



AMERICAN

FIRE SPRINKLER

HCA – SURGERY CENTER OF LEE’S SUMMIT

1950 SE SHENANDOAH DRIVE
LEE’S SUMMIT, MO 64063

HYDRAULIC CALCULATIONS INDEX REVISION #1

- WET SYSTEM
 - AREA 1
 - AREA 2
- DRY SYSTEM
 - AREA 3
 - AREA 4





Job Number 1	Designer	
Job Name: Drawing2	Phone	FAX
Address 1	State Certification/License Number	
Address 2	AHJ	
Address 3	Job Site/Building	

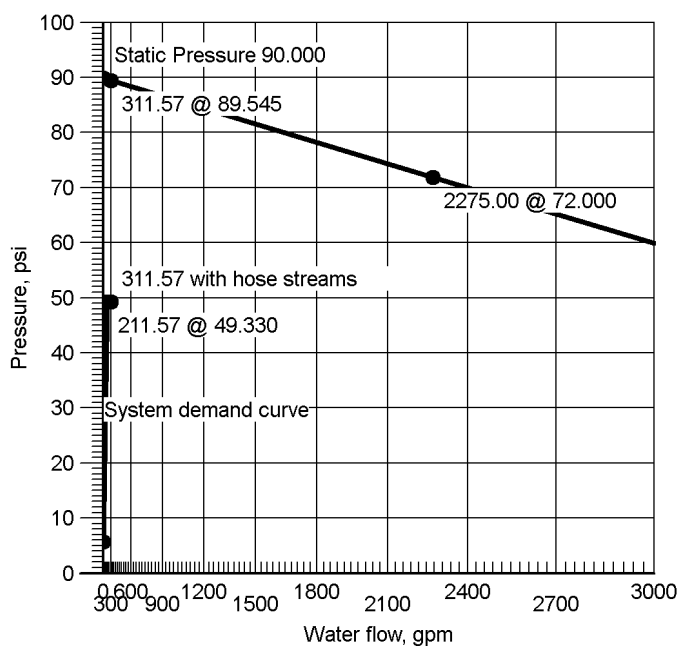
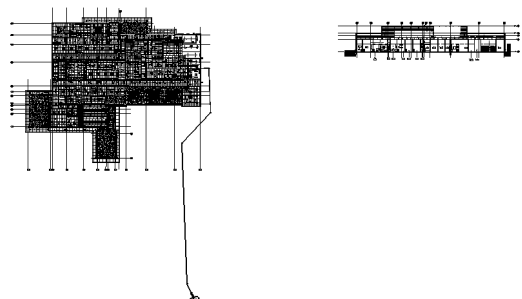
Density 0.10 gpm/ft²	Area of Application 1500 ft² (Actual 1056 ft²)	
Most Demanding Sprinkler Data 5.6 K-Factor 14.82 at 7.000	Hose Streams 100.00	
Coverage Per Sprinkler 225 ft²	Number Of Sprinklers Calculated 13	Number Of Nozzles Calculated 0
System Pressure Demand 49.330	System Flow Demand 211.57	
Total Demand 311.57 @ 49.330	Pressure Result +40.215 (44.9%)	

Check Point Gauges

<u>Node</u>	<u>Name</u>	<u>Flow(gpm)</u>	<u>Hose Flow(gpm)</u>	<u>Static(psi)</u>	<u>Residual(psi)</u>	<u>Identifier</u>	<u>Pressure(psi)</u>	<u>K-Factor(K)</u>	<u>Flow(gpm)</u>
1019	Water Supply	2275.00	100.00	90.000	72.000	BOR (1016)	35.721	35.4	211.57

LS ASC.cad

Water Supply at Node 1019 (2275.00, 0.00, 90.000, 72.000)





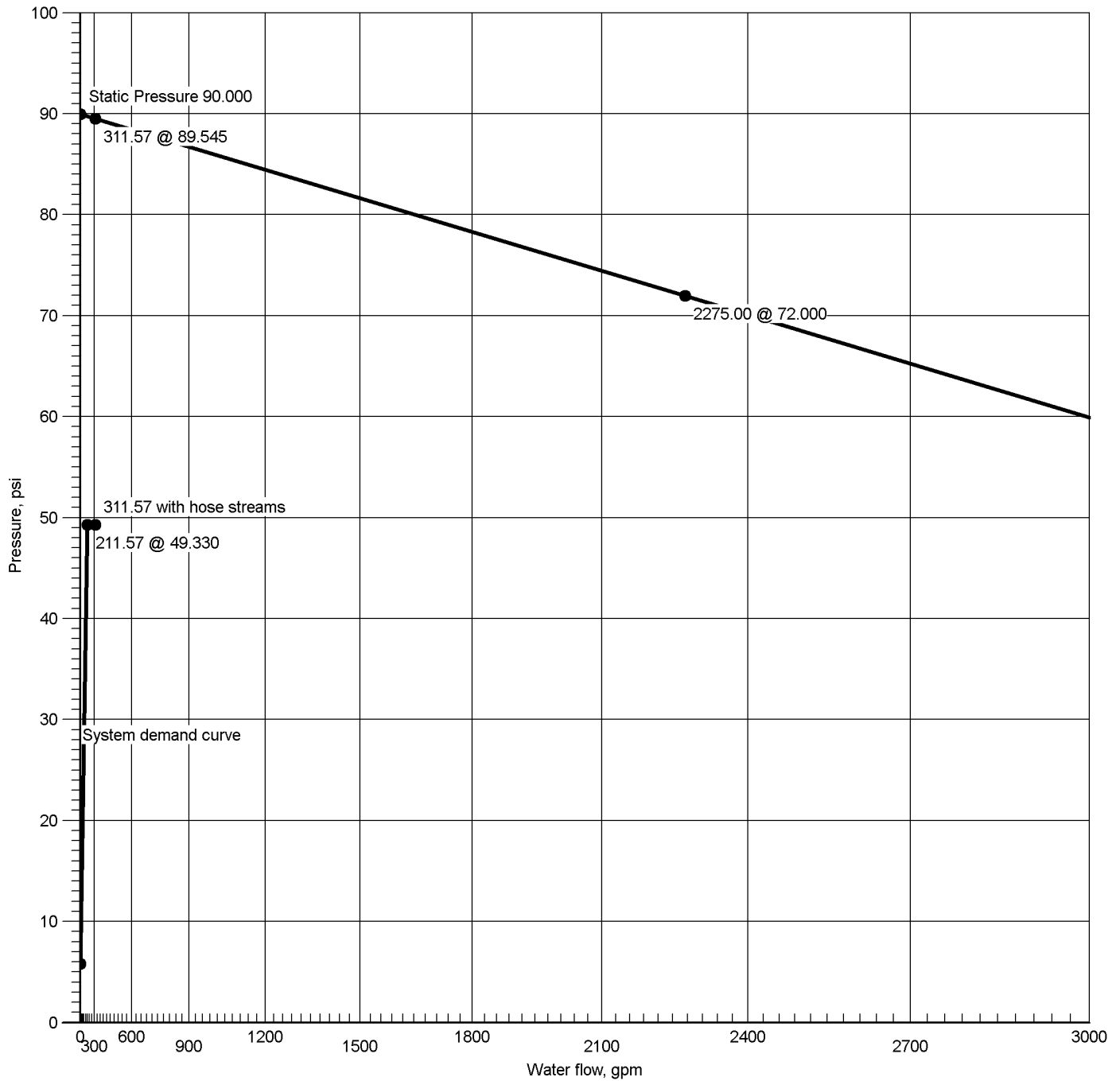
Hydraulic Summary

Job Number: 1
Report Description: Light Hazard - AREA 1 -

Job											
Job Number 1					Designer						
Job Name: Drawing2					State Certification/License Number						
Address 1					AHJ						
Address 2					Job Site/Building						
Address 3					Drawing Name LS ASC.cad						
System					Remote Area(s)						
Most Demanding Sprinkler Data 5.6 K-Factor 14.82 at 7.000					Occupancy Light Hazard - AREA 1 -			Job Suffix			
Hose Allowance At Source 100.00					Density 0.10 gpm/ft²			Area of Application 1500 ft² (Actual 1056 ft²)			
Additional Hose Supplies <u>Node</u> <u>Flow(gpm)</u>					Number Of Sprinklers Calculated 13		Number Of Nozzles Calculated 0		Coverage Per Sprinkler 225 ft²		
					AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area						
Total Hose Streams 100.00											
System Flow Demand 211.57			Total Water Required (Including Hose Allowance) 311.57								
Maximum Pressure Unbalance In Loops 0.000											
Maximum Velocity Above Ground 12.45 between nodes 1015 and 1014											
Maximum Velocity Under Ground 2.19 between nodes 1018 and 1017											
Volume capacity of Wet Pipes 891.54 gal			Volume capacity of Dry Pipes								
Supplies											
Node	Name	Hose Flow (gpm)	Static (psi)	Residual (psi)	@	Flow (gpm)	Available (psi)	@	Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1019	Water Supply	100.00	90.000	72.000		2275.00	89.545		311.57	49.330	40.215
Contractor											
		Contractor Number			Contact Name				Contact Title		
Name of Contractor:					Phone				Extension		
Address 1					FAX						
Address 2					E-mail						
Address 3					Web-Site						



Water Supply at Node 1019



Hydraulic Graph

Water Supply at Node 1019

Static: Pressure
90.000

Residual: Pressure
72.000 @ 2275.00

Available Flow @ 20 PSI:
4034.37

Available Pressure at System Demand
89.545 @ 311.57

Required Pressure at System Demand
49.330 @ 211.57

Required Pressure at System Demand (Including Hose Allowance at Source)
49.330 @ 311.57



Summary Of Outflowing Devices

Job Number: 1

Report Description: Light Hazard - AREA 1 -

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
➡ Sprinkler	100	14.82	14.82	5.6	7.000			
Sprinkler	101	15.01	14.82	5.6	7.186			
Sprinkler	102	14.85	14.82	5.6	7.033			
Sprinkler	103	14.97	14.82	5.6	7.147			
Sprinkler	104	15.26	14.82	5.6	7.424			
Sprinkler	105	15.15	14.82	5.6	7.320			
Sprinkler	106	15.02	14.82	5.6	7.189			
Sprinkler	107	15.37	14.82	5.6	7.537			
Sprinkler	108	15.88	14.82	5.6	8.037			
Sprinkler	109	16.60	14.82	5.6	8.789			
Sprinkler	110	19.28	14.82	5.6	11.849			
Sprinkler	111	19.60	14.82	5.6	12.249			
Sprinkler	112	19.77	14.82	5.6	12.467			

➡ Most Demanding Sprinkler Data



Node Analysis

Job Number: 1

Report Description: Light Hazard - AREA 1 -

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)
100	9'-6	Spr(-7.000), fd(43'-0)	7.000	14.82
101	9'-0	Spr(-7.186), fd(43'-0)	7.186	15.01
102	9'-6	Spr(-7.033), fd(43'-0)	7.033	14.85
103	9'-6	Spr(-7.147), fd(43'-0)	7.147	14.97
104	9'-0	Spr(-7.424), fd(43'-0)	7.424	15.26
105	9'-0	Spr(-7.320), fd(43'-0)	7.320	15.15
106	9'-6	Spr(-7.189), fd(43'-0)	7.189	15.02
107	9'-0	Spr(-7.537), fd(43'-0)	7.537	15.37
108	9'-0	Spr(-8.037), fd(43'-0)	8.037	15.88
109	8'-0	Spr(-8.789), fd(43'-0)	8.789	16.60
110	9'-0	Spr(-11.849), fd	11.849	19.28
111	8'-0	Spr(-12.249), fd	12.249	19.60
112	8'-0	Spr(-12.467), fd	12.467	19.77
1019	-4'-0	S	49.330	211.57
1003	10'-2	PO(6'-0)	17.176	
1005	10'-2	PO(6'-0)	17.174	
1007	10'-2	PO(6'-0)	17.168	
1008	10'-2	PO(6'-0)	17.161	
1009	10'-2	PO(6'-0)	17.136	
1011	10'-2	PO(6'-0)	16.952	
1012	10'-2	PO(6'-0)	16.872	
1013	10'-2	PO(6'-0)	24.913	
1014	10'-2	FT(14'-10)	25.407	
1015	2'-9	PO(26'-4)	34.626	
1016	1'-0	BOR	35.721	
1017	-4'-0	LtE(11'-11½)	37.914	
1018	-4'-0	T(47'-3½)	49.330	
1024	13'-2	PO(6'-0)	16.055	
1026	13'-2	PO(6'-0)	16.075	
1027	10'-2	PO(6'-0)	17.433	
1028	13'-0	PO(6'-0)	23.338	
1029	13'-0	PO(6'-0)	23.359	
1030	10'-2	PO(6'-0)	24.751	
1063	10'-2	PO(5'-0)	10.297	
1064	10'-2	PO(5'-0)	10.346	
1065	14'-6	T(5'-3½), Tr(2'-2)	10.145	
1066	14'-6	T(5'-3½)	11.353	
1067	13'-2	PO(6'-0)	21.517	
1068	13'-2	PO(6'-0)	21.526	
1069	13'-2	PO(6'-0)	21.691	
1070	10'-2	PO(6'-0)	23.606	
1071	10'-2	PO(5'-0)	10.354	
1072	10'-2	PO(5'-0)	10.513	
1073	10'-2	PO(5'-0)	10.576	
1074	10'-2	PO(5'-0)	10.704	
1075	10'-2	PO(5'-0)	11.605	
1076	10'-2	PO(6'-0)	14.835	
1077	10'-2	PO(6'-0)	14.908	
1078	10'-2	PO(6'-0)	15.127	
1079	10'-2	PO(6'-0)	15.889	
1080	10'-2	PO(5'-0)	16.225	
1081	10'-2	T(5'-3½), Tr(2'-2)	18.697	
1082	10'-2	PO(5'-0)	10.551	
1086	10'-2	PO(5'-0)	10.870	
1087	10'-2	PO(5'-0)	12.275	
1097	10'-2	PO(5'-0)	11.951	
1098	14'-6	T(5'-3½), Tr(2'-2)	11.532	
1099	10'-2	PO(5'-0)	11.937	
1100	10'-2	PO(5'-0)	12.165	
1104	10'-2	PO(6'-0)	16.628	



Hydraulic Analysis

Job Number: 1

Report Description: Light Hazard - AREA 1 -

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss		Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	
Route 1								
DY	1.0490	14.82	5.50	120		0.074703	0'-0	Pf 3.586
100	9'-6	14.82	5.6	7.000		Sprinkler,	48'-0	Pe -0.289
1063	10'-2			10.297		PO(5'-0), fd(43'-0)	48'-0	Pv
BL	1.3800	7.01	1.50	120		0.004915	10'-0	Pf 0.049
1063	10'-2			10.297				Pe
1064	10'-2			10.346			10'-0	Pv
BL	1.3800	21.86	4.69	120		0.040336	31'-1	Pf 1.678
1064	10'-2	14.85		10.346		Flow (q) from Route 2	10'-6	Pe -1.879
1065	14'-6			10.145		4E(2'-1), Tr(2'-2)	41'-7	Pv
BL	1.3800	44.88	9.63	120		0.152661	2'-7½	Pf 1.208
1065	14'-6	23.02		10.145		Flow (q) from Route 3	5'-3½	Pe
1066	14'-6			11.353		T(5'-3½)	7'-11	Pv
BL	1.3800	33.76	7.24	120		0.090163	87'-10	Pf 9.587
1066	14'-6			11.353			18'-6	Pe 0.578
1067	13'-2			21.517		6E(2'-1), PO(6'-0)	106'-4	Pv
CM	2.6350	33.76	1.99	120		0.003864	2'-1½	Pf 0.008
1067	13'-2			21.517				Pe
1068	13'-2			21.526			2'-1½	Pv
CM	2.6350	67.69	3.98	120		0.013993	11'-10	Pf 0.166
1068	13'-2	33.93		21.526		Flow (q) from Route 11		Pe
1069	13'-2			21.691			11'-10	Pv
CM	2.6350	89.67	5.28	120		0.023545	14'-3½	Pf 0.614
1069	13'-2	21.99		21.691		Flow (q) from Route 14	11'-9½	Pe 1.301
1070	10'-2			23.606		2fE(5'-11)	26'-1	Pv
CM	2.6350	120.18	7.07	120		0.040473	17'-10½	Pf 1.801
1070	10'-2	30.51		23.606		Flow (q) from Route 4	26'-7½	Pe
1014	10'-2			25.407		2fE(5'-11), fT(14'-10)	44'-6	Pv
CM	2.6350	211.57	12.45	120		0.115229	19'-4½	Pf 6.009
1014	10'-2	91.39		25.407		Flow (q) from Route 16	32'-9½	Pe 3.211
1015	2'-9			34.626		fE(5'-11), CV(26'-10½)	52'-2	Pv
CM	4.2600	211.57	4.76	120		0.011105	0'-11	Pf 0.332
1015	2'-9			34.626			28'-11½	Pe 0.763
1016	1'-0			35.721		sCV(28'-11½), BOR	29'-10½	Pv
FR	6.0650	211.57	2.35	140		0.001495	5'-0	Pf 0.025
1016	1'-0			35.721			11'-11½	Pe 2.168
1017	-4'-0			37.914		LtE(11'-11½)	16'-11½	Pv
UG	6.2800	211.57	2.19	140		0.001261	302'-11½	Pf 11.416
1017	-4'-0			37.914			99'-3½	Pe
1018	-4'-0			49.330		LtE(14'-2), 2EE(11'-0½), Ee2(11'-0½), BFP(-10.909), GV(4'-8½), T(47'-3½)	402'-3	Pv
UG	12.4600	211.57	0.56	140		0.000045	4'-0	Pf 0.000
1018	-4'-0			49.330			4'-0	Pe
1019	-4'-0			49.330		Water Supply		Pv
		100.00				Hose Allowance At Source		
1019		311.57						
Route 2								
DY	1.0490	14.85	5.51	120		0.075033	0'-0	Pf 3.602
102	9'-6	14.85	5.6	7.033		Sprinkler,	48'-0	Pe -0.289
1064	10'-2			10.346		PO(5'-0), fd(43'-0)	48'-0	Pv
Route 3								
DY	1.0490	14.97	5.56	120		0.076150	0'-0	Pf 3.655
103	9'-6	14.97	5.6	7.147		Sprinkler,	48'-0	Pe -0.289
1072	10'-2			10.513		PO(5'-0), fd(43'-0)	48'-0	Pv
BL	1.3800	8.01	1.72	120		0.006293	10'-0	Pf 0.063
1072	10'-2			10.513				Pe
1073	10'-2			10.576			10'-0	Pv
BL	1.3800	23.02	4.94	120		0.044403	23'-2	Pf 1.448
1073	10'-2	15.02		10.576		Flow (q) from Route 5	9'-5½	Pe -1.879
1065	14'-6			10.145		2E(2'-1), T(5'-3½)	32'-7½	Pv
Route 4								
DY	1.0490	15.01	5.57	120		0.076540	0'-0	Pf 3.674
101	9'-0	15.01	5.6	7.186		Sprinkler,	48'-0	Pe -0.506
1071	10'-2			10.354		PO(5'-0), fd(43'-0)	48'-0	Pv



Hydraulic Analysis

Job Number: 1
Report Description: Light Hazard - AREA 1 -

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss		Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	
BL	1.3800	22.82	4.90	120		0.043693	8'-0"	Pf 0.350
1071	10'-2	7.81		10.354		Flow (q) from Route 22	8'-0"	Pe
1074	10'-2			10.704				Pv
BL	1.3800	38.08	8.17	120		0.112653	8'-0"	Pf 0.901
1074	10'-2	15.26		10.704		Flow (q) from Route 7	8'-0"	Pe
1075	10'-2			11.605				Pv
BL	1.3800	53.96	11.57	120		0.214641	9'-0½"	Pf 3.230
1075	10'-2	15.88		11.605		Flow (q) from Route 9	6'-0"	Pe
1076	10'-2			14.835		PO(6'-0)	15'-0½"	Pv
CM	2.6350	53.96	3.17	120		0.009199	7'-11½"	Pf 0.073
1076	10'-2			14.835			7'-11½"	Pe
1077	10'-2			14.908				Pv
CM	2.6350	108.05	6.36	120		0.033238	6'-7"	Pf 0.218
1077	10'-2	54.09		14.908		Flow (q) from Route 6	6'-7"	Pe
1078	10'-2			15.127				Pv
CM	2.6350	143.89	8.47	120		0.056466	13'-6"	Pf 0.762
1078	10'-2	35.84		15.127		Flow (q) from Route 13	13'-6"	Pe
1079	10'-2			15.889				Pv
CM	2.6350	121.90	7.17	120		0.041549	8'-1"	Pf 0.337
1079	10'-2			15.889			8'-1"	Pe
1080	10'-2			16.225				Pv
BL	1.3800	16.28	3.49	120		0.023392	83'-11½"	Pf 2.472
1080	10'-2			16.225		PO(6'-0)	21'-8½"	Pe 0.000
1081	10'-2			18.697		5E(2'-1), T(5'-3½)	105'-8"	Pv
BL	1.3800	30.51	6.54	120		0.074756	59'-8"	Pf 4.909
1081	10'-2	14.23		18.697		Flow (q) from Route 15	6'-0"	Pe
1070	10'-2			23.606		PO(6'-0)	65'-8"	Pv
Route 5								
DY	1.0490	15.02	5.57	120		0.076571	0'-0"	Pf 3.675
106	9'-6	15.02	5.6	7.189		Sprinkler,	48'-0"	Pe -0.289
1073	10'-2			10.576		PO(5'-0), fd(43'-0)	48'-0"	Pv
Route 6								
DY	1.0490	15.15	5.62	120		0.077855	0'-0"	Pf 3.737
105	9'-0	15.15	5.6	7.320		Sprinkler,	48'-0"	Pe -0.506
1082	10'-2			10.551		PO(5'-0), fd(43'-0)	48'-0"	Pv
BL	1.3800	22.11	4.74	120		0.041219	7'-9"	Pf 0.319
1082	10'-2	6.96		10.551		Flow (q) from Route 25	7'-9"	Pe
1086	10'-2			10.870				Pv
BL	1.3800	37.49	8.04	120		0.109435	12'-10"	Pf 1.405
1086	10'-2	15.37		10.870		Flow (q) from Route 8	12'-10"	Pe
1087	10'-2			12.275				Pv
BL	1.3800	54.09	11.60	120		0.215632	6'-2½"	Pf 2.633
1087	10'-2	16.60		12.275		Flow (q) from Route 10	6'-0"	Pe
1077	10'-2			14.908		PO(6'-0)	12'-2½"	Pv
Route 7								
DY	1.0490	15.26	5.66	120		0.078876	0'-0"	Pf 3.786
104	9'-0	15.26	5.6	7.424		Sprinkler,	48'-0"	Pe -0.506
1074	10'-2			10.704		PO(5'-0), fd(43'-0)	48'-0"	Pv
Route 8								
DY	1.0490	15.37	5.71	120		0.079988	0'-0"	Pf 3.839
107	9'-0	15.37	5.6	7.537		Sprinkler,	48'-0"	Pe -0.506
1086	10'-2			10.870		PO(5'-0), fd(43'-0)	48'-0"	Pv
Route 9								
DY	1.0490	15.88	5.89	120		0.084882	0'-0"	Pf 4.074
108	9'-0	15.88	5.6	8.037		Sprinkler,	48'-0"	Pe -0.506
1075	10'-2			11.605		PO(5'-0), fd(43'-0)	48'-0"	Pv
Route 10								
DY	1.0490	16.60	6.16	120		0.092206	0'-0"	Pf 4.426
109	8'-0	16.60	5.6	8.789		Sprinkler,	48'-0"	Pe -0.939
1087	10'-2			12.275		PO(5'-0), fd(43'-0)	48'-0"	Pv
Route 11								
DY	1.0490	19.28	7.16	120		0.121559	0'-0"	Pf 0.608
110	9'-0	19.28	5.6	11.849		Sprinkler,	5'-0"	Pe -0.506
1097	10'-2			11.951		PO(5'-0), fd	5'-0"	Pv
BL	1.3800	22.81	4.89	120		0.043648	25'-0½"	Pf 1.460
1097	10'-2	3.53		11.951		Flow (q) from Route 12	8'-5"	Pe -1.879
1098	14'-6			11.532		3E(2'-1), Tr(2'-2)	33'-5½"	Pv



Hydraulic Analysis

Job Number: 1
Report Description: Light Hazard - AREA 1 -

Pipe Type	Diameter	Flow	Velocity	HWC	Pn	Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt		Fittings	Eq. Length	Summary
Upstream							Total Length	
BL	1.3800	33.93	7.28	120		0.090983	85'-0"	Pf 9.415
1098	14'-6"	11.12		11.532		Flow (q) from Route 23	18'-6"	Pe 0.578
1068	13'-2"			21.526		6E(2'-1), PO(6'-0)	103'-6"	Pv
Route 12								
DY	1.0490	19.60	7.28	120		0.125352	0'-0"	Pf 0.627
111	8'-0"	19.60	5.6	12.249		Sprinkler,	5'-0"	Pe -0.939
1099	10'-2"			11.937		PO(5'-0), fd	5'-0"	Pv
BL	1.3800	3.53	0.76	120		0.001385	10'-4½"	Pf 0.014
1099	10'-2"			11.937				Pe
1097	10'-2"			11.951			10'-4½"	Pv
Route 13								
DY	1.0490	19.77	7.34	120		0.127414	0'-0"	Pf 0.637
112	8'-0"	19.77	5.6	12.467		Sprinkler,	5'-0"	Pe -0.939
1100	10'-2"			12.165		PO(5'-0), fd	5'-0"	Pv
BL	1.3800	35.84	7.69	120		0.100696	23'-5"	Pf 2.962
1100	10'-2"	16.07		12.165		Flow (q) from Route 24	6'-0"	Pe
1078	10'-2"			15.127		PO(6'-0)	29'-5"	Pv
Route 14								
BL	1.3800	21.99	4.72	120		0.040776	143'-5½"	Pf 7.103
1079	10'-2"			15.889		PO(6'-0)	30'-9"	Pe -1.301
1069	13'-2"			21.691		9E(2'-1), PO(6'-0)	174'-2½"	Pv
Route 15								
CM	2.6350	105.62	6.21	120		0.031869	12'-7½"	Pf 0.403
1080	10'-2"	16.28		16.225		Flow (q) from Route 4		Pe
1104	10'-2"			16.628			12'-7½"	Pv
BL	1.3800	14.23	3.05	120		0.018229	86'-7"	Pf 2.069
1104	10'-2"			16.628		PO(6'-0)	26'-11"	Pe 0.000
1081	10'-2"			18.697		9E(2'-1), Tr(2'-2)	113'-6"	Pv
Route 16								
CM	2.6350	91.39	5.38	120		0.024385	10'-0½"	Pf 0.245
1104	10'-2"	14.23		16.628		Flow (q) from Route 15		Pe
1012	10'-2"			16.872			10'-0½"	Pv
CM	2.6350	68.59	4.04	120		0.014341	5'-6"	Pf 0.079
1012	10'-2"			16.872				Pe
1011	10'-2"			16.952			5'-6"	Pv
CM	2.6350	45.44	2.67	120		0.006694	15'-8½"	Pf 0.184
1011	10'-2"			16.952			11'-9½"	Pe
1009	10'-2"			17.136		2fE(5'-11)	27'-6"	Pv
BL	1.3800	21.80	4.68	120		0.040134	150'-9"	Pf 7.451
1009	10'-2"			17.136		PO(6'-0)	34'-11"	Pe -1.228
1029	13'-0"			23.359		11E(2'-1), PO(6'-0)	185'-8"	Pv
CM	2.6350	45.44	2.67	120		0.006694	12'-8"	Pf 0.164
1029	13'-0"	23.64		23.359		Flow (q) from Route 18	11'-9½"	Pe 1.228
1030	10'-2"			24.751		2fE(5'-11)	24'-5½"	Pv
CM	2.6350	68.59	4.04	120		0.014341	11'-3½"	Pf 0.162
1030	10'-2"	23.16		24.751		Flow (q) from Route 26		Pe
1013	10'-2"			24.913			11'-3½"	Pv
CM	2.6350	91.39	5.38	120		0.024385	5'-5"	Pf 0.494
1013	10'-2"	22.80		24.913		Flow (q) from Route 17	14'-10"	Pe
1014	10'-2"			25.407		fT(14'-10)	20'-3"	Pv
Route 17								
BL	1.3800	22.80	4.89	120		0.043605	151'-7"	Pf 8.041
1012	10'-2"			16.872		PO(6'-0)	32'-10"	Pe
1013	10'-2"			24.913		10E(2'-1), PO(6'-0)	184'-5"	Pv
Route 18								
CM	2.6350	23.64	1.39	120		0.001998	12'-8½"	Pf 0.025
1009	10'-2"	21.80		17.136		Flow (q) from Route 16		Pe
1008	10'-2"			17.161			12'-8½"	Pv
CM	2.6350	16.85	0.99	120		0.001068	6'-5½"	Pf 0.007
1008	10'-2"			17.161				Pe
1007	10'-2"			17.168			6'-5½"	Pv
CM	2.6350	10.91	0.64	120		0.000478	13'-5"	Pf 0.006
1007	10'-2"			17.168				Pe
1005	10'-2"			17.174			13'-5"	Pv
CM	2.6350	5.41	0.32	120		0.000130	10'-4"	Pf 0.001
1005	10'-2"			17.174				Pe
1003	10'-2"			17.176			10'-4"	Pv



Hydraulic Analysis

Job Number: 1

Report Description: Light Hazard - AREA 1 -

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss		Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	
BL	1.3800	5.41	1.16	120		0.003044	41'-4"	Pf 0.175
1003	10'-2			17.176		PO(6'-0)	16'-2"	Pe -1.301
1105	13'-2			16.050		2E(2'-1), PO(6'-0)	57'-6"	Pv
CM	2.0670	5.41	0.52	120		0.000426	10'-4"	Pf 0.004
1105	13'-2			16.050				Pe
1024	13'-2			16.055			10'-4"	Pv
CM	2.0670	10.91	1.04	120		0.001559	13'-5"	Pf 0.021
1024	13'-2	5.50		16.055		Flow (q) from Route 20		Pe
1026	13'-2			16.075			13'-5"	Pv
CM	2.0670	16.85	1.61	120		0.003483	9'-5½"	Pf 0.057
1026	13'-2	5.94		16.075		Flow (q) from Route 21	7'-0"	Pe 1.301
1027	10'-2			17.433		2fE(3'-6)	16'-5½"	Pv
BL	1.3800	23.64	5.07	120		0.046631	115'-11½"	Pf 7.133
1027	10'-2	6.79		17.433		PO(6'-0), Flow (q) from Route 19	37'-0"	Pe -1.228
1028	13'-0			23.338		12E(2'-1), PO(6'-0)	152'-11½"	Pv
CM	2.6350	23.64	1.39	120		0.001998	10'-4"	Pf 0.021
1028	13'-0			23.338				Pe
1029	13'-0			23.359			10'-4"	Pv
Route 19								
BL	1.3800	6.79	1.46	120		0.004642	38'-4"	Pf 0.272
1008	10'-2			17.161		PO(6'-0)	20'-4"	Pe 0.000
1027	10'-2			17.433		4E(2'-1), PO(6'-0)	58'-8"	Pv
Route 20								
BL	1.3800	5.50	1.18	120		0.003144	41'-4"	Pf 0.181
1005	10'-2			17.174		PO(6'-0)	16'-2"	Pe -1.301
1024	13'-2			16.055		2E(2'-1), PO(6'-0)	57'-6"	Pv
Route 21								
BL	1.3800	5.94	1.27	120		0.003619	41'-4"	Pf 0.208
1007	10'-2			17.168		PO(6'-0)	16'-2"	Pe -1.301
1026	13'-2			16.075		2E(2'-1), PO(6'-0)	57'-6"	Pv
Route 22								
BL	1.3800	7.81	1.68	120		0.006010	9'-7"	Pf 0.058
1063	10'-2	7.01		10.297		Flow (q) from Route 1		Pe
1071	10'-2			10.354			9'-7"	Pv
Route 23								
BL	1.3800	11.12	2.38	120		0.011549	4'-11½"	Pf 0.179
1066	14'-6			11.353		T(5'-3½)	10'-7"	Pe
1098	14'-6			11.532		T(5'-3½)	15'-6½"	Pv
Route 24								
BL	1.3800	16.07	3.45	120		0.022824	10'-0"	Pf 0.228
1099	10'-2	3.53		11.937		Flow (q) from Route 12		Pe
1100	10'-2			12.165			10'-0"	Pv
Route 25								
BL	1.3800	6.96	1.49	120		0.004861	7'-10"	Pf 0.038
1072	10'-2	8.01		10.513		Flow (q) from Route 3		Pe
1082	10'-2			10.551			7'-10"	Pv
Route 26								
DY	1.3800	23.16	4.97	120		0.044880	149'-3½"	Pf 7.799
1011	10'-2			16.952		PO(6'-0)	24'-6"	Pe 0.000
1030	10'-2			24.751		6E(2'-1), PO(6'-0)	173'-9½"	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

C Value Multiplier

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}} \right)^{4.87} = \text{Factor}$$

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51



Hydraulic Analysis

Job Number: 1

Report Description: Light Hazard - AREA 1 -

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss		Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend	Units Legend		Fittings Legend	
AO Arm-Over	Diameter	Inch	ALV Alarm Valve	
BL Branch Line	Elevation	Foot	AngV Angle Valve	
CM Cross Main	Flow	gpm	b Bushing	
DN Drain	Discharge	gpm	BaV Ball Valve	
DR Drop	Velocity	fps	BFP Backflow Preventer	
DY Dynamic	Pressure	psi	BV Butterfly Valve	
FM Feed Main	Length	Foot	C Cross Flow Turn 90°	
FR Feed Riser	Friction Loss	psi/Foot	cplg Coupling	
MS Miscellaneous	HWC	Hazen-Williams Constant	Cr Cross Run	
OR Outrigger	Pt	Total pressure at a point in a pipe	CV Check Valve	
RN Riser Nipple	Pn	Normal pressure at a point in a pipe	DeV Deluge Valve	
SN Swing Nipple	Pf	Pressure loss due to friction between points	DPV Dry Pipe Valve	
SP Sprig	Pe	Pressure due to elevation difference between indicated points	E 90° Elbow	
ST Stand Pipe	Pv	Velocity pressure at a point in a pipe	EE 45° Elbow	
UG Underground			Ee1 11¼° Elbow	
			Ee2 22½° Elbow	
			f Flow Device	
			fd Flex Drop	
			FDC Fire Department Connection	
			fE 90° FireLock(TM) Elbow	
			fEE 45° FireLock(TM) Elbow	
			flg Flange	
			FN Floating Node	
			fT FireLock(TM) Tee	
			g Gauge	
			GloV Globe Valve	
			GV Gate Valve	
			Ho Hose	
			Hose Hose	
			HV Hose Valve	
			Hyd Hydrant	
			LtE Long Turn Elbow	
			mecT Mechanical Tee	
			Noz Nozzle	
			P1 Pump In	
			P2 Pump Out	
			PIV Post Indicating Valve	
			PO Pipe Outlet	
			PrV Pressure Relief Valve	
			PRV Pressure Reducing Valve	
			red Reducer/Adapter	
			S Supply	
			sCV Swing Check Valve	
			SFx Seismic Flex	
			Spr Sprinkler	
			St Strainer	
			T Tee Flow Turn 90°	
			Tr Tee Run	
			U Union	
			WirF Wirsbo	
			WMV Water Meter Valve	
			Z Cap	



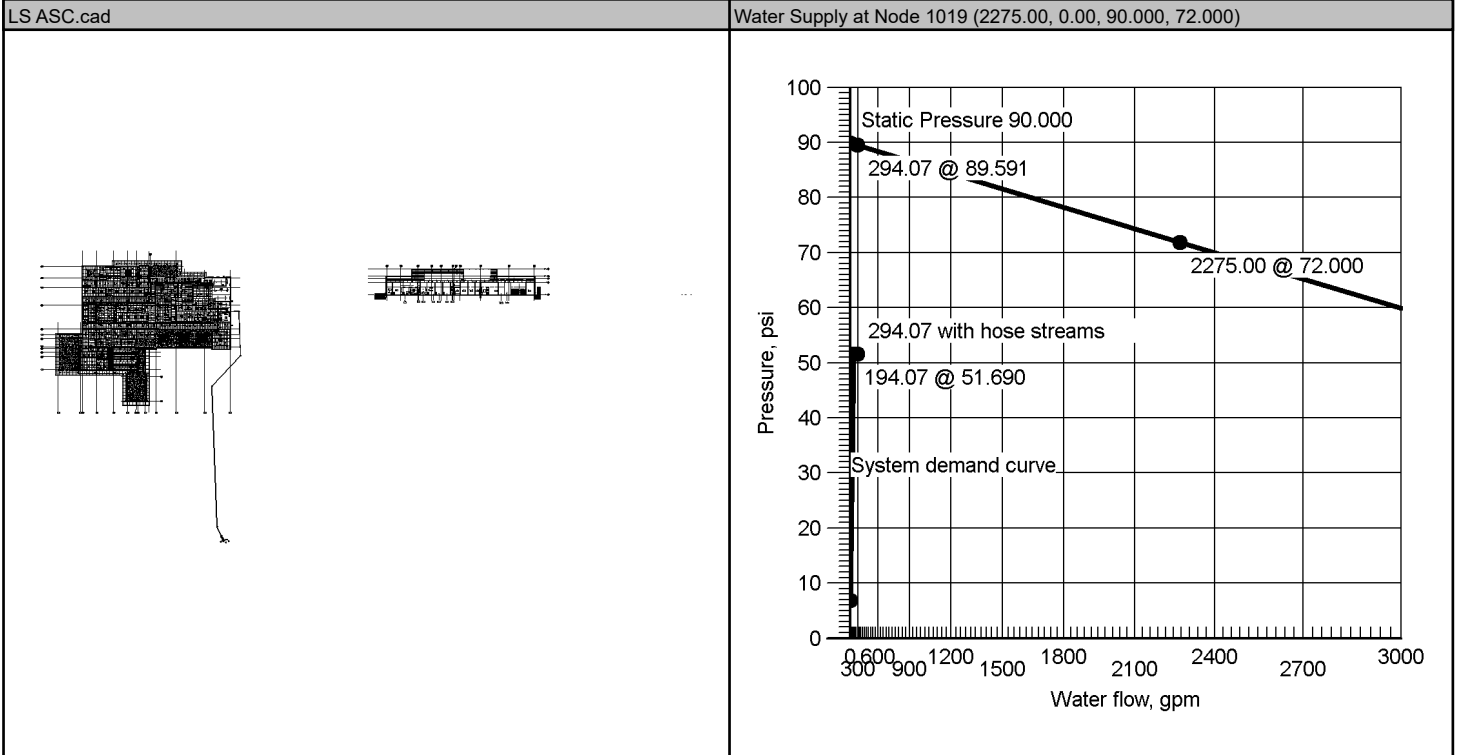
Hydraulic Overview

Job Number: 1
Report Description: Light Hazard - AREA 2 -

Job		
Job Number 1	Designer	
Job Name: Drawing2	Phone	FAX
Address 1	State Certification/License Number	
Address 2	AHJ	
Address 3	Job Site/Building	

System		
Density 0.10 gpm/ft ²	Area of Application 1500 ft ² (Actual 1122 ft ²)	
Most Demanding Sprinkler Data 5.6 K-Factor 17.00 at 9.216	Hose Streams 100.00	
Coverage Per Sprinkler 225 ft ²	Number Of Sprinklers Calculated 11	Number Of Nozzles Calculated 0
System Pressure Demand 51.690	System Flow Demand 194.07	
Total Demand 294.07 @ 51.690	Pressure Result +37.901 (42.3%)	

Supplies						Check Point Gauges			
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)	Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
1019	Water Supply	2275.00	100.00	90.000	72.000	BOR (1016)	38.053	31.46	194.07





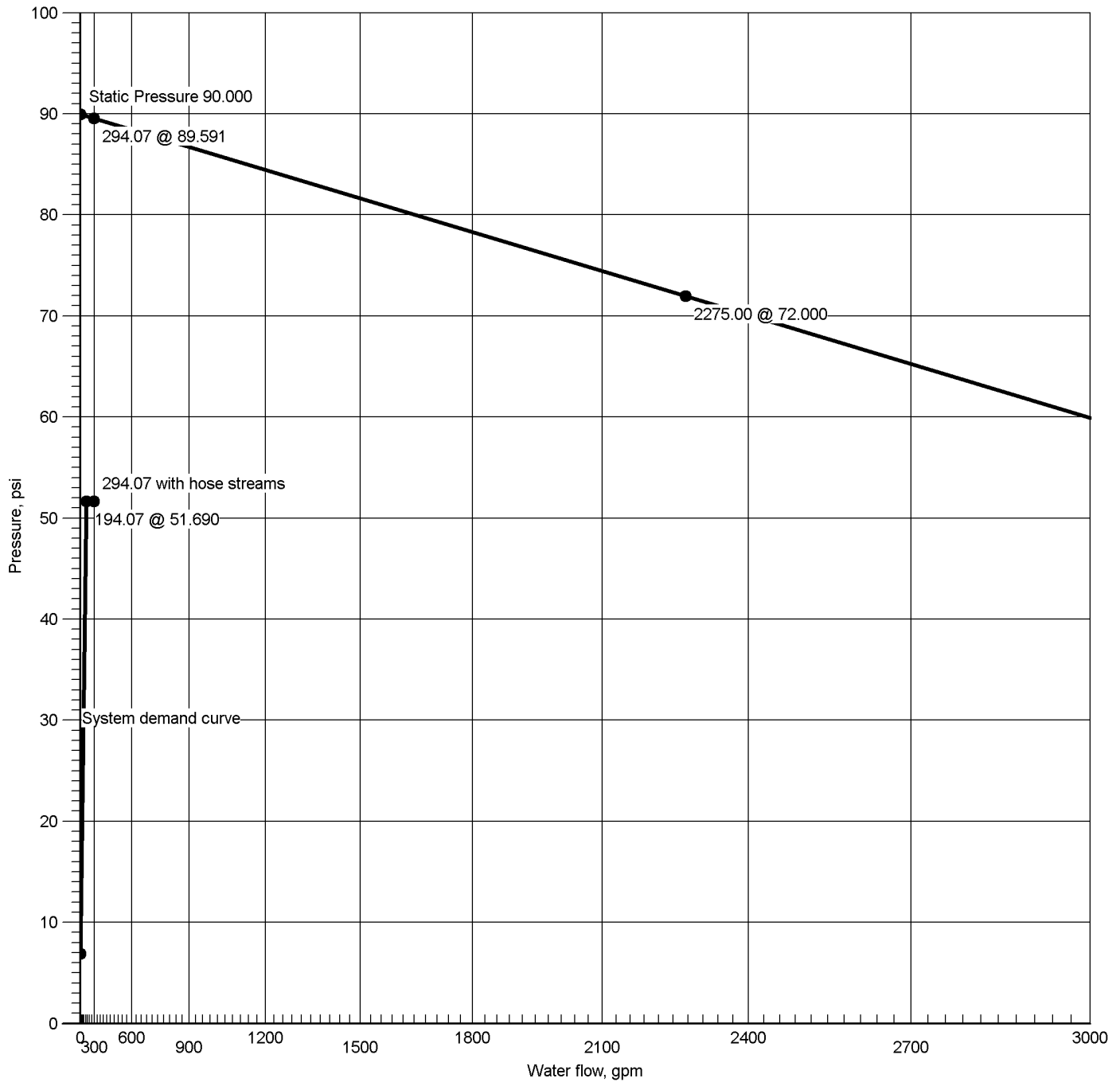
Hydraulic Summary

Job Number: 1
Report Description: Light Hazard - AREA 2 -

Job											
Job Number 1				Designer							
Job Name: Drawing2				State Certification/License Number							
Address 1				AHJ							
Address 2				Job Site/Building							
Address 3				Drawing Name LS ASC.cad							
System				Remote Area(s)							
Most Demanding Sprinkler Data 5.6 K-Factor 17.00 at 9.216				Occupancy Light Hazard - AREA 2 -			Job Suffix				
Hose Allowance At Source 100.00				Density 0.10 gpm/ft²			Area of Application 1500 ft² (Actual 1122 ft²)				
Additional Hose Supplies Node Flow(gpm)				Number Of Sprinklers Calculated 11		Number Of Nozzles Calculated 0		Coverage Per Sprinkler 225 ft²			
				AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area							
Total Hose Streams 100.00											
System Flow Demand 194.07		Total Water Required (Including Hose Allowance) 294.07									
Maximum Pressure Unbalance In Loops 0.000											
Maximum Velocity Above Ground 11.42 between nodes 1015 and 1014											
Maximum Velocity Under Ground 2.01 between nodes 1018 and 1017											
Volume capacity of Wet Pipes 891.54 gal		Volume capacity of Dry Pipes									
Supplies											
Node	Name	Hose Flow (gpm)	Static (psi)	Residual (psi)	@	Flow (gpm)	Available (psi)	@	Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1019	Water Supply	100.00	90.000	72.000		2275.00	89.591		294.07	51.690	37.901
Contractor											
Contractor Number		Contact Name				Contact Title					
Name of Contractor:				Phone				Extension			
Address 1				FAX							
Address 2				E-mail							
Address 3				Web-Site							



Water Supply at Node 1019



Hydraulic Graph

Water Supply at Node 1019

Static: Pressure
90.000

Residual: Pressure
72.000 @ 2275.00

Available Flow @ 20 PSI:
4034.37

Available Pressure at System Demand
89.591 @ 294.07

Required Pressure at System Demand
51.690 @ 194.07

Required Pressure at System Demand (Including Hose Allowance at Source)
51.690 @ 294.07



Summary Of Outflowing Devices

Job Number: 1

Report Description: Light Hazard - AREA 2 -

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
⇒ Sprinkler	300	17.00	17.00	5.6	9.216			
Sprinkler	301	17.07	17.00	5.6	9.287			
Sprinkler	302	17.14	17.00	5.6	9.368			
Sprinkler	303	17.21	17.00	5.6	9.442			
Sprinkler	304	17.57	16.30	5.6	9.842			
Sprinkler	305	17.64	16.30	5.6	9.919			
Sprinkler	306	17.45	16.30	5.6	9.711			
Sprinkler	307	16.64	14.82	5.6	8.831			
Sprinkler	308	18.22	14.82	5.6	10.589			
Sprinkler	309	18.93	14.82	5.6	11.430			
Sprinkler	310	19.20	14.82	5.6	11.756			

⇒ Most Demanding Sprinkler Data



Node Analysis

Job Number: 1

Report Description: Light Hazard - AREA 2 -

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)
1079	10'-2	PO(6'-0)	20.942	
1080	10'-2	PO(5'-0)	20.840	
1081	10'-2	T(5'-3½), Tr(2'-2)	22.882	
1094	10'-2	PO(5'-0)	16.568	
1098	14'-6	T(5'-3½), Tr(2'-2)	21.121	
1104	10'-2	PO(6'-0)	20.607	
300	12'-0	Spr(-9.216), fd(43'-0)	9.216	17.00
301	12'-0	Spr(-9.287), fd(43'-0)	9.287	17.07
302	12'-0	Spr(-9.368), fd(43'-0)	9.368	17.14
303	12'-0	Spr(-9.442), fd(43'-0)	9.442	17.21
304	10'-0	Spr(-9.842), fd(43'-0)	9.842	17.57
305	10'-0	Spr(-9.919), fd(43'-0)	9.919	17.64
306	12'-0	Spr(-9.711), fd(43'-0)	9.711	17.45
307	9'-0	Spr(-8.831), fd(72'-0)	8.831	16.64
308	9'-0	Spr(-10.589), fd(43'-0)	10.589	18.22
309	9'-0	Spr(-11.430), fd(43'-0)	11.430	18.93
310	9'-0	Spr(-11.756), fd(43'-0)	11.756	19.20
1019	-4'-0	S	51.690	194.07
1000	13'-2	PO(5'-0)	13.335	
1001	13'-2	PO(5'-0)	13.383	
1002	10'-2	PO(5'-0)	15.342	
1003	10'-2	PO(6'-0)	16.816	
1004	10'-2	PO(6'-0)	16.830	
1005	10'-2	PO(6'-0)	16.920	
1006	10'-2	PO(5'-0)	17.043	
1007	10'-2	PO(6'-0)	17.423	
1008	10'-2	PO(6'-0)	17.784	
1009	10'-2	PO(6'-0)	18.688	
1011	10'-2	PO(6'-0)	20.143	
1012	10'-2	PO(6'-0)	20.352	
1013	10'-2	PO(6'-0)	28.086	
1014	10'-2	fT(14'-10)	28.675	
1015	2'-9	PO(26'-4)	37.007	
1016	1'-0	BOR	38.053	
1017	-4'-0	LtE(11'-11½)	40.242	
1018	-4'-0	T(47'-3½)	51.690	
1020	13'-2	PO(5'-0)	13.439	
1021	13'-2	PO(5'-0)	13.496	
1022	10'-2	PO(5'-0)	15.456	
1023	13'-2	PO(5'-0)	13.557	
1024	13'-2	PO(6'-0)	13.640	
1025	13'-2	PO(5'-0)	13.665	
1026	13'-2	PO(6'-0)	14.041	
1027	10'-2	PO(6'-0)	15.787	
1028	13'-0	PO(6'-0)	26.382	
1029	13'-0	PO(6'-0)	26.417	
1030	10'-2	PO(6'-0)	27.879	
1031	13'-2	PO(5'-0)	14.058	
1065	14'-6	T(5'-3½), Tr(2'-2)	20.606	
1066	14'-6	T(5'-3½)	21.075	
1067	13'-2	PO(6'-0)	25.837	
1068	13'-2	PO(6'-0)	25.841	
1069	13'-2	PO(6'-0)	25.913	
1070	10'-2	PO(6'-0)	27.542	
1076	10'-2	PO(6'-0)	21.047	
1077	10'-2	PO(6'-0)	21.041	
1078	10'-2	PO(6'-0)	21.025	



Hydraulic Analysis

Job Number: 1

Report Description: Light Hazard - AREA 2 -

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss		Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	
Route 1								
DY	1.0490	17.00	6.31	120		0.096344	0'-0	Pf 4.625
300	12'-0	17.00	5.6	9.216		Sprinkler,	48'-0	Pe -0.506
1000	13'-2			13.335		PO(5'-0), fd(43'-0)	48'-0	Pv
BL	1.3800	6.17	1.32	120		0.003890	12'-6	Pf 0.049
1000	13'-2			13.335				Pe
1001	13'-2			13.383			12'-6	Pv
BL	1.3800	23.74	5.09	120		0.047005	9'-10	Pf 0.658
1001	13'-2	17.57		13.383		Flow (q) from Route 6	4'-2	Pe 1.301
1002	10'-2			15.342		2E(2'-1)	14'-0	Pv
BL	1.3800	41.96	9.00	120		0.134829	4'-11	Pf 1.474
1002	10'-2	18.22		15.342		Flow (q) from Route 9	6'-0	Pe
1003	10'-2			16.816		PO(6'-0)	10'-11	Pv
CM	2.6350	41.96	2.47	120		0.005778	2'-6½	Pf 0.015
1003	10'-2			16.816				Pe
1004	10'-2			16.830			2'-6½	Pv
CM	2.6350	60.90	3.58	120		0.011507	7'-9½	Pf 0.090
1004	10'-2	18.93		16.830		Flow (q) from Route 10		Pe
1005	10'-2			16.920			7'-9½	Pv
CM	2.6350	101.75	5.99	120		0.029744	4'-1½	Pf 0.123
1005	10'-2	40.85		16.920		Flow (q) from Route 2		Pe
1006	10'-2			17.043			4'-1½	Pv
CM	2.6350	120.95	7.12	120		0.040953	9'-3½	Pf 0.380
1006	10'-2	19.20		17.043		Flow (q) from Route 11		Pe
1007	10'-2			17.423			9'-3½	Pv
CM	2.6350	143.06	8.42	120		0.055868	6'-5½	Pf 0.361
1007	10'-2	22.11		17.423		Flow (q) from Route 3		Pe
1008	10'-2			17.784			6'-5½	Pv
CM	2.6350	163.00	9.59	120		0.071123	12'-8½	Pf 0.904
1008	10'-2	19.94		17.784		Flow (q) from Route 19		Pe
1009	10'-2			18.688			12'-8½	Pv
CM	2.6350	138.92	8.17	120		0.052916	15'-8½	Pf 1.455
1009	10'-2			18.688			11'-9½	Pe
1011	10'-2			20.143		2fE(5'-11)	27'-6	Pv
CM	2.6350	115.87	6.82	120		0.037827	5'-6	Pf 0.209
1011	10'-2			20.143				Pe
1012	10'-2			20.352			5'-6	Pv
CM	2.6350	93.55	5.50	120		0.025460	10'-0½	Pf 0.255
1012	10'-2			20.352				Pe
1104	10'-2			20.607			10'-0½	Pv
BL	1.3800	14.98	3.21	120		0.020043	86'-7	Pf 2.275
1104	10'-2			20.607		PO(6'-0)	26'-11	Pe 0.000
1081	10'-2			22.882		9E(2'-1), Tr(2'-2)	113'-6	Pv
BL	1.3800	29.66	6.36	120		0.070956	59'-8	Pf 4.659
1081	10'-2	14.68		22.882		Flow (q) from Route 12	6'-0	Pe
1070	10'-2			27.542		PO(6'-0)	65'-8	Pv
CM	2.6350	93.55	5.50	120		0.025460	17'-10½	Pf 1.133
1070	10'-2	63.89		27.542		Flow (q) from Route 13	26'-7½	Pe
1014	10'-2			28.675		2fE(5'-11), fT(14'-10)	44'-6	Pv
CM	2.6350	194.07	11.42	120		0.098211	19'-4½	Pf 5.121
1014	10'-2	100.52		28.675		Flow (q) from Route 15	32'-9½	Pe 3.211
1015	2'-9			37.007		fE(5'-11), CV(26'-10½)	52'-2	Pv
CM	4.2600	194.07	4.37	120		0.009465	0'-11	Pf 0.283
1015	2'-9			37.007			28'-11½	Pe 0.763
1016	1'-0			38.053		sCV(28'-11½), BOR	29'-10½	Pv
FR	6.0650	194.07	2.16	140		0.001274	5'-0	Pf 0.022
1016	1'-0			38.053			11'-11½	Pe 2.168
1017	-4'-0			40.242		LtE(11'-11½)	16'-11½	Pv
UG	6.2800	194.07	2.01	140		0.001075	302'-11½	Pf 11.448
1017	-4'-0			40.242			99'-3½	Pe
1018	-4'-0			51.690		LtE(14'-2), 2EE(11'-0½), Ee2(11'-0½), BFP(-11.016), GV(4'-8½), T(47'-3½)	402'-3	Pv
UG	12.4600	194.07	0.51	140		0.000038	4'-0	Pf 0.000
1018	-4'-0			51.690				Pe
1019	-4'-0			51.690		Water Supply	4'-0	Pv



Hydraulic Analysis

Job Number: 1
Report Description: Light Hazard - AREA 2 -

Pipe Type	Diameter	Flow	Velocity	HWC	Pn	Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt		Fittings	Eq. Length	Summary
Upstream							Total Length	
		100.00				Hose Allowance At Source		
1019		294.07						
Route 2								
DY	1.0490	17.07	6.34	120		0.097031	0'-0	Pf 4.657
301	12'-0	17.07	5.6	9.287		Sprinkler,	48'-0	Pe -0.506
1020	13'-2			13.439		PO(5'-0), fd(43'-0)	48'-0	Pv
BL	1.3800	6.58	1.41	120		0.004372	13'-2	Pf 0.058
1020	13'-2			13.439				Pe
1021	13'-2			13.496			13'-2	Pv
BL	1.3800	24.21	5.19	120		0.048744	9'-4	Pf 0.659
1021	13'-2	17.64		13.496		Flow (q) from Route 7	4'-2	Pe 1.301
1022	10'-2			15.456		2E(2'-1)	13'-6	Pv
BL	1.3800	40.85	8.76	120		0.128299	5'-5	Pf 1.464
1022	10'-2	16.64		15.456		Flow (q) from Route 8	6'-0	Pe
1005	10'-2			16.920		PO(6'-0)	11'-5	Pv
Route 3								
DY	1.0490	17.14	6.36	120		0.097811	0'-0	Pf 4.695
302	12'-0	17.14	5.6	9.368		Sprinkler,	48'-0	Pe -0.506
1023	13'-2			13.557		PO(5'-0), fd(43'-0)	48'-0	Pv
CM	2.0670	27.97	2.67	120		0.008897	9'-4	Pf 0.083
1023	13'-2	10.83		13.557		Flow (q) from Route 24		Pe
1024	13'-2			13.640			9'-4	Pv
CM	2.0670	38.46	3.68	120		0.016038	1'-7	Pf 0.026
1024	13'-2	10.49		13.640		Flow (q) from Route 25		Pe
1025	13'-2			13.665			1'-7	Pv
CM	2.0670	55.66	5.32	120		0.031788	11'-10	Pf 0.376
1025	13'-2	17.21		13.665		Flow (q) from Route 4		Pe
1026	13'-2			14.041			11'-10	Pv
BL	1.3800	4.66	1.00	120		0.002310	1'-5	Pf 0.017
1026	13'-2			14.041		PO(6'-0)	6'-0	Pe
1031	13'-2			14.058			7'-5	Pv
BL	1.3800	22.11	4.74	120		0.041198	39'-11	Pf 2.064
1031	13'-2	17.45		14.058		Flow (q) from Route 5	10'-2	Pe 1.301
1007	10'-2			17.423		2E(2'-1), PO(6'-0)	50'-1	Pv
Route 4								
DY	1.0490	17.21	6.39	120		0.098527	0'-0	Pf 4.729
303	12'-0	17.21	5.6	9.442		Sprinkler,	48'-0	Pe -0.506
1025	13'-2			13.665		PO(5'-0), fd(43'-0)	48'-0	Pv
Route 5								
DY	1.0490	17.45	6.48	120		0.101117	0'-0	Pf 4.854
306	12'-0	17.45	5.6	9.711		Sprinkler,	48'-0	Pe -0.506
1031	13'-2			14.058		PO(5'-0), fd(43'-0)	48'-0	Pv
Route 6								
DY	1.0490	17.57	6.52	120		0.102382	0'-0	Pf 4.914
304	10'-0	17.57	5.6	9.842		Sprinkler,	48'-0	Pe -1.373
1001	13'-2			13.383		PO(5'-0), fd(43'-0)	48'-0	Pv
Route 7								
DY	1.0490	17.64	6.55	120		0.103125	0'-0	Pf 4.950
305	10'-0	17.64	5.6	9.919		Sprinkler,	48'-0	Pe -1.373
1021	13'-2			13.496		PO(5'-0), fd(43'-0)	48'-0	Pv
Route 8								
DY	1.0490	16.64	6.18	120		0.092611	0'-0	Pf 7.131
307	9'-0	16.64	5.6	8.831		Sprinkler,	77'-0	Pe -0.506
1022	10'-2			15.456		PO(5'-0), fd(72'-0)	77'-0	Pv
Route 9								
DY	1.0490	18.22	6.76	120		0.109554	0'-0	Pf 5.259
308	9'-0	18.22	5.6	10.589		Sprinkler,	48'-0	Pe -0.506
1002	10'-2			15.342		PO(5'-0), fd(43'-0)	48'-0	Pv
Route 10								
DY	1.0490	18.93	7.03	120		0.117576	0'-0	Pf 5.644
309	9'-0	18.93	5.6	11.430		Sprinkler,	48'-0	Pe -0.506
1094	10'-2			16.568		PO(5'-0), fd(43'-0)	48'-0	Pv
BL	1.3800	18.93	4.06	120		0.030923	2'-6	Pf 0.262
1094	10'-2			16.568			6'-0	Pe
1004	10'-2			16.830		PO(6'-0)	8'-6	Pv
Route 11								



Hydraulic Analysis

Job Number: 1
Report Description: Light Hazard - AREA 2 -

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss		Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	
DY	1.0490	19.20	7.13	120		0.120676		0'-0" Pf 5.792
310	9'-0	19.20	5.6	11.756		Sprinkler,		48'-0" Pe -0.506
1006	10'-2			17.043		PO(5'-0), fd(43'-0)		48'-0" Pv
Route 12								
BL	1.3800	14.68	3.15	120		0.019325		83'-11½" Pf 2.042
1080	10'-2	78.57		20.840		PO(6'-0), Flow (q) from Route 26		21'-8½" Pe 0.000
1081	10'-2			22.882		5E(2'-1), T(5'-3½)		105'-8" Pv
Route 13								
CM	2.6350	63.89	3.76	120		0.012573		8'-1" Pf 0.102
1080	10'-2	78.57		20.840		Flow (q) from Route 26		Pe
1079	10'-2			20.942			8'-1"	Pv
CM	2.6350	43.33	2.55	120		0.006131		13'-6" Pf 0.083
1079	10'-2			20.942				Pe
1078	10'-2			21.025			13'-6"	Pv
CM	2.6350	26.92	1.58	120		0.002541		6'-7" Pf 0.017
1078	10'-2			21.025				Pe
1077	10'-2			21.041			6'-7"	Pv
CM	2.6350	13.07	0.77	120		0.000668		7'-11½" Pf 0.005
1077	10'-2			21.041				Pe
1076	10'-2			21.047			7'-11½"	Pv
BL	1.3800	13.07	2.80	120		0.015587		75'-9" Pf 1.438
1076	10'-2			21.047		PO(6'-0)		16'-6" Pe -1.879
1065	14'-6			20.606		4E(2'-1), Tr(2'-2)		92'-3" Pv
BL	1.3800	26.92	5.77	120		0.059301		2'-7½" Pf 0.469
1065	14'-6	13.85		20.606		Flow (q) from Route 21		5'-3½" Pe
1066	14'-6			21.075		T(5'-3½)		7'-11" Pv
BL	1.3800	21.57	4.63	120		0.039351		87'-10" Pf 4.184
1066	14'-6			21.075				18'-6" Pe 0.578
1067	13'-2			25.837		6E(2'-1), PO(6'-0)		106'-4" Pv
CM	2.6350	21.57	1.27	120		0.001686		2'-1½" Pf 0.004
1067	13'-2			25.837				Pe
1068	13'-2			25.841			2'-1½"	Pv
CM	2.6350	43.33	2.55	120		0.006131		11'-10" Pf 0.073
1068	13'-2	21.76		25.841		Flow (q) from Route 20		Pe
1069	13'-2			25.913			11'-10"	Pv
CM	2.6350	63.89	3.76	120		0.012573		14'-3½" Pf 0.328
1069	13'-2	20.55		25.913		Flow (q) from Route 14		11'-9½" Pe 1.301
1070	10'-2			27.542		2fE(5'-11)		26'-1" Pv
Route 14								
BL	1.3800	20.55	4.41	120		0.036002		143'-5½" Pf 6.272
1079	10'-2			20.942		PO(6'-0)		30'-9" Pe -1.301
1069	13'-2			25.913		9E(2'-1), PO(6'-0)		174'-2½" Pv
Route 15								
BL	1.3800	22.32	4.79	120		0.041943		151'-7" Pf 7.734
1012	10'-2			20.352		PO(6'-0)		32'-10" Pe
1013	10'-2			28.086		10E(2'-1), PO(6'-0)		184'-5" Pv
CM	2.6350	100.52	5.91	120		0.029082		5'-5" Pf 0.589
1013	10'-2	78.20		28.086		Flow (q) from Route 16		14'-10" Pe
1014	10'-2			28.675		fT(14'-10)		20'-3" Pv
Route 16								
CM	2.6350	78.20	4.60	120		0.018275		11'-3½" Pf 0.207
1030	10'-2	55.14 + 23.05		27.879		Flow (q) from Route 17 and 27		Pe
1013	10'-2			28.086			11'-3½"	Pv
Route 17								
BL	1.3800	24.08	5.16	120		0.048242		150'-9" Pf 8.957
1009	10'-2			18.688		PO(6'-0)		34'-11" Pe -1.228
1029	13'-0			26.417		11E(2'-1), PO(6'-0)		185'-8" Pv
CM	2.6350	55.14	3.24	120		0.009576		12'-8" Pf 0.234
1029	13'-0	31.07		26.417		Flow (q) from Route 18		11'-9½" Pe 1.228
1030	10'-2			27.879		2fE(5'-11)		24'-5½" Pv
Route 18								
BL	1.3800	31.07	6.66	120		0.077294		115'-11½" Pf 11.824
1027	10'-2	51.01		15.787		PO(6'-0), Flow (q) from Route 23		37'-0" Pe -1.228
1028	13'-0			26.382		12E(2'-1), PO(6'-0)		152'-11½" Pv
CM	2.6350	31.07	1.83	120		0.003312		10'-4" Pf 0.034
1028	13'-0			26.382				Pe
1029	13'-0			26.417			10'-4"	Pv
Route 19								



Hydraulic Analysis

Job Number: 1
Report Description: Light Hazard - AREA 2 -

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss		Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	
BL	1.3800	19.94	4.28	120		0.034039	38'-4"	Pf 1.997
1027	10'-2	51.01		15.787		PO(6'-0), Flow (q) from Route 23	20'-4"	Pe 0.000
1008	10'-2			17.784		4E(2'-1), PO(6'-0)	58'-8"	Pv
Route 20								
BL	1.3800	16.41	3.52	120		0.023739	68'-9½"	Pf 1.975
1078	10'-2			21.025		PO(6'-0)	14'-5"	Pe -1.879
1098	14'-6			21.121		3E(2'-1), Tr(2'-2)	83'-2½"	Pv
BL	1.3800	21.76	4.67	120		0.040017	85'-0"	Pf 4.141
1098	14'-6	5.35		21.121		Flow (q) from Route 22	18'-6"	Pe 0.578
1068	13'-2			25.841		6E(2'-1), PO(6'-0)	103'-6"	Pv
Route 21								
BL	1.3800	13.85	2.97	120		0.017334	67'-9½"	Pf 1.443
1077	10'-2			21.041		PO(6'-0)	15'-5½"	Pe -1.879
1065	14'-6			20.606		2E(2'-1), T(5'-3½)	83'-3"	Pv
Route 22								
BL	1.3800	5.35	1.15	120		0.002987	4'-11½"	Pf 0.046
1066	14'-6			21.075		T(5'-3½)	10'-7"	Pe
1098	14'-6			21.121		T(5'-3½)	15'-6½"	Pv
Route 23								
CM	2.0670	51.01	4.88	120		0.027043	9'-5½"	Pf 0.445
1026	13'-2	4.66		14.041		Flow (q) from Route 3	7'-0"	Pe 1.301
1027	10'-2			15.787		2fE(3'-6)	16'-5½"	Pv
Route 24								
BL	1.3800	10.83	2.32	120		0.010997	14'-1"	Pf 0.221
1000	13'-2	6.17		13.335		Flow (q) from Route 1	6'-0"	Pe
1105	13'-2			13.555		PO(6'-0)	20'-1"	Pv
CM	2.0670	10.83	1.04	120		0.001537	1'-0"	Pf 0.002
1105	13'-2			13.555				Pe
1023	13'-2			13.557			1'-0"	Pv
Route 25								
BL	1.3800	10.49	2.25	120		0.010372	13'-5"	Pf 0.201
1020	13'-2	6.58		13.439		Flow (q) from Route 2	6'-0"	Pe
1024	13'-2			13.640		PO(6'-0)	19'-5"	Pv
Route 26								
CM	2.6350	78.57	4.62	120		0.018436	12'-7½"	Pf 0.233
1104	10'-2	14.98		20.607		Flow (q) from Route 1		Pe
1080	10'-2			20.840			12'-7½"	Pv
Route 27								
DY	1.3800	23.05	4.95	120		0.044516	149'-3½"	Pf 7.736
1011	10'-2			20.143		PO(6'-0)	24'-6"	Pe 0.000
1030	10'-2			27.879		6E(2'-1), PO(6'-0)	173'-9½"	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

C Value Multiplier

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}} \right)^{4.87} = \text{Factor}$$

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51



Hydraulic Analysis

Job Number: 1
Report Description: Light Hazard - AREA 2 -

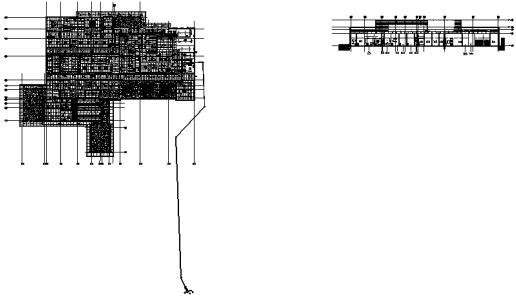
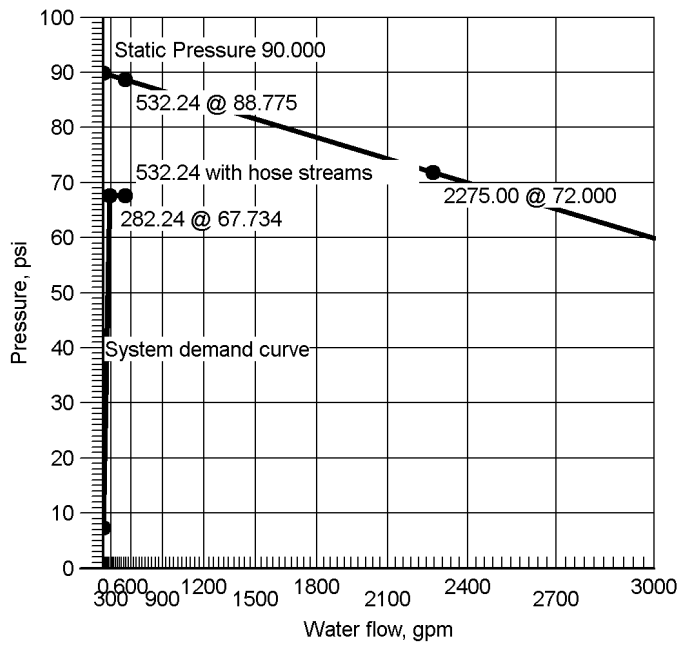
Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss		Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend		Units Legend		Fittings Legend	
AO	Arm-Over	Diameter	Inch	ALV	Alarm Valve
BL	Branch Line	Elevation	Foot	AngV	Angle Valve
CM	Cross Main	Flow	gpm	b	Bushing
DN	Drain	Discharge	gpm	BaV	Ball Valve
DR	Drop	Velocity	fps	BFP	Backflow Preventer
DY	Dynamic	Pressure	psi	BV	Butterfly Valve
FM	Feed Main	Length	Foot	C	Cross Flow Turn 90°
FR	Feed Riser	Friction Loss	psi/Foot	cplg	Coupling
MS	Miscellaneous	HWC	Hazen-Williams Constant	Cr	Cross Run
OR	Outrigger	Pt	Total pressure at a point in a pipe	CV	Check Valve
RN	Riser Nipple	Pn	Normal pressure at a point in a pipe	DeV	Deluge Valve
SN	Swing Nipple	Pf	Pressure loss due to friction between points	DPV	Dry Pipe Valve
SP	Sprig	Pe	Pressure due to elevation difference between indicated points	E	90° Elbow
ST	Stand Pipe	Pv	Velocity pressure at a point in a pipe	EE	45° Elbow
UG	Underground			Ee1	11¼° Elbow
				Ee2	22½° Elbow
				f	Flow Device
				fd	Flex Drop
				FDC	Fire Department Connection
				fE	90° FireLock(TM) Elbow
				fEE	45° FireLock(TM) Elbow
				flg	Flange
				FN	Floating Node
				fT	FireLock(TM) Tee
				g	Gauge
				GloV	Globe Valve
				GV	Gate Valve
				Ho	Hose
				Hose	Hose
				HV	Hose Valve
				Hyd	Hydrant
				LtE	Long Turn Elbow
				mecT	Mechanical Tee
				Noz	Nozzle
				P1	Pump In
				P2	Pump Out
				PIV	Post Indicating Valve
				PO	Pipe Outlet
				PrV	Pressure Relief Valve
				PRV	Pressure Reducing Valve
				red	Reducer/Adapter
				S	Supply
				sCV	Swing Check Valve
				SFx	Seismic Flex
				Spr	Sprinkler
				St	Strainer
				T	Tee Flow Turn 90°
				Tr	Tee Run
				U	Union
				WirF	Wirsbo
				WMV	Water Meter Valve
				Z	Cap



Hydraulic Overview

Job Number: 1
Report Description: Light Hazard - AREA 3 -

Job									
Job Number 1			Designer						
Job Name: Drawing2			Phone		FAX				
Address 1			State Certification/License Number						
Address 2			AHJ						
Address 3			Job Site/Building						
System									
Density 0.10 gpm/ft²			Area of Application 1500 ft² (Actual 1077 ft²)						
Most Demanding Sprinkler Data 5.6 K-Factor 14.82 at 7.000			Hose Streams 250.00						
Coverage Per Sprinkler 168 ft²			Number Of Sprinklers Calculated 13		Number Of Nozzles Calculated 0				
System Pressure Demand 67.734			System Flow Demand 282.24						
Total Demand 532.24 @ 67.734			Pressure Result +21.041 (23.7%)						
Supplies			Check Point Gauges						
<u>Node</u>	<u>Name</u>	<u>Flow(gpm)</u>	<u>Hose Flow(gpm)</u>	<u>Static(psi)</u>	<u>Residual(psi)</u>	<u>Identifier</u>	<u>Pressure(psi)</u>	<u>K-Factor(K)</u>	<u>Flow(gpm)</u>
1019	Water Supply	2275.00	250.00	90.000	72.000	BOR (1016)	54.261	38.32	282.24
LS ASC.cad						Water Supply at Node 1019 (2275.00, 0.00, 90.000, 72.000)			
									



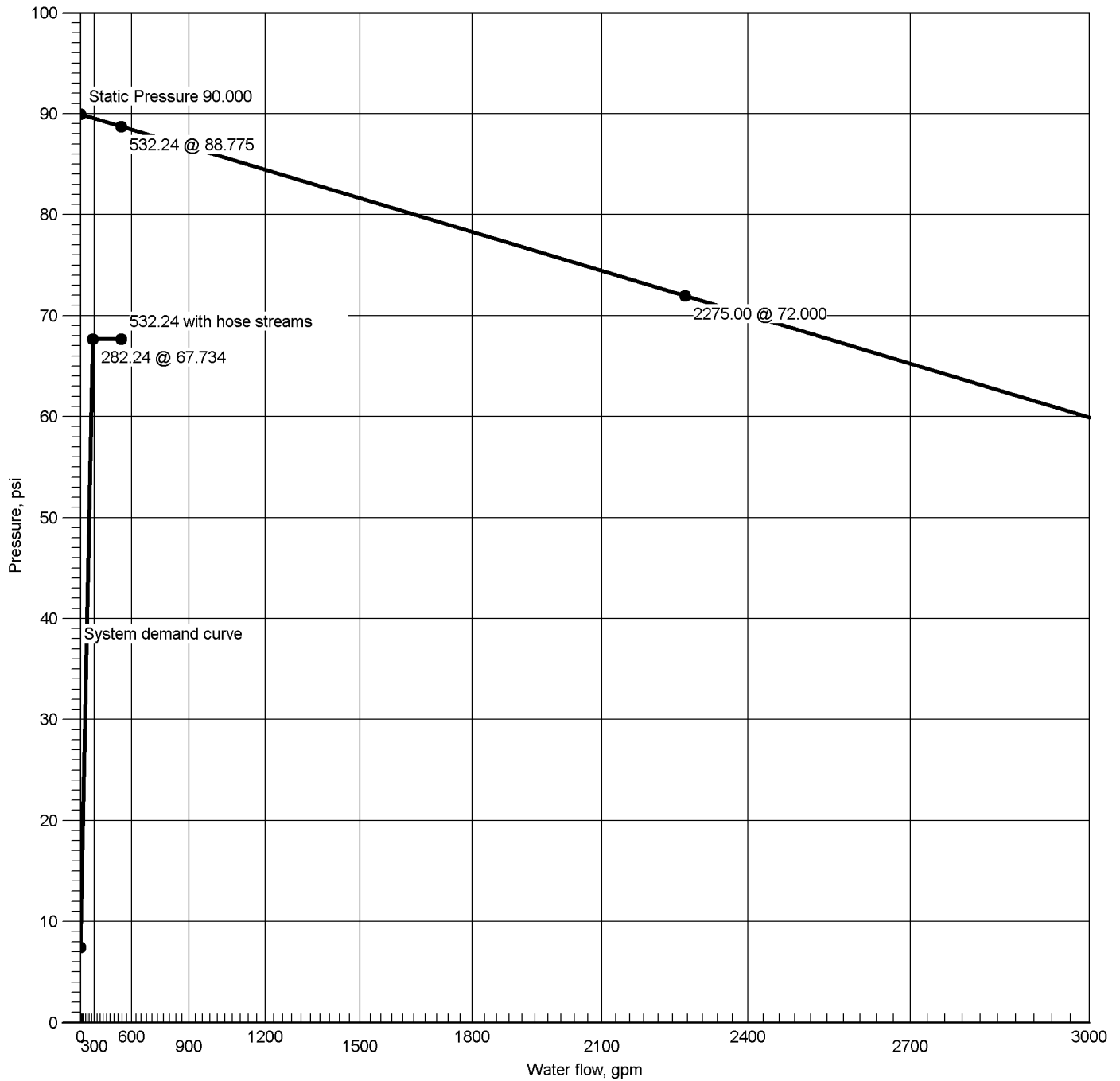
Hydraulic Summary

Job Number: 1
Report Description: Light Hazard - AREA 3 -

Job											
Job Number 1				Designer							
Job Name: Drawing2				State Certification/License Number							
Address 1				AHJ							
Address 2				Job Site/Building							
Address 3				Drawing Name LS ASC.cad							
System				Remote Area(s)							
Most Demanding Sprinkler Data 5.6 K-Factor 14.82 at 7.000				Occupancy Light Hazard - AREA 3 -			Job Suffix				
Hose Allowance At Source 250.00				Density 0.10 gpm/ft²			Area of Application 1500 ft² (Actual 1077 ft²)				
Additional Hose Supplies Node Flow(gpm)				Number Of Sprinklers Calculated 13		Number Of Nozzles Calculated 0		Coverage Per Sprinkler 168 ft²			
				AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area							
Total Hose Streams 250.00											
System Flow Demand 282.24		Total Water Required (Including Hose Allowance) 532.24									
Maximum Pressure Unbalance In Loops 0.000											
Maximum Velocity Above Ground 21.74 between nodes 1040 and 1039											
Maximum Velocity Under Ground 2.92 between nodes 1018 and 1017											
Volume capacity of Wet Pipes 891.54 gal		Volume capacity of Dry Pipes 252.04 gal									
Supplies											
Node	Name	Hose Flow (gpm)	Static (psi)	Residual (psi)	@	Flow (gpm)	Available (psi)	@	Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1019	Water Supply	250.00	90.000	72.000		2275.00	88.775		532.24	67.734	21.041
Contractor											
Contractor Number		Contact Name				Contact Title					
Name of Contractor:				Phone				Extension			
Address 1				FAX							
Address 2				E-mail							
Address 3				Web-Site							



Water Supply at Node 1019



Hydraulic Graph

Water Supply at Node 1019

Static: Pressure
90.000

Residual: Pressure
72.000 @ 2275.00

Available Flow @ 20 PSI:
4034.37

Available Pressure at System Demand
88.775 @ 532.24

Required Pressure at System Demand
67.734 @ 282.24

Required Pressure at System Demand (Including Hose Allowance at Source)
67.734 @ 532.24



Summary Of Outflowing Devices

Job Number: 1

Report Description: Light Hazard - AREA 3 -

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
➡ Sprinkler	500	14.82	14.82	5.6	7.000			
Sprinkler	501	15.73	14.82	5.6	7.891			
Sprinkler	502	16.78	14.82	5.6	8.979			
Sprinkler	503	17.85	14.82	5.6	10.163			
Sprinkler	504	18.94	14.82	5.6	11.435			
Sprinkler	505	19.03	14.82	5.6	11.552			
Sprinkler	506	20.27	14.82	5.6	13.099			
Sprinkler	507	22.79	14.82	5.6	16.562			
Sprinkler	508	24.92	14.82	5.6	19.805			
Sprinkler	509	26.52	14.82	5.6	22.420			
Sprinkler	510	27.17	14.82	5.6	23.548			
Sprinkler	511	28.39	14.82	5.6	25.702			
Sprinkler	512	29.03	14.82	5.6	26.880			

➡ Most Demanding Sprinkler Data



Node Analysis

Job Number: 1

Report Description: Light Hazard - AREA 3 -

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)
500	13'-3	Spr(-7.000)	7.000	14.82
501	13'-3	Spr(-7.891)	7.891	15.73
502	13'-3	Spr(-8.979)	8.979	16.78
503	13'-3	Spr(-10.163)	10.163	17.85
504	13'-3	Spr(-11.435)	11.435	18.94
505	13'-3	Spr(-11.552)	11.552	19.03
506	13'-3	Spr(-13.099)	13.099	20.27
507	13'-3	Spr(-16.562)	16.562	22.79
508	13'-3	Spr(-19.805)	19.805	24.92
509	13'-3	Spr(-22.420)	22.420	26.52
510	13'-3	Spr(-23.548)	23.548	27.17
511	13'-3	Spr(-25.702)	25.702	28.39
512	13'-3	Spr(-26.880)	26.880	29.03
1019	-4'-0	S	67.734	282.24
1016	1'-0	BOR	54.261	
1017	-4'-0	LtE(11'-11½)	56.472	
1018	-4'-0	T(47'-3½)	67.734	
1032	13'-6½	T(3'-7)	9.067	
1033	13'-6	T(3'-7)	10.348	
1034	13'-5	T(3'-7)	13.202	
1035	13'-4½	PO(5'-8½)	16.408	
1036	13'-4½	PO(3'-7)	19.127	
1037	13'-4	PO(3'-7)	22.861	
1038	13'-3½	PO(3'-7)	27.869	
1039	13'-3½	PO(3'-7)	31.201	
1040	13'-3½	fE(2'-6)	33.206	
1041	13'-3½	T(3'-7)	34.842	
1042	10'-10½	fT(15'-0½)	46.295	
1043	4'-1½	DPV(-0.880)	51.310	
1095	13'-5½	T(3'-7)	13.325	
1096	13'-5	T(3'-7)	15.132	
1103	13'-3½	T(3'-7)	29.720	



Hydraulic Analysis

Job Number: 1
Report Description: Light Hazard - AREA 3 -

Pipe Type	Diameter	Flow	Velocity	HWC	Pn	Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt		Fittings	Eq. Length	Summary
Upstream							Total Length	
Route 1								
DR	1.0490	14.82	5.50	100		0.104671	14'-6"	Pf 2.190
500	13'-3"	14.82	5.6	7.000		Sprinkler,	6'-5"	Pe -0.123
1032	13'-6½"			9.067		T(3'-7"), 2E(1'-5)	20'-11"	Pv
AO	1.3800	30.55	6.55	100		0.104984	12'-0"	Pf 1.260
1032	13'-6½"	15.73		9.067		Flow (q) from Route 2		Pe 0.022
1033	13'-6"			10.348			12'-0"	Pv
AO	1.3800	47.33	10.15	100		0.235991	12'-0"	Pf 2.832
1033	13'-6"	16.78		10.348		Flow (q) from Route 3		Pe 0.022
1034	13'-5"			13.202			12'-0"	Pv
AO	1.6100	66.26	10.44	100		0.207618	9'-8"	Pf 3.189
1034	13'-5"	18.94		13.202		Flow (q) from Route 5	5'-8½"	Pe 0.017
1035	13'-4½"			16.408		PO(5'-8½")	15'-4½"	Pv
CM	2.0670	123.42	11.80	100		0.194303	11'-5½"	Pf 2.709
1035	13'-4½"	57.15		16.408		Flow (q) from Route 4	2'-6"	Pe 0.010
1036	13'-4½"			19.127		fE(2'-6")	13'-11½"	Pv
CM	2.0670	146.21	13.98	100		0.265844	14'-0"	Pf 3.722
1036	13'-4½"	22.79		19.127		Flow (q) from Route 8		Pe 0.013
1037	13'-4"			22.861			14'-0"	Pv
CM	2.0670	171.13	16.36	100		0.355699	14'-0½"	Pf 4.995
1037	13'-4"	24.92		22.861		Flow (q) from Route 9		Pe 0.013
1038	13'-3½"			27.869			14'-0½"	Pv
CM	2.0670	198.30	18.96	100		0.467193	4'-7½"	Pf 3.327
1038	13'-3½"	27.17		27.869		Flow (q) from Route 11	2'-6"	Pe 0.004
1039	13'-3½"			31.201		fE(2'-6")	7'-1½"	Pv
CM	2.0670	227.34	21.74	100		0.601555	0'-10"	Pf 2.004
1039	13'-3½"	29.03		31.201		Flow (q) from Route 13	2'-6"	Pe 0.001
1040	13'-3½"			33.206		fE(2'-6")	3'-4"	Pv
CM	3.2600	227.34	8.74	100		0.065405	10'-6"	Pf 1.627
1040	13'-3½"			33.206			14'-4½"	Pe 0.009
1041	13'-3½"			34.842		T(14'-4½")	24'-10½"	Pv
CM	3.2600	282.24	10.85	100		0.097594	72'-2"	Pf 10.408
1041	13'-3½"	54.91		34.842		Flow (q) from Route 10	34'-6"	Pe 1.045
1042	10'-10½"			46.295		4fE(4'-9½"), fT(15'-0½")	106'-7½"	Pv
CM	4.2600	282.24	6.35	100		0.026520	26'-5"	Pf 2.088
1042	10'-10½"			46.295			19'-2"	Pe 2.927
1043	4'-1½"			51.310		3fE(6'-4½"), DPV(-0.880)	45'-7"	Pv
CM	4.2600	282.24	6.35	120		0.018927	2'-11"	Pf 1.600
1043	4'-1½"			51.310			81'-7½"	Pe 1.351
1016	1'-0"			54.261		2PO(26'-4"), sCV(28'-11½"), BOR	84'-6½"	Pv
FR	6.0650	282.24	3.13	140		0.002547	5'-0"	Pf 0.043
1016	1'-0"			54.261			11'-11½"	Pe 2.168
1017	-4'-0"			56.472		LtE(11'-11½")	16'-11½"	Pv
UG	6.2800	282.24	2.92	140		0.002150	302'-11½"	Pf 11.262
1017	-4'-0"			56.472			99'-3½"	Pe
1018	-4'-0"			67.734		LtE(14'-2"), 2EE(11'-0½"), Ee2(11'-0½"), BFP(-10.398), GV(4'-8½"), T(47'-3½")	402'-3"	Pv
UG	12.4600	282.24	0.74	140		0.000076	4'-0"	Pf 0.000
1018	-4'-0"			67.734			4'-0"	Pe
1019	-4'-0"			67.734		Water Supply		Pv
		250.00				Hose Allowance At Source		
1019		532.24						
Route 2								
DR	1.0490	15.73	5.84	100		0.116939	2'-6½"	Pf 1.299
501	13'-3"	15.73	5.6	7.891		Sprinkler,	8'-6½"	Pe -0.123
1032	13'-6½"			9.067		2T(3'-7"), E(1'-5)	11'-1½"	Pv
Route 3								
DR	1.0490	16.78	6.23	100		0.131784	2'-7"	Pf 1.470
502	13'-3"	16.78	5.6	8.979		Sprinkler,	8'-6½"	Pe -0.101
1033	13'-6"			10.348		2T(3'-7"), E(1'-5)	11'-2"	Pv
Route 4								
DR	1.0490	17.85	6.63	100		0.147770	15'-7"	Pf 3.251
503	13'-3"	17.85	5.6	10.163		Sprinkler,	6'-5"	Pe -0.088
1095	13'-5½"			13.325		T(3'-7"), 2E(1'-5)	22'-0"	Pv



Hydraulic Analysis

Job Number: 1

Report Description: Light Hazard - AREA 3 -

Pipe Type	Diameter	Flow	Velocity	HWC	Pn	Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt		Fittings	Eq. Length	Summary
Upstream							Total Length	
AO	1.3800	36.89	7.91	100		0.148803	12'-0	Pf 1.786
1095	13'-5½	19.03		13.325		Flow (q) from Route 6		Pe 0.022
1096	13'-5			15.132			12'-0	Pv
AO	1.6100	57.15	9.01	100		0.157915	2'-4	Pf 1.271
1096	13'-5	20.27		15.132		Flow (q) from Route 7	5'-8½	Pe 0.004
1035	13'-4½			16.408		PO(5'-8½)	8'-0½	Pv
Route 5								
DR	1.0490	18.94	7.03	100		0.164804	2'-8	Pf 1.847
504	13'-3	18.94	5.6	11.435		Sprinkler,	8'-6½	Pe -0.079
1034	13'-5			13.202		2T(3'-7), E(1'-5)	11'-2½	Pv
Route 6								
DR	1.0490	19.03	7.07	100		0.166367	2'-7½	Pf 1.861
505	13'-3	19.03	5.6	11.552		Sprinkler,	8'-6½	Pe -0.088
1095	13'-5½			13.325		2T(3'-7), E(1'-5)	11'-2	Pv
Route 7								
DR	1.0490	20.27	7.52	100		0.186876	2'-8	Pf 2.100
506	13'-3	20.27	5.6	13.099		Sprinkler,	8'-6½	Pe -0.066
1096	13'-5			15.132		2T(3'-7), E(1'-5)	11'-3	Pv
Route 8								
DR	1.0490	22.79	8.46	100		0.232163	2'-8½	Pf 2.616
507	13'-3	22.79	5.6	16.562		Sprinkler,	8'-6½	Pe -0.052
1036	13'-4½			19.127		T(3'-7), E(1'-5), PO(3'-7)	11'-3	Pv
Route 9								
DR	1.0490	24.92	9.25	100		0.273926	2'-9	Pf 3.095
508	13'-3	24.92	5.6	19.805		Sprinkler,	8'-6½	Pe -0.039
1037	13'-4			22.861		T(3'-7), E(1'-5), PO(3'-7)	11'-3½	Pv
Route 10								
DR	1.0490	26.52	9.84	100		0.307213	15'-3	Pf 7.314
509	13'-3	26.52	5.6	22.420		Sprinkler,	8'-6½	Pe -0.013
1103	13'-3½			29.720		2T(3'-7), E(1'-5)	23'-9½	Pv
AO	1.0490	54.91	20.38	100		1.181012	0'-9½	Pf 5.121
1103	13'-3½	28.39		29.720		Flow (q) from Route 12	3'-7	Pe 0.001
1041	13'-3½			34.842		T(3'-7)	4'-4	Pv
Route 11								
DR	1.0490	27.17	10.09	100		0.321495	4'-11½	Pf 4.347
510	13'-3	27.17	5.6	23.548		Sprinkler,	8'-6½	Pe -0.026
1038	13'-3½			27.869		T(3'-7), E(1'-5), PO(3'-7)	13'-6½	Pv
Route 12								
DR	1.0490	28.39	10.54	100		0.348595	3'-0	Pf 4.032
511	13'-3	28.39	5.6	25.702		Sprinkler,	8'-6½	Pe -0.013
1103	13'-3½			29.720		2T(3'-7), E(1'-5)	11'-7	Pv
Route 13								
DR	1.0490	29.03	10.78	100		0.363360	3'-4½	Pf 4.343
512	13'-3	29.03	5.6	26.880		Sprinkler,	8'-6½	Pe -0.022
1039	13'-3½			31.201		T(3'-7), E(1'-5), PO(3'-7)	11'-11½	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

C Value Multiplier

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}} \right)^{4.87} = \text{Factor}$$

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51



Hydraulic Analysis

Job Number: 1

Report Description: Light Hazard - AREA 3 -

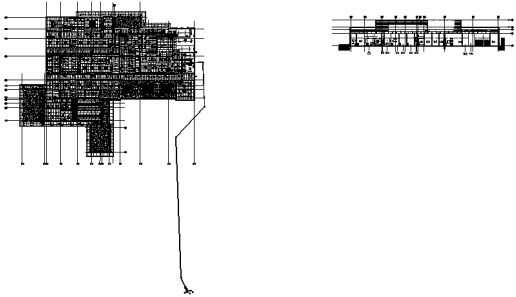
Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss		Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend	Units Legend		Fittings Legend	
AO Arm-Over	Diameter	Inch	ALV Alarm Valve	
BL Branch Line	Elevation	Foot	AngV Angle Valve	
CM Cross Main	Flow	gpm	b Bushing	
DN Drain	Discharge	gpm	BaV Ball Valve	
DR Drop	Velocity	fps	BFP Backflow Preventer	
DY Dynamic	Pressure	psi	BV Butterfly Valve	
FM Feed Main	Length	Foot	C Cross Flow Turn 90°	
FR Feed Riser	Friction Loss	psi/Foot	cplg Coupling	
MS Miscellaneous	HWC	Hazen-Williams Constant	Cr Cross Run	
OR Outrigger	Pt	Total pressure at a point in a pipe	CV Check Valve	
RN Riser Nipple	Pn	Normal pressure at a point in a pipe	DeV Deluge Valve	
SN Swing Nipple	Pf	Pressure loss due to friction between points	DPV Dry Pipe Valve	
SP Sprig	Pe	Pressure due to elevation difference between indicated points	E 90° Elbow	
ST Stand Pipe	Pv	Velocity pressure at a point in a pipe	EE 45° Elbow	
UG Underground			Ee1 11¼° Elbow	
			Ee2 22½° Elbow	
			f Flow Device	
			fd Flex Drop	
			FDC Fire Department Connection	
			fE 90° FireLock(TM) Elbow	
			fEE 45° FireLock(TM) Elbow	
			flg Flange	
			FN Floating Node	
			fT FireLock(TM) Tee	
			g Gauge	
			GloV Globe Valve	
			GV Gate Valve	
			Ho Hose	
			Hose Hose	
			HV Hose Valve	
			Hyd Hydrant	
			LtE Long Turn Elbow	
			mecT Mechanical Tee	
			Noz Nozzle	
			P1 Pump In	
			P2 Pump Out	
			PIV Post Indicating Valve	
			PO Pipe Outlet	
			PrV Pressure Relief Valve	
			PRV Pressure Reducing Valve	
			red Reducer/Adapter	
			S Supply	
			sCV Swing Check Valve	
			SFx Seismic Flex	
			Spr Sprinkler	
			St Strainer	
			T Tee Flow Turn 90°	
			Tr Tee Run	
			U Union	
			WirF Wirsbo	
			WMV Water Meter Valve	
			Z Cap	



Hydraulic Overview

Job Number: 1
Report Description: Ordinary Group I - AREA 4 -

Job									
Job Number 1				Designer					
Job Name: Drawing2				Phone			FAX		
Address 1				State Certification/License Number					
Address 2				AHJ					
Address 3				Job Site/Building					
System									
Density 0.15 gpm/ft²				Area of Application 1950 ft² (Actual 2001 ft²)					
Most Demanding Sprinkler Data 5.6 K-Factor 19.35 at 11.939				Hose Streams 250.00					
Coverage Per Sprinkler 225 ft²				Number Of Sprinklers Calculated 22			Number Of Nozzles Calculated 0		
System Pressure Demand 76.414				System Flow Demand 474.43					
Total Demand 724.43 @ 76.414				Pressure Result +11.419 (13.0%)					
Supplies						Check Point Gauges			
<u>Node</u>	<u>Name</u>	<u>Flow(gpm)</u>	<u>Hose Flow(gpm)</u>	<u>Static(psi)</u>	<u>Residual(psi)</u>	<u>Identifier</u>	<u>Pressure(psi)</u>	<u>K-Factor(K)</u>	<u>Flow(gpm)</u>
1019	Water Supply	2275.00	250.00	90.000	72.000	BOR (1016)	62.945	59.8	474.43
LS ASC.cad						Water Supply at Node 1019 (2275.00, 0.00, 90.000, 72.000)			
									



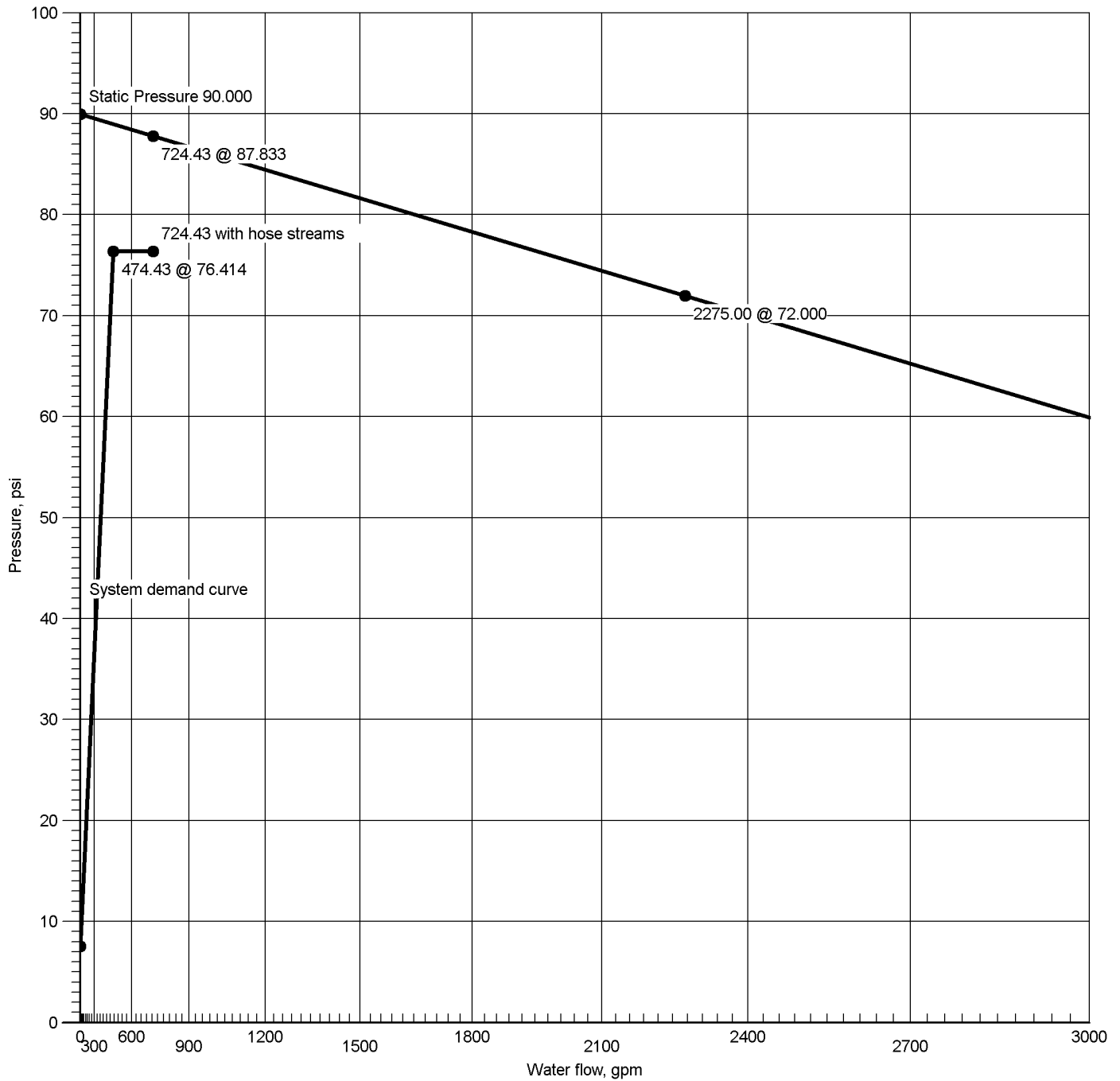
Hydraulic Summary

Job Number: 1
Report Description: Ordinary Group I - AREA 4 -

Job											
Job Number 1				Designer							
Job Name: Drawing2				State Certification/License Number							
Address 1				AHJ							
Address 2				Job Site/Building							
Address 3				Drawing Name LS ASC.cad							
System				Remote Area(s)							
Most Demanding Sprinkler Data 5.6 K-Factor 19.35 at 11.939				Occupancy Ordinary Group I - AREA 4 -			Job Suffix				
Hose Allowance At Source 250.00				Density 0.15 gpm/ft²			Area of Application 1950 ft² (Actual 2001 ft²)				
Additional Hose Supplies Node Flow(gpm)				Number Of Sprinklers Calculated 22		Number Of Nozzles Calculated 0		Coverage Per Sprinkler 225 ft²			
				AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area							
Total Hose Streams 250.00											
System Flow Demand 474.43		Total Water Required (Including Hose Allowance) 724.43									
Maximum Pressure Unbalance In Loops 0.000											
Maximum Velocity Above Ground 18.24 between nodes 1058 and 1057											
Maximum Velocity Under Ground 4.91 between nodes 1018 and 1017											
Volume capacity of Wet Pipes 891.54 gal		Volume capacity of Dry Pipes 252.04 gal									
Supplies											
Node	Name	Hose Flow (gpm)	Static (psi)	Residual (psi)	@	Flow (gpm)	Available (psi)	@	Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1019	Water Supply	250.00	90.000	72.000		2275.00	87.833		724.43	76.414	11.419
Contractor											
Contractor Number		Contact Name				Contact Title					
Name of Contractor:				Phone				Extension			
Address 1				FAX							
Address 2				E-mail							
Address 3				Web-Site							



Water Supply at Node 1019



Hydraulic Graph

Water Supply at Node 1019

Static: Pressure

90.000

Residual: Pressure

72.000 @ 2275.00

Available Flow @ 20 PSI:

4034.37

Available Pressure at System Demand

87.833 @ 724.43

Required Pressure at System Demand

76.414 @ 474.43

Required Pressure at System Demand (Including Hose Allowance at Source)

76.414 @ 724.43



Summary Of Outflowing Devices

Job Number: 1

Report Description: Ordinary Group I - AREA 4 -

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
➡ Sprinkler	700	19.35	19.35	5.6	11.939			
Sprinkler	701	19.40	19.35	5.6	11.998			
Sprinkler	702	19.54	19.05	5.6	12.177			
Sprinkler	703	19.56	18.90	5.6	12.202			
Sprinkler	704	19.82	18.90	5.6	12.521			
Sprinkler	705	20.21	19.35	5.6	13.019			
Sprinkler	706	19.71	18.60	5.6	12.384			
Sprinkler	707	19.98	18.90	5.6	12.733			
Sprinkler	708	20.35	19.35	5.6	13.209			
Sprinkler	709	19.49	18.00	5.6	12.115			
Sprinkler	710	20.04	18.45	5.6	12.809			
Sprinkler	711	20.93	19.35	5.6	13.971			
Sprinkler	712	20.07	18.15	5.6	12.843			
Sprinkler	713	20.19	14.85	5.6	12.999			
Sprinkler	714	20.47	15.15	5.6	13.363			
Sprinkler	715	22.95	14.82	5.6	16.799			
Sprinkler	716	23.82	14.82	5.6	18.094			
Sprinkler	717	24.77	14.82	5.6	19.572			
Sprinkler	718	25.54	15.30	5.6	20.792			
Sprinkler	719	25.76	15.30	5.6	21.155			
Sprinkler	720	25.82	14.82	5.6	21.254			
Sprinkler	721	26.66	14.82	5.6	22.670			

➡ Most Demanding Sprinkler Data



Node Analysis

Job Number: 1

Report Description: Ordinary Group I - AREA 4 -

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)
700	13'-6	Spr(-11.939)	11.939	19.35
701	13'-6	Spr(-11.998)	11.998	19.40
702	13'-6	Spr(-12.177)	12.177	19.54
703	13'-6	Spr(-12.202)	12.202	19.56
704	13'-6	Spr(-12.521)	12.521	19.82
705	13'-6	Spr(-13.019)	13.019	20.21
706	13'-6	Spr(-12.384)	12.384	19.71
707	13'-6	Spr(-12.733)	12.733	19.98
708	13'-6	Spr(-13.209)	13.209	20.35
709	13'-6	Spr(-12.115)	12.115	19.49
710	13'-6	Spr(-12.809)	12.809	20.04
711	13'-6	Spr(-13.971)	13.971	20.93
712	13'-6	Spr(-12.843)	12.843	20.07
713	13'-6	Spr(-12.999)	12.999	20.19
714	13'-6	Spr(-13.363)	13.363	20.47
715	13'-6	Spr(-16.799)	16.799	22.95
716	13'-6	Spr(-18.094)	18.094	23.82
717	13'-6	Spr(-19.572)	19.572	24.77
718	13'-6	Spr(-20.792)	20.792	25.54
719	13'-6	Spr(-21.155)	21.155	25.76
720	13'-6	Spr(-21.254)	21.254	25.82
721	13'-6	Spr(-22.670)	22.670	26.66
1019	-4'-0	S	76.414	474.43
1016	1'-0	BOR	62.945	
1017	-4'-0	LtE(11'-11½)	65.226	
1018	-4'-0	T(47'-3½)	76.413	
1043	4'-1½	DPV(-1.634)	57.413	
1044	14'-3	PO(3'-7)	13.465	
1045	14'-2½	PO(3'-7)	13.691	
1046	14'-2	PO(3'-7)	14.565	
1047	13'-9	PO(5'-8½)	16.032	
1048	13'-9	PO(5'-8½)	16.092	
1049	13'-9	PO(5'-8½)	16.341	
1050	13'-8½	PO(5'-8½)	16.804	
1051	13'-8½	PO(5'-8½)	17.514	
1052	13'-8	PO(3'-7)	19.451	
1053	13'-8	PO(3'-7)	20.957	
1054	13'-7½	PO(3'-7)	22.674	
1055	13'-7	PO(3'-7)	24.624	
1056	13'-7	PO(3'-7)	26.315	
1057	13'-7	PO(5'-8½)	26.460	
1058	13'-6½	fT(12'-5½)	34.900	
1059	11'-1½	fE(8'-11½)	38.422	
1060	14'-2½	PO(3'-7)	13.552	
1061	14'-2	PO(3'-7)	13.813	
1062	14'-1½	PO(3'-7)	14.530	
1083	14'-2½	PO(3'-7)	13.768	
1084	14'-2	PO(3'-7)	14.033	
1085	14'-1½	PO(3'-7)	14.759	
1088	14'-2	PO(3'-7)	14.171	
1089	14'-1½	PO(3'-7)	14.443	
1090	14'-1	PO(3'-7)	15.188	
1091	14'-2	PO(3'-7)	14.744	
1092	14'-1½	PO(3'-7)	14.987	
1093	14'-1	PO(3'-7)	15.925	
1101	13'-10½	PO(3'-7)	23.847	



Hydraulic Analysis

Job Number: 1
Report Description: Ordinary Group I - AREA 4 -

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss		Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	
Route 1								
DR	1.0490	19.35	7.18	100		0.171516	2'-2½"	Pf 1.846
700	13'-6"	19.35	5.6	11.939		Sprinkler,	8'-6½"	Pe -0.320
1044	14'-3"			13.465		T(3'-7'), E(1'-5'), PO(3'-7)	10'-9"	Pv
BL	1.6100	19.35	3.05	100		0.021293	9'-9½"	Pf 0.208
1044	14'-3"			13.465				Pe 0.018
1045	14'-2½"			13.691			9'-9½"	Pv
BL	1.6100	38.84	6.12	100		0.077284	11'-0½"	Pf 0.854
1045	14'-2½"	19.49		13.691		Flow (q) from Route 10		Pe 0.020
1046	14'-2"			14.565			11'-0½"	Pv
BL	1.6100	58.91	9.28	100		0.167011	0'-8"	Pf 1.300
1046	14'-2"	20.07		14.565		Flow (q) from Route 13	7'-1½"	Pe 0.168
1047	13'-9"			16.032		EE(1'-5'), PO(5'-8½")	7'-9½"	Pv
CM	3.2600	58.91	2.26	100		0.005378	9'-11½"	Pf 0.053
1047	13'-9"			16.032				Pe 0.006
1048	13'-9"			16.092			9'-11½"	Pv
CM	3.2600	117.91	4.53	100		0.019415	12'-4½"	Pf 0.240
1048	13'-9"	59.00		16.092		Flow (q) from Route 2		Pe 0.008
1049	13'-9"			16.341			12'-4½"	Pv
CM	3.2600	177.35	6.82	100		0.041315	11'-0½"	Pf 0.457
1049	13'-9"	59.44		16.341		Flow (q) from Route 3		Pe 0.007
1050	13'-8½"			16.804			11'-0½"	Pv
CM	3.2600	237.62	9.13	100		0.070982	9'-11"	Pf 0.704
1050	13'-8½"	60.27		16.804		Flow (q) from Route 6		Pe 0.006
1051	13'-8½"			17.514			9'-11"	Pv
CM	3.2600	299.11	11.50	100		0.108656	12'-11"	Pf 1.926
1051	13'-8½"	61.49		17.514		Flow (q) from Route 5	4'-9½"	Pe 0.011
1052	13'-8"			19.451		fE(4'-9½")	17'-8½"	Pv
CM	3.2600	322.06	12.38	100		0.124583	12'-0"	Pf 1.495
1052	13'-8"	22.95		19.451		Flow (q) from Route 16		Pe 0.011
1053	13'-8"			20.957			12'-0"	Pv
CM	3.2600	345.88	13.29	100		0.142163	12'-0"	Pf 1.706
1053	13'-8"	23.82		20.957		Flow (q) from Route 17		Pe 0.011
1054	13'-7½"			22.674			12'-0"	Pv
CM	3.2600	370.66	14.25	100		0.161573	12'-0"	Pf 1.939
1054	13'-7½"	24.77		22.674		Flow (q) from Route 18		Pe 0.011
1055	13'-7"			24.624			12'-0"	Pv
CM	3.2600	396.47	15.24	100		0.183007	9'-2½"	Pf 1.683
1055	13'-7"	25.82		24.624		Flow (q) from Route 21		Pe 0.008
1056	13'-7"			26.315			9'-2½"	Pv
CM	3.2600	423.14	16.26	100		0.206424	0'-8½"	Pf 0.144
1056	13'-7"	26.66		26.315		Flow (q) from Route 22		Pe 0.001
1057	13'-7"			26.460			0'-8½"	Pv
CM	3.2600	474.43	18.24	100		0.255085	20'-6½"	Pf 8.422
1057	13'-7"	51.29		26.460		Flow (q) from Route 19	12'-5½"	Pe 0.019
1058	13'-6½"			34.900		fT(12'-5½")	33'-0"	Pv
CM	4.2600	474.43	10.68	120		0.049470	32'-4"	Pf 2.485
1058	13'-6½"			34.900			17'-11"	Pe 1.036
1059	11'-1½"			38.422		2fE(8'-11½")	50'-3"	Pv
CM	4.2600	474.43	10.68	100		0.069316	159'-6"	Pf 15.943
1059	11'-1½"			38.422			46'-11½"	Pe 3.047
1043	4'-1½"			57.413		5fE(6'-4½"), fT(15'-0½"), DPV(-1.634)	206'-5"	Pv
CM	4.2600	474.43	10.68	120		0.049470	2'-11"	Pf 4.182
1043	4'-1½"			57.413			81'-7½"	Pe 1.351
1016	1'-0"			62.945		2PO(26'-4"), sCV(28'-11½"), BOR	84'-6½"	Pv
FR	6.0650	474.43	5.27	140		0.006658	5'-0"	Pf 0.113
1016	1'-0"			62.945			11'-11½"	Pe 2.168
1017	-4'-0"			65.226		LiE(11'-11½")	16'-11½"	Pv
UG	6.2800	474.43	4.91	140		0.005619	302'-11½"	Pf 11.187
1017	-4'-0"			65.226			99'-3½"	Pe
1018	-4'-0"			76.413		LiE(14'-2"), 2EE(11'-0½"), Ee2(11'-0½"), BFP(-8.927), GV(4'-8½"), T(47'-3½")	402'-3"	Pv
UG	12.4600	474.43	1.25	140		0.000200	4'-0"	Pf 0.001
1018	-4'-0"			76.413			4'-0"	Pe
1019	-4'-0"			76.414		Water Supply		Pv



Hydraulic Analysis

Job Number: 1
Report Description: Ordinary Group I - AREA 4 -

Pipe Type	Diameter	Flow	Velocity	HWC	Pn	Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt		Fittings	Eq. Length	Summary
Upstream							Total Length	
		250.00				Hose Allowance At Source		
1019		724.43						
Route 2								
DR	1.0490	19.40	7.20	100		0.172307	2'-3½"	Pf 1.866
701	13'-6"	19.40	5.6	11.998		Sprinkler,	8'-6½"	Pe -0.313
1060	14'-2½"			13.552		T(3'-7), E(1'-5), PO(3'-7)	10'-10"	Pv
BL	1.6100	19.40	3.06	100		0.021391	11'-3½"	Pf 0.241
1060	14'-2½"			13.552				Pe 0.020
1061	14'-2"			13.813			11'-3½"	Pv
BL	1.6100	38.96	6.14	100		0.077720	9'-0"	Pf 0.701
1061	14'-2"	19.56		13.813		Flow (q) from Route 4		Pe 0.016
1062	14'-1½"			14.530			9'-0"	Pv
BL	1.6100	59.00	9.30	100		0.167491	1'-2½"	Pf 1.393
1062	14'-1½"	20.04		14.530		Flow (q) from Route 11	7'-1½"	Pe 0.169
1048	13'-9"			16.092		EE(1'-5), PO(5'-8½")	8'-4"	Pv
Route 3								
DR	1.0490	19.54	7.25	100		0.174682	2'-3½"	Pf 1.896
702	13'-6"	19.54	5.6	12.177		Sprinkler,	8'-6½"	Pe -0.305
1083	14'-2½"			13.768		T(3'-7), E(1'-5), PO(3'-7)	10'-10"	Pv
BL	1.6100	19.54	3.08	100		0.021686	11'-3½"	Pf 0.244
1083	14'-2½"			13.768				Pe 0.020
1084	14'-2"			14.033			11'-3½"	Pv
BL	1.6100	39.25	6.19	100		0.078790	9'-0"	Pf 0.710
1084	14'-2"	19.71		14.033		Flow (q) from Route 9		Pe 0.016
1085	14'-1½"			14.759			9'-0"	Pv
BL	1.6100	59.44	9.37	100		0.169794	1'-2½"	Pf 1.412
1085	14'-1½"	20.19		14.759		Flow (q) from Route 14	7'-1½"	Pe 0.169
1049	13'-9"			16.341		EE(1'-5), PO(5'-8½")	8'-4"	Pv
Route 4								
DR	1.0490	19.56	7.26	100		0.175010	2'-4"	Pf 1.904
703	13'-6"	19.56	5.6	12.202		Sprinkler,	8'-6½"	Pe -0.293
1061	14'-2"			13.813		T(3'-7), E(1'-5), PO(3'-7)	10'-10½"	Pv
Route 5								
DR	1.0490	20.21	7.50	100		0.185821	2'-3½"	Pf 2.017
705	13'-6"	20.21	5.6	13.019		Sprinkler,	8'-6½"	Pe -0.292
1091	14'-2"			14.744		T(3'-7), E(1'-5), PO(3'-7)	10'-10½"	Pv
BL	1.6100	20.21	3.18	100		0.023069	9'-9"	Pf 0.225
1091	14'-2"			14.744				Pe 0.018
1092	14'-1½"			14.987			9'-9"	Pv
BL	1.6100	40.56	6.39	100		0.083724	10'-11½"	Pf 0.918
1092	14'-1½"	20.35		14.987		Flow (q) from Route 7		Pe 0.020
1093	14'-1"			15.925			10'-11½"	Pv
BL	1.6100	61.49	9.69	100		0.180797	0'-9"	Pf 1.421
1093	14'-1"	20.93		15.925		Flow (q) from Route 12	7'-1½"	Pe 0.168
1051	13'-8½"			17.514		EE(1'-5), PO(5'-8½")	7'-10½"	Pv
Route 6								
DR	1.0490	19.82	7.36	100		0.179233	2'-4"	Pf 1.948
704	13'-6"	19.82	5.6	12.521		Sprinkler,	8'-6½"	Pe -0.298
1088	14'-2"			14.171		T(3'-7), E(1'-5), PO(3'-7)	10'-10½"	Pv
BL	1.6100	19.82	3.12	100		0.022251	11'-3½"	Pf 0.251
1088	14'-2"			14.171				Pe 0.020
1089	14'-1½"			14.443			11'-3½"	Pv
BL	1.6100	39.80	6.27	100		0.080842	9'-0"	Pf 0.729
1089	14'-1½"	19.98		14.443		Flow (q) from Route 8		Pe 0.016
1090	14'-1"			15.188			9'-0"	Pv
BL	1.6100	60.27	9.50	100		0.174210	1'-2"	Pf 1.448
1090	14'-1"	20.47		15.188		Flow (q) from Route 15	7'-1½"	Pe 0.169
1050	13'-8½"			16.804		EE(1'-5), PO(5'-8½")	8'-4"	Pv
Route 7								
DR	1.0490	20.35	7.56	100		0.188330	2'-4"	Pf 2.052
708	13'-6"	20.35	5.6	13.209		Sprinkler,	8'-6½"	Pe -0.274
1092	14'-1½"			14.987		T(3'-7), E(1'-5), PO(3'-7)	10'-10½"	Pv
Route 8								
DR	1.0490	19.98	7.42	100		0.182038	2'-4½"	Pf 1.987
707	13'-6"	19.98	5.6	12.733		Sprinkler,	8'-6½"	Pe -0.278
1089	14'-1½"			14.443		T(3'-7), E(1'-5), PO(3'-7)	10'-11"	Pv
Route 9								



Hydraulic Analysis

Job Number: 1
Report Description: Ordinary Group I - AREA 4 -

Pipe Type	Diameter	Flow	Velocity	HWC	Pn	Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt		Fittings	Eq. Length	Summary
Upstream							Total Length	
DR	1.0490	19.71	7.32	100		0.177419	2'-4	Pf 1.934
706	13'-6	19.71	5.6	12.384		Sprinkler,	8'-6½	Pe -0.285
1084	14'-2			14.033		T(3'-7), E(1'-5), PO(3'-7)	10'-11	Pv
Route 10								
DR	1.0490	19.49	7.24	100		0.173852	2'-3	Pf 1.878
709	13'-6	19.49	5.6	12.115		Sprinkler,	8'-6½	Pe -0.302
1045	14'-2½			13.691		T(3'-7), E(1'-5), PO(3'-7)	10'-9½	Pv
Route 11								
DR	1.0490	20.04	7.44	100		0.183041	2'-4½	Pf 1.998
710	13'-6	20.04	5.6	12.809		Sprinkler,	8'-6½	Pe -0.277
1062	14'-1½			14.530		T(3'-7), E(1'-5), PO(3'-7)	10'-11	Pv
Route 12								
DR	1.0490	20.93	7.77	100		0.198361	2'-7	Pf 2.208
711	13'-6	20.93	5.6	13.971		Sprinkler,	8'-6½	Pe -0.254
1093	14'-1			15.925		T(3'-7), E(1'-5), PO(3'-7)	11'-1½	Pv
Route 13								
DR	1.0490	20.07	7.45	100		0.183494	2'-4½	Pf 2.004
712	13'-6	20.07	5.6	12.843		Sprinkler,	8'-6½	Pe -0.282
1046	14'-2			14.565		T(3'-7), E(1'-5), PO(3'-7)	10'-11	Pv
Route 14								
DR	1.0490	20.19	7.50	100		0.185550	2'-4½	Pf 2.030
713	13'-6	20.19	5.6	12.999		Sprinkler,	8'-6½	Pe -0.269
1085	14'-1½			14.759		T(3'-7), E(1'-5), PO(3'-7)	10'-11½	Pv
Route 15								
DR	1.0490	20.47	7.60	100		0.190364	2'-5	Pf 2.085
714	13'-6	20.47	5.6	13.363		Sprinkler,	8'-6½	Pe -0.261
1090	14'-1			15.188		T(3'-7), E(1'-5), PO(3'-7)	10'-11½	Pv
Route 16								
DR	1.0490	22.95	8.52	100		0.235233	3'-0½	Pf 2.728
715	13'-6	22.95	5.6	16.799		Sprinkler,	8'-6½	Pe -0.075
1052	13'-8			19.451		T(3'-7), E(1'-5), PO(3'-7)	11'-7	Pv
Route 17								
DR	1.0490	23.82	8.84	100		0.251953	3'-1	Pf 2.928
716	13'-6	23.82	5.6	18.094		Sprinkler,	8'-6½	Pe -0.064
1053	13'-8			20.957		T(3'-7), E(1'-5), PO(3'-7)	11'-7½	Pv
Route 18								
DR	1.0490	24.77	9.20	100		0.270941	3'-1	Pf 3.155
717	13'-6	24.77	5.6	19.572		Sprinkler,	8'-6½	Pe -0.053
1054	13'-7½			22.674		T(3'-7), E(1'-5), PO(3'-7)	11'-7½	Pv
Route 19								
DR	1.0490	25.54	9.48	100		0.286527	2'-8	Pf 3.214
718	13'-6	25.54	5.6	20.792		Sprinkler,	8'-6½	Pe -0.159
1101	13'-10½			23.847		T(3'-7), E(1'-5), PO(3'-7)	11'-2½	Pv
BL	1.6100	25.54	4.02	100		0.035571	12'-0	Pf 0.427
1101	13'-10½			23.847				Pe 0.019
1102	13'-10			24.292			12'-0	Pv
BL	1.6100	51.29	8.08	100		0.129266	7'-4½	Pf 2.060
1102	13'-10	25.76		24.292		Flow (q) from Route 20	8'-6½	Pe 0.107
1057	13'-7			26.460		2EE(1'-5), PO(5'-8½)	15'-11½	Pv
Route 20								
DR	1.0490	25.76	9.56	100		0.291145	2'-8½	Pf 3.278
719	13'-6	25.76	5.6	21.155		Sprinkler,	8'-6½	Pe -0.141
1102	13'-10			24.292		T(3'-7), E(1'-5), PO(3'-7)	11'-3	Pv
Route 21								
DR	1.0490	25.82	9.58	100		0.292407	3'-1½	Pf 3.412
720	13'-6	25.82	5.6	21.254		Sprinkler,	8'-6½	Pe -0.043
1055	13'-7			24.624		T(3'-7), E(1'-5), PO(3'-7)	11'-8	Pv
Route 22								
DR	1.0490	26.66	9.90	100		0.310381	3'-3½	Pf 3.680
721	13'-6	26.66	5.6	22.670		Sprinkler,	8'-6½	Pe -0.034
1056	13'-7			26.315		T(3'-7), E(1'-5), PO(3'-7)	11'-10½	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

C Value Multiplier

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}} \right)^{4.87} = \text{Factor}$$

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51



Hydraulic Analysis

Job Number: 1

Report Description: Ordinary Group I - AREA 4 -

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss		Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend		Units Legend		Fittings Legend	
AO	Arm-Over	Diameter	Inch	ALV	Alarm Valve
BL	Branch Line	Elevation	Foot	AngV	Angle Valve
CM	Cross Main	Flow	gpm	b	Bushing
DN	Drain	Discharge	gpm	BaV	Ball Valve
DR	Drop	Velocity	fps	BFP	Backflow Preventer
DY	Dynamic	Pressure	psi	BV	Butterfly Valve
FM	Feed Main	Length	Foot	C	Cross Flow Turn 90°
FR	Feed Riser	Friction Loss	psi/Foot	cplg	Coupling
MS	Miscellaneous	HWC	Hazen-Williams Constant	Cr	Cross Run
OR	Outrigger	Pt	Total pressure at a point in a pipe	CV	Check Valve
RN	Riser Nipple	Pn	Normal pressure at a point in a pipe	DeV	Deluge Valve
SN	Swing Nipple	Pf	Pressure loss due to friction between points	DPV	Dry Pipe Valve
SP	Sprig	Pe	Pressure due to elevation difference between indicated points	E	90° Elbow
ST	Stand Pipe	Pv	Velocity pressure at a point in a pipe	EE	45° Elbow
UG	Underground			Ee1	11¼° Elbow
				Ee2	22½° Elbow
				f	Flow Device
				fd	Flex Drop
				FDC	Fire Department Connection
				fE	90° FireLock(TM) Elbow
				fEE	45° FireLock(TM) Elbow
				flg	Flange
				FN	Floating Node
				fT	FireLock(TM) Tee
				g	Gauge
				GloV	Globe Valve
				GV	Gate Valve
				Ho	Hose
				Hose	Hose
				HV	Hose Valve
				Hyd	Hydrant
				LtE	Long Turn Elbow
				mecT	Mechanical Tee
				Noz	Nozzle
				P1	Pump In
				P2	Pump Out
				PIV	Post Indicating Valve
				PO	Pipe Outlet
				PrV	Pressure Relief Valve
				PRV	Pressure Reducing Valve
				red	Reducer/Adapter
				S	Supply
				sCV	Swing Check Valve
				SFx	Seismic Flex
				Spr	Sprinkler
				St	Strainer
				T	Tee Flow Turn 90°
				Tr	Tee Run
				U	Union
				WirF	Wirsbo
				WMV	Water Meter Valve
				Z	Cap