



**... Fire Protection by Computer Design**

DEAN & ALLYN, INC.  
32 LEWISTON ROAD BUILDING 1C  
P.O. BOX 709  
GRAY, ME 04039  
207-657-5646

Job Name : 15 EXCHANGE ST. SECOND FLOOR  
Building :  
Location : 15 EXCHANGE STREET PORTLAND MAINE  
System : ONE  
Contract : C09914  
Data File : 15 EXCHANGE ST SECOND FLOOR.WXF

Hydraulic Design Information Sheet

Name - 15 EXCHANGE STREET SECOND FLOOR Date - 10-25-09  
 Location - 15 EXCHANGE STREET PORTLAND MAINE  
 Building - System No. - ONE  
 Contractor - DEAN AND ALLYN, INC. Contract No. - C09914  
 Calculated By - H. KING Drawing No. - 1 OF 1  
 Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - 10'  
 Occupancy - RESTAURANT

S (X) NFPA 13 (X) Lt. Haz. Ord.Haz.Gp. ( ) 1 ( ) 2 ( ) 3 ( ) Ex.Haz.  
 Y ( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve

S Other

T Specific Ruling Made By Date

E  
 M Area of Sprinkler Operation - LARGEST+2 System Type Sprinkler/Nozzle  
 Density - .10 (X) Wet Make VIKING  
 D Area Per Sprinkler - 288/130 ( ) Dry Model MICROFAST  
 E Elevation at Highest Outlet - 24 ( ) Deluge Size 1/2"  
 S Hose Allowance - Inside - ( ) Preaction K-Factor 5.6  
 I Rack Sprinkler Allowance - ( ) Other Temp.Rat.155  
 G Hose Allowance - Outside - 100

N Note CUSHION 9.79 PSI

Calculation Flow Required - 271.39 Press Required - 99.1 CITY  
 Summary C-Factor Used: 120 Overhead 140 Underground

W Water Flow Test: Pump Data: Tank or Reservoir:  
 A Date of Test - 4-27-05 Cap. -  
 T Time of Test - Rated Cap.- Elev.-  
 E Static Press - 109 @ Press -  
 R Residual Press - 106 Elev. - Well  
 Flow - 1635 Proof Flow  
 S Elevation - 0

U Location - COMMERCIAL AT UNION

P  
 L Source of Information - P. W. D.  
 Y

C Commodity Class Location  
 O Storage Ht. Area Aisle W.  
 M Storage Method: Solid Piled % Palletized % Rack  
 M  
 ( ) Single Row ( ) Conven. Pallet ( ) Auto. Storage ( ) Encap.  
 S R ( ) Double Row ( ) Slave Pallet ( ) Solid Shelf ( ) Non  
 T A ( ) Mult. Row ( ) Open Shelf  
 O C

R K Flue Spacing Clearance:Storage to Ceiling  
 A Longitudinal Transverse

G  
 E Horizontal Barriers Provided:

# 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	
A	Alarm Rel E1 & E3							7.7	21.5		17		27	29								
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	
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	

## Units Summary

Diameter Units           Inches  
Length Units             Feet  
Flow Units                US Gallons per Minute  
Pressure Units           Pounds per Square Inch

# Pressure / Flow Summary - STANDARD

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
30A	58.0	4.9	27.3	na	25.6	0.1	256	7.0
1	24.0	5.6	27.65	na	29.45	0.1	288	26.8
2	24.0	5.6	21.75	na	26.11	0.1	130	7.0
3	24.0	5.6	20.98	na	25.65	0.1	130	7.0
4	24.0	5.6	26.8	na	28.99	0.1	288	26.8
5	24.0	5.6	29.32	na	30.33	0.1	288	26.8
6	24.0	5.6	30.39	na	30.87	0.1	288	26.8
51	24.0		24.32	na				
52	24.0		25.16	na				
50	24.0		28.83	na				
53	24.0		30.12	na				
54	24.0		35.78	na				
55	24.0		40.37	na				
56	13.0		48.95	na				
57	13.0		52.51	na				
58	13.0		57.61	na				
59	9.0		66.52	na				
60	0.0		73.98	na				
61	0.0		79.01	na				
TR	0.0		98.02	na				
FF	0.0		99.02	na				
CTY	0.0		99.1	na	100.0			

The maximum velocity is 16.39 and it occurs in the pipe between nodes 6 and 54

# 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	*****
30A to 30	25.60  25.6	1.049 120.0 0.2055	1T	5.0 0.0 0.0	1.000 5.000 6.000	27.295 25.120 1.233			K Factor = 4.90  Vel = 9.50	
	0.0 25.60						53.648		K Factor = 3.50	
1 to 50	29.45  29.45	1.38 120.0 0.0701	1T	6.0 0.0 0.0	10.800 6.000 16.800	27.653 0.0 1.177			K Factor = 5.60  Vel = 6.32	
	0.0 29.45						28.830		K Factor = 5.48	
2 to 52	26.12  26.12	1.049 120.0 0.2132	1T 1E	5.0 2.0 0.0	9.000 7.000 16.000	21.747 0.0 3.411			K Factor = 5.60  Vel = 9.70	
	0.0 26.12						25.158		K Factor = 5.21	
3 to 51	25.65  25.65	1.049 120.0 0.2062	2T	10.0 0.0 0.0	6.200 10.000 16.200	20.977 0.0 3.340			K Factor = 5.60  Vel = 9.52	
	0.0 25.65						24.317		K Factor = 5.20	
4 to 50	80.75  80.75	1.61 120.0 0.2137	1T	8.0 0.0 0.0	1.500 8.000 9.500	26.800 0.0 2.030			K Factor = 5.60  Vel = 12.73	
	0.0 80.75						28.830		K Factor = 15.04	
5 to 53	30.33  30.33	1.38 120.0 0.0740		0.0 0.0 0.0	10.800 0.0 10.800	29.324 0.0 0.799			K Factor = 5.60  Vel = 6.51	
	0.0 30.33						30.123		K Factor = 5.53	
6 to 54	171.40  171.4	2.067 120.0 0.2546	1E	5.0 0.0 0.0	16.200 5.000 21.200	30.387 0.0 5.398			K Factor = 5.60  Vel = 16.39	
	0.0 171.40						35.785		K Factor = 28.65	
51 to 52	25.65  25.65	1.38 120.0 0.0543	1E 1T	3.0 6.0 0.0	6.500 9.000 15.500	24.317 0.0 0.841			  Vel = 5.50	
52 to 4	26.11  51.76	1.61 120.0 0.0938	1E	4.0 0.0 0.0	13.500 4.000 17.500	25.158 0.0 1.642			  Vel = 8.16	
	0.0 51.76						26.800		K Factor = 10.00	
50 to 53	110.20  110.2	2.067 120.0 0.1124	1T	10.0 0.0 0.0	1.500 10.000 11.500	28.830 0.0 1.293			  Vel = 10.54	
53 to 6	30.33  140.53	2.067 120.0 0.1760		0.0 0.0 0.0	1.500 0.0 1.500	30.123 0.0 0.264			  Vel = 13.44	

# 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	*****
	0.0 140.53						30.387		K Factor = 25.49	
54 to 55	171.40 171.4	2.067 120.0 0.2546	2E	10.0 0.0	8.000 10.000	35.785 0.0			Vel = 16.39	
55 to 56	0.0 171.4	2.067 120.0 0.2545	1E	5.0 0.0	10.000 5.000	40.368 4.764			Vel = 16.39	
56 to 57	0.0 171.4	2.067 120.0 0.2546	1E	5.0 0.0	9.000 5.000	48.950 0.0			Vel = 16.39	
57 to 58	0.0 171.4	2.067 120.0 0.2546	1E 1T	5.0 10.0	5.000 15.000	52.515 0.0			Vel = 16.39	
58 to 59	0.0 171.4	2.067 120.0 0.2546	3E	15.0 0.0	13.200 15.000	57.607 1.732			Vel = 16.39	
59 to 60	0.0 171.4	2.067 120.0 0.2546	1E	5.0 0.0	9.000 5.000	66.519 3.898			Vel = 16.39	
60 to 61	0.0 171.4	2.635 120.0 0.0780	2E 2T	16.474 32.948	15.000 49.422	73.981 0.0			Vel = 10.08	
61 to TR	0.0 171.4	2.635 120.0 0.0780	15E	123.557 0.0	120.000 123.557	79.009 0.0			Vel = 10.08	
TR to FF	0.0 171.4	3.26 120.0 0.0277	1A 1G	28.895 1.344	6.000 30.239	98.018 0.0			Vel = 6.59	
FF to CTY	0.0 171.4	6.16 140.0 0.0009	1E 1G 1T	20.084 4.304 43.037	20.000 67.425 87.425	99.021 0.0 0.082			Vel = 1.85	
	100.00 271.40						99.103		Qa = 100.00 K Factor = 27.26	

# Water Supply Curve (C)

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City Water Supply:  
C1 - Static Pressure : 109  
C2 - Residual Pressure: 106  
C2 - Residual Flow : 1635

Demand:  
D1 - Elevation : 10.394  
D2 - System Flow : 171.397  
D2 - System Pressure : 99.103  
Hose ( Adj City ) : \_\_\_\_\_  
Hose ( Demand ) : 100  
D3 - System Demand : 271.397  
Safety Margin : 9.789

