



... 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 3rd floor room 301 #3A
Drawing : FP-03
Location : 119 Exchange Street Portland
Remote Area : 3A
Contract : 110713-1
Data File : Calc #3A 3rd floor Unit 301 (new h2o).WXF

HYDRAULIC CALCULATIONS
for

Project name: Press Hotel 3rd floor room 301 #3A
Location: 119 Exchange Street Portland
Drawing no: FP-03
Date: 3/20/14

Design

Remote area number: 3A
Remote area location: 3rd floor Unit 301
Occupancy classification: Residential / light hazard
Density: .1 - Gpm/SqFt
Area of application: 327 - SqFt
Coverage per sprinkler: 224 - SqFt
Type of sprinklers calculated: Residential Pendants
No. of sprinklers calculated: 4
In-rack demand: n/a - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 196 - GPM @ 73 - Psi
Type of system: Wet NFPA 13
Volume of dry or preaction system: n/a - Gal

Water supply information

Date: 5-12-2014
Location: Corner of Exchange Street 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.)

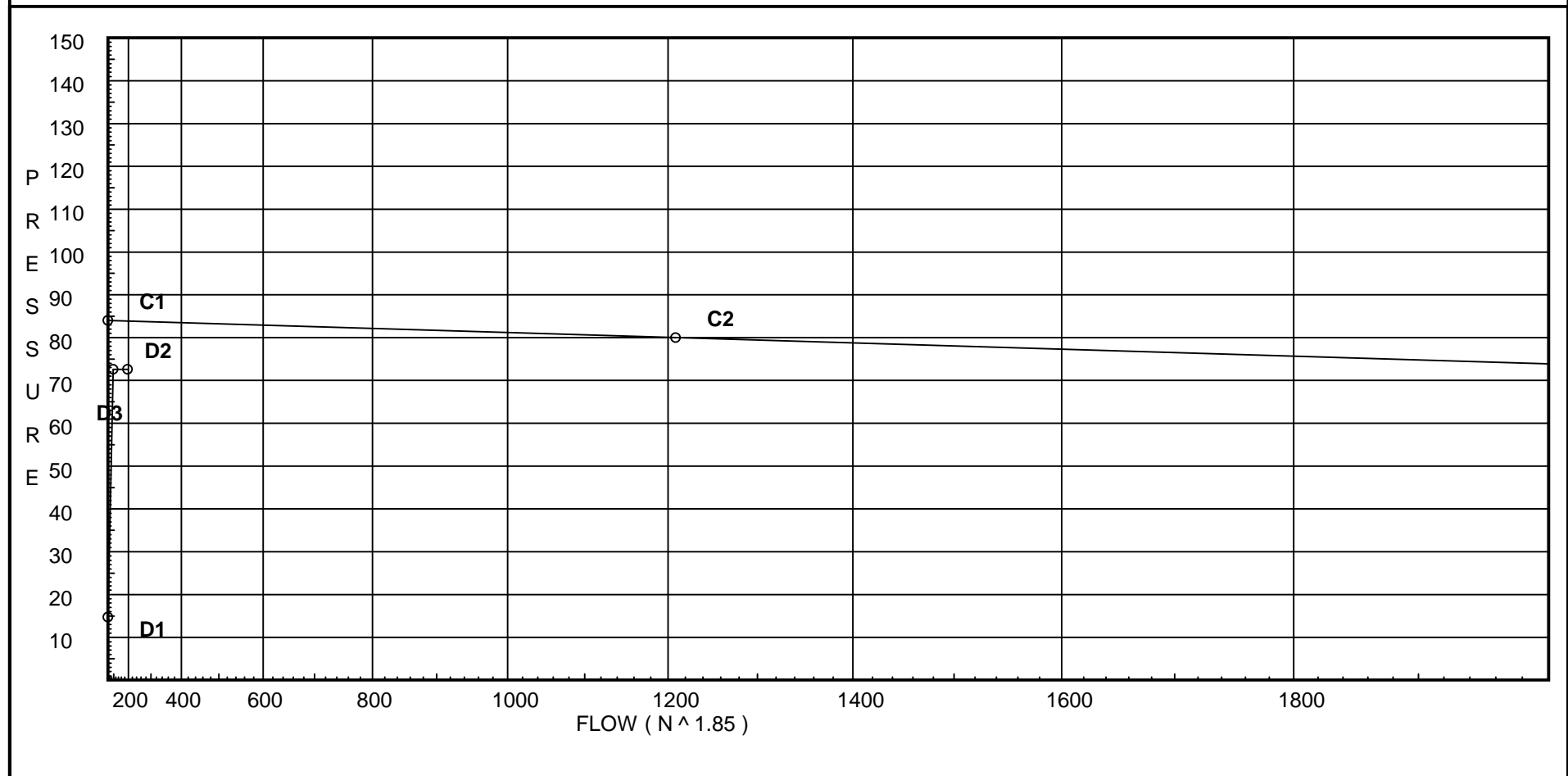
Water Supply Curve (C)

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

Demand:
D1 - Elevation : 14.725
D2 - System Flow : 95.774
D2 - System Pressure : 72.607
Hose (Demand) : 100
D3 - System Demand : 195.774
Safety Margin : 11.255



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
N *	CPVC 90'EI Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
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' EI 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	5.8	14.92	na	22.4	0.1	224	7.6
DP2	-1.0	5.8	14.92	na	22.4	0.1	224	7.6
300	37.0	K = K @ EQ01	15.15	na	22.4			
301	37.0	5.8	15.77	na	23.03	0.1	224	13.2
302	37.0		16.39	na				
303	37.0	K = K @ EQ02	17.01	na	23.87			
304	37.0	5.8	20.83	na	26.47	0.1	224	13.2
305	37.0		22.06	na				
306	37.0		25.78	na				
307	37.0		26.98	na				
308	37.0		33.74	na				
309	37.0		35.83	na				
310	37.0		41.75	na				
SR3	37.0		48.35	na				
SR1	14.0		58.5	na				
SR11	14.0		58.66	na				
SR0	0.0		64.77	na				
SR01	0.0		65.15	na				
SR02	0.0		66.16	na				
SR03	0.0		66.22	na				
TOR	-4.0		68.26	na				
BOR	-6.0		72.13	na				
BASE	-6.0		76.31	na				
HS1	-4.0		75.48	na				
HS2	-4.0		75.5	na				
HS3	-4.0		75.59	na	100.0			
TEST	3.0		72.61	na				

The maximum velocity is 20.13 and it occurs in the pipe between nodes 305 and 306

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	22.40 22.4	1.101 150.0 0.0839	1N	7.0 0.0 0.0	1.000 7.000 8.000	14.916 -0.433 0.671			K Factor = 5.80 Vel = 7.55	
	0.0 22.40						15.154		K Factor = 5.75	
DP2 to EQ02	22.40 22.4	1.101 150.0 0.0838	1O	5.0 0.0 0.0	1.000 5.000 6.000	14.916 -0.433 0.503			K Factor = 5.80 Vel = 7.55	
	0.0 22.40						14.986		K Factor = 5.79	
300 to 302	22.40 22.4	1.101 150.0 0.0839	1N	7.0 0.0 0.0	7.750 7.000 14.750	15.154 0.0 1.238			K Factor @ node EQ01 Vel = 7.55	
	0.0 22.40						16.392		K Factor = 5.53	
301 to 302	23.03 23.03	1.101 150.0 0.0884	1O	5.0 0.0 0.0	2.000 5.000 7.000	15.773 0.0 0.619			K Factor = 5.80 Vel = 7.76	
302 to 303	22.40 45.43	1.101 150.0 0.3100		0.0 0.0 0.0	2.000 0.0 2.000	16.392 0.0 0.620			Vel = 15.31	
303 to 305	23.87 69.3	1.394 150.0 0.2149	2N	16.0 0.0 0.0	7.500 16.000 23.500	17.012 0.0 5.050			K Factor @ node EQ02 Vel = 14.57	
	0.0 69.30						22.062		K Factor = 14.75	
304 to 305	26.47 26.47	1.101 150.0 0.1143	1O	5.0 0.0 0.0	5.750 5.000 10.750	20.833 0.0 1.229			K Factor = 5.80 Vel = 8.92	
305 to 306	69.30 95.77	1.394 150.0 0.3909	1N	8.0 0.0 0.0	1.500 8.000 9.500	22.062 0.0 3.714			Vel = 20.13	
306 to 307	0.0 95.77	2.003 150.0 0.0669		0.0 0.0 0.0	18.000 0.0 18.000	25.776 0.0 1.204			Vel = 9.75	
307 to 308	0.0 95.77	2.003 150.0 0.0669	1N 1O	11.0 10.0 0.0	80.000 21.000 101.000	26.980 0.0 6.758			Vel = 9.75	
308 to 309	0.0 95.77	2.067 120.0 0.0870		0.0 0.0 0.0	1.000 0.0 1.000	33.738 2.000 0.087			* Fixed loss = 2 Vel = 9.16	
309 to 310	0.0 95.77	2.003 150.0 0.0669	2N	22.0 0.0 0.0	66.500 22.000 88.500	35.825 0.0 5.922			Vel = 9.75	
310 to SR3	0.0 95.77	2.157 120.0 0.0705	1B 1Fsp 1S 2X	7.384 0.0 13.537 20.921	5.000 46.149 51.149	41.747 3.000 3.605			* Fixed loss = 3 Vel = 8.41	

Final Calculations - Hazen-Williams

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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	*****
			1V 4.307						
SR3 to SR1	0.0 95.77	4.26 120.0 0.0026	5V 44.768 0.0 0.0	30.000 44.768 74.768	48.352 9.961 0.192		Vel = 2.16		
SR1 to SR11	0.0 95.77	4.26 120.0 0.0026	3V 26.861 0.0 0.0	32.000 26.861 58.861	58.505 0.0 0.151		Vel = 2.16		
SR11 to SR0	0.0 95.77	4.26 120.0 0.0026	1V 8.954 0.0 0.0	10.000 8.954 18.954	58.656 6.063 0.049		Vel = 2.16		
SR0 to SR01	0.0 95.77	4.26 120.0 0.0026	3V 26.861 1B 15.8 1X 21.067 1F 5.267	81.500 68.995 150.495	64.768 0.0 0.386		Vel = 2.16		
SR01 to SR02	0.0 95.77	4.26 120.0 0.0020	0.0 0.0 0.0	1.000 0.0 1.000	65.154 1.000 0.002		* Fixed loss = 1 Vel = 2.16		
SR02 to SR03	0.0 95.77	4.26 120.0 0.0026	1X 21.067 0.0 0.0	2.000 21.067 23.067	66.156 0.0 0.059		Vel = 2.16		
SR03 to TOR	0.0 95.77	4.26 120.0 0.0026	2V 17.907 1X 21.067 0.0	81.000 38.974 119.974	66.215 1.732 0.308		Vel = 2.16		
TOR to BOR	0.0 95.77	4.26 120.0 0.0028	1Fsp 0.0 0.0 0.0	4.000 0.0 4.000	68.255 3.866 0.011		* Fixed loss = 3 Vel = 2.16		
BOR to BASE	0.0 95.77	4.26 120.0 0.0020	1Zia 0.0 0.0 0.0	1.000 0.0 1.000	72.132 4.178 0.002		* Fixed loss = 4.178 Vel = 2.16		
BASE to HS1	0.0 95.77	6.14 100.0 0.0006	1G 2.273 1E 10.608 1T 22.732	25.000 35.613 60.613	76.312 -0.866 0.037		Vel = 1.04		
HS1 to HS2	0.0 95.77	8.23 100.0 0.0001	1T 29.011 0.0 0.0	90.000 29.010 119.010	75.483 0.0 0.017		Vel = 0.58		
HS2 to HS3	0.0 95.77	6.14 100.0 0.0006	1T 22.732 0.0 0.0	120.000 22.732 142.732	75.500 0.0 0.087		Vel = 1.04		
HS3 to TEST	100.00 195.77	6.14 100.0 0.0023	1G 2.273 1E 10.608 0.0	10.000 12.881 22.881	75.587 -3.032 0.052		Qa = 100 Vel = 2.12		
	0.0 195.77				72.607		K Factor = 22.98		