

... Fire Protection by Computer Design

ABL FIRE PROTECTION  
RALEIGH, NORTH CAROLINA

Job Name : SOLEIL CENTER 42ND FLOOR  
Building :  
Location : 4501 CREEDMOOR ROAD, RALEIGH, NORTH CAROLINA  
System : 42ND FLR  
Contract : 2698  
Data File : SOLEIL 42ND.WXF

Hydraulic Design Information Sheet

Name - SOLEIL CENTER Date - 11-25-07  
 Location - 4501 CREEDMOOR ROAD, RALEIGH, NORTH CAROLINA  
 Building - System No. - 42ND FLR  
 Contractor - Contract No. - 2698  
 Calculated By - JSB Drawing No. - FP-59  
 Construction: ( ) Combustible (X) Non-Combustible Ceiling Height - 8'-0  
 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 VK300
E	Elevation at Highest Outlet	- 349.500	( ) 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

Calculation Flow Required - 550.63 Press Required - 326.115 AT PUMP DISCHARGE  
 Summary C-Factor Used: 120 Overhead 140 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
T	( ) Mult. Row		( ) Open Shelf

O

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

G

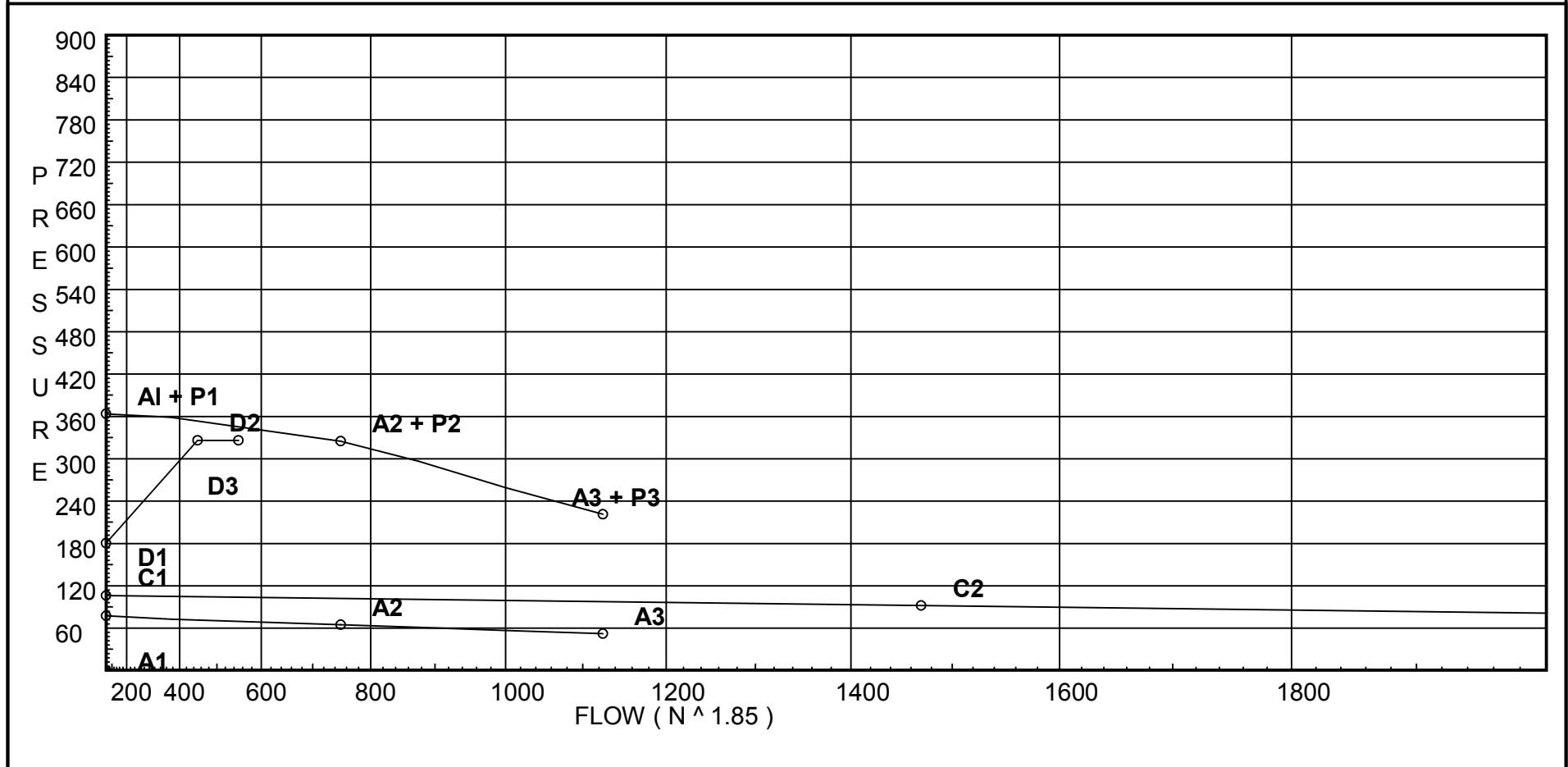
E Horizontal Barriers Provided:

# Water Supply Curve (C)

ABL FIRE PROTECTION  
SOLEIL CENTER 42ND FLOOR

Page 2  
Date

<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 : 180.386 D2 - System Flow : 450.63 D2 - System Pressure : 326.115 Hose ( Adj City ) : 870 Hose ( Demand ) : 100 D3 - System Demand : 550.63 Safety Margin : 19.600
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# Fittings Used Summary

ABL FIRE PROTECTION  
SOLEIL CENTER 42ND FLOOR

Page 3  
Date

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
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

ABL FIRE PROTECTION  
SOLEIL CENTER 42ND FLOOR

Page 4  
Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
1	417.5	5.6	21.56	na	26.0	0.2	130	7.0
2	417.5	5.6	21.92	na	26.22	0.2	130	7.0
3	417.5	5.6	24.8	na	27.89	0.2	130	7.0
4	417.5	5.6	27.74	na	29.49	0.2	130	7.0
5	417.5	5.6	29.95	na	30.65	0.2	130	7.0
6	417.5	5.6	30.45	na	30.9	0.2	130	7.0
7	417.5	5.6	32.26	na	31.81	0.2	130	7.0
9	417.5	5.6	27.95	na	29.6	0.2	130	7.0
10	417.5	5.6	27.26	na	29.24	0.2	130	7.0
11	417.5		29.23	na				
12	417.5	5.6	30.48	na	30.92	0.2	130	7.0
13	417.5	5.6	32.19	na	31.77	0.2	130	7.0
14	417.5	5.6	30.64	na	31.0	0.2	130	7.0
15	417.5	5.6	30.88	na	31.12	0.2	130	7.0
16	417.5	5.6	31.75	na	31.55	0.2	130	7.0
17	417.5	5.6	33.61	na	32.46	0.2	130	7.0
8	417.5		36.64	na				
18	417.5		38.2	na				
19	417.5		88.31	na				
20	417.5		112.91	na				
42ND	417.5		136.54	na	100.0			
HZT	24.5		311.82	na				
CON	17.5		315.42	na				
HZD	17.5		326.12	na				
HZS	17.5		70.05	na				
RED	17.5		70.65	na				
MF4	3.0		77.11	na				
DI	1.0		88.3	na				
HDI	-3.0		90.32	na	150.0			
HD2	-3.0		90.88	na	720.0			
POC	1.0		92.86	na				

The maximum velocity is 26.51 and it occurs in the pipe between nodes 18 and 19

Final Calculations - Hazen-Williams

ABL FIRE PROTECTION  
SOLEIL CENTER 42ND FLOOR

Page 5  
Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
1	26.00	1.442		0.0	8.000	21.556				
to		120		0.0	0.0	0.0				
2	26.0	0.0449		0.0	8.000	0.359				Vel = 5.11
2	26.22	1.442	2E	7.432	10.250	21.915				K Factor = 5.60
to		120		0.0	7.432	0.0				
3	52.22	0.1631		0.0	17.682	2.884				Vel = 10.26
3	27.88	1.442		0.0	8.170	24.799				K Factor = 5.60
to		120		0.0	0.0	0.0				
4	80.1	0.3600		0.0	8.170	2.941				Vel = 15.74
4	29.50	1.442	1T	7.432	6.420	27.740				K Factor = 5.60
to		120		0.0	7.432	0.0				
8	109.6	0.6429		0.0	13.852	8.905				Vel = 21.53
	0.0									
	109.60					36.645				K Factor = 18.11
5	30.65	1.442		0.0	8.170	29.954				K Factor = 5.60
to		120		0.0	0.0	0.0				
6	30.65	0.0608		0.0	8.170	0.497				Vel = 6.02
6	30.90	1.442		0.0	8.170	30.451				K Factor = 5.60
to		120		0.0	0.0	0.0				
7	61.55	0.2212		0.0	8.170	1.807				Vel = 12.09
7	31.81	1.442	1T	7.432	1.750	32.258				K Factor = 5.60
to		120		0.0	7.432	0.0				
8	93.36	0.4778		0.0	9.182	4.387				Vel = 18.34
	0.0									
	93.36					36.645				K Factor = 15.42
9	29.60	1.049		0.0	4.790	27.946				K Factor = 5.60
to		120		0.0	0.0	0.0				
11	29.6	0.2687		0.0	4.790	1.287				Vel = 10.99
	0.0									
	29.60					29.233				K Factor = 5.47
10	29.24	1.049	1T	5.0	2.500	27.263				K Factor = 5.60
to		120		0.0	5.000	0.0				
11	29.24	0.2627		0.0	7.500	1.970				Vel = 10.85
11	29.60	1.682		0.0	12.960	29.233				
to		120		0.0	0.0	0.0				
12	58.84	0.0961		0.0	12.960	1.246				Vel = 8.50
12	30.92	1.682		0.0	8.170	30.479				K Factor = 5.60
to		120		0.0	0.0	0.0				
13	89.76	0.2099		0.0	8.170	1.715				Vel = 12.96
13	31.77	1.682	1T	9.9	6.420	32.194				K Factor = 5.60
to		120		0.0	9.900	0.0				
18	121.53	0.3678		0.0	16.320	6.002				Vel = 17.55

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	0.0 121.53					38.196		K Factor = 19.66	
14 to 15	31.00 31.0	1.682 120 0.0294	0.0 0.0 0.0	8.170 0.0 8.170	30.642 0.0 0.240			K Factor = 5.60 Vel = 4.48	
15 to 16	31.12 62.12	1.682 120 0.1062	0.0 0.0 0.0	8.170 0.0 8.170	30.882 0.0 0.868			K Factor = 5.60 Vel = 8.97	
16 to 17	31.55 93.67	1.682 120 0.2273	0.0 0.0 0.0	8.170 0.0 8.170	31.750 0.0 1.857			K Factor = 5.60 Vel = 13.53	
17 to 18	32.47 126.14	1.682 120 0.3939	1T 9.9 0.0 0.0	1.750 9.900 11.650	33.607 0.0 4.589			K Factor = 5.60 Vel = 18.21	
	0.0 126.14					38.196		K Factor = 20.41	
8 to 18	202.95 202.95	2.635 120 0.1067	0.0 0.0 0.0	14.540 0.0 14.540	36.645 0.0 1.551			Vel = 11.94	
18 to 19	247.68 450.63	2.635 120 0.4667	1E 8.237 1T 16.474 0.0	82.670 24.711 107.381	38.196 0.0 50.112			Vel = 26.51	
19 to 20	0.0 450.63	2.635 120 0.4667	1E 8.237 1B 9.61 0.0	34.880 17.847 52.727	88.308 0.0 24.606			Vel = 26.51	
20 to 42ND	0.0 450.63	2.635 120 0.4667	1T 16.474 0.0 0.0	2.000 16.474 18.474	112.914 15.000 8.621			* Fixed loss = 15 Vel = 26.51	
42ND to HZT	100.00 550.63	6.357 120 0.0093	4E 70.411 1T 37.72 1B 12.573	427.000 120.704 547.704	136.535 170.208 5.082			Qa = 100 Vel = 5.57	
HZT to CON	0.0 550.63	6.357 120 0.0093	1T 37.72 1B 12.573 0.0	10.000 50.293 60.293	311.825 3.032 0.559			Vel = 5.57	
CON to HZD	0.0 550.63	6.357 120 0.0093	1S 40.235 1E 17.603 1B 12.573	5.000 70.411 75.411	315.416 10.000 0.699			* Fixed loss = 10 Vel = 5.57	
	0.0 550.63					326.115		K Factor = 30.49	
System Demand Pressure					326.115				
Safety Margin					19.600				
Continuation Pressure					345.715				

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
Pressure @ Pump Outlet					345.715				
Pressure From Pump Curve					-275.661				
Pressure @ Pump Inlet					70.054				
HZS to RED	0.0 550.63	6.357 120 0.0093	1E 17.603 1G 3.772 1T 37.72	5.000 59.095 64.095	70.054 0.0 0.595		Vel = 5.57		
RED to MF4	0.0 550.63	8.249 120 0.0026	1B 14.094 1T 41.108 0.0	12.500 55.202 67.702	70.649 6.280 0.176		Vel = 3.31		
MF4 to DI	0.0 550.63	8.249 120 0.0026	1Zai 0.0 1E 21.141 0.0	1.000 21.141 22.141	77.105 11.134 0.058		* Fixed loss = 10.267 Vel = 3.31		
DI to HDI	0.0 550.63	8.27 140 0.0019	1F 14.234 1G 6.326 1T 55.354 1E 28.468	45.000 104.382 149.382	88.297 1.732 0.289		Vel = 3.29		
HDI to HD2	150.00 700.63	10.28 140 0.0010	2F 33.148 1T 75.336 1G 7.534	420.000 116.018 536.018	90.318 0.0 0.562		Qa = 150 Vel = 2.71		
HD2 to POC	720.00 1420.63	10.28 140 0.0039	1F 16.574 2G 15.067 1Zaf 0.0	131.000 31.641 162.641	90.880 1.347 0.631		Qa = 720 * Fixed loss = 3.079 Vel = 5.49		
	0.0 1420.63						92.858	K Factor = 147.43	