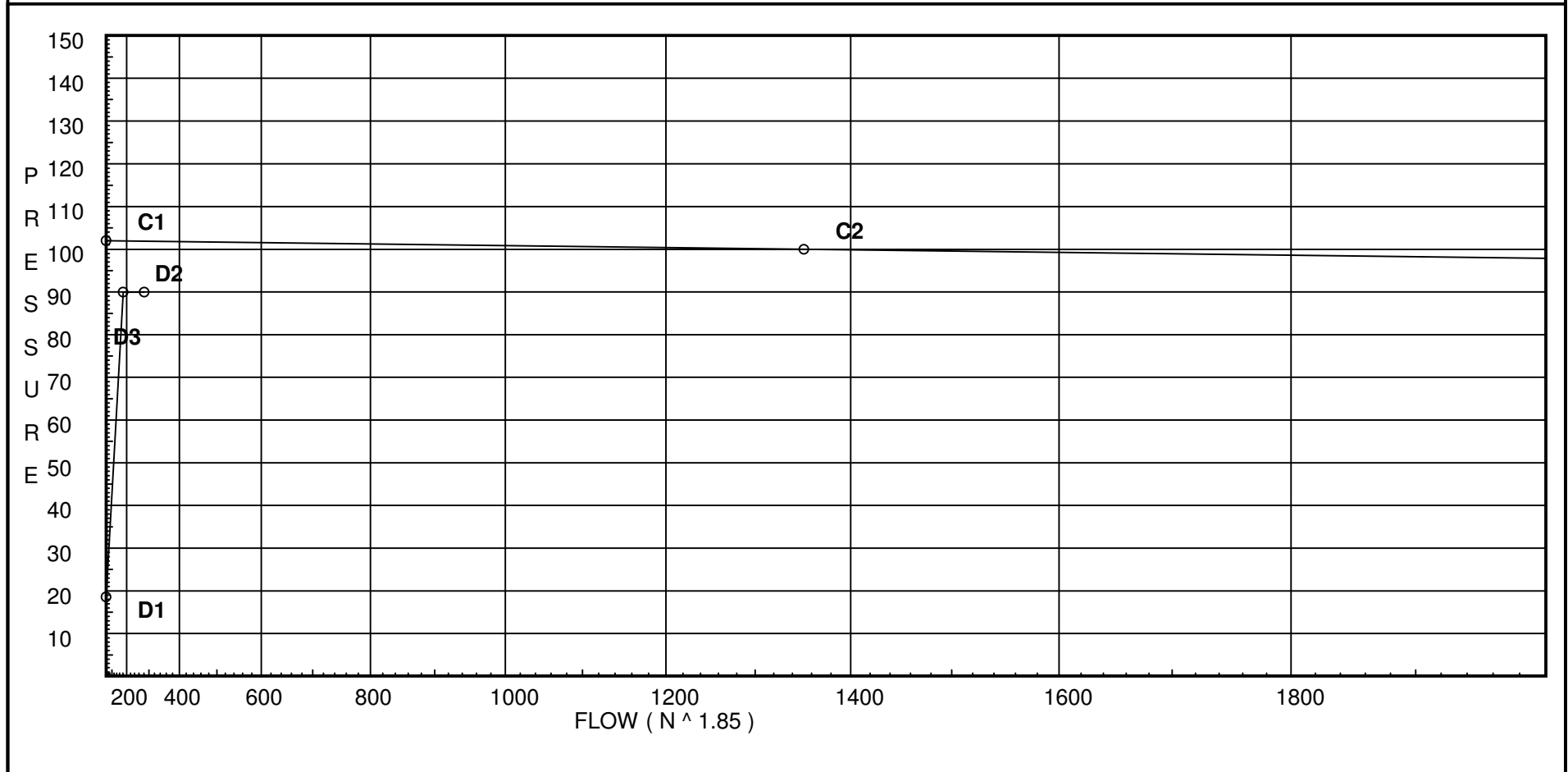
# Water Supply Curve C

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

Demand:  
D1 - Elevation : 18.589  
D2 - System Flow : 181.02  
D2 - System Pressure : 89.938  
Hose ( Demand ) : 100  
D3 - System Demand : 281.02  
Safety Margin : 11.953



# 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
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	101.891	281.02	89.938

**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>
S101	64.5	5.6	9.0	16.8	
S102	64.5	5.6	9.0	16.8	
21	64.5	5.52	13.33	20.15	K=K @ EQ01
22	64.5	5.52	14.09	20.71	K=K @ EQ01
23	64.5	5.52	14.74	21.18	K=K @ EQ01
24	64.5	5.52	16.95	22.72	K=K @ EQ01
25	64.5	5.52	17.61	23.16	K=K @ EQ01
14	64.5	5.49	9.37	16.8	K=K @ EQ02
15	64.5	5.52	9.91	17.37	K=K @ EQ01
16	64.5	5.52	11.93	19.06	K=K @ EQ01
17	64.5	5.52	12.98	19.88	K=K @ EQ01
18	64.5		17.13		
19	64.5		17.8		
20	64.5		27.07		
2M	64.5		54.88		
4M	64.5		61.64		
TOR	31.08		78.22		
FLG	23.0		89.21		
TEST	21.58		89.94	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	*****
S101 to EQ01	64.500 64.500	5.60	16.80 16.8	1 1.101	O	5.0 0.0 0.0	0.500 5.000 5.500	150 0.0493	9.000 0.0 0.271		Vel = 5.66	
EQ01			0.0 16.80						9.271		K Factor = 5.52	
S102 to EQ02	64.500 64.500	5.60	16.80 16.8	1 1.101	N	7.0 0.0 0.0	0.500 7.000 7.500	150 0.0493	9.000 0.0 0.370		Vel = 5.66	
EQ02			0.0 16.80						9.370		K Factor = 5.49	
21 to 22	64.500 64.500	5.52	20.15 20.15	1 1.101		0.0 0.0 0.0	11.000 0.0 11.000	150 0.0690	13.334 0.0 0.759		K = K @ EQ01 Vel = 6.79	
22 to 23	64.500 64.500	5.52	20.71 40.86	1.25 1.394		0.0 0.0 0.0	8.000 0.0 8.000	150 0.0808	14.093 0.0 0.646		K = K @ EQ01 Vel = 8.59	
23 to 19	64.500 64.500	5.52	21.18 62.04	1.25 1.394	O	6.0 0.0 0.0	11.500 6.000 17.500	150 0.1751	14.739 0.0 3.065		K = K @ EQ01 Vel = 13.04	
19			0.0 62.04						17.804		K Factor = 14.70	
24 to 18	64.500 64.500	5.52	22.72 22.72	1.25 1.394	O	6.0 0.0 0.0	0.790 6.000 6.790	150 0.0272	16.949 0.0 0.185		K = K @ EQ01 Vel = 4.78	
18			0.0 22.72						17.134		K Factor = 5.49	
25 to 19	64.500 64.500	5.52	23.16 23.16	1.25 1.394	O	6.0 0.0 0.0	0.790 6.000 6.790	150 0.0283	17.612 0.0 0.192		K = K @ EQ01 Vel = 4.87	
19			0.0 23.16						17.804		K Factor = 5.49	
14 to 15	64.500 64.500	5.49	16.80 16.8	1 1.101		0.0 0.0 0.0	11.000 0.0 11.000	150 0.0493	9.370 0.0 0.542		K = K @ EQ02 Vel = 5.66	
15 to 16	64.500 64.500	5.52	17.37 34.17	1 1.101		0.0 0.0 0.0	11.000 0.0 11.000	150 0.1833	9.912 0.0 2.016		K = K @ EQ01 Vel = 11.51	
16 to 17	64.500 64.500	5.52	19.06 53.23	1.25 1.394		0.0 0.0 0.0	8.000 0.0 8.000	150 0.1319	11.928 0.0 1.055		K = K @ EQ01 Vel = 11.19	
17 to 18	64.500 64.500	5.52	19.88 73.11	1.25 1.394	O	6.0 0.0 0.0	11.500 6.000 17.500	150 0.2372	12.983 0.0 4.151		K = K @ EQ01 Vel = 15.37	
18 to 19	64.500 64.500		22.71 95.82	2 2.003		0.0 0.0 0.0	10.000 0.0 10.000	150 0.0670	17.134 0.0 0.670		Vel = 9.76	

# 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	*****
19 to 20	64.500 64.500		85.20 181.02	2 2.003	2N O	22.0 10.0 0.0	10.670 32.000 42.670	150 0.2172	17.804 0.0 9.270		Vel = 18.43	
20 to 2M	64.500 64.500		0.0 181.02	2 2.003	3N O	33.0 10.0 0.0	85.000 43.000 128.000	150 0.2173	27.074 0.0 27.810		Vel = 18.43	
2M to 4M	64.500 64.500		0.0 181.02	2.5 2.635	2V 2X S B	11.807 29.654 19.22 9.61	8.000 70.291 78.291	120 0.0863	54.884 0.0 6.760		Vel = 10.65	
4M to TOR	64.500 31.080		0.0 181.02	4 4.26	U 8V 2X B	4.477 71.629 42.135 15.8	118.000 134.041 252.041	120 0.0083	61.644 14.474 2.097		Vel = 4.07	
TOR to FLG	31.080 23		0.0 181.02	2.5 2.635	3V Zca	17.71 0.0 0.0	14.000 17.710 31.710	120 0.0863	78.215 8.261 2.738		** Fixed Loss = 4.762 Vel = 10.65	
FLG to TEST	23 21.580		0.0 181.02	6 6.16	L 2G T	12.911 8.607 43.037	40.000 64.555 104.555	140 0.0010	89.214 0.615 0.109		Vel = 1.95	
TEST			100.00 281.02						89.938		Qa = 100.00 K Factor = 29.63	