

... Fire Protection by Computer Design

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

Job Name : 428 FOREST AVE MERCENTILE CALC  
Building : FP-01  
Location : 428 FOREST AVE  
System : #1  
Contract :  
Data File : 428 FOREST AVE MERCANTILE CALC.WXF

**HYDRAULIC CALCULATIONS**  
**for**

**Project name:** 428 FOREST AVE MERCENTILE CALC  
**Location:** 428 FOREST AVE  
**Drawing no:** FP-01  
**Date:** 12-20-16

**Design**

**Remote area number:** #1  
**Remote area location:** GROUND FLOOR MERCANTILE SPACE  
**Occupancy classification:** ORDINARY HAZARD GROUP 2  
**Density:** .2 - Gpm/SqFt  
**Area of application:** 757 - SqFt  
**Coverage per sprinkler:** 130 - SqFt  
**Type of sprinklers calculated:** RELIABLE F1FR56 UPRIGHT/ PEND  
**No. of sprinklers calculated:** 8  
**In-rack demand:** - GPM  
**Hose streams:** 250 - GPM  
**Total water required (including hose streams):** 484.2 - GPM @ 87.9847 - Psi  
**Type of system:** NFPA 13 WET  
**Volume of dry or preaction system:** - Gal

**Water supply information**

**Date:** 11-2-16  
**Location:** CORNER OF FOREST AVE AND PITT ST.  
**Source:** PORTLAND WATER DIST.

**Name of contractor:** ALTERNATIVE SPRINKLER FIRE PROTECTION  
**Address:** 39 JACKSON HILL 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.)

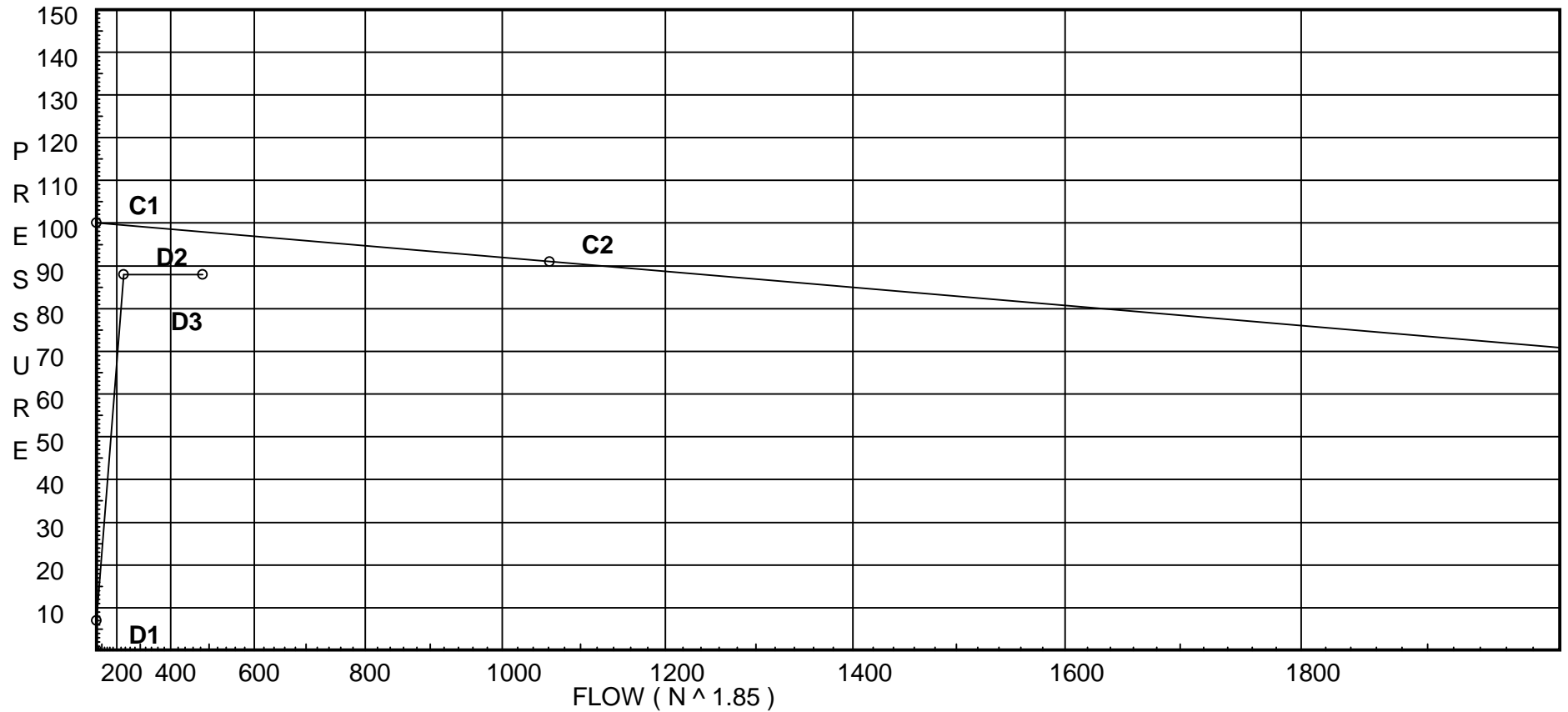
# Water Supply Curve (C)

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City Water Supply:  
C1 - Static Pressure : 100  
C2 - Residual Pressure: 91  
C2 - Residual Flow : 1061

Demand:  
D1 - Elevation : 6.930  
D2 - System Flow : 234.2  
D2 - System Pressure : 87.985  
Hose ( Adj City ) :  
Hose ( Demand ) : 250  
D3 - System Demand : 484.2  
Safety Margin : 9.907



# Fittings Used Summary

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Fitting Legend		½	¾	1	1¼	1½	2	2½	3	3½	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	
Z	Generic Flow Switch	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61	
Zid	Wilkins 350DA	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	12.9	5.6	21.56	na	26.0	0.2	130	7.0
1	13.0	5.6	30.66	na	31.01	0.2	130	7.0
2	13.0	5.6	33.67	na	32.5	0.2	130	7.0
4	13.0	5.6	30.77	na	31.06	0.2	130	7.0
5	13.0	5.6	33.79	na	32.55	0.2	130	7.0
3	13.0		36.96	na				
6	13.0		37.97	na				
7	16.0	K = K @ EQO1	31.83	na	27.27			
8	16.0	K = K @ EQO1	32.59	na	27.59			
10	16.0	K = K @ EQO1	28.94	na	26.0			
11	16.0	K = K @ EQO1	29.43	na	26.22			
12	16.0		32.6	na				
9	16.0		34.97	na				
13	16.0		35.38	na				
14	16.0		36.16	na				
15	13.0		38.79	na				
16	7.0		42.35	na				
17	7.0		47.55	na				
18	7.0		59.04	na				
19	7.0		71.52	na				
TOR	7.0		74.06	na				
BOR	-4.0		88.8	na				
UG	-4.0		89.51	na				
TEST	0.0		87.98	na	250.0			

The maximum velocity is 20.56 and it occurs in the pipe between nodes 16 and 17

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	*****
DP1	26.00	1.049	1E	2.0	1.500	21.556			K Factor = 5.60	
to		120.0	1T	5.0	7.000	5.587				
EQO1	26.0	0.2114		0.0	8.500	1.797			Vel = 9.65	
	0.0									
	26.00					28.940			K Factor = 4.83	
1	31.01	1.097	1E	2.487	10.300	30.662			K Factor = 5.60	
to		120.0		0.0	2.487	0.0				
2	31.01	0.2356		0.0	12.787	3.012			Vel = 10.53	
2	32.50	1.442	1T	7.432	2.900	33.674			K Factor = 5.60	
to		120.0	1E	3.716	11.148	0.0				
3	63.51	0.2343		0.0	14.048	3.291			Vel = 12.48	
	0.0									
	63.51					36.965			K Factor = 10.45	
4	31.06	1.097	1E	2.487	10.300	30.772			K Factor = 5.60	
to		120.0		0.0	2.487	0.0				
5	31.06	0.2363		0.0	12.787	3.022			Vel = 10.54	
5	32.56	1.442	2T	14.864	2.900	33.794			K Factor = 5.60	
to		120.0		0.0	14.864	0.0				
6	63.62	0.2350		0.0	17.764	4.175			Vel = 12.50	
	0.0									
	63.62					37.969			K Factor = 10.32	
3	63.51	2.157	1E	6.153	12.000	36.965				
to		120.0	1T	12.307	18.460	0.0				
6	63.51	0.0330		0.0	30.460	1.004			Vel = 5.58	
6	63.61	2.157	1T	12.307	2.700	37.969				
to		120.0		0.0	12.307	2.599				
16	127.12	0.1190		0.0	15.007	1.786			Vel = 11.16	
	0.0									
	127.12					42.354			K Factor = 19.53	
7	27.27	1.442	1T	7.432	8.000	31.829			K Factor @ node EQO1	
to		120.0		0.0	7.432	0.0				
8	27.27	0.0491		0.0	15.432	0.757			Vel = 5.36	
8	27.59	1.442	1E	3.716	9.600	32.586			K Factor @ node EQO1	
to		120.0		0.0	3.716	0.0				
9	54.86	0.1787		0.0	13.316	2.379			Vel = 10.78	
	0.0									
	54.86					34.965			K Factor = 9.28	
10	26.00	1.442	1T	7.432	3.500	28.940			K Factor @ node EQO1	
to		120.0		0.0	7.432	0.0				
11	26.0	0.0449		0.0	10.932	0.491			Vel = 5.11	

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
11 to 12	26.22 52.22	1.442 120.0 0.1631	1T 7.432 0.0	12.000 7.432	29.431 0.0			K Factor @ node EQO1	
12 to 13	0.0 52.22	1.442 120.0 0.1631	1T 7.432 0.0	9.600 7.432	32.601 0.0			Vel = 10.26	
	0.0 52.22				35.379			K Factor = 8.78	
9 to 13	54.86 54.86	2.157 120.0 0.0252	1E 6.153 0.0	10.300 6.153	34.965 0.0			Vel = 4.82	
13 to 14	52.22 107.08	2.157 120.0 0.0866	1E 6.153 0.0	2.900 6.153	35.379 0.0			Vel = 9.40	
14 to 15	0.0 107.08	2.157 120.0 0.0867	1T 12.307 0.0	3.000 12.307	36.163 1.299			Vel = 9.40	
15 to 16	0.0 107.08	2.157 120.0 0.0866	1E 6.153 0.0	5.000 6.153	38.789 2.599			Vel = 9.40	
16 to 17	127.12 234.2	2.157 120.0 0.3685	1T 12.307 0.0	1.800 12.307	42.354 0.0			Vel = 20.56	
17 to 18	0.0 234.2	2.157 120.0 0.3686	1E 6.153 0.0	25.000 6.153	47.553 0.0			Vel = 20.56	
18 to 19	0.0 234.2	2.157 120.0 0.3686	1E 6.153 1T 12.307	15.400 18.460	59.036 0.0			Vel = 20.56	
19 to TOR	0.0 234.2	3.26 120.0 0.0493	1E 9.408 1T 20.159	22.000 29.567	71.516 0.0			Vel = 9.00	
TOR to BOR	0.0 234.2	3.26 120.0 0.0493	1Z 9.408 1Zid 0.0	7.000 9.408	74.059 13.934			* Fixed loss = 9.17 Vel = 9.00	
BOR to UG	0.0 234.2	4.1 150.0 0.0107	1G 3.302 1T 33.024	30.000 36.326	88.802 0.0			Vel = 5.69	
UG to TEST	0.0 234.2	6.16 140.0 0.0017	1E 20.084 1T 43.037	60.000 63.121	89.511 -1.732			Vel = 2.52	

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  	*****
	250.00							Qa = 250.00	
	484.20				87.985			K Factor = 51.62	