

**. . . 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 : 1ST FLOOR  
Remote Area : 1  
Contract : 1-05637-SP-17  
Data File : 1ST FLOOR CALC..W XF

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**HYDRAULIC CALCULATIONS**  
*for*

**Project name:** 224 PREBLE ST.  
**Location:** 1ST FLOOR  
**Drawing no:** 1 OF 2  
**Date:** 8/11/2017

**Design**

**Remote area number:** 1  
**Remote area location:** 1ST FLOOR  
**Occupancy classification:** LIGHT HAZARD/ORDINARY HAZARD I  
**Density:** .1/.15 - Gpm/SqFt  
**Area of application:** 982 - SqFt  
**Coverage per sprinkler:** 120/110/225 - SqFt  
**Type of sprinklers calculated:** RELIABLE F1FR56 200\* K=5.6  
**No. of sprinklers calculated:** 10  
**In-rack demand:** - GPM  
**Hose streams:** 250 - GPM  
**Total water required (including hose streams):** 498.672 - GPM @ 65.824 - 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

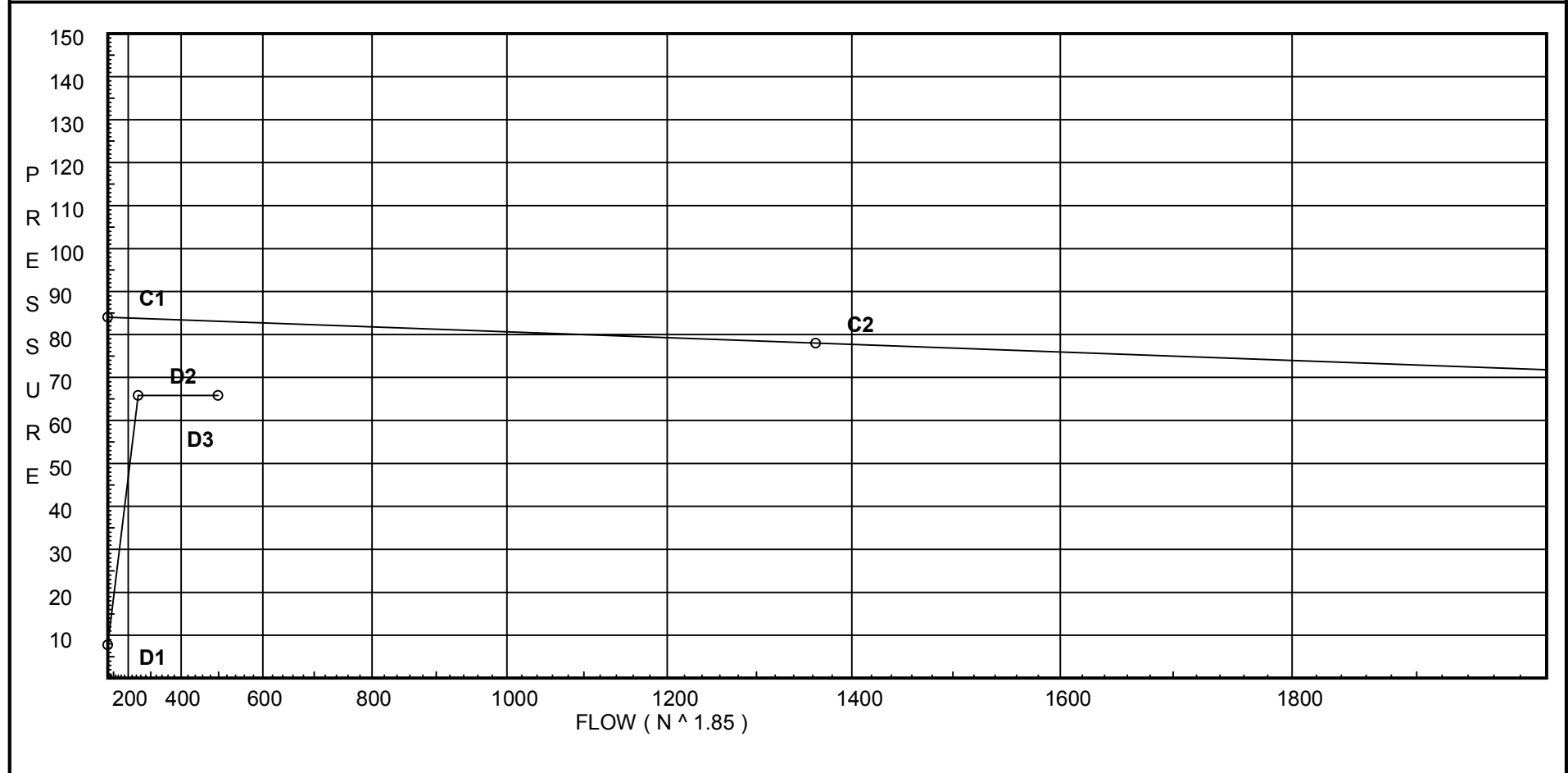
# Water Supply Curve C

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

Demand:  
D1 - Elevation : 7.761  
D2 - System Flow : 248.672  
D2 - System Pressure : 65.824  
Hose ( Demand ) : 250  
D3 - System Demand : 498.672  
Safety Margin : 17.243



# 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
V	90' Ell 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

## 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	83.066	498.67	65.824

**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	7.0	14.82	
HEAD2	0.0	5.6	14.06	21.0	
300	120.75	5.6	15.02	21.7	
301	120.75	5.6	16.14	22.5	
302	120.75		25.53		
303	120.75	5.6	17.37	23.34	
304	120.75	5.6	18.86	24.32	
305	120.75	5.6	22.89	26.79	
306	120.75		25.55		
307	120.75	5.6	23.17	26.96	
308	120.75		25.73		
309	120.75	5.6	17.82	23.64	
310	120.75	5.6	18.27	23.93	
311	120.75		19.54		
312	120.75		26.01		
313	120.75	5.6	24.14	27.52	
314	120.75		26.26		
315	120.75	5.6	24.96	27.98	
316	120.75		27.38		
317	120.75		37.71		
318	116.0		45.51		
37	116.0		52.88		
38	106.5		57.26		
39	106.5		58.12		
TOR	105.83		59.42		
BASE	102.83		65.77		
TEST	102.83		65.82	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	14.82 14.82	1 1.049	T	5.0 0.0 0.0	12.000 5.000 17.000	120 0.0747	7.000 0.0 1.270			Vel = 5.50
LIN1			0.0 14.82						8.270			K Factor = 5.15
HEAD2 to LIN2	0 0	5.60	21.00 21.0	1 1.049	T	5.0 0.0 0.0	12.000 5.000 17.000	120 0.1425	14.062 0.0 2.422			Vel = 7.80
LIN2			0.0 21.00						16.484			K Factor = 5.17
300 to 301	120.750 120.750	5.60	21.70 21.7	1 1.049	E	2.0 0.0 0.0	5.420 2.000 7.420	120 0.1513	15.020 0.0 1.123			Vel = 8.06
301 to 302	120.750 120.750	5.60	22.50 44.2	1 1.049	T	5.0 0.0 0.0	11.625 5.000 16.625	120 0.5644	16.143 0.0 9.383			Vel = 16.41
302 to 306	120.750 120.750		0.0 44.2	2.5 2.635		0.0 0.0 0.0	3.375 0.0 3.375	120 0.0062	25.526 0.0 0.021			Vel = 2.60
306			0.0 44.20						25.547			K Factor = 8.74
303 to 304	120.750 120.750	5.60	23.34 23.34	1 1.049		0.0 0.0 0.0	8.580 0.0 8.580	120 0.1732	17.373 0.0 1.486			Vel = 8.66
304 to 305	120.750 120.750	5.60	24.32 47.66	1 1.049		0.0 0.0 0.0	6.210 0.0 6.210	120 0.6488	18.859 0.0 4.029			Vel = 17.69
305 to 306	120.750 120.750	5.60	26.79 74.45	1.25 1.38	T	6.0 0.0 0.0	0.830 6.000 6.830	120 0.3893	22.888 0.0 2.659			Vel = 15.97
306 to 308	120.750 120.750		44.21 118.66	2.5 2.635		0.0 0.0 0.0	4.670 0.0 4.670	120 0.0396	25.547 0.0 0.185			Vel = 6.98
308			0.0 118.66						25.732			K Factor = 23.39
307 to 308	120.750 120.750	5.60	26.96 26.96	1 1.049	T	5.0 0.0 0.0	6.330 5.000 11.330	120 0.2260	23.171 0.0 2.561			Vel = 10.01
308 to 312	120.750 120.750		118.65 145.61	2.5 2.635		0.0 0.0 0.0	4.790 0.0 4.790	120 0.0576	25.732 0.0 0.276			Vel = 8.57
312			0.0 145.61						26.008			K Factor = 28.55
309 to 311	120.750 120.750	5.60	23.64 23.64	1 1.049		0.0 0.0 0.0	9.750 0.0 9.750	120 0.1773	17.815 0.0 1.729			Vel = 8.78
311			0.0 23.64						19.544			K Factor = 5.35

# 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	*****
310 to 311	120.750 120.750	5.60	23.93	1	T 5.0	2.040 0.0 5.000	120	18.266 0.0			
			23.93	1.049		7.040	0.1815	1.278	Vel =	8.88	
311 to 312	120.750 120.750		23.64	1	T 5.0	5.000 0.0 5.000	120	19.544 0.0			
			47.57	1.049		10.000	0.6464	6.464	Vel =	17.66	
312 to 314	120.750 120.750		145.61	2.5		0.0 0.0 2.540	120	26.008 0.0			
			193.18	2.635		2.540	0.0976	0.248	Vel =	11.37	
314			0.0 193.18					26.256	K Factor =	37.70	
313 to 314	120.750 120.750	5.60	27.52	1	T 5.0	4.000 0.0 5.000	120	24.143 0.0			
			27.52	1.049		9.000	0.2348	2.113	Vel =	10.22	
314 to 316	120.750 120.750		193.18	2.5		0.0 0.0 9.000	120	26.256 0.0			
			220.7	2.635		9.000	0.1246	1.121	Vel =	12.98	
316			0.0 220.70					27.377	K Factor =	42.18	
315 to 316	120.750 120.750	5.60	27.98	1	T 5.0	5.000 0.0 5.000	120	24.956 0.0			
			27.98	1.049		10.000	0.2421	2.421	Vel =	10.39	
316 to 317	120.750 120.750		220.69	2.5	V 5.903	60.625 0.0 5.903	120	27.377 0.0			
			248.67	2.635		66.528	0.1554	10.336	Vel =	14.63	
317 to 318	120.750 116		0.0	2.5	3V 17.71	19.205 0.0 17.710	120	37.713 2.057			
			248.67	2.635		36.915	0.1554	5.736	Vel =	14.63	
318 to 37	116 116		0.0	2.5	B 9.61	2.125 19.22 45.304	120	45.506 0.0			
			248.67	2.635	T 16.474	47.429	0.1554	7.369	Vel =	14.63	
37 to 38	116 106.500		0.0	4	V 8.954	9.040 0.0 8.954	120	52.875 4.114			
			248.67	4.26		17.994	0.0150	0.270	Vel =	5.60	
38 to 39	106.500 106.500		0.0	4	V 8.954	11.420 21.067 45.821	120	57.259 0.0			
			248.67	4.26	B 15.8	57.241	0.0150	0.857	Vel =	5.60	
39 to TOR	106.500 105.830		0.0	4	3V 26.861	14.835 26.334 53.195	120	58.116 0.290			
			248.67	4.26	T 0.0	68.030	0.0150	1.019	Vel =	5.60	
TOR to BASE	105.830 102.830		0.0	4		3.000 0.0 0.0	120	59.425 6.299	** Fixed Loss =	5	
			248.67	4.26		3.000	0.0150	0.045	Vel =	5.60	
BASE to TEST	102.830 102.830		0.0	8	L 20.56	40.000 55.354 82.240	140	65.769 0.0			
			248.67	8.27	G 6.326	122.240	0.0004	0.055	Vel =	1.49	
TEST			250.00 498.67					65.824	Qa =	250.00	
									K Factor =	61.46	

# Final Calculations - Hazen-Williams

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Node1	Elev1	K	Qa	Nom	Fitting		Pipe	CFact	Pt			
to					or		Ftng's		Pe	*****	Notes	*****
Node2	Elev2	Fact	Qt	Act	Eqv.	Ln.	Total	Pf/Ft	Pf			

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