



Hydraulic Overview

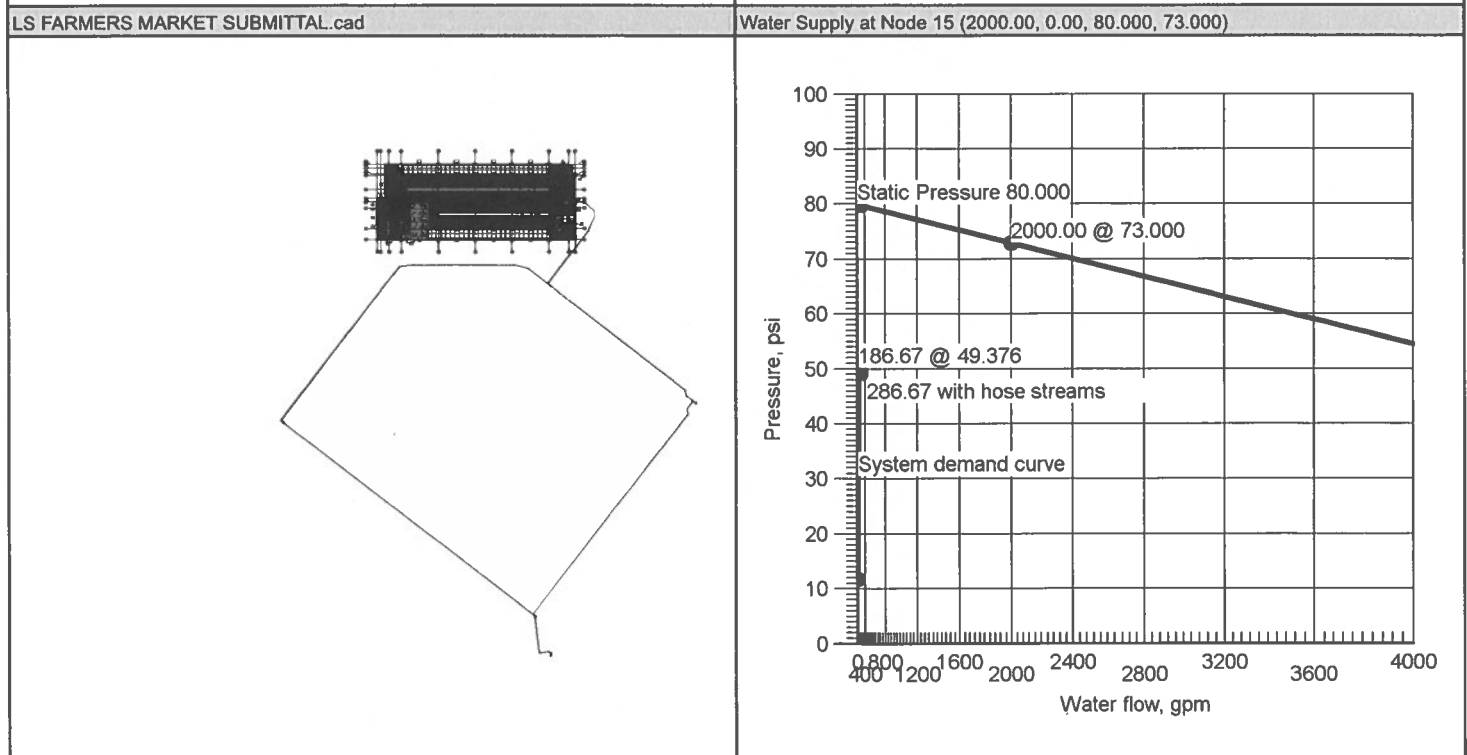
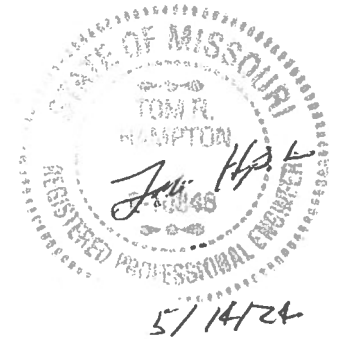
Job Number: 4353CK

Report Description: Light Hazard (OVERHEAD GRID)

Job		
Job Number 4353CK	Designer JONATHAN THOMPSON	
Job Name LEE'S SUMMIT FARMERS MARKET	Phone 913-722-6900	FAX 913-722-6969
Address 1 209 SE GREEN ST	State Certification/License Number	
Address 2 LEE'S SUMMIT, MISSOURI 64063	AHJ	
Address 3	Job Site/Building	

System	
Density 0.10 gpm/ft²	Area of Application 1500 ft² (Actual 1595 ft²)
Most Demanding Sprinkler Data 5.6 K-Factor 18.00 at 10.332	Hose Streams 100.00
Coverage Per Sprinkler 225 ft²	Number Of Sprinklers Calculated 10 0
System Pressure Demand 49.376	System Flow Demand 186.67
Total Demand 286.67 @ 49.376	Pressure Result +30.432 (38.1%)

Supplies						Check Point Gauges			
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)	Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
15	Water Supply	2000.00	100.00	80.000	73.000	BASE OF RISER (9)	49.365	26.57	186.67





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Address 1 209 SE GREEN ST	AHJ
Address 2 LEE'S SUMMIT, MISSOURI 64063	Job Site/Building
Address 3	Drawing Name LS FARMERS MARKET SUBMITTAL.cad

Remote Area(s)

Most Demanding Sprinkler Data 5.6 K-Factor 18.00 at 10.332		Occupancy Light Hazard		Job Suffix	
Hose Allowance At Source 100.00		Density 0.10 gpm/ft ²		Area of Application 1500 ft ² (Actual 1595 ft ²)	
Additional Hose Supplies Node Flow(gpm)		Number Of Sprinklers Calculated 10		Number Of Nozzles Calculated 0	
		Coverage Per Sprinkler 225 ft ²			
		AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area Left: 48.793			
Total Hose Streams 100.00					
System Flow Demand 186.67		Total Water Required (Including Hose Allowance) 286.67			
Maximum Pressure Unbalance In Loops 0.000					
Maximum Velocity Above Ground 10.98 between nodes 6 and 5					
Maximum Velocity Under Ground 1.92 between nodes 11 and 10					
Volume capacity of Wet Pipes 3336.93 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)
15	Water Supply	100.00	80.000	73.000	2000.00	79.808	286.67	49.376	30.432

Contractor

	Contractor Number	Contact Name	Contact Title
Name of Contractor:		Phone	Extension
Address 1		FAX	
Address 2		E-mail	
Address 3		Web-Site	



Summary Of Outflowing Devices

Job Number: 4353CK

Report Description: Light Hazard (OVERHEAD GRID)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
➡ Sprinkler	100	18.00	18.00	5.6	10.332			
Sprinkler	101	18.11	18.00	5.6	10.463			
Sprinkler	102	18.13	18.00	5.6	10.477			
Sprinkler	103	18.38	18.00	5.6	10.775			
Sprinkler	104	18.66	17.30	5.6	11.102			
Sprinkler	105	19.34	18.00	5.6	11.930			
Sprinkler	106	19.52	18.00	5.6	12.145			
Sprinkler	107	18.76	17.30	5.6	11.225			
Sprinkler	108	18.77	17.30	5.6	11.232			
Sprinkler	109	19.00	17.30	5.6	11.515			

➡ Most Demanding Sprinkler Data



Node Analysis

Job Number: 4353CK

Report Description: Light Hazard (OVERHEAD GRID)

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)
15	2'-0	S	49.376	186.67
100	29'-5½	Spr(-10.332)	10.332	18.00
101	29'-5½	Spr(-10.463)	10.463	18.11
102	29'-5½	Spr(-10.477)	10.477	18.13
103	29'-5½	Spr(-10.775)	10.775	18.38
104	27'-7½	Spr(-11.102)	11.102	18.66
105	27'-8	Spr(-11.930)	11.930	19.34
106	27'-8	Spr(-12.145)	12.145	19.52
107	27'-7½	Spr(-11.225)	11.225	18.76
108	27'-7½	Spr(-11.232)	11.232	18.77
109	27'-7½	Spr(-11.515)	11.515	19.00
1	29'-5½	T(8'-0)	10.547	
2	22'-7½	PO(8'-0)	14.067	
3	22'-7½	PO(8'-0)	14.117	
4	22'-7½	PO(8'-0)	14.166	
5	22'-7½	PO(8'-0)	20.937	
6	13'-11	T(16'-5½)	32.051	
7	10'-9	PO(16'-5½), C(16'-5½)	41.245	
9	1'-0	BASE OF RISER	49.365	
10	-4'-0	E(14'-0)	51.562	
11	-4'-0	T(54'-11)	51.759	
12	-4'-0	E(32'-6)	51.776	
13	-4'-0	T(54'-11)	51.867	
14	-4'-0	E(25'-7½)	51.968	
16	22'-7½	PO(8'-0)	19.795	
17	22'-7½	PO(8'-0)	20.227	
18	27'-7½	T(8'-0)	11.331	
19	22'-7½	PO(8'-0)	14.066	
20	22'-7½	PO(8'-0)	14.105	
21	22'-7½	PO(8'-0)	19.584	
22	22'-7½	PO(8'-0)	19.622	
23	-4'-0	E(32'-6)	51.787	
24	10'-9	PO(16'-5½), C(16'-5½)	41.229	



Hydraulic Analysis

Job Number: 4353CK

Report Description: Light Hazard (OVERHEAD GRID)

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								
BL	1.6100	18.00	2.84	120		0.013295	8'-2	Pf 0.215
100	29'-5½	18.00	5.6	10.332		Sprinkler,	8'-0	Pe
1	29'-5½			10.547		T(8'-0)	16'-2	Pv
RN	1.6100	31.85	5.02	120		0.038215	6'-10	Pf 0.566
1	29'-5½	13.85		10.547		Flow (q) from Route 3	8'-0	Pe 2.954
2	22'-7½			14.067		PO(8'-0)	14'-10	Pv
CM	2.6350	35.03	2.06	120		0.004138	12'-0	Pf 0.050
2	22'-7½	3.18		14.067		Flow (q) from Route 12		Pe
3	22'-7½			14.117			12'-0	Pv
CM	2.6350	35.61	2.09	120		0.004263	11'-6	Pf 0.049
3	22'-7½	0.57		14.117		Flow (q) from Route 6		Pe
4	22'-7½			14.166			11'-6	Pv
RN	1.6100	35.61	5.61	120		0.046960	116'-2½	Pf 6.772
4	22'-7½			14.166		PO(8'-0)	28'-0	Pe
5	22'-7½			20.937		T(8'-0), E(4'-0), PO(8'-0)	144'-2½	Pv
CM	2.6350	186.67	10.98	120		0.091401	34'-4	Pf 7.340
5	22'-7½	151.07		20.937		Flow (q) from Route 2	46'-0	Pe 3.774
6	13'-11			32.051		5fE(5'-11), T(16'-5½)	80'-3½	Pv
CM	2.6350	110.38	6.49	120		0.034576	175'-6	Pf 7.819
6	13'-11			32.051			50'-8	Pe 1.374
7	10'-9			41.245		3fE(5'-11), PO(16'-5½), C(16'-5½)	226'-1½	Pv
CM	3.2600	186.67	7.18	120		0.032418	27'-1	Pf 1.610
7	10'-9	76.30		41.245		Flow (q) from Route 11	22'-7	Pe 0.463
238	9'-8			43.318		2fE(6'-8½), fE(9'-1½)	49'-8	Pv
FR	4.2600	186.67	4.20	120		0.008809	6'-8½	Pf 2.281
238	9'-8			43.318			15'-9	Pe 3.766
9	1'-0			49.365		fE(8'-11½), Tr(6'-9½), 2f(-0.000), BFP(-2.083), BASE OF RISER	22'-5½	Pv
FR	6.0650	186.67	2.07	120		0.001577	5'-0	Pf 0.030
9	1'-0			49.365			14'-0	Pe 2.168
10	-4'-0			51.562		E(14'-0)	19'-0	Pv
UG	6.3100	186.67	1.92	150		0.000860	121'-9	Pf 0.196
10	-4'-0			51.562			106'-2½	Pe
11	-4'-0			51.759		4EE(12'-10), T(54'-11)	227'-11½	Pv
UG	8.2800	94.62	0.56	150		0.000065	203'-3½	Pf 0.017
11	-4'-0			51.759			65'-0½	Pe
12	-4'-0			51.776		2EE(16'-3), E(32'-6)	268'-3½	Pv
UG	6.3100	94.62	0.97	150		0.000245	291'-4½	Pf 0.091
12	-4'-0			51.776			80'-7	Pe
13	-4'-0			51.867		2EE(12'-10), T(54'-11)	371'-11½	Pv
UG	6.3100	186.67	1.92	150		0.000860	52'-8½	Pf 0.101
13	-4'-0	92.06		51.867		Flow (q) from Route 9	64'-1	Pe
14	-4'-0			51.968		EE(12'-10), 2E(25'-7½)	116'-9½	Pv
FR	6.0650	186.67	2.07	120		0.001577	6'-0	Pf 0.009
14	-4'-0			51.968				Pe -2.601
15	2'-0			49.376		Water Supply	6'-0	Pv
		100.00				Hose Allowance At Source		
15		286.67						
Route 2								
BL	1.6100	4.26	0.67	120		0.000925	15'-0	Pf 0.014
101	29'-5½	18.11	5.6	10.463		Sprinkler		Pe
102	29'-5½			10.477			15'-0	Pv
BL	1.6100	22.39	3.53	120		0.019904	15'-0	Pf 0.299
102	29'-5½	18.13	5.6	10.477		Sprinkler		Pe
103	29'-5½			10.775			15'-0	Pv
BL	1.6100	40.77	6.43	120		0.060333	84'-6½	Pf 6.066
103	29'-5½	18.38	5.6	10.775		Sprinkler,	16'-0	Pe 2.954
16	22'-7½			19.795		T(8'-0), PO(8'-0)	100'-6½	Pv
CM	2.6350	112.78	6.64	120		0.035982	12'-0	Pf 0.432
16	22'-7½	72.01		19.795		Flow (q) from Route 4		Pe
17	22'-7½			20.227			12'-0	Pv
CM	2.6350	151.07	8.89	120		0.061789	11'-6	Pf 0.711
17	22'-7½	38.29		20.227		Flow (q) from Route 5		Pe
5	22'-7½			20.937			11'-6	Pv
Route 3								



Hydraulic Analysis

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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	1.6100	13.85	2.18	120		0.008189	2'-2½"	Pf 0.084
101	29'-5½"	18.11	5.6	10.463		Sprinkler,	8'-0"	Pe
1	29'-5½"			10.547		T(8'-0)	10'-2½"	Pv
Route 4								
BL	1.6100	18.66	2.94	120		0.014209	8'-2"	Pf 0.230
104	27'-7½"	18.66	5.6	11.102		Sprinkler,	8'-0"	Pe
18	27'-7½"			11.331		T(8'-0)	16'-2"	Pv
RN	1.6100	34.45	5.43	120		0.044183	5'-0"	Pf 0.574
18	27'-7½"	15.79		11.331		Flow (q) from Route 8	8'-0"	Pe 2.161
19	22'-7½"			14.066		PO(8'-0)	13'-0"	Pv
CM	2.6350	31.27	1.84	120		0.003353	11'-6"	Pf 0.039
19	22'-7½"			14.066				Pe
20	22'-7½"			14.105			11'-6"	Pv
RN	1.6100	31.27	4.93	120		0.036932	116'-4"	Pf 5.479
20	22'-7½"			14.105		PO(8'-0)	32'-0"	Pe
21	22'-7½"			19.584		2T(8'-0), PO(8'-0)	148'-4"	Pv
CM	2.6350	31.27	1.84	120		0.003353	11'-6"	Pf 0.039
21	22'-7½"			19.584				Pe
22	22'-7½"			19.622			11'-6"	Pv
CM	2.6350	72.01	4.24	120		0.015690	11'-0"	Pf 0.173
22	22'-7½"	40.74		19.622		Flow (q) from Route 7		Pe
16	22'-7½"			19.795			11'-0"	Pv
Route 5								
BL	1.6100	18.77	2.96	120		0.014366	15'-0"	Pf 0.215
105	27'-8"	19.34	5.6	11.930		Sprinkler		Pe
106	27'-8"			12.145			15'-0"	Pv
BL	1.6100	38.29	6.03	120		0.053709	97'-9"	Pf 5.895
106	27'-8"	19.52	5.6	12.145		Sprinkler,	12'-0"	Pe 2.186
17	22'-7½"			20.227		E(4'-0), PO(8'-0)	109'-9"	Pv
Route 6								
BL	1.6100	0.57	0.09	120		0.000022	7'-3"	Pf 0.001
105	27'-8"	19.34	5.6	11.930		Sprinkler,	16'-0"	Pe 2.186
3	22'-7½"			14.117		T(8'-0), PO(8'-0)	23'-3"	Pv
Route 7								
BL	1.6100	2.97	0.47	120		0.000474	15'-0"	Pf 0.007
107	27'-7½"	18.76	5.6	11.225		Sprinkler		Pe
108	27'-7½"			11.232			15'-0"	Pv
BL	1.6100	21.74	3.43	120		0.018846	15'-0"	Pf 0.283
108	27'-7½"	18.77	5.6	11.232		Sprinkler		Pe
109	27'-7½"			11.515			15'-0"	Pv
BL	1.6100	40.74	6.42	120		0.060247	82'-8½"	Pf 5.947
109	27'-7½"	19.00	5.6	11.515		Sprinkler,	16'-0"	Pe 2.161
22	22'-7½"			19.622		T(8'-0), PO(8'-0)	98'-8½"	Pv
Route 8								
BL	1.6100	15.79	2.49	120		0.010437	2'-2½"	Pf 0.107
107	27'-7½"	18.76	5.6	11.225		Sprinkler,	8'-0"	Pe
18	27'-7½"			11.331		T(8'-0)	10'-2½"	Pv
Route 9								
UG	6.3100	92.06	0.94	150		0.000233	344'-2½"	Pf 0.080
23	-4'-0"	92.06		51.787		Flow (q) from Route 10		Pe
13	-4'-0"			51.867			344'-2½"	Pv
Route 10								
UG	8.2800	92.06	0.55	150		0.000062	377'-8½"	Pf 0.028
11	-4'-0"	94.62		51.759		Flow (q) from Route 1	81'-3½"	Pe
23	-4'-0"			51.787		3EE(16'-3), E(32'-6)	458'-11½"	Pv
Route 11								
CM	3.2600	76.30	2.93	120		0.006193	2'-7"	Pf 0.016
24	10'-9"	76.30		41.229		Flow (q) from Route 13		Pe
7	10'-9"			41.245			2'-7"	Pv
Route 12								
CM	2.6350	3.18	0.19	120		0.000049	11'-0"	Pf 0.001
19	22'-7½"	31.27		14.066		Flow (q) from Route 4		Pe
2	22'-7½"			14.067			11'-0"	Pv
Route 13								
CM	2.6350	76.30	4.49	120		0.017461	325'-4½"	Pf 7.803
6	13'-11"	110.38		32.051		Flow (q) from Route 1	121'-6"	Pe 1.374
24	10'-9"			41.229		15fE(5'-11), PO(16'-5½), C(16'-5½)	446'-10½"	Pv



Hydraulic Analysis

Job Number: 4353CK

Report Description: Light Hazard (OVERHEAD GRID)

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

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
				Multiplying Factor	0.713	1.16	1.33
							150
							1.51

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	

