



... 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 1st floor room Lobby #1A
Drawing : FP-02
Location : 119 Exchange Street Portland, ME
Remote Area : 1A
Contract : 110713-1
Data File : Calc #1A 1st floor Unit Lobby (new h2o).WXF

HYDRAULIC CALCULATIONS
for

Project name: Press Hotel 1st floor Lobby
Location: 119 Exchange Street Portland, ME
Drawing no: FP-02
Date: 3/20/14

Design

Remote area number: 1A
Remote area location: 1st Floor Lobby
Occupancy classification: Light hazard
Density: .1 - Gpm/SqFt
Area of application: 1000 - SqFt
Coverage per sprinkler: 225 - SqFt
Type of sprinklers calculated: Commercial pendent and sidewall
No. of sprinklers calculated: 11
In-rack demand: n/a - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 375 - 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.)

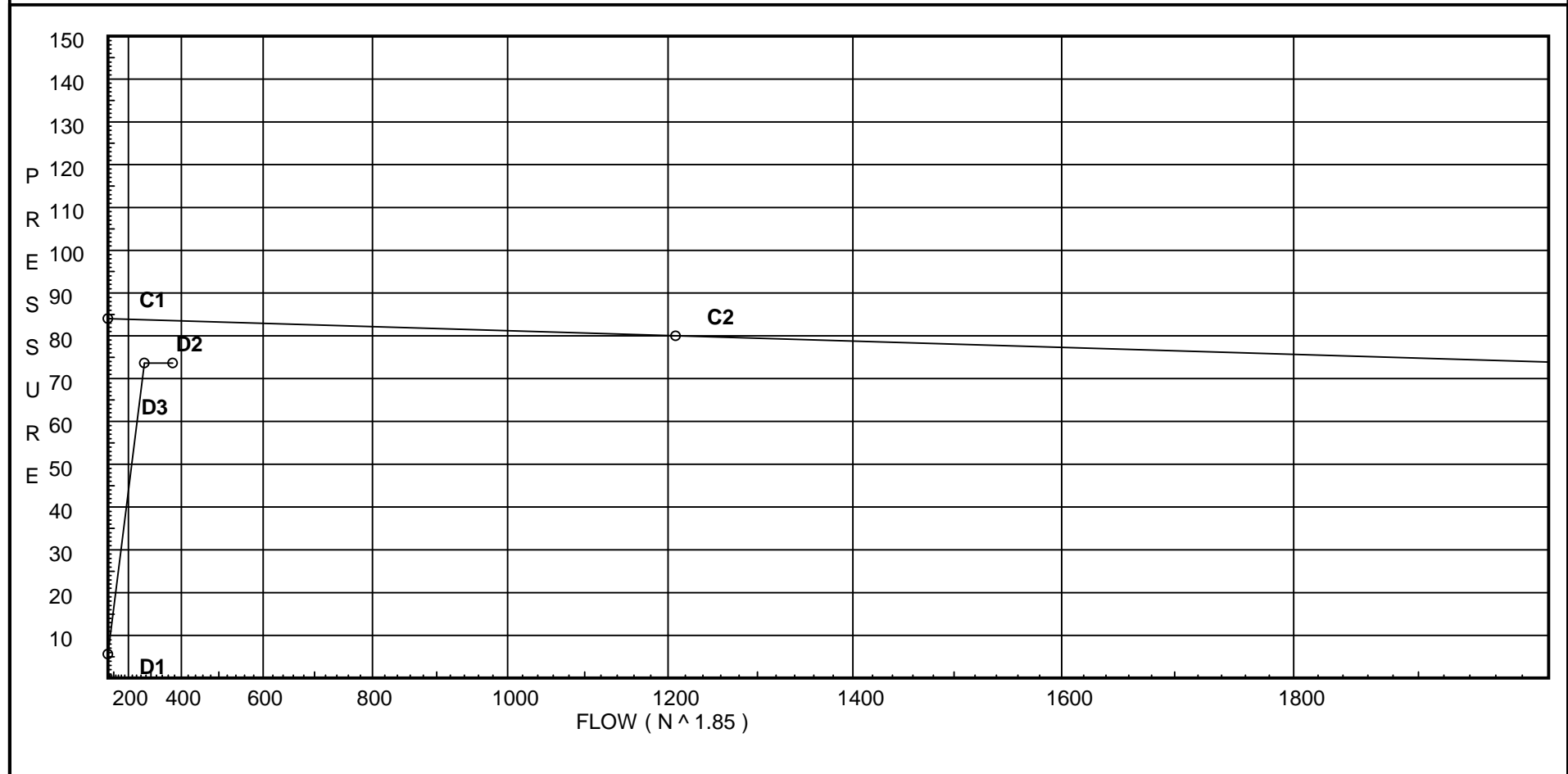
Water Supply Curve (C)

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

Demand:
D1 - Elevation : 5.630
D2 - System Flow : 274.228
D2 - System Pressure : 73.612
Hose (Demand) : 100
D3 - System Demand : 374.228
Safety Margin : 9.931



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	16.14	na	22.5	0.1	225	7.0
DP2	0.0	5.6	12.25	na	19.6	0.1	196	7.0
DP3	-1.0	5.6	16.14	na	22.5	0.1	225	7.0
100	16.0	K = K @ EQ01	20.51	na	24.65			
101	16.0	K = K @ EQ02	21.13	na	24.99			
102	16.0	K = K @ EQ01	19.73	na	24.18			
103	16.0		21.26	na				
104	16.0	K = K @ EQ02	22.16	na	25.59			
105	16.0	K = K @ EQ03	23.06	na	26.08			
106	16.0		23.58	na				
107	16.0	K = K @ EQ02	23.75	na	26.49			
110	16.0	K = K @ EQ01	19.35	na	23.94			
111	16.0	K = K @ EQ01	19.49	na	24.03			
112	16.0	K = K @ EQ01	17.09	na	22.5			
113	16.0		19.67	na				
114	16.0	K = K @ EQ01	20.94	na	24.91			
115	16.0		24.38	na				
116	16.0	K = K @ EQ02	24.44	na	26.87			
117	16.0		28.35	na				
120	16.0		32.25	na				
121	16.0		33.48	na				
122	16.0		36.54	na				
123	16.0		43.92	na				
124	16.0		45.99	na				
125	16.0		52.59	na				
SR11	14.0		54.29	na				
SR0	0.0		60.7	na				
SR01	0.0		63.4	na				
SR02	0.0		64.42	na				
SR03	0.0		64.83	na				
TOR	-4.0		68.72	na				
BOR	-6.0		72.65	na				
BASE	-6.0		76.35	na				
HS1	-4.0		75.75	na				
HS2	-4.0		75.87	na				
HS3	-4.0		76.47	na	100.0			
TEST	3.0		73.61	na				

The maximum velocity is 16.13 and it occurs in the pipe between nodes 116 and 117

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	22.50 22.5	1.049 120.0 0.1619	1E 1T	2.0 5.0 0.0	1.500 7.000 8.500	16.143 -0.433 1.376			K Factor = 5.60 Vel = 8.35	
	0.0 22.50						17.086		K Factor = 5.44	
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 0.0 0.752			K Factor = 5.60 Vel = 7.28	
	0.0 19.60						13.002		K Factor = 5.44	
DP3 to EQ03	22.50 22.5	1.049 120.0 0.1618	1E 1T	2.0 5.0 0.0	2.000 7.000 9.000	16.143 -0.433 1.456			K Factor = 5.60 Vel = 8.35	
	0.0 22.50						17.166		K Factor = 5.43	
100 to 101	24.65 24.65	1.38 120.0 0.0504	1E	3.0 0.0 0.0	9.300 3.000 12.300	20.513 0.0 0.620			K Factor @ node EQ01 Vel = 5.29	
101 to 103	24.99 49.64	1.682 120.0 0.0697		0.0 0.0 0.0	1.750 0.0 1.750	21.133 0.0 0.122			K Factor @ node EQ02 Vel = 7.17	
	0.0 49.64						21.255		K Factor = 10.77	
102 to 103	24.18 24.18	1.049 120.0 0.1848	1T	5.0 0.0 0.0	3.250 5.000 8.250	19.730 0.0 1.525			K Factor @ node EQ01 Vel = 8.98	
103 to 104	49.64 73.82	1.682 120.0 0.1463		0.0 0.0 0.0	6.200 0.0 6.200	21.255 0.0 0.907			Vel = 10.66	
104 to 106	25.59 99.41	1.682 120.0 0.2536		0.0 0.0 0.0	5.600 0.0 5.600	22.162 0.0 1.420			K Factor @ node EQ02 Vel = 14.35	
	0.0 99.41						23.582		K Factor = 20.47	
105 to 106	26.08 26.08	1.38 120.0 0.0559	1T	6.0 0.0 0.0	3.300 6.000 9.300	23.062 0.0 0.520			K Factor @ node EQ03 Vel = 5.59	
106 to 107	99.41 125.49	2.635 120.0 0.0437		0.0 0.0 0.0	3.750 0.0 3.750	23.582 0.0 0.164			Vel = 7.38	
107 to 115	26.49 151.98	2.635 120.0 0.0625		0.0 0.0 0.0	10.100 0.0 10.100	23.746 0.0 0.631			K Factor @ node EQ02 Vel = 8.94	
	0.0 151.98						24.377		K Factor = 30.78	
110 to 111	23.94 23.94	1.682 120.0 0.0181		0.0 0.0 0.0	8.000 0.0 8.000	19.348 0.0 0.145			K Factor @ node EQ01 Vel = 3.46	

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	*****
111 to 113	24.04 47.98	1.682 120.0 0.0658		0.0 0.0 0.0	2.750 0.0 2.750	19.493 0.0 0.181			K Factor @ node EQ01 Vel = 6.93	
	0.0 47.98						19.674		K Factor = 10.82	
112 to 113	22.50 22.5	1.049 120.0 0.1618	1E 1T	2.0 5.0 0.0	9.000 7.000 16.000	17.086 0.0 2.588			K Factor @ node EQ01 Vel = 8.35	
113 to 114	47.98 70.48	1.682 120.0 0.1343		0.0 0.0 0.0	9.400 0.0 9.400	19.674 0.0 1.262			Vel = 10.18	
114 to 115	24.90 95.38	1.682 120.0 0.2349	1T	9.9 0.0 0.0	4.750 9.900 14.650	20.936 0.0 3.441			K Factor @ node EQ01 Vel = 13.77	
115 to 116	151.98 247.36	2.635 120.0 0.1547		0.0 0.0 0.0	0.375 0.0 0.375	24.377 0.0 0.058			Vel = 14.55	
116 to 117	26.87 274.23	2.635 120.0 0.1862		0.0 0.0 0.0	21.000 0.0 21.000	24.435 0.0 3.910			K Factor @ node EQ02 Vel = 16.13	
117 to 120	0.0 274.23	3.26 120.0 0.0660	1V 1X	6.72 17.471 0.0	35.000 24.191 59.191	28.345 0.0 3.909			Vel = 10.54	
120 to 121	0.0 274.23	3.26 120.0 0.0661		0.0 0.0 0.0	18.500 0.0 18.500	32.254 0.0 1.222			Vel = 10.54	
121 to 122	0.0 274.23	3.26 120.0 0.0660		0.0 0.0 0.0	1.000 0.0 1.000	33.476 3.000 0.066			* Fixed loss = 3 Vel = 10.54	
122 to 123	0.0 274.23	3.26 120.0 0.0660	2X 1V	34.943 6.72 0.0	70.000 41.663 111.663	36.542 0.0 7.374			Vel = 10.54	
123 to 124	0.0 274.23	3.26 120.0 0.0660	1X	17.471 0.0 0.0	14.000 17.471 31.471	43.916 0.0 2.078			Vel = 10.54	
124 to 125	0.0 274.23	3.26 120.0 0.0660	1B 1Fsp 1S 1X	13.44 0.0 21.503 17.471	2.000 52.414 54.414	45.994 3.000 3.593			* Fixed loss = 3 Vel = 10.54	
125 to SR11	0.0 274.23	4.26 120.0 0.0179	3V	26.861 0.0 0.0	20.000 26.861 46.861	52.587 0.866 0.841			Vel = 6.17	
SR11 to SR0	0.0 274.23	4.26 120.0 0.0180	1V	8.954 0.0 0.0	10.000 8.954 18.954	54.294 6.063 0.341			Vel = 6.17	
SR0 to SR01	0.0 274.23	4.26 120.0 0.0179	3V 1B 1X	26.861 15.8 21.067	81.500 68.995 150.495	60.698 0.0 2.700			Vel = 6.17	

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	*****
				1F	5.267					
SR01 to SR02	0.0 274.23	4.26 120.0 0.0180		0.0	1.000 0.0 1.000	63.398 1.000 0.018			* Fixed loss = 1 Vel = 6.17	
SR02 to SR03	0.0 274.23	4.26 120.0 0.0179	1X	21.067	2.000 21.067 23.067	64.416 0.0 0.414			Vel = 6.17	
SR03 to TOR	0.0 274.23	4.26 120.0 0.0180	2V 1X	17.907 21.067	81.000 38.974 119.974	64.830 1.732 2.154			Vel = 6.17	
TOR to BOR	0.0 274.23	4.26 120.0 0.0180	1Fsp	0.0	4.000 0.0 4.000	68.716 3.866 0.072			* Fixed loss = 3 Vel = 6.17	
BOR to BASE	0.0 274.23	4.26 120.0 0.0170	1Zia	0.0	1.000 0.0 1.000	72.654 3.683 0.017			* Fixed loss = 3.683 Vel = 6.17	
BASE to HS1	0.0 274.23	6.14 100.0 0.0042	1G 1E 1T	2.273 10.608 22.732	25.000 35.613 60.613	76.354 -0.866 0.257			Vel = 2.97	
HS1 to HS2	0.0 274.23	8.23 100.0 0.0010	1T	29.011	90.000 29.010 119.010	75.745 0.0 0.121			Vel = 1.65	
HS2 to HS3	0.0 274.23	6.14 100.0 0.0042	1T	22.732	120.000 22.732 142.732	75.866 0.0 0.605			Vel = 2.97	
HS3 to TEST	100.00 374.23	6.14 100.0 0.0076	1G 1E	2.273 10.608	10.000 12.881 22.881	76.471 -3.032 0.173			Qa = 100 Vel = 4.06	
	0.0 374.23									K Factor = 43.62