



. . . Fire Protection by Computer Design

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

Job Name : Bank of America 9th Floor-Light Hazard Area
Building : 9th Floor Renovations
Location : Portland, Maine
System : WX1
Contract : C1277
Data File : C1277 BoA 9th Floor.WX1

Hydraulic Design Information Sheet

Name - Bank of America Date - 07-17-2015
Location - Portland, Maine
Building - 9th Floor Renovations System No. - WX1
Contractor - Dean & Allyn, Inc. Contract No. - C1277
Calculated By - T. Clarke Drawing No. - 1 of 2
Construction: () Combustible (X) Non-Combustible Ceiling Height - 8'-6"
Occupancy - Offices

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 - 900 System Type Sprinkler/Nozzle
Density - 0.10 (X) Wet Make Reliable
D Area Per Sprinkler - 196 () Dry Model G5-56
E Elevation at Highest Outlet - 122.500 () Deluge Size 1/2x1/2
S Hose Allowance - Inside - 100 () Preaction K-Factor 5.6
I Rack Sprinkler Allowance - 0 () Other Temp.Rat.155F
G Hose Allowance - Outside - 0

N Note Safety Margin: 36.4 PSI

Calculation Flow Required - 323.6 Press Required - 118.4 At Pump
Summary C-Factor Used: 120 Overhead 140 Underground

W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - 04-17-2014 Cap. -
T Time of Test - Rated Cap.- 500 Elev.-
E Static Press - 165 @ Press - 71
R Residual Press - 142 Elev. - 1 Well
Flow - 501 Proof Flow
S Elevation - 1

U Location -

P
L Source of Information - Annual Pump Test Report
Y

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

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	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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																			
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
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

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.
901A	122.5	5.6	12.25	na	19.6	0.1	196	7.0
902A	122.5	5.6	13.34	na	20.45	0.1	196	7.0
903A	122.5	5.6	18.58	na	24.14	0.1	196	7.0
904A	122.5	5.6	26.77	na	28.97	0.1	196	7.0
905A	122.5	5.6	18.59	na	24.14	0.1	196	7.0
906A	122.5	5.6	19.31	na	24.61	0.1	196	7.0
907A	122.5	5.6	20.57	na	25.4	0.1	196	7.0
908A	122.5	5.6	24.3	na	27.6	0.1	196	7.0
909A	122.5	5.6	26.29	na	28.72	0.1	196	7.0
901	123.0		13.29	na				
902	123.0		14.73	na				
903	123.0		20.53	na				
904	123.0		29.03	na				
905	123.0		22.07	na				
907	123.0		23.79	na				
908	123.0		27.06	na				
909	123.0		29.12	na				
911	123.0		31.64	na				
912	123.0		32.33	na				
913	123.0		33.01	na				
FCV	123.0		63.27	na	100.0			
PUMP	1.0		118.36	na				

The maximum velocity is 23.83 and it occurs in the pipe between nodes 903 and 911

Final Calculations - Hazen-Williams - 2007

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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	*****
901A to 901	19.60 19.6	1.049 120.0 0.1254	3E	6.0 0.0 0.0	4.000 6.000 10.000	12.250 -0.217 1.254			K Factor = 5.60 Vel = 7.28	
	0.0 19.60						13.287		K Factor = 5.38	
902A to 902	20.45 20.45	1.049 120.0 0.1357	2E T	4.0 5.0 0.0	2.833 9.000 11.833	13.340 -0.217 1.606			K Factor = 5.60 Vel = 7.59	
	0.0 20.45						14.729		K Factor = 5.33	
903A to 903	24.14 24.14	1.049 120.0 0.1843	2E T	4.0 5.0 0.0	2.750 9.000 11.750	18.580 -0.217 2.166			K Factor = 5.60 Vel = 8.96	
	0.0 24.14						20.529		K Factor = 5.33	
904A to 904	28.97 28.97	1.049 120.0 0.2584	3E	6.0 0.0 0.0	3.583 6.000 9.583	26.768 -0.217 2.476			K Factor = 5.60 Vel = 10.75	
	0.0 28.97						29.027		K Factor = 5.38	
905A to 905	24.14 24.14	1.049 120.0 0.1844	3E T	6.0 5.0 0.0	9.042 11.000 20.042	18.588 -0.217 3.696			K Factor = 5.60 Vel = 8.96	
	0.0 24.14						22.067		K Factor = 5.14	
906A to 905	24.61 24.61	1.049 120.0 0.1910	2E T	4.0 5.0 0.0	6.583 9.000 15.583	19.308 -0.217 2.976			K Factor = 5.60 Vel = 9.14	
	0.0 24.61						22.067		K Factor = 5.24	
907A to 907	25.40 25.4	1.049 120.0 0.2025	2E T	4.0 5.0 0.0	7.958 9.000 16.958	20.572 -0.217 3.434			K Factor = 5.60 Vel = 9.43	
	0.0 25.40						23.789		K Factor = 5.21	
908A to 908	27.60 27.6	1.049 120.0 0.2362	2E T	4.0 5.0 0.0	3.625 9.000 12.625	24.297 -0.217 2.982			K Factor = 5.60 Vel = 10.25	
	0.0 27.60						27.062		K Factor = 5.31	
909A to 909	28.72 28.72	1.049 120.0 0.2541	2E T	4.0 5.0 0.0	2.958 9.000 11.958	26.294 -0.217 3.039			K Factor = 5.60 Vel = 10.66	
	0.0 28.72						29.116		K Factor = 5.32	
901 to 902	19.60 19.6	1.049 120.0 0.1254		0.0 0.0 0.0	11.500 0.0 11.500	13.287 0.0 1.442			Vel = 7.28	

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
902 to 903	20.45 40.05	1.049 120.0 0.4703		0.0 0.0 0.0	12.333 0.0 12.333	14.729 0.0 5.800		Vel = 14.87	
903 to 911	24.14 64.19	1.049 120.0 1.1254	T 5.0 0.0 0.0	4.875 5.000 9.875	20.529 0.0 11.113			Vel = 23.83	
	0.0 64.19					31.642		K Factor = 11.41	
904 to 911	28.97 28.97	1.049 120.0 0.2583	T 5.0 0.0 0.0	5.125 5.000 10.125	29.027 0.0 2.615			Vel = 10.75	
	0.0 28.97					31.642		K Factor = 5.15	
905 to 912	48.75 48.75	1.049 120.0 0.6765	T 5.0 0.0 0.0	10.167 5.000 15.167	22.067 0.0 10.260			Vel = 18.10	
	0.0 48.75					32.327		K Factor = 8.57	
907 to 908	25.40 25.4	1.049 120.0 0.2024	2E 4.0 0.0 0.0	12.167 4.000 16.167	23.789 0.0 3.273			Vel = 9.43	
908 to 912	27.60 53.0	1.049 120.0 0.7897	T 5.0 0.0 0.0	1.667 5.000 6.667	27.062 0.0 5.265			Vel = 19.67	
	0.0 53.00					32.327		K Factor = 9.32	
909 to 913	28.72 28.72	1.049 120.0 0.2541	T 5.0 0.0 0.0	10.333 5.000 15.333	29.116 0.0 3.896			Vel = 10.66	
	0.0 28.72					33.012		K Factor = 5.00	
911 to 912	93.16 93.16	2.635 120.0 0.0253	2E 16.474 0.0 0.0	10.625 16.474 27.099	31.642 0.0 0.685			Vel = 5.48	
912 to 913	101.76 194.92	2.635 120.0 0.0990		0.0 0.0 6.917	6.917 0.0 0.685			Vel = 11.47	
913 to FCV	28.71 223.63	2.635 120.0 0.1277	3E T S B Fsp 24.711 16.474 19.22 9.61 0.0	143.500 70.015 213.515	33.012 3.000 27.260			*** Fixed Loss = 3 Vel = 13.16	
FCV to PUMP	100.00 323.63	6.357 120.0 0.0035	8E 2T B Fsp 140.822 75.44 12.573 0.0	130.500 228.835 359.335	63.272 53.838 1.247			Qa = 100 *** Fixed Loss = 1 Vel = 3.27	
	0.0 323.63					118.357		K Factor = 29.75	

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	*****
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Water Supply Curve C

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City Water Supply:
C1 - Static Pressure : 165
C2 - Residual Pressure: 142
C2 - Residual Flow : 501

Demand:
D1 - Elevation : 52.622
D2 - System Flow : 223.634
D2 - System Pressure : 118.357
Hose (Demand) : 100
D3 - System Demand : 323.634
Safety Margin : 36.395

