

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

EASTERN FIRE PROTECTION  
170 KITTY HAWK AVE  
AUBURN, ME 04210  
207-784-1507

Job Name : 24 PREBLE ST.  
Drawing : 1 OF 2  
Location : BASEMENT  
Remote Area : 5  
Contract : 1-05637-SP-17  
Data File : BASEMENT CALC..WXF

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**HYDRAULIC CALCULATIONS**  
*for*

**Project name:** 24 PREBLE ST.  
**Location:** BASEMENT  
**Drawing no:** 1 OF 2  
**Date:** 8/11/2017

**Design**

**Remote area number:** 5  
**Remote area location:** BASEMENT  
**Occupancy classification:** ORDINARY HAZARD I  
**Density:** .15 - Gpm/SqFt  
**Area of application:** 901 - SqFt  
**Coverage per sprinkler:** 130 - SqFt  
**Type of sprinklers calculated:** RELIABLE F1FR56 200\* K=5.6  
**No. of sprinklers calculated:** 9  
**In-rack demand:** - GPM  
**Hose streams:** 250 - GPM  
**Total water required (including hose streams):** 454.96 - GPM @ 62.621 - Psi  
**Type of system:** WET  
**Volume of dry or preaction system:** - Gal

**Water supply information**

**Date:** 7/6/16  
**Location:** CUMBERLAND AVE. PORTLAND, ME.  
**Source:** PORTLAND WATER DISTRICT

**Name of contractor:** EASTERN FIRE PROTECTION  
**Address:** 170 KITTY HAWK AVE / / AUBURN, ME 04210  
**Phone number:** 207-784-1507  
**Name of designer:** EWM  
**Authority having jurisdiction:** MAINE STATE FIRE MARSHAL  
**Notes: (Include peaking information or gridded systems here.)** REMOTE AREA REDUCED PER NFPA 13 (2016) SEC. 11.2.3.2.3.1

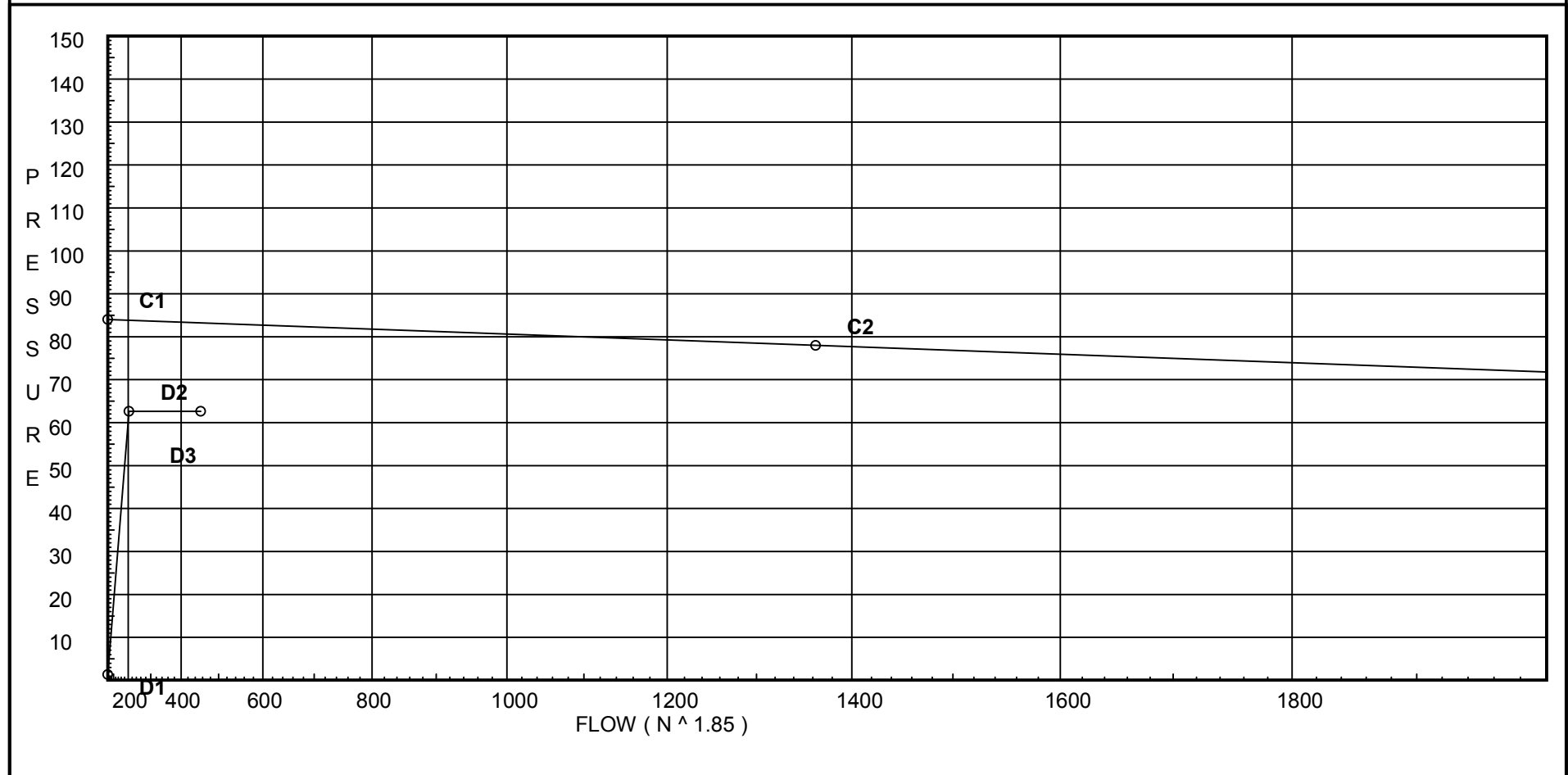
# Water Supply Curve C

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City Water Supply:  
C1 - Static Pressure : 84  
C2 - Residual Pressure: 78  
C2 - Residual Flow : 1363

Demand:  
D1 - Elevation : 1.373  
D2 - System Flow : 204.96  
D2 - System Pressure : 62.621  
Hose ( Demand ) : 250  
D3 - System Demand : 454.96  
Safety Margin : 20.591



# 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
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

## 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	84.0	78	1363.0	83.212	454.96	62.621

**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>
HEAD	0.0	5.6	12.13	19.5	
HEAD2	0.0	5.6	31.64	31.5	
400	106.0	5.17	14.24	19.5	K=K @ LIN1
401	106.0	5.17	14.36	19.59	K=K @ LIN1
402	106.0	5.17	14.86	19.93	K=K @ LIN1
403	106.0	5.17	15.94	20.63	K=K @ LIN1
404	106.0	5.17	17.83	21.82	K=K @ LIN1
405	106.0	5.17	18.0	21.93	K=K @ LIN1
406	106.0	5.17	18.62	22.3	K=K @ LIN1
407	106.0	5.17	19.94	23.08	K=K @ LIN1
408	106.0		20.45		
409	106.0	5.17	49.03	36.19	K=K @ LIN1
410	106.0		50.16		
411	106.0		53.98		
412	106.0		54.0		
TOR	106.0		56.18		
BASE	102.83		62.58		
TEST	102.83		62.62	250.0	

# 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	*****
HEAD to LIN1	0 0	5.60	19.50 19.5	1 1.049	T 0.0 0.0	5.0 0.0 17.000	120 0.1242	12.125 0.0 2.111		Vel = 7.24	
LIN1			0.0 19.50					14.236		K Factor = 5.17	
HEAD2 to LIN2	0 0	5.60	31.50 31.5	1 1.049	T 0.0 0.0	5.0 0.0 17.000	120 0.3015	31.641 0.0 5.126		Vel = 11.69	
LIN2			0.0 31.50					36.767		K Factor = 5.19	
400 to 401	106 106	5.17	19.50 19.5	1.5 1.682	0.0 0.0 0.0	10.125 0.0 10.125	120 0.0124	14.236 0.0 0.126		K = K @ LIN1 Vel = 2.82	
401 to 402	106 106	5.17	19.59 39.09	1.5 1.682	0.0 0.0 0.0	11.125 0.0 11.125	120 0.0451	14.362 0.0 0.502		K = K @ LIN1 Vel = 5.64	
402 to 403	106 106	5.17	19.92 59.01	1.5 1.682	0.0 0.0 0.0	11.125 0.0 11.125	120 0.0966	14.864 0.0 1.075		K = K @ LIN1 Vel = 8.52	
403 to 408	106 106	5.17	20.63 79.64	1.5 1.682	E T 0.0	4.95 9.9 26.810	120 0.1683	15.939 0.0 4.512		K = K @ LIN1 Vel = 11.50	
408			0.0 79.64					20.451		K Factor = 17.61	
404 to 405	106 106	5.17	21.82 21.82	1.5 1.682	0.0 0.0 0.0	11.125 0.0 11.125	120 0.0154	17.828 0.0 0.171		K = K @ LIN1 Vel = 3.15	
405 to 406	106 106	5.17	21.93 43.75	1.5 1.682	0.0 0.0 0.0	11.125 0.0 11.125	120 0.0556	17.999 0.0 0.618		K = K @ LIN1 Vel = 6.32	
406 to 407	106 106	5.17	22.30 66.05	1.5 1.682	0.0 0.0 0.0	11.125 0.0 11.125	120 0.1190	18.617 0.0 1.324		K = K @ LIN1 Vel = 9.54	
407 to 408	106 106	5.17	23.08 89.13	1.5 1.682	0.0 0.0 0.0	2.460 0.0 2.460	120 0.2073	19.941 0.0 0.510		K = K @ LIN1 Vel = 12.87	
408 to 412	106 106		79.64 168.77	1.5 1.682	T 0.0 0.0	9.9 0.0 49.690	120 0.6751	20.451 0.0 33.546		Vel = 24.37	
412			0.0 168.77					53.997		K Factor = 22.97	
409 to 410	106 106	5.17	36.19 36.19	1.5 1.682	T 0.0 0.0	9.9 0.0 28.730	120 0.0391	49.035 0.0 1.123		K = K @ LIN1 Vel = 5.23	
410 to 411	106 106		0.0 36.19	1.5 1.682	T 0.0 0.0	9.9 0.0 97.820	120 0.0391	50.158 0.0 3.826		Vel = 5.23	
411 to 412	106 106		0.0 36.19	3 3.26	0.0 0.0 0.0	8.625 0.0 8.625	120 0.0015	53.984 0.0 0.013		Vel = 1.39	

# 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	*****
412 to TOR	106 106		168.77 204.96	3 3.26	B S E	13.44 21.503 9.408	12.210 44.351 56.561	120 0.0 0.0385	53.997 0.0 2.180	Vel = 7.88	
TOR to BASE	106 102.830		0.0 204.96	4 4.26		0.0 0.0 0.0	3.170 0.0 3.170	120 6.373 0.0104	56.177 6.373 0.033	* * Fixed Loss = 5 Vel = 4.61	
BASE to TEST	102.830 102.830		0.0 204.96	8 8.27	L T G	20.56 55.354 6.326	40.000 82.240 122.240	140 0.0 0.0003	62.583 0.0 0.038	Vel = 1.22	
TEST			250.00 454.96						62.621	Qa = 250.00 K Factor = 57.49	