HOLBROOK FARMS AREA PLAN
CULINARY WATER

Introduction

Lehi City conducted a water model analysis of the region which included the Holbrook Farms properties. This document represents a water system analysis specific to the Holbrook Farms Area plan. For this analysis the following assumptions have been made:

1. Water source from connection to existing Lehi City water system on east side of the Jordan River
2. Future water source of Lehi City connection to CWP pipeline.
3. Lower tank water surface elevation of 4757
4. Upper tank water surface elevation of 5115

Design Criteria

Minimum Pipe Size	6"
Pipe Roughness Coefficient	130
Maximum Pipe Velocity	5 feet per second
Capita per Unit	3.8
Average Flow	100 gallons per day per person
Peak Instantaneous Flow	400 gallons per day per person (Peaking Factor = 4)
Peak Hourly Flow	0.8 GPM/ERU
Storage	400 gallons per day per connection ERU
Source	800 gallons per day per connection or ERU
Minimum Pressure	50 psi at peak flow 50 psi at peak flow with fire flow
Interior Sprinklers	1500 GPM at J17 and J28 ("Big Box Commercial)

Summary of Results

Peak Hourly Flow	2,138 gallons per minute
Source Required	1,484.7 gallons per minute
Storage Required	
Upper Tank	329,200 gallons + 180,000 gallons fire storage = 509,200 gallons (1.56 ac-ft)
Lower Tank	739,805 gallons + 180,000 gallons fire storage = 919,805 gallons (2.82 ac-ft)

Case 1: Peak Instantaneous (no fire flow)

Minimum Pressure 71.02 psi @ J25

Case 2: Peak Hourly + 1500 GPM Fire Flow for "Big Box" Commercial

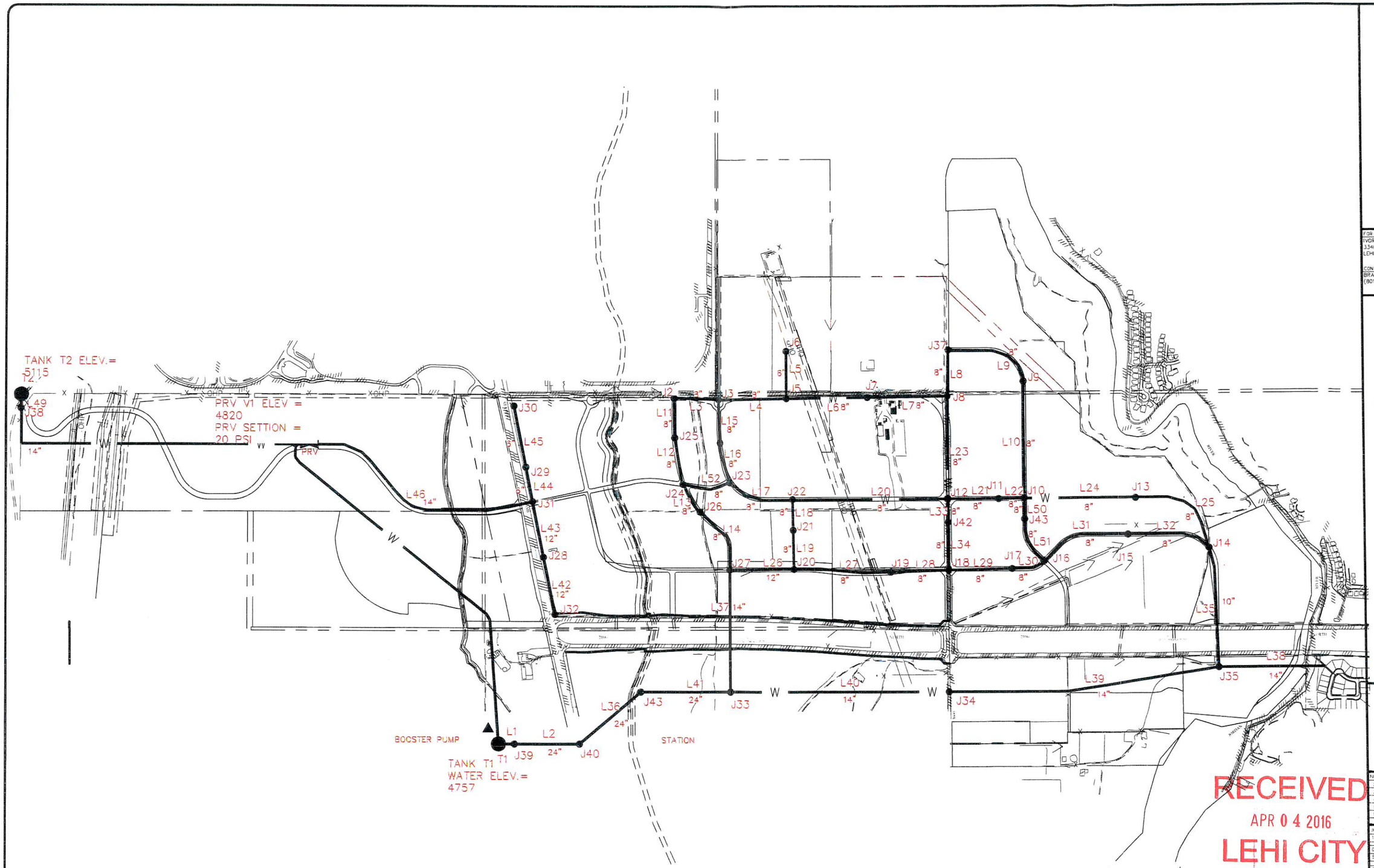
Minimum Pressure 67.89 psi @ J25
(1500 GPM at J17 and J28)

HOLBROOK FARMS AREA PLAN
CULINARY WATER

Area	*Land Use*	*Approx. Acres*	Units per acre (Density)	Estimated Units	Capita/Unit	No. Capita	Flow/Capita (gal/day)	Average Flow (gal/day)	Peak Factor	Peak Inst. Flow (gal/day)	Peak Inst. Flow (gal/min)	Peak Hourly Flow (0.8 gpm/Unit)	Storage Required (400 gal/Unit)	Storage Required (Ac-ft)	Source Required (800 gpd/Unit)	Source Required (gpm)
1A	Flex Zone	55.00	2.73	150	3.8	570	100	57,000	4	228,000	158	120	60,000	0.18	120,000	83.3
1B	Flex Zone	82.18	3.65	300	3.8	1,140	100	114,000	4	456,000	317	240	120,000	0.37	240,000	166.7
2	Commercial/Office	7.18	3.00	21.5	19.0	409	20	8,185	4	32,741	23	17	8,616	0.03	17,232	12.0
3	Residential Area	11.48	23.08	265	3.8	1,007	100	100,700	4	402,800	280	212	106,000	0.33	212,000	147.2
4	Commercial/Office	28.82	3.00	86.5	19.0	1,643	20	32,855	4	131,419	91	69	34,584	0.11	69,168	48.0
5	Commercial/Office	6.19	3.50	22	19.0	412	20	8,233	4	32,931	23	17	8,666	0.03	17,332	12.0
6	Residential Area	24.33	12.00	292	3.8	1,109	100	110,945	4	443,779	308	234	116,784	0.36	233,568	162.2
7	Residential Area	29.37	12.00	352	3.8	1,339	100	133,927	4	535,709	372	282	140,976	0.43	281,952	195.8
8	Residential Area	11.98	7.11	85	3.8	324	100	32,368	4	129,470	90	68	34,071	0.10	68,142	47.3
9	Residential Area	30.04	7.11	214	3.8	812	100	81,162	4	324,648	225	171	85,434	0.26	170,868	118.7
10	Open Space	40.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Residential Area	34.49	5.00	172	3.8	655	100	65,531	4	262,124	182	138	68,980	0.21	137,960	95.8
12	Residential Area	34.00	2.50	85	3.8	323	100	32,300	4	129,200	90	68	34,000	0.10	68,000	47.2
13	Commercial/Office	17.97	3.50	63	19.0	1,195	20	23,900	4	95,600	66	50	25,158	0.08	50,316	34.9
14	Commercial/Office	11.86	3.50	42	19.0	789	20	15,774	4	63,095	44	33	16,604	0.05	33,208	23.1
15	Commercial/Office	16.82	3.50	59	3.8	224	100	22,371	4	89,482	62	47	23,548	0.07	47,096	32.7
16a	Residential Area	33.88	3.00	102	3.8	386	100	38,623	4	154,493	107	81	40,656	0.12	81,312	56.5
16b	Residential Area	65.68	3.00	197	3.8	749	100	74,875	4	299,501	208	158	78,816	0.24	157,632	109.5
17	Commercial/Office	41.16	3.50	144	19.0	2,737	20	54,743	4	218,971	152	115	57,624	0.18	115,248	80.0
18	Residential Area	24.46	7.00	171	3.8	651	100	65,064	4	260,254	181	137	68,488	0.21	136,976	95.1
19	Open Space	28.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	Neighborhood Open Sp	18.93	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	Trails	13.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major Roads	27.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Totals	696.19		2,823		15,903		1,015,555		4,062,219	2,821	2,138	1,069,005	3.28	2,138,010	1,484.7

Total Approved ERU's	2,823.00

Upper Tank	329,200	1.01
Lower Tank	739,805	2.27



ASSUMED WATER SOURCES:
CWP CONNECTION (CWP SYSTEM PRESSURE UNKNOWN)
EXISTING LEHI CITY SYSTEM EAST OF JORDAN RIVER

PEAK HOUR FLOW WITH 1500 GPM FIRE FLOW AT J17 AND J28
PEAK INSTANTANEOUS FLOW WITH NO FIRE FLOW

JACKSON ENGINEERING
3376 STONEHILL LANE
COTTONWOOD HEIGHTS, UTAH 84121
PHONE (801) 558-5293

FOR
IVORY DEVELOPMENT
3340 NORTH CENTER STREET
LEHI, UTAH 84043

CONTACT
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HOLBROOK FARMS AREA PLAN
WATER SYSTEM ANALYSIS
CULINARY WATER SYSTEM
IVORY DEVELOPMENT

NO.	DATE	REVISION	BY
2	11/12/15	CITY COMMNET	SLJ
3	11/24/15	CITY COMMNET	SLJ
4	3/2/16	TANK NEW LOCATION	SLJ
5	3/2/16	3600 W CROSSING	SLJ
6	3/23/15	CITY COMMENT	SLJ
7	3/25/15	CITY COMMENT	SLJ

PROJECT NO.	DATE
15.023.102	3/25/2016
DRAWN BY:	CHECKED BY:
SLJ	SLJ
PROJECT MANAGER:	
PROJECT MANAGER	

EXHIBIT
W03

HOLBROOK FARMS AREA PLAN
CULINARY WATER MODEL
PEAK HOUR WITH 1500 GPM FIRE FLOW @ J17 and J28

Node Report

Node ID	Elevation ft	Demand GPM	Pressure psi	Area	Land Use	
J2	4586	0.00	68.67			
J3	4574	0.00	73.79			
J4	4574	68.00	74.04	8	Residential	
J5	4566	0.00	76.27			
J6	4566	138.00	76.03	11	Residential	
J7	4560	68.00	78.32	12	Residential	
J8	4546	81.00	84.17	16a	Residential	
J9	4535	158.00	88.72	16b	Residential	
J10	4529	0.00	91.35			
J11	4545	0.00	84.52			
J12	4542	0.00	85.93			
J13	4527	137.00	92.76			
J14	4522	0.00	97.29			
J15	4525	115.00	93.76	17	Commercial/Office	
J16	4528	0.00	85.09			
J17	4532	1533.00	86.43	14	Commercial/Office	1500 GPM Fire Flow
J18	4540	0.00	86.41			
J19	4546	50.00	86.27	13	Commercial/Office	
J20	4554	0.00	86.36			
J21	4556	171.00	83.64	9	Residential	
J22	4558	0.00	81.63			
J23	4572	0.00	77.55			
J24	4584	0.00	70.23			
J25	4588	234.00	67.89	6	Residential	
J26	4582	282.00	71.96	7	Residential	
J27	4573	17.00	79.60	5	Commercial/Office	
J28	4670	1569.00	77.52	4	Commercial/Office	1500 GPM Fire Flow
J29	4670	212.00	77.69	3	Residential	
J30	4675	17.00	75.52	2	Commercial/Office	
J31	4675	360.00	76.37	1	Flex Zone	
J32	4665	0.00	79.69			
J37	4545	0.00	84.50			
J38	5100	0.00	6.49			
J39	4752	0.00	4.33			
J40	4660	0.00	43.86			
J41	4820	0.00	20.00			
J1	4541	47.00	86.23	15	Residential	
J42	4529	72.00	91.10	18	Residential	
J43	4619	00.00	61.38			
Tank 1	4757	-3,171.00	Water Surface Elevation			
Tank 2	5115	-2,158.00	Water Surface Elevation			

HOLBROOK FARMS AREA PLAN
CULINARY WATER MODEL
PEAK HOUR WITH 1500 GPM FIRE FLOW @ J17 J28

Pipe Report

Link ID	Diameter in	Flow GPM	Velocity fps	Length ft	Roughness	Status
Pipe L1	24	3171.00	2.25	20	130	Open
Pipe L2	24	3171.00	2.25	1050	130	Open
Pipe L3	8	122.65	0.78	540	130	Open
Pipe L4	8	364.67	2.33	800	130	Open
Pipe L5	6	138.00	1.57	300	130	Open
Pipe L6	8	226.67	1.45	1100	130	Open
Pipe L7	8	158.67	1.01	800	130	Open
Pipe L8	8	112.19	0.72	515	130	Open
Pipe L9	8	112.19	0.72	1100	130	Open
Pipe L10	8	45.81	0.29	1380	130	Open
Pipe L11	8	122.65	0.78	500	130	Open
Pipe L12	8	356.65	2.28	520	130	Open
Pipe L13	8	496.73	3.17	400	130	Open
Pipe L14	8	778.73	4.97	750	130	Open
Pipe L15	8	242.02	1.54	450	130	Open
Pipe L16	8	310.02	1.98	450	130	Open
Pipe L17	8	169.94	1.08	820	130	Open
Pipe L18	8	578.01	3.69	400	130	Open
Pipe L19	8	749.01	4.78	400	130	Open
Pipe L20	8	408.07	2.60	1750	130	Open
Pipe L21	8	120.65	0.77	650	130	Open
Pipe L22	8	120.65	0.77	650	130	Open
Pipe L23	8	34.52	0.22	1200	130	Open
Pipe L24	8	297.08	1.90	650	130	Open
Pipe L25	8	434.08	2.77	1400	130	Open
Pipe L26	12	1398.47	3.97	720	130	Open
Pipe L27	8	649.46	4.15	1000	130	Open
Pipe L28	8	599.46	3.83	800	130	Open
Pipe L29	8	805.36	5.14	650	130	Open
Pipe L30	8	727.64	4.64	650	130	Open
Pipe L31	8	427.72	2.73	875	130	Open
Pipe L32	8	542.72	3.46	875	130	Open
Pipe L37	14	2,152.42	4.49	1200	130	Open
Pipe L36	24	3171.00	2.25	750	130	Open
Pipe L41	24	3171.00	2.25	1020	130	Open
Pipe L42	12	0.00	0.00	1600	130	Open
Pipe L43	12	1569.00	4.45	400	130	Open
Pipe L44	6	229.00	2.60	400	130	Open
Pipe L45	6	17.00	0.19	600	130	Open
Pipe L46	14	2158.00	4.50	3000	130	Open
Pipe L49	14	2158.00	4.50	5	130	Open
Pipe L33	8	252.90	1.61	200	130	Open
Pipe L34	8	205.90	1.31	600	130	Open
Pipe L50	8	371.92	2.37	200	130	Open
Pipe L51	8	299.92	1.91	600	130	Open
Pipe L52	8	140.08	0.89	550	130	Open
Valve VI	14	2158.00	4.50	#N/A	130	Active

Setting 20 psi

HOLBROOK FARMS AREA PLAN
CULINARY WATER MODEL
PEAK INSTANTANEOUS - NO FIRE FLOW

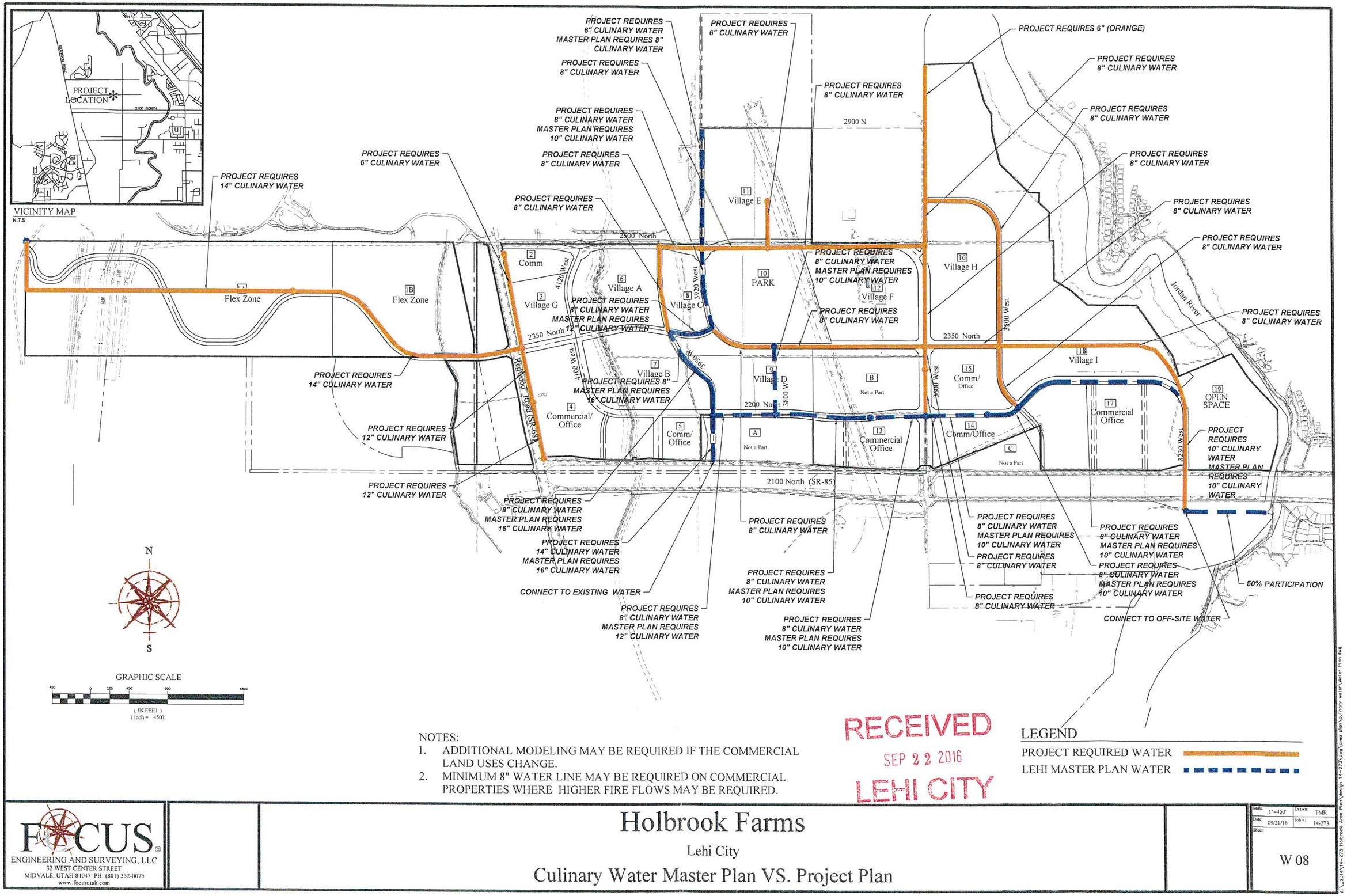
Node Report

Node ID	Elevation ft	Demand GPM	Pressure psi	Area	Land Use
J2	4586	0.00	71.90		
J3	4574	0.00	77.11		
J4	4574	90.00	77.24	8	Residential
J5	4566	0.00	80.44		
J6	4566	182.00	80.03	11	Residential
J7	4560	90.00	83.08	12	Residential
J8	4546	107.00	89.33	16a	Residential
J9	4535	208.00	94.10	16b	Residential
J10	4529	0.00	97.38		
J11	4545	0.00	90.44		
J12	4542	0.00	91.74		
J13	4527	0.00	98.62		
J14	4522	0.00	101.59		
J15	4525	152.00	99.52	17	Commercial/Office
J16	4528	0.00	98.01		
J17	4532	44.00	96.28	14	Commercial/Office
J18	4540	0.00	92.86		
J19	4546	66.00	90.78	13	Commercial/Office
J20	4554	0.00	88.31		
J21	4556	225.00	86.30	9	Residential
J22	4558	0.00	84.98		
J23	4572	0.00	78.39		
J24	4584	0.00	73.10		
J25	4588	308.00	71.02	6	Residential
J26	4582	372.00	74.24	7	Residential
J27	4573	23.00	80.73	5	Commercial/Office
J28	4670	91.00	83.79	4	Commercial/Office
J29	4670	280.00	82.39	3	Residential
J30	4675	23.00	80.20	2	Commercial/Office
J31	4675	475.00	81.63	1	Flex Zone
J32	4665	0.00	85.96		
J33	4573	0.00	81.47		
J34	4527	0.00	100.98		
J35	4520	0.00	103.50		
J36	4520	0.00	103.50		
J37	4545	0.00	89.77		
J38	5100	0.00	6.50		
J39	4752	0.00	4.33		
J40	4752	0.00	4.33		
J41	4820	0.00	20.00		
J1	4541	62.00	92.21	15	Residential
J42	4529	181.00	97.38	18	Residential
J43	4619	0.00	61.69		
J44	4660	0.00	44.04		
Tank 1	4757	-2,110.00	Water Surface Elevation		
Tank 2	5115	-869.00	Water Surface Elevation		

HOLBROOK FARMS AREA PLAN
CULINARY WATER MODEL
PEAK INSTANTANEOUS - NO FIRE FLOW

Pipe Report

Link ID	Diameter in	Flow GPM	Velocity fps	Length ft	Roughness	Status
Pipe L1	24	2,110.00	1.50	20	130	Open
Pipe L2	24	2,110.00	1.50	1050	130	Open
Pipe L3	8	41.95	0.27	540	130	Open
Pipe L4	8	124.80	0.80	800	130	Open
Pipe L5	6	182.00	2.07	300	130	Open
Pipe L6	8	57.20	0.37	1100	130	Open
Pipe L7	8	147.20	0.94	800	130	Open
Pipe L8	8	14.53	0.09	515	130	Open
Pipe L9	8	14.53	0.09	1100	130	Open
Pipe L10	8	222.53	1.42	1380	130	Open
Pipe L11	8	41.95	0.27	500	130	Open
Pipe L12	8	266.05	1.70	520	130	Open
Pipe L13	8	266.05	1.70	400	130	Open
Pipe L14	8	638.50	4.07	750	130	Open
Pipe L15	8	166.75	1.06	450	130	Open
Pipe L16	8	256.75	1.64	450	130	Open
Pipe L17	8	256.75	1.64	820	130	Open
Pipe L18	8	350.81	2.24	400	130	Open
Pipe L19	8	575.81	3.68	400	130	Open
Pipe L20	8	94.07	0.60	1750	130	Open
Pipe L21	8	18.99	0.12	650	130	Open
Pipe L22	8	18.99	0.12	650	130	Open
Pipe L23	8	239.67	1.53	1200	130	Open
Pipe L24	8	242.48	1.55	650	130	Open
Pipe L25	8	242.48	1.55	1400	130	Open
Pipe L26	12	902.01	2.56	720	130	Open
Pipe L27	8	326.19	2.08	1000	130	Open
Pipe L28	8	260.19	1.66	800	130	Open
Pipe L29	8	71.59	0.46	650	130	Open
Pipe L30	8	27.59	0.18	650	130	Open
Pipe L31	8	152.46	0.97	875	130	Open
Pipe L32	8	304.46	1.50	750	130	Open
Pipe L36	24	2,110.00	0.00	1600	130	Open
Pipe L37	14	1,524.81	3.18	1200	130	Open
Pipe L41	24	2,110.00	1.50	1020	130	Open
Pipe L42	12	0.00	0.00	1600	130	Open
Pipe L43	12	91.01	0.26	400	130	Open
Pipe L44	6	303.00	3.44	400	130	Open
Pipe L45	6	23.00	0.26	600	130	Open
Pipe L46	14	869.01	1.81	3000	130	Open
Pipe L49	14	869.00	1.81	5	130	Open
Pipe L33	8	126.61	0.81	200	130	Open
Pipe L34	8	188.61	1.20	600	130	Open
Pipe L50	8	0.95	0.01	200	130	Open
Pipe L51	8	180.05	1.15	600	130	Open
Valve V1	14	1,315.00	3.73	#N/A	130	Active



NOTES:

1. ADDITIONAL MODELING MAY BE REQUIRED IF THE COMMERCIAL LAND USES CHANGE.
2. MINIMUM 8" WATER LINE MAY BE REQUIRED ON COMMERCIAL PROPERTIES WHERE HIGHER FIRE FLOWS MAY BE REQUIRED.

RECEIVED
SEP 22 2016
LEHI CITY

LEGEND

PROJECT REQUIRED WATER

LEHI MASTER PLAN WATER

FOCUS ©
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www.focusutah.com

Holbrook Farms

Lehi City

Culinary Water Master Plan VS. Project Plan

Scale:	1"=450'
Drawn:	TMR
Date:	09/21/16
Job #:	14-273
Sheet:	W 08

Z:_2014\14-273 Holbrook Area Plan\design 14-273\dwg\area plan\culinary water\Water Plan.dwg