



... Fire Protection by Computer Design

DEAN & ALLYN, INC.
PO BOX 709
116 LEWISTON ROAD
GRAY, MAINE 04039
207-657-5646

Job Name : C1003 INDIA STREET 1ST FLOOR-SHOP
Building : 1 OF 3
Location : PORTLAND, MAINE
System : WX3
Contract : C111003
Data File : C1003 INDIA STREET 1ST FLOOR AREA 1.wx3

HYDRAULIC CALCULATIONS
for

Project name: 61 INDIA STREET
Location: PORTLAND, MAINE
Drawing no: 1 OF 3
Date: 05/10/2011

Design

Remote area number: WX3
Remote area location: 1ST FLOOR
Occupancy classification: ORDINARY HAZARD 2
Density: 0.20 - Gpm/SqFt
Area of application: LARGEST ROOM - SqFt
Coverage per sprinkler: 100 - SqFt
Type of sprinklers calculated: K=5.6
No. of sprinklers calculated: 11
In-rack demand: 0 - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 506.11 - GPM @ 74.59 - Psi
Type of system: WET
Volume of dry or preaction system: N/A - Gal

Water supply information

Date: 04/20/2007
Location: HYDRANT #298
Source: PORTLAND WATER DISTRICT

Name of contractor: DEAN & ALLYN, INC.
Address: PO BOX 709 / 116 LEWISTON ROAD / GRAY, MAINE 04039
Phone number: 207-657-5646
Name of designer: T CLARKE
Authority having jurisdiction: MAINE STATE FIRE MARSHAL'S OFFICE
Notes: (Include peaking information or gridded systems here.)SAFETY MARGIN: 21.8 PSI

Fittings Used Summary

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Fitting Legend		½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Abbrev.	Name																				
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
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
I	90' Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
J	90'Tee-Branch Grv Vic #20	0	0	4.5	6	8	8.5	10.8	13	17	16	21	25	33	41	50	65	78	88	98	120
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
Zca	Colt C200 Horz Butt	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.
111	20.79	5.6	13.78	na	20.79	0.2	100	7.0
112	19.38	5.6	13.52	na	20.59	0.2	100	7.0
113	19.38	5.6	14.35	na	21.21	0.2	100	7.0
114	19.38	5.6	18.0	na	23.76	0.2	100	7.0
115	19.38	5.6	20.2	na	25.17	0.2	100	7.0
116	19.38	5.6	22.1	na	26.33	0.2	100	7.0
117	21.54		25.77	na				
101	20.79	5.6	12.76	na	20.0	0.2	100	7.0
102	20.79		12.89	na				
103	20.79		13.99	na				
104	20.79	5.6	16.18	na	22.53	0.2	100	7.0
105	20.79	5.6	18.25	na	23.92	0.2	100	7.0
106	20.79	5.6	20.02	na	25.05	0.2	100	7.0
107	20.79	5.6	22.83	na	26.76	0.2	100	7.0
108	21.54		30.35	na				
109	19.458		44.81	na				
110	19.458		54.38	na				
TR	19.125		64.91	na				
BR	8.0		75.76	na				
CITY	0.0		82.24	na	250.0			
TEST	20.0		74.59	na				

The maximum velocity is 24.49 and it occurs in the pipe between nodes 108 and 109

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftg's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
111	20.79	1.049		1.500	13.782			K Factor = 5.60	
to		120.0		0.0	0.0				
103	20.79	0.1393		1.500	0.209			Vel = 7.72	
	0.0								
	20.79				13.991			K Factor = 5.56	
112	20.59	1.049		6.000	13.523			K Factor = 5.60	
to		120.0		0.0	0.0				
113	20.59	0.1373		6.000	0.824			Vel = 7.64	
113	21.21	1.049		7.170	14.347			K Factor = 5.60	
to		120.0		0.0	0.0				
114	41.8	0.5091		7.170	3.650			Vel = 15.52	
114	23.76	1.38		7.170	17.997			K Factor = 5.60	
to		120.0		0.0	0.0				
115	65.56	0.3078		7.170	2.207			Vel = 14.06	
115	25.17	1.61		7.170	20.204			K Factor = 5.60	
to		120.0		0.0	0.0				
116	90.73	0.2650		7.170	1.900			Vel = 14.30	
116	26.33	1.61	2E	8.0	22.104			K Factor = 5.60	
to		120.0		0.0	8.000				
117	117.06	0.4245		10.840	4.602			Vel = 18.45	
117	0.0	1.682		13.330	25.771				
to		120.0		0.0	0.0				
108	117.06	0.3431		13.330	4.574			Vel = 16.90	
	0.0								
	117.06				30.345			K Factor = 21.25	
101	20.00	1.049		1.000	12.755			K Factor = 5.60	
to		120.0		0.0	0.0				
102	20.0	0.1300		1.000	0.130			Vel = 7.42	
102	0.0	1.049	1T	5.0	12.885				
to		120.0		0.0	5.000				
103	20.0	0.1301		8.500	1.106			Vel = 7.42	
103	20.79	1.049		4.500	13.991				
to		120.0		0.0	0.0				
104	40.79	0.4864		4.500	2.189			Vel = 15.14	
104	22.53	1.38		7.170	16.180			K Factor = 5.60	
to		120.0		0.0	0.0				
105	63.32	0.2886		7.170	2.069			Vel = 13.58	
105	23.92	1.61		7.170	18.249			K Factor = 5.60	
to		120.0		0.0	0.0				
106	87.24	0.2464		7.170	1.767			Vel = 13.75	
106	25.05	1.61		7.170	20.016			K Factor = 5.60	
to		120.0		0.0	0.0				
107	112.29	0.3932		7.170	2.819			Vel = 17.70	

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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	*****
107	26.76	1.61	1T	8.0	1.420	22.835			K Factor = 5.60	
to		120.0	1E	4.0	12.000	-0.325				
108	139.05	0.5838		0.0	13.420	7.835			Vel = 21.91	
108	117.06	2.067	4I	14.0	11.333	30.345				
to		120.0		0.0	14.000	0.902				
109	256.11	0.5352		0.0	25.333	13.559			Vel = 24.49	
109	0.0	2.157	1J	10.461	11.542	44.806				
to		120.0		0.0	10.461	0.0				
110	256.11	0.4349		0.0	22.003	9.569			Vel = 22.49	
110	0.0	2.157	1I	4.307	9.125	54.375				
to		120.0	1J	10.461	14.768	0.144				
TR	256.11	0.4349		0.0	23.893	10.392			Vel = 22.49	
TR	0.0	3.26	1Zca	0.0	16.792	64.911				
to		120.0	1E	9.408	16.128	8.929			* Fixed loss = 4.111	
BR	256.11	0.0582	1I	6.72	32.920	1.916			Vel = 9.84	
BR	0.0	4.1	2E	29.067	150.000	75.756				
to		140.0	1T	29.067	61.041	3.465				
CITY	256.11	0.0143	1G	2.907	211.041	3.023			Vel = 6.22	
CITY	250.00	8.27	1E	28.468	520.000	82.244			Qa = 250	
to		140.0	1T	55.354	90.148	-8.662				
TEST	506.11	0.0017	1G	6.326	610.148	1.011			Vel = 3.02	
	0.0									
	506.11					74.593			K Factor = 58.60	

Water Supply Curve (C)

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City Water Supply:
 C1 - Static Pressure : 98
 C2 - Residual Pressure: 92
 C2 - Residual Flow : 1034

Demand:
 D1 - Elevation : 0.342
 D2 - System Flow : 256.113
 D2 - System Pressure : 74.593
 Hose (Demand) : 250
 D3 - System Demand : 506.113
 Safety Margin : 21.807

