



... 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 : WX3
Contract : C0810818
Data File : MMC---2C.WX3

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. - WX3
 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- corridor/elevator lobby

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

M	Area of Sprinkler Operation	- 7 HEADS	System Type	Sprinkler/Nozzle
	Density	- .1	(X) Wet	Make VIKING
D	Area Per Sprinkler	- 167	() Dry	Model VK462
E	Elevation at Highest Outlet	- 7'-7"	() 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	- 0		

N Note SAFETY MARGIN = 100.87 PSI - CORRIDOR (5 HEADS)

Calculation Flow Required - 245.15 Press Required - 63.77
 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

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

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

G 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.
D201	30.083	5.6	8.89	na	16.7	0.1	167	7.0
D202	30.083	5.6	14.33	na	21.2	0.1	142	7.0
D203	30.083	5.6	9.56	na	17.31	0.1	132	7.0
D204	30.083	5.6	15.36	na	21.95	0.1	138	7.0
D205	30.083	5.6	15.35	na	21.94	0.1	159	7.0
D206	30.083	5.6	16.1	na	22.47	0.1	116	7.0
D207	30.083	5.6	17.72	na	23.57	0.1	116	7.0
67	31.083		15.4	na				
65	31.083		14.51	na				
66	31.083		15.42	na				
64	31.08		29.19	na				
9	31.08		37.16	na				
10	31.083		41.04	na				
11	31.083		43.9	na				
12	31.083		46.15	na				
13	31.083		51.19	na				
14	11.5		59.69	na				
58	31.083		8.85	na				
59	31.083		9.43	na				
60	31.08		15.43	na				
61	31.08		16.18	na				
62	31.08		17.84	na				
63	31.08		19.65	na				
21	31.08		41.04	na				
20	31.08		41.04	na				
19	31.08		40.97	na				
18	31.08		40.96	na				
17	31.08		40.95	na				
5	31.08		40.95	na				
6	31.08		40.95	na				
7	31.08		40.94	na				
42	31.08		40.93	na				
43	31.08		40.92	na				
44	31.08		40.91	na				
41	31.08		40.91	na				
8	31.083		40.87	na				
15	31.083		43.65	na	100.0			
16	31.083		50.98	na				
14B	11.5		59.52	na				
14A	3.0		63.49	na				
TEST	3.0		63.77	na				

The maximum velocity is 23.22 and it occurs in the pipe between nodes 63 and 64

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	*****
D201 to 58	16.70 16.7 0.0 16.70	1.101 150 0.0488	1N	7.0 0.0 0.0	1.000 7.000 8.000	8.893 -0.433 0.390			K Factor = 5.60 Vel = 5.63	
						8.850			K Factor = 5.61	
D202 to 65	21.20 21.2 0.0 21.20	1.101 150 0.0759	1N	7.0 0.0 0.0	1.000 7.000 8.000	14.332 -0.433 0.607			K Factor = 5.60 Vel = 7.14	
						14.506			K Factor = 5.57	
D203 to 59	17.31 17.31 0.0 17.31	1.101 150 0.0522	1O	5.0 0.0 0.0	1.000 5.000 6.000	9.555 -0.433 0.313			K Factor = 5.60 Vel = 5.83	
						9.435			K Factor = 5.64	
D204 to 66	21.95 21.95 0.0 21.95	1.101 150 0.0808	1O	5.0 0.0 0.0	1.000 5.000 6.000	15.363 -0.433 0.485			K Factor = 5.60 Vel = 7.40	
						15.415			K Factor = 5.59	
D205 to 67	21.94 21.94 0.0 21.94	1.101 150 0.0808	1O	5.0 0.0 0.0	1.000 5.000 6.000	15.353 -0.433 0.485			K Factor = 5.60 Vel = 7.39	
						15.405			K Factor = 5.59	
D206 to 61	22.47 22.47 0.0 22.47	1.101 150 0.0845	1O	5.0 0.0 0.0	1.000 5.000 6.000	16.101 -0.432 0.507			K Factor = 5.60 Vel = 7.57	
						16.176			K Factor = 5.59	
D207 to 62	23.57 23.57 0.0 23.57	1.101 150 0.0923	1O	5.0 0.0 0.0	1.000 5.000 6.000	17.721 -0.432 0.554			K Factor = 5.60 Vel = 7.94	
						17.843			K Factor = 5.58	
67 to 60	21.94 21.94 0.0 21.94	1.598 150 0.0130		0.0 0.0 0.0	2.000 0.0 2.000	15.405 0.001 0.026			Vel = 3.51	
						15.432			K Factor = 5.59	
65 to 66	21.20 21.2 0.0 21.20	1.101 150 0.0758		0.0 0.0 0.0	12.000 0.0 12.000	14.506 0.0 0.909			Vel = 7.14	
66 to 63	21.95 43.15 0.0 21.95	1.101 150 0.2823	1O	5.0 0.0 0.0	10.000 5.000 15.000	15.415 0.001 4.234			Vel = 14.54	

Final Calculations - Standard

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftg's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	43.15					19.650			K Factor = 9.73	
64 to 9	70.05	1.598 150	1O	8.0 0.0	62.660 8.000	29.194 0.0				
	70.05	0.1127		0.0	70.660	7.963			Vel = 11.21	
9 to 8	0.0	1.598 150	1O	8.0 0.0	24.950 8.000	37.157 -0.001				
	70.05	0.1127		0.0	32.950	3.713			Vel = 11.21	
	0.0 70.05					40.869			K Factor = 10.96	
10 to 11	80.79	1.598 150	1O	8.0 0.0	11.450 8.000	41.045 0.0				
	80.79	0.1467		0.0	19.450	2.854			Vel = 12.92	
11 to 12	0.0	1.598 150	1N	9.0 0.0	6.330 9.000	43.899 0.0				
	80.79	0.1468		0.0	15.330	2.250			Vel = 12.92	
12 to 13	0.0	2.067 120	3E 1Fsp	15.0 0.0	4.020 28.250	46.149 3.000			* Fixed loss = 3	
	80.79	0.0633	1S 1Mbb	11.0 2.25	32.270	2.043			Vel = 7.72	
13 to 14	0.0	6.065 120	1E	14.0 0.0	31.100 14.000	51.192 8.481				
	80.79	0.0004		0.0	45.100	0.016			Vel = 0.90	
14 to 14A	0.0	6.065 120	7E 2T	98.0 60.0	207.000 164.000	59.689 3.681				
	80.79	0.0003	2G	6.0	371.000	0.124			Vel = 0.90	
	0.0 80.79					63.494			K Factor = 10.14	
58 to 59	16.70	1.101 150		0.0 0.0	12.000 0.0	8.850 0.0				
	16.7	0.0487		0.0	12.000	0.585			Vel = 5.63	
59 to 60	17.31	1.101 150	2N 1O	14.0 5.0	14.000 19.000	9.435 0.001				
	34.01	0.1817		0.0	33.000	5.996			Vel = 11.46	
60 to 61	21.94	1.598 150		0.0 0.0	10.000 0.0	15.432 0.0				
	55.95	0.0744		0.0	10.000	0.744			Vel = 8.95	
61 to 62	22.47	1.598 150		0.0 0.0	12.000 0.0	16.176 0.0				
	78.42	0.1389		0.0	12.000	1.667			Vel = 12.54	
62 to 63	23.58	1.598 150		0.0 0.0	8.000 0.0	17.843 0.0				
	102.0	0.2259		0.0	8.000	1.807			Vel = 16.32	
63 to 64	43.15	1.598 150	1O	8.0 0.0	14.000 8.000	19.650 0.0				
	145.15	0.4338		0.0	22.000	9.544			Vel = 23.22	
64 to 10	-70.05	1.598 150	2N 1O	18.0 8.0	66.450 26.000	29.194 -0.001				
	75.1	0.1282		0.0	92.450	11.852			Vel = 12.01	

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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	*****
10 to 21	-80.79 -5.69	1.598 150 -0.0011		0.0 0.0 0.0	6.370 0.0 6.370	41.045 0.001 -0.007				Vel = 0.91
21 to 20	0.0 -5.69	1.598 150 0.0		0.0 0.0 0.0	0.330 0.0 0.330	41.039 0.0 0.0				Vel = 0.91
20 to 19	0.0 -5.69	1.598 150 -0.0011	1O	8.0 0.0 0.0	56.700 8.000 64.700	41.039 0.0 -0.070				Vel = 0.91
19 to 18	0.0 -5.69	1.598 150 -0.0012		0.0 0.0 0.0	6.000 0.0 6.000	40.969 0.0 -0.007				Vel = 0.91
18 to 17	0.0 -5.69	1.598 150 -0.0011		0.0 0.0 0.0	8.000 0.0 8.000	40.962 0.0 -0.009				Vel = 0.91
17 to 5	0.0 -5.69	1.598 150 -0.0010		0.0 0.0 0.0	2.080 0.0 2.080	40.953 0.0 -0.002				Vel = 0.91
5 to 6	0.0 -5.69	1.598 150 -0.0010		0.0 0.0 0.0	1.910 0.0 1.910	40.951 0.0 -0.002				Vel = 0.91
6 to 7	0.0 -5.69	1.598 150 -0.0011		0.0 0.0 0.0	9.000 0.0 9.000	40.949 0.0 -0.010				Vel = 0.91
7 to 42	0.0 -5.69	1.598 150 -0.0010		0.0 0.0 0.0	5.910 0.0 5.910	40.939 0.0 -0.006				Vel = 0.91
42 to 43	0.0 -5.69	1.598 150 -0.0011		0.0 0.0 0.0	9.080 0.0 9.080	40.933 0.0 -0.010				Vel = 0.91
43 to 44	0.0 -5.69	1.598 150 -0.0011		0.0 0.0 0.0	12.000 0.0 12.000	40.923 0.0 -0.013				Vel = 0.91
44 to 41	0.0 -5.69	1.598 150 -0.0011		0.0 0.0 0.0	2.750 0.0 2.750	40.910 0.0 -0.003				Vel = 0.91
41 to 8	0.0 -5.69	1.598 150 -0.0011		0.0 0.0 0.0	33.910 0.0 33.910	40.907 -0.001 -0.037				Vel = 0.91
8 to 15	70.05 64.36	1.598 150 0.0964	2O	16.0 0.0 0.0	12.830 16.000 28.830	40.869 0.0 2.778				Vel = 10.30
15 to 16	100.00 164.36	2.635 120 0.0722	3E 1B 1Fsp	24.711 9.61 0.0	6.450 53.541 59.991	43.647 3.000 4.332				Qa = 100 * Fixed loss = 3 Vel = 9.67
16 to 14B	0.0 164.36	6.065 120 0.0013	1E	14.0 0.0 0.0	31.100 14.000 45.100	50.979 8.481 0.057				Vel = 1.83

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	*****
14B	0.0	6.065	6E 84.0	91.000	59.517				
to		120	2T 60.0	147.000	3.681				
14A	164.36	0.0012	1G 3.0	238.000	0.296		Vel = 1.83		
14A	80.79	6.065	2E 28.0	12.000	63.494				
to		120	1T 30.0	93.000	0.0				
TEST	245.15	0.0026	1G 3.0	105.000	0.275		Vel = 2.72		
			1S 32.0						
	0.0								
	245.15				63.769		K Factor = 30.70		

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 : 11.730
D2 - System Flow : 145.148
D2 - System Pressure : 63.769
Hose (Adj City) : _____
Hose (Demand) : 100
D3 - System Demand : 245.148
Safety Margin : 100.874

