

... Fire Protection by Computer Design

ALTERNATIVE SPRINKLER  
39 JACKSON RD.  
POLAND SPRING, ME  
04274  
207-838-8930

Job Name : 671 FOREST AVE 2ND FLOOR RESIDENTIAL UNIT #1  
Building : FP-1  
Location : 671  
System : #2  
Contract :  
Data File : 2ND FLOOR RES.WXF

**HYDRAULIC CALCULATIONS**  
**for**

**Project name:** 671 FOREST AVE 2ND FLOOR RESIDENTIAL UNIT #1  
**Location:** 671  
**Drawing no:** FP-1  
**Date:** 10-23-14

**Design**

**Remote area number:** #2  
**Remote area location:** SECOND FL APARTMENT  
**Occupancy classification:** LIGHT HAZARD  
**Density:** .1 - Gpm/SqFt  
**Area of application:** 381 - SqFt  
**Coverage per sprinkler:** 196 - SqFt  
**Type of sprinklers calculated:** RELIABLE F1FR56 PENDENTS  
**No. of sprinklers calculated:** 4  
**In-rack demand:** - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 212.732 - GPI@ 85.4137 - Psi  
**Type of system:** WET SYSTEM  
**Volume of dry or preaction system:** - Gal

**Water supply information**

**Date:** 8-29-08  
**Location:** FOREST AVE  
**Source:** PORTLAND WATER DIST.

**Name of contractor:** RESIDENTIAL FIRE PROTECTION  
**Address:** 64 DAGGETT HILL RD / / GREENE ME, 04236  
**Phone number:** 207-946-3474  
**Name of designer:** TIM FORTIN  
**Authority having jurisdiction:** STATE OF MAINE / CITY OF PORTLAND  
**Notes:** (Include peaking information or gridded systems here.)

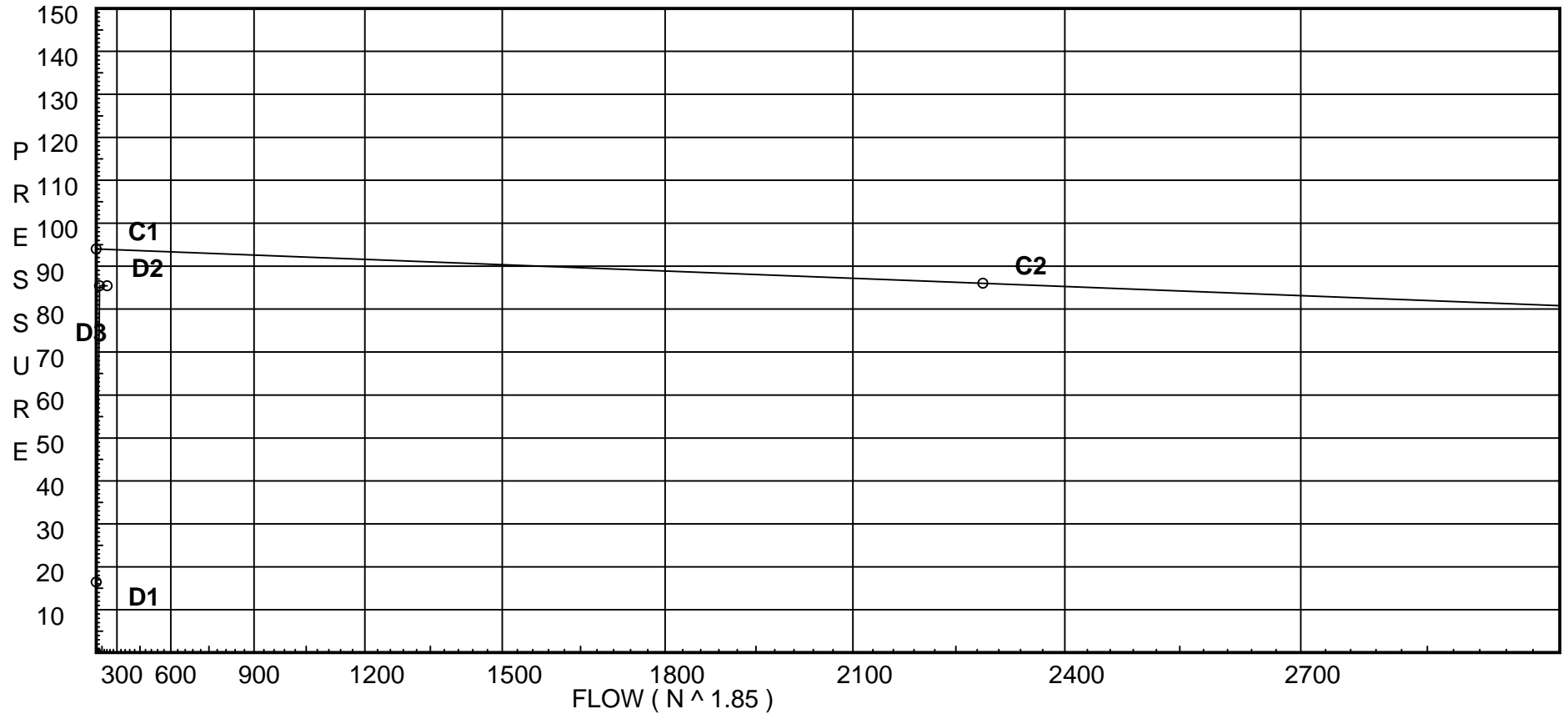
# Water Supply Curve (C)

ALTERNATIVE SPRINKLER  
671 FOREST AVE 2ND FLOOR RESIDENTIAL UNIT #1

Page 2  
Date 10-23-14

City Water Supply:  
C1 - Static Pressure : 94  
C2 - Residual Pressure: 86  
C2 - Residual Flow : 2288

Demand:  
D1 - Elevation : 16.458  
D2 - System Flow : 112.732  
D2 - System Pressure : 85.414  
Hose ( Adj City ) :  
Hose ( Demand ) : 100  
D3 - System Demand : 212.732  
Safety Margin : 8.487



# Fittings Used Summary

ALTERNATIVE SPRINKLER  
671 FOREST AVE 2ND FLOOR RESIDENTIAL UNIT #1

Page 3  
Date 10-23-14

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	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G	Generic Gate Valve	0	0	1	1	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	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
Z	Generic Flow Switch	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Zia	Wilkins 350	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.

Pressure / Flow Summary - STANDARD

ALTERNATIVE SPRINKLER  
671 FOREST AVE 2ND FLOOR RESIDENTIAL UNIT #1

Page 4  
Date 10-23-14

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
DP1	-1.0	5.6	20.9	na	25.6	0.1	256	7.6
DP2	-1.0	5.6	20.9	na	25.6	0.1	256	7.6
100	30.0	K = K @ EQ01	21.08	na	25.6			
101	30.0	K = K @ EQ02	23.03	na	26.38			
102	30.0		27.6	na				
103	30.0		32.32	na				
110	30.0	K = K @ EQ01	29.35	na	30.21			
111	30.0		32.73	na				
120	30.0	K = K @ EQ02	30.9	na	30.55			
121	30.0		34.25	na				
122	30.0		49.06	na				
123	19.0		58.29	na				
124	19.0		63.44	na				
D	19.0		64.17	na				
E	19.0		64.88	na				
F	7.0		70.69	na				
G	7.0		71.55	na				
TOR	7.0		72.55	na				
BOR	1.0		81.12	na				
HOSE	0.0		81.76	na	100.0			
TEST	-8.0		85.41	na				

The maximum velocity is 19.3 and it occurs in the pipe between nodes 101 and 102

Final Calculations - Hazen-Williams

ALTERNATIVE SPRINKLER  
671 FOREST AVE 2ND FLOOR RESIDENTIAL UNIT #1

Page 5  
Date 10-23-14

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
DP1 to EQ01	25.60 25.6	1.049 120.0 0.2053	1E	2.0 0.0 0.0	1.000 2.000 3.000	20.898 -0.433 0.616			K Factor = 5.60	
	0.0 25.60						21.081		K Factor = 5.58	
DP2 to EQ02	25.60 25.6	1.049 120.0 0.2055	1T	5.0 0.0 0.0	1.000 5.000 6.000	20.898 -0.433 1.233			K Factor = 5.60	
	0.0 25.60						21.698		K Factor = 5.50	
100 to 101	25.60 25.6	1.049 120.0 0.2055		0.0 0.0 0.0	9.500 0.0 9.500	21.081 0.0 1.952			K Factor @ node EQ01	Vel = 9.50
101 to 102	26.38 51.98	1.049 120.0 0.7615		0.0 0.0 0.0	6.000 0.0 6.000	23.033 0.0 4.569			K Factor @ node EQ02	Vel = 19.30
102 to 103	0.0 51.98	1.049 120.0 0.7616	1T	5.0 0.0 0.0	1.200 5.000 6.200	27.602 0.0 4.722				Vel = 19.30
103 to 111	0.0 51.98	1.682 120.0 0.0764		0.0 0.0 0.0	5.300 0.0 5.300	32.324 0.0 0.405				Vel = 7.51
	0.0 51.98						32.729		K Factor = 9.09	
110 to 111	30.21 30.21	1.049 120.0 0.2790	1T	5.0 0.0 0.0	7.100 5.000 12.100	29.353 0.0 3.376			K Factor @ node EQ01	Vel = 11.21
111 to 121	51.97 82.18	1.682 120.0 0.1784		0.0 0.0 0.0	8.500 0.0 8.500	32.729 0.0 1.516				Vel = 11.87
	0.0 82.18						34.245		K Factor = 14.04	
120 to 121	30.55 30.55	1.049 120.0 0.2849	1T	5.0 0.0 0.0	6.750 5.000 11.750	30.897 0.0 3.348			K Factor @ node EQ02	Vel = 11.34
121 to 122	82.18 112.73	1.682 120.0 0.3200	1T	9.9 0.0 0.0	36.400 9.900 46.300	34.245 0.0 14.817				Vel = 16.28
122 to 123	0.0 112.73	1.682 120.0 0.3200	1E	4.95 0.0 0.0	9.000 4.950 13.950	49.062 4.764 4.464				Vel = 16.28

Final Calculations - Hazen-Williams

ALTERNATIVE SPRINKLER  
671 FOREST AVE 2ND FLOOR RESIDENTIAL UNIT #1

Page 6  
Date 10-23-14

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
123	0.0	1.682	1T 9.9	6.200	58.290				
to		120.0	0.0	9.900	0.0				
124	112.73	0.3200	0.0	16.100	5.152		Vel = 16.28		
124	0.0	2.635	1X 14.827	5.300	63.442				
to		120.0	0.0	14.827	0.0				
D	112.73	0.0360	0.0	20.127	0.724		Vel = 6.63		
D	0.0	2.635	1T 16.474	3.500	64.166				
to		120.0	0.0	16.474	0.0				
E	112.73	0.0359	0.0	19.974	0.718		Vel = 6.63		
E	0.0	2.635	1V 5.903	11.000	64.884				
to		120.0	0.0	5.903	5.197				
F	112.73	0.0360	0.0	16.903	0.608		Vel = 6.63		
F	0.0	2.635	1X 14.827	9.000	70.689				
to		120.0	0.0	14.827	0.0				
G	112.73	0.0360	0.0	23.827	0.857		Vel = 6.63		
G	0.0	3.26	3V 20.159	58.300	71.546				
to		120.0	0.0	20.159	0.0				
TOR	112.73	0.0127	0.0	78.459	1.000		Vel = 4.33		
TOR	0.0	3.26	1Z 9.408	4.000	72.546				
to		120.0	1Zia 0.0	9.408	8.406		* Fixed loss = 5.807		
BOR	112.73	0.0128	0.0	13.408	0.171		Vel = 4.33		
BOR	0.0	4.1	1G 2.907	20.000	81.123				
to		140.0	1E 14.534	46.508	0.433				
HOSE	112.73	0.0031	1T 29.067	66.508	0.209		Vel = 2.74		
HOSE	100.00	12.24	8E 174.103	1780.000	81.765		Qa = 100		
to		100.0	1T 48.362	222.466	3.465				
TEST	212.73	0.0001	0.0	2002.466	0.184		Vel = 0.58		
	0.0								
	212.73				85.414		K Factor = 23.02		