

... Fire Protection by Computer Design

HTFP
84 HACKETT MILLS ROAD
POLAND 04258
207-998-2551

Job Name : Keeley Banquet Center Seating area ECOH
Building : FP-01
Location : Banquet room
System : #1
Contract :
Data File : EXT COV PEND.WXF

HYDRAULIC CALCULATIONS
for

Project name: Keeley Banquet Center
Location: Banquet room
Drawing no: FP-01
Date: 5/08/13

Design

Remote area number: #1
Remote area location: Banquet room
Occupancy classification: Ordinary hazard Group 2
Density: .2 - Gpm/SqFt
Area of application: 1500 - SqFt
Coverage per sprinkler: 324 - SqFt
Type of sprinklers calculated: Extended Coverage OH 18' x 18'
No. of sprinklers calculated: 6
In-rack demand: n/a - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 653 - GPM @ 63 - Psi
Type of system: Wet system
Volume of dry or preaction system: n/a - Gal

Water supply information

Date: 5/2/2013
Location: hydrant in front of project
Source: Portland Water District

Name of contractor: HIGH TECH FIRE PROTECTION
Address: PO BOX 156 / / MINOT, ME 04258-156
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.)

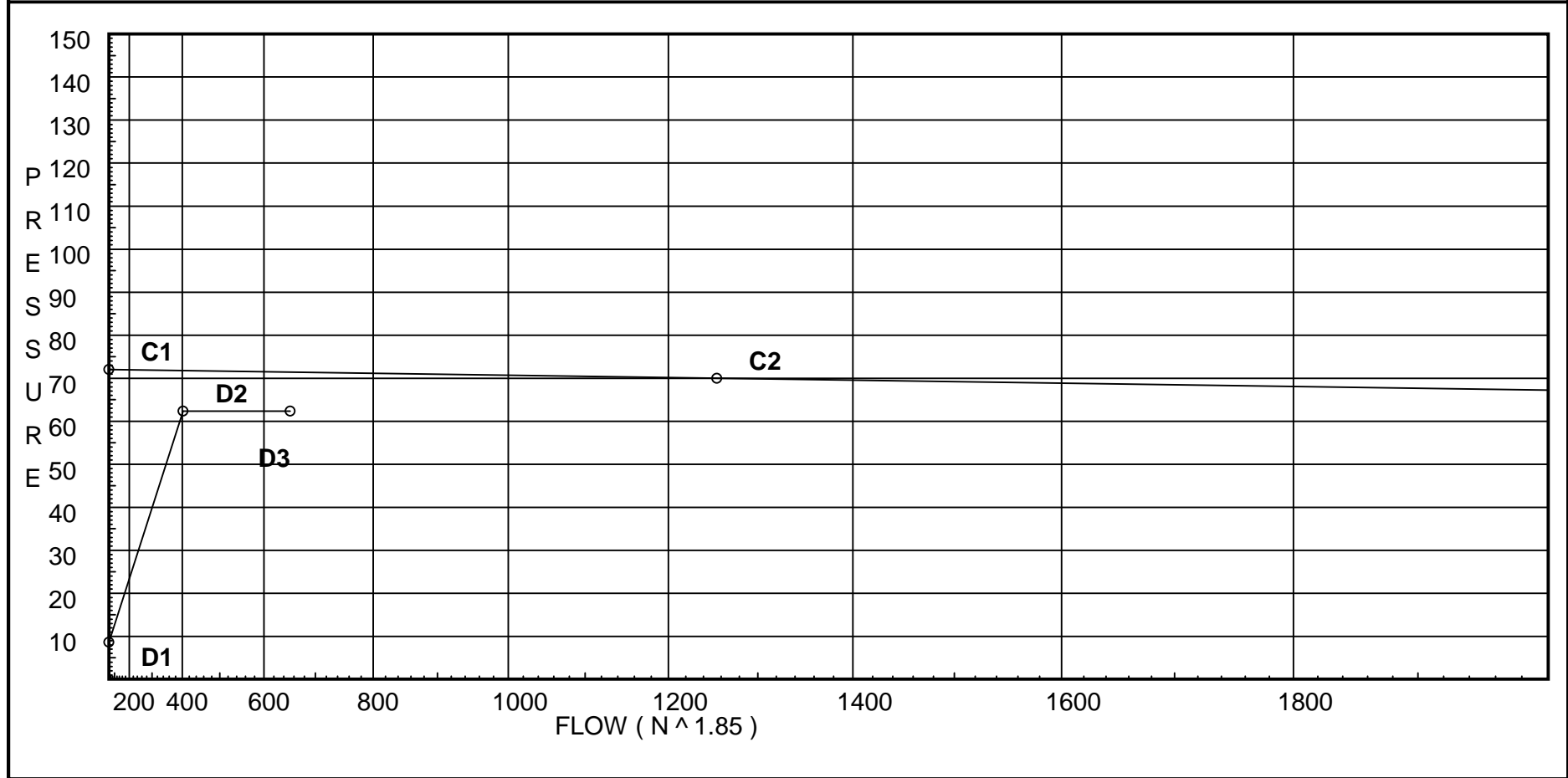
Water Supply Curve (C)

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City Water Supply:
 C1 - Static Pressure : 72
 C2 - Residual Pressure: 70
 C2 - Residual Flow : 1255

Demand:
 D1 - Elevation : 8.662
 D2 - System Flow : 402.761
 D2 - System Pressure : 62.346
 Hose (Adj City) :
 Hose (Demand) : 250
 D3 - System Demand : 652.761
 Safety Margin : 9.057



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	
Abbrev.	Name																				
24																					
B	Generic Butterfly Valve	0	0	0	0	0	0	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	0
61																					
G	Generic Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	
13																					
T	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
Z	Generic Flow Switch	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	0
61																					
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	14	21.6	na	65.07	0.2	324	21.6
DP2	-1.0	14	21.6	na	65.07	0.2	324	21.6
10	11.0	K = K @ EQ01	28.68	na	65.74			
11	11.0	K = K @ EQ01	29.31	na	66.46			
12	11.0	K = K @ EQ01	31.36	na	68.74			
13	11.0		32.97	na				
20	11.0	K = K @ EQ02	24.05	na	65.07			
21	11.0		27.69	na				
22	11.0		29.67	na				
23	11.0	K = K @ EQ01	30.0	na	67.24			
24	11.0	K = K @ EQ01	32.05	na	69.5			
25	11.0		33.68	na				
A	11.0		36.59	na				
B	11.0		37.26	na				
C	11.0		41.83	na				
TOR	11.0		44.75	na				
BOR	3.0		50.46	na				
BASE	0.0		57.36	na				
HOSE	0.0		58.3	na				
H2	0.0		58.31	na				
TEST	-9.0		62.35	na	250.0			

The maximum velocity is 24.16 and it occurs in the pipe between nodes DP1 and EQ01

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftgng's Total	Pt Pe Pf	Pt Pv Pn	***** Notes *****
DP1 to EQ01	65.07 65.07	1.049 120.0 1.1538	1T 5.0 0.0 0.0	1.000 5.000 6.000	21.600 -0.433 6.923		K Factor = 14.00 Vel = 24.16
	0.0 65.07					28.090	K Factor = 12.28
DP2 to EQ02	65.07 65.07	1.049 120.0 1.1540	1E 2.0 0.0 0.0	0.500 2.000 2.500	21.600 -0.433 2.885		K Factor = 14.00 Vel = 24.16
	0.0 65.07					24.052	K Factor = 13.27
10 to 11	65.74 65.74	2.157 120.0 0.0352	0.0 0.0 0.0	18.000 0.0 18.000	28.676 0.0 0.633		K Factor @ node EQ01 Vel = 5.77
11 to 12	66.46 132.2	2.157 120.0 0.1279	0.0 0.0 0.0	16.000 0.0 16.000	29.309 0.0 2.047		K Factor @ node EQ01 Vel = 11.61
12 to 13	68.75 200.95	2.157 120.0 0.2778	1V 4.307 0.0 0.0	1.500 4.307 5.807	31.356 0.0 1.613		K Factor @ node EQ01 Vel = 17.64
13 to A	0.0 200.95	2.157 120.0 0.2776	1T 12.307 0.0 0.0	0.750 12.307 13.057	32.969 0.0 3.625		Vel = 17.64
	0.0 200.95					36.594	K Factor = 33.22
20 to 21	65.07 65.07	1.38 120.0 0.3035	1E 3.0 0.0 0.0	9.000 3.000 12.000	24.052 0.0 3.642		K Factor @ node EQ02 Vel = 13.96
21 to 22	0.0 65.07	1.38 120.0 0.3034	1T 6.0 0.0 0.0	0.500 6.000 6.500	27.694 0.0 1.972		Vel = 13.96
22 to 23	0.0 65.07	2.157 120.0 0.0345	0.0 0.0 0.0	9.750 0.0 9.750	29.666 0.0 0.336		Vel = 5.71
23 to 24	67.24 132.31	2.157 120.0 0.1282	0.0 0.0 0.0	16.000 0.0 16.000	30.002 0.0 2.051		K Factor @ node EQ01 Vel = 11.62
24 to 25	69.50 201.81	2.157 120.0 0.2798	1V 4.307 0.0 0.0	1.500 4.307 5.807	32.053 0.0 1.625		K Factor @ node EQ01 Vel = 17.72
25 to B	0.0 201.81	2.157 120.0 0.2799	1T 12.307 0.0 0.0	0.500 12.307 12.807	33.678 0.0 3.585		Vel = 17.72

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 *****
	0.0 201.81				37.263		K Factor = 33.06
A to B	200.95	3.26 120.0	0.0	18.000	36.594 0.0		Vel = 7.72
B to C	201.81	3.26 120.0	0.0	34.000	37.263 0.0		Vel = 15.48
C to TOR	402.76	0.1345	0.0	34.000	4.572		Vel = 9.07
TOR to BOR	0.0	4.26 120.0	2V 17.907 0.0	62.000 17.907	41.835 0.0		Vel = 9.07
BOR to BASE	402.76	0.0365	0.0	79.907	2.919		Vel = 9.07
BASE to HOSE	0.0	4.26 120.0	1Z 13.167 1B 15.8	6.000 55.301	44.754 3.465		* Fixed loss = 4.083 Vel = 9.07
HOSE to H2	402.76	0.0366	1T 26.334	61.301	2.240		Vel = 4.34
H2 to TEST	0.0	4.26 120.0	1Zia 0.0 3E 39.501	2.000 39.501	50.459 5.382		Vel = 0.39
TEST	402.76	0.0366	0.0	41.501	1.517		Vel = 4.34
	0.0 250.00 652.76	6.16 140.0	2E 40.168 1T 43.037	120.000 87.509	57.358 0.0		Qa = 250.00 K Factor = 82.67
		0.0046	1G 4.304	207.509	0.946		Vel = 4.34
		20.57 140.0	1T 207.444 0.0	575.000 207.444	58.304 0.0		Vel = 0.39
		0.0	0.0	782.444	0.010		Vel = 0.39
		6.16 140.0	1G 4.304 1E 20.084	5.000 24.388	58.314 3.898		Vel = 4.34
		0.0046	0.0	29.388	0.134		Vel = 4.34
					62.346		