



**... 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. BASEMENT  
Building :  
Location : 15 EXCHANGE STREET PORTLAND MAINE  
System : ONE  
Contract : C09914  
Data File : 15 EXCHANGE ST basement.WXF

Hydraulic Design Information Sheet

Name - 15 EXCHANGE STREET 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 - 8'  
 Occupancy - RESTAURANT BASEMENT

S (X) NFPA 13 ( ) Lt. Haz. Ord.Haz.Gp. (X) 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 - ENTIRE System Type Sprinkler/Nozzle  
 Density - .15 (X) Wet Make VIKING  
 D Area Per Sprinkler - 100/130 ( ) Dry Model MICROFAST  
 E Elevation at Highest Outlet - 7 ( ) 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 - 250

N Note CUSHION 8.8 PSI

Calculation Flow Required - 563.41 Press Required - 99.77 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.
20	0.0	5.6	7.28	na	15.11	0.15	100	7.0
21	0.0	5.6	7.17	na	15.0	0.15	100	7.0
22	0.0	5.6	7.44	na	15.27	0.15	100	7.0
23	0.0	5.6	8.89	na	16.7	0.15	100	7.0
24	0.0	5.6	9.16	na	16.95	0.15	100	7.0
25	0.0	5.6	15.73	na	22.21	0.15	100	7.0
26	0.0	5.6	18.23	na	23.91	0.15	130	7.0
27	0.0	5.6	16.47	na	22.72	0.15	100	7.0
28	0.0	5.6	17.45	na	23.4	0.15	100	7.0
29	0.0	5.6	18.19	na	23.89	0.15	100	7.0
30	0.0	5.6	19.28	na	24.59	0.15	100	7.0
31	0.0	5.6	20.66	na	25.45	0.15	130	7.0
32	0.0	5.6	36.16	na	33.68	0.15	130	7.0
33	0.0	5.6	38.05	na	34.55	0.15	100	7.0
80	0.0		7.4	na				
81	0.0		10.02	na				
82	0.0		20.93	na				
83	0.0		23.09	na				
84	0.0		38.04	na				
61	0.0		38.4	na				
TR	0.0		96.46	na				
FF	0.0		99.53	na				
CTY	0.0		99.78	na	250.0			

The maximum velocity is 23.44 and it occurs in the pipe between nodes 83 and 61

# 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	*****
20 to 80	15.11 15.11	1.38 120.0 0.0203		0.0 0.0 0.0	6.200 0.0 6.200	7.276 0.0 0.126			K Factor = 5.60 Vel = 3.24	
	0.0 15.11					7.402			K Factor = 5.55	
21 to 80	15.00 15.0	1.38 120.0 0.0201	1T	6.0 0.0 0.0	5.300 6.000 11.300	7.175 0.0 0.227			K Factor = 5.60 Vel = 3.22	
	0.0 15.00					7.402			K Factor = 5.51	
22 to 23	45.38 45.38	1.61 120.0 0.0736	2E	8.0 0.0 0.0	11.800 8.000 19.800	7.438 0.0 1.457			K Factor = 5.60 Vel = 7.15	
23 to 81	16.70 62.08	1.61 120.0 0.1313	1E	4.0 0.0 0.0	4.600 4.000 8.600	8.895 0.0 1.129			K Factor = 5.60 Vel = 9.78	
	0.0 62.08					10.024			K Factor = 19.61	
24 to 81	16.95 16.95	1.049 120.0 0.0958	1E 1T	2.0 5.0 0.0	2.000 7.000 9.000	9.162 0.0 0.862			K Factor = 5.60 Vel = 6.29	
	0.0 16.95					10.024			K Factor = 5.35	
25 to 26	101.24 101.24	2.067 120.0 0.0961	2E	10.0 0.0 0.0	16.000 10.000 26.000	15.731 0.0 2.499			K Factor = 5.60 Vel = 9.68	
26 to 82	23.91 125.15	2.067 120.0 0.1423	1E	5.0 0.0 0.0	14.000 5.000 19.000	18.230 0.0 2.704			K Factor = 5.60 Vel = 11.97	
	0.0 125.15					20.934			K Factor = 27.35	
27 to 28	22.72 22.72	1.049 120.0 0.1648		0.0 0.0 0.0	6.000 0.0 6.000	16.465 0.0 0.989			K Factor = 5.60 Vel = 8.43	
28 to 82	23.40 46.12	1.049 120.0 0.6105	1T	5.0 0.0 0.0	0.700 5.000 5.700	17.454 0.0 3.480			K Factor = 5.60 Vel = 17.12	
	0.0 46.12					20.934			K Factor = 10.08	
29 to 30	23.89 23.89	1.049 120.0 0.1808		0.0 0.0 0.0	6.000 0.0 6.000	18.194 0.0 1.085			K Factor = 5.60 Vel = 8.87	
30 to 83	24.59 48.48	1.049 120.0 0.6695	1T	5.0 0.0 0.0	0.700 5.000 5.700	19.279 0.0 3.816			K Factor = 5.60 Vel = 18.00	
	0.0 48.48					23.095			K Factor = 10.09	

# 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	*****
31 to 83	25.45 25.45	1.049 120.0 0.2033	1T	5.0 0.0 0.0	7.000 5.000 12.000	20.656 0.0 2.439			K Factor = 5.60 Vel = 9.45	
	0.0 25.45						23.095		K Factor = 5.30	
32 to 84	33.68 33.68	1.049 120.0 0.3411		0.0 0.0 0.0	5.500 0.0 5.500	36.162 0.0 1.876			K Factor = 5.60 Vel = 12.50	
	0.0 33.68						38.038		K Factor = 5.46	
33 to 61	68.22 68.22	2.635 120.0 0.0142	1T	16.474 0.0 0.0	8.000 16.474 24.474	38.055 0.0 0.347			K Factor = 5.60 Vel = 4.01	
	0.0 68.22						38.402		K Factor = 11.01	
80 to 22	30.11 30.11	1.38 120.0 0.0720		0.0 0.0 0.0	0.500 0.0 0.500	7.402 0.0 0.036			Vel = 6.46	
	0.0 30.11						7.438		K Factor = 11.04	
81 to 25	79.03 79.03	1.61 120.0 0.2053	3E	12.0 0.0 0.0	15.800 12.000 27.800	10.024 0.0 5.707			Vel = 12.45	
	0.0 79.03						15.731		K Factor = 19.93	
82 to 83	171.27 171.27	2.067 120.0 0.2542		0.0 0.0 0.0	8.500 0.0 8.500	20.934 0.0 2.161			Vel = 16.38	
83 to 61	73.93 245.2	2.067 120.0 0.4938	1E 1T	5.0 10.0 0.0	16.000 15.000 31.000	23.095 0.0 15.307			Vel = 23.44	
	0.0 245.20						38.402		K Factor = 39.57	
84 to 33	33.68 33.68	2.635 120.0 0.0040		0.0 0.0 0.0	4.300 0.0 4.300	38.038 0.0 0.017			Vel = 1.98	
	0.0 33.68						38.055		K Factor = 5.46	
61 to TR	313.42 313.42	2.635 120.0 0.2384	15E	123.557 0.0 0.0	120.000 123.557 243.557	38.402 0.0 58.060			Vel = 18.44	
TR to FF	0.0 313.42	3.26 120.0 0.0845	1A 1G	28.895 1.344 0.0	6.000 30.239 36.239	96.462 0.0 3.064			Vel = 12.05	
FF to CTY	0.0 313.42	6.16 140.0 0.0029	1E 1G 1T	20.084 4.304 43.037	20.000 67.425 87.425	99.526 0.0 0.251			Vel = 3.37	

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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	*****
	250.00 563.42								
					99.777			Qa = 250.00 K Factor = 56.40	

# 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 : \_\_\_\_\_  
D2 - System Flow : 313.416  
D2 - System Pressure : 99.777  
Hose ( Adj City ) : \_\_\_\_\_  
Hose ( Demand ) : 250  
D3 - System Demand : 563.416  
Safety Margin : 8.805

