

... Fire Protection by Computer Design

ABL FIRE PROTECTION  
300 HOKE STREET  
RALEIGH, NC  
919-835-2225

Job Name : SOLEIL CENTER: 18TH FLOOR RES  
Building : TOWER  
Location : 4501 CREEDMOOR DR, RALEIGH, NORTH CAROLINA  
System : 18TH-2 FLR  
Contract :  
Data File : SOLEIL 18-2TH.WXF

HYDRAULIC DESIGN INFORMATION SHEET

Name - SOLEIL CENTER Date - 11-25-07  
 Location - 4501 CREEDMOOR DR, RALEIGH, NORTH CAROLINA  
 Building - TOWER System No. - 18TH-2 FLR  
 Contractor - Contract No. -  
 Calculated By - JSB Drawing No. - FP-47  
 Construction: ( ) Combustible (X) Non-Combustible Ceiling Height VARIES  
 OCCUPANCY - RESIDENTIAL

S Type of Calculation: (X)NFPA 13 Residential ( )NFPA 13R ( )NFPA 13D  
 Y Number of Sprinklers Flowing: ( )1 ( )2 (X)4 ( )  
 S ( )Other  
 T ( )Specific Ruling Made by Date  
 E  
 M Listed Flow at Start Point - 25.6 Gpm System Type  
 Listed Pres. at Start Point - 14.5 Psi (X) Wet ( ) Dry  
 D MAXIMUM LISTED SPACING 18' x 18' ( ) Deluge ( ) PreAction  
 E Domestic Flow Added - 720 Gpm Sprinkler or Nozzle  
 S Additional Flow Added - 100 Gpm Make TYCO Model LF-II  
 I Elevation at Highest Outlet - 180 Feet Size 1/2 K-Factor 4.9  
 G Note: Temperature Rating 155  
 N

Calculation Gpm Required 176.10 Psi Required 231.124 AT PUMP DISCHARGE  
 Summary C-Factor Used: Overhead 150 Underground 150

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test -	Rated Cap. 1000	Cap.
T	Time of Test -	@ Psi 180	Elev.
E	Static (Psi) - 106	Elev. 0	
R	Residual (Psi) - 92	Other	Well
	Flow (Gpm) - 1470		Proof Flow Gpm
S	Elevation - 0		

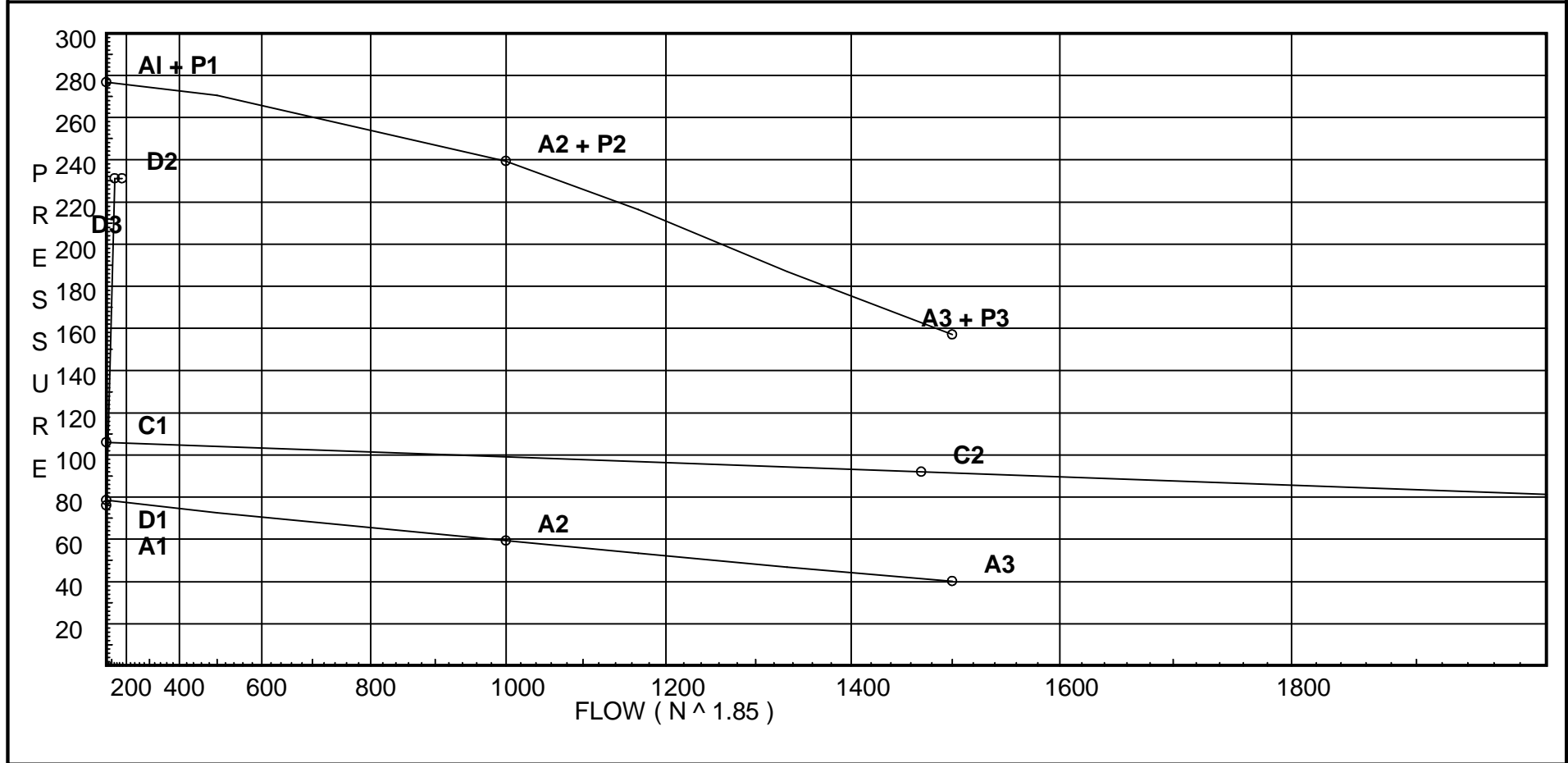
P Location:  
 P  
 L Source of Information:  
 Y

# 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: 78.654 A2 - Adj Resid : 59.292 @ 1000 A3 - Adj Resid : 40.022 @ 1500	<b>Pump Data:</b> P1 - Pump Churn Pressure : 198 P2 - Pump Rated Pressure : 180 P2 - Pump Rated Flow : 1000 P3 - Pump Pressure @ Max Flow : 117 P3 - Pump Max Flow : 1500 City Residual Flow @ 0 = 4390.85 City Residual Flow @ 20 = 3921.60 City Water @ 150% of Pump = 91.47	<b>Demand:</b> D1 - Elevation : 76.009 D2 - System Flow : 126.102 D2 - System Pressure : 231.124 Hose ( Adj City ) : 770 Hose ( Demand ) : 50 D3 - System Demand : 176.102 Safety Margin : 43.164
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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																			

## Units Summary

Diameter Units           Inches  
Length Units               Feet  
Flow Units                 US Gallons per Minute  
Pressure Units             Pounds per Square Inch

Pressure / Flow Summary - STANDARD

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
1	180.0	4.2	45.82	na	28.43	0.1	256	14.5
2H	176.5	4.9	43.72	na	32.4	0.1	324	12.0
2	180.0		46.58	na				
4H	176.5	4.9	49.53	na	34.49	0.1	324	12.0
4	180.0		53.31	na				
6	180.0	4.2	53.73	na	30.79	0.1	256	14.5
3	180.0		56.0	na				
5	180.0		56.6	na				
7	180.0		58.2	na				
8	180.0		107.63	na				
AA	180.0		121.56	na				
BB	180.0		125.73	na				
18	180.0		126.36	na				
19	180.0		127.49	na				
20	180.0		128.61	na				
21	180.0		134.55	na				
18TH	180.0		150.17	na	50.0			
LZT	24.5		217.94	na				
CON	17.5		221.04	na				
LZD	17.5		231.12	na				
LZS	17.5		76.29	na				
RED	17.5		76.36	na				
MF4	3.0		82.66	na				
DI	1.0		95.85	na				
HDI	-3.0		97.62	na	50.0			
HD2	-3.0		97.69	na	720.0			
POC	1.0		99.8	na				

The maximum velocity is 20.5 and it occurs in the pipe between nodes 2 and 3

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
1	28.43	1.101		0.0	5.790	45.824			K Factor = 4.20	
to		150		0.0	0.0	0.0				
2	28.43	0.1304		0.0	5.790	0.755			Vel = 9.58	
	0.0									
	28.43					46.579			K Factor = 4.17	
2H	32.40	0.874	1T	8.053	0.500	43.722			K Factor = 4.90	
to		150		0.0	8.052	-1.516				
2	32.4	0.5113		0.0	8.552	4.373			Vel = 17.33	
2	28.43	1.101	1T	9.563	8.130	46.579				
to		150		0.0	9.562	0.0				
3	60.83	0.5327		0.0	17.692	9.425			Vel = 20.50	
	0.0									
	60.83					56.004			K Factor = 8.13	
4H	34.48	0.874	2E	8.053	1.170	49.530			K Factor = 4.90	
to		150		0.0	8.052	-1.516				
4	34.48	0.5740		0.0	9.222	5.293			Vel = 18.44	
4	0.0	1.101	1T	9.563	8.130	53.307				
to		150		0.0	9.562	0.0				
5	34.48	0.1864		0.0	17.692	3.298			Vel = 11.62	
	0.0									
	34.48					56.605			K Factor = 4.58	
6	30.79	1.101	2E	7.65	12.380	53.727			K Factor = 4.20	
to		150	1T	9.563	17.212	0.0				
7	30.79	0.1511		0.0	29.592	4.472			Vel = 10.38	
	0.0									
	30.79					58.199			K Factor = 4.04	
3	60.83	1.598		0.0	6.920	56.004				
to		150		0.0	0.0	0.0				
5	60.83	0.0868		0.0	6.920	0.601			Vel = 9.73	
5	34.49	1.598		0.0	8.000	56.605				
to		150		0.0	0.0	0.0				
7	95.32	0.1992		0.0	8.000	1.594			Vel = 15.25	
7	30.78	1.598	2E	11.656	124.500	58.199				
to		150	1T	11.656	23.312	0.0				
8	126.1	0.3344		0.0	147.812	49.430			Vel = 20.17	
8	0.0	1.598	1T	11.656	30.000	107.629				
to		150		0.0	11.656	0.0				
AA	126.1	0.3344		0.0	41.656	13.930			Vel = 20.17	
AA	0.0	2.157	1T	12.307	23.250	121.559				
to		120		0.0	12.307	0.0				
BB	126.1	0.1173		0.0	35.557	4.170			Vel = 11.07	

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
BB	0.0	2.157		0.0	5.420	125.729				
to 18	126.1	120 0.1172		0.0	0.0	0.0				
18	0.0	2.157		0.0	9.580	126.364				
to 19	126.1	120 0.1172		0.0	0.0	0.0			Vel = 11.07	
19	0.0	2.157		0.0	9.580	127.487				
to 20	126.1	120 0.1173		0.0	0.0	0.0			Vel = 11.07	
20	0.0	2.157	1E	6.153	44.500	128.611				
to 21	126.1	120 0.1172		0.0	6.153	0.0				
21	0.0	2.635	1B	9.61	4.500	134.550				
to 18TH	126.1	120 0.0442		0.0	9.610	15.000			* Fixed loss = 15	
18TH	50.00	6.357	4E	70.411	251.000	150.174			Qa = 50	
to LZT	176.1	120 0.0011	1T	37.72	120.704	67.347			Vel = 1.78	
LZT	0.0	6.357	1T	37.72	10.000	217.940				
to CON	176.1	120 0.0011	1B	12.573	50.293	3.032			Vel = 1.78	
CON	0.0	6.357	1S	40.235	5.000	221.039				
to LZD	176.1	120 0.0011	1E	17.603	70.411	10.000			* Fixed loss = 10	
	0.0		1B	12.573	75.411	0.085			Vel = 1.78	
	176.10					231.124			K Factor = 11.58	
System Demand Pressure						231.124				
Safety Margin						43.164				
Continuation Pressure						274.288				
Pressure @ Pump Outlet						274.288				
Pressure From Pump Curve						-197.998				
Pressure @ Pump Inlet						76.290				
LZS	0.0	6.357	1E	17.603	5.000	76.290				
to RED	176.1	120 0.0011	1G	3.772	59.095	0.0				
RED	0.0	8.249	1B	14.094	12.500	76.362			Vel = 1.78	
to MF4	176.1	120 0.0003	1T	41.108	55.202	6.280				
MF4	0.0	8.249		0.0	67.702	0.021			Vel = 1.06	
to DI	176.1	120 0.0003	1Zai	0.0	1.000	82.663				
			1E	21.141	21.141	13.179			* Fixed loss = 12.313	
				0.0	22.141	0.007			Vel = 1.06	

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 *****
DI to HDI	0.0 176.1	8.27 140 0.0002	1F 14.234 1G 6.326 1T 55.354 1E 28.468	45.000 104.382 149.382	95.849 1.732 0.036		Vel = 1.05	
HDI to HD2	50.00 226.1	10.28 140 0.0001	2F 33.148 1T 75.336 1G 7.534	420.000 116.018 536.018	97.617 0.0 0.069		Qa = 50 Vel = 0.87	
HD2 to POC	720.00 946.1	10.28 140 0.0018	1F 16.574 2G 15.067 1Zaf 0.0	131.000 31.641 162.641	97.686 1.822 0.297		Qa = 720 * Fixed loss = 3.554 Vel = 3.66	
	0.0 946.10				99.805		K Factor = 94.70	