

... Fire Protection by Computer Design

ABL FIRE PROTECTION  
RALEIGH, NORTH CAROLINA

Job Name : SOLEIL CENTER: 15TH FLOOR RES  
Building : TOWER  
Location : 4501 CREEDMOOR DR, RALEIGH, NORTH CAROLINA  
System : 15TH FLR  
Contract :  
Data File : SOLEIL 15TH.WXF

HYDRAULIC DESIGN INFORMATION SHEET

Name - SOLEIL CENTER Date - 11-25-07  
 Location - 4501 CREEDMOOR DR, RALEIGH, NORTH CAROLINA  
 Building - TOWER System No. - 15TH FLR  
 Contractor - Contract No. -  
 Calculated By - JSB Drawing No. - FP-41  
 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 176.91 Psi Required 254.214 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

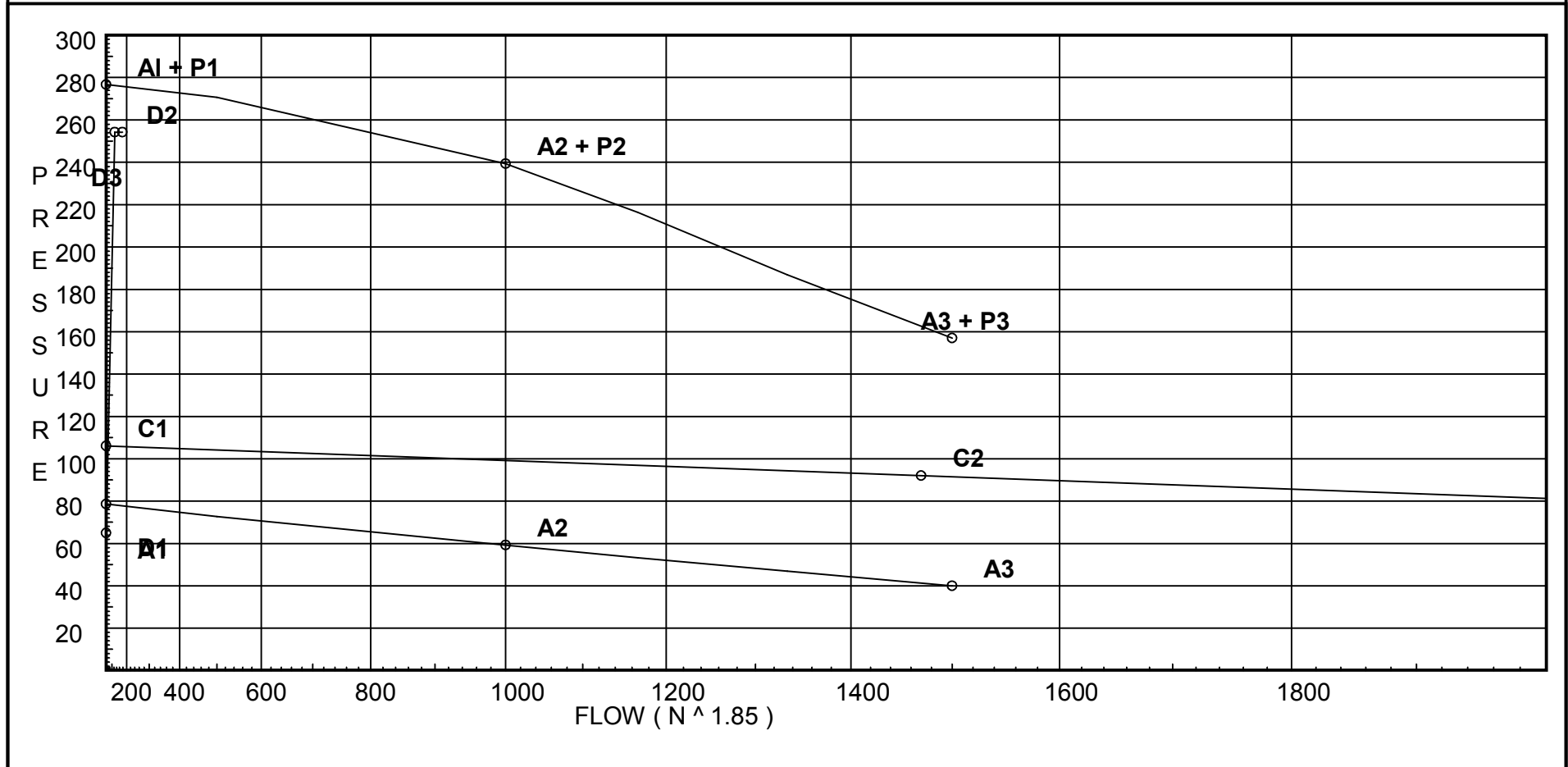
P Location:  
 P  
 L Source of Information:  
 Y

# 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 : 64.965 D2 - System Flow : 126.911 D2 - System Pressure : 254.214 Hose ( Adj City ) : 770 Hose ( Demand ) : 50 D3 - System Demand : 176.911 Safety Margin : 20.068
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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
Mb	B Ball Milw BB-SC100			2.25	2	2.5	2.25	10													
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.
1	151.5	4.2	47.1	na	28.83	0.1	256	14.5
2H	151.0	4.9	43.72	na	32.4	0.1	324	12.0
2	151.5		47.88	na				
4H	151.0	4.9	49.63	na	34.52	0.1	324	12.0
4	151.5		54.72	na				
6	151.5	4.2	55.06	na	31.16	0.1	256	14.5
3	151.5		57.42	na				
5	151.5		58.02	na				
7	151.5		59.63	na				
8	151.5		161.7	na				
9	151.5		170.06	na				
15TH	151.5		185.64	na	50.0			
LZT	24.5		241.03	na				
CON	17.5		244.13	na				
LZD	17.5		254.21	na				
LZS	17.5		76.28	na				
RED	17.5		76.36	na				
MF4	3.0		82.66	na				
DI	1.0		95.84	na				
HDI	-3.0		97.61	na	50.0			
HD2	-3.0		97.68	na	720.0			
POC	1.0		99.79	na				

The maximum velocity is 20.63 and it occurs in the pipe between nodes 2 and 3

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	*****
1	28.83	1.101		0.0	5.790	47.104				
to		150		0.0	0.0	0.0				
2	28.83	0.1337		0.0	5.790	0.774				K Factor = 4.20
	0.0									Vel = 9.72
	28.83					47.878				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	-0.217				
2	32.4	0.5113		0.0	8.552	4.373				Vel = 17.33
2	28.83	1.101	1T	9.563	8.130	47.878				
to		150		0.0	9.562	0.0				
3	61.23	0.5391		0.0	17.692	9.538				Vel = 20.63
	0.0									
	61.23					57.416				K Factor = 8.08
4H	34.52	0.874	2E	8.053	1.170	49.634				K Factor = 4.90
to		150		0.0	8.052	-0.217				
4	34.52	0.5750		0.0	9.222	5.303				Vel = 18.46
4	0.0	1.101	1T	9.563	8.130	54.720				
to		150		0.0	9.562	0.0				
5	34.52	0.1868		0.0	17.692	3.304				Vel = 11.63
	0.0									
	34.52					58.024				K Factor = 4.53
6	31.16	1.101	2E	7.65	12.380	55.058				K Factor = 4.20
to		150	1T	9.563	17.212	0.0				
7	31.16	0.1546		0.0	29.592	4.574				Vel = 10.50
	0.0									
	31.16					59.632				K Factor = 4.04
3	61.23	1.598		0.0	6.920	57.416				
to		150		0.0	0.0	0.0				
5	61.23	0.0879		0.0	6.920	0.608				Vel = 9.79
5	34.52	1.598		0.0	8.000	58.024				
to		150		0.0	0.0	0.0				
7	95.75	0.2010		0.0	8.000	1.608				Vel = 15.32
7	31.16	1.598	6E	34.968	255.000	59.632				
to		150	1T	11.656	46.624	0.0				
8	126.91	0.3384		0.0	301.624	102.068				Vel = 20.30
8	0.0	1.682	2E	9.9	8.000	161.700				
to		120	1Mb	3.094	12.994	0.0				
9	126.91	0.3984		0.0	20.994	8.365				Vel = 18.32
9	0.0	2.635	15E	123.557	4.500	170.065				
to		120		0.0	8.237	15.000				
15TH	126.91	0.0448		0.0	12.737	0.570				Vel = 7.47

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	***** Notes *****
15TH to LZT	50.00 176.91	6.357 120 0.0011	4E 70.411 1T 37.72 1B 12.573	222.500 120.704 343.204	185.635 55.004 0.389		Qa = 50 Vel = 1.79
LZT to CON	0.0 176.91	6.357 120 0.0011	1T 37.72 1B 12.573 0.0	10.000 50.293 60.293	241.028 3.032 0.068		Vel = 1.79
CON to LZD	0.0 176.91	6.357 120 0.0011	1S 40.235 1E 17.603 1B 12.573	5.000 70.411 75.411	244.128 10.000 0.086		* Fixed loss = 10 Vel = 1.79
	0.0 176.91				254.214		K Factor = 11.10
System Demand Pressure					254.214		
Safety Margin					20.068		
Continuation Pressure					274.282		
Pressure @ Pump Outlet					274.282		
Pressure From Pump Curve					-197.998		
Pressure @ Pump Inlet					76.284		
LZS to RED	0.0 176.91	6.357 120 0.0011	1E 17.603 1G 3.772 1T 37.72	5.000 59.095 64.095	76.284 0.0 0.072		Vel = 1.79
RED to MF4	0.0 176.91	8.249 120 0.0003	1B 14.094 1T 41.108 0.0	12.500 55.202 67.702	76.356 6.280 0.022		Vel = 1.06
MF4 to DI	0.0 176.91	8.249 120 0.0003	1Zai 0.0 1E 21.141 0.0	1.000 21.141 22.141	82.658 13.174 0.006		* Fixed loss = 12.307 Vel = 1.06
DI to HDI	0.0 176.91	8.27 140 0.0002	1F 14.234 1G 6.326 1T 55.354 1E 28.468	45.000 104.382 149.382	95.838 1.732 0.036		Vel = 1.06
HDI to HD2	50.00 226.91	10.28 140 0.0001	2F 33.148 1T 75.336 1G 7.534	420.000 116.018 536.018	97.606 0.0 0.070		Qa = 50 Vel = 0.88
HD2 to POC	720.00 946.91	10.28 140 0.0018	1F 16.574 2G 15.067 1Zaf 0.0	131.000 31.641 162.641	97.676 1.821 0.297		Qa = 720 * Fixed loss = 3.553 Vel = 3.66
	0.0 946.91				99.794		K Factor = 94.79