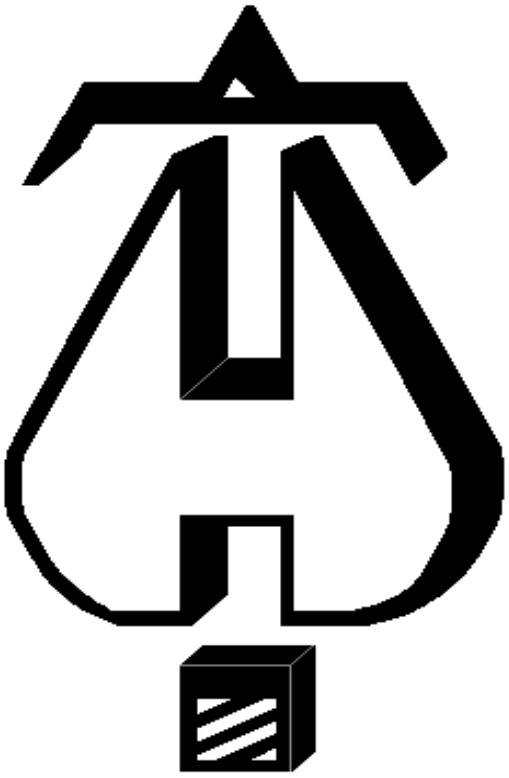

. . . Fire Protection by Computer Design

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

Job Name	:	Bank of America 10th Floor-Light Hazard Area
Building	:	10th Floor Renovations
Location	:	Portland, Maine
System	:	WX4
Contract	:	C1277
Data File	:	C1277 BoA 10th Floor.WX4

Hydraulic Design Information Sheet

Name - Bank of America Date - 07-17-2015
Location - Portland, Maine
Building - 10th Floor Renovations System No. - WX4
Contractor - Dean & Allyn, Inc. Contract No. - C1277
Calculated By - T. Clarke Drawing No. - 2 of 2
Construction: ( ) Combustible (X) Non-Combustible Ceiling Height - 8'-6"
Occupancy - Offices

SYSTEM DESIGN

(X) NFPA 13 (X) Lt. Haz. Ord.Haz.Gp. ( ) 1 ( ) 2 ( ) 3 ( ) Ex.Haz.
( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve
Other
Specific Ruling Made By Date

Area of Sprinkler Operation - 900	System Type	Sprinkler/Nozzle
Density - 0.10	(X) Wet	Make Reliable
Area Per Sprinkler - 150	( ) Dry	Model G5-56
Elevation at Highest Outlet - 135.167	( ) Deluge	Size 1/2x1/2
Hose Allowance - Inside - 100	( ) Preaction	K-Factor 5.6
Rack Sprinkler Allowance - 0	( ) Other	Temp.Rat.155F
Hose Allowance - Outside - 0		

Note Safety Margin: 19.3 PSI

Calculation Summary: Flow Required - 483.8 Press Required - 124.1 At Pump
C-Factor Used: 120 Overhead 140 Underground

WATER SUPPLY

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

Location -

Source of Information - Annual Pump Test Report

COMMODITY

Commodity N/A Class Location
Storage Ht. Area Aisle W.
Storage Method: Solid Piled % Palletized % Rack

( ) Single Row ( ) Conven. Pallet ( ) Auto. Storage ( ) Encap.
( ) Double Row ( ) Slave Pallet ( ) Solid Shelf ( ) Non
( ) Mult. Row ( ) Open Shelf

STORAGE

Flue Spacing Clearance:Storage to Ceiling
Longitudinal Transverse

Horizontal Barriers Provided:

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
Y	Mechanical Tee	2	4	5	6	8	10.5	12.5	15.5	0	22	0	0	0	0	0	0	0	0	0	0

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

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
101A	135.167	5.6	7.17	na	15.0	0.1	150	7.0
102A	135.167	5.6	7.75	na	15.59	0.1	150	7.0
103A	135.167	5.6	9.78	na	17.51	0.1	150	7.0
104A	135.167	5.6	11.67	na	19.13	0.1	150	7.0
104B	135.167	5.6	12.01	na	19.41	0.1	150	7.0
105A	135.167	5.6	7.5	na	15.33	0.1	150	7.0
106A	135.167	5.6	7.99	na	15.83	0.1	150	7.0
107A	135.167	5.6	8.7	na	16.52	0.1	150	7.0
108A	135.167	5.6	11.96	na	19.36	0.1	150	7.0
109A	135.167	5.6	12.83	na	20.06	0.1	150	7.0
110A	135.167	5.6	11.67	na	19.13	0.1	150	7.0
111A	135.167	5.6	12.47	na	19.78	0.1	150	7.0
112A	135.167	5.6	14.3	na	21.18	0.1	150	7.0
101	135.667		7.73	na				
102	135.667		8.52	na				
103	135.667		10.78	na				
104	135.667		13.15	na				
105	135.667		8.01	na				
106	135.667		8.81	na				
107	135.667		9.94	na				
108	135.667		13.11	na				
109	135.667		14.51	na				
110	135.667		12.44	na				
111	135.667		13.67	na				
112	135.667		16.46	na				
131	135.667		18.26	na				
132	135.667		18.49	na				
133	135.667		18.54	na				
134	135.667		19.04	na				
135	135.667		19.13	na				
136	135.667		23.18	na				
137	135.667		23.53	na				
138	135.667		24.31	na				
139	135.667		26.35	na				
140	135.667		28.41	na				
141	135.667		29.11	na				
FCV1	135.667		62.13	na	250.0			
PUMP	1.0		124.07	na				

The maximum velocity is 17.86 and it occurs in the pipe between nodes 103 and 131

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
101A	15.00	1.049	3E	6.0	4.042	7.175		K Factor = 5.60
to		120.0		0.0	6.000	-0.217		
101	15.0	0.0765		0.0	10.042	0.768		Vel = 5.57
	0.0							
	15.00					7.726		K Factor = 5.40
102A	15.59	1.049	2E	4.0	3.042	7.750		K Factor = 5.60
to		120.0	T	5.0	9.000	-0.217		
102	15.59	0.0821		0.0	12.042	0.989		Vel = 5.79
	0.0							
	15.59					8.522		K Factor = 5.34
103A	17.51	1.049	2E	4.0	3.000	9.778		K Factor = 5.60
to		120.0	T	5.0	9.000	-0.217		
103	17.51	0.1018		0.0	12.000	1.222		Vel = 6.50
	0.0							
	17.51					10.783		K Factor = 5.33
104A	19.13	1.049	2E	4.0	5.208	11.667		K Factor = 5.60
to		120.0	T	5.0	9.000	-0.217		
104	19.13	0.1199		0.0	14.208	1.703		Vel = 7.10
	0.0							
	19.13					13.153		K Factor = 5.27
104B	19.41	1.049	3E	6.0	5.042	12.010		K Factor = 5.60
to		120.0		0.0	6.000	-0.217		
104	19.41	0.1232		0.0	11.042	1.360		Vel = 7.21
	0.0							
	19.41					13.153		K Factor = 5.35
105A	15.33	1.049	3E	6.0	3.208	7.497		K Factor = 5.60
to		120.0		0.0	6.000	-0.217		
105	15.33	0.0796		0.0	9.208	0.733		Vel = 5.69
	0.0							
	15.33					8.013		K Factor = 5.42
106A	15.83	1.049	2E	4.0	3.208	7.994		K Factor = 5.60
to		120.0	T	5.0	9.000	-0.217		
106	15.83	0.0845		0.0	12.208	1.032		Vel = 5.88
	0.0							
	15.83					8.809		K Factor = 5.33
107A	16.52	1.049	2E	4.0	6.917	8.704		K Factor = 5.60
to		120.0	T	5.0	9.000	-0.217		
107	16.52	0.0914		0.0	15.917	1.455		Vel = 6.13
	0.0							
	16.52					9.942		K Factor = 5.24
108A	19.36	1.049	3E	6.0	5.167	11.956		K Factor = 5.60
to		120.0		0.0	6.000	-0.217		
108	19.36	0.1226		0.0	11.167	1.369		Vel = 7.19
	0.0							
	19.36					13.108		K Factor = 5.35
109A	20.06	1.049	2E	4.0	5.500	12.828		K Factor = 5.60
to		120.0	T	5.0	9.000	-0.217		
109	20.06	0.1308		0.0	14.500	1.897		Vel = 7.45

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							
	20.06					14.508		K Factor = 5.27
110A	19.13	1.049	3E	6.0	2.250	11.669		K Factor = 5.60
to		120.0		0.0	6.000	-0.217		
110	19.13	0.1199		0.0	8.250	0.989		Vel = 7.10
	0.0							
	19.13					12.441		K Factor = 5.42
111A	19.78	1.049	2E	4.0	2.125	12.473		K Factor = 5.60
to		120.0	T	5.0	9.000	-0.217		
111	19.78	0.1275		0.0	11.125	1.418		Vel = 7.34
	0.0							
	19.78					13.674		K Factor = 5.35
112A	21.18	1.049	2E	4.0	7.417	14.300		K Factor = 5.60
to		120.0	T	5.0	9.000	-0.217		
112	21.18	0.1447		0.0	16.417	2.375		Vel = 7.86
	0.0							
	21.18					16.458		K Factor = 5.22
101	15.00	1.049		0.0	10.417	7.726		
to		120.0		0.0	0.0	0.0		
102	15.0	0.0764		0.0	10.417	0.796		Vel = 5.57
102	15.59	1.049		0.0	7.917	8.522		
to		120.0		0.0	0.0	0.0		
103	30.59	0.2856		0.0	7.917	2.261		Vel = 11.36
103	17.51	1.049	T	5.0	6.333	10.783		
to		120.0		0.0	5.000	0.0		
131	48.1	0.6599		0.0	11.333	7.479		Vel = 17.86
	0.0							
	48.10					18.262		K Factor = 11.26
104	38.54	1.049	T	5.0	6.667	13.153		
to		120.0		0.0	5.000	0.0		
131	38.54	0.4379		0.0	11.667	5.109		Vel = 14.31
	0.0							
	38.54					18.262		K Factor = 9.02
105	15.33	1.049		0.0	10.000	8.013		
to		120.0		0.0	0.0	0.0		
106	15.33	0.0796		0.0	10.000	0.796		Vel = 5.69
106	15.84	1.049		0.0	3.833	8.809		
to		120.0		0.0	0.0	0.0		
107	31.17	0.2956		0.0	3.833	1.133		Vel = 11.57
107	16.52	1.049	T	5.0	8.167	9.942		
to		120.0		0.0	5.000	0.0		
132	47.69	0.6494		0.0	13.167	8.551		Vel = 17.70
	0.0							
	47.69					18.493		K Factor = 11.09
108	19.36	1.049		0.0	11.417	13.108		
to		120.0		0.0	0.0	0.0		
109	19.36	0.1226		0.0	11.417	1.400		Vel = 7.19

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
109	20.06	1.049	T	5.0	3.833	14.508		
to		120.0		0.0	5.000	0.0		
133	39.42	0.4566		0.0	8.833	4.033		Vel = 14.63
	0.0							
	39.42					18.541		K Factor = 9.15
110	19.13	1.049		0.0	10.292	12.441		
to		120.0		0.0	0.0	0.0		
111	19.13	0.1198		0.0	10.292	1.233		Vel = 7.10
111	19.78	1.049	Y	5.0	7.042	13.674		
to		120.0		0.0	5.000	0.0		
134	38.91	0.4457		0.0	12.042	5.367		Vel = 14.44
	0.0							
	38.91					19.041		K Factor = 8.92
112	21.18	1.049	2E	4.0	9.500	16.458		
to		120.0	T	5.0	9.000	0.0		
135	21.18	0.1446		0.0	18.500	2.675		Vel = 7.86
	0.0							
	21.18					19.133		K Factor = 4.84
131	86.64	2.635		0.0	10.500	18.262		
to		120.0		0.0	0.0	0.0		
132	86.64	0.0220		0.0	10.500	0.231		Vel = 5.10
132	47.68	2.635		0.0	0.958	18.493		
to		120.0		0.0	0.0	0.0		
133	134.32	0.0501		0.0	0.958	0.048		Vel = 7.90
133	39.42	2.635		0.0	6.250	18.541		
to		120.0		0.0	0.0	0.0		
134	173.74	0.0800		0.0	6.250	0.500		Vel = 10.22
134	38.91	2.635		0.0	0.792	19.041		
to		120.0		0.0	0.0	0.0		
135	212.65	0.1162		0.0	0.792	0.092		Vel = 12.51
135	21.18	2.635		0.0	29.208	19.133		
to		120.0		0.0	0.0	0.0		
136	233.83	0.1387		0.0	29.208	4.050		Vel = 13.76
136	0.0	2.635		0.0	2.500	23.183		
to		120.0		0.0	0.0	0.0		
137	233.83	0.1388		0.0	2.500	0.347		Vel = 13.76
137	0.0	2.635		0.0	5.625	23.530		
to		120.0		0.0	0.0	0.0		
138	233.83	0.1387		0.0	5.625	0.780		Vel = 13.76
138	0.0	2.635	E	8.237	6.458	24.310		
to		120.0		0.0	8.237	0.0		
139	233.83	0.1386		0.0	14.695	2.037		Vel = 13.76
139	0.0	2.635	E	8.237	6.667	26.347		
to		120.0		0.0	8.237	0.0		
140	233.83	0.1386		0.0	14.904	2.066		Vel = 13.76
140	0.0	2.635		0.0	5.000	28.413		
to		120.0		0.0	0.0	0.0		
141	233.83	0.1388		0.0	5.000	0.694		Vel = 13.76

Final Calculations - Hazen-Williams

DEAN & ALLYN, INC.
Bank of America 10th Floor-Light Hazard Area

Date 07/17/2015

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
141	0.0	2.635	3E	24.711	146.500	29.107		
to		120.0	T	16.474	70.015	3.000		* * Fixed Loss = 3
FCV1	233.83	0.1386	S	19.22	216.515	30.019		Vel = 13.76
			B	9.61				
			Fsp	0.0				
FCV1	250.00	6.357	8E	140.822	130.500	62.126		Qa = 250
to		120.0	2T	75.44	228.835	59.324		* * Fixed Loss = 1
PUMP	483.83	0.0073	B	12.573	359.335	2.624		Vel = 4.89
			Fsp	0.0				
	0.0							
	483.83					124.074		K Factor = 43.44

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

Demand:
- D1 - Elevation : 58.108
- D2 - System Flow : 233.828
- D2 - System Pressure : 124.074
- Hose (Demand) : 250
- D3 - System Demand : 483.828
- Safety Margin : 19.363