



... Fire Protection by Computer Design

High Tech Fire Protection
84 Hackett Mills Rd
PO Box 156
Poland, ME, 04274
207-998-2551

Job Name : 123 Washington Ave Barrel Room
Building : 1
Location : 123 Washington Ave
System : 2
Contract : 061417-1
Data File : Barrel Room.WXF

HYDRAULIC CALCULATIONS
for

Project name: 123 Washington Ave Barrel Room
Location: 123 Washington Ave
Drawing no: 1
Date: 4/6/2017

Design

Remote area number: 2
Remote area location: Barrel Room
Occupancy classification: Ordinary Group 2
Density: .20 - Gpm/SqFt
Area of application: 1060 - SqFt
Coverage per sprinkler: 130 - SqFt
Type of sprinklers calculated: Commercial Uprights
No. of sprinklers calculated: 11
In-rack demand: - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 540.603 - GPM @ 66.6237 - Psi
Type of system: NFPA 13 Wet
Volume of dry or preaction system: N/A - Gal

Water supply information

Date: 08/25/16
Location: Corner of Fox Street and Washington Ave
Source: Portland Water District

Name of contractor: High Tech Fire Protection
Address: 84 Hackett Mills Rd / PO Box 156 / Poland, ME, 04274
Phone number: 207-998-2551
Name of designer: Ed Pennell
Authority having jurisdiction: Portland Fire Department
Notes: (Include peaking information or gridded systems here.)

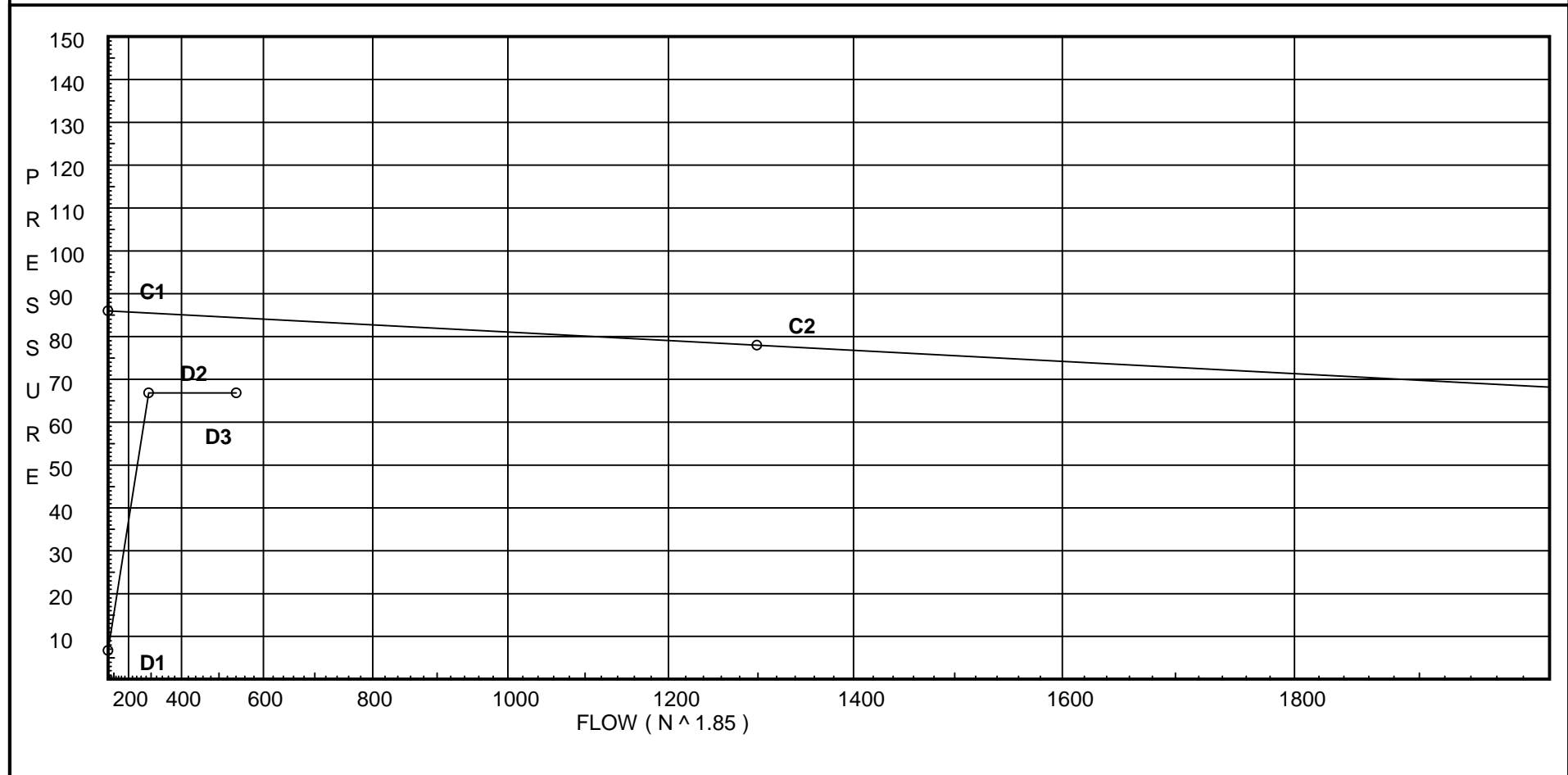
Water Supply Curve (C)

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City Water Supply:
C1 - Static Pressure : 86
C2 - Residual Pressure: 78
C2 - Residual Flow : 1299

Demand:
D1 - Elevation : 6.713
D2 - System Flow : 290.927
D2 - System Pressure : 66.827
Hose (Demand) : 250
D3 - System Demand : 540.927
Safety Margin : 17.591



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	0	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
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.
O1	15.5	5.6	21.72	na	26.1	0.2	130	7.0
O2	15.5	5.6	21.97	na	26.25	0.2	130	7.0
O3	15.5		23.01	na				
P*	0.0		28.27	na				
O4	15.5	5.6	21.56	na	26.0	0.2	130	7.0
O5	15.5	5.6	21.77	na	26.13	0.2	130	7.0
O6	15.5		23.04	na				
O7	15.5	5.6	21.85	na	26.17	0.2	130	7.0
O8	15.5	5.6	22.03	na	26.29	0.2	130	7.0
O9	15.5		23.15	na				
O10	15.5	5.6	22.18	na	26.37	0.2	130	7.0
O11	15.5	5.6	22.39	na	26.5	0.2	130	7.0
O13	15.5	5.6	22.33	na	26.46	0.2	130	7.0
O14	15.5	5.6	22.55	na	26.59	0.2	130	7.0
O12	15.5		23.7	na				
O15	15.5	5.6	25.11	na	28.06	0.2	130	7.0
O16	15.5		25.76	na				
O17	13.5		29.1	na				
O18	13.5		30.74	na				
O19	13.5		36.36	na				
L14	13.5		41.74	na				
TOR	3.0		54.25	na				
TOV	1.0		58.89	na				
BOV	-6.0		69.04	na				
UG1	-6.0		69.11	na				
UG2	-6.0		69.25	na				
UG3	-6.0		69.3	na				
TEST	0.0		66.83	na	250.0			

The maximum velocity is 17.12 and it occurs in the pipe between nodes O16 and O17

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	*****
O1 to O2	26.10 26.1	1.682 120.0 0.0213		0.0 0.0 0.0	12.000 0.0 12.000	21.717 0.0 0.256		K Factor = 5.60		Vel = 3.77
O2 to O3	26.25 52.35	1.682 120.0 0.0774	1T	9.9 0.0 0.0	3.500 9.900 13.400	21.973 0.0 1.037		K Factor = 5.60		Vel = 7.56
O3 to O6	0.0 52.35	2.635 120.0 0.0090		0.0 0.0 0.0	2.900 0.0 2.900	23.010 0.0 0.026				Vel = 3.08
	0.0 52.35					23.036		K Factor = 10.91		
O4 to O5	26.00 26.0	1.682 120.0 0.0212		0.0 0.0 0.0	10.000 0.0 10.000	21.556 0.0 0.212		K Factor = 5.60		Vel = 3.75
O5 to O6	26.13 52.13	1.682 120.0 0.0768	1T	9.9 0.0 0.0	6.600 9.900 16.500	21.768 0.0 1.268		K Factor = 5.60		Vel = 7.53
O6 to O9	52.35 104.48	2.635 120.0 0.0311		0.0 0.0 0.0	3.700 0.0 3.700	23.036 0.0 0.115				Vel = 6.15
	0.0 104.48					23.151		K Factor = 21.71		
O7 to O8	26.17 26.17	1.682 120.0 0.0215		0.0 0.0 0.0	8.700 0.0 8.700	21.845 0.0 0.187		K Factor = 5.60		Vel = 3.78
O8 to O9	26.29 52.46	1.682 120.0 0.0777	1T	9.9 0.0 0.0	4.500 9.900 14.400	22.032 0.0 1.119		K Factor = 5.60		Vel = 7.57
O9 to O12	104.47 156.93	2.635 120.0 0.0663		0.0 0.0 0.0	8.200 0.0 8.200	23.151 0.0 0.544				Vel = 9.23
	0.0 156.93					23.695		K Factor = 32.24		
O10 to O11	26.37 26.37	1.682 120.0 0.0218		0.0 0.0 0.0	10.000 0.0 10.000	22.176 0.0 0.218		K Factor = 5.60		Vel = 3.81
O11 to O12	26.50 52.87	1.682 120.0 0.0788	1T	9.9 0.0 0.0	6.600 9.900 16.500	22.394 0.0 1.301		K Factor = 5.60		Vel = 7.63
	0.0 52.87					23.695		K Factor = 10.86		
O13 to O14	26.46 26.46	1.682 120.0 0.0219		0.0 0.0 0.0	10.000 0.0 10.000	22.333 0.0 0.219		K Factor = 5.60		Vel = 3.82
O14 to O12	26.60 53.06	1.682 120.0 0.0794	1T	9.9 0.0 0.0	4.500 9.900 14.400	22.552 0.0 1.143		K Factor = 5.60		Vel = 7.66
O12 to O16	209.80 262.86	2.635 120.0 0.1722		0.0 0.0 0.0	12.000 0.0 12.000	23.695 0.0 2.066				Vel = 15.47

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	*****
	0.0 262.86						25.761		K Factor = 51.79	
O15 to O16	28.06 28.06	1.682 120.0 0.0244	1T	9.9 0.0 0.0	16.600 9.900 26.500	25.114 0.0 0.647			K Factor = 5.60	
O16 to O17	262.87 290.93	2.635 120.0 0.2078	1V	5.903 0.0 0.0	6.000 5.903 11.903	25.761 0.866 2.473			Vel = 4.05	
O17 to O18	0.0 290.93	2.635 120.0 0.2076	1V	5.903 0.0 0.0	2.000 5.903 7.903	29.100 0.0 1.641			Vel = 17.12	
O18 to O19	0.0 290.93	2.635 120.0 0.2077	1T	16.474 0.0 0.0	10.600 16.474 27.074	30.741 0.0 5.623			Vel = 17.12	
O19 to L14	0.0 290.93	3.26 120.0 0.0737		0.0 0.0 0.0	73.000 0.0 73.000	36.364 0.0 5.378			Vel = 11.18	
L14 to TOR	0.0 290.93	3.26 120.0 0.0737	3V	20.159 0.0 0.0	87.900 20.159 108.059	41.742 4.548 7.960			Vel = 11.18	
TOR to TOV	0.0 290.93	3.26 120.0 0.0737	1Fsp	0.0 0.0 0.0	10.500 0.0 10.500	54.250 3.866 0.774			* Fixed loss = 3 Vel = 11.18	
TOV to BOV	0.0 290.93	3.26 120.0 0.0735	1Zia	0.0 0.0 0.0	2.000 0.0 2.000	58.890 10.006 0.147			* Fixed loss = 6.974 Vel = 11.18	
BOV to UG1	0.0 290.93	6.16 140.0 0.0025	1E	20.084 0.0 0.0	7.000 20.084 27.084	69.043 0.0 0.068			Vel = 3.13	
UG1 to UG2	0.0 290.93	6.16 140.0 0.0025	1T 1G	43.037 4.304 0.0	10.000 47.341 57.341	69.111 0.0 0.143			Vel = 3.13	
UG2 to UG3	0.0 290.93	8.27 140.0 0.0006	1T	55.354 0.0 0.0	25.000 55.354 80.354	69.254 0.0 0.048			Vel = 1.74	
UG3 to TEST	0.0 290.93	6.16 140.0 0.0025	1E 1G	20.084 4.304 0.0	25.000 24.388 49.388	69.302 -2.599 0.124			Vel = 3.13	
	250.00 540.93						66.827		Qa = 250.00 K Factor = 66.17	