



. . . Fire Protection by Computer Design

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

Job Name : 671 FOREST AVE 1ST FLOOR COMMERCIAL
Building : FP-01
Location : 671 FOREST AVE
System : #1
Contract :
Data File : 1ST FLOOR COM.WXF

HYDRAULIC CALCULATIONS
for

Project name: 671 FOREST AVE 1ST FLOOR COMMERCIAL
Location: 671 FOREST AVE
Drawing no: FP-01
Date: 10-23-14

Design

Remote area number: #1
Remote area location: 1ST FLOOR
Occupancy classification: MERCHANTILE
Density: .2 - Gpm/SqFt
Area of application: 900 - SqFt
Coverage per sprinkler: 196 - SqFt
Type of sprinklers calculated: RELIABLE F1FR PENDENTS
No. of sprinklers calculated: 11
In-rack demand: - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 554.79 - GPM@ 84.6261 - Psi
Type of system: WET SYSTEM
Volume of dry or preaction system: - Gal

Water supply information

Date: 8-29-2008
Location: FOREST AVE
Source: PORTLAND WATER DISTRICT

Name of contractor: ALTERNATIVE SPRINKLER
Address: 39 JACKSON RD. / POLAND SPRING, ME / 04274
Phone number: 207-838-8930
Name of designer: TIM FORTIN
Authority having jurisdiction: STATE OF MAINE & CITY OF PORTLAND
Notes: (Include peaking information or gridded systems here.)

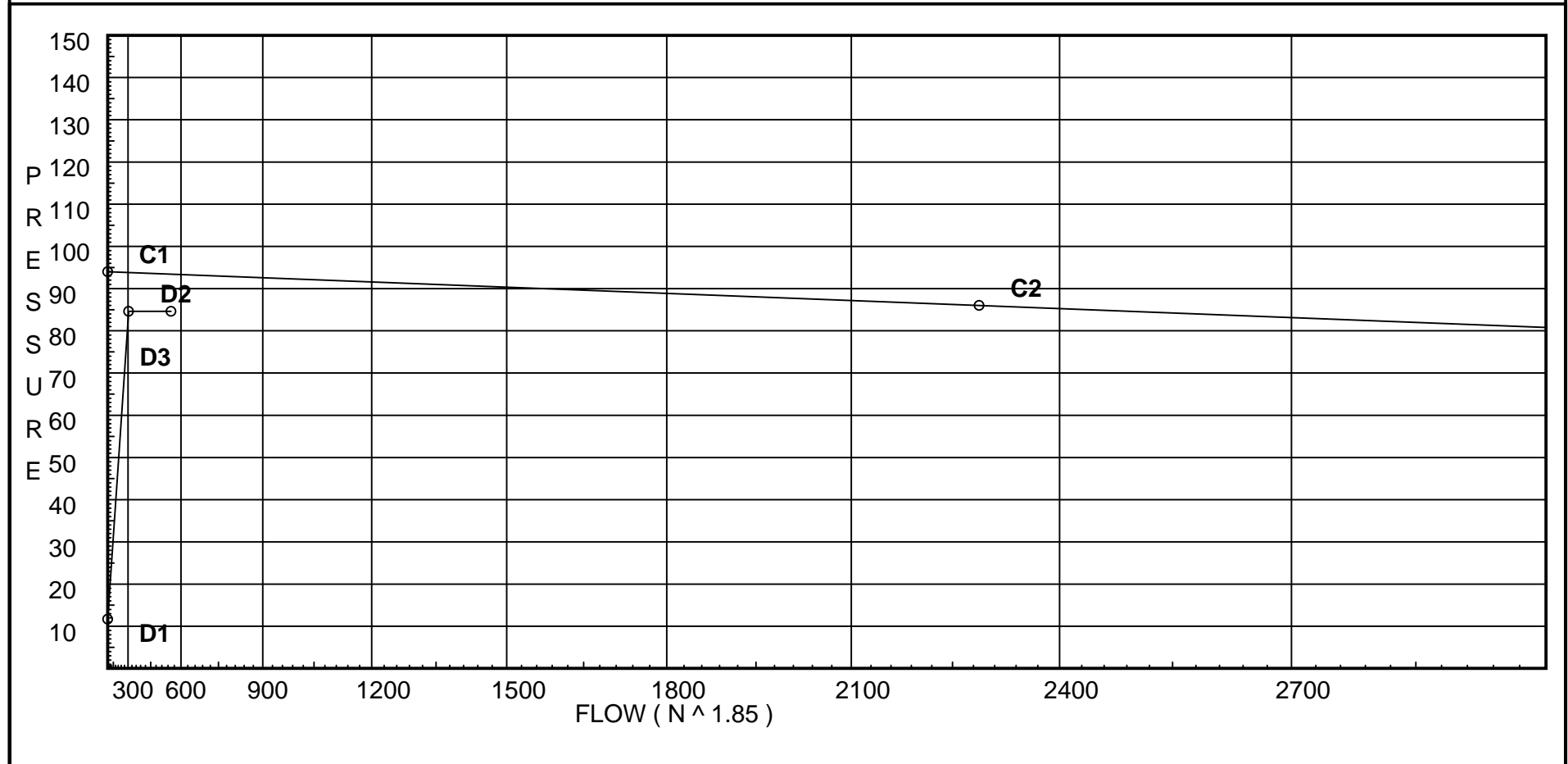
Water Supply Curve (C)

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

Demand:
D1 - Elevation : 11.694
D2 - System Flow : 304.79
D2 - System Pressure : 84.626
Hose (Adj City) :
Hose (Demand) : 250
D3 - System Demand : 554.79
Safety Margin : 8.792



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																				
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

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
DP1	-1.0	5.6	21.56	na	26.0	0.2	130	7.0
10	15.5	5.6	18.53	na	24.1	0.2	120	7.0
11	15.5	5.6	18.53	na	24.1	0.2	120	7.0
12	15.5		20.36	na				
13	15.5		21.29	na				
14	19.0		20.87	na				
15	19.0	K = K @ EQ01	22.39	na	26.0			
16	19.0		22.53	na				
17	19.0	K = K @ EQ01	22.93	na	26.31			
18	19.0	K = K @ EQ01	25.26	na	27.62			
20	19.0	K = K @ EQ01	27.56	na	28.85			
21	19.0	K = K @ EQ01	27.79	na	28.97			
22	19.0	K = K @ EQ01	28.63	na	29.4			
30	19.0	K = K @ EQ01	28.99	na	29.58			
31	19.0	K = K @ EQ01	29.23	na	29.71			
32	19.0	K = K @ EQ01	30.11	na	30.15			
A	19.0		30.13	na				
B	19.0		31.35	na				
C	19.0		32.96	na				
124	19.0		37.71	na				
D	19.0		42.27	na				
E	19.0		46.79	na				
F	7.0		55.81	na				
G	7.0		61.21	na				
TOR	7.0		67.51	na				
BOR	1.0		78.33	na				
HOSE	0.0		80.08	na	250.0			
TEST	-8.0		84.63	na				

The maximum velocity is 18.5 and it occurs in the pipe between nodes 18 and A

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	26.00	1.049	1T	5.0	1.000	21.556			K Factor = 5.60	
to		120.0		0.0	5.000	-0.433				
EQ01	26.0	0.2115		0.0	6.000	1.269			Vel = 9.65	
	0.0									
	26.00					22.392			K Factor = 5.49	
10	24.10	1.049	1T	5.0	5.000	18.526			K Factor = 5.60	
to		120.0		0.0	5.000	0.0				
12	24.1	0.1838		0.0	10.000	1.838			Vel = 8.95	
	0.0									
	24.10					20.364			K Factor = 5.34	
11	24.10	1.049	1T	5.0	5.000	18.526			K Factor = 5.60	
to		120.0		0.0	5.000	0.0				
12	24.1	0.1838		0.0	10.000	1.838			Vel = 8.95	
12	24.11	1.38	1E	3.0	2.300	20.364				
to		120.0		0.0	3.000	0.0				
13	48.21	0.1743		0.0	5.300	0.924			Vel = 10.34	
13	0.0	1.38	1E	3.0	3.300	21.288				
to		120.0		0.0	3.000	-1.516				
14	48.21	0.1743		0.0	6.300	1.098			Vel = 10.34	
14	0.0	1.38	1T	6.0	3.500	20.870				
to		120.0		0.0	6.000	0.0				
16	48.21	0.1742		0.0	9.500	1.655			Vel = 10.34	
	0.0									
	48.21					22.525			K Factor = 10.16	
15	26.00	1.682		0.0	6.300	22.392			K Factor @ node EQ01	
to		120.0		0.0	0.0	0.0				
16	26.0	0.0211		0.0	6.300	0.133			Vel = 3.75	
16	48.21	1.682		0.0	2.750	22.525				
to		120.0		0.0	0.0	0.0				
17	74.21	0.1476		0.0	2.750	0.406			Vel = 10.72	
17	26.31	1.682		0.0	9.000	22.931			K Factor @ node EQ01	
to		120.0		0.0	0.0	0.0				
18	100.52	0.2589		0.0	9.000	2.330			Vel = 14.51	
18	27.61	1.682	1T	9.9	2.100	25.261			K Factor @ node EQ01	
to		120.0		0.0	9.900	0.0				
A	128.13	0.4056		0.0	12.000	4.867			Vel = 18.50	
	0.0									
	128.13					30.128			K Factor = 23.34	
20	28.85	1.682		0.0	9.000	27.563			K Factor @ node EQ01	
to		120.0		0.0	0.0	0.0				
21	28.85	0.0258		0.0	9.000	0.232			Vel = 4.17	

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	***** Notes *****
21 to 22	28.96 57.81	1.682 120.0 0.0930		9.000 0.0 9.000	27.795 0.0 0.837		K Factor @ node EQ01 Vel = 8.35
22 to B	29.40 87.21	1.682 120.0 0.1990	1T 0.0	9.9 0.0 13.650	3.750 9.900 2.717	28.632 0.0	K Factor @ node EQ01 Vel = 12.59
	0.0 87.21					31.349	K Factor = 15.58
30 to 31	29.58 29.58	1.682 120.0 0.0269		9.000 0.0 9.000	28.990 0.0 0.242		K Factor @ node EQ01 Vel = 4.27
31 to 32	29.71 59.29	1.682 120.0 0.0976		9.000 0.0 9.000	29.232 0.0 0.878		K Factor @ node EQ01 Vel = 8.56
32 to C	30.15 89.44	1.682 120.0 0.2085	1T 0.0	9.9 0.0 13.650	3.750 9.900 2.846	30.110 0.0	K Factor @ node EQ01 Vel = 12.91
	0.0 89.44					32.956	K Factor = 15.58
A to B	128.13 128.13	2.635 120.0 0.0455	2V 0.0	11.807 0.0 26.807	15.000 11.807 2.221	30.128 0.0	Vel = 7.54
B to C	87.22 215.35	2.635 120.0 0.1190		0.0 0.0 13.500	13.500 0.0 1.607	31.349 0.0	Vel = 12.67
C to 124	89.44 304.79	2.635 120.0 0.2264		0.0 0.0 21.000	21.000 0.0 4.755	32.956 0.0	Vel = 17.93
124 to D	0.0 304.79	2.635 120.0 0.2264	1X 0.0	14.827 0.0 20.127	5.300 14.827 4.556	37.711 0.0	Vel = 17.93
D to E	0.0 304.79	2.635 120.0 0.2264	1T 0.0	16.474 0.0 19.974	3.500 16.474 4.522	42.267 0.0	Vel = 17.93
E to F	0.0 304.79	2.635 120.0 0.2264	1V 0.0	5.903 0.0 16.903	11.000 5.903 3.827	46.789 5.197	Vel = 17.93
F to G	0.0 304.79	2.635 120.0 0.2264	1X 0.0	14.827 0.0 23.827	9.000 14.827 5.394	55.813 0.0	Vel = 17.93
G to TOR	0.0 304.79	3.26 120.0 0.0803	3V 0.0	20.159 0.0 78.459	58.300 20.159 6.300	61.207 0.0	Vel = 11.72

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	***** Notes *****
TOR	0.0	3.26	1Z	9.408	4.000	67.507	
to		120.0	1Zia	0.0	9.408	9.744	* Fixed loss = 7.146
BOR	304.79	0.0803		0.0	13.408	1.077	Vel = 11.72
BOR	0.0	4.1	1G	2.907	20.000	78.328	
to		140.0	1E	14.534	46.508	0.433	
HOSE	304.79	0.0198	1T	29.067	66.508	1.314	Vel = 7.41
HOSE	250.00	12.24	8E	174.103	1780.000	80.075	Qa = 250
to		100.0	1T	48.362	222.466	3.465	
TEST	554.79	0.0005		0.0	2002.466	1.086	Vel = 1.51
	0.0						
	554.79					84.626	K Factor = 60.31