

... Fire Protection by Computer Design

ABL FIRE PROTECTION  
RALEIGH, NORTH CAROLINA

Job Name : SOLEIL CENTER: 19TH FLOOR MEZZ  
Building : TOWER  
Location : 4501 CREEDMOOR ROAD, RALEIGH, NORTH CAROLINA  
System : 19M FLOOR  
Contract :  
Data File : SOLEIL 19M.WXF

Hydraulic Design Information Sheet

Name - SOLEIL CENTER Date - 11-25-07  
 Location - 4501 CREEDMOOR ROAD, RALEIGH, NORTH CAROLINA  
 Building - TOWER System No. - 19M FLOOR  
 Contractor - Contract No. -  
 Calculated By - JSB Drawing No. - FP51  
 Construction: ( ) Combustible (X) Non-Combustible Ceiling Height - VARIES  
 Occupancy - MECHANICAL

S (X) NFPA 13 ( ) Lt. Haz. Ord.Haz.Gp. ( ) 1 (X) 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 - 1500	System Type	Sprinkler/Nozzle
	Density - .2	(X) Wet	Make VIKING
D	Area Per Sprinkler - 130	( ) Dry	Model M
E	Elevation at Highest Outlet - 199	( ) Deluge	Size 1/2
S	Hose Allowance - Inside - 100	( ) Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance -	( ) Other	Temp.Rat.155
G	Hose Allowance - Outside - 150		

N

Note 720 GALLONS ADDED FOR DOMESTIC WATER

Calculation Flow Required - 581.40 Press Required - 231.748 AT PUMP DISCHARGE  
 Summary C-Factor Used: 150 Overhead 150 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test -		Cap. -
T	Time of Test -	Rated Cap.- 750	Elev.-
E	Static Press - 106	@ Press - 260	
R	Residual Press - 92	Elev. - 0	Well
	Flow - 1470		Proof Flow
S	Elevation - 0		

U

P Location -

P

L Source of Information -

Y

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

O

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

G

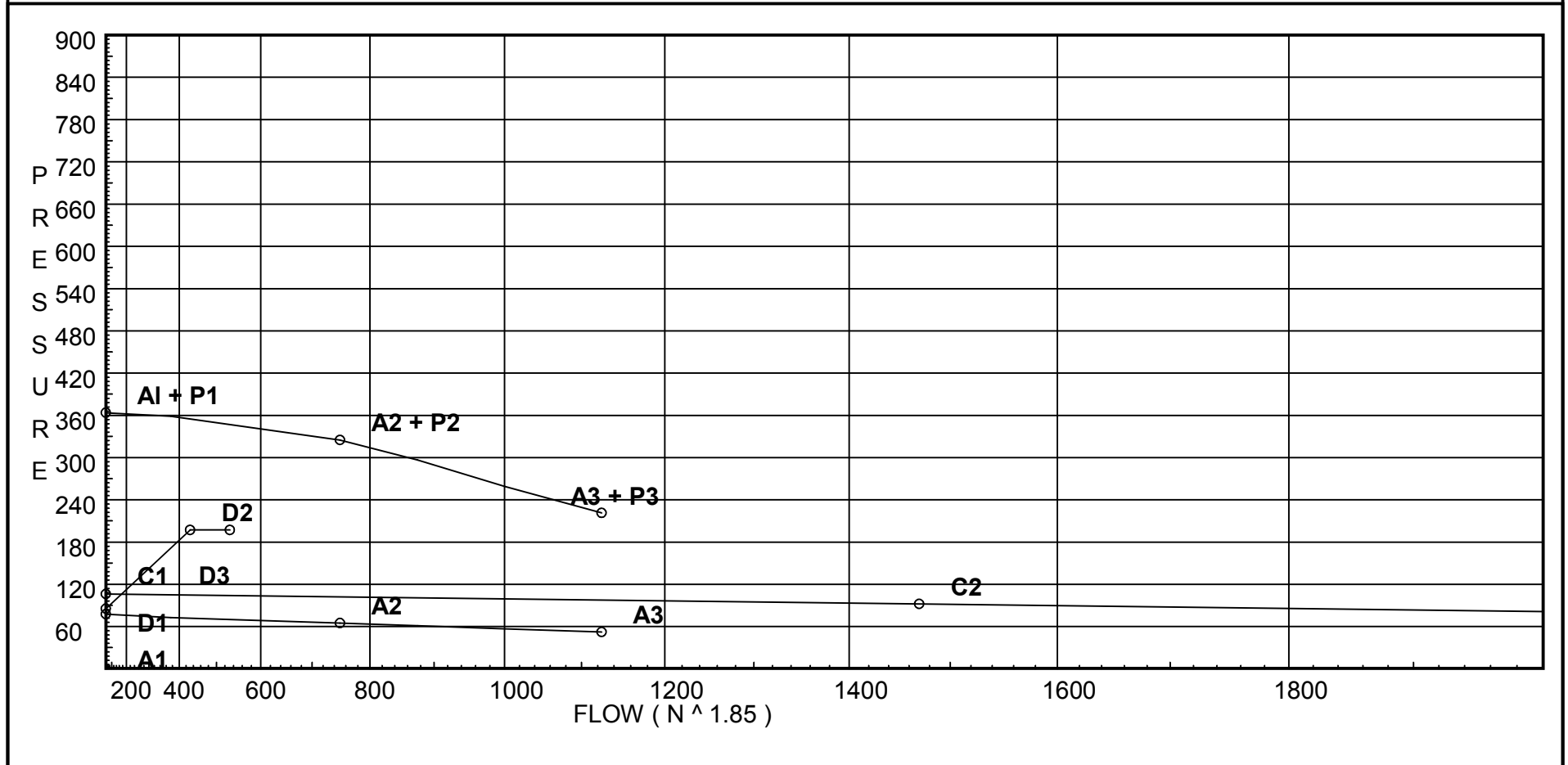
E Horizontal Barriers Provided:

# Water Supply Curve (C)

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<b>City Water Supply:</b> C1 - Static Pressure : 106 C2 - Residual Pressure: 92 C2 - Residual Flow : 1470  <b>City Water Adjusted to Pump Inlet for Pf - Elev - Hose Flow</b> A1 - Adjusted Static: 77.600 A2 - Adj Resid : 64.939 @ 750 A3 - Adj Resid : 52.147 @ 1125	<b>Pump Data:</b> P1 - Pump Churn Pressure : 286 P2 - Pump Rated Pressure : 260 P2 - Pump Rated Flow : 750 P3 - Pump Pressure @ Max Flow : 169 P3 - Pump Max Flow : 1125 City Residual Flow @ 0 = 4390.85 City Residual Flow @ 20 = 3921.60 City Water @ 150% of Pump = 97.46	<b>Demand:</b> D1 - Elevation : 85.321 D2 - System Flow : 431.72 D2 - System Pressure : 197.273 Hose ( Adj City ) : 870 Hose ( Demand ) : 100 D3 - System Demand : 531.72 Safety Margin : 150.025
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# 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	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
F	45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
G	Generic Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
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
Zaf	Ames 3000SS	Fitting generates a Fixed Loss Based on Flow																			
Zai	Ames 4000SS	Fitting generates a Fixed Loss Based on Flow																			

Pressure / Flow Summary - STANDARD

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
1H	198.0	5.6	14.39	na	21.24	0.2	90	7.0
2H	198.0	5.6	14.49	na	21.32	0.2	90	7.0
3H	198.0	5.6	13.19	na	20.34	0.2	90	7.0
4H	198.0	5.6	14.88	na	21.6	0.2	108	7.0
5H	198.0	5.6	16.54	na	22.77	0.2	108	7.0
1	199.0		14.83	na				
2	199.0		14.94	na				
3	199.0		14.99	na				
4	199.0		15.64	na				
5	199.0		17.43	na				
6	199.0	5.6	20.27	na	25.22	0.2	108	7.0
7	199.0	5.6	25.38	na	28.21	0.2	108	7.0
9	199.0	5.6	23.96	na	27.41	0.2	108	7.0
10	199.0	5.6	24.18	na	27.54	0.2	108	7.0
11	199.0	5.6	26.11	na	28.62	0.2	108	7.0
12A	199.0	5.6	27.59	na	29.41	0.2	108	7.0
12	199.0	5.6	30.16	na	30.75	0.2	108	7.0
14H	199.0	5.6	29.79	na	30.56	0.2	130	7.0
14	199.0		31.67	na				
15	199.0	5.6	31.97	na	31.67	0.2	130	7.0
16A	199.0	5.6	32.83	na	32.08	0.2	130	7.0
16	199.0	5.6	34.67	na	32.97	0.2	130	7.0
8	199.0		36.42	na				
13	199.0		37.13	na				
17	199.0		40.23	na				
18	199.0		53.26	na				
19	199.0		73.53	na				
19M	199.0		104.09	na	100.0			
HZT	24.5		183.06	na				
CON	17.5		186.62	na				
HZD	17.5		197.27	na				
HZS	17.5		70.37	na				
RED	17.5		70.92	na				
MF4	3.0		77.37	na				
DI	1.0		88.66	na				
HDI	-3.0		90.66	na	150.0			
HD2	-3.0		91.2	na	720.0			
POC	1.0		93.18	na				

The maximum velocity is 25.4 and it occurs in the pipe between nodes 17 and 18

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 *****
1H to 1	21.24	1.049 120	1T 5.0 0.0	1.000 5.000	14.386 -0.433		K Factor = 5.60 Vel = 7.88
	0.0 21.24					14.825	K Factor = 5.52
2H to 2	21.32	1.049 120	1T 5.0 0.0	1.000 5.000	14.494 -0.433		K Factor = 5.60 Vel = 7.91
	0.0 21.32					14.940	K Factor = 5.52
3H to 3	20.34	1.049 120	1E 2.0 1T 5.0	9.630 7.000	13.193 -0.433		K Factor = 5.60 Vel = 7.55
	0.0 20.34					14.992	K Factor = 5.25
4H to 4	21.60	1.049 120	1T 5.0 0.0	3.000 5.000	14.878 -0.433		K Factor = 5.60 Vel = 8.02
	0.0 21.60					15.645	K Factor = 5.46
5H to 5	22.77	1.049 120	1T 5.0 0.0	3.000 5.000	16.538 -0.433		K Factor = 5.60 Vel = 8.45
	0.0 22.77					17.428	K Factor = 5.45
1 to 2	21.24	1.682 120	0.0 0.0	7.830 0.0	14.825 0.0		Vel = 3.07
2 to 3	21.32	1.682 120	0.0 0.0	1.000 0.0	14.940 0.0		Vel = 6.15
3 to 4	20.34	1.682 120	0.0 0.0	6.000 0.0	14.992 0.0		Vel = 9.08
4 to 5	21.60	1.682 120	0.0 0.0	9.500 0.0	15.645 0.0		Vel = 12.20
5 to 6	22.77	1.682 120	0.0 0.0	9.750 0.0	17.428 0.0		Vel = 15.49
6 to 7	107.27	0.2920	0.0	9.750	2.847		
6 to 7	25.22	1.682 120	0.0 0.0	11.830 0.0	20.275 0.0		K Factor = 5.60 Vel = 19.13

Hyd. Ref. Point	Qa  Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
7	28.21	1.682	1T 9.9	8.000	25.379			K Factor = 5.60	
to		120	0.0	9.900	0.0				
8	160.7	0.6166	0.0	17.900	11.037			Vel = 23.20	
	0.0								
	160.70				36.416			K Factor = 26.63	
9	27.41	1.682	0.0	9.500	23.963			K Factor = 5.60	
to		120	0.0	0.0	0.0				
10	27.41	0.0234	0.0	9.500	0.222			Vel = 3.96	
10	27.54	1.682	2E 9.9	12.880	24.185			K Factor = 5.60	
to		120	0.0	9.900	0.0				
11	54.95	0.0847	0.0	22.780	1.929			Vel = 7.93	
11	28.62	1.682	0.0	8.000	26.114			K Factor = 5.60	
to		120	0.0	0.0	0.0				
12A	83.57	0.1840	0.0	8.000	1.472			Vel = 12.07	
12A	29.41	1.682	0.0	8.000	27.586			K Factor = 5.60	
to		120	0.0	0.0	0.0				
12	112.98	0.3212	0.0	8.000	2.570			Vel = 16.31	
12	30.75	1.682	1T 9.9	4.000	30.156			K Factor = 5.60	
to		120	0.0	9.900	0.0				
13	143.73	0.5017	0.0	13.900	6.973			Vel = 20.75	
	0.0								
	143.73				37.129			K Factor = 23.59	
14H	30.56	1.049	1T 5.0	1.580	29.789			K Factor = 5.60	
to		120	0.0	5.000	0.0				
14	30.56	0.2851	0.0	6.580	1.876			Vel = 11.34	
14	0.0	1.682	0.0	10.750	31.665				
to		120	0.0	0.0	0.0				
15	30.56	0.0287	0.0	10.750	0.308			Vel = 4.41	
15	31.67	1.682	0.0	8.000	31.973			K Factor = 5.60	
to		120	0.0	0.0	0.0				
16A	62.23	0.1066	0.0	8.000	0.853			Vel = 8.99	
16A	32.08	1.682	0.0	8.000	32.826			K Factor = 5.60	
to		120	0.0	0.0	0.0				
16	94.31	0.2300	0.0	8.000	1.840			Vel = 13.62	
16	32.98	1.682	1T 9.9	4.000	34.666			K Factor = 5.60	
to		120	0.0	9.900	0.0				
17	127.29	0.4006	0.0	13.900	5.569			Vel = 18.38	
	0.0								
	127.29				40.235			K Factor = 20.07	
8	160.70	2.635	0.0	10.290	36.416				
to		120	0.0	0.0	0.0				
13	160.7	0.0693	0.0	10.290	0.713			Vel = 9.45	

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
13	143.73	2.635		0.0	13.750	37.129				
to		120		0.0	0.0	0.0				
17	304.43	0.2259		0.0	13.750	3.106		Vel =	17.91	
17	127.29	2.635	1T	16.474	13.750	40.235				
to		120		0.0	16.474	0.0				
18	431.72	0.4311		0.0	30.224	13.029		Vel =	25.40	
18	0.0	2.635	1T	16.474	30.540	53.264				
to		120		0.0	16.474	0.0				
19	431.72	0.4311		0.0	47.014	20.268		Vel =	25.40	
19	0.0	2.635	1B	9.61	10.000	73.532				
to		120	15T	247.113	26.084	15.000				
19M	431.72	0.4311		0.0	36.084	15.556		Vel =	25.40	
19M	100.00	6.357	4E	70.411	270.000	104.088		Qa =	100	
to		120	1T	37.72	120.704	75.576				
HZT	531.72	0.0087	1B	12.573	390.704	3.397		Vel =	5.37	
HZT	0.0	6.357	1T	37.72	10.000	183.061				
to		120	1B	12.573	50.293	3.032				
CON	531.72	0.0087		0.0	60.293	0.524		Vel =	5.37	
CON	0.0	6.357	1S	40.235	5.000	186.617				
to		120	1E	17.603	70.411	10.000		* Fixed loss =	10	
HZD	531.72	0.0087	1B	12.573	75.411	0.656		Vel =	5.37	
	0.0									
	531.72					197.273		K Factor =	37.86	
System Demand Pressure						197.273				
Safety Margin						150.025				
Continuation Pressure						347.298				
Pressure @ Pump Outlet						347.298				
Pressure From Pump Curve						-276.932				
Pressure @ Pump Inlet						70.366				
HZS	0.0	6.357	1E	17.603	5.000	70.366				
to		120	1G	3.772	59.095	0.0				
RED	531.72	0.0087	1T	37.72	64.095	0.557		Vel =	5.37	
RED	0.0	8.249	1B	14.094	12.500	70.923				
to		120	1T	41.108	55.202	6.280				
MF4	531.72	0.0025		0.0	67.702	0.166		Vel =	3.19	
MF4	0.0	8.249	1Zai	0.0	1.000	77.369				
to		120	1E	21.141	21.141	11.237		* Fixed loss =	10.371	
DI	531.72	0.0024		0.0	22.141	0.054		Vel =	3.19	
DI	0.0	8.27	1F	14.234	45.000	88.660				
to		140	1G	6.326	104.382	1.732				
HDI	531.72	0.0018	1T	55.354	149.382	0.272		Vel =	3.18	
			1E	28.468						

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	*****
HDI	150.00	10.28	2F 33.148	420.000	90.664		Qa = 150		
to		140	1T 75.336	116.018	0.0				
HD2	681.72	0.0010	1G 7.534	536.018	0.534		Vel = 2.64		
HD2	720.00	10.28	1F 16.574	131.000	91.198		Qa = 720		
to		140	2G 15.067	31.641	1.366		* Fixed loss = 3.098		
POC	1401.72	0.0038	1Zaf 0.0	162.641	0.615		Vel = 5.42		
	0.0								
	1401.72				93.179		K Factor = 145.21		