

... Fire Protection by Computer Design

HIGH TECH FIRE PROTECTION
84 HACKETT MILLS ROAD
P.O. BOX 156
POLAND, ME 04274
207-998-2551

Job Name : Press Hotel Lower Level Restroom - Meeting rm #0A
Drawing : FP-01
Location : 119 Exchange Street Portland, ME
Remote Area : 0A
Contract : 110713-1
Data File : Calc #0A Lower Level bathroom - meeting rm (new h2o).W XF

HYDRAULIC CALCULATIONS
for

Project name: Press Hotel Lower Level Meeting / Rest Room
Location: 119 Exchange Street Portland, ME
Drawing no: FP-01
Date: 3/20/14

Design

Remote area number: 0A
Remote area location: Lower Level Rest Room/ Meeting
Occupancy classification: Light hazard
Density: .1 - Gpm/SqFt
Area of application: 1000 - SqFt
Coverage per sprinkler: 196 - SqFt
Type of sprinklers calculated: Commercial pendent
No. of sprinklers calculated: 15
In-rack demand: n/a - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 435 - GPM @ 74 - Psi
Type of system: Wet NFPA 13 System
Volume of dry or preaction system: n/a - Gal

Water supply information

Date: 5-12-2014
Location: hydrant on the corner of exchange and federal st.
Source: Portland Water District

Name of contractor: High Tech Fire Protection
Address: 84 Hackett Mills Road Poland / P.O. Box 154 Minot, ME / Pola
Phone number: 207-998-2551
Name of designer: Ed Poulin
Authority having jurisdiction: State of Maine / City of Portland
Notes: (Include peaking information or gridded systems here.)

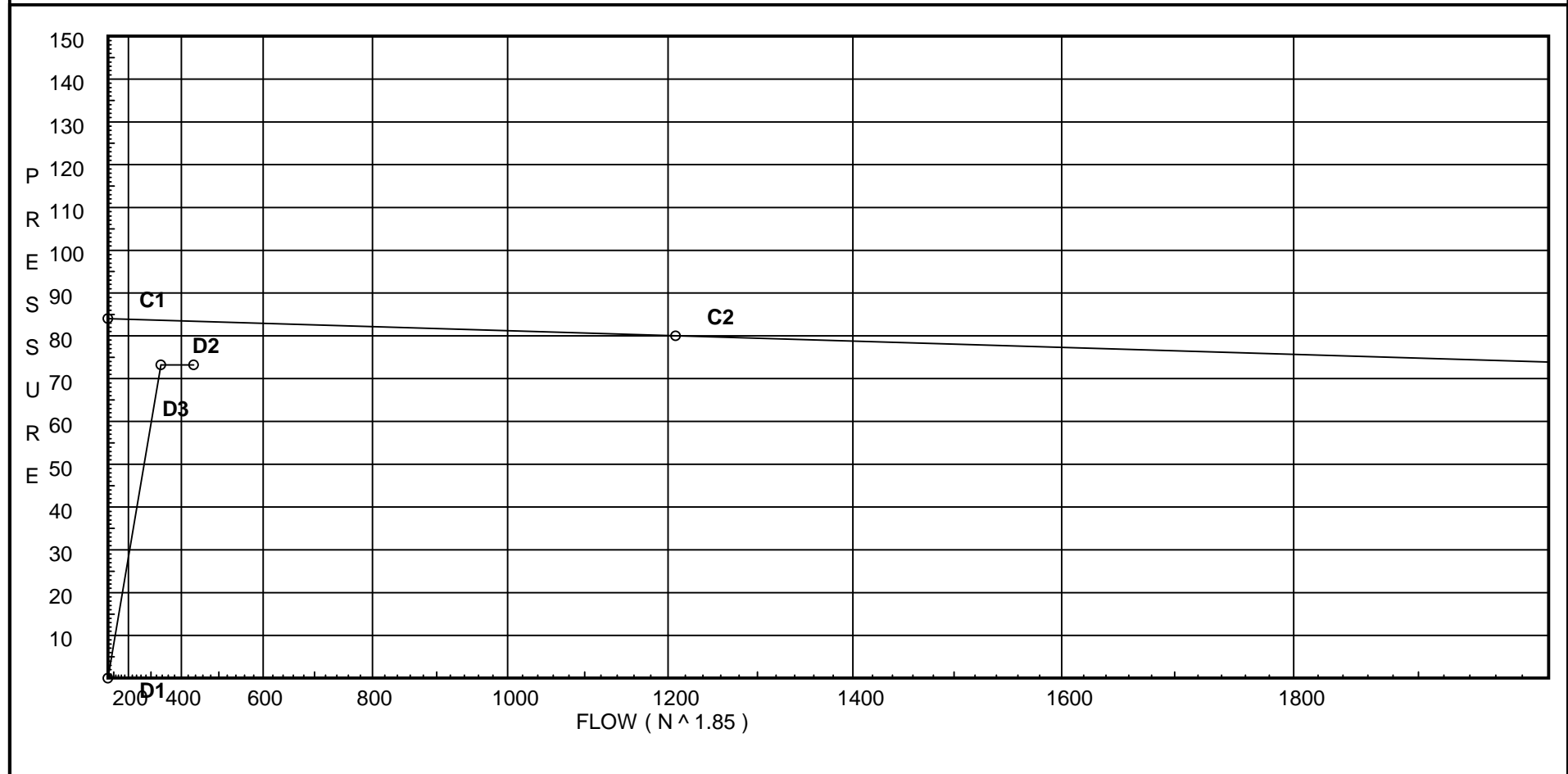
Water Supply Curve (C)

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City Water Supply:
C1 - Static Pressure : 84
C2 - Residual Pressure: 80
C2 - Residual Flow : 1209

Demand:
D1 - Elevation : -0.433
D2 - System Flow : 335.031
D2 - System Pressure : 73.212
Hose (Demand) : 100
D3 - System Demand : 435.031
Safety Margin : 10.184



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																				
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
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
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
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	12.25	na	19.6	0.1	196	7.0
DP2	-1.0	5.6	12.25	na	19.6	0.1	196	7.0
DP3	-1.0	5.6	12.25	na	19.6	0.1	196	7.0
50	2.0	K = K @ EQ01	12.19	na	19.6			
51	2.0	K = K @ EQ02	13.04	na	19.96			
52	2.0		13.86	na				
53	2.0	K = K @ EQ01	13.0	na	20.24			
54	2.0		14.26	na				
55	2.0	K = K @ EQ03	14.79	na	21.0			
56	2.0	K = K @ EQ03	16.98	na	22.5			
57	2.0	K = K @ EQ03	19.16	na	23.9			
60	2.0	K = K @ EQ01	13.19	na	20.39			
61	2.0		14.34	na				
62	2.0	K = K @ EQ01	13.29	na	20.46			
63	2.0		14.44	na				
64	2.0	K = K @ EQ02	14.84	na	21.3			
65	2.0	K = K @ EQ01	13.65	na	20.73			
66	2.0		14.9	na				
67	2.0	K = K @ EQ02	15.64	na	21.86			
68	2.0		19.86	na				
69	2.0		20.25	na				
70	2.0	K = K @ EQ01	19.48	na	24.77			
71	2.0		20.95	na				
72	2.0		21.35	na				
73	2.0	K = K @ EQ02	21.5	na	25.63			
74	2.0	K = K @ EQ02	22.36	na	26.14			
75	2.0	K = K @ EQ01	22.34	na	26.53			
76	2.0		25.46	na				
80	2.0		26.11	na				
81	2.0		31.48	na				
82	2.0		33.78	na				
83	2.0		35.91	na				
84	2.0		46.32	na				
85	2.0		48.21	na				
86	0.0		57.19	na				
SR01	0.0		61.1	na				
SR02	0.0		62.12	na				
SR03	0.0		62.72	na				
TOR	-4.0		67.71	na				
BOR	-6.0		71.68	na				
BASE	-6.0		75.46	na				
HS1	-4.0		74.96	na				
HS2	-4.0		75.14	na				
HS3	-4.0		76.02	na	100.0			
TEST	3.0		73.21	na				

The maximum velocity is 18.37 and it occurs in the pipe between nodes 57 and 68

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 to EQ01	19.60 19.6	1.049 120.0 0.1253	1E	2.0 0.0 0.0	1.000 2.000 3.000	12.250 -0.433 0.376			K Factor = 5.60	
	0.0 19.60						12.193		K Factor = 5.61	
DP2 to EQ02	19.60 19.6	1.049 120.0 0.1253	1T	5.0 0.0 0.0	1.000 5.000 6.000	12.250 -0.433 0.752			K Factor = 5.60	
	0.0 19.60						12.569		K Factor = 5.53	
DP3 to EQ03	19.60 19.6	1.049 120.0 0.1253	1E 1T	2.0 5.0 0.0	1.500 7.000 8.500	12.250 -0.433 1.065			K Factor = 5.60	
	0.0 19.60						12.882		K Factor = 5.46	
50 to 51	19.60 19.6	1.049 120.0 0.1253		0.0 0.0 0.0	6.750 0.0 6.750	12.193 0.0 0.846			K Factor @ node EQ01	
51 to 52	19.96 39.56	1.38 120.0 0.1209	1T	6.0 0.0 0.0	0.750 6.000 6.750	13.039 0.0 0.816			K Factor @ node EQ02	
52 to 54	0.0 39.56	1.682 120.0 0.0461		0.0 0.0 0.0	8.800 0.0 8.800	13.855 0.0 0.406				Vel = 8.49
	0.0 39.56						14.261		K Factor = 10.48	
53 to 54	20.24 20.24	1.049 120.0 0.1329	1T	5.0 0.0 0.0	4.500 5.000 9.500	12.998 0.0 1.263			K Factor @ node EQ01	
54 to 55	39.56 59.8	1.682 120.0 0.0991		0.0 0.0 0.0	5.300 0.0 5.300	14.261 0.0 0.525				Vel = 8.63
55 to 56	21.00 80.8	1.682 120.0 0.1728	1E	4.95 0.0 0.0	7.750 4.950 12.700	14.786 0.0 2.195			K Factor @ node EQ03	
56 to 57	22.50 103.3	1.682 120.0 0.2722		0.0 0.0 0.0	8.000 0.0 8.000	16.981 0.0 2.178			K Factor @ node EQ03	
57 to 68	23.90 127.2	1.682 120.0 0.4000		0.0 0.0 0.0	1.750 0.0 1.750	19.159 0.0 0.700			K Factor @ node EQ03	
	0.0 127.20						19.859		K Factor = 28.54	
60 to 61	20.39 20.39	1.049 120.0 0.1348	1T	5.0 0.0 0.0	3.500 5.000 8.500	13.194 0.0 1.146			K Factor @ node EQ01	
61 to 63	0.0 20.39	1.682 120.0 0.0135		0.0 0.0 0.0	7.500 0.0 7.500	14.340 0.0 0.101				Vel = 7.57
										Vel = 2.94

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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	*****
	0.0 20.39						14.441		K Factor = 5.37	
62 to 63	20.46	1.049 120.0	1T	5.0 0.0	3.500 5.000	13.288 0.0			K Factor @ node EQ01	
63 to 64	20.46	0.1356		0.0	8.500	1.153			Vel = 7.60	
63 to 64	20.39	1.682 120.0		0.0 0.0	8.200 0.0	14.441 0.0				
64 to 66	40.85	0.0489		0.0	8.200	0.401			Vel = 5.90	
64 to 66	21.30	2.157 120.0		0.0 0.0	1.750 0.0	14.842 0.0			K Factor @ node EQ02	
66	62.15	0.0320		0.0	1.750	0.056			Vel = 5.46	
	0.0 62.15						14.898		K Factor = 16.10	
65 to 66	20.73	1.049 120.0	1T	5.0 0.0	4.000 5.000	13.646 0.0			K Factor @ node EQ01	
66 to 67	20.73	0.1391		0.0	9.000	1.252			Vel = 7.70	
66 to 67	62.15	1.682 120.0		0.0 0.0	4.100 0.0	14.898 0.0				
67 to 68	82.88	0.1812		0.0	4.100	0.743			Vel = 11.97	
67 to 68	21.87	1.682 120.0	1T	9.9 0.0	5.200 9.900	15.641 0.0			K Factor @ node EQ02	
68 to 69	104.75	0.2793		0.0	15.100	4.218			Vel = 15.12	
68 to 69	127.20	3.26 120.0	1V	6.72 0.0	1.300 6.720	19.859 0.0				
69	231.95	0.0484		0.0	8.020	0.388			Vel = 8.92	
	0.0 231.95						20.247		K Factor = 51.55	
69 to 72	231.95	3.26 120.0	2V	13.44 0.0	9.250 13.440	20.247 0.0				
72	231.95	0.0485		0.0	22.690	1.100			Vel = 8.92	
	0.0 231.95						21.347		K Factor = 50.20	
70 to 71	24.77	1.049 120.0	1T	5.0 0.0	2.600 5.000	19.481 0.0			K Factor @ node EQ01	
71 to 72	24.77	0.1934		0.0	7.600	1.470			Vel = 9.20	
71 to 72	0.0	1.682 120.0	1T	9.9 0.0	10.500 9.900	20.951 0.0				
72 to 73	24.77	0.0194		0.0	20.400	0.396			Vel = 3.58	
72 to 73	231.96	3.26 120.0		0.0 0.0	2.600 0.0	21.347 0.0				
73 to 74	256.73	0.0585		0.0	2.600	0.152			Vel = 9.87	
73 to 74	25.63	3.26 120.0		0.0 0.0	12.300 0.0	21.499 0.0			K Factor @ node EQ02	
74 to 80	282.36	0.0697		0.0	12.300	0.857			Vel = 10.85	
74 to 80	26.14	3.26 120.0	1X 1V	17.471 6.72	21.500 24.191	22.356 0.0			K Factor @ node EQ02	
80	308.5	0.0821		0.0	45.691	3.752			Vel = 11.86	

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftn'g's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	0.0 308.50					26.108		K Factor = 60.38	
75 to 76	26.53	1.049 120.0	1E 0.0	2.0 0.0	12.200 2.000	22.344 0.0		K Factor @ node EQ01	
76 to 80	26.53	0.2195 1.38 120.0	0.0 1E 1T	0.0 3.0 6.0	14.200 2.200 9.000	3.117 25.461 0.0		Vel = 9.85	
80 to 81	308.50 335.03	3.26 0.0956 120.0	1X 1V	17.471 6.72	32.000 24.191	26.108 0.0		Vel = 5.69	
81 to 82	0.0 335.03	3.26 0.0957 120.0	0.0 0.0	0.0 0.0	24.000 0.0	31.482 0.0		Vel = 12.88	
82 to 83	0.0 335.03	3.068 0.1290 120.0	0.0 0.0	0.0 0.0	1.000 0.0	33.778 2.000		* Fixed loss = 2 Vel = 14.54	
83 to 84	0.0 335.03	3.26 0.0956 120.0	2V 1X	13.44 17.471	78.000 30.911	35.907 0.0		Vel = 12.88	
84 to 85	0.0 335.03	3.26 0.0956 120.0	1V 0.0	6.72 0.0	13.000 6.720	46.324 0.0		Vel = 12.88	
85 to 86	0.0 335.03	3.26 0.0957 120.0	1B 1Fsp 1S 1X	13.44 0.0 21.503 17.471	1.000 52.414 53.414	48.210 3.866 5.110		* Fixed loss = 3 Vel = 12.88	
86 to SR01	0.0 335.03	4.26 0.0260 120.0	3V 1B 1X 1F	26.861 15.8 21.067 5.267	81.500 68.995 150.495	57.186 0.0 3.911		Vel = 7.54	
SR01 to SR02	0.0 335.03	4.26 0.0260 120.0	0.0 0.0	0.0 0.0	1.000 0.0	61.097 1.000		* Fixed loss = 1 Vel = 7.54	
SR02 to SR03	0.0 335.03	4.26 0.0260 120.0	1X 0.0	21.067 0.0	2.000 21.067	62.123 0.0		Vel = 7.54	
SR03 to TOR	0.0 335.03	4.26 0.0260 120.0	2V 1X 1F	17.907 21.067 5.267	81.000 44.241 125.241	62.723 1.732 3.255		Vel = 7.54	
TOR to BOR	0.0 335.03	4.26 0.0262 120.0	1Fsp 0.0	0.0 0.0	4.000 0.0	67.710 3.866		* Fixed loss = 3 Vel = 7.54	
BOR to BASE	0.0 335.03	4.26 0.0250 120.0	1Zia 0.0	0.0 0.0	1.000 0.0	71.681 3.752		* Fixed loss = 3.752 Vel = 7.54	
BASE to HS1	0.0 335.03	6.14 0.0061 100.0	1G 1E 1T	2.273 10.608 22.732	25.000 35.613 60.613	75.458 -0.866 0.372		Vel = 3.63	

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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	*****
HS1 to HS2	0.0 335.03	8.23 100.0 0.0015	1T	29.011 0.0 0.0	90.000 29.010 119.010	74.964 0.0 0.176		Vel = 2.02	
HS2 to HS3	0.0 335.03	6.14 100.0 0.0061	1T	22.732 0.0 0.0	120.000 22.732 142.732	75.140 0.0 0.876		Vel = 3.63	
HS3 to TEST	100.00 435.03	6.14 100.0 0.0100	1G 1E	2.273 10.608 0.0	10.000 12.881 22.881	76.016 -3.032 0.228		Qa = 100 Vel = 4.71	
	0.0 435.03					73.212		K Factor = 50.84	