



Hydraulic Overview

Job Number: 4353CK
Report Description: Ordinary Group I (CATERING KITCHEN)

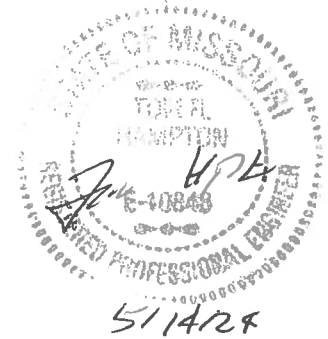
Job		
Job Number 4353CK	Designer JONATHAN THOMPSON	
Job Name LEE'S SUMMIT FARMERS MARKET	Phone 913-722-6900	FAX 913-722-6969
Address 1 209 SE GREEN ST	State Certification/License Number	
Address 2 LEE'S SUMMIT, MISSOURI 64063	AHJ	
Address 3	Job Site/Building	

System	
Density 0.15 gpm/ft ²	Area of Application 1500 ft ² (Actual 928 ft ²)
Most Demanding Sprinkler Data 5.6 K-Factor 19.50 at 12.125	Hose Streams 250.00
Coverage Per Sprinkler 225 ft ²	Number Of Sprinklers Calculated 11 0
System Pressure Demand 51.974	System Flow Demand 235.01
Total Demand 485.01 @ 51.974	Pressure Result +27.517 (34.6%)

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>
15	Water Supply	2000.00	250.00	80.000	73.000	BASE OF RISER (9)	51.727	32.68	235.01

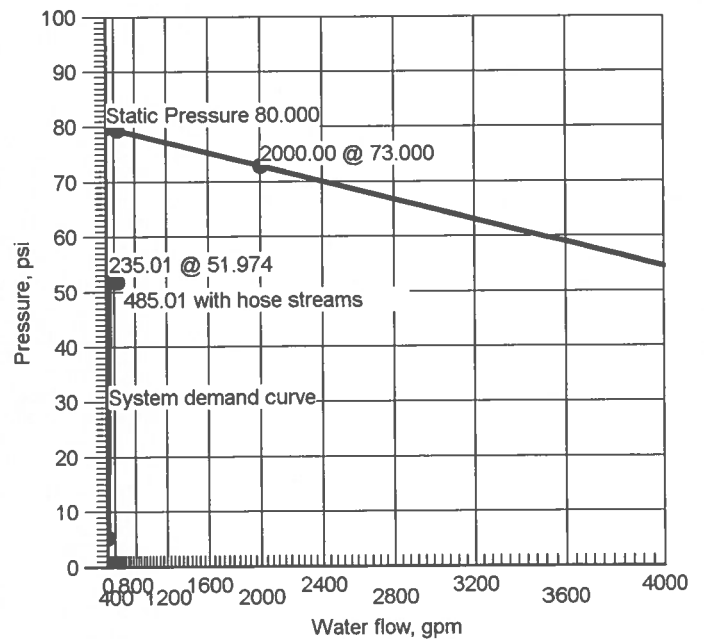
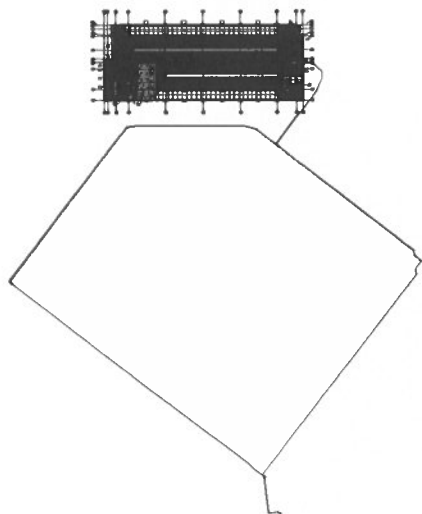


5/14/28



LS FARMERS MARKET SUBMITTAL.cad

Water Supply at Node 15 (2000.00, 0.00, 80.000, 73.000)





Hydraulic Summary

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Job											
Job Number 4353CK					Designer JONATHAN THOMPSON						
Job Name: LEE'S SUMMIT FARMERS MARKET					State Certification/License Number						
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						
System					Remote Area(s)						
Most Demanding Sprinkler Data 5.6 K-Factor 19.50 at 12.125					Occupancy Ordinary Group I			Job Suffix			
Hose Allowance At Source 250.00					Density 0.15 gpm/ft²			Area of Application 1500 ft² (Actual 928 ft²)			
Additional Hose Supplies <u>Node</u> <u>Flow(gpm)</u>					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 Right: 51.974						
Total Hose Streams 250.00											
System Flow Demand 235.01			Total Water Required (Including Hose Allowance) 485.01								
Maximum Pressure Unbalance In Loops 0.000											
Maximum Velocity Above Ground 22.05 between nodes 31 and 36											
Maximum Velocity Under Ground 2.41 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	250.00	80.000	73.000		2000.00	79.491		485.01	51.974	27.517
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

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Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
⇒ Sprinkler	400	19.50	19.50	5.6	12.125			
Sprinkler	401	19.52	19.50	5.6	12.151			
Sprinkler	402	19.65	16.80	5.6	12.318			
Sprinkler	403	19.68	16.80	5.6	12.345			
Sprinkler	404	20.21	16.80	5.6	13.022			
Sprinkler	405	20.23	16.80	5.6	13.049			
Sprinkler	406	21.36	16.80	5.6	14.543			
Sprinkler	407	21.38	16.80	5.6	14.573			
Sprinkler	408	21.97	16.80	5.6	15.392			
Sprinkler	409	21.99	16.80	5.6	15.423			
Sprinkler	411	29.53	17.85	5.6	27.802			

⇒ Most Demanding Sprinkler Data



Node Analysis

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Node	Elevation(foot)	Fittings	Pressure(psi)	Discharge(gpm)
15	2'-0	S	51.974	235.01
400	9'-0	Spr(-12.125), fd(32'-0)	12.125	19.50
401	9'-0	Spr(-12.151), fd(32'-0)	12.151	19.52
402	9'-0	Spr(-12.318), fd(32'-0)	12.318	19.65
403	9'-0	Spr(-12.345), fd(32'-0)	12.345	19.68
404	9'-0	Spr(-13.022), fd(32'-0)	13.022	20.21
405	9'-0	Spr(-13.049), fd(32'-0)	13.049	20.23
406	9'-0	Spr(-14.543), fd(32'-0)	14.543	21.36
407	9'-0	Spr(-14.573), fd(32'-0)	14.573	21.38
408	9'-0	Spr(-15.392), fd(32'-0)	15.392	21.97
409	9'-0	Spr(-15.423), fd(32'-0)	15.423	21.99
411	14'-5	Spr(-27.802)	27.802	29.53
7	10'-9	PO(16'-5½), C(16'-5½)	42.418	
9	1'-0	BASE OF RISER	51.727	
10	-4'-0	E(14'-0)	53.941	
11	-4'-0	T(54'-11)	54.241	
12	-4'-0	E(32'-6)	54.268	
13	-4'-0	T(54'-11)	54.407	
14	-4'-0	E(25'-7½)	54.561	
23	-4'-0	E(32'-6)	54.284	
24	10'-9	PO(16'-5½), C(16'-5½)	42.394	
25	10'-3	PO(5'-0)	16.178	
26	10'-3	PO(5'-0)	16.439	
27	10'-3	PO(5'-0)	17.388	
28	10'-3	PO(5'-0)	19.437	
29	10'-3	PO(5'-0)	21.308	
30	13'-11	PO(6'-0)	29.367	
31	13'-11	PO(6'-0)	29.431	
32	10'-3	PO(5'-0)	16.212	
33	10'-3	PO(5'-0)	16.474	
34	10'-3	PO(5'-0)	17.425	
35	10'-3	PO(5'-0)	19.478	
36	10'-3	PO(5'-0)	21.353	
39	13'-11	PO(5'-0)	29.500	
238	9'-8	fE(9'-1½)	45.347	



Hydraulic Analysis

Job Number: 4353CK

Report Description: Ordinary Group I (CATERING KITCHEN)

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	19.50	7.24	120		0.124174	0'-0	Pf 4.594
400	9'-0	19.50	5.6	12.125		Sprinkler,	37'-0	Pe -0.542
25	10'-3			16.178		PO(5'-0), fd(32'-0)	37'-0	Pv
BL	1.3800	19.50	4.18	120		0.032658	8'-0	Pf 0.261
25	10'-3			16.178			8'-0	Pe
26	10'-3			16.439			8'-0	Pv
BL	1.3800	39.15	8.40	120		0.118601	8'-0	Pf 0.949
26	10'-3	19.65		16.439		Flow (q) from Route 3	8'-0	Pe
27	10'-3			17.388			8'-0	Pv
BL	1.3800	59.36	12.73	120		0.256116	8'-0	Pf 2.049
27	10'-3	20.21		17.388		Flow (q) from Route 5	8'-0	Pe
28	10'-3			19.437			8'-0	Pv
BL	1.3800	80.72	17.31	120		0.452205	4'-1½	Pf 1.872
28	10'-3	21.36		19.437		Flow (q) from Route 7	4'-1½	Pe
29	10'-3			21.308			4'-1½	Pv
BL	1.3800	102.69	22.03	120		0.705917	4'-8	Pf 9.650
29	10'-3	21.97		21.308		Flow (q) from Route 9	9'-0	Pe -1.591
30	13'-11			29.367		E(3'-0), PO(6'-0)	13'-8	Pv
CM	2.6350	35.85	2.11	120		0.004319	14'-8½	Pf 0.064
30	13'-11			29.367			14'-8½	Pe
31	13'-11			29.431			14'-8½	Pv
CM	2.6350	138.65	8.16	120		0.052723	169'-7½	Pf 11.614
31	13'-11	102.80		29.431		Flow (q) from Route 2	50'-8	Pe 1.374
7	10'-9			42.418		3fE(5'-11), PO(16'-5½), C(16'-5½)	220'-3½	Pv
CM	3.2600	235.01	9.03	120		0.049636	27'-1	Pf 2.465
7	10'-9	96.36		42.418		Flow (q) from Route 11	22'-7	Pe 0.463
238	9'-8			45.347		2fE(6'-8½), fE(9'-1½)	49'-8	Pv
FR	4.2600	235.01	5.29	120		0.013488	6'-8½	Pf 2.614
238	9'-8			45.347			15'-9	Pe 3.766
9	1'-0			51.727		fE(8'-11½), Tr(6'-9½), 2f(-0.000), BFP(-2.311), BASE OF RISER	22'-5½	Pv
FR	6.0650	235.01	2.61	120		0.002414	5'-0	Pf 0.046
9	1'-0			51.727			14'-0	Pe 2.168
10	-4'-0			53.941		E(14'-0)	19'-0	Pv
UG	6.3100	235.01	2.41	150		0.001317	121'-9	Pf 0.300
10	-4'-0			53.941			106'-2½	Pe
11	-4'-0			54.241		4EE(12'-10), T(54'-11)	227'-11½	Pv
UG	8.2800	119.12	0.71	150		0.000100	203'-3½	Pf 0.027
11	-4'-0			54.241			65'-0½	Pe
12	-4'-0			54.268		2EE(16'-3), E(32'-6)	268'-3½	Pv
UG	6.3100	119.12	1.22	150		0.000375	291'-4½	Pf 0.139
12	-4'-0			54.268			80'-7	Pe
13	-4'-0			54.407		2EE(12'-10), T(54'-11)	371'-11½	Pv
UG	6.3100	235.01	2.41	150		0.001317	52'-8½	Pf 0.154
13	-4'-0	115.90		54.407		Flow (q) from Route 12	64'-1	Pe
14	-4'-0			54.561		EE(12'-10), 2E(25'-7½)	116'-9½	Pv
FR	6.0650	235.01	2.61	120		0.002414	6'-0	Pf 0.014
14	-4'-0			54.561			6'-0	Pe -2.601
15	2'-0			51.974		Water Supply	6'-0	Pv
		250.00				Hose Allowance At Source		
15		485.01						
Route 2								
DY	1.0490	19.52	7.25	120		0.124417	0'-0	Pf 4.603
401	9'-0	19.52	5.6	12.151		Sprinkler,	37'-0	Pe -0.542
32	10'-3			16.212		PO(5'-0), fd(32'-0)	37'-0	Pv
BL	1.3800	19.52	4.19	120		0.032723	8'-0	Pf 0.262
32	10'-3			16.212			8'-0	Pe
33	10'-3			16.474			8'-0	Pv
BL	1.3800	39.20	8.41	120		0.118833	8'-0	Pf 0.951
33	10'-3	19.68		16.474		Flow (q) from Route 4	8'-0	Pe
34	10'-3			17.425			8'-0	Pv
BL	1.3800	59.43	12.75	120		0.256618	8'-0	Pf 2.053
34	10'-3	20.23		17.425		Flow (q) from Route 6	8'-0	Pe
35	10'-3			19.478			8'-0	Pv



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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	1.3800	80.80	17.33	120		0.453089	4'-1½"	Pf 1.875
35	10'-3	21.38		19.478		Flow (q) from Route 8		Pe
36	10'-3			21.353				Pv
BL	1.3800	102.80	22.05	120		0.707287	4'-8" 9'-0" 13'-8"	Pf 9.668
36	10'-3	21.99		21.353		Flow (q) from Route 10		Pe -1.591
31	13'-11			29.431		E(3'-0), PO(6'-0)		Pv
Route 3								
DY	1.0490	19.65	7.30	120		0.126006	0'-0" 37'-0" 37'-0"	Pf 4.662
402	9'-0	19.65	5.6	12.318		Sprinkler,		Pe -0.542
26	10'-3			16.439		PO(5'-0), fd(32'-0)		Pv
Route 4								
DY	1.0490	19.68	7.30	120		0.126253	0'-0" 37'-0" 37'-0"	Pf 4.671
403	9'-0	19.68	5.6	12.345		Sprinkler,		Pe -0.542
33	10'-3			16.474		PO(5'-0), fd(32'-0)		Pv
Route 5								
DY	1.0490	20.21	7.50	120		0.132645	0'-0" 37'-0" 37'-0"	Pf 4.908
404	9'-0	20.21	5.6	13.022		Sprinkler,		Pe -0.542
27	10'-3			17.388		PO(5'-0), fd(32'-0)		Pv
Route 6								
DY	1.0490	20.23	7.51	120		0.132904	0'-0" 37'-0" 37'-0"	Pf 4.917
405	9'-0	20.23	5.6	13.049		Sprinkler,		Pe -0.542
34	10'-3			17.425		PO(5'-0), fd(32'-0)		Pv
Route 7								
DY	1.0490	21.36	7.93	120		0.146915	0'-0" 37'-0" 37'-0"	Pf 5.436
406	9'-0	21.36	5.6	14.543		Sprinkler,		Pe -0.542
28	10'-3			19.437		PO(5'-0), fd(32'-0)		Pv
Route 8								
DY	1.0490	21.38	7.94	120		0.147201	0'-0" 37'-0" 37'-0"	Pf 5.446
407	9'-0	21.38	5.6	14.573		Sprinkler,		Pe -0.542
35	10'-3			19.478		PO(5'-0), fd(32'-0)		Pv
Route 9								
BL	1.0490	21.97	8.16	120		0.154835	2'-8½" 39'-0" 41'-8½"	Pf 6.458
408	9'-0	21.97	5.6	15.392		Sprinkler,		Pe -0.542
29	10'-3			21.308		E(2'-0), PO(5'-0), fd(32'-0)		Pv
Route 10								
BL	1.0490	21.99	8.16	120		0.155127	2'-8½" 39'-0" 41'-8½"	Pf 6.472
409	9'-0	21.99	5.6	15.423		Sprinkler,		Pe -0.542
36	10'-3			21.353		E(2'-0), PO(5'-0), fd(32'-0)		Pv
Route 11								
SP	1.0490	29.53	10.96	120		0.267541	0'-6" 5'-0" 5'-6"	Pf 1.475
411	14'-5	29.53	5.6	27.802		Sprinkler,		Pe 0.223
39	13'-11			29.500		PO(5'-0)		Pv
CM	2.6350	96.36	5.67	120		0.026895	306'-9½" 121'-6" 428'-3½"	Pf 11.519
39	13'-11	66.83		29.500		Flow (q) from Route 14		Pe 1.374
24	10'-9			42.394		15fE(5'-11), PO(16'-5½), C(16'-5½)		Pv
CM	3.2600	96.36	3.70	120		0.009539	2'-7" 2'-7"	Pf 0.025
24	10'-9			42.394				Pe
7	10'-9			42.418				Pv
Route 12								
UG	6.3100	115.90	1.19	150		0.000356	344'-2½" 344'-2½"	Pf 0.123
23	-4'-0	115.90		54.284		Flow (q) from Route 13		Pe
13	-4'-0			54.407				Pv
Route 13								
UG	8.2800	115.90	0.69	150		0.000095	377'-8½" 81'-3½" 458'-11½"	Pf 0.044
11	-4'-0	119.12		54.241		Flow (q) from Route 1		Pe
23	-4'-0			54.284		3EE(16'-3), E(32'-6)		Pv
Route 14								
CM	2.6350	66.83	3.93	120		0.013668	9'-9" 9'-9"	Pf 0.133
30	13'-11	35.85		29.367		Flow (q) from Route 1		Pe
39	13'-11			29.500				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			



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Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Eq. Length	Summary
Upstream					Fittings	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 Reducing Valve
		PrV Pressure Relief Valve
		red Reducer/Adapter
		S Supply
		sCV Swing Check Valve
		Spr Sprinkler
		St Strainer
		T Tee Flow Turn 90°
		Tr Tee Run
		U Union
		WirF Wirsbo
		WMV Water Meter Valve
		Z Cap

