



... 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 2nd floor room 201
Drawing : FP-02
Location : 119 Exchange Street Portland, ME
Remote Area : 2A
Contract : 110713-1
Data File : Calc #2A 2nd floor Unit 201.WXF

HYDRAULIC CALCULATIONS
for

Project name: Press Hotel 2nd floor room 201
Location: 119 Exchange Street Portland, ME
Drawing no: FP-02
Date: 3/20/14

Design

Remote area number: 2A
Remote area location: 2nd Floor Unit 201
Occupancy classification: Residential/ Light hazard
Density: .1 - Gpm/SqFt
Area of application: 528 - SqFt
Coverage per sprinkler: 224 - SqFt
Type of sprinklers calculated: Residential pendent and sidewall
No. of sprinklers calculated: 4
In-rack demand: n/a - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 194 - GPM @ 62 - 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.)

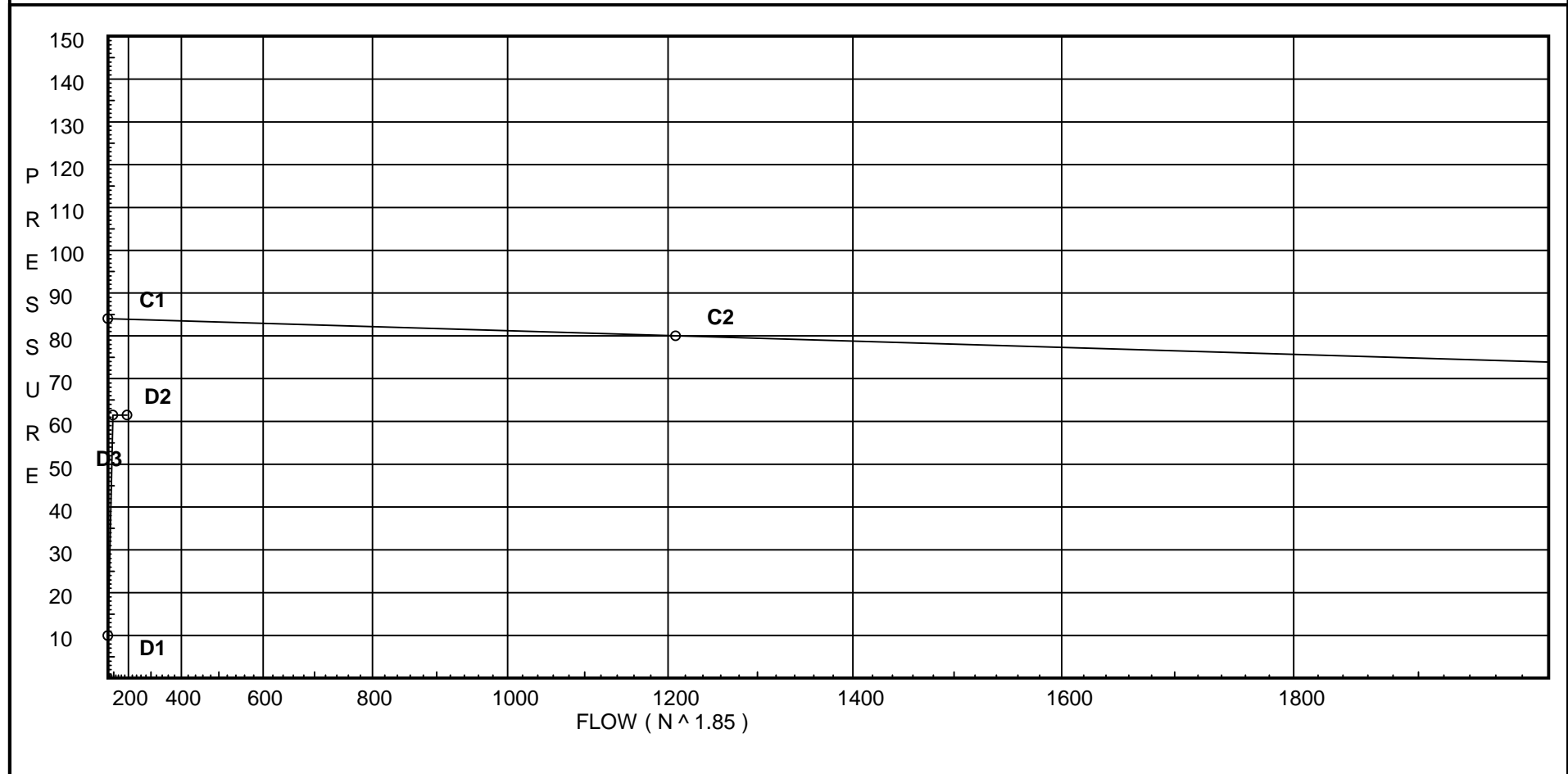
Water Supply Curve (C)

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

Demand:
D1 - Elevation : 9.961
D2 - System Flow : 93.874
D2 - System Pressure : 61.480
Hose (Demand) : 100
D3 - System Demand : 193.874
Safety Margin : 22.385



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
200	26.0	5.8	14.92	na	22.4	0.1	224	13.2
201	26.0	K = K @ EQ01	15.69	na	22.79			
202	26.0		15.8	na				
203	26.0	K = K @ EQ01	17.31	na	23.94			
204	26.0		17.95	na				
205	26.0	5.8	18.2	na	24.74	0.1	224	13.2
206	26.0		18.8	na				
207	26.0		21.16	na				
210	26.0		25.03	na				
220	26.0		30.31	na				
230	26.0		32.38	na				
240	78.0		13.99	na				
SR2	14.0		47.27	na				
SR1	14.0		47.33	na				
SR11	14.0		47.48	na				
SR0	0.0		53.59	na				
SR01	0.0		53.96	na				
SR02	0.0		54.96	na				
SR03	0.0		55.02	na				
TOR	-4.0		57.05	na				
BOR	-6.0		60.93	na				
BASE	-6.0		65.19	na				
HS1	-4.0		64.36	na				
HS2	-4.0		64.38	na				
HS3	-4.0		64.46	na	100.0			
TEST	3.0		61.48	na				

The maximum velocity is 19.73 and it occurs in the pipe between nodes 206 and 207

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	
200 to 202	22.40 22.4	1.101 150.0 0.0839	1O	5.0 0.0 0.0	5.500 5.000 10.500	14.916 0.0 0.881			K Factor = 5.80 Vel = 7.55	
	0.0 22.40						15.797		K Factor = 5.64	
201 to 202	22.79 22.79	1.101 150.0 0.0872		0.0 0.0 0.0	1.250 0.0 1.250	15.688 0.0 0.109			K Factor @ node EQ01 Vel = 7.68	
202 to 204	22.40 45.19	1.101 150.0 0.3073		0.0 0.0 0.0	7.000 0.0 7.000	15.797 0.0 2.151			Vel = 15.23	
	0.0 45.19						17.948		K Factor = 10.67	
203 to 204	23.94 23.94	1.101 150.0 0.0948	1O	5.0 0.0 0.0	1.750 5.000 6.750	17.308 0.0 0.640			K Factor @ node EQ01 Vel = 8.07	
204 to 206	45.19 69.13	1.394 150.0 0.2140		0.0 0.0 0.0	4.000 0.0 4.000	17.948 0.0 0.856			Vel = 14.53	
	0.0 69.13						18.804		K Factor = 15.94	
205 to 206	24.74 24.74	1.101 150.0 0.1008	1O	5.0 0.0 0.0	1.000 5.000 6.000	18.199 0.0 0.605			K Factor = 5.80 Vel = 8.34	
206 to 207	69.13 93.87	1.394 150.0 0.3768	1O	6.0 0.0 0.0	0.250 6.000 6.250	18.804 0.0 2.355			Vel = 19.73	
207 to 210	0.0 93.87	2.003 150.0 0.0645	1N 1O	11.0 10.0 0.0	39.000 21.000 60.000	21.159 0.0 3.868			Vel = 9.56	
210 to 220	0.0 93.87	2.003 150.0 0.0645	2N	22.0 0.0 0.0	60.000 22.000 82.000	25.027 0.0 5.287			Vel = 9.56	
220 to 230	0.0 93.87	2.157 120.0 0.0680		0.0 0.0 0.0	1.000 0.0 1.000	30.314 2.000 0.068			* Fixed loss = 2 Vel = 8.24	
230 to 240	0.0 93.87	2.003 150.0 0.0645		0.0 0.0 0.0	64.000 0.0 64.000	32.382 -22.521 4.126			Vel = 9.56	
240 to SR2	0.0 93.87	2.157 120.0 0.0680	1B 1Fsp 1S 1X	7.384 0.0 13.537 10.461	2.000 35.689 37.689	13.987 30.718 2.561			* Fixed loss = 3 Vel = 8.24	

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	*****
			1V 4.307						
SR2 to SR1	0.0 93.87	4.26 120.0 0.0024	2V 17.907 0.0	10.000 17.907 27.907	47.266 0.0 0.068		Vel = 2.11		
SR1 to SR11	0.0 93.87	4.26 120.0 0.0025	3V 26.861 0.0	32.000 26.861 58.861	47.334 0.0 0.146		Vel = 2.11		
SR11 to SR0	0.0 93.87	4.26 120.0 0.0025	1V 8.954 0.0	10.000 8.954 18.954	47.480 6.063 0.047		Vel = 2.11		
SR0 to SR01	0.0 93.87	4.26 120.0 0.0025	3V 26.861 1B 15.8 1F 5.267	81.500 68.995 150.495	53.590 0.0 0.372		Vel = 2.11		
SR01 to SR02	0.0 93.87	4.26 120.0 0.0020		1.000 0.0 1.000	53.962 1.000 0.002		* Fixed loss = 1 Vel = 2.11		
SR02 to SR03	0.0 93.87	4.26 120.0 0.0025	1X 21.067 0.0	2.000 21.067 23.067	54.964 0.0 0.057		Vel = 2.11		
SR03 to TOR	0.0 93.87	4.26 120.0 0.0025	2V 17.907 1X 21.067 0.0	81.000 38.974 119.974	55.021 1.732 0.297		Vel = 2.11		
TOR to BOR	0.0 93.87	4.26 120.0 0.0025	1Fsp 0.0 0.0	4.000 0.0 4.000	57.050 3.866 0.010		* Fixed loss = 3 Vel = 2.11		
BOR to BASE	0.0 93.87	4.26 120.0 0.0020	1Zia 0.0 0.0	1.000 0.0 1.000	60.926 4.263 0.002		* Fixed loss = 4.263 Vel = 2.11		
BASE to HS1	0.0 93.87	6.14 100.0 0.0006	1G 2.273 1E 10.608 1T 22.732	25.000 35.613 60.613	65.191 -0.866 0.036		Vel = 1.02		
HS1 to HS2	0.0 93.87	8.23 100.0 0.0001	1T 29.011 0.0	90.000 29.010 119.010	64.361 0.0 0.016		Vel = 0.57		
HS2 to HS3	0.0 93.87	6.14 100.0 0.0006	1T 22.732 0.0	120.000 22.732 142.732	64.377 0.0 0.083		Vel = 1.02		
HS3 to TEST	100.00 193.87	6.14 100.0 0.0023	1G 2.273 1E 10.608 0.0	10.000 12.881 22.881	64.460 -3.032 0.052		Qa = 100 Vel = 2.10		
	0.0 193.87				61.480		K Factor = 24.73		