



... 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 : Asylum Kitchen Existing Building Calc
Drawing : FP-01
Location : 121 Center Street Portland
Remote Area : #3
Contract : 062716-1
Data File : Kitchen Existing building.WXF

HYDRAULIC CALCULATIONS
for

Project name: Asylum Kitchen Existing area calc #3
Location: 121 Center Street Portland
Drawing no: FP-01
Date: 10/20/16

Design

Remote area number: #3
Remote area location: Existing Kitchen area
Occupancy classification: Ordinary Hazard Group 1
Density: .15 - Gpm/SqFt
Area of application: 900 - SqFt
Coverage per sprinkler: 130 - SqFt
Type of sprinklers calculated: Quick Response Pendent
No. of sprinklers calculated: 9
In-rack demand: N/A - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 443 - GPM @ 40 - Psi
Type of system: Wet
Volume of dry or preaction system: N/A - Gal

Water supply information

Date: 10/18/16
Location: Hydrant in front of building
Source: Portland Water District

Name of contractor: HIGH TECH FIRE PROTECTION
Address: 84 HACKETT MILLS ROAD / P.O. BOX 156 / POLAND, ME 04274
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.)

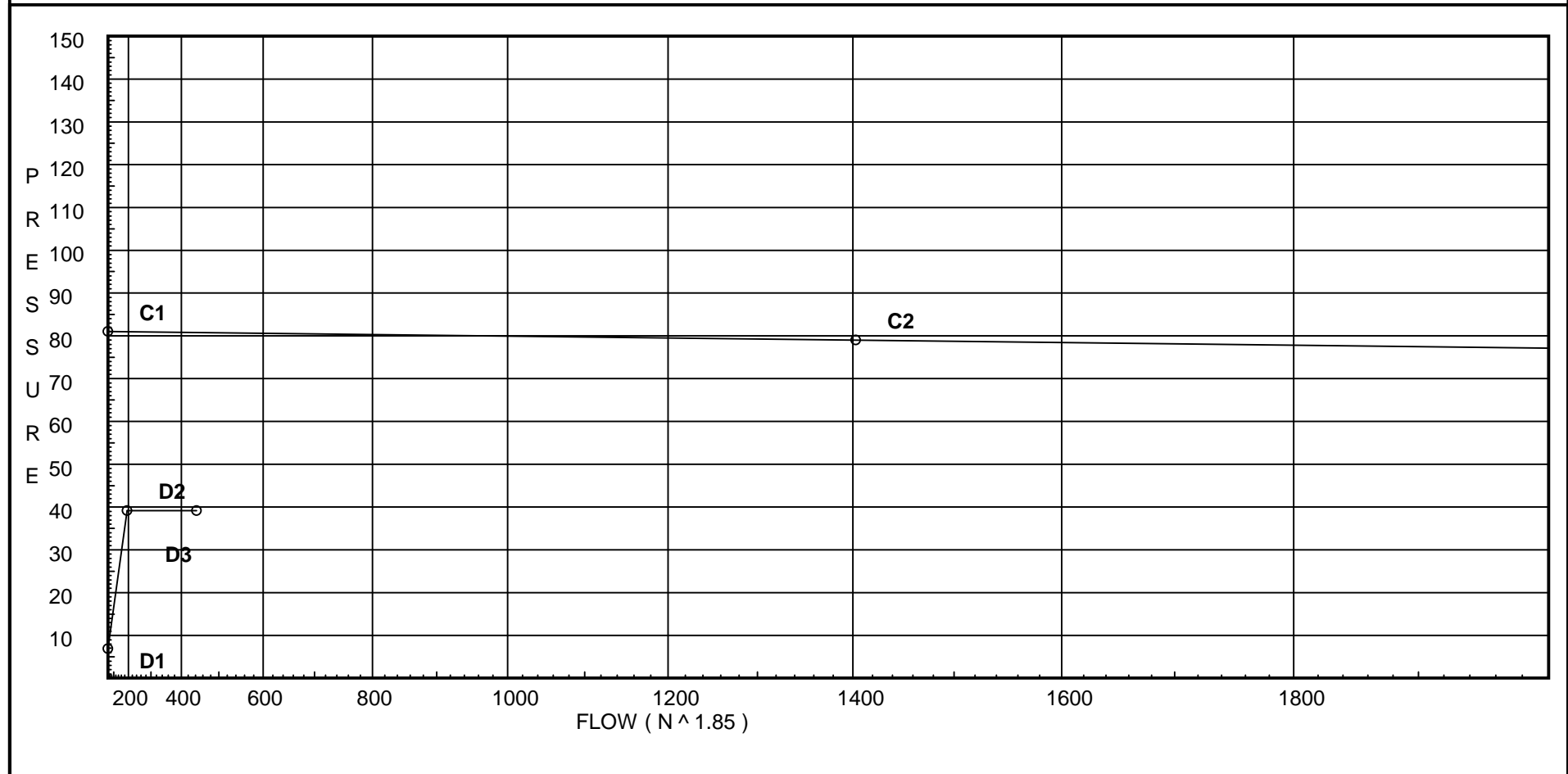
Water Supply Curve (C)

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City Water Supply:
C1 - Static Pressure : 81
C2 - Residual Pressure: 79
C2 - Residual Flow : 1403

Demand:
D1 - Elevation : 6.930
D2 - System Flow : 192.905
D2 - System Pressure : 39.187
Hose (Demand) : 250
D3 - System Demand : 442.905
Safety Margin : 41.576



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
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
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
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' EII Firelock #001	0	0	0	0	3.5	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0
Zib	Wilkins 350A	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
100	18.0	K = K @ EQ02	12.93	na	19.5			
101	18.0	K = K @ EQ02	13.21	na	19.71			
102	18.0	K = K @ EQ02	14.34	na	20.53			
103	18.0		17.32	na				
104	18.0		18.61	na				
105	18.0		19.02	na				
110	18.0	K = K @ EQ01	15.59	na	21.11			
111	18.0	K = K @ EQ02	16.96	na	22.33			
112	18.0		18.61	na				
113	18.0		19.32	na				
114	18.0		19.55	na				
120	18.0	K = K @ EQ01	15.95	na	21.35			
121	18.0	K = K @ EQ02	17.35	na	22.58			
122	18.0		19.04	na				
123	18.0		19.76	na				
124	18.0		20.0	na				
130	18.0	K = K @ EQ01	17.34	na	22.26			
131	18.0	K = K @ EQ02	18.84	na	23.54			
132	18.0		20.66	na				
133	18.0		21.45	na				
134	18.0		21.7	na				
106	17.5		19.62	na				
115	17.5		19.98	na				
125	17.5		20.43	na				
135	17.5		22.15	na				
140	17.5		22.28	na				
141	17.5		23.44	na				
142	8.0		28.36	na				
143	8.0		29.72	na				
TOR	8.0		29.87	na				
BOR	2.0		35.56	na				
BASE	-2.0		40.69	na				
H1	-2.0		40.76	na				
H2	-2.0		40.76	na	250.0			
TEST	2.0		39.19	na				

The maximum velocity is 12.81 and it occurs in the pipe between nodes 102 and 103

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftn'g's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
DP1 to EQ01	19.50 19.5 0.0 19.50	1.049 120.0 0.1242	2T	10.0 0.0 0.0	3.000 10.000 13.000	12.125 -0.433 1.614			K Factor = 5.60 Vel = 7.24	
							13.306		K Factor = 5.35	
DP2 to EQ02	19.50 19.5 0.0 19.50	1.049 120.0 0.1242	1E 1T	2.0 5.0 0.0	3.000 7.000 10.000	12.125 -0.433 1.242			K Factor = 5.60 Vel = 7.24	
							12.934		K Factor = 5.42	
100 to 101	19.50 19.5	1.38 120.0 0.0327		0.0 0.0 0.0	8.500 0.0 8.500	12.934 0.0 0.278			K Factor @ node EQ02 Vel = 4.18	
101 to 102	19.71 39.21	1.38 120.0 0.1188		0.0 0.0 0.0	9.500 0.0 9.500	13.212 0.0 1.129			K Factor @ node EQ02 Vel = 8.41	
102 to 103	20.53 59.74	1.38 120.0 0.2591		0.0 0.0 0.0	11.500 0.0 11.500	14.341 0.0 2.980			K Factor @ node EQ02 Vel = 12.81	
103 to 104	0.0 59.74	1.61 120.0 0.1224		0.0 0.0 0.0	10.500 0.0 10.500	17.321 0.0 1.285			Vel = 9.41	
104 to 105	0.0 59.74	2.067 120.0 0.0362	1T	10.0 0.0 0.0	1.400 10.000 11.400	18.606 0.0 0.413			Vel = 5.71	
105 to 106	0.0 59.74	2.067 120.0 0.0362	1T	10.0 0.0 0.0	0.500 10.000 10.500	19.019 0.217 0.380			Vel = 5.71	
	0.0 59.74						19.616		K Factor = 13.49	
110 to 111	21.11 21.11	1.049 120.0 0.1438		0.0 0.0 0.0	9.500 0.0 9.500	15.591 0.0 1.366			K Factor @ node EQ01 Vel = 7.84	
111 to 112	22.33 43.44	1.38 120.0 0.1437		0.0 0.0 0.0	11.500 0.0 11.500	16.957 0.0 1.652			K Factor @ node EQ02 Vel = 9.32	
112 to 113	0.0 43.44	1.61 120.0 0.0679		0.0 0.0 0.0	10.500 0.0 10.500	18.609 0.0 0.713			Vel = 6.85	
113 to 114	0.0 43.44	2.067 120.0 0.0201	1T	10.0 0.0 0.0	1.400 10.000 11.400	19.322 0.0 0.229			Vel = 4.15	
114 to 115	0.0 43.44	2.067 120.0 0.0200	1T	10.0 0.0 0.0	0.500 10.000 10.500	19.551 0.217 0.210			Vel = 4.15	
	0.0 43.44						19.978		K Factor = 9.72	
120 to 121	21.35 21.35	1.049 120.0 0.1468		0.0 0.0 0.0	9.500 0.0 9.500	15.952 0.0 1.395			K Factor @ node EQ01 Vel = 7.93	

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftn'g's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
121	22.58	1.38		0.0	11.500	17.347			K Factor @ node EQ02	
to 122	43.93	120.0 0.1468		0.0	0.0	0.0			Vel = 9.42	
122	0.0	1.61		0.0	10.500	19.035				
to 123	43.93	120.0 0.0693		0.0	0.0	0.0			Vel = 6.92	
123	0.0	2.067	1T	10.0	1.400	19.763				
to 124	43.93	120.0 0.0204		0.0	10.000	0.0			Vel = 4.20	
124	0.0	2.067	1T	10.0	0.500	19.996				
to 125	43.93	120.0 0.0205		0.0	10.000	0.217			Vel = 4.20	
	0.0									
	43.93					20.428			K Factor = 9.72	
130	22.26	1.049		0.0	9.500	17.336			K Factor @ node EQ01	
to 131	22.26	120.0 0.1586		0.0	0.0	0.0			Vel = 8.26	
131	23.53	1.38		0.0	11.500	18.843			K Factor @ node EQ02	
to 132	45.79	120.0 0.1584		0.0	0.0	0.0			Vel = 9.82	
132	0.0	1.61		0.0	10.500	20.665				
to 133	45.79	120.0 0.0748		0.0	0.0	0.0			Vel = 7.22	
133	0.0	2.067	1T	10.0	1.400	21.450				
to 134	45.79	120.0 0.0222		0.0	10.000	0.0			Vel = 4.38	
134	0.0	2.067	1T	10.0	0.500	21.703				
to 135	45.79	120.0 0.0221		0.0	10.000	0.217			Vel = 4.38	
	0.0									
	45.79					22.152			K Factor = 9.73	
106	59.74	2.067		0.0	10.000	19.616				
to 115	59.74	120.0 0.0362		0.0	0.0	0.0			Vel = 5.71	
115	43.44	2.469		0.0	10.750	19.978				
to 125	103.18	120.0 0.0419		0.0	0.0	0.0			Vel = 6.91	
125	43.93	2.469	1T	12.0	10.900	20.428				
to 140	147.11	120.0 0.0808		0.0	12.000	0.0			Vel = 9.86	
	0.0									
	147.11					22.278			K Factor = 31.17	
135	45.79	2.469	1T	12.0	1.500	22.152				
to 140	45.79	120.0 0.0093		0.0	12.000	0.0			Vel = 3.07	
140	147.11	3.068	1E	7.0	18.000	22.278				
to 141	192.9	120.0 0.0463		0.0	7.000	0.0			Vel = 8.37	

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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	*****
141	0.0	3.068	1E	7.0	10.400	23.435				
to		120.0		0.0	7.000	4.114				
142	192.9	0.0463		0.0	17.400	0.806		Vel =	8.37	
142	0.0	3.068	1E	7.0	7.500	28.355				
to		120.0	1T	15.0	22.000	0.0				
143	192.9	0.0463		0.0	29.500	1.366		Vel =	8.37	
143	0.0	4.026	1E	10.0	2.000	29.721				
to		120.0		0.0	10.000	0.0				
TOR	192.9	0.0123		0.0	12.000	0.148		Vel =	4.86	
	0.0									
	192.90					29.869		K Factor =	35.30	
TOR	192.90	4.26	1Fsp	0.0	1.000	29.869				
to		120.0	1V	8.954	8.954	5.599		* Fixed loss =	3	
BOR	192.9	0.0093		0.0	9.954	0.093		Vel =	4.34	
BOR	0.0	4.26	1Zib	0.0	1.000	35.561				
to		120.0	1E	13.167	13.167	4.995		* Fixed loss =	3.262	
BASE	192.9	0.0093		0.0	14.167	0.132		Vel =	4.34	
BASE	0.0	6.16	1G	4.304	10.000	40.688				
to		140.0	1T	43.037	47.341	0.0				
H1	192.9	0.0012		0.0	57.341	0.067		Vel =	2.08	
H1	0.0	12.24	1T	48.362	5.000	40.755				
to		100.0		0.0	48.362	0.0				
H2	192.9	0.0001		0.0	53.362	0.004		Vel =	0.53	
H2	250.00	6.16	1G	4.304	5.000	40.759		Qa =	250	
to		140.0	1E	20.084	24.388	-1.732				
TEST	442.9	0.0054		0.0	29.388	0.160		Vel =	4.77	
	0.0									
	442.90					39.187		K Factor =	70.75	