



... 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 : MMC 2CND FLOOR RICHARDS
Building : Richards Building
Location : Maine Medical Center-22 Bramhall St-Portland, Me
System : WX2
Contract : C0810818
Data File : MMC--- 2C.WX2

Hydraulic Design Information Sheet

Name - Second Floor Fire Protection Upgrade Date - 11/7/08
 Location - Maine Medical Center-22 Bramhall St-Portland, Me
 Building - Richards Building System No. - WX2
 Contractor - Dean & Allyn, Inc Contract No. - C0810818
 Calculated By - James R White Drawing No. - 1 of 1
 Construction: () Combustible (X) Non-Combustible Ceiling Height - 8'-0"
 Occupancy - Hospital- storage room/environmental service area

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 - 900 sq ft System Type Sprinkler/Nozzle
 Density - .15/.1 (X) Wet Make VIKING
 D Area Per Sprinkler - 96 () Dry Model VK606
 E Elevation at Highest Outlet - 8'-0" () Deluge Size 1/2"
 S Hose Allowance - Inside - 100 () Preaction K-Factor 5.6
 I Rack Sprinkler Allowance - 0 () Other Temp.Rat.155 deg
 G Hose Allowance - Outside - 150

N Note SAFETY MARGIN = 76.01 PSI

Calculation Flow Required - 532.27 Press Required - 76.46
 Summary C-Factor Used: 120 Overhead 120 Underground

W Water Flow Test: Pump Data: Tank or Reservoir:
 A Date of Test - 10/11/07 Cap. -
 T Time of Test - Rated Cap.- Elev.-
 E Static Press - 170 @ Press -
 R Residual Press - 75 Elev. - Well
 Flow - 1160 Proof Flow
 S Elevation - 0

U Location - RICHARDS FIRE PUMP

P Source of Information - ANNUAL PUMP TEST

Y
 C Commodity N/A Class Location
 O Storage Ht. N/A 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 N/A Clearance:Storage to Ceiling
 A Longitudinal N/A Transverse N/A

G
 E Horizontal Barriers Provided: N/A

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
B	Generic Butterfly Valve	0	0	0	0	0	0	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	90' Standard Elbow	2	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																			
G	Generic Gate Valve	0	0	0	0	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
Mbb	B Ball Milw BB-SC100			2.25	2	2.5	2.25	10													
N	CPVC 90'EI Harvel-Spears	7	7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
S	Generic Swing Check Valve	4	5	5	7	9	11	14	16	19	22	27	32	45	55	65	76	87	98	109	130
T	90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Pressure / Flow Summary - STANDARD

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
D101	30.083	5.6	26.96	na	29.08	0.1	96	7.0
D102	30.083	5.6	26.71	na	28.94	0.1	96	7.0
57A	29.5	5.6	17.58	na	23.48	0.15	64	7.0
46A	29.5	5.6	11.78	na	19.22	0.15	96	7.0
45B	29.5	5.6	12.32	na	19.66	0.15	96	7.0
45A	29.5	5.6	14.3	na	21.18	0.15	96	7.0
46	29.5	5.6	23.27	na	27.01	0.15	64	7.0
56A	29.5	5.6	17.37	na	23.34	0.15	64	7.0
58A	29.5	5.6	18.1	na	23.82	0.15	64	7.0
59A	29.5		26.23	na				
60A	29.5		31.85	na				
10	31.083		43.96	na				
21	31.083		41.82	na				
20	31.083		41.77	na				
19	31.083		32.11	na				
18	31.083		31.22	na				
17	31.083		30.02	na				
5	31.083		29.71	na				
6	31.083		29.43	na				
7	31.083		28.08	na				
42	31.083		27.2	na				
43	31.083		27.09	na				
45	31.083		27.09	na				
44	31.083		27.34	na				
8	31.083		39.61	na				
9	31.083		38.94	na				
9A	31.083		37.37	na				
11	31.083		50.3	na				
12	31.083		55.3	na				
13	31.083		62.83	na				
14	11.5		71.35	na				
39A	29.5	5.6	7.0	na	14.82	0.15	96	7.0
39	29.5	5.6	7.77	na	15.61	0.15	96	7.0
40A	29.5	5.6	9.02	na	16.82	0.15	96	7.0
40	29.5	5.6	11.86	na	19.29	0.15	96	7.0
41	31.083		27.6	na				
15	31.083		54.23	na				
16	31.083		61.42	na	100.0			
14B	11.5		70.03	na	150.0			
14A	3.0		75.3	na				
TEST	3.0		76.45	na				

The maximum velocity is 25.26 and it occurs in the pipe between nodes 8 and 15

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	*****
D101 to 44	29.08 29.08	1.101 150 0.1360	1O	5.0 0.0 0.0	1.000 5.000 6.000	26.959 -0.433 0.816			K Factor = 5.60 Vel = 9.80	
	0.0 29.08					27.342			K Factor = 5.56	
D102 to 43	28.94 28.94	1.101 150 0.1348	1O	5.0 0.0 0.0	1.000 5.000 6.000	26.711 -0.433 0.809			K Factor = 5.60 Vel = 9.75	
	0.0 28.94					27.087			K Factor = 5.56	
57A to 58A	23.48 23.48	1.101 150 0.0915	1O	5.0 0.0 0.0	0.660 5.000 5.660	17.579 0.0 0.518			K Factor = 5.60 Vel = 7.91	
	0.0 23.48					18.097			K Factor = 5.52	
46A to 45B	19.22 19.22	1.101 150 0.0633		0.0 0.0 0.0	8.500 0.0 8.500	11.783 0.0 0.538			K Factor = 5.60 Vel = 6.48	
45B to 45A	19.66 38.88	1.101 150 0.2327		0.0 0.0 0.0	8.500 0.0 8.500	12.321 0.0 1.978			K Factor = 5.60 Vel = 13.10	
45A to 42	21.18 60.06	1.101 150 0.5203	2N 1O	14.0 5.0 0.0	7.120 19.000 26.120	14.299 -0.686 13.589			K Factor = 5.60 Vel = 20.24	
	0.0 60.06					27.202			K Factor = 11.52	
46 to 45	27.01 27.01	1.101 150 0.1187	3N 1O	21.0 5.0 0.0	12.000 26.000 38.000	23.270 -0.686 4.510			K Factor = 5.60 Vel = 9.10	
	0.0 27.01					27.094			K Factor = 5.19	
56A to 58A	23.34 23.34	1.101 150 0.0905		0.0 0.0 0.0	8.000 0.0 8.000	17.373 0.0 0.724			K Factor = 5.60 Vel = 7.87	
58A to 59A	47.30 70.64	1.101 150 0.7025	1N	7.0 0.0 0.0	4.580 7.000 11.580	18.097 0.0 8.135			K Factor = 5.60 Vel = 23.80	
59A to 60A	0.0 70.64	1.101 150 0.7025	1N	7.0 0.0 0.0	1.000 7.000 8.000	26.232 0.0 5.620			Vel = 23.80	
60A to 9A	0.0 70.64	1.101 150 0.7026	1O	5.0 0.0 0.0	3.830 5.000 8.830	31.852 -0.686 6.204			Vel = 23.80	
	0.0 70.64					37.370			K Factor = 11.56	
10 to 21	-81.54 -81.54	1.598 150 -0.1493	1O	8.0 0.0 0.0	6.370 8.000 14.370	43.965 0.0 -2.145			Vel = 13.04	

Final Calculations - Standard

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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	*****
21 to 20	0.0 -81.54	1.598 150 -0.1485		0.0 0.0 0.0	0.330 0.0 0.330	41.820 0.0 -0.049			Vel = 13.04	
20 to 19	0.0 -81.54	1.598 150 -0.1493	1O	8.0 0.0 0.0	56.700 8.000 64.700	41.771 0.0 -9.658			Vel = 13.04	
19 to 18	0.0 -81.54	1.598 150 -0.1493		0.0 0.0 0.0	6.000 0.0 6.000	32.113 0.0 -0.896			Vel = 13.04	
18 to 17	0.0 -81.54	1.598 150 -0.1492		0.0 0.0 0.0	8.000 0.0 8.000	31.217 0.0 -1.194			Vel = 13.04	
17 to 5	0.0 -81.54	1.598 150 -0.1495		0.0 0.0 0.0	2.080 0.0 2.080	30.023 0.0 -0.311			Vel = 13.04	
5 to 6	0.0 -81.54	1.598 150 -0.1492		0.0 0.0 0.0	1.910 0.0 1.910	29.712 0.0 -0.285			Vel = 13.04	
6 to 7	0.0 -81.54	1.598 150 -0.1492		0.0 0.0 0.0	9.000 0.0 9.000	29.427 0.0 -1.343			Vel = 13.04	
7 to 42	0.0 -81.54	1.598 150 -0.1492		0.0 0.0 0.0	5.910 0.0 5.910	28.084 0.0 -0.882			Vel = 13.04	
42 to 43	60.06 -21.48	1.598 150 -0.0127		0.0 0.0 0.0	9.080 0.0 9.080	27.202 0.0 -0.115			Vel = 3.44	
43 to 45	28.94 7.46	1.598 150 0.0018		0.0 0.0 0.0	3.833 0.0 3.833	27.087 0.0 0.007			Vel = 1.19	
45 to 44	27.01 34.47	1.598 150 0.0304		0.0 0.0 0.0	8.167 0.0 8.167	27.094 0.0 0.248			Vel = 5.51	
44 to 41	29.08 63.55	1.598 150 0.0938		0.0 0.0 0.0	2.750 0.0 2.750	27.342 0.0 0.258			Vel = 10.17	
	0.0 63.55					27.600			K Factor = 12.10	
8 to 9	-27.85 -27.85	1.598 150 -0.0205	1O	8.0 0.0 0.0	24.910 8.000 32.910	39.612 0.0 -0.674			Vel = 4.46	
9 to 9A	0.0 -27.85	1.598 120 -0.0309		0.0 0.0 0.0	50.750 0.0 50.750	38.938 0.0 -1.568			Vel = 4.46	
9A to 10	70.64 42.79	1.598 120 0.0684	2N	18.0 0.0 0.0	78.370 18.000 96.370	37.370 0.0 6.595			Vel = 6.85	
10 to 11	81.54 124.33	1.598 150 0.3258	1O	8.0 0.0 0.0	11.450 8.000 19.450	43.965 0.0 6.336			Vel = 19.89	

Final Calculations - Standard

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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	*****
11 to 12	0.0 124.33	1.598 150 0.3258	1N	9.0 0.0 0.0	6.330 9.000 15.330	50.301 0.0 4.995			Vel = 19.89	
12 to 13	0.0 124.33	2.067 120 0.1406	3E 1Fsp 1S 1Mbb	15.0 0.0 11.0 2.25	4.020 28.250 32.270	55.296 3.000 4.536		* Fixed loss = 3 Vel = 11.89		
13 to 14	0.0 124.33	6.065 120 0.0008	1E	14.0 0.0 0.0	31.100 14.000 45.100	62.832 8.481 0.034		Vel = 1.38		
14 to 14A	0.0 124.33	6.065 120 0.0007	7E 2T 2G	98.0 60.0 6.0	207.000 164.000 371.000	71.347 3.681 0.276		Vel = 1.38		
	0.0 124.33					75.304		K Factor = 14.33		
39A to 39	14.82 14.82	1.101 150 0.0391	1O	5.0 0.0 0.0	14.667 5.000 19.667	7.000 0.0 0.768		K Factor = 5.60 Vel = 4.99		
39 to 40A	15.60 30.42	1.101 150 0.1479		0.0 0.0 0.0	8.500 0.0 8.500	7.768 0.0 1.257		K Factor = 5.60 Vel = 10.25		
40A to 40	16.83 47.25	1.101 150 0.3338		0.0 0.0 0.0	8.500 0.0 8.500	9.025 0.0 2.837		K Factor = 5.60 Vel = 15.92		
40 to 41	19.28 66.53	1.101 150 0.6288	2N 1O	14.0 5.0 0.0	7.120 19.000 26.120	11.862 -0.686 16.424		K Factor = 5.60 Vel = 22.42		
41 to 8	63.55 130.08	1.598 150 0.3542		0.0 0.0 0.0	33.910 0.0 33.910	27.600 0.0 12.012		Vel = 20.81		
8 to 15	27.85 157.93	1.598 150 0.5071	2O	16.0 0.0 0.0	12.830 16.000 28.830	39.612 0.0 14.621		Vel = 25.26		
15 to 16	0.0 157.93	2.469 120 0.0921	3E 1B 1Fsp 1S	18.0 7.0 0.0 14.0	6.450 39.000 45.450	54.233 3.000 4.185		* Fixed loss = 3 Vel = 10.58		
16 to 14B	100.00 257.93	6.065 120 0.0029	1E	14.0 0.0 0.0	31.100 14.000 45.100	61.418 8.481 0.130		Qa = 100 Vel = 2.86		
14B to 14A	150.00 407.93	6.065 120 0.0067	6E 2T 1G	84.0 60.0 3.0	91.000 147.000 238.000	70.029 3.681 1.594		Qa = 150 Vel = 4.53		
14A to TEST	124.34 532.27	6.065 120 0.0110	2E 1T 1G 1S	28.0 30.0 3.0 32.0	12.000 93.000 105.000	75.304 0.0 1.151		Vel = 5.91		
	0.0									

Final Calculations - Standard

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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	*****
				532.27	76.455	K Factor = 60.87			

Water Supply Curve (C)

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City Water Supply:
C1 - Static Pressure : 170
C2 - Residual Pressure: 75
C2 - Residual Flow : 1160

Demand:
D1 - Elevation : 11.477
D2 - System Flow : 282.266
D2 - System Pressure : 76.455
Hose (Adj City) : _____
Hose (Demand) : 250
D3 - System Demand : 532.266
Safety Margin : 71.064

