



... 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 Sub-Basement - Unfinished Rm #00A
Drawing : FP-01
Location : 119 Exchange Street Portland, ME
Remote Area : 00A
Contract : 110713-1
Data File : Calc #00A Sub-Basement Unfinished rm.WXF

HYDRAULIC CALCULATIONS
for

Project name: Press Hotel Lower Sub-Basement
Location: 119 Exchange Street Portland, ME
Drawing no: FP-01
Date: 3/20/14

Design

Remote area number: 00A
Remote area location: Sub-Basement Unfinished B22
Occupancy classification: Ordinary Hazard Group 1
Density: .15 - Gpm/SqFt
Area of application: 1000 - SqFt
Coverage per sprinkler: 130 - SqFt
Type of sprinklers calculated: Commercial Uprights
No. of sprinklers calculated: 13
In-rack demand: n/a - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 554 - GPM @ 70 - 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.)

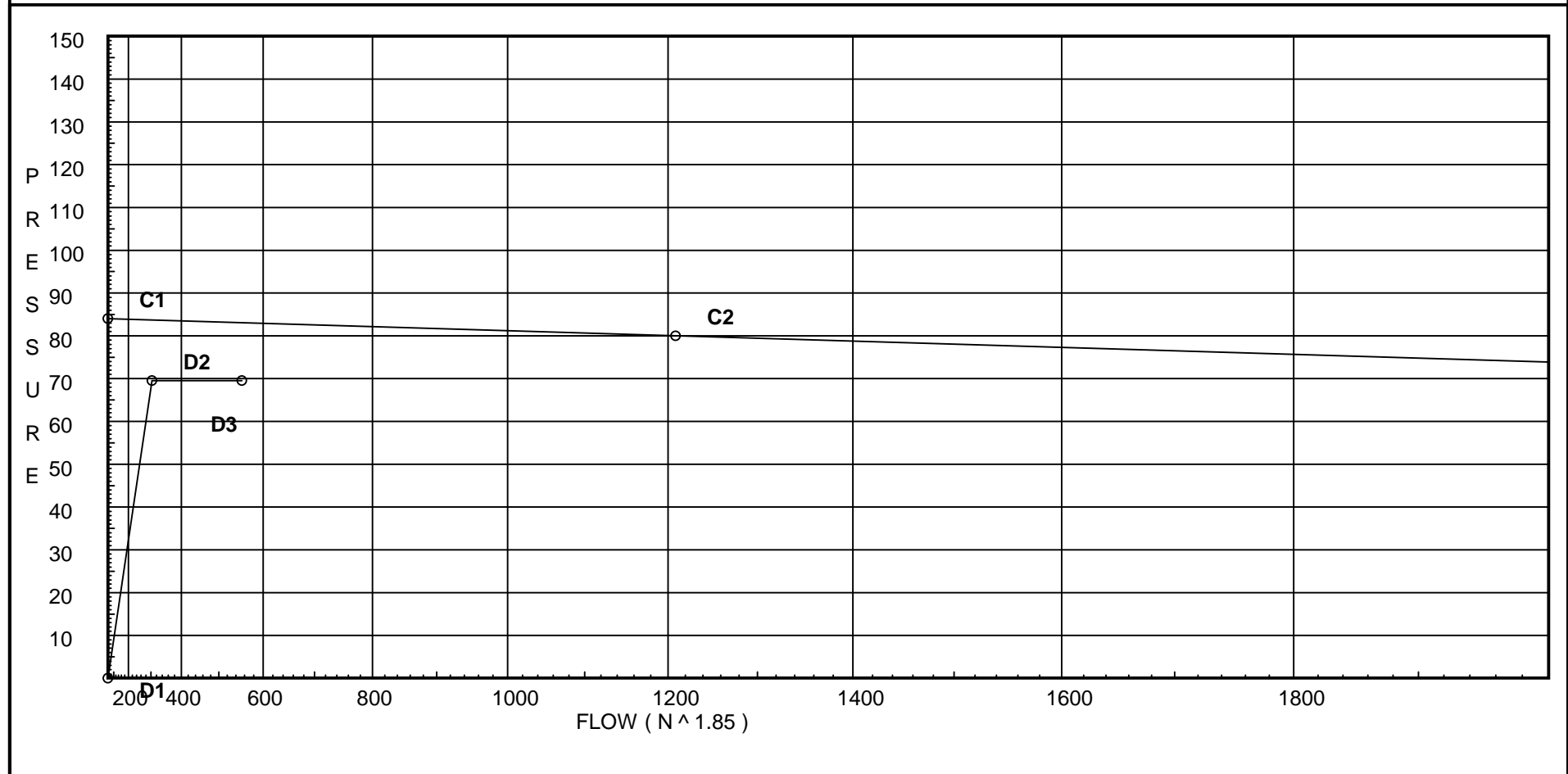
Water Supply Curve (C)

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

Demand:
D1 - Elevation : -5.630
D2 - System Flow : 304.031
D2 - System Pressure : 69.537
Hose (Demand) : 250
D3 - System Demand : 554.031
Safety Margin : 13.518



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
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	12.13	na	19.5	0.15	130	7.0
DP2	1.0	5.6	12.13	na	19.5	0.15	130	7.0
10	-10.0	K = K @ EQ01	16.84	na	21.94			
11	-10.0	K = K @ EQ01	16.98	na	22.03			
12	-10.0	K = K @ EQ02	12.93	na	19.5			
13	-10.0	K = K @ EQ01	15.0	na	20.71			
14	-10.0		17.12	na				
15	-10.0	K = K @ EQ01	18.33	na	22.89			
16	-10.0	K = K @ EQ01	20.66	na	24.3			
17	-10.0	K = K @ EQ02	25.47	na	27.37			
20	-10.0	K = K @ EQ02	16.44	na	21.99			
21	-10.0		18.66	na				
22	-10.0	K = K @ EQ01	18.68	na	23.11			
23	-10.0	K = K @ EQ01	19.21	na	23.43			
24	-10.0	K = K @ EQ01	20.36	na	24.12			
25	-10.0	K = K @ EQ01	22.14	na	25.15			
26	-10.0	K = K @ EQ02	25.7	na	27.49			
18	-10.0		27.37	na				
27	-10.0		27.62	na				
30	-10.0		32.42	na				
31	-10.0		39.58	na				
32	-10.0		48.89	na				
33	-10.0		57.34	na				
34	-10.0		57.72	na				
86	0.0		54.07	na				
SR01	0.0		57.34	na				
SR02	0.0		59.36	na				
SR03	0.0		59.86	na				
TOR	-4.0		64.2	na				
BOR	-6.0		68.15	na				
BASE	-6.0		71.89	na				
HS1	-4.0		71.33	na				
HS2	-4.0		71.48	na				
HS3	-4.0		72.21	na	250.0			
TEST	3.0		69.54	na				

The maximum velocity is 18.97 and it occurs in the pipe between nodes 16 and 18

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	19.50 19.5 0.0 19.50	1.049 120.0 0.1243	1T	5.0 0.0 0.0	1.000 5.000 6.000	12.125 0.433 0.746			K Factor = 5.60 Vel = 7.24	
							13.304		K Factor = 5.35	
DP2 to EQ02	19.50 19.5 0.0 19.50	1.049 120.0 0.1243	1E	2.0 0.0 0.0	1.000 2.000 3.000	12.125 0.433 0.373			K Factor = 5.60 Vel = 7.24	
							12.931		K Factor = 5.42	
10 to 11	21.94 21.94	1.682 120.0 0.0154		0.0 0.0 0.0	9.000 0.0 9.000	16.843 0.0 0.139			K Factor @ node EQ01 Vel = 3.17	
11 to 14	22.03 43.97 0.0 43.97	1.682 120.0 0.0564		0.0 0.0 0.0	2.500 0.0 2.500	16.982 0.0 0.141			K Factor @ node EQ01 Vel = 6.35	
							17.123		K Factor = 10.63	
12 to 13	19.50 19.5	1.049 120.0 0.1242	1E	2.0 0.0 0.0	14.700 2.000 16.700	12.931 0.0 2.074			K Factor @ node EQ02 Vel = 7.24	
13 to 14	20.71 40.21 0.0 43.97	1.38 120.0 0.1246	1T	6.0 0.0 0.0	11.000 6.000 17.000	15.005 0.0 2.118			K Factor @ node EQ01 Vel = 8.63	
14 to 15	43.97 84.18	1.682 120.0 0.1863		0.0 0.0 0.0	6.500 0.0 6.500	17.123 0.0 1.211			Vel = 12.15	
15 to 16	22.89 107.07	1.682 120.0 0.2910		0.0 0.0 0.0	8.000 0.0 8.000	18.334 0.0 2.328			K Factor @ node EQ01 Vel = 15.46	
16 to 18	24.31 131.38 0.0 131.38	1.682 120.0 0.4247	1T	9.9 0.0 0.0	5.900 9.900 15.800	20.662 0.0 6.711			K Factor @ node EQ01 Vel = 18.97	
							27.373		K Factor = 25.11	
17 to 18	27.37 27.37	1.049 120.0 0.2324	1T	5.0 0.0 0.0	3.200 5.000 8.200	25.467 0.0 1.906			K Factor @ node EQ02 Vel = 10.16	
							27.373		K Factor = 5.23	
20 to 21	21.99 21.99	1.049 120.0 0.1550	1T	5.0 0.0 0.0	9.300 5.000 14.300	16.439 0.0 2.217			K Factor @ node EQ02 Vel = 8.16	
21 to 22	0.0 21.99	1.682 120.0 0.0160		0.0 0.0 0.0	1.500 0.0 1.500	18.656 0.0 0.024			Vel = 3.18	
22 to 23	23.10 45.09	1.682 120.0 0.0587		0.0 0.0 0.0	9.000 0.0 9.000	18.680 0.0 0.528			K Factor @ node EQ01 Vel = 6.51	

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	*****
23	23.43	1.682		0.0	9.000	19.208			K Factor @ node EQ01	
to		120.0		0.0	0.0	0.0				
24	68.52	0.1274		0.0	9.000	1.147			Vel = 9.89	
24	24.13	1.682		0.0	8.000	20.355			K Factor @ node EQ01	
to		120.0		0.0	0.0	0.0				
25	92.65	0.2226		0.0	8.000	1.781			Vel = 13.38	
25	25.15	1.682	1T	9.9	5.900	22.136			K Factor @ node EQ01	
to		120.0		0.0	9.900	0.0				
27	117.8	0.3471		0.0	15.800	5.484			Vel = 17.01	
	0.0									
	117.80					27.620			K Factor = 22.41	
26	27.49	1.049	1T	5.0	3.200	25.698			K Factor @ node EQ02	
to		120.0		0.0	5.000	0.0				
27	27.49	0.2344		0.0	8.200	1.922			Vel = 10.21	
	0.0									
	27.49					27.620			K Factor = 5.23	
18	158.74	3.26		0.0	10.300	27.373				
to		120.0		0.0	0.0	0.0				
27	158.74	0.0240		0.0	10.300	0.247			Vel = 6.10	
27	145.29	3.26		0.0	60.000	27.620				
to		120.0		0.0	0.0	0.0				
30	304.03	0.0799		0.0	60.000	4.796			Vel = 11.69	
30	0.0	3.26		0.0	2.000	32.416				
to		120.0		0.0	0.0	7.000			* Fixed loss = 7	
31	304.03	0.0800		0.0	2.000	0.160			Vel = 11.69	
31	0.0	3.26	5V	33.599	83.000	39.576				
to		120.0		0.0	33.599	0.0				
32	304.03	0.0799		0.0	116.599	9.319			Vel = 11.69	
32	0.0	3.26	1V	6.72	9.000	48.895				
to		120.0	1B	13.44	59.134	3.000			* Fixed loss = 3	
33	304.03	0.0799	1Fsp	0.0	68.134	5.445			Vel = 11.69	
			1S	21.503						
			1X	17.471						
33	0.0	4.26	1V	8.954	8.750	57.340				
to		120.0		0.0	8.954	0.0				
34	304.03	0.0217		0.0	17.704	0.385			Vel = 6.84	
34	0.0	4.26	1X	21.067	10.000	57.725				
to		120.0		0.0	21.067	-4.331				
86	304.03	0.0217		0.0	31.067	0.675			Vel = 6.84	
86	0.0	4.26	3V	26.861	81.500	54.069				
to		120.0	1B	15.8	68.995	0.0				
SR01	304.03	0.0217	1X	21.067	150.495	3.268			Vel = 6.84	
			1F	5.267						
SR01	0.0	4.26		0.0	1.000	57.337				
to		120.0		0.0	0.0	2.000			* Fixed loss = 2	
SR02	304.03	0.0220		0.0	1.000	0.022			Vel = 6.84	
SR02	0.0	4.26	1X	21.067	2.000	59.359				
to		120.0		0.0	21.067	0.0				
SR03	304.03	0.0217		0.0	23.067	0.501			Vel = 6.84	

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SR03 to TOR	0.0 304.03	4.26 120.0 0.0217	2V 1X	17.907 21.067 0.0	81.000 38.974 119.974	59.860 1.732 2.606		Vel = 6.84	
TOR to BOR	0.0 304.03	4.26 120.0 0.0217	1Fsp	0.0 0.0 0.0	4.000 0.0 4.000	64.198 3.866 0.087		* Fixed loss = 3 Vel = 6.84	
BOR to BASE	0.0 304.03	4.26 120.0 0.0210	1Zia	0.0 0.0 0.0	1.000 0.0 1.000	68.151 3.717 0.021		* Fixed loss = 3.717 Vel = 6.84	
BASE to HS1	0.0 304.03	6.14 100.0 0.0051	1G 1E 1T	2.273 10.608 22.732	25.000 35.613 60.613	71.889 -0.866 0.311		Vel = 3.29	
HS1 to HS2	0.0 304.03	8.23 100.0 0.0012	1T	29.011 0.0 0.0	90.000 29.010 119.010	71.334 0.0 0.147		Vel = 1.83	
HS2 to HS3	0.0 304.03	6.14 100.0 0.0051	1T	22.732 0.0 0.0	120.000 22.732 142.732	71.481 0.0 0.732		Vel = 3.29	
HS3 to TEST	250.00 554.03	6.14 100.0 0.0156	1G 1E	2.273 10.608 0.0	10.000 12.881 22.881	72.213 -3.032 0.356		Qa = 250 Vel = 6.00	
	0.0 554.03					69.537		K Factor = 66.44	