SOUTH SALT LAKE
CITY ON THE
MOVE

CITY COUNCIL
SHARLA BEVERLY
RYAN GOLD
IRVIN JONES
KEVIN D. RAPP
MIKE RUTTER
DEBBIE SNOW
ROY TURNER

220 E MORRIS AVE
SUITE 200
SOUTH SALT LAKE CITY
UTAH
84115
P 801.483.6027
F 801.464.6770
TTY: 711

CHERIE WOOD
MAYOR

220 E MORRIS AVE
SUITE 200
SOUTH SALT LAKE CITY
UTAH
84115
P 801.464.6757
801.464.6770
TTY: 711

South Salt Lake City Council
REGULAR MEETING AGENDA

Public notice is hereby given that the **South Salt Lake City Council** will hold a Regular Meeting on **Wednesday, July 30, 2014** in the City Council Chambers, 220 East Morris Avenue, commencing at **7:00 p.m.**, or as soon thereafter as possible.

Conducting: Ryan Gold, District 1
Council Chair: Irvin H. Jones, Jr.
Sergeant at Arms: John Ferguson

Opening Ceremonies

1. Welcome/Introductions — Ryan Gold
2. Serious Moment of Reflection/Pledge of Allegiance — Irvin H. Jones, Jr.

Approval of Minutes

July 9, 2014 Work Meeting
July 9, 2014 Regular Meeting

No Action Comments

1. Scheduling — City Recorder
2. Citizen Comments/Questions
   a. Response to Comments/Questions (at discretion of conducting council member)
3. Mayor Comments
4. City Attorney Comments
5. City Council Comments
6. Information
   a. Youth City Council Report — Nicholas Allred
   b. Victim Advocate Report – VOCA and VAWA Grant Update — Brooke St. John

Action Items

Unfinished Council Business

1. An Ordinance Amending and Updating the South Salt Lake Administrative Code Title 2 Establishing a Public Assets Department and Adding a Public Assets Director and a Recreation Director to the List of Appointed Employees — Lyn Creswell
2. PUBLIC MEETING - A Resolution Adopting the Drinking Water System Master Plan — Dennis Pay
3. A Resolution of the City of South Salt Lake City Council Authorizing Execution of the Attached Interlocal Cooperation Agreement with Salt Lake County for the Granting of a Perpetual Easement Related to the Construction of an Urban Recreational Trail — Lyn Creswell

New Council Business

1. Sanitary Sewer Master Plan — Dennis Pay
2. Water Conservation Plan — Dennis Pay
3. Amendment to the Future Land Use Map of the General Plan for Millcreek Townhomes, a 6-lot Planned Unit Development Located at 137 and 115 West 3030 South. Application is made by Glenburn Investments, Inc. — Mike Florence

See Page Two for Continuation of Agenda

4. Final Plat Approval and Zoning Map Amendment for Millcreek Townhomes, a 6-lot Planned Unit Development Located at 137 and 115 West 3030 South. Application is made by Glenburn Investments, Inc. — Mike Florence

Motion for Closed Meeting

In accordance with State Statute and Council Policy, one or more Council Members may be connected via speakerphone.

Those needing auxiliary communicative aids or other services for this meeting should contact Craig Burton at 801 483-6027, giving at least 24 hours' notice.

Each of the Deseret News and Salt Lake Tribune was advised of the Agenda of the Regular Meeting of the City Council to be held Wednesday, July 30, 2014, by fax transmittal of the foregoing agenda on Friday, July 25, 2014.
Craig D. Burton, City Recorder
Dated this 25th day of July, 2014

Craig D. Burton, City Recorder

Citizen Comments/Question Policy

Time is made available for anyone in the audience to address the Council and/or Mayor concerning matters pertaining to City business. When a member of the audience addresses the Council and/or Mayor, he or she will come to the podium and state his or her name and address. Citizens will be asked to limit their remarks/questions to five (5) minutes each. The conducting Councilmember shall have discretion as to who will respond to a comment/question. In all cases the criteria for response will be that comments/questions must be pertinent to City business, that there are no argumentative questions and no personal attacks. Some comments/questions may have to wait for a response until the next regular council meeting. The conducting Councilmember will inform a citizen when he or she has used the allotted time. Grievances by City employees must be processed in accordance with adopted personnel rules.

CERTIFICATE OF COMPLIANCE WITH OPEN MEETING LAW

The undersigned, duly qualified and acting City Recorder of the City of South Salt Lake, does hereby certify that on the 25th day of July, 2014, pursuant to Utah Code Annotated Section 52-4-202 (1953), as amended, there was posted (at least 24 hours prior to the meeting time) at the regular meeting place of the City Council of the City of South Salt, written notice of the Agenda or the Regular Meeting of the Council, a copy of which is attached and incorporated herein as Exhibit "A". The undersigned does further certify that there was mailed or delivered to all persons shown on Exhibit "B", Notice of Agenda of the above mentioned regular meeting, a copy of which is attached hereto and incorporated herein.

Name: CRAIG D. BURTON
Title: CITY RECORDER

Signature: _____

Witnessed the 25th day of July, 2014 by
Name: SHERI MILLER

Signature: _____

CITY OF SOUTH SALT LAKE
CITY COUNCIL MEETING

COUNCIL MEETING	Wednesday, July 30, 2014 7:00 p.m.
CITY OFFICES	220 East Morris Avenue – Suite 200 South Salt Lake, Utah 84115
PRESIDING	Council Vice-Chair LeRoy Turner
CONDUCTING	Council Member Ryan Gold
SERIOUS MOMENT OF REFLECTION/ PLEDGE OF ALLEGIANCE	Council Member Sharla Beverly
SERGEANT AT ARMS	Jennifer Smartt

COUNCIL MEMBERS PRESENT:
Sharla Beverly, Ryan Gold, Kevin Rapp, LeRoy Turner
Michael Rutter and Debbie Snow

COUNCIL MEMBERS EXCUSED:
Irvin H. Jones, Jr.

STAFF PRESENT:
Mayor Cherie Wood
Charee Peck, Chief of Staff
Lyn Creswell, City Attorney
Dwayne Ruth, Deputy Police Chief
Dennis Pay, Public Works Director
Randy Sant, Economic Development Consultant
Mike Florence, Community Development Director
Hayley Pratt, City Planner
Glenn Smith, Urban Livability Director
Aaron Wiet, Parks and Recreation Director
Mont Roosendaal, Fleet Manager
Sharen Hauri, Urban Design Director
Craig Burton, City Recorder
Paula Melgar, Deputy City Recorder

OTHERS PRESENT:
See attached list

APPROVAL OF MINUTES

July 9, 2014 Work Meeting. Council Member Rapp moved to approve these minutes.

MOTION:	Kevin Rapp
SECOND:	Sharla Beverly
Voice Vote:	
Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

July 9, 2014 Regular Meeting. Council Member Turner moved to approve these minutes.

MOTION:	LeRoy Turner
SECOND:	Kevin Rapp
Voice Vote:	
Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

NO ACTION COMMENTS

1. **SCHEDULING.** The City Recorder informed those at the meeting of upcoming events, meetings, activities, etc.

2. **CITIZEN COMMENTS/QUESTIONS.** None.

3. **MAYOR COMMENTS.** Mayor Wood mentioned the Chinatown event on Friday night with fireworks. Also, next Tuesday night, August 5, is the Night Out Against Crime.

4. **CITY ATTORNEY COMMENTS.** City Attorney, Lyn Creswell, advised that the Utah League of Cities and Towns recently formed a Sales Tax Task Force because they are anticipating some sales tax issues during the next legislative session. Mayor Wood has asked Finance Director, Kyle Kershaw to represent the City on that task force. Community Development Director, Mike Florence, participates on a land use group and Mr. Creswell participates in a policy discussion group. Economic Development Consultant, Randy Sant, participates in RDA discussions and is basically the chair of that for the League throughout the State.

5. CITY COUNCIL COMMENTS.

Council Member Rutter congratulated the Chinatown group. He welcomed them to South Salt Lake.

Council Member Rapp advised that because of the Diamond Tree fire, the American West Analytical Laboratories will no longer be able to function because they cannot get fire insurance coverage.

Mayor Wood advised that she met with the owner yesterday and that's not the information she got. They have just been offered to purchase the Asarco property on 700 West which is in the City.

Council Member Rapp said that in talking to the spouse of an employee, most of the employees were being let go.

Mayor Wood advised that she did not discuss that with the owner.

Council Member Rapp said it was sad that the fire had so much impact on the businesses around it.

Mayor Wood agreed and said there was another small fire at Diamond Tree on Saturday. She, and Fire Chief, Ron Morris, directed Fire Marshal Johnson to shut down the operations of Diamond Tree and ordered the pile to be removed completely from the site. They are working through that right now. The City is suspending their business license. They do have an appeal right on that but they still have to abide by the Fire Marshal's order during that appeal so there won't be any business conducted from that location.

Council Member Rapp thanked the Mayor for that information.

Council Member Snow congratulated Chinatown as well.

Council Member Beverly enjoyed seeing the ladder truck and getting a ride.

Council Member Gold thanked the Fire Department as well. They not only got to hear what the ladder truck can do but got to see what it can do at the Diamond Tree fire. He's glad they have it. He also congratulated Chinatown. He encouraged everyone to visit.

6. INFORMATION.

a. **Youth Council Report.** The Youth City Council reported on their past and future activities.

b. **Victim Advocate Report – VOCA and VAWA Grant Update.** Victim Advocate, Brooke St. John, advised the Council that prosecutors have been successful in removing of a perpetrator from the streets. He will be spending a lot of time in prison and the City is a safer place because of that. She had previously submitted a report of their activities for the last quarter to the Council. A copy of her report is attached and incorporated by this reference.

UNFINISHED COUNCIL BUSINESS

1. **An ordinance amending and updating the South Salt Lake Administrative Code Title 2 establishing a Public Assets Department and adding a Public Assets Director and a Recreation Director to the list of appointed employees.** Mr. Creswell advised the Council that this ordinance creates a new City department and adds a Public Assets Director as an appointed employee and changes the title of the Parks and Recreation Director to Recreation Director.

   Council Member Beverly moved to adopt this ordinance.

MOTION:	Sharla Beverly
SECOND:	Mike Rutter
Voice Vote:	
Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

2. **PUBLIC MEETING – A resolution adopting the Drinking Water System Master Plan.** Public Works Director, Dennis Pay, advised that he reviewed the Plan with the Council at their last meeting. The Master Plan looks at what the current capacity is and tries to look at future needs and projects what projects may need to be done in the future to meet those needs and estimates the costs. A copy is attached to these minutes and incorporated by this reference.

   Council Member Turner asked if this Plan applies to South Salt Lake water and not Jordan Valley Water.

   Mr. Pay answered affirmatively.

   Council Member Snow asked what the big needs are for the water system.

   Mr. Pay said the redevelopment going on will increase the need. There are a number of undersized water lines that need to be replaced. They have been working for many years to upgrade those. They have identified pipes with problems. One of the big items is on the west side of I-15. They don't have adequate storage and they probably need to do another storage tank in that area. Right now they are relying on their connection to Jordan Valley Water to provide additional storage when needed. They also need to have better ways to regulate pressure on the west side of the City.

   Council Member Beverly asked if these items could be prioritized for the next budget year.

Mr. Pay advised that they have done that, to a certain extent, in this document with a five year and ten year plan. They will look at them closer at budget season.

Council Member Gold opened the meeting to public comment. There was none.

Council Member Rutter moved to approve this resolution.

MOTION:	Mike Rutter
SECOND:	LeRoy Turner
Voice Vote:	
Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

3. **A Resolution of the City of South Salt Lake City Council authorizing execution of the attached interlocal cooperation agreement with Salt Lake County for the granting of a perpetual easement related to the construction of an urban recreational trial.** Mr. Creswell advised that during the process of designing and developing the streetcar, there was a piece of nuisance property that was available for sale and the City purchased it. It is strategically located because it is the first property as the streetcar comes into the City and they are planning to put a sign on it. It will also be part of the trail that will run along the north side of the streetcar. The County will maintain the trail and they need a portion of this property as an easement to maintain the trail.

   Council Member Turner moved to approve this resolution.

MOTION:	LeRoy Turner
SECOND:	Kevin Rapp
Voice Vote:	
Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

NEW COUNCIL BUSINESS

1. **Sanitary Sewer Master Plan.** Mr. Pay advised that this is a similar document to the Drinking Water Master Plan. The City hired Hansen, Allen and Luce to look at the sewer collection system, look at deficiencies, current capacities, future development, future needs, deficiencies, and make some recommendations on

what needs to be done to meet new requirements and estimate the cost. A copy is attached to these minutes and incorporated by this reference.

Council Member Gold asked if there were any major concerns.

Mr. Pay said that a lot of the system is essentially running at capacity right now and there will be increases in capacity that will have to be made as the City redevelops. Another concern is the system is old and there is a lot of need for replacement. Inflow and infiltration is a major problem which is related to the age of the system. As things settle the joints, and seals in the joints, start to fail. Sometimes joints will even be offset. We have a high water table in South Salt Lake and so a lot of ground water ends up getting in the sewer system so they end up paying to treat ground water. Inflow happens when there's a storm and water can get into manholes, etc. Eliminating inflow and infiltration will help a lot with capacity. That's the biggest issue the City faces right now.

Council Member Rutter moved to put this on Unfinished Business for the August 13, 2014 City Council Meeting.

MOTION:	Mike Rutter
SECOND:	LeRoy Turner
Voice Vote:	
Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

2. **Water Conservation Plan.** Mr. Pay advised that the City is required by State statute to have a water conservation plan. In 2000 there was a goal set by the State to try and reduce per capita water consumption by twenty-five percent by 2050. Governor Herbert has pushed that date up to 2025. This is the City's Plan on what they intent to do for that goal. Some of the Plan is public education. Recently they adopted a new rate structure that encourages conservation by charging more as consumption goes up. There are also some things they can do maintenance wise to detect and repair leaks. A copy is attached to these minutes and incorporated by this reference.

   Council Member Snow asked about the water unaccounted for and what it means.

   Mr. Pay said it's the discrepancy between what they produce and what they bill. They are producing more than what they are billing which accounts for water lose. There are leaks and other things in the system that they need to identify. All water systems have to deal with that. They all have leaks but there is more that can be done. One of the things in the Plan suggests purchasing a leak detection system that will help identify where the leaks are so they can repair them.

Council Member Rutter asked if there is a system that could be set up to talk to private property owners who run their sprinkling systems every day. He asked if they could talk about this in a future meeting and determine what, if anything, they can do.

Mr. Pay said they try to educate people on water use.

Council Member Rutter moved to put this on Unfinished Business for the August 13, 2014 City Council Meeting.

MOTION:	Mike Rutter
SECOND:	LeRoy Turner
Voice Vote:	
Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

3. **Amendment to the future land use map of the General Plan for Millcreek Townhomes, a 6-lot planned unit development located at 137 and 115 West 3030 South. Application is made by Glennburn Investments, Inc.** Community Development Director, Mike Florence, and City Planner, Hayley Pratt, presented a power point presentation to amend the General Plan for Millcreek Townhomes. A copy is attached to these minutes and incorporated by this reference.

   Mr. Florence advised that the General Plan currently recommends that the land stays commercial. The applicant has assembled property and he's requesting that it be transitioned to residential use. That's the question before the Council tonight. The Planning Commission gave a unanimous recommendation to support owner occupied housing.

   Council Member Turner moved to put this on Unfinished Business for the August 13, 2014 City Council Meeting.

MOTION:	LeRoy Turner
SECOND:	Mike Rutter
Voice Vote:	
Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

4. **Final plat approval and zoning map amendment for Millcreek Townhomes, a 6-lot planned unit development located at 137 and 115 West 3030 South. Application is made by Glennburn Investments, Inc.** Ms. Pratt presented a power point presentation to the Council. A copy is attached to these minutes and incorporated by this reference.

   Council Member Rapp asked what the height would be and if the land owner to the west had any comments.

   Mr. Florence said the project would be twenty-eight feet high and the land owner had been notified three times and staff has not heard from them.

   Council Member Snow said she is struggling trying to justify why they want to continue to have this neighborhood be a patchwork of uses. She doesn't feel they are building a unified quality neighborhood. It's just little chunks surrounded by other chunks of all sorts of mixed uses that aren't related to each other. This project seems nice but it's dropped into the middle of a whole bunch of other different things and she's wondering if that's the kind of community they want to build. She would like something different.

   Mr. Florence advised that this same developer will be back in about forty-five days for another townhome project on West Temple which may be the start of a transition where this becomes a great neighborhood. He'll have two projects going in the area.

   Dave Curtis, National Commercial Properties. Mr. Curtis said there are other properties they are looking at. This project will attract young families to the area and that's what they want. They have to start somewhere. They are starting with this and trying to get more pieces.

   Council Member Snow asked why they ruled out an office building here.

   Mr. Curtis explained that they do Class A office buildings and they need to be on a major street to work.

   Council Member Gold asked if other lots become available could they become business.

   Mr. Florence answered yes. That is what they are zoned for currently. If a developer wanted to build residential housing on them they would have to go through this same General Plan and zone change process.

   Council Member Turner moved to put this on Unfinished Business for the August 13, 2014 City Council Meeting.

MOTION: LeRoy Turner
SECOND: Sharla Beverly

Voice Vote:

Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

Motion for Closed Meeting

Council Member Turner moved to adjourn to Closed Meeting to discuss strategy for the sale, purchase, exchange or lease of real property pursuant to Utah Code Annotated, 1953 as amended, Sec. 52-4-204 and Sec. 52-4-205(1)(d) and (e).

MOTION: LeRoy Turner
SECOND: Mike Rutter
Voice Vote:

Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

The Council adjourned to Closed Meeting at 8:23 p.m.

In accordance with U.C.A. Section 52-4-206, 1953, as amended by Chapter 180, Laws of Utah, 1987, as amended, a recording was made of the Closed Meeting held to discuss the sale, purchase, exchange or lease of real property. Such recordings are protected records under Title 63, Chapter 2, Government Records Access and Management Act.

Closed Meeting ended at 9:08 p.m. Council Members returned to Council Chambers.

Council Member Rutter moved to adjourn.

MOTION: Mike Rutter
SECOND: LeRoy Turner
Voice Vote:

Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

The meeting adjourned at 9:09 p.m.

Irvin H. Jones, Jr., Council Chair

Craig D. Burton, City Recorder

July 30, 2014

CITY COUNCIL - REGULAR MEETING
LIST OF ATTENDEES

NAME	ADDRESS	REPRESENTING
Charee Pugh	220 E Morris	Mayor's Office
Dennis Pay	195 W. Oakland Ave	Public Works
DWAYNE FUTH	2835 S. MAIN (PD)	POLICE
GLENN SMITH	220 E MORRIS Ave	ULS
Mont Roosendaal	3640 So. West Temple	Public Assets
Diane Keay	788 E Woodoak Ln, Murray	SL Co Health Dept
Aaron Wiet	2531 S. 400 E.	SSL Rec.
HAYLEY PRATT	615 E 700 S #4	COMMUNITY DEVELOPMENT.
Mike Florence	220 E. Morris Ave	Community Dev.
Dave Curtis	766 Parkway N.S.L.C.	National Commercial Properties
Sasha Nicho	275 E. 3790 S.	YCC
Matthew Halton	3700 So. 3325 W.	YCC
Nicholas Halton	"	"
Pablo garcia	" 335 W. Archard Ave	"
Francisco Garcia	"	"
Maya Ellis	174 E. Commonwealth Ave.	" "
Sandhya Kafley	3195 South 300 East #16	"
Jocelyn Ajanel	45 W. crystal ave	YCC
Joana Aceredo	241 Crestone Ave	YCC
Jennifer Allred	3610 So. 300 E #L	Youth City Council
Brooke St. John	PD	PD
Jalynn Gold	2275 So Carolyn Way Bountiful	
Janet Bates	" " "	
Joseph Cole	North Salt Lake	Millcreek Townhomes

July 30, 2014

CITY COUNCIL - REGULAR MEETING
LIST OF ATTENDEES

NAME	ADDRESS	REPRESENTING
Michele Johnson	634 E. Springfield	self
Sharon Hauri		City

VAWA QUARTERLY STATS / April, May and June, 2014
DOMESTIC VIOLENCE/ DATING VIOLENCE/ SEXUAL ASSAULT/ STALKING STATS ONLY: (DET. BENCH)

PRIMARY VICTIMS:
Sex:
Female: 212
Male: 0
= 212
Age:
0-12: 0
13-17: 0
18-24: 38
25-59: 160
60+: 10
U: 4
= 212
Race:
White: 139
Black: 7
Latino: 37
Asian: 4
Indian: 10
Pacific Islander: 3
Croatian: 1
U: 11
= 212

PRIMARY VICTIMS
DV CRIMES:
Assault/DV: 63
Assault/DV with Strangulation: 7
Agg. Assault/DV: 8
Agg Assault/DV with Strangulation: 1
Verbal/DV: 85
Threats/DV: 3
Harassment/DV: 5
Criminal Mischief/DV: 8
Unlawful DT/DV: 1
Custodial Interference/DV: 2
PO Violation: 7
Interruption of a Communication Device/DV: 1
Witness Tampering/DV: 1
= 212

SEXUAL ASSAULT CRIMES:
Rape: 10
Adult Sexual Assault: 3
Lewdness with a Victim: 3
Sexual Harassment: 1

STALKING CRIMES:
Stalking: 3

PRIMARY VICTIMS CONT./ April - June, 2014/ VAWA Detective

Relationship

Partner:	153
Dating:	2
Family:	32
Roommates:	11
Acquaintance:	9
Stranger:	4
U:	1
	=212

SECONDARY VICTIMS / DV& DATING VIOLENCE, SEXUAL ASSAULT AND STALKING / April, May and June, 2014 / Det. Bench

Sex

Male:	94
Female:	95
	= 189

Age:

0-12:	81
13-17:	12
18-24:	18
25-59:	66
60+:	12
U:	0
	=189

Race:

White:	104
Black:	10
Latino:	60
Asian:	7
Indian:	8
Pacific Islander:	0
U:	0
	=189

FIVE Unborn Babies were Secondary Victims During this Quarter.

SECONDARY VICTIMS / DV & DATING VIOLENCE, SEXUAL ASSAULT AND STALKING] April, May and June, 2014:

DV CRIMES:

Assault/DV: 82
Assault/DV with Strangulation: 10
Agg. Assault/DV: 22
Agg. Assault/DV with Strangulation: 2
Verbal/DV: 38
Criminal Mischief/DV: 5
Custodial Interference/DV: 3
PO Violation: 3
Threats/DV: 2
Interruption Communication Device: 4
Unlawful Detention/DV: 1
Harass: 3
Witness Tampering/DV: 1
= 189

SEXUAL ASSAULT CRIMES:

Rape: 8
Lewdness with a Victim: 1
Adult Sexual Assault: 4

STALKING VICTIMS:
Stalking: 0

*****FIVE UNBORN BABIES WERE IMPACTED BY DOMSTIC VIOLENCE CRIMES FOR CRIMES AS FOLLOWS:**
Assault/DV: 3
Criminal Mischief/DV: 1
Verbal DV: 1
= 5

SERVICE STATS / VAWA / JANUARY-MARCH, 2014 / DV & DATING VIOLENCE, SEXUAL ASSAULT AND STALKING

Civil Legal Advocacy - 0
Civil Legal Assistance - 0
Criminal Justice Advocacy - 71
Crisis Intervention - 212
Forensic Exam – 6
Hospital - 11
Language - 11
Transportation - 6
Victim Advocacy – 212 (Primary & Secondary Victims)
Shelter - 7
Hotline - 0
Counseling Referrals – Referrals made by Victim Advocates - 212
Victim Service Outreach – 212 (Primary & Secondary Victims)
Protective Order Requested - 34 (that was reflected or relayed by victim)
Protective Order Granted - 15 (that was reflected or relayed by victim)
Calls for Service -212
Incident Reports - 212
Cases Investigated - 212
Arrests - 42
Dual Arrests - 0
Protective Orders Served - 0
Violations of Bond Arrests – 0
Enforcements of Warrants - 7
Protective Order Violation Arrests – 3
PO/NCO Issues -15
Referrals to Prosecution - 66
Referrals for Federal Firearms Charges - 0
Referral to Victim Services – 212 (Primary & Secondary Victims)

VAWA / APRIL, MAY AND JUNE, 2013 / DETECTIVE BENCH
OTHER CRIME STATS:
PRIMARY VICTIMS:
Sex:
Male: 0
Female: 33
=33
Age:
0-12: 0
13-17: 0
18-24: 5
25-59: 25
60+: 3
U: 0
=33
Race:
White: 22
Black: 0
Latino: 7
Asian: 1
Indian: 0
Pacific Islander: 1
U: 2
=33

PRIMARY VICTIMS / OTHER CRIMES:
Assault: 10
Agg. Assault: 5
Robbery: 2
Agg Robbery: 1
Threats (Non-DV): 6
Harassment (Non-DV): 9
=33

PRIMARY VICTIMS / Relationship
Partner: 0
Unknown: 0
Dating: 2
Family: 0
=33
Roommates: 0
Acquaintance: 11
Stranger: 20

SECONDARY VICTIMS/OTHER CRIMES – APRIL, MAY AND JUNE, 2014
VAWA GRANT

Sex

Male:	15
Female:	15
	=30

Age:

0-12:	6
13-17:	0
18-24:	3
25-59:	18
60+:	3
U:	0
	=30

Race:

White:	24
Black:	0
Latino:	4
Asian:	1
Indian:	0
Pacific Islander:	1
U:	0
	=30

SECONDARY VICTIMS OTHER CRIMES:

Assault: 15
Agg. Assault: 5
Robbery: 2
Agg. Robbery: 3
Threats: 2
Harassment: 3
=30

SERVICE STATS / OTHER CRIMES / APRIL, MAY AND JUNE, 2014 / DET. BENCH

Civil Legal Advocacy - 0
Civil Legal Assistance - 0
Criminal Justice Advocacy - 12
Crisis Intervention - 33
Forensic Exam - 0
Hospital - 1
Language - 1
Transportation - 0
Victim Advocacy - 33 **(Primary & Secondary Victims)**
Shelter - 0
Hotline - 0
Victim Service Outreach – 33 **(Primary & Secondary Victims)**
Protective Order Requested - 3 **(that was reflected in notes)**
Protective Order Granted - 0 **(that was reported back by victim)**
Calls for Service - 33
Incident Reports - 33
Cases Investigated - 33
Arrests - 7
Dual Arrests – 0
Protective Orders Served - 0
Violations of Bond Arrests - 0
Enforcements of Warrants - 0
Protective Order Violation Arrests - 0
Referrals to Prosecution - 11
Referrals for Federal Firearms Charges - 0
Victim Service Referrals – 33 **(PrImary & Secondary Victims)**

VOCA GRANT STATS

April, May and June, 2014

Brooke St. John, Kristen Thompson and J. Daniel Hernandez
Heather Day (Volunteer), Tayler St. John (Volunteer), Shawndell Hoyt (Volunteer)

PRIMARY VICTIM CRIMES

Sex

Male:	206
Female:	303
Total:	**509**

Age

0-12:	76
13-17:	30
18-29:	150
30-44:	146
45-64:	80
65+:	18
Unknown:	9
Total:	**509**

Race

White:	293
Black:	26
Latino:	117
Indian:	13
Asian:	11
Pacific Isl.	0
Middle East:	2
Croatian:	1
Unknown:	46
Total:	**509**

SECONDARY VICTIM CRIMES

Sex

Male:	38
Female:	79
Total:	**117**

Age

0-12:	74
13-17:	3
18-29:	13
30-44:	18
45-64:	6
65+:	2
Unknown:	1
Total:	**117**

Race

White:	42
Black:	13
Latino:	52
Indian:	4
Asian:	3
Pacific Isl.	0
Middle East:	0
Croatian:	0
Unknown:	3
Total:	**117**

**** ONE UNBORN BABY WAS A SECONDARY VICTIM DURING THIS QUARTER.**

Primary Victim Crimes

Homicide (Non-DV):	1
Assault/Domestic Violence:	99
Assault/DV with Strangulation:	1
Aggravated Assault/DV:	8
Verbal Domestic:	117
DV in a Child's Presence:	39
Criminal Mischief/DV:	10
Burglary/DV (Forced Entry):	1
Threats/DV:	1
Unlawful Detention/DV:	2

Purple – DV Crimes
Red – Other Violent Crimes
Blue – Other Crimes
Black – Crimes with a designated category on grant report.

PRIMARY VICTIM CRIMES CONTINUE – April, May and June, 2014 – Combined All VA Stats

Custodial Interference:	4
Damage/Interrupt. Of Comm Device/DV:	1
Violation of Protective Order:	12
Violation of a Jail No Contact Order:	1
Stalking:	3
Assault:	73
Aggravated Assault:	24
Adult Sexual Assault:	15
Lewdness with a Victim:	8
Child Abuse/Physical:	8
Rape of a Child:	1
Sodomy Upon a Child:	1
Child Abuse/Sexual:	7
Robbery:	7
Aggravated Robbery:	5
Terroristic Threats (Non-DV):	33
Aggravated Threats (Non-DV):	1
Harassment (Non-DV):	24
Criminal Mischief (Non-DV):	1
Witness Tampering:	1
Total:	**509**

SECONDARY VICTIM CRIMES – June, 2014 – All VAs

Homicide (Non-DV):	5	5
Assault/Domestic Violence:	56	
Aggravated Assault/DV:	3	
Domestic-Verbal:	13	
Criminal Mischief/DV:	6	
Threats/DV:	1	
Custodial Interference:	3	
Unlawful Detention/DV:	1	
Burglary/DV (Forced Entry):	1	
Stalking:	1	
Assault:	2	
Aggravated Assault:	1	
Adult Sexual Assault:	1	
Lewdness with a Victim:	1	
Child Abuse/Physical:	2	
Rape of a Child:	2	
Sodomy Upon a Child:	3	
Child Abuse/Sexual:	9	
Aggravated Robbery:	2	
Aggravated Threats (Non-DV):	3	
Harassment (Non-DV):	1	
Total:	**117**	

PREGNANT WOMEN: 1 Unborn Baby was a Secondary Victims as Follows:

Assault/DV:	1
Total:	**1**

SERVICE STATS – April, May and June, 2014 – All Advocates

Crisis Response In Person:	12
Police Referrals:	47
Shelter Referrals:	13
Other Referrals:	179
Court Advocacy:	120
CJ Support:	949
Counseling:	51
Personal Advocacy:	316
CVR:	197
Information and Referral (In Person)	1,361
Follow-Up:	1,578
Evaluations	22
Other Letters:	1,708
Appointments – Primary Victims:	55
Secondary Victims:	4
RESTAT Existing Cases with New Grant Year – Primary Victims:	14
Secondary Victims:	15
June Continuing Care:	37

On Stats Report "other services" includes: police referral/advocacy, other referrals, evaluations, other letters, appointments with primary and secondary victims, restitution.

TELEPHONE CALL STATS
April, May and June, 2014 / All Advocates

PRIMARY VICTIMS

CJ Support:	359
Personal Advocacy:	236
Info & Referral:	552
Police Advocacy:	122
Crisis Calls:	52
Follow-Up:	478
CVR:	159
Restitution:	50
Total Primary T/C:	**2,008**

SECONDARY VICTIMS

CJ Support:	71
Personal Advocacy:	40
Info & Referral:	125
Police Advocacy:	16
Crisis Calls:	23
Follow-Up:	82
CVR:	11
Restitution:	1
Total Secondary T/C:	**369**

Quarterly Grant Report, April, May and June, 2014 – 4th Quarter

Total Volunteer Hours: 32 Heather Day / Volunteer
4 Shawndell Hoyt / Volunteer
81 Tayler St. John / Volunteer

New Spanish Speaking Only Victims: 15 (7 Secondary Victims)

New Victims with a Disability: 6 (Mental Health, Low Functioning & Born Mentally Challenged)

VICTIM RESIDENT CITY / PRIMARY VICTIMS
April, May and June 2014 / All Advocates

Cottonwood Heights (CH):	1
Draper (D):	1
Heber City (HC):	1
Holladay (H);	1
Kaysville (K):	2
Kearns (KR):	6
Layton (L):	2
Magna (M):	1
Midvale (MI):	5
Millcreek (MC):	1
Monroe (MR):	1
Murray (MU):	12
Ogden (O):	3
Park City (PC):	1
Pleasant Grove (PG):	1
Riverton (RI):	2
Roy (ROY):	1
Salt Lake City (SLC):	46
Sandy (S):	2
South Jordan (SJ):	1
SSL (SSL)	372
Sunset (SU):	1
Taylorsville (T):	9
West Jordan (WJ):	3
West Valley (WVC):	22
SSL @ Work:	5
Homeless:	4
Evanston, Wyoming:	1
Florida:	1
TOTAL:	**509**

CRIME VICTIM REPARATIONS
350 East 500 South
Suite 200
Salt Lake City, Utah 84111

VICTIMS OF CRIME ACT VICTIM ASSISTANCE
ANNUAL PERFORMANCE REPORT

SECTION I SUBGRANTEE IDENTIFICATION

A. Agency Name: **South Salt Lake Victim Services (Police Department)**

B. Grant Number: **13-VOCA-61**

C. The address (Including Street, P.O. Box, City and Zip Code):
2835 South Main Street
South Salt Lake City, Utah 84115

D. Contact Person: **Brooke St. John – Victim Services Supervisor**

SECTION II REPORT TIME FRAME

Agencies receiving funds under the Victims of Crime Act are required to submit an Annual Performance Report 90 days after the end of the contract period. The Annual Performance Report should be submitted to the Office of Crime Victim Reparations and is due by September 30. This Annual Performance Report covers the 12-month period from **July 1, 2013 to June 30, 2014.**

SECTION III PROGRAM INFORMATION

A. Program Statistics:

Indicate the total number of paid and the total number of volunteer staffs in the VOCA victim assistance-funded projects.

____**2**____# of Paid Staff ____**4**____# of Volunteer Staff

B. Victim Statistics:

1. Indicate the total number of victims who received services from the VOCA victim assistance funded project during the contract period:

__**2,656**_____Primary Victims __**786**_____Secondary Victims

---

2. Indicate the total number of primary and secondary victims served by type of victimization:

Primary Victims	Secondary Victims		Primary Victims	Secondary Victims	
38	**20**	**Child Abuse Physical**	**0**	**0**	**AMAC**
38	**37**	**Child Abuse Sexual**	**5**	**8**	**Homicide Survivors**
4	**0**	**Victims of DUI/DWI**	**78**	**9**	**Robbery**
1,710	**597**	**Domestic Violence**	**428**	**62**	**Assault**
85	**19**	**Sexual assault, Adult**	**17**	**7**	**Other Violent Crimes**
1	**1**	**Elder Abuse**	**252**	**26**	**Other**

The total number of Primary Victims listed under all crime categories should equal the total number of Primary Victims under Section B Victim Statistics.

The total number of Secondary Victims listed under all crime categories should equal the total number of Secondary Victims under Section B Victim Statistics.

C. Service Statistics:

1. Indicate the number of victims who received each of the following services:

Primary Victim	Secondary Victim		Primary Victim	Secondary Victim	
406		Crisis Counseling	5,343		Criminal Justice Supp/Advocacy
8,820		Follow up Contact	8		Emergency Financial Assistance
0		Therapy	0		Emergency Legal Advocacy
0		Group Treatment	1,111		Assistance in Filing Comp Claims
51		Crisis Hotline	2,246		Personal Advocacy
50		Shelter/Safe House	2,483		Information & Referral (Telephone Contact)
5,179		Information & Referral (In Person)	9,686		Other (Specify)

****Services are not kept according to primary and secondary victims.**

*****Other Includes: Police Referral/Advocacy, Referral to Local Service Providers (Other Services), Evaluations, Letters, Appointments with Primary and Secondary Victims, Continuing Care Program Referral and Restitution.**

SECTION IV NONDISCRIMINATION INFORMATION

The following information will be used only to compile statistics in order to comply with Federal Nondiscrimination requirements. Please provide the number of victims served in each category.

1. **Race or National Origin:**

Primary and Secondary

__1,908_____ White (Not of Hispanic Origin)
__ 224_____ Black (Not of Hispanic Origin)
__ 835_____ Hispanic
__ 127_____ Asian
__ 88_____ American Indian or Alaskan Native
__ 29_____ Pacific Islander
__ 10_____Middle Eastern
__ 1_____India
__ 1_____Croatian
__ 217_____ Unknown

2. **Gender**:

Primary Victim	**Secondary Victim**
__1,558_____ Female	__434_____ Female
__1,098_____ Male	__352_____ Male

---

3. **Ages of Primary Victims:**

__695_____	0 - 12 Years
__173_____	13 - 17 Years
__746_____	18 - 29 Years
__709_____	30 - 44 Years
__449_____	45 - 64 Years
__ 54_____	65 + Years
__ 47_____	Unknown

A. Briefly describe your agency=s efforts to coordinate victim services at a local level, with the state victim=s compensation program, mental health, Division of Family Services, etc.

South Salt Lake City lies in the heart of the Salt Lake valley. It is surrounded by other law enforcement agencies and the valley is home to numerous providers of services. South Salt Lake victim advocates have forced a strong working relationship with other victim advocates and with other law enforcement agencies. South Salt Lake victim advocates operate various programs, such as the Domestic Violence Court Program, which permit the opportunity for local treatment providers and victim advocates to exchange information and ensure the victim has a voice in the treatment process, as well as to ensure offender accountability. Victim advocates participate in monthly domestic violence and sexual assault coalition meetings to ensure there is strong working relationship with other providers. The victim advocates also work closely with agencies such as Legal Aid, the Utah Office for Victims of Crime, Division of Child and Family Services and Adult Protective Services to enable them to interact with other professionals and ensure the safety and support of violent crime victims.

B. Indicate the types of training activities VOCA victims assistance-funded staff (volunteer and paid) have attended. **VOCA Funded**

	YES	NO
Filling Out Compensation Claims	X	
Counseling and Other Direct Services	X	
Other: Crisis Response	X	
Safety Planning	X	
Assisting Through the Criminal Justice Sys.	X	
Valley wide and Statewide Training	X	

C. Describe efforts taken by your agency to increase victim cooperation with law enforcement.

Victim advocates review and assess incident reports each morning to identify primary and secondary and to identify personal, safety and urgent care needs. Victim advocates make direct contact with all violent crime victims. This lends itself to personal interaction and the development of trust by the victim. South Salt Lake Victim Services has also increased response to serving victims by the development of specialized programs, such as the Special Victims Teams and the Continuing Care Program. Under Special Victims when a victim is identified who presents with numerous service needs and/or barriers to services, a specialized team is called together to develop a plan for meeting those needs. Under the Continuing Care Program, victims are contact subsequent to the final case closure to assess for any ongoing support or needs. Additionally, South Salt Lake Victim Advocates maintain case monitoring and update of the victim through the end of review hearings and case closure in court. The same victim advocate stays with the victim the entire time. This facilitates strong working relationships and trust.

D. Describe activities conducted by your agency to improve the delivery of victim services (i.e., needs assessments, program monitoring and program evaluations).

South Salt Lake victim advocates conduct individualized needs assessment. No two victims are alike and no two victims should receive identical services. Services must be tailored to meet unique needs. Victim advocates also maintain contact with victims in order for them to assess changing needs and for their assigned victim advocates to assist in meeting those needs. The victim services supervisor checks advocate involvement every week for cases appearing in court the preceding week. If

any further services or updates need to be made, this is a checks and balances system. In addition, the program supervisor conducts a monthly audit of all cases assigned to victim advocates to ensure advocates are extending appropriate services and meeting victim needs in a timely manner.

The South Salt Lake Victim Services Unit sends out evaluation forms once a case has completed the entire criminal justice process. This ensures that victims are able to give feedback through review hearings and assess the effectiveness and support throughout the process and not just during initial proceedings. The program's evaluation encourages victims to make suggestions which they feel would have made their experience better. These suggestions are thoroughly considered by the program supervisor and the team takes efforts to implement suggested improvements.

E. Specifically discuss the delivery of and improvements to service within your agency as a result of receiving VOCA victim assistance funding. Please submit anecdotal information and individual case histories to illustrate the ways in which VOCA funds have been used to assist crime victims.

Without the support of the VOCA grant funding, the South Salt Lake Victim Services Unit would not be able to meet the current level of services being extended to violent crime victims. City administrators have advised that if VOCA were to pull grant funding, they program would be cut by at least one full-time victim advocate. South Salt Lake, per capita, experiences the highest violent crime rate of any city in the State of Utah. We simply could not provide the level of services, the ongoing information and the support that are currently provided. Specialized programs would need to be cut, just to meet bare minimum services. Advocates would not be able to attend hearings with victims, to ensure they have support through criminal justice proceedings.

This quarter victim advocates spoke with a victim of domestic violence, whose husband had been charged in the District Court with an enhanced count of assault/domestic violence, because she had been eight months pregnant at the time he physically assaulted her. During the investigation and proceedings this victim experienced incapacitating fear. Her abuser was a US citizen and she was an immigrant from Mexico and was not documented in the US. Her husband had repeatedly told her he'd kill her and then go to Mexico and kill her family if she ever contacted police. He'd also told her he'd ensure she was deported and would never see her son. Those threats were so engrained, she was paralyzed by the fear. Advocates were able to work with Holy Cross Ministries to facilitate a UVISA application. This victim is now more confident that the deportation threat won't happen, but she is still fearful her husband will kill her. She has relocated near family, outside of Utah. Her abuser accepted a plea deal and she was never required to testify against him. He is on probation for 36 months and court mandated to

domestic violence treatment. She is filing for divorce through a pro bono attorney that her victim advocate located for her. The fear is, however, that her soon-to-be ex-husband will be given visitation of her infant son. Luckily the child was delivered in a healthy state.

F. Identify any emerging issues or notable trends impacting crime victim services in your agency and community.

The South Salt Lake Victim Services Unit has noted a trend over the past year of increasing violence against victims who are considered elderly, as they are over 65 years of age. Many of these victims present barriers of distrust. They also have demonstrated trust issues and an unwillingness to seek therapy. South Salt Lake is home to a recognizable elder community and the department is concern for the future well-being of these individuals, especially if they are victimized by violent crime. The department has asked the victim services supervisor to develop an elder outreach program. This program will identify the elderly citizens in the South Salt Lake Community and officers will be assigned to check on these individuals every month. The South Salt Lake Police Administration wants to ensure these individuals understand they are invaluable to the community and that the police department cares about them and wants to ensure their ongoing safety.
Domestic Violence also continues to be reported at over 90% of the victim advocate caseload. More and more children are witness to violence in their homes each year. The program supervisor is working with local schools to ensure teachers are aware of things to look for when they fear a student may be living in a violent home. Victim advocates have been able to convince prosecutors to request full evaluations, so that if children have been involved in domestic violence, these perpetrators can be court ordered into parenting class and receive information on the effects their actions can have on their children.

G. Has your agency provided services to Federal Crime Victims? If so, please describe your efforts to coordinate with the Federal Criminal Justice System.

The VOCA victim advocates have not provided any services to Federal crime victims this quarter. If a violent crime victim should be involved in a Federal investigation, services will be extended by the program supervisor, who is paid by the City of South Salt Lake.

_____ _____

Authorized Signature Date

ORDINANCE NO. 2014-19

AN ORDINANCE AMENDING AND UPDATING THE SOUTH SALT LAKE ADMINISTRATIVE CODE TITLE 2 ESTABLISHING A PUBLIC ASSETS DEPARTMENT AND ADDING A PUBLIC ASSETS DIRECTOR AND A RECREATION DIRECTOR TO THE LIST OF APPOINTED EMPLOYEES

Whereas, the City has a stewardship to the taxpayers of South Salt Lake to effectively and efficiently manage City-owned physical assets, including fleet equipment, real property, parks, open space, and facilities;

Whereas, the City Council has determined that these stewardship responsibilities are best managed under a single administrative unit;

Whereas, the Mayor has proposed the creation of a Public Assets Department to manage the City's physical assets;

Whereas, the City Council has agreed to the appointment of an at-will Public Assets Director to be effective with the establishment of a Public Assets Department;

Whereas, the Mayor has proposed changing the position of Parks and Recreation Director to Recreation Director.

Whereas, the South Salt Lake Municipal Code Title 2 sets forth departments of the City and responsibilities of City officers and senior staff ;

Whereas, the City Council of the City of South Salt Lake intends to amend the City's Municipal Code to create a Public Assets Department, to authorize the appointment of a department director, and to change the position of Parks and Recreation Director to Recreation Director;

Now, therefore, be it resolved, by the City Council of South Salt Lake that Municipal Code Title 2 be amended as follows:

2.04.030 Powers and duties.

The mayor shall be the chief executive and administrative officer of the city and shall be given the power and duty to:

G. Appoint with the advice and consent of the city council, qualified persons to:

1. a. City recorder;

b. City treasurer;

c. City attorney;

d. Police chief;

e. Fire chief;

f. Director of finance;

g. Director of urban livability;

h. Director of community development;

i. Justice court administrator;

j. Human resources and information services director;

k. Director of public works;

l. Recreation director;

m. Deputy city attorney;

n. Public assets director:

o. All statutory officers, commissions, boards and committees of the city.

2. No person may perform the functions of any position specified in paragraph G of this section without the prior consent of the municipal council.

2.60.060 Employment classification.

C. Employment Status.

1. To facilitate provisions of the Fair Labor Standards Act, employees shall also be classified as either exempt or nonexempt, with respect to eligibility for overtime payment. They shall be defined as:

a. Exempt. Positions of a managerial, administrative, or professional nature, as prescribed by federal and state labor statutes shall be exempt from minimum wage and mandatory overtime payment regulations.

i. Exempt employees have no right to overtime or compensatory time; however, the mayor may authorize compensatory time plans for exempt employees.

ii. Exempt employees may accrue compensatory time for hours in excess of forty (40) hours worked per week up to a maximum of eighty (80) hours of compensatory time. This time shall be calculated at a straight time rate.

iii. Exempt employees who accrue compensatory time have no property right or cash value in the accrued time. Use and/or scheduling of compensatory time is solely within the mayor's discretion.

iv. Upon termination of employment, for whatever reason, an exempt employee is not entitled to cash or other compensation in exchange for unused, accrued compensatory time.

b. Nonexempt. Positions of a clerical, technical, or service nature, as defined by federal and state labor statutes, which are covered by provisions for minimum wage and mandatory overtime payment regulations.

2. Positions Not in Merit Service and Exempt from FLSA. The following permanent full-time positions of employment in city government shall not be merit service and are exempt from FLSA:

a. Elected members of the city council, and staff;

b. The mayor, and his or her executive secretary/assistant;

c. The following heads of departments and divisions appointed by the mayor, with the advice and consent of the city council:

i. Police chief,

ii. City attorney,

iii. City engineer,

iv. City recorder,

v. City treasurer,

vi. Director of community development,

vii. Director of urban livability,

viii. Director of finance,

ix. Director of public works,

x. Fire chief,

xi. Justice court judge,

xii. Recreation director,

xiii. Human resources and information services director,

xiv. Justice court administrator,

xv. Deputy city attorney,

xvi. Public assets director,

xvii. One confidential secretary or assistant to any of the foregoing officials as deemed necessary by the city council,

xviii. Members of policy, advisory, review, and appeal boards, or similar bodies, who do not perform administrative duties as individuals.

Chapter 2.30 Public Assets Department.

2.30.010 Public Assets Department

A. The department head will be a city employee, appointed with the advice and consent of the city council, by and reporting to the mayor.

B. Functional Responsibilities. This department's function is to oversee the stewardship of the city's physical assets in the best interest of the taxpayers. The services of this department are subject to the limitations of applicable funds' appropriations, statutes, and ordinances. These services include, but are not limited to, the following:

1. Create and maintain records of all city physical assets.

2. Identify and use best practices in servicing and maintaining all city physical assets.

3. Develop and oversee a city capital improvement plan.

4. Develop sound practices for the acquisition, leasing, renting, and disposal of city real property and public use facilities.

5. Determine and administer all legal compliance requirements associated with city-owned property.

6. Determine and administer best practices for all construction activity affecting the city's property assets.

7. Determine and administer best practices relating to emergency repairs and use of city property during emergencies.

8. Administer all purchases relating to property assets as required by city policy and ordinances.

9. Safeguard and secure the city's property assets.

DATED this 30th day of July 2014.

BY THE CITY COUNCIL

~~Irvin H. Jones, Jr.~~, Council Chair

LeRoy R. Turner Vice Chair

Attest:

Craig D. Burton, City Recorder

City Council Vote as Recorded:

Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

Transmitted to the Mayor's office on this 31st day of July 2014.

Craig D. Burton, City Recorder

MAYOR'S ACTION: Approved

Dated this 4 day of August 2014.

Cherie Wood, Mayor

Attest:

Craig Burton, City Recorder

CITY OF SOUTH SALT LAKE CORPORATE Seal SALT LAKE COUNTY, UTAH

SOUTH SALT LAKE

DRINKING WATER SYSTEM MASTER PLAN

(HAL Project No.: 126.27.200)

FINAL

December 2013

HANSEN ALLEN & LUCE inc
ENGINEERS

CITY OF SOUTH SALT LAKE

DRINKING WATER SYSTEM MASTER PLAN

(HAL Project No.: 126.27.200)

PROFESSIONAL ENGINEER
11 Dec 2013
No. 362076-2202
STEVEN C. JONES
STATE OF UTAH

Steven C. Jones, P.E.
Project Engineer

HANSEN ALLEN & LUCE INC
ENGINEERS

December 2013

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ACKNOWLEDGMENTS

Successful completion of this study was made possible by the cooperation and assistance of many individuals, including the Mayor of South Salt Lake, City Council Members, and City Staff personnel as shown below. We sincerely appreciate the cooperation and assistance provided by these individuals.

City of South Salt Lake

Mayor

Cherie Wood

City Council

Casey R. Fitts
Mike Rutter
Ryan Gold
Boyd Marshall
John B. Weaver
Roy Turner
Irvin Jones

City Staff

Dennis Pay, Public Works Director
Ed Rufener, Deputy Director
Marvin Taylor, Water Division Supervisor
Jason Taylor, Field Supervisor

GLOSSARY OF TECHNICAL TERMS

Average Daily Flow: The average yearly demand volume expressed in a flow rate.

Average Yearly Demand: The volume of water used during an entire year.

Build-out: When the development density reaches maximum allowed by planned development.

Demand: Required water flow rate or volume.

Distribution System: The network of pipes, valves and appurtenances contained within a water system.

Drinking Water: Water of sufficient quality for human consumption. Also referred to as Culinary or Potable water.

Dynamic Pressure: The pressure exerted by water within the pipelines and other water system appurtenances when water is flowing through the system.

Equivalent Residential Connection: A measure used in comparing water demand from non-residential connections to residential connections.

Fire Flow Requirements: The rate of water delivery required to extinguish a particular fire. Usually it is given in rate of flow (gallons per minute) for a specific period of time (hours).

Head: A measure of the pressure in a distribution system that is exerted by the water. Head represents the height of the free water surface (or pressure reduction valve setting) above any point in the hydraulic system.

Headloss: The amount of pressure lost in a distribution system under dynamic conditions due to the wall roughness and other physical characteristics of pipes in the system.

Peak Day: The day(s) of the year in which a maximum amount of water is used in a 24-hour period.

Peak Day Demand: The average daily flow required to meet the needs imposed on a water system during the peak day(s) of the year.

Peak Instantaneous Demand: The flow required to meet the needs imposed on a water system during maximum flow on a peak day.

Pressure Reducing Valve (PRV): A valve used to reduce excessive pressure in a water distribution system.

Pressure Zone: The area within a distribution system in which water pressure is maintained within specified limits.

Service Area: Typically the area within the boundaries of the entity or entities that participate in the ownership, planning, design, construction, operation and maintenance of a water system.

Static Pressure: The pressure exerted by water within the pipelines and other water system appurtenances when water is not flowing through the system, i.e., during periods of little or no water use.

Storage Reservoir: A facility used to store, contain and protect drinking water until it is needed by the customers of a water system. Also referred to as a Storage Tank.

Transmission Pipeline: A pipeline that transfers water from a source to a reservoir or from a reservoir to a distribution system.

Water Conservation: Planned management of water to prevent waste.

ABBREVIATIONS

ac-ft	acre-feet
DDW	The State of Utah Division of Drinking Water
ERC	Equivalent Residential Connection
GIS	Geographic Information System
gpd	Gallons per Day
gpd/conn	Gallons per Day per Connection
gpm	Gallons per Minute
HAL	Hansen, Allen & Luce, Inc.
JVWCD	Jordan Valley Water Conservancy District
MG	Million Gallons
PRV	Pressure Reducing Valve
psi	Pounds per Square Inch
SCADA	Supervisory Control And Data Acquisition

CHAPTER I

INTRODUCTION

PURPOSE

The purpose of this master plan is to provide specific direction to the City of South Salt Lake for decisions that will be made over the next 5 to 40 years in order to help the City provide adequate water to customers at the most reasonable cost. Recommendations are based on City drinking water demand data and standards established by the Utah Division of Drinking Water (DDW).

SCOPE

The scope of this master plan includes a study of the City's drinking water system and customer water use including: build-out growth projections, source requirements, water rights, storage requirements, distribution system requirements and water quality. From this study of the water system, an implementation plan with recommended improvements has been prepared. The implementation plan includes conceptual-level cost estimates for the recommended improvements.

The conclusions and recommendations of this study are limited by the accuracy of the development projections and other assumptions used in preparing the study. It is expected that the City will review and update this master plan every 5-10 years or more frequently if indicated by a significant change in development.

BACKGROUND

The City of South Salt Lake was incorporated in 1938. The desire for water and sewer services was one of the primary motivations in the effort to incorporate the City. South Salt Lake experienced rapid growth following incorporation, and shortly after World War II, the population had reached 10,000. After the initial rapid increase in population, residential growth slowed, while considerable commercial and industrial development continued. In 1998, South Salt Lake annexed areas to the south of the City between 3300 South and 3900 South. Two years after the annexation, the 2000 Census was completed. At that time the City had a population of just over 22,000. Modest growth continued through the following decade and in 2010 the most recent census gave a population of just over 23,600. Over time, South Salt Lake has developed into a diverse mix of single- and multi-family residences, commercial and business areas, and a variety of light industries.

An aging water distribution system and wells with declining flow capacity are two major issues that South Salt Lake City must address in order to meet future water system demands. Much of the existing water distribution system was constructed in 1948. Many of the original unlined cast iron pipes have now been in the ground for over 50 years and are nearing the end of their useful life. Culinary water for South Salt Lake is currently supplied from two general source categories. The City owns and operates its own wells and the City purchases wholesale water from Jordan Valley Water Conservancy District (JVWCD). Growing water demand and no excess capacity in the City wells have forced the City to an increasing dependence on water supplied from JVWCD, which is significantly more expensive than water obtained from the City's wells. In addition to the two primary sources, South Salt Lake also maintains two connections with the Salt Lake City distribution network. However, usage of the Salt Lake connections is generally avoided as the cost is much higher than the JVWCD water.

Figure I-1 illustrates the extent of the South Salt Lake water system. To the east of State Street the land usage is primarily residential. Between State Street and I-15 there is a mix of land usage with commercial, residential, light industrial and mixed use zones. West of I-15, the land usage is primarily light industrial. As shown, the distribution network is divided into western and eastern pressure zones. The eastern zone has been labeled as Zone 1, and is composed of a mixture of various land uses. The western zone, Zone 2, is composed primarily of light industrial areas. Although Zone 1 and Zone 2 have similar elevations, the pressure in Zone 2 is maintained 25 to 30 psi higher than the pressure in Zone 1. Combining the two zones into a single zone has been considered; however, many of the buildings in Zone 2 include fire suppression sprinkler systems which were designed based on the higher Zone 2 pressures. For this reason, the separation between the pressure zones has been maintained.

WATER SYSTEM MASTER PLANNING APPROACH

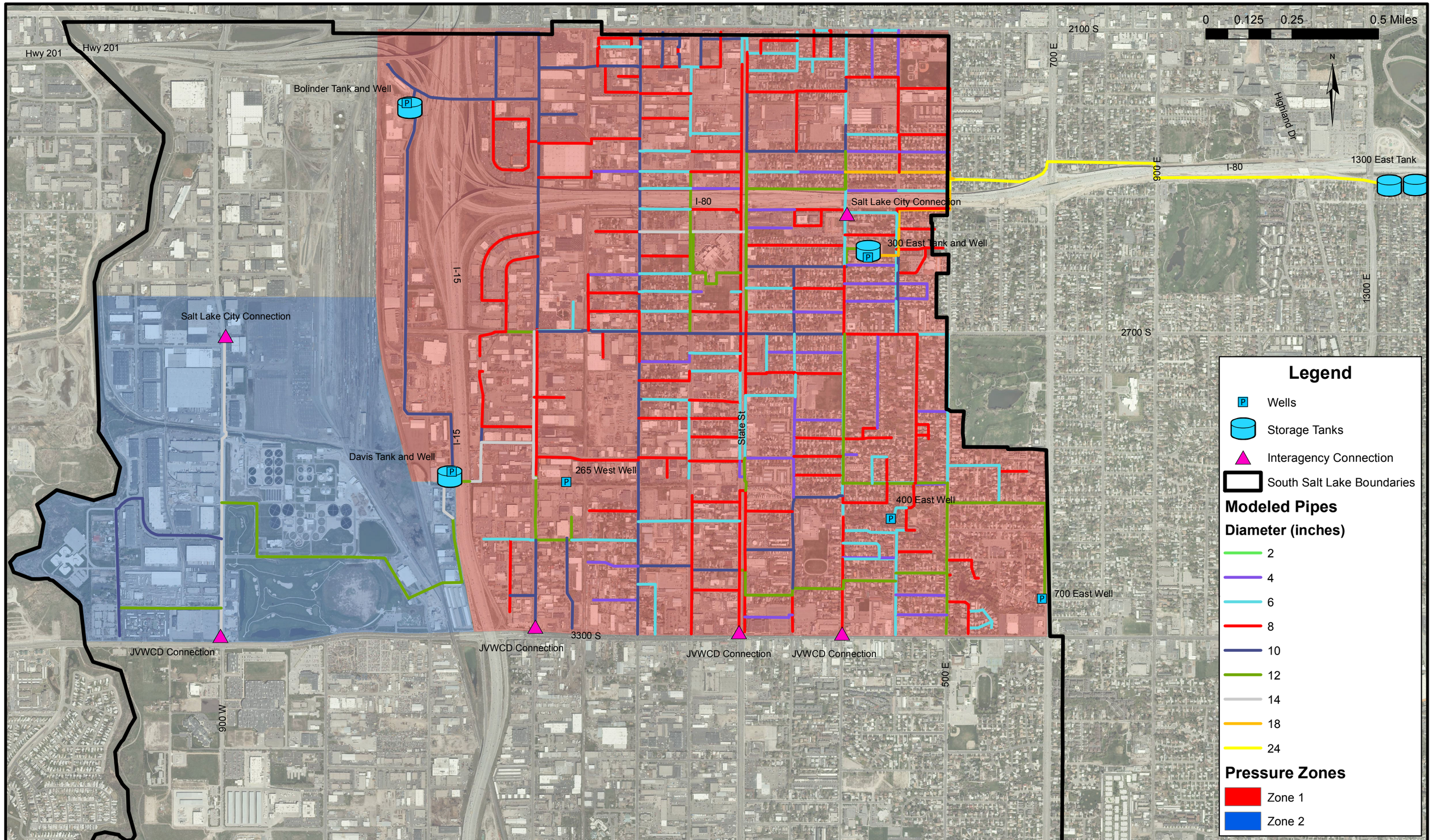
The South Salt Lake water distribution network is made up of a variety of components including booster pumps, storage facilities, valves, and pipes. The City water system must be capable of responding to daily and seasonal variations in demand while concurrently providing adequate capacity for firefighting and other emergency needs. In order to meet these goals, each of the distribution system components must be designed and operated properly. Furthermore, careful planning is required in order to ensure that the distribution system is capable of meeting the City's needs over the next several decades.

Both present and future needs were evaluated in this master plan. Present water needs were calculated according to Utah Division of Drinking Water (DDW) requirements and compared with actual water use records obtained from billing record data and system flow records. Future water needs were estimated by identifying locations where redevelopment is expected, adding the incremental increase in water demand associated with the development to the current demand. South Salt Lake's build-out water demand was estimated by applying this process throughout City.

In order to facilitate the analysis of South Salt Lake's drinking water system, a computer model of the system was prepared and analyzed in two parts. First, the performance of existing facilities with present water demands was analyzed. Next, projected future demands were added to the drinking water system and the analysis was repeated. Recommendations for system improvements were prepared based on the results of this analysis. This report is organized to follow the outline of the DDW requirements found in section R309-510 of the Utah Administrative Code entitled "Minimum Sizing Requirements".

KEY SYSTEM DESIGN CRITERIA AND PERFORMANCE FINDINGS

Summaries of the key water system design criteria and performance findings for the South Salt Lake drinking water system are included in Table I-1. The design criteria were used in evaluating system performance and in recommending future water system improvements. Table I-2 presents the design flows analyzed in the drinking water model.



HANSEN ALLEN & LUCE inc ENGINEERS

SOUTH SALT LAKE CITY
DRINKING WATER SYSTEM MASTER PLAN

EXISTING SYSTEM

FIGURE
I-1

TABLE I-1
KEY SYSTEM DESIGN CRITERIA

	CRITERIA	2013 EXISTING REQUIREMENTS	ESTIMATED BUILD-OUT REQUIREMENTS
EQUIVALENT RESIDENTIAL CONNECTIONS	Calculated	6,337 ERCs	12,677 ERCs
SOURCE			
Peak Day Demand	R309-510	5,779 gpm	9,301 gpm
Average Yearly Demand	R309-510	4,550 ac-ft	7,391 ac-ft
STORAGE			
Equalization	R309-510	4.16 MG	6.70 MG
Fire Suppression	Highest fire flow volumes	1.50 MG	1.50 MG
Emergency	20% of Fire and Eq.	1.13 MG	1.64 MG
Total		6.79 MG	9.84 MG
DISTRIBUTION			
Peak Instantaneous	1.6 x Peak Day Demand	9,246 gpm	14,882 gpm
Minimum Fire Flow	@ 20 psi	1,200 gpm	1,200 gpm
Max Operating Pressure	City Preference	110 psi	110 psi
Min. Operating Pressure	City Preference	50 psi	50 psi

TABLE I-2
DESIGN FLOW SUMMARY

SCENARIO		CALCULATION PROCEDURE	DEMAND	FLOW RATIO
Average Day	Existing	0.445 gpm/ERC	2,821 gpm	ADD/ADD = 1.00
	Build-Out	Existing demand Indoor demand for new future ERCs	2,821 gpm 1,761 gpm 4,582 gpm	ADD/ADD = 1.00
Peak Day	Existing	0.912 gpm/ERC	5,779 gpm	PDD/ADD = 2.05
	Build-Out	Existing demand Indoor demand for new future ERCs	5,779 gpm 3,522 gpm 9,301 gpm	PDD/ADD = 2.03
Peak Instantaneous	Existing	1.459 gpm/ERC	9,246 gpm	PID/ADD = 3.28
	Build-Out	Existing demand Indoor demand for new future ERCs	9,246 gpm 5,636 gpm 14,882 gpm	PID/ADD = 3.25

CHAPTER II

CONNECTIONS

EXISTING CONNECTIONS

According to 2012 connection information reported to the Division of Water Resources, the South Salt Lake distribution network includes 3,314 connections. Of this total, 2,371 are residential connections and 943 connections are nonresidential. An Equivalent Residential Connection (ERC) is a measure used in comparing water demand from non-residential connections to residential connections. By definition, each typical residential connection represents 1 ERC. The demand per ERC was evaluated based on Utah Administrative Code R309-510-7. As defined by Utah code, the peak day indoor demand per ERC is 800 gallons/day (0.56 gpm/ERC).

Outdoor demand per ERC is dependent upon the irrigated acreage associated with each ERC. Irrigated acreage was estimated by randomly selecting ten residential properties and measuring the irrigated acreage attached to each property. Based on these measurements, an average irrigated acreage of 0.09 acres was associated with each ERC. Multiplying 0.09 acres/ERC by the total number ERCs gives a total irrigated acreage of 570 acres. South Salt Lake is located in consumptive use zone 4 (refer to R309-510-7(3)), giving a peak day outdoor demand of 0.36 gpm/ERC.

Summing the indoor and outdoor demands gives a total peak day demand of 1313 gallons/day (0.91 gpm) per ERC. In order to express the commercial and industrial demands in terms of ERCs, the average demand for those connections was divided by the demand per ERC. Additional ERCs were also added to account for the irrigation of the open spaces located throughout the City. In all, the total number of ERCs computed for South Salt Lake was 6,337. Of the total, 2,605 represent residential demands, 2,837 represent commercial and industrial demands, and 895 represent the irrigation of open spaces (see Appendix A for ERC calculations). Table II-1 is a summary of ERCs by pressure zone.

TABLE II-1
EXISTING ERCS

PRESSURE ZONE	ERCs
1	5,542
2	795
TOTAL	**6,337**

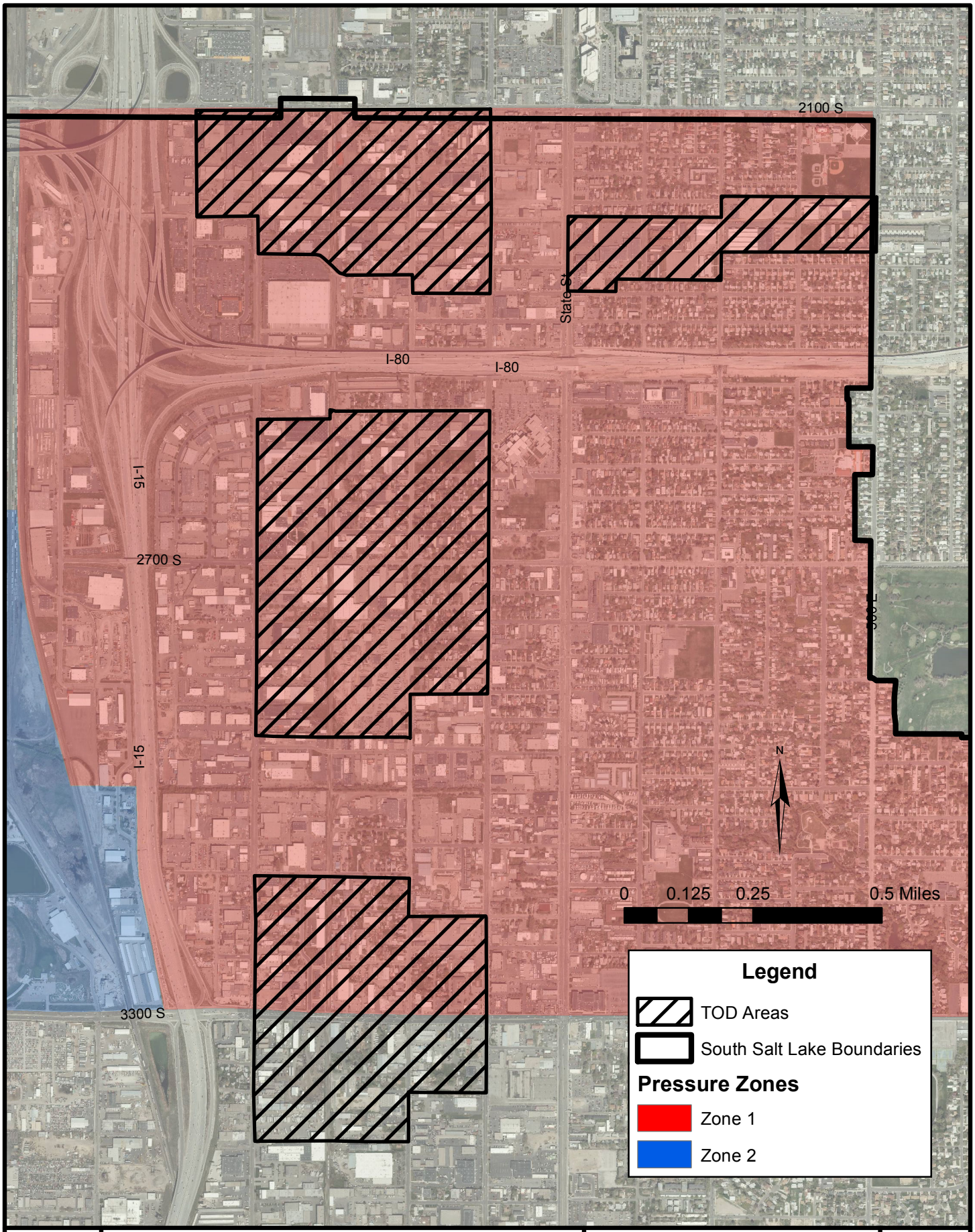
Existing system design flows were calculated based on the calculated ERCs and R309-510. Demand within the system was distributed using billing data. The billing data included the billed water used as well as the address describing the location of use. The addresses were used to geocode the locations of each billing account. By assigning the demands associated with the billing account to the nearest nodes within the South Salt Lake drinking water system, demands were distributed in a realistic manner based on actual usage. Because the geocoded demands were obtained from monthly data, it was then necessary to scale the individual nodal demands so that the sum of the individual demands equaled the design flow.

CONNECTIONS PROJECTED AT BUILD-OUT

South Salt Lake City is close to build-out. As a result, increases in demand are primarily expected to be the result of redevelopment. By extension, indoor demand is expected to increase over time as new connections are added, while outdoor demand is expected to remain mostly unchanged. Using the population projections from the 2010 census and the Governor's Office of Planning & Budget, the population of the city is expected to increase by about 100% by 2050. South Salt Lake has designated overlays for the purpose of directing redevelopment within specific areas. In particular, four transit oriented development (TOD) overlays exist within the service area of the South Salt Lake drinking water distribution network (see Figure II-1). Based on a review of building requirements within the TOD overlay areas, 25 ERCs/acre was selected as the total build-out ERC density for three of the overlay areas and the density of the fourth was raised to 9.65 ERCs/Arcre. It was assumed that all of the future growth will occur within the overlay areas. By 2050, 6,340 ERCs are expected to be added to the TOD areas. Table II-2 provides a summary of the build-out ERCs by pressure zone.

TABLE II-2
BUILD-OUT ERCS

ZONE	ERC
1	11,882
2	795
TOTAL	**12,677**



HANSEN ALLEN & LUCE inc ENGINEERS	SOUTH SALT LAKE CITY DRINKING WATER SYSTEM MASTER PLAN	TOD Areas	FIGURE II-1

CHAPTER III

SOURCES

EXISTING SOURCES

The following paragraphs outline the water rights owned by South Salt Lake along with the corresponding sources. A summary of South Salt Lake water rights tied to existing wells is shown in Table III-1.

TABLE III-1
SUMMARY OF SOUTH SALT LAKE WELLS

SOURCE	PHYSICAL CAPACITY (gpm)	TOTAL OF ASSOCIATED WATER RIGHTS[1] (gpm)
300 East Well	725	920
265 West Well[2]	850	898
400 East Well[2]	500	707
700 East Well	1,000	1,795
Bolinder Well[2]	2,000	2,244
Davis Well	2,900	2,944

1. For an itemized list of the individual water rights see Appendix B
2. Currently not in use

The water rights included in Table III-1 sum to 9,508 gpm. However, the 265 West and Bolinder Wells have been abandoned, and the 400 East Well is currently inactive, leaving 5,659 gpm of useable water rights. The water rights associated with the unused and abandoned wells are unusable without transferring the rights to other potential sources. In addition, the City owns water rights that are not connected to existing or previous municipal water sources. These additional rights total to 2,103 gpm. All of the City's wells are located in Zone 1. A complete listing of the water rights owned by South Salt Lake has been included in Appendix B.

Besides the City owned wells, South Salt Lake also maintains four connections with Jordan Valley Water Conservancy District (JVWCD) as listed in Table III-2.

TABLE III-2
SUMMARY OF JVWCD CONNECTIONS

ZONE	SOURCE	METER SIZE (inches)	FLOW CAPACITY (gpm)	ANNUAL CONTRACT (acre-feet)
1	300 East JVWCD	6	700	1,020
1	State St JVWCD	6	700	
1	300 West JVWCD	8	1,300	
2	900 West JVWCD	10	1,500	
	TOTAL	**-**	**4,200**	**1,020**

All of the JVWCD connections are located along 3300 South. The connections are used to supplement the water obtained from the City's wells. South Salt Lake's current contract with JVWCD limits annual withdrawals from these connections to 1,020 acre-feet. As shown in Table III-2, the 900 West connection provides water to Zone 2, while the remaining connections provide water to Zone 1. The South Salt Lake network also shares two connections with the Salt Lake City network. One of the Salt Lake City connections is connected to Zone 1 and is located at 300 East Robert Avenue. The second is located at 2775 South 900 West and is connected to Zone 2. The Salt Lake City connections are only utilized during emergency situations.

EXISTING SOURCE REQUIREMENTS

DDW standards require that distribution network water sources must be able to meet the expected water demand for two conditions: peak day demand and average yearly demand. Each of these criteria will be addressed in the following paragraphs.

Existing Peak Day Demand

Peak day demand is the water demand on the day of the year with the highest water use and is used to determine the required source capacity under existing and build-out conditions. The two primary descriptors in characterizing peak day demand are the diurnal demand curve and average peak day demand. The peak day diurnal curve, in non-dimensional form, is shown Figure III-1.

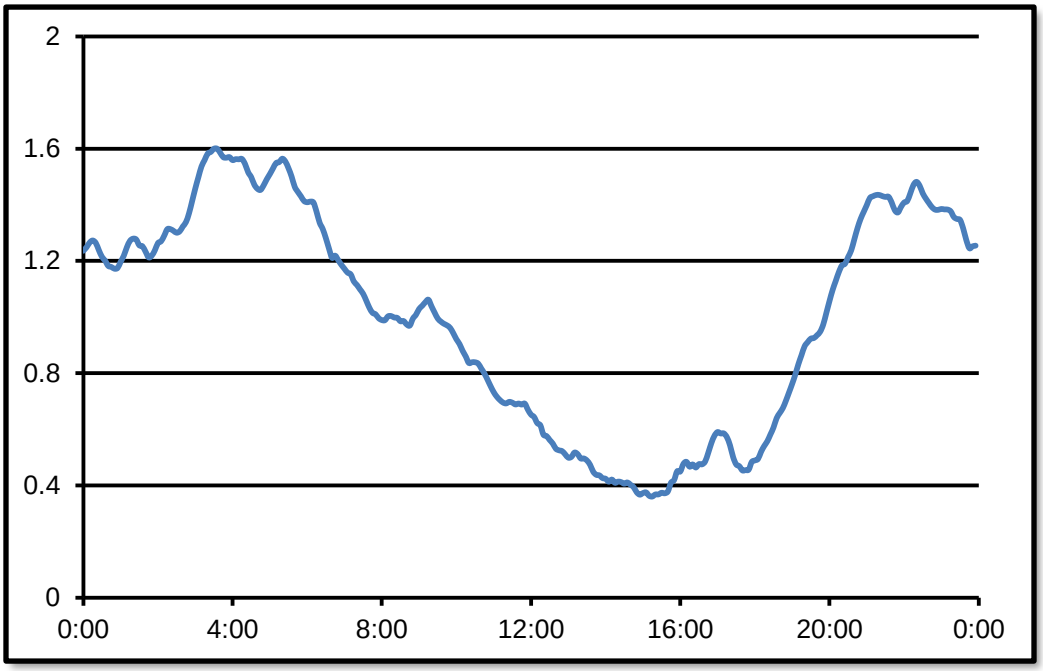


FIGURE III-2: PEAK DAY DIURNAL CURVE FOR SOUTH SALT LAKE CITY

The diurnal curve was obtained by analyzing South Salt Lake's production data. The non-dimensional form was obtained by dividing the instantaneous flow values by the daily average flow. The peak day average demand was found to be 0.912 gpm/ERC, corresponding to an average yearly flow of 0.556 gpm/ERC and a peak instantaneous flow of 1.459 gpm/ERC.

The primary peak occurs in the morning at about 3:45 AM, with a prolonged peak lasting until

about 5:45 AM. The period with the lowest demand is during midafternoon at about 3:00 PM. The relatively high nighttime demand is likely a result of night time irrigation using automatic sprinklers.

Existing source requirements and capacities for each pressure zone are summarized in Table III-3. The "ERCs" and "Zone Demand (gpm/ERC)" columns are, respectively, the number of ERCs in each pressure zone and the average demand per ERC, both as outlined previously. The "Zone Demand (gpm)" column is the average demand estimated for each zone on the peak day.

TABLE III-3
EXISTING SOURCE REQUIREMENTS

ZONE	EXISTING SOURCE (PEAK DAY) DEMAND			EXISTING SOURCE CAPACITY (gpm)		CAPACITY REMAINING (gpm)	
	ERCs	DEMAND[1] (gpm/ERC)	DEMAND (gpm)	PHYSICAL	AVAILABLE[2]	PHYSICAL	AVAILABLE
1	5,542	0.912	5,054	7,325	8,359	2,271	3,305
2	795	0.912	725	1,500	1,450	725	725
TOTAL	6,337	NA	5,779	8,825	9,809	NA	NA

1. The demands are based on State Standards
2. Total of water rights tied to wells and contracted JVWCD water

Approximately **5,779** gpm is required to meet the existing demands of South Salt Lake City, with 5,054 gpm, and 725 gpm required for the individual pressure zones 1 and 2.

The "Existing Source Capacity" has been divided into "Physical" and "Available" categories. "Physical" capacity is the sum of the maximum physical capacities of each source (all wells and JVWCD connections) within the respective zone. Available capacity was determined through summation of the instantaneous water rights and the contracted JVWCD connection flow rates. "Capacity Remaining" is defined as the "Zone Demand" subtracted from the "Existing Source Capacity" and is divided into "physical" and "available" categories. For Zone 1, the remaining available source capacity is 3,305 gpm. However, due to the currently unavailable sources with associated water rights, the remaining physical capacity for Zone 1 is 2,271 gpm.

In addition to the sources listed above, water can also be pumped from Zone 1 into Zone 2 via the West Davis Booster Station; however, the City operates the West Davis Booster Pump as a redundant source for the JVWCD connection located at 900 West. As such, during general usage the City does not use the booster pump; rather, all of the water in Zone 2 is supplied by the JVWCD connection. For this reason the capacity associated with the West Davis Booster Station has not been included in Table III-3.

Existing Average Yearly Demand

Water utilities must also be able to supply the average yearly demand. Average yearly demand is the average volume of water used during the course of one year. Using State Standards, the average yearly demand for the South Salt Lake City distribution system was found to be **4,550** ac-ft. Summation of the water rights of available sources for the City gives 9,129 ac-ft, and the

annual contract with JVWCD limits the connection volume to 1,020 ac-ft. The combination of available water rights and JVWCD connection (10,149 ac-ft) exceeds the average year demand. Therefore, on an annual basis 4,458 ac-ft of annual source capacity remains.

BUILD-OUT SOURCE REQUIREMENTS

Water demand is expected to increase as redevelopment occurs within the city. The following build-out source projections assume that the outdoor demand per ERC will not change between the existing and build-out scenarios. Accordingly, indoor use is expected to be the primary source of increased demand while outdoor use is expected to stay the same or perhaps decrease. South Salt Lake is mostly built-out and in order for additional development to occur open spaces will be reduced or existing development will be redeveloped to higher densities. As with existing water source requirements, future water source needs were evaluated on the basis of peak day demand and average yearly demand. Each requirement is addressed separately in the following paragraphs.

Build-Out Peak Day Demand

Table III-4 provides a summary of the build-out source requirements for South Salt Lake City with each column heading as previously defined for Table III-3. The projected total peak day demand at build-out is **9,301 gpm**. Zone 1 is projected to have deficits of 1,401 gpm in physical capacity and 217 gpm in available source capacity. Table III-4 illustrates that the City will need to obtain water sources capable of providing about 1,400 gpm to Zone 1. Water conservation efforts represent one alternative for reducing the projected shortfall. Two additional options for addressing this deficiency are making improvements in order to return unused and abandoned wells back into service and increasing the capacity of the City's JVWCD connections.

TABLE III-4
BUILD-OUT SOURCE REQUIREMENTS

ZONE	BUILD-OUT SOURCE (PEAK DAY) DEMAND			EXISTING SOURCE CAPACITY (gpm)		CAPACITY REMAINING (gpm)	
	ERCs	DEMAND[1] (gpm/ERC)	DEMAND (gpm)	PHYSICAL	AVAILABLE	PHYSICAL	AVAILABLE
1	5,542 (Ex.) 6,340 (Fut.) 11,882	0.912 0.556	5,054 3,522 8,576	7,175	8,359	-1,401	-217
2	795	0.912	725	1,450	1,450	725	725
TOTAL	12,677	NA	9,301	8,625	9,809	NA	NA

1. The demands are based on State Standards

Build-Out Average Yearly Demand

The projected average yearly demand at build-out is **7,391 ac-ft**. Of the total demand, 7,079 ac-ft is projected to be required for Zone 1 and 714 ac-ft for Zone 2, showing that all of the projected growth is expected to occur in Zone 1. The build-out annual demand is expected to be met by the annual available amount of water rights and contractual volume through the JVWCD connections. The physical capabilities of the sources are less than the water rights for the sources but still total to 8,238 ac-ft which will meet the build-out annual demand.

TABLE III-5
BUILD-OUT AVERAGE YEARLY REQUIREMENTS

ZONE	BUILD-OUT ANNUAL DEMAND (ac-ft)	BUILD-OUT ANNUAL CAPACITY	
		AVAILABLE (ac-ft)	REMAINING (ac-ft)
1	6,820	9,129[1]	2,309
2	571	1,020[2]	449
TOTAL	7,391	10,149	N/A

1. Available Water Rights for South Salt Lake City
2. Contractual annual volume for the JVWCD connection

SOURCE REDUNDANCY

It is recommended that the drinking water system have sufficient source capacity in order to meet all of the demand objectives with a major source unavailable. It is advisable to have sufficient capacity so there is no single source which is indispensable. For that reason it is recommended that redundancy be evaluated assuming the largest source will be unavailable. The largest South Salt Lake source is Davis Well, with a capacity of 2900 gpm. Under existing conditions, the City has a surplus physical capacity of 2,271 gpm; however, if Davis Well were to be unavailable, the City would face a deficit of 629 gpm.

Under the build-out scenario, there is insufficient capacity even with all of the current sources at full capacity. In order to meet build-out demands with full source redundancy South Salt Lake will need to be able to meet the projected deficit of 1,401 gpm without using Davis Well. Therefore the effective build-out deficit, considering redundancy, is 4,301 gpm.

SOURCE RECOMMENDATIONS

Under existing conditions, South Salt Lake has a deficit of 629 gpm when source redundancy is considered. When build-out demands are considered the deficit, including redundancy, swells to 4,301 gpm. As obtaining new water rights is generally difficult, it is recommended that South Salt Lake City meet the projected water demands through a combination of transferal of existing water rights and increasing their JVWCD contract volume. South Salt Lake City owns several water rights associated with sources that are not currently in service, such as the 300 West Well, 400 East Well, the Scott Hatchery Wells, and the Bolinder Well. It is recommended that existing water rights be transferred to viable sources, or that the necessary actions be taken so that sources currently out of service may be reintroduced to the drinking water system.

Specifically, it is recommended that a new well be drilled near the abandoned Bolinder Well. Bolinder Well was abandoned due to a collapse within the formation. Prior to abandonment, Bolinder Well provided good production with a nominal capacity of about 2,000 gpm. Furthermore, drilling a new well near the existing well will allow the City to use the Bolinder water rights, and Bolinder Tank. A new well at this location could supply sufficient water to provide redundancy under existing conditions.

Under build-out conditions additional sources will be needed. Assuming a replacement for Bolinder Well will produce about 2,000 gpm, another 2,300 gpm of capacity will still be required. It is recommended that the remaining flow capacity be reached through the construction of one new well and increasing the capacity from JVWCD to make up the difference. Because of the limited availability of undeveloped property in South Salt Lake, it is expected that property acquisition will be the limiting factor in new well construction. For this reason, it is suggested

that the City assemble a list of suitable locations and prioritize the locations based on suitability. Items that should be considered include: proximity to transmission pipeline, impacts on water quality, property costs, issues associated with transferal of water rights, etc. One possible location for the well would be near the inactive 400 East Well.

In order to increase capacity from JVWCD, two options are suggested. The first option would be to add a new connection at 3300 S West Temple into the existing 10" line. A second option is to upsize the existing 300 East connection. The 300 East connection currently feeds into an 8-inch pipeline. However, there is a 12-inch transmission line just to the north at 3185 South and upsizing the pipe between the connection and the existing transmission line should increase the capacity of the connection. Prior to constructing any improvements for the purpose of increasing the City's capacity from JVWCD, the JVWCD system should be modeled and field testing conducted to ensure the JVWCD system has sufficient capacity to convey the desired flow. Within the "Capital Cost" section of this master plan it was assumed the first option, adding a new connection at 3300 S West Temple, would be selected.

CHAPTER IV

WATER STORAGE AND BOOSTER PUMPS

EXISTING STORAGE

The City's current drinking water system includes four storage facilities with a total capacity of 8 MG. The locations of storage facilities are shown on Figure I-1. The 1300 East tank is directly connected to Zone 1 and provides water to that zone via gravity flow. Bolinder Tank and 300 East tank are connected to Zone 1 via booster pump stations. Davis Tank is connected to both Zones 1 and 2 by booster pump stations. Table IV-1 presents a listing of the names and select attributes of the South Salt Lake water storage tanks.

TABLE IV-1
EXISTING STORAGE TANKS

FACILITY	TYPE	DIAMETER (ft)	VOLUME (MG)	TANK LEVELS			
				OUTLET	EMERG. STORAGE	FIRE SUPP.	OVERFLOW/ EQU.
300 East Tank	Concrete	110	1.0	4262.0 (0 feet)	N/A	N/A	4277.0 (15.0 feet)
1300 East Tank	Concrete	N/A	4.0	4402.0 (0 feet)	4409.9 (7.9)	4416.5 (14.5 feet)	4424.5 (22.5 feet)
Bolinder Tank	Steel	50	1.0	4236.0 (0 feet)	N/A	N/A	4272.0 (36.0 feet)
Davis Tank	Steel	95	2.0	4242.0 (0 feet)	N/A	N/A	4277.0 (35.0 feet)

Although Bolinder Tank is in serviceable condition, it is not currently operational. Previously, water from Bolinder Well was pumped into Bolinder Tank before being pumped out to Zone 1 via the Bolinder Booster Station. Bolinder Well is out of service due to irreparable damage. For this reason, the storage associated with Bolinder Tank has not been included in later tables within this section.

EXISTING STORAGE REQUIREMENTS

According to DDW standards, storage tanks must be able to provide: 1) equalization storage volume to make up the difference between the peak day flow rate and the peak instantaneous demand; 2) fire suppression storage volume to supply water for firefighting; and 3) emergency storage, if deemed necessary. A summary of the existing storage requirements for the drinking water system is provided in Table IV-2. Detailed explanations for each requirement have been included in the following paragraphs.

Equalization Storage

The need for equalization storage is highest during the irrigation season on days of peak water use. Equalization storage is used to meet peak demands during the time when demand exceeds the capacity of the sources. For South Salt Lake the required equalization storage was calculated according to the guidelines outlined by Utah Administrative Code R309-510-8. Storage requirements include an indoor component of 400 gallons per ERC and an outdoor component of 2,848 gallons per irrigated acre. Based on a value of 0.09 irrigated acres per ERC, the storage requirement for outdoor demands is 256 gallons per ERC. Combining the indoor and outdoor demands gives a total requirement of 656 gallons per ERC. The existing

equalization storage requirement for South Salt Lake was found to be **4.16 MG**. Of that total 3.64 MG is required for Zone 1 and 0.52 MG is required for Zone 2. Because Zone 2 does not have any storage tanks, peak instantaneous flows to Zone 2 are supplied by the 900 West JVWCD connection.

TABLE IV-2
EXISTING WATER STORAGE REQUIREMENTS

PRESSURE ZONE	ERCs	REQUIRED STORAGE (MG)				EXISTING STORAGE (MG)	REMAINING (MG)
		EQUALIZATION (MG)	FIRE SUPP. (MG)	EMERG. (MG)	TOTAL (MG)		
1	5,542	3.64	1.50	1.03	6.17	7.00	0.83
2	795	0.52	1.00	0.30	1.82	0	-1.82
TOTAL	**6,337**	**4.16**	**2.50**	**1.33**	**7.99**	**7.00**	**NA[1]**

1. There is no means to convey adequate fire suppression flow from Zone 1 to Zone 2. For this reason the total "Remaining" value is reported as not applicable.

Fire Suppression Storage

Fire suppression storage is required for water systems that provide water for firefighting. The South Salt Lake Fire Department has jurisdiction over the City and the fire flow requirements in this master plan were set by the Fire Marshall, Boyd Johnson. The contact information for the South Salt Lake Fire department is as follows:

Phone: (801)483-4000

Address: 2600 S Main St
South Salt Lake, UT 84115

The minimum fire flow requirement for a building was **1,200 gpm for 4 hours.** Depending on the size of the building and the type of construction, higher flow requirements were assessed based on the International Fire Code and fire marshal recommendations. The required fire suppression storage for a given zone is determined by the building in the zone with the highest fire flow requirement. Granite Park Junior High School was assessed a required flow of **6,250 gpm for 4 hours** (1.5 MG), which was the largest requirement in Zone 1. In Zone 2, two industrial buildings at 2850 S 900 W and 2828 S 900 W were each assessed fire suppression flows of **4000 gpm for 4 hours**, which corresponds to a volume of about 1 MG. However, as stated previously, there are no storage tanks located in Zone 2. Moreover, JVWCD does not allow wholesale customers to consider JVWCD storage tanks in meeting fire storage requirements.

It is essential that the water system is managed so that the storage volume dedicated to fire suppression is available to meet fire flow requirements whenever or wherever it is needed. This can be accomplished by designating minimum storage tank water levels that provide reserve storage equal to the required fire suppression storage. Although it is important to utilize

equalization storage, typical daily water fluctuations in the tanks should never be allowed below the minimum established levels except during fire or emergency situations. Fire suppression tank levels are included in Table IV-1. All of the fire suppression storage for Zone 1 has been assigned to the 1300 East Tank because it is the only tank within Zone 1 that can supply water via gravity flow.

Emergency Storage

DDW standards suggest that emergency storage be considered in the sizing of storage facilities. Emergency storage is intended to provide a safety factor that can be used in the case of unexpectedly high demands, pipeline failures, equipment failures, electrical power outages, water supply contamination, or natural disasters. Emergency storage has been assigned to each zone at a rate of 20% of the sum of the equalization volume and fire suppression volume.

BUILD-OUT STORAGE REQUIREMENTS

The storage volumes required at build-out are based on the same equalization, fire suppression, pump operation, and emergency storage requirements as were calculated for the existing conditions. The build-out equalization storage will be higher than existing conditions because the number of ERCs is projected to increase. However, similar to the source requirements, only indoor storage requirements have been considered for new future development. The indoor storage requirement is 400 gallons per ERC. Moreover, fire suppression volumes are not expected to increase. Instead, it is likely that the required fire suppression volume will be lower at build-out as a result of older buildings being replaced with newer buildings that meet updated building codes. However, because it is not known if, or when such upgrades will occur, the existing fire suppression volumes have been carried over to the build-out projections. Emergency storage was again calculated as 20% of the sum of the equalization volume and fire suppression volume. The City's future storage requirements at build-out are presented in Table IV-3.

TABLE IV-3
BUILD-OUT STORAGE REQUIREMENTS

ZONE	RECOMMENDED STORAGE REQUIREMENTS					EXISTING STORAGE (MG)	REMAINING (MG)
	ERCs	Equalization (MG)	Fire Suppression (MG)	Emergency (MG)	Total (MG)		
1	5,542 (Ex.) 6,340 (Fut.) 11,882	3.64 2.54 6.18	1.50	1.54	9.22	7.0	-2.22
2	795	0.52	1.00	0.30	1.82	0	-1.82
TOTAL	**12,677**	**6.70**	**2.50**	**1.84**	**11.04**	**7.0**	**-4.04**

EXISTING BOOSTER PUMPS

With the exception of the 1300 East Tank, the storage reservoirs in the South Salt Lake distribution network are not able to supply water via gravity flow. Booster pumping stations are needed to pump water out of the 300 East Tank, Bolinder Tank, and Davis Tank and into the supply network. The 300 East and Davis Booster Stations pump water into Zone 1. Davis Booster Station also includes pumps to Zone 2. When operable, Bolinder Booster Station

supplies water to Zone 1; however, as with other Bolinder facilities, the Bolinder booster station in not currently in use because the well is out of service. Data regarding the booster pumps was obtained through communication with South Salt City personnel and is presented in Table IV-4.

TABLE IV-4
BOOSTER PUMP CHARACTERISTICS

FACILITY	BOOSTER PUMP DATA		NOTES
	POWER (HP)	CAPACITY (gpm)	
300 East Booster 1 Booster 2	 40 75	 700 800	Normally only one booster pump is on, usually the smaller pump.
Bolinder Booster 1 Booster 2	 50 50	 600 600	Not currently in use.
Davis Booster 1 Booster 2 Booster 3	 100 100 75	 1,200 1,200 850	Normally only one booster is on at a time.
West Davis Booster 1	No Data	400	No recent data for this pump. The pump serves as a redundant source for the 900 West JVWCD connection.

In order to make full use of a drinking water source capacity, storage tanks and booster pumps that are associated with wells should be sized based on the capacity of the well. For example, 300 East Well, with a capacity of 725 gpm is able to provide for the peak day demand of 795 ERCs (725 gpm ÷ 0.912 gpm/ERC). The tank should have at least enough capacity to provide equalization storage for the ERCs the well can serve. For South Salt Lake, the required storage is 656 gallons per ERC, which results in a required equalization volume of about 0.52 MG for the 300 East Tank. Similarly, booster pumps should be sized to provide the peak instantaneous demand for the ERCs a well serves. The existing peak instantaneous demand for South Salt Lake is 1.459 gpm per ERC which gives a required capacity of 1,160 gpm for the 300 East Booster Station. Similar calculations were completed for all of the facilities where a well feeds directly into a storage tank and the results are displayed in Table IV-5.

TABLE IV-5
STORAGE AND BOOSTER RECOMMENDATIONS

FACILITY	WELL CAPACITY (gpm)	ERCs SERVED	STORAGE (MG)	BOOSTER (gpm)
300 East	725	795	0.52	1,160
Bolinder	2,000	2,193	1.44	3,200
Davis	2,900	3,180	2.09	4,640

It was assumed that the existing rated capacity of the pumps is equal to the sum of the individual pump capacities, minus the capacity of the largest pump. Although not currently operational, the Bolinder facilities have been included for completeness and because it is recommended to drill a new well in the same general location. Sizing of the storage and booster facilities at Bolinder well should be reviewed if or when the new well is completed and the source capacity is known. However, based on the previous capacity of Bolinder Well, an

additional storage volume of 0.44 MG will be required. In order to provide peak instantaneous flows the booster station will need an additional capacity of 2,600 gpm.

With regard to the facilities that are currently in use, the 300 East Tank is large enough to provide peak day equalization storage with about 0.48 MG of extra storage that could be considered emergency or fire suppression storage. Conversely, Davis Tank is slightly undersized with respect to equalization storage. Nonetheless, the deficiency is small enough that adding additional equalization storage would be impractical. The 300 East booster station includes two pumps. The larger pump has a reported capacity of 800 gpm while the smaller pump has a capacity of about 700 gpm. Although capacities of the two pumps sum to 1,500 gpm, which is greater than the required value of 1,160 gpm, redundancy should be incorporated such that the pump station can supply the flow with the largest pump out of service. Therefore, an additional 460 gpm of capacity is recommended for the 300 East pump station. The Davis Booster Station includes two 1,200 gpm pumps and one 850 gpm pump. In order to provide the recommended capacity with the largest pump offline, an additional capacity of 2,590 gpm would be needed.

BOOSTER PUMP AND STORAGE RECOMMENDATIONS

South Salt Lake City currently has 7.0 MG of storage, all located in Zone 1. Under existing conditions there is an adequate volume of storage to provide equalization, fire suppression, and emergency needs in Zone 1. However, based on the evaluations of the booster stations, the equalization storage in Davis Tank is not useable and a portion of the equalization storage in 300 East Tank has no provision for redundancy. The 300 East Booster Station requires an additional 460 gpm of capacity, and the Davis Booster Station an additional 2,590 gpm of capacity. Therefore, it is recommended that additional pump capacity be added to both booster stations. Upsizing the existing booster facilities may be possible and should be explored as an option. However, since it is not clear whether upsizing the existing facilities is feasible, the cost estimates presented later assume that new pump stations will be built to replace the existing pump stations. It is recommended that the rated capacity of the proposed 300 East Booster Station should be 1,160 gpm. A rated capacity of 4,640 is recommended for the Davis Booster Station. In addition, if Bolinder Well is replaced, additional facilities will be needed at that location in order to take advantage of the expected 2,000 gpm well capacity. It is expected that the storage at Bolinder Tank will need to be expanded by about 0.5 MG and that a new pump station, with a flow rate of 3200 gpm, will be required. However, improvements to Bolinder facilities should be completed only after the well has been constructed and the capacity of the well is known.

Zone 1 has a build-out storage requirement of 9.22 MG, giving a build-out deficit of 2.22 MG. Reactivating Bolinder Tank (currently 1 MG) and increasing the storage at the location by 0.5 MG, cuts the build-out deficit to 0.72 MG. In order to provide the required storage it is suggested that a new Zone 1 storage facility be considered with a volume of about 1.00 MG. It is proposed that the extra capacity should be added at the location of the existing 1300 East Storage Tanks, if possible. An additional option for eliminating the storage deficit is to accept a reduction in emergency storage. Utah Administrative Code R309-105-8(4) requires consideration of emergency storage; however, no explicit guidelines regarding the required emergency storage volume are provided. Instead, the following guidance is offered:

> It is advisable to provide water storage for emergency situations, such as pipeline failures, major trunk main failures, equipment failures, electrical power outages, water treatment facility failures, raw-water supply contamination, or natural disasters. Generally, the need for emergency storage shall be determined by the water supplier and design engineer.

Based on conversations with City personnel, an emergency storage volume equal to 20% of the combined equalization and fire flow storage volumes has been recommended. Past experience has indicated that Utah State Standards for equalization storage are generally quite conservative. For this reason, additional emergency storage is not always needed. If the future emergency storage requirement is reduced to 10% of the combined equalization and fire storage volumes, the additional storage suggested at the location of the 1300 East Storage Tanks becomes unnecessary.

Two options have been identified that will allow the City to provide fire storage to Zone 2. The first option is for the City to utilize the existing Salt Lake City connection located at 2775 S 900 W. Communication with City personnel indicates that the connection to South Salt Lake is 12-inches. In addition, South Salt Lake provided fire flow test records to HAL during the process of preparing this master plan. The records show that a fire flow test was conducted by Insurance Services Offices, Inc. at 2600 S 900 W, just north of the Salt Lake City connection. Fire flows at that location were provided by the Salt Lake distribution system and total 4,800 gpm. Based on this data, it is probable that the Salt Lake City connection could provide the 4,000 gpm fire flow that is required in Zone 2. In order to use this fire flow, South Salt Lake would need to enter into an agreement with Salt Lake City. Salt Lake City would need to agree to provide the flow and also 1 MG of fire suppression storage. An automatic valve would need to be installed at 2775 S 900 W that would open if pressures dropped in the South Salt Lake system due to emergency flows.

A second option for providing fire flows and fire suppression storage to Zone 2 would be to add a connection at Davis Tank that would allow water to flow from Zone 1 to Zone 2 if the pressure in Zone 2 dropped due to a fire event. In addition to adding the connection, the transmission lines connecting Davis Tank to Zone 1 would need to be upsized and a parallel line would need to be installed between Davis Tank and 900 West. State Street acts as a bottle neck for water moving from the 1300 East tank to the west side of the distribution system. For this reason, an additional connection across State Street will be needed. Additional details are provided under the “Capital Improvements” portion of this master plan. It is assumed within this master plan that the City will continue to use the JVWCD connection at 900 West to supply peak instantaneous flow rates to Zone 2. Therefore, JVWCD provides the equalization storage for Zone 2.

CHAPTER V

DISTRIBUTION SYSTEM

EXISTING DISTRIBUTION SYSTEM

The distribution system consists of all pipelines, valves, fittings, and other appurtenances used to convey water from the water sources and storage tanks to the water users. The existing water system contains over 50 miles of distribution pipe ranging in size from 2 to 24 inches in diameter. Figure V-1 presents a summary of pipe length by diameter.

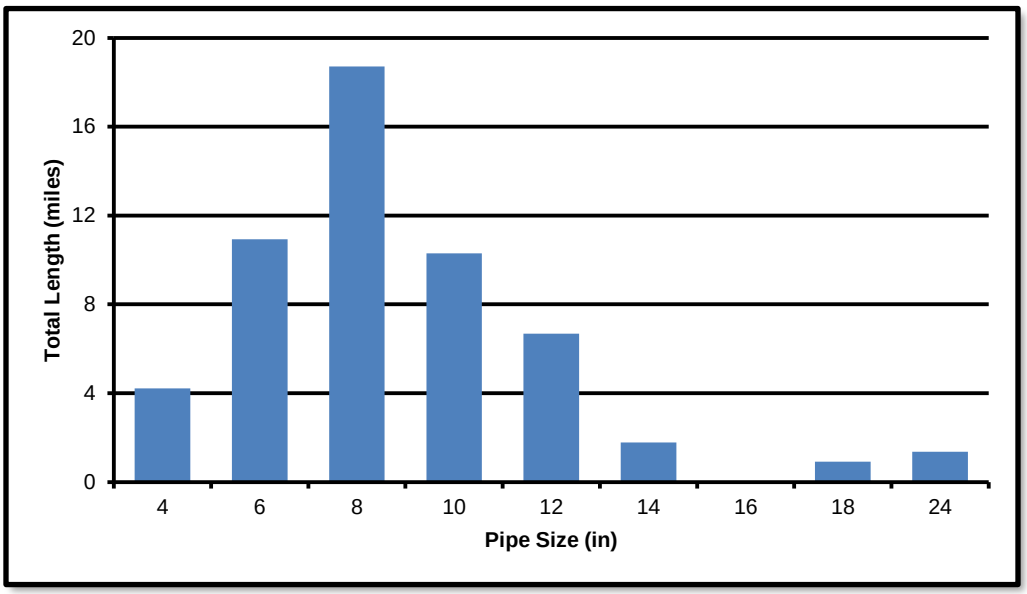


FIGURE V-1: SUMMARY OF PIPE LENGTH BY DIAMETER

Two pressure zones exist in South Salt Lake City. Zone 1 is in a physically separate system from Zone 2. The existing distribution system is shown in Figure I-1.

EXISTING DISTRIBUTION SYSTEM REQUIREMENTS

Utah Administrative Code R309-105-9(1) applies to existing systems approved prior to January 1, 2007 and requires that distribution systems be able to maintain a minimum of 20 psi at all points in the system during normal operating conditions and during conditions of fire flow and peak day demand. R309-105-9(2) adds the following minimum water pressure constraints: (a) 20 psi during conditions of fire flow and fire demand experienced during peak day demand; (b) 30 psi during peak instantaneous demand; and (c) 40 psi during peak day demand. R309 105-9(2) applies to new systems approved after January 1, 2007 and to new areas or subdivisions of existing systems. Much of South Salt Lake City is subject only to R309-105-9(1); however, new developments will need to meet the criteria outlined by R309-105-9(2). The City further prefers that the distribution system maintain pressures between **50 and 110 psi** at all points in the system under normal operating conditions, including Peak Instantaneous, Peak Day, and Average Day.

Existing Peak Instantaneous Demand

Peak instantaneous demand is the highest demand on the peak day. The pipes in the distribution system must be large enough to convey the peak instantaneous demand while maintaining a pressure at connections between 50 and 110 psi. The peaking factor from the

peak day average flow to peak instantaneous flow was estimated to be 1.6 at 3:40 a.m. based on flow data out of the tank on June 16th-18th 2010 (see Figure III-2). Applying this peaking factor of 1.6 to the peak day demand gives a total existing peak instantaneous demand of **9,246 gpm**.

Existing Peak Day Plus Fire Flow Demand

In accordance with DDW regulations, the distribution system must be capable of delivering fire flow to a specified location within the system while supplying the peak day demand to the entire distribution system and maintaining 20 psi minimum pressure at all delivery points within the distribution system. A minimum fire flow demand of **1,200 gpm** or more is required for all demand nodes in the system. Larger fire flows are required at larger structures throughout the system based on the International Fire Code and recommendations from the South Salt Lake City Fire Marshall. As noted above, Granite Park Junior High School was assessed a required flow of **6,250 gpm for 4 hours**, which was the largest requirement in Zone 1. The highest Zone 2 requirement was **4,000 gpm for 4 hours**, assessed to two industrial buildings at about 2850 S 900 W and 2828 S 900 W. All fire flows were simulated under peak day demand conditions (see Chapter III for a complete explanation of peak day demand).

BUILD-OUT DISTRIBUTION SYSTEM REQUIREMENTS

The existing system requirements apply to the projected build-out system as outlined previously. Similar to existing conditions, the build-out system was evaluated based on the City's preferences of 50 psi and 110 psi for minimum and maximum pressures.

Build-Out Peak Instantaneous Demand

Assuming the same peaking factor of 1.6 applies to the build-out peak day demand gives a peak instantaneous demand of **14,882 gpm**.

Build-Out Peak Day Demand Plus Fire Flow

The distribution network was also simulated using build-out demands in order to identify the improvements that will be necessary with future City development. The build-out system was evaluated using the same criteria as the existing system (R309-105-9(2) and City preference). The following sections outline the demand requirements for the build-out system.

COMPUTER MODEL

A computer model of the City's water distribution system was developed to analyze the performance of the existing and future distribution system and to prepare solutions for existing facilities that cannot meet the DDW or City criteria for water system pressures. The software used for the model was EPANET 2.0. EPANET 2.0 is a computer program that models the hydraulic behavior of piping networks. The pipe, tank, and valve data used to develop the model were obtained from a previous model of the South Salt Lake City water system and updated according to information supplied by the City. The previous model of the South Salt Lake City water system was a steady state model, while the model of the water system developed for this Master Plan is an extended period model. System controls were provided by the City in order to correctly model the on and off triggers for sources and valves.

Computer models were developed for three phases of water system development. The first phase was the development of a model of the existing system (existing model). This model was used to calibrate the model and identify deficiencies in the existing system. A second model was developed which was used to identify those corrections necessary to improve existing

system deficiencies (corrected existing model). The third phase was the development of a future model to indicate those improvements that will be necessary for the projected “build-out” condition (future model).

MODEL COMPONENTS

The two basic elements of the computer model are pipes and nodes. A pipe is described by its inside diameter, overall length, minor friction loss factors, and a roughness value associated with friction head losses. A pipe can include elbows, bends, valves, pumps, and other operational elements. Nodes are the end points of a pipe and they can be categorized as junction nodes or boundary nodes. A junction node is a point where two or more pipes meet, where a change in pipe diameter occurs, or where flow is put in or taken out of the system. A boundary node is a point where the hydraulic grade is known (a reservoir or PRV).

The computer model of the water distribution system is not an exact replica of the actual water system. Pipeline locations used in the model are approximate and every pipeline may not be included in the model, although efforts were made to make the model as complete and accurate as possible. It is not necessary to include all of the distribution system pipes in the model to accurately simulate its performance.

Pipe Network

As indicated previously, the pipe network layout was based upon the model prepared for South Salt Lake City's previous drinking water master plan. Updates to the model were made from maps and drawings provided by the City.

Demands

Water demands were input into the water system model by flow in gallons per minute. Existing and Future water demand was assigned to nodes in the model which best represented the location of the demand. Demand data sets were created in the model for the appropriate demand conditions for each scenario. The data sets include the average demand according to the billing data between September 2008 and September 2010, the State Standards for the existing system, and the State Standards for the build-out system. In the extended period model scenarios, the model runs for 24 hours or more and the demand changes over time according to the diurnal curve defined by Figure III-1.

Sources, Storage Tanks, and Booster Stations

The sources of water in the model are the wells and connections with the JVWCD water system. The levels in the tanks are modeled in the extended period model scenario. Several of the South Salt Lake wells feed directly into tanks with booster stations needed to pump water out into the distribution network. The extended period model predicts the levels in the tanks as they fill from sources and as water is pumped out to meet demand in the system.

MODEL CALIBRATION

A water system computer model should be calibrated before it may be relied on to accurately simulate the performance of the distribution system. Calibration is a comparison of the computer results, field tests, and actual system performance. Field tests are accomplished by performing fire flow tests and pressure tests on the system. When the computer model does not match the field tests within an acceptable level of accuracy, the computer model is adjusted to match field conditions. Calibration is especially useful for identifying pipe sizes that are not correct and PRVs or isolation valves that are not operating as expected. Pipe roughness is an

additional characteristic which may also be adjusted during calibration. Many of the pipelines within the South Salt Lake distribution network have been in use for over 50 years. However, the City maintains an ongoing pipeline replacement program. Consequently, although many of the pipelines are old, a significant number of newer pipelines are also mixed in. Sufficient data for characterizing all of the pipes based on age and condition was not provided. For this reason, no attempt was made to characterize individual pipes; rather, all of the pipes in the distribution model were assigned a roughness of 0.003 feet (0.036 inches). This is a fairly large roughness and is most applicable to the older pipes with significant corrosion.

The model was calibrated successfully with the use of fire flow tests, pressure tests, and system performance information. Calibration results are included in Appendix C. In general, the static pressures in the model averaged about 15% lower in Zone 1 and 2% higher in Zone 2 as compared to measured values. Moreover, source utilization was also considered during the hydraulic calibration. Flow patterns from the South Salt City sources that were active during July and August of 2010 were compared against modeled sources. Included in the calibration were 700 East Well, Davis Well, 300 East Well, and the JVWCD connections. The overall flow patterns in the model matched the observed values very well (flow data is included in Appendix C). It is recommended that City staff continue to conduct fire flow tests on an ongoing basis and review SCADA information to refine the model calibration as system conditions change.

ANALYSIS METHODOLOGY

The EPANET 2.0 model was used to analyze the performance of the water system for current and projected future demands under three main operating conditions: low flow (highest pressure) conditions, peak instantaneous conditions, and peak day plus fire flow conditions. Each of these conditions put the water system into a worst-case situation so the performance of the distribution system may be analyzed for compliance with DDW and South Salt Lake City's requirements. The results of the model for each of the conditions are discussed below.

High Pressure Conditions

Low flow or static conditions are usually the worst case for high pressures in a water distribution system. In the wintertime, water demand during night time hours is very low, tanks are nearly full, and movement of water through the system is minimal. Under these conditions, the water system approaches a static condition and water pressure in the distribution system is dependent only upon the elevation differences and pressure regulating devices. Another condition similar to static condition that can also cause high pressures in the City's water system occurs in the summer when demand is low and pumps are on to fill storage tanks. During times of low demand, the pumps increase the pressure in the system high enough to reverse the flow coming from the tanks. The highest pressures are reached when pumps are on, tanks are almost full, and demand is low. Both of these high pressure conditions were simulated with the model. While modeling these scenarios, observed pressures were below the City's preferred maximum pressure of 110 psi.

Peak Instantaneous Demand Conditions

Peak Instantaneous demand conditions can sometimes be the worst-case scenario for low pressures throughout a water distribution system. The water system reaches peak instantaneous demand conditions during the hottest days of the summer when both indoor and outdoor water use is the highest. The high demand creates high velocities in the distributions pipes which reduces pressure. R309-105-9(2) requires the pipes in the distribution system to be capable of delivering peak instantaneous demand to the entire service area and maintain a minimum pressure of 30 psi at any service connection within the distribution system. Usually,

minimum pressures of 30 psi at peak instantaneous demand are too low for customer satisfaction; hence, the City prefers a minimum pressure of 50 psi under this condition. Within the model of the existing system, minimum pressures were observed in the northeast portion of the system and reached as low as 58 psi. The future model, which includes build-out demands as well as recommended system improvements, had a low pressure of 47 psi. The low pressure in the future model was observed in the northeast area of the system. Due to the difficulties associated with projecting future demands, and because this modeled pressure is just less than the threshold set by South Salt Lake for minimum pressures, no projects to address this deficiency have been suggested at this time. Instead, it is recommended that the possibility of low pressures in that area should be reevaluated in future master plans.

Peak Day Demand Plus Fire Flow Conditions

Even though peak instantaneous conditions are the worst-case for the lowest pressure and highest demand for the entire system, the peak day plus fire flow is often the worst-case scenario for the lowest pressures for specific locations in the system. This condition occurs when fire hydrants are being used on a day of high water demand. The distribution system must be capable of delivering the required fire flow to the specified location within the system, while supplying the peak day demand to the entire distribution system. In accordance with the recommendations from the South Salt Lake City Fire Marshal, the required fire flows must be delivered while maintaining 20 psi minimum residual pressure at the delivery point and to all service connections within the distribution system.

Identifying every pipe which is not capable of supplying the required fire flow is beyond the scope of this study. While the computer analysis is useful for providing general indications of the fire flow capacity, it does not calculate the capacity at every fire hydrant, nor does it identify every water line where fire flow capacity is inadequate. The computer analysis checks fire flow capacity at model junction nodes which are generally placed at the intersections of two or more pipes. Fire flow capacity at fire hydrants between model nodes could be less than the computer analysis indicates. For this reason, the computer analysis should not replace physical fire flow tests at fire hydrants as the primary method of determining fire flow capacity.

The following fire flow deficiencies were identified in the in computer model:

1. Insufficient fire flow delivered to an office building at 180 E 2100 S.
2. Insufficient fire flow delivered to residential area along 400 E near 2100 S.
3. Fire hydrant at about 200 East Burton Avenue does not provide sufficient fire flow.
4. Insufficient fire flow delivered to industrial area at about 230 W 2700 S.
5. Insufficient fire flow delivered to South Salt Lake Police Athletic/Activities League .building at 2825 S 200 E and to Granite Park Junior High at 3031 S 200 E.
6. Dead-end 4-inch pipeline in Angelo Avenue between West Temple and 200 W provides insufficient fire flows.
7. Inadequate fire flow delivered to a residential area along 300 E near 2100 S.
8. Insufficient fire flow capacity to fire hydrant on Richards Street.
9. Inadequate fire flow delivered along Walton Avenue.
10. Insufficient fire flow delivered to an industrial building at about 2115 S 400 W.
11. Insufficient fire flow in Zone 2.

Specific recommendation to address these deficiencies are included below under the heading “Distribution System Recommendations”.

Peak Day Extended Period

The peak day extended period model was used to model the water system performance over time. An extended period model is actually a static model run several times for each time period, like a movie is made up of individual pictures put together. The peak day extended period model was used to set system conditions for the static models, calibrate zone to zone water transfers, analyze system controls and the performance of the system over time, analyze system recommendations for performance over time, and analyze the water system for optimization recommendations. The peak day extended period model was run for several days with the peak day demand curve repeating every 24 hours such that the model operated in a stable pattern. The model has reached stabilization when the filling and emptying cycles of the tanks repeat in a consistent pattern without running empty. System recommendations for existing conditions and future conditions at build-out were checked with the extended period model to confirm adequacy.

The primary deficiency identified during the extended period modeling was relatively high flow velocities in the pipes connecting the Davis Pump Station to Zone 1. The high velocities lead to high head loss within the pipes. This deficiency is addressed below by projects outlined within the "Distribution System Recommendations" section. The deficiency is not addressed individually, but instead is corrected by the projects included for providing fire flow to Zone 2.

MODEL OUTPUT

The model output primarily consists of the computed pressures at nodes and flow rates through pipes. The model also provides additional data related to pipeline flow velocity and head loss to help evaluate the performance of the various components of the distribution system. Results from the model are available on a CD in Appendix D. Due to the large number of pipes and nodes in the model, it is impractical to prepare a figure which illustrates pipe numbers and node numbers. The reader should refer to the CD to review model output.

CONTINUED USE OF THE COMPUTER PROGRAM

It is recommended that the City continue updating the model as the water system changes. Below is a list of ways in which the model could help the City with water system management. The computer model can assist City staff in determining:

- Effect on the system if individual facilities are added or taken out of service
- Selection of pipe diameters and location of proposed water mains
- Capacity of the water system to provide fire flows in specific areas
- Water age for water quality monitoring
- Residual chlorine and fluoride levels in the system

The computer model should be maintained for future use. Necessary data required for continued use of the program are:

- The location , length, diameter, pipe material, and ground elevation at each end of each new pipeline constructed
- Changes in water supply location and characteristics
- Location and demand for new large customers
- Changes in chlorine and fluoride dosing rates and procedures

DISTRIBUTION SYSTEM RECOMMENDATIONS

Distribution system recommendations provide solutions for existing deficiencies and define improvements to provide capacity for projected future growth. Projects have been divided into two groups. Group one includes general project recommendations. Group two includes all projects specifically developed for providing fire flow to Zone 2. The general project recommendations are included in Table V-1. The Zone 2 project recommendations are included in Table V-2. Conceptual level costs for the proposed projects are presented in Chapter VI.

TABLE V-1
PROPOSED GENERAL IMPROVEMENT PROJECTS

LOCATION	ELEMENT ID	PROBLEM DESCRIPTION	PREFERRED SOLUTION
180 East 2100 South	J-264	Insufficient fire flow	Add a fire hydrant just to the south near the corner of Commonwealth Ave. and 200 East
400 East from Utopia Ave. to 2100 South	J-49	Insufficient fire flow	Replace existing pipe with an 8” pipeline in 400 East from Utopia Ave. to 2100 South
Burton Ave. from 200 East to 300 East	P-71	Insufficient fire flows	Replace existing pipe with an 8” pipeline in Burton Ave. from 200 East to 300 East
2700 South 230 West	P-125	Insufficient fire flows and aging pipe behind industrial buildings	Replace existing pipe with a 10” pipeline in the alley at approximately 230 West from 2700 South to approximately 2620 South
200 East from Gregson Ave. to Sunset Ave.	P-500, P-499, P-480, P-479, P-596, P-597, P-557, P-374, P-591, P-546, P-547, P-545	Insufficient fire flows	Replace existing pipe with a 10” pipeline in 200 East from Gregson Ave to Sunset Ave.
150 W Angelo Ave.	P-414	Insufficient fire flows	Replace existing pipe with an 8” pipeline in Angelo Ave from West Temple to approximately 200 West
300 East from 2100 South to Commonwealth Ave.	P-252	Insufficient fire flows	Replace existing pipe with an 8” pipeline in 300 East between 2100 South and Commonwealth Ave.
Andy Ave. from 600 West	P-395, P-42, P-43, P-45	High velocity and head loss, insufficient fire flows at industrial building at 2115 S 400 W	Install a parallel 12” pipeline in Andy Ave. from 600 West to 300 West alongside the existing 10” pipeline. In addition, requires improvements to Bolinder Well, Tank, and Pump Station.
Richards Street from 3222 South to 3200 South connecting over to West Temple	P-399	Insufficient fire flows	Replace existing pipe with an 8” pipeline in Richards St. and connecting over to West Temple
Walton Ave from West Temple to 300 West	P-186	Insufficient fire flows	Replace existing pipe with a 10” pipeline in Walton Ave.

TABLE V-2
PROPOSED ZONE 2 FIRE FLOW IMPROVEMENT PROJECTS

LOCATION	ELEMENT ID	PROBLEM DESCRIPTION	PREFERRED SOLUTION
Through parking lot at about 2920 South from 300 West to 400 West, In 400 West from 2920 South to 2970 South, Under I-15 from 400 West to the existing Davis Booster Station	P-164, P-162, P-433	Insufficient conveyance from Zone 1 to Davis Booster Station	Replace existing pipelines with a 16-inch pipeline
South from Davis Pump Station in 465 West to about 3180 South, southwest across train tracks following existing 12-inch line to Central Valley Road, in Central Valley Road from 650 West to about 850 West, in 850 West from Central Valley Road to 3100 South, in 3100 South from 850 West to 900 West	P-444, P-5, P-449	Insufficient conveyance from Davis Booster Station to Zone 2	Install parallel 16-inch pipeline alongside existing 12-inch pipeline
North from 3100 South along 900 West to 2780 South	P-434	Insufficient conveyance along 900 W	Install parallel 18-inch pipeline in addition to existing 14-inch pipeline
Intersection of State Street and Truman Ave.	N/A	High velocities in pipelines along State Street	New connection across State Street
In 3160 South from 900 West to 1030 West, and in 1030 West from 3160 South to 3120 South	27	Inadequate fire flow to industrial buildings at 3120 S 1030 W	Install a parallel 10-inch pipeline in 3160 S and 1030 W

CHAPTER VI

WATER QUALITY

One advantage of the EPANET extended period model is the ability to model water quality. Water age, disinfection byproduct potential, chlorine residual, and fluoride concentration were modeled to analyze the existing water system for water quality issues.

WATER AGE AND DISINFECTION BYPRODUCT EVALUATION

The extended period model was used to predict the areas in the water system that have the highest potential for disinfection by-product (DPB) production. The month that typically has the highest DBP levels in Utah is October and DBP testing has confirmed this to be true for the City's water system. This is because the water is still relatively warm and water use is less than during the summer. The potential for DBP production is higher in warmer and older water. Water demand for October 2008 was used to simulate water demand conditions in the model. Water age was then calculated for every location in the system by running the model to simulate several days in October. The locations having poor circulation and thus the oldest water were identified as having the highest potential for DBP production. Figure VI-1 on the following page illustrates a snapshot of the results of the water age model scenario run for 96 hours. The water age at a given location varies depending on the operating condition of the distribution network. For example, as a pump turns on, new water is pushed out into the system. This is illustrated by the light and dark blue in the areas around 700 East Well and Davis well. On the other hand, the water coming from the 1300 East Tank is considerably older. Dead end lines with low demands also tend to have older water. Based on the model results, DBP testing should focus on the northeast area of the system. This area is fed predominantly by the 1300 East Tank with minor contributions from other sources.

CHLORINE RESIDUAL EVALUATION

Chlorine residual is the amount of free chlorine remaining in the water at the time of the test. While chlorine is an effective disinfectant in controlling many microorganisms in drinking water, it reacts with organic material found in drinking water to form potentially harmful disinfection byproducts (DBPs) as it decays. Although the risk of becoming ill from microbial pathogens is tens of thousands of times greater than the risk of becoming ill from DBPs, it is enough of a concern that the Environment Protection Agency (EPA) has developed rules to balance the risks between microbial pathogens and DBPs. A drinking water system needs enough chlorine to destroy pathogens but also not produce excessive DBPs. Chlorine dosing rates were set at the sources of water in the system. The chlorine dosing concentrations assumed for each source are shown in Table VI-1.

Chlorine residuals are influenced by how much organic material is in the water. Therefore, modeling chlorine residuals requires calibration using system specific data. Chlorine decay was modeled as a first order reaction with a bulk coefficient of -1.0 per day. This bulk rate coefficient was selected based on comparisons with the field data using a sampling of 19 chlorine residual field test sites from the spring of 2008 (refer to Appendix E for tabular water quality data).

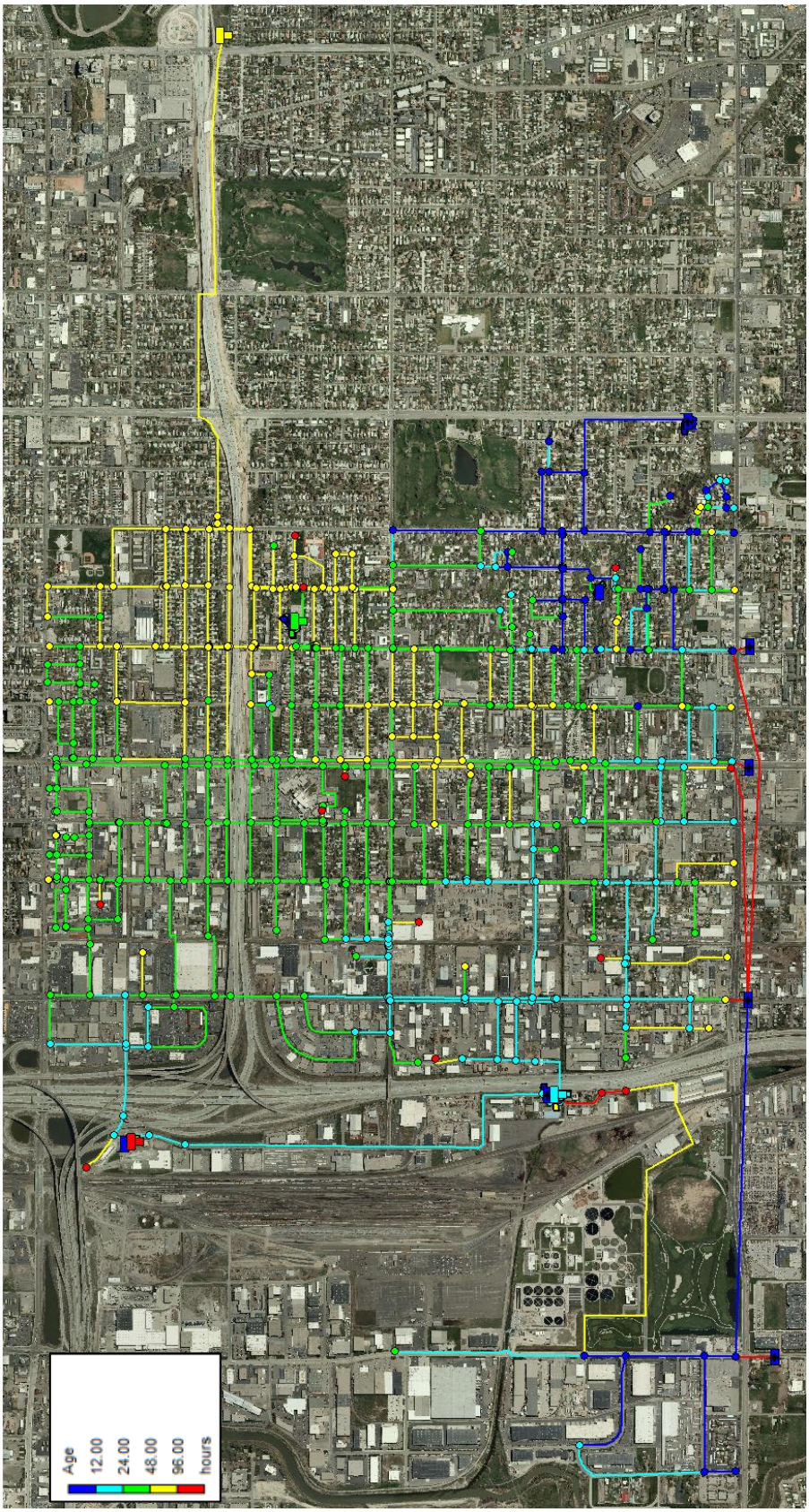


FIGURE VI-1: WATER AGE MODELING RESULTS

TABLE VI-1
DOSING CONCENTRATIONS ASSUMED AT SOURCES

SOURCE	CHLORINE CONCENTRATION (mg/L)
Davis Well	0.27
300 E Well	0.18
700 E Well	0.18
900 W JVWCD	0.14
300 W JVWCD	0.20
State St JVWCD	0.13
300 E JVWCD	0.13

The model was run sufficiently long for the chlorine residual to stabilize into a recurring daily pattern. Three days of model run time was generally adequate to reach this state of pseudo-equilibrium, depending on the water demand. Total chlorine residual test results from South Salt Lake and Central Valley Laboratory were used to calibrate the model with a demand set from October. The month of October was selected because low flows commonly occur during that month. As a result of the low flows, residence times in drinking water storage tanks are high, leading to low residual concentrations. Model results are shown in Figure VI-2 and generally follow the same pattern as water age. Higher concentrations of chlorine residual were found in areas around wells while lower concentrations were found in areas fed primarily by storage tanks where the water is stored for long periods of time, or in areas with low demand where the amount of time for the water to travel from source to demand is excessive. Figure VI-3 presents a comparison between field test and modeled chlorine residuals.

Some of the same areas that indicated the oldest water from the DBP model also have the lowest chlorine residuals. This suggests that improving the circulation of water will increase chlorine residuals and reduce DBPs. Several methods exist for increasing circulation within a distribution system. Often, two of the most practical are: strategic operation of drinking water sources and maximizing the use of equalization storage in the storage tanks. Both options require minimal capital investment while offering the potential to reduce chlorine and DBP issues. The drinking water model is a valuable tool in identifying source production patterns which promote circulation. New transmission lines are an additional option which can increase circulation if properly planned. If improvement to circulation is not able to resolve water quality issues, an additional possibility would be to install mechanical mixing or chlorine dosing at the larger storage tanks.

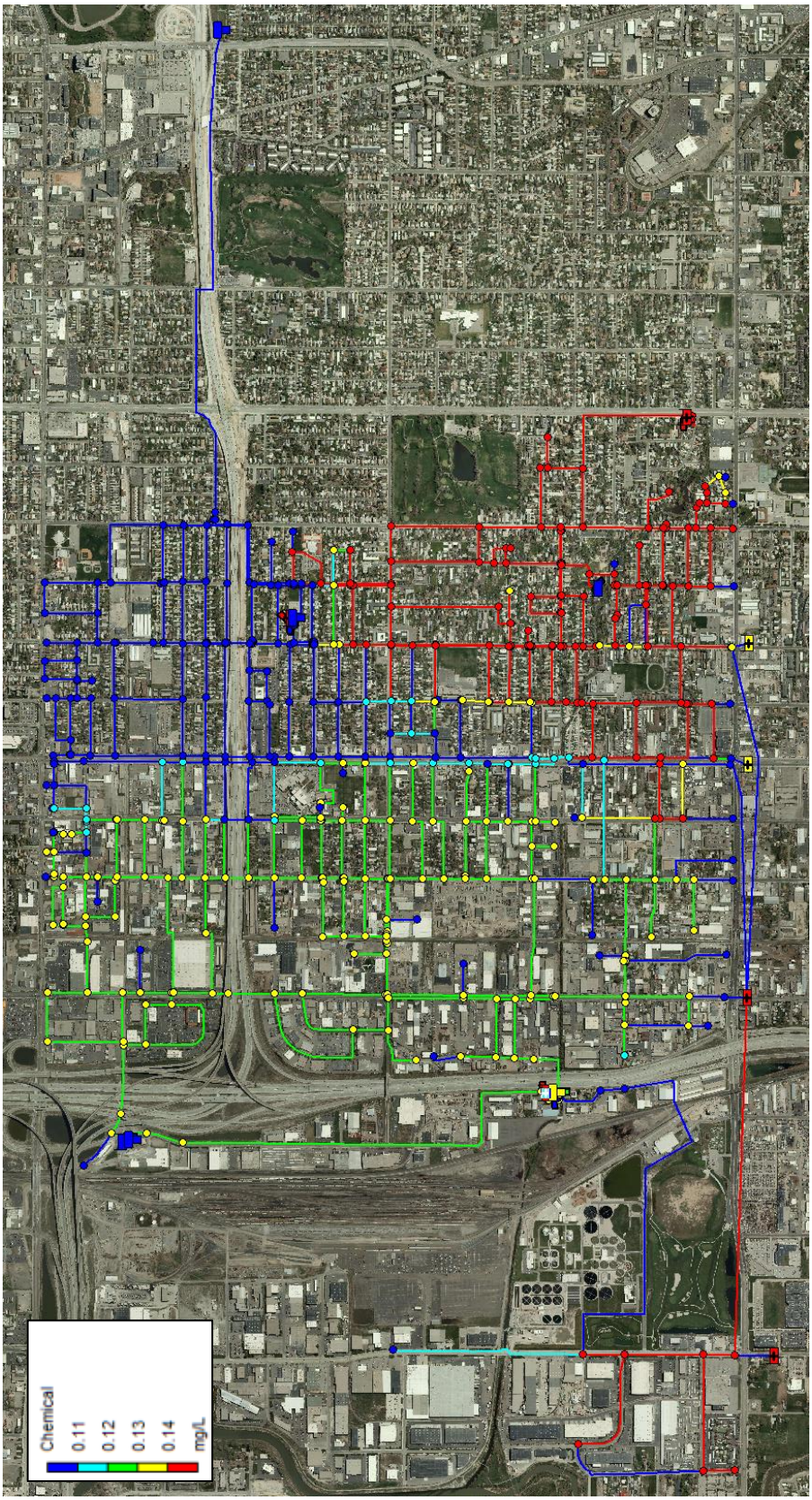


FIGURE VI-2: CHLORINE RESIDUAL MODELING RESULTS

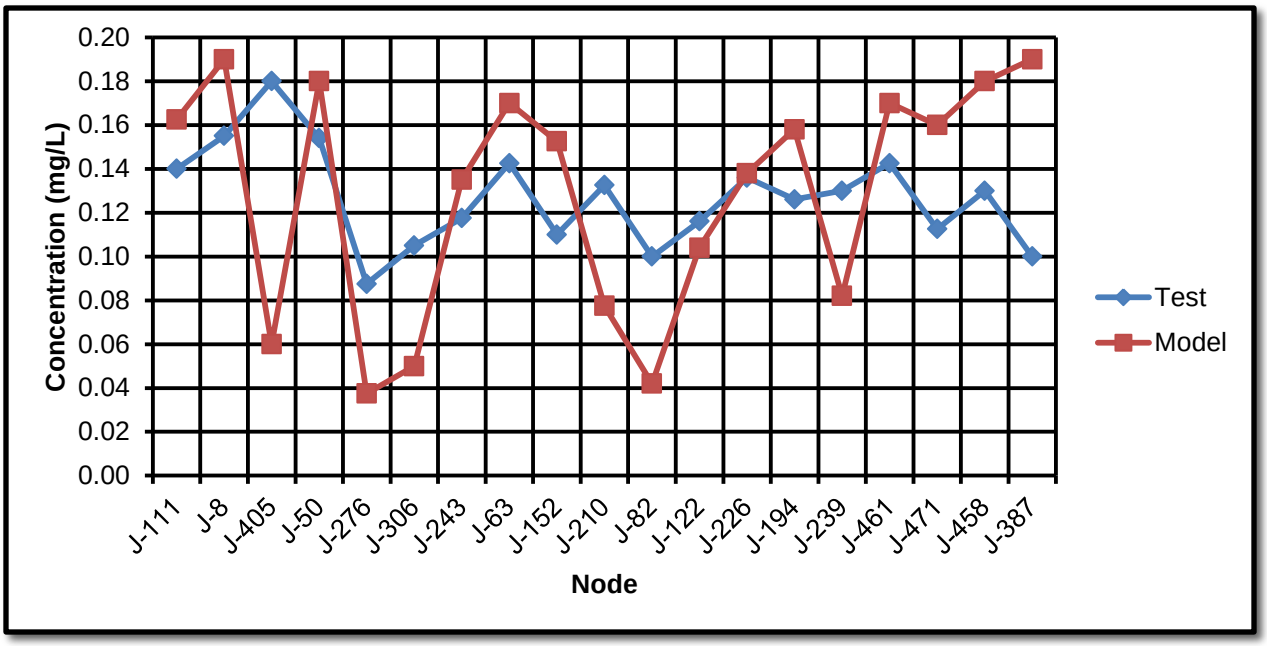


FIGURE VI-3: FIELD TEST VS. MODELED CHLORINE

SUMMARY OF WATER QUALITY RECOMMENDATIONS

Based on the field test results and the water quality model, circulation appears to generally be adequate within the South Salt Lake system. More specifically, areas in close proximity to wells generally had very good circulation. Conversely, the northeast area of the system appears to be the most susceptible to water quality issues. Demands are fairly low in this area and water is provided almost exclusively by the 1300 East Tank. Due to the size of the 1300 East Tank it is particularly important that the equalization storage in the tank be utilized in order to promote mixing in the tank. The following general recommendations are offered:

1. Continue to monitor water quality test results. If problem areas are identified, use the water quality model to determine source production patterns which promote water circulation.
2. Maximize the use of equalization storage in the storage tanks.

Many water quality problems can be effectively dealt with at a low cost by applying the above recommendations. Additional options for managing water quality include installing new pipelines to complete loops on dead end pipelines and applying mixing technologies to storage tanks.

CHAPTER VII

CAPITAL IMPROVEMENTS PLAN

Throughout the master planning process, the three main components of the City's water system (source, storage, and distribution) were analyzed to determine the system's ability to meet existing demands and also the anticipated future demands at build-out. Each of the system deficiencies identified in the master planning process and described previously in this report were presented in an alternatives workshop with City staff. Possible solutions were discussed for each of the identified system deficiencies as well as possible solutions for maintenance and other system needs not identified in the system analysis. After the workshop, HAL studied the feasibility of the solution alternatives and developed conceptual costs.

One important method of paying for system improvements is through impact fees. Impact fees are collected from new development and should only be used to pay for system improvements related to new development. For this reason it is important to identify which projects are related to resolving existing deficiencies, and which projects are related to providing anticipated future capacity for new development.

PRECISION OF COST ESTIMATES

When considering cost estimates, there are several levels or degrees of precision, depending on the purpose of the estimate and the percentage of detailed design that has been completed. The following levels of precision are typical:

Type of Estimate	Precision
Master Planning	±50%
Preliminary Design	±30%
Final Design or Bid	±10%

For example, at the master planning level (or conceptual or feasibility design level), if a project is estimated to cost $1,000,000, then the precision or reliability of the cost estimate would typically be expected to range between approximately $500,000 and $1,500,000. While this may seem very imprecise, the purpose of master planning is to develop general sizing, location, cost, and scheduling information on a number of individual projects that may be designed and constructed over a period of many years. Master planning also typically includes the selection of common design criteria to help ensure uniformity and compatibility among future individual projects. Details such as the exact capacity of individual projects, the level of redundancy, the location of facilities, the alignment and depth of pipelines, the extent of utility conflicts, the cost of land and easements, the construction methodology, the types of equipment and material to be used, the time of construction, interest and inflation rates, permitting requirements, etc., are typically developed during the more detailed levels of design.

At the preliminary or 30% design level, some of the aforementioned information will have been developed. Major design decisions such as the size of facilities, selection of facility sites, pipeline alignments and depths, and the selection of the types of equipment and material to be used during construction will typically have been made. At this level of design the precision of the cost estimate for a $1,000,000 project would typically be expected to range between approximately $700,000 and $1,300,000.

After the project has been completely designed, and is ready to bid, all design plans and technical specifications will have been completed and nearly all of the significant details about the project should be known. At this level of design, the precision of the cost estimate for the

same $1,000,000 project would typically be expected to range between approximately $900,000 and $1,100,000.

SYSTEM IMPROVEMENT PROJECTS

As discussed in previous chapters, several source, storage and distribution system deficiencies were identified during the system analysis. Project costs for water system improvements are presented in Table VII-1 with the location of each project shown in Figure VII-1. Each recommendation includes a conceptual cost estimate for construction.

Unit costs for the construction cost estimates are based on conceptual level engineering. Sources used to estimate construction costs include:

1. “Means Heavy Construction Cost Data, 2013"
2. Price quotes from equipment suppliers
3. Recent construction bids for similar work

All costs are presented in 2013 dollars. Recent price and economic trends indicate that future costs are difficult to predict with certainty. Engineering cost estimates provided in this study should be regarded as conceptual level for use as a planning guide. Only during final design can a definitive and more accurate estimate be provided for each project. A cost estimate calculation for each project is provided in Appendix F and Table VII-1 provides a cost summary for the recommended system improvements.

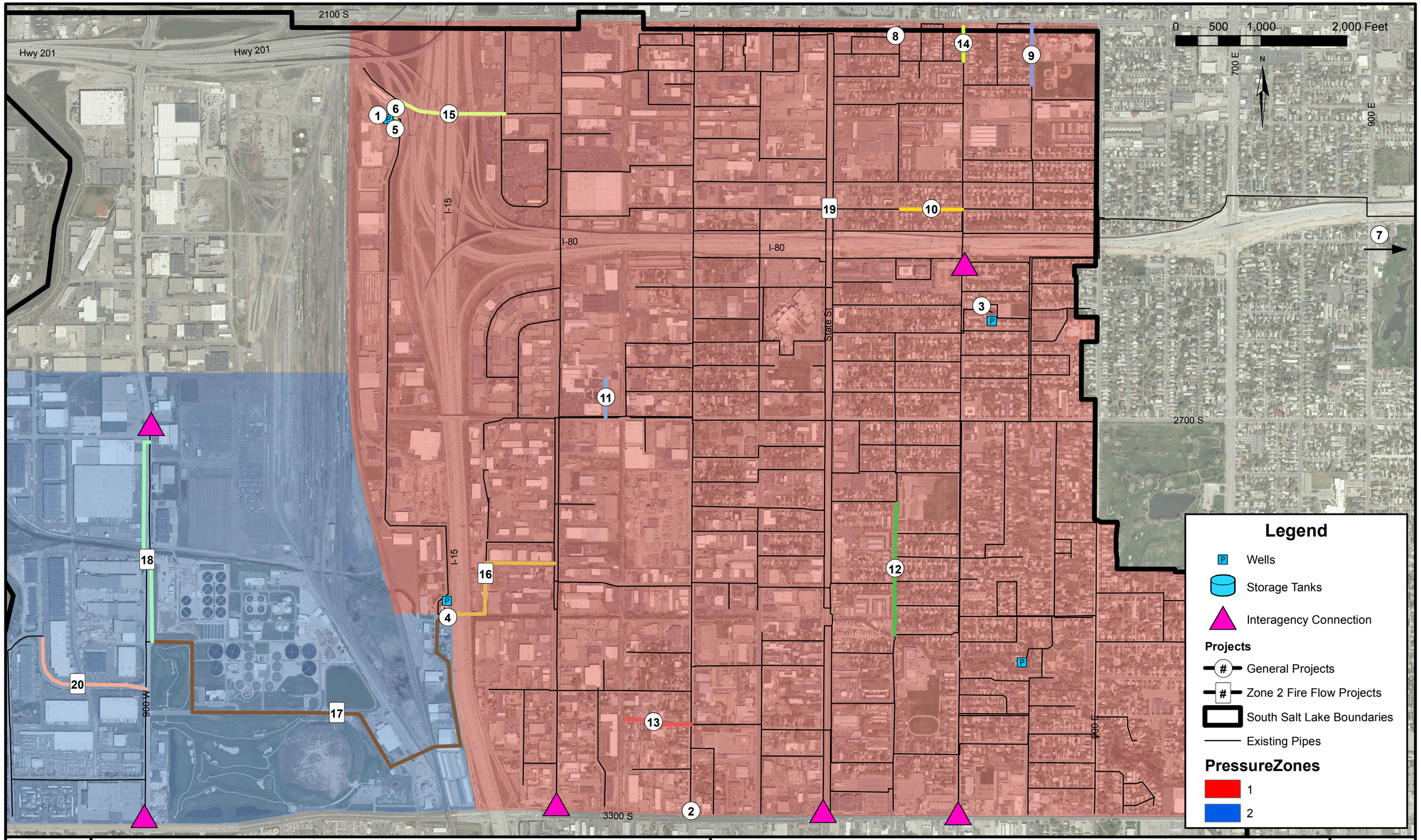
TABLE VII-1
PROJECT COSTS FOR SYSTEM IMPROVEMENTS

TYPE[1]	MAP ID	RECOMMENDED PROJECT[2]	COST
Existing	1	Construct a replacement for Bolinder Well	$945,000
Future	NA	Construct a new Zone 1 well	$945,000
Future	2	Install a new JVWCD connection at 3300 South West Temple	$41,000
Existing	3	Construct a new booster pump station with a rated capacity of 1,160 gpm at the 300 East Tank	$540,000
Existing	4	Construct a new booster pump station at Davis Tank, with a capacity of 4,640 gpm	$1,080,000
Existing	5	Expand the existing Bolinder Tank by 0.5 MG by either building a new 0.5 MG Tank, or by replacing the existing 1.0 MG tank with a 1.5 MG tank (cost estimate for new 0.5 MG tank)	$540,000
Existing	6	Construct a new booster pump station at Bolinder Tank, with a rated capacity of 3,200 gpm	$844,000
Future	7	Construct a new 1.0 MG Zone 1 storage facility by the existing 1300 East Tanks	$1,080,000
Existing	8	Install fire hydrant at 200 East and approximately 2115 South	$7,000
Existing	9	Replace existing pipe with 725 feet of 8” pipeline in 400 East from Utopia Ave. to 2100 South	$90,000

TYPE[1]	MAP ID	RECOMMENDED PROJECT[2]	COST
Existing	10	Replace existing pipe with 725 feet of 8” pipeline in Burton Ave. from 250 East to 300 East	$90,000
Existing	11	Replace existing pipe with 450 feet of 10” pipeline in the alley at approximately 230 West from 2700 South to approximately 2620 South	$63,000
Existing	12	Replace existing pipe with 1,550 feet of 10” pipeline in 200 East from Gregson Ave. to Sunset Ave.	$216,000
Existing	13	Replace existing pipe with 785 feet 8” pipeline in Angelo Ave. from West Temple to approximately 200 West	$97,000
Existing	14	Replace existing pipe with 410 feet of 8” pipeline in 300 East from 2100 South to Commonwealth Ave.	$51,000
Existing	15	Install 1,465 feet of 12” pipeline in Andy Ave. between 600 West and 300 West parallel to the existing 10” pipeline. This project addresses a fire Flow deficiency at 2115 W 400 S. In order to fully address the deficiency, projects 1, 5, and 6 must also be completed.	$229,000
Existing	16	Install 1,900 feet of new 16“ pipeline parallel to existing pipeline, through parking lot at about 2920 S from 300 W to 400 W, in 400 W from 2920 S to 2970 S, Under I-15 from 400 West to the existing Davis Booster Station	$333,000
Existing	17	Install 6,500 feet of new parallel 16” pipeline south from Davis Pump Station in 465 W until about 3180 S, southwest across train tracks following the existing 12-inch line to Central Valley Road, in Central Valley Road from 650 W to about 850 W, in 850 W from Central Valley Road to 3100 S, and in 3100 S from 850 W to 900 W	$1,365,000
Existing	18	Install 2,480 feet of 18” pipeline along 900 W from 3100 S to 2780 S	$525,000
Existing	19	Connection across State Street at intersection of State Street and Truman Ave	$68,000
Existing	20	Install 1,740 feet of 10” pipeline parallel to the existing pipeline in 3160 S from 900 W to 1030 W, and in 1030 W from 3160 S to 3120 S	$242,000
Total			**$9,391,000**

1. Projects categorized as “Existing” are needed to address existing system deficiencies. “Future” projects address deficiencies which are projected to occur in the future based on growth and demand projections.
2. See descriptions in the source, storage and distribution system recommendation summaries presented in previous chapters.

All existing system improvement projects are recommended to be completed in 0 to 5 years. The total estimated cost of projects which address existing deficiencies is $7,325,000. Projects which address future deficiencies sum to $2,066,000.



HANSEN ALLEN & LUCE inc ENGINEERS

SOUTH SALT LAKE CITY
DRINKING WATER SYSTEM MASTER PLAN

PROJECT LOCATIONS

FIGURE VII-1

FUNDING OPTIONS

Funding options for the recommended projects, in addition to water use fees, could include the following options: general obligation bonds, revenue bonds, State/Federal grants and loans, and impact fees. In reality, the City may need to consider a combination of these funding options. The following discussion describes each of these options.

General Obligation Bonds

This form of debt enables the City to issue general obligation bonds for capital improvements and replacement. General Obligation (G.O.) Bonds would be used for items not typically financed through the Water Revenue Bonds (for example, the purchase of water source to ensure a sufficient water supply for the City in the future). G.O. bonds are debt instruments backed by the full faith and credit of the City which would be secured by an unconditional pledge of the City to levy assessments, charges or ad valorem taxes necessary to retire the bonds. G.O. bonds are the lowest-cost form of debt financing available to local governments and can be combined with other revenue sources such as specific fees, or special assessment charges to form a dual security through the City's revenue generating authority. These bonds are supported by the City as a whole, so the amount of debt issued for the water system is limited to a fixed percentage of the real market value for taxable property within the City.

Revenue Bonds

This form of debt financing is also available to the City for utility related capital improvements. Unlike G.O. bonds, revenue bonds are not backed by the City as a whole, but constitute a lien against the water service charge revenues of a Water Utility. Revenue bonds present a greater risk to the investor than do G.O. bonds, since repayment of debt depends on an adequate revenue stream, legally defensible rate structure and sound fiscal management by the issuing jurisdiction. Due to this increased risk, revenue bonds generally require a higher interest rate than G.O. bonds, although currently interest rates are at historic lows. This type of debt also has very specific coverage requirements in the form of a reserve fund specifying an amount, usually expressed in terms of average or maximum debt service due in any future year. This debt service is required to be held as a cash reserve for annual debt service payment to the benefit of bondholders. Typically, voter approval is not required when issuing revenue bonds.

State/Federal Grants and Loans

Historically, both local and county governments have experienced significant infrastructure funding support from state and federal government agencies in the form of block grants, direct grants in aid, interagency loans, and general revenue sharing. Federal expenditure pressures and virtual elimination of federal revenue sharing dollars are clear indicators that local government may be left to its own devices regarding infrastructure finance in general. However, state/federal grants and loans should be further investigated as a possible funding source for needed water system improvements.

It is also important to assess likely trends regarding federal / state assistance in infrastructure financing. Future trends indicate that grants will be replaced by loans through a public works revolving fund. Local governments can expect to access these revolving funds or public works trust funds by demonstrating both the need for and the ability to repay the borrowed monies, with interest. As with the revenue bonds discussed earlier, the ability of infrastructure programs to wisely manage their own finances will be a key element in evaluating whether many secondary funding sources, such as federal/state loans, will be available to the City.

Impact Fees

Impact fees can be applied to water related facilities under the Utah Impact Fees Act. The Utah Impacts Fees Act is designed to provide a logical and clear framework for establishing new development assessments. It is also designed to establish the basis for the fee calculation which the City must follow in order to comply with the statute. However, the fundamental objective for the fee structure is the imposition on new development of only those costs associated with providing or expanding water infrastructure to meet the capacity needs created by that specific new development. Also, impact fees cannot be applied retroactively.

SUMMARY OF RECOMMENDATIONS

Several recommendations were made throughout the master plan report. A summary of the recommendations is presented below, with the projects organized by whether they apply to existing or future deficiencies.

Existing recommendations which should be completed within the next five years:

- Construct a replacement for Bolinder Well and return the Bolinder Tank and Pump Station to service. It is expected that the storage should be expanded by 0.5 MG and that the capacity of the booster pumps should be increased to 3,200 gpm.

- Replace the existing booster pump station at the 300 East Tank with a new pump station with a rated capacity of 1,200 gpm.

- Construct a new pump station at Davis Tank with a rated capacity of 4,640 gpm.

- All of the Zone 1 fire flow projects should be completed.

- Projects necessary for providing fire flow volume to Zone 2 should also be completed. Two separate options have been suggested above. The first option presented was to obtain the fire flow from Salt Lake City and the second option included capital improvements to allow water from 1300 East Tank to be used in Zone 2.

- The City should update the model as the water system changes.

- Continue to monitor water quality test results, particularly in the northeast area of the City. If problem areas are identified, use the water quality model to determine source production patterns which promote water circulation.

- Maximize the use of equalization storage in the tanks, especially 1300 East Tank.

Future recommendations which should be monitored and addressed as needed:

- Construct a new well in Zone 1 to address projected future source deficiencies.

- Install a new JVWCD connection to the existing 10” South Salt Lake pipeline at 3300 S West Temple.

- Construct a new 1 MG Zone 1 storage tank alongside the existing 1300 East Tank.

REFERENCES

Environmental Protection Agency (EPA). 2006. *Fluoride: Dose-Response Analysis For Non-cancer Effects*. EPA 820-R-10-019. U.S. Environmental Protection Agency, Health and Ecological Criteria Division, Office of Water. Washington, D.C.

Governor's Office of Planning & Budget, 2013.

International Fire Code Institute, Uniform Fire Code, 1997.

State of Utah, Utah Administrative Code.

APPENDIX A
ERC Calculations

HANSEN ALLEN & LUCE inc
ENGINEERS

CLIENT City of South Salt Lake
PROJECT Drinking Water Master Plan
FEATURE ERC calculation
PROJECT NO 126.27.200

SHEET 1 OF 1
COMPUTED RTC
CHECKED
DATE 11-01-2010

Given Annual Production data

Find The total number of ERCs, and ERC breakdown for South Salt Lake City

Solution

Annual use info for 2009 gives the following totals

Connections
Domestic: 2605
Commercial: 698
(water data indicates the total 2010 connections is 3,426)

Annual Use
Domestic: 1131.63 Acre-feet
Commercial: 1232.32 Acre-feet

Define ERC (R309-510) ⇒ South Salt Lake is in Zone 4 of the Consumptive use map which give 3.96 gpm/acre. Reviewed 10 residential properties, the average irrigated acreage/property was ~0.09 acres

$$\frac{800\ \text{gal}}{\text{d}\cdot\text{Conn}} \cdot \frac{\text{d}}{1440\ \text{min}} + \frac{3.96\ \text{gal}}{\text{min}\cdot\text{acre}} \cdot \frac{0.09\ \text{Acres}}{\text{conn}} = 0.91\ \text{gpm/ERC}$$

Convert Commercial/Industrial connections to ERCs

$$\frac{1232.32\ \text{Acre-ft}/698\ \text{Com/Ind}}{1131.63\ \text{Acre-ft}/2605\ \text{ERCs}} = 4.06\ \frac{\text{ERCs}}{\text{com/Ind Conn}}$$

Calculate ERCs for Open Space

South Salt Lake GIS Gives 206 acres of Public Open Space (from SSL Planning Map)

$$206\ \text{Acres} \cdot \frac{3.96\ \text{gpm}}{\text{Acre}} = 816\ \text{gpm}$$

Calculate total ERCs

$$2605\ \text{ERCs} + 4.06\ \frac{\text{ERCs}}{\text{Com/Ind Conn}}(698\ \text{Conn.}) + 816\ \text{gpm}/0.91\ \text{gpm/ERC}$$

$$= 2605\ \text{ERCs} + 2{,}837\ \text{ERCs} + 895\ \text{ERCs} = 6337\ \text{ERCs}$$

SYSTEM COMPONENTS	EXISTING	FUTURE	
Population	22,274	44,560	ppl
Population Growth	22,286		ppl
% Population Growth	100.05%		Percent
# Connections	3,303	6,608	Conn.
Growth of ERCs	**6,340**		**ERC**
System ERCs	6,337	**12,677**	ERC
ERCs in Zone 1	5,542	11,882	ERC
ERCs in Zone 2	795	795	ERC
ERCs/Connections	1.92		ERC/Conn
Irr. Crop Consumptive Use Zone	4		Zone
Irr. Acres per ERC	0.09		Irr. Ac/ERC
Estimated Irr. Acres	570	570	ac

Population growth is based on estimates made in 2008 from the Governor's Office of Planning and Budget

Input	
Output	

PEAK DAY DEMAND	EXISTING	FUTURE	
Outdoor Peak Day State Standard	3.96		gpm/irr ac
	2,259	2,259	gpm
Indr. Peak Day SS	800		gpd/ERC
Indoor Peak Day State Standard	0.556		gpm/ERC
	3,521	7,043	gpm
Total Peak Day SS	**5,779**	**9,301**	gpm

PEAK INSTANTANEOUS DEMAND	EXISTING	FUTURE	
Peak Instant. (1.6x Peak Day)	9,246	14,882	gpm
Minimum Fire Flow @ 20 psi	1,200	1,200	gpm
Max Pressure Standard	110	110	psi
Min Pressure Standard	50	50	psi

AVERAGE YEARLY DEMAND	EXISTING	FUTURE	
Outdoor Average Yearly Demand	3.0		ac-ft/irr ac
State Standard	1,711	1,711	ac-ft
Indr. Average Yearly Demand SS	146,000		gal/ERC
Indoor Average Yearly Demand	925	1,851	MG/yr
State Standard	2,839	5,680	ac-ft/yr
Total Average Yearly Demand State	**4,550**	**7,391**	ac-ft/yr
Standard	2,821	4,582	gpm

State Standards require 1.87 ac-ft/irr ac. A conveyance efficiency of 90% and irrigation efficiency of 70% were used to calculate 3.0 ac-ft/irr ac

STORAGE	EXISTING	FUTURE	
Indoor Equalization SS	400		gal/ERC
Indoor Equalization SS	2.53	5.07	MG
Outdoor Equalization State	2,848		gal/irr ac
Standard	1.62	1.62	MG
Total Equalization SS	4.16	6.70	MG
Fire Suppression	2.5	2.5	MG
Emergency (20% of FF & EQ)	1.33	1.84	MG
Total	**7.99**	**11.04**	**MG**

FIRE FLOW	EXISTING	FUTURE	
Min Fire Flow	1,200	1,200	gpm
Granite Park Jr High Fire Flow	6,250	6,250	gpm
Fire Flow Duration	4	4	hr
Min Fire Volume	0.288	0.288	MG
Hospital Fire Volume	1.5	1.5	MG

FLOWS AND VOLUMES	Peak Day	Ave Yr	
	gpm	gpm	ac-ft
Existing Zone 1	5,054	2,467	3,979
Existing Zone 2	725	354	571
Existing Total	**5,779**	**2,821**	**4,550**
Future Zone 1	8,576	4,228	6820
Future Zone 2	725	354	571
Future Total	**9,301**	**4,582**	**7391**

Future ERCs

Assumptions:

1. Utah Population Estimates Committee projections are accurate
2. City-wide growth projections are representative of the growth expected in the study area, which includes the portion of the City north of 3300 South.
3. New connections only add additional indoor use

Calculations:

The Utah Population Estimates Committee estimates that the 2010 population of South Salt Lake is about 22,270 people. They further project that in 2050 the population will be 44,560, an increase of about 100%. The current number of connections within the study area is 3,303. The total number of ERCs is 6,337, producing a connection to ERC ratio of 1:1.918. Increasing the number of connections proportionally with population gives a projection of 6,608 connections in 2050 with an additional 3305 connections. Because the City is essentially "built-out", it is reasonable that additional connections will add to the indoor water demand but not to the outdoor water demand. Based on aerial imagery of South Salt Lake it is estimated that the average lot within the R-1 residential zone has 0.09 irrigable acres. The additional average day demand from new development is calculated to be:

$$3305\ conn. \times 1.918 \frac{ERC}{conn} = 6{,}340\ ERCs$$

If added to the existing 6,337 ERCs, the projected future total is 12,677 ERCs.

APPENDIX B
Water Rights

Source	WR Number	Flow (cfs)	Flow (gpm)	Status
300 East	57-1056	1.000	448.83	Certificated
	57-2660	1.050	471.27	Certificated
265 West	57-1057	1.000	448.83	Certificated
	57-8684	0.180	80.79	Certificated
	57-1058	0.820	368.04	Certificated
400 East Well	57-4246	0.172	77.20	No Action Required
	57-4247	0.082	36.80	No Action Required
	57-4248	0.082	36.80	No Action Required
	57-4249	0.107	48.02	No Action Required
	57-4250	0.078	35.01	No Action Required
	57-4251	0.016	7.18	No Action Required
	57-4253	0.056	25.13	No Action Required
	57-4254	0.056	25.13	No Action Required
	57-4255	0.134	60.14	No Action Required
	57-4256	0.033	14.81	No Action Required
	57-4257	0.125	56.10	No Action Required
	57-4258	0.134	60.14	No Action Required
	57-4259	0.096	43.09	No Action Required
	57-4260	0.051	22.89	No Action Required
	57-4261	0.060	26.93	No Action Required
	57-4262	0.045	20.20	No Action Required
	57-4263	0.096	43.09	No Action Required
	57-4264	0.082	36.80	No Action Required
	57-4265	0.071	31.87	No Action Required
700 East	57-8374	1.560	700.18	Certificated
	57-8789	2.440	1,095.15	Proof due 10/31/2014
Bolinder Well	57-3157	1.000	448.83	Certificated
	57-8037	1.390	623.88	Certificated
	57-8683	2.610	1,171.45	Proof due 10/31/2020
Davis Well	57-641	2.610	1,171.45	Certificated
	57-8288	0.330	148.11	Certificated
	57-8717	1.330	596.95	Certificated
	57-6010	2.000	897.66	Certificated
	57-7515	0.290	130.16	Certificated
Scott Hatchery Wells	57-208	4.373[1]	1,962.74	Certificated
	57-5665	0.245	109.96	No Action Required
Miscellaneous	57-818	0.015	6.73	No Action Required
	57-3113	0.030	13.46	Certificated
	57-7160	0.022	9.87	No Action Required
	57-10113	NA[2]	NA	No Action Required
	Totals =	25.871	11,611.71	

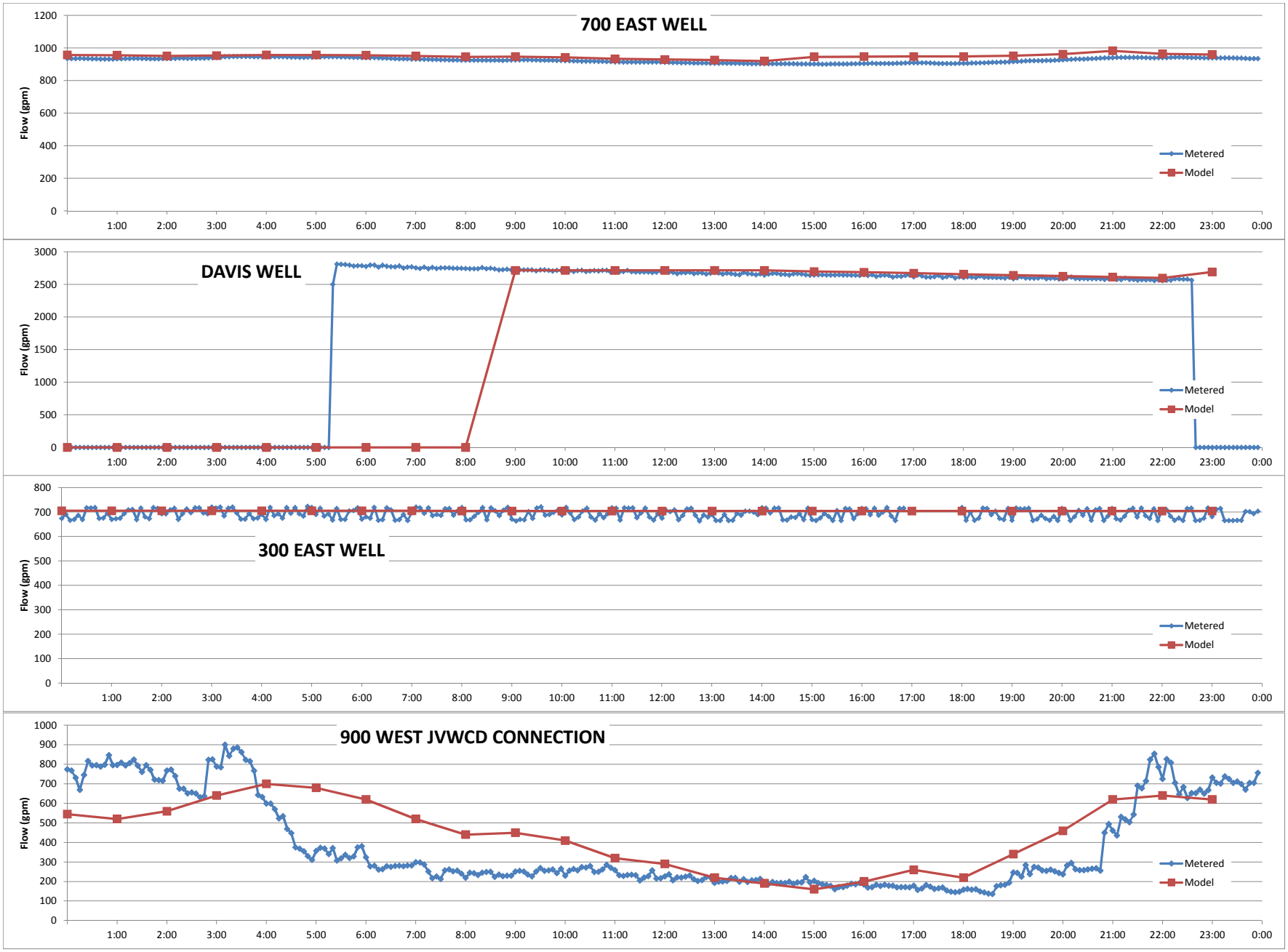
1. 57-208 is limited to an annual volume of 3006.95 acre-feet
2. 57-10113 does not have a flow rate limitation, but is limited to an annual volume of 1.1 acre-feet

APPENDIX C
Calibration Data

Insurance Services Office, Inc.
Hydrant Flow Data Summary
27-May-03

Test No.	Type Dist.	Test Location	Service	Flow (gpm) $Q=(29.83(C(d^2)p^{0.5}))$ Individual Hydrants		Total	Pressure (psi) Static	Resid.	Flow (gpm) @ 20 psi $Q_R=Q_F(h_R^{0.54}/h_F^{0.54})$ Needed	Avail.	Remarks	Model Node	Pressure (psi) Static	Diff.	(psi) Resid.	Diff.	Zone
1	Commercial	2565 S 300 W	SSLC	1,210	1,030	2,240	96	84	9,000	6,100	(A)-(4760 gpm)	J-152	80	-17%	66	-21%	1
1A	Commercial	2566 S 300 W	SSLC	1,210	1,030	2,240	96	84	3,500	6,100		J-152	80	-17%	66	-21%	1
2	Commercial	909 W 2900 S	SSLC	1,260		1,260	90	45	5,000	1,600		J-50	98.88	10%			2
2A	Commercial	910 W 2900 S	SSLC	1,260		1,260	90	45	3,500	1,600		J-50	98.88	10%			2
3	Commercial	3180 S Eldridge	SSLC	1,110	1,570	2,680	95	65	6,500	4,400	(A)-(3090 gpm)	J-199	78	-18%	43	-34%	1
3A	Commercial	3181 S Eldridge	SSLC	1,110	1,570	2,680	95	65	2,000	4,400		J-199	78	-18%	43	-34%	1
4	Commercial	2330 S 300 W	SSLC	1,060	2,120	3,180	96	75	4,500	6,400		J-109	81.5	-15%	73	-3%	1
4A	Commercial	2331 S 300 W	SSLC	1,060	2,120	3,180	96	75	3,500	6,400		J-109	81.5	-15%	73	-3%	1
5	Commercial	Burton 200 W	SSLC	1,220		1,220	96	85	4,500	3,500	(A)-(3090 gpm)	J-130	81	-16%	68	-20%	1
5A	Commercial	Burton 200 W	SSLC	1,220		1,220	96	85	2,500	3,500		J-130	81	-16%	68	-20%	1
6	Commercial	2700 S 600 W	SSLC	760	1,620	2,380	100	65	4,000	3,700	(A)-(2840 gpm)	J-62	82.5	-18%	66	2%	1
7	Commercial	3007 S West Temple	SSLC	1,030	1,810	2,840	89	70	4,000	5,700		J-224	75.5	-15%	65	-7%	1
7A	Commercial	3008 S West Temple	SSLC	1,030	1,810	2,840	89	70	2,500	5,700		J-224	75.5	-15%	65	-7%	1
8	Commercial	3131 S West Temple	SSLC	580	530	1,110	85	75	4,000	3,100		J-215	75	-12%	73	-3%	1
8A	Commercial	3132 S West Temple	SSLC	580	530	1,110	85	75	3,500	3,100		J-215	75	-12%	73	-3%	1
9	Commercial	3148 S 1100 W	SSLC	480	860	1,340	90	40	4,000	1,600		12	98.35	9%			2
10	Commercial	Oakland Ave State St	SSLC	1,580	1,680	3,260	80	65	4,000	3,900		J-311	73.5	-8%	72	11%	1
10A	Commercial	Oakland Ave State St	SSLC	1,580	1,680	3,260	80	65	1,250	3,900		J-311	73.5	-8%	72	11%	1
11	Commercial	2600 S 900 W	SSLC	1,160	1,300	2,460	125	95	3,500	4,800	(C)-(2827 gpm)	J-405	100.25	-20%			2
12	Commercial	420 E 3760 S	SSLC	1,030		1,030	66	58	3,000	2,600		NA					
12R	Residential	421 E 3760 S	SSLC	1,030		1,030	66	58	1,500	2,600		NA					
13	Commercial	3410 S 700 W	SSLC	760		760	90	66	2,500	1,400		NA					
14	Commercial	3645 S State St	SSLC	1,170		1,170	80	65	2,000	2,500		NA					

Zone	average	stdev
1	-15%	3%
2	2%	15%


700 EAST WELL
Flow (gpm)
Metered
Model
DAVIS WELL
Flow (gpm)
Metered
Model
300 EAST WELL
Flow (gpm)
Metered
Model
900 WEST JVWCD CONNECTION
Flow (gpm)
Metered
Model

APPENDIX D
Computer Model Output

SEE DISK

APPENDIX E
Water quality Calibration Data

Water Quality Calibration Results

	Test	Model	Diff.
Junction	mg/L	mg/L	
J-111	0.14	0.16	16%
J-8	0.16	0.19	23%
J-405	0.18	0.06	-67%
J-50	0.15	0.18	17%
J-276	0.09	0.04	-57%
J-306	0.11	0.05	-52%
J-243	0.12	0.14	15%
J-63	0.14	0.17	19%
J-152	0.11	0.15	39%
J-210	0.13	0.08	-42%
J-82	0.10	0.04	-58%
J-122	0.12	0.10	-10%
J-226	0.14	0.14	1%
J-194	0.13	0.16	25%
J-239	0.13	0.08	-37%
J-461	0.14	0.17	19%
J-471	0.11	0.16	42%
J-458	0.13	0.18	38%
J-387	0.10	0.19	90%

APPENDIX F
Cost Estimate Calculations

COST CALCULATIONS FOR RECOMMENDED PROJECTS

MAP ID	Project Description	UNIT	UNIT TYPE	UNIT COST	COST	Contingency (20%) and Engineering (15%)	TOTAL COST
1	Replacment fo Bolinder Well	1	ea	$700,000.00	$700,000	$245,000	$945,000
NA	New Zone 1 Well	1	ea	$700,000.00	$700,000	$245,000	$945,000
2	JVWCD Connection at 3300 S West Temple	1	ea	$30,000.00	$30,000	$10,500	$41,000
3	New 300 East booster station	1	ea	$400,000.00	$400,000	$140,000	$540,000
4	New Davis Tank booster station	1	ea	$800,000.00	$800,000	$280,000	$1,080,000
5	Build new 0.5 MG Tank	500,000	gal	$0.80	$400,000	$140,000	$540,000
6	New Bolinder booster station	1	ea	$625,000.00	$625,000	$218,750	$844,000
7	Build new 1.0 MG Tank	1,000,000	gal	$0.80	$800,000	$280,000	$1,080,000
8	Install fire hydrant	1	ea	$5,000.00	$5,000	$1,750	$7,000
9	725 feet of 8-inch pipe	725	foot	$92.00	$66,700	$23,345	$90,000
10	725 feet of 8-inch pipe	725	foot	$92.00	$66,700	$23,345	$90,000
11	450 feet of 10-inch pipe	450	foot	$103.00	$46,350	$16,223	$63,000
12	1,550 feet of 10-inch pipe	1,550	foot	$103.00	$159,650	$55,878	$216,000
13	785 feet of 8-inch pipe	785	foot	$92.00	$72,220	$25,277	$97,000
14	410 feet of 8-inch pipe	410	foot	$92.00	$37,720	$13,202	$51,000
15	1,465 feet of 12" pipeline	1,465	foot	$116.00	$169,940	$59,479	$229,000
16	1,900 feet of 16" pipe	1,900	foot	$130.00	$247,000	$86,450	$333,000
17	6,500 feet of 16" pipe	6,500	foot	$130.00	$845,000	$295,750	$1,141,000
	Millcreek crossing	60	foot	$260.00	$15,600	$5,460	$21,000
	Railroad crossing	1	ea	$150,000.00	$150,000	$52,500	$203,000
18	2,480 feet of 18" pipline	2,390	feet	$152.00	$363,280	$127,148	$490,000
	Concrete street crossing	90	foot	$290.00	$26,100	$9,135	$35,000
19	Connection across State Street	1	ea	$50,000.00	$50,000	$17,500	$68,000
20	1,740 feet of 10" pipeline	1,740	foot	$103.00	$179,220	$62,727	$242,000

109 **TOTAL** $9,391,000

APPENDIX G
DDW Report Certification

HYDRAULIC MODEL DESIGN ELEMENTS & SYSTEM CAPACITY EXPANSION REPORT

REPORT CERTIFICATION

It is herby certified that the Hydraulic Model Design Elements & System Capacity Expansion Report for:

City of South Salt Lake Drinking Water Master Plan
(Project Name)

18032
(Water System Number)

South Salt Lake Culinary Water
(Water System Name)

(DDW File Number, If Available)

7/15/2013
(Date)

Meets all requirements as set forth in *R309-511 Hydraulic Modeling Rule* and *R309-110-4 Definitions* and complies with the provisions thereof, as well as the sizing requirements of *R309-510*, and the minimum water pressures of *R309-105-9*. Where applicable the proposed additions to the distribution system will not cause the pressures at any new or existing connections to be less than those specified in R309-105-9. The calibration methodology is described in the report and the model is sufficiently calibrated and accurate to represent the conditions within this water system. The hydraulic modeling method is (*use of computer software or hand calculations*), and the computer software used was *(name and version).*

Steven C. Jones, P.E.

State of Utah No. 362076-2202

CHECKLIST FOR HYDRAULIC MODEL DESIGN ELEMENTS REPORT

This hydraulic model checklist identifies the components included in the Hydraulic Model Design Elements Report for

City of South Salt Lake Drinking Water Master Plan
(Project Name)

18032
(Water System Number)

South Salt Lake Culinary Water
(Water System Name)
7/15/2013
(Date)

The checkmarks or P.E. initials after each item indicate the conditions supporting P.E. Certification of this Report.

1. The Report contains:

   (a) A listing of sources including: the source name, the source type (i.e., well, spring, reservoir, stream etc.) for both existing sources and additional sources identified as needed for system expansion, the minimum reliable flow of the source in gallons per minute, the status of the water right and the flow capacity of the water right. *[R309-110-4 "Master Plan" definition]* ☑ SA

   (b) A listing of storage facilities including: the storage tank name, the type of material (i.e., steel, concrete etc.), the diameter, the total volume in gallons, and the elevation of the overflow, the lowest level (elevation) of the equalization volume, the fire suppression volume, and the emergency volume or the outlet. *[R309-110-4 "Master Plan" definition]* ☑ SA

   (c) A listing of pump stations including: the pump station name and the pumping capacity in gallons per minute. Under this requirement one does not need to list well pump stations as they are provided in requirement (a) above. *[R309-110-4 "Master Plan" definition]* ☑ SA

   (d) A listing by customer type (i.e., single family residence, 40 unit condominium complex, elementary school, junior high school, high school, hospital, post office, industry, commercial etc.) along with an assessment of their associated number of ERC'S. *[R309-110-4 "Master Plan" definition]* ☑ SA

   (e) The number of connections along with their associated ERC value that the public drinking water system is committed to serve, but has not yet physically connected to the infrastructure. *[R309-110-4 "Master Plan" definition]* ☑ SA

(f) A description of the nature and extent of the area currently served by the water system and a plan of action to control addition of new service connections or expansion of the public drinking water system to serve new development(s). The plan shall include current number of service connections and water usage as well as land use projections and forecasts of future water usage. *[R309-110-4 "Master Plan" definition]* ☑ SA

(h) A hydraulic analysis of the existing distribution system along with any proposed distribution system expansion identified in (g) above. *[R309-110-4 "Master Plan" definition]* ☑ SA

(i) A description of potential alternatives to manage system growth, including interconnections with other existing public drinking water systems, developer responsibilities and requirements, water rights issues, source and storage capacity issues and distribution issues. *[R309-110-4 "Master Plan" definition]* ☑ SA

2. At least 80 percent of the total pipe lengths in the distribution system affected by the proposed project are included in the model. *[R309-511-5(1)]* ☑ SA

3. 100 percent of the flow in the distribution system affected by the proposed project is included in the model. If customer usage in the system is metered, water demand allocations in the model account for at least 80 percent of the flow delivered by the distribution system affected by the proposed project. *[R309-511-5(2)]* ☑ SA

4. All 8-inch diameter and larger pipes are included in the model. Pipes smaller than 8-inch diameter are also included if they connect pressure zones, storage facilities, major demand areas, pumps, and control valves, or if they are known or expected to be significant conveyers of water such as fire suppression demand. *[R309-511-5(3)]* ☑ SA

5. All pipes serving areas at higher elevations, dead ends, remote areas of a distribution system, and areas with known under-sized pipelines are included in the model. *[R309-511-5(4)]* ☑ SA

6. All storage facilities and accompanying controls or settings applied to govern the open/closed status of the facility for standard operations are included in the model. *[R309-511-5(5)]* ☑ SA

7. Any applicable pump stations, drivers (constant or variable speed), and accompanying controls and settings applied to govern their on/off/speed status for various operating conditions and drivers are included in the model. *[R309-511-5(6)]* ☑ SA

8. Any control valves or other system features that could significantly affect the flow of water through the distribution system (i.e. interconnections with other systems,

pressure reducing valves between pressure zones) for various operating conditions are included in the model. *[R309-511-5(7)]* ☑ _____

9. Imposed peak day and peak instantaneous demands to the water system's facilities are included in the model. The Hydraulic Model Design Elements Report explains which of the Rule-recognized standards for peak day and peak instantaneous demands are implemented in the model (i.e., (i) peak day and peak instantaneous demand values per *R309-510, Minimum Sizing Requirements*, (ii) reduced peak day and peak instantaneous demand values approved by the Executive Secretary per *R309-510-5, Reduction of Requirements*, or (iii) peak day and peak instantaneous demand values expected by the water system in excess of the values in *R309-510, Minimum Sizing Requirements*). The Hydraulic Model Design Elements Report explains the multiple model simulations to account for the varying water demand conditions, or it clearly explains why such simulations are not included in the model. The Hydraulic Model Design Elements Report explains the extended period simulations in the model needed to evaluate changes in operating conditions over time, or it clearly explains (e.g., in the context of the water system, the extent of anticipated fire event, or the nature of the new expansion) why such simulations are not included in the model. *[R309-511-5(8) & R309-511-6(1)(b)]*

☑ _____

10. The hydraulic model incorporates the appropriate demand requirements as specified in *R309-510, Minimum Sizing Requirements*, and *R309-511, Hydraulic Modeling Rule*, in the evaluation of various operating conditions of the public drinking water system. The Report includes:
    - the methodology used for calculating demand and allocating it to the model;
    - a summary of pipe length by diameter;
    - a hydraulic schematic of the distribution piping showing pressure zones, general pipe connectivity between facilities and pressure zones, storage, elevation, and sources; and
    - a list or ranges of values of friction coefficient used in the hydraulic model according to pipe material and condition in the system. In accordance with Rule stipulation, all coefficients of friction used in the hydraulic analysis are consistent with standard practices.

    [R309-511-7(4)] ☑ _____

11. The Hydraulic Model Design Elements Report documents the calibration methodology used for the hydraulic model and quantitative summary of the calibration results (i.e., comparison tables or graphs). The hydraulic model is sufficiently accurate to represent conditions likely to be experienced in the water delivery system. The model is calibrated to adequately represent the actual field conditions using field measurements and observations. *[R309-511-4(2)(b), R309-511-5(9), R309-511-6(1)(e) & R309-511-7(7)]* ☑ _____

12. The Hydraulic Model Design Elements Report includes a statement regarding whether fire hydrants exists within the system. Where fire hydrants are connected to the distribution system, the model incorporates required fire suppression flow standards. The statement that appears in the Report also

identifies the local fire authority's name, address, and contact information, as well as the standards for fire flow and duration explicitly adopted from *R309-510-9(4), Fireflows*, or alternatively established by the local fire suppression agency, pursuant to *R309-510-9(4), Fireflows.* The Hydraulic Model Design Elements Report explains if a steady-state model was deemed sufficient for residential fire suppression demand, or acknowledges that significant fire suppression demand warrants extended model simulations and explains the run time used in the simulations for the period of the anticipated fire event. *[R309-511-5(10) & R309-511-7(5)]* ☑ _____

13. If the public drinking water system provides water for outdoor use, the Report describes the criteria used to estimate this demand. If the irrigation demand map in *R309-510-7(3), Estimated Outdoor Use,* is not used, the report provides justification for the alternative demands used in the model. If the irrigation demands are based on the map in *R309-510-7(3), Estimated Outdoor Use,* the Report identifies the irrigation zone number, a statement and/or map of how the irrigated acreage is spatially distributed, and the total estimated irrigated acreage. The indicated irrigation demands are used in the model simulations in accordance with Rule stipulation. The model accounts for outdoor water use, such as irrigation, if the drinking water system supplies water for outdoor use. *[R309-511-5(11) & R309-511-7(1)]* ☑ _____

14. The Report states the total number of connections served by the water system including existing connections and anticipated new connections served by the water system after completion of the construction of the project. *[R309-511-7(2)]* ☑ _____

15. The Report states the total number of equivalent residential connections (ERC) including both existing connections as well as anticipated new connections associated with the project. In accordance with Rule stipulation, the number of ERC's includes high as well as low volume water users. In accordance with Rule stipulation, the determination of the equivalent residential connections is based on flow requirements using the anticipated demand as outlined in *R309-510, Minimum Sizing Requirements*, or is based on alternative sources of information that are deemed acceptable by the Executive Secretary. *[R309-511-7(3)]* ☑ _____

16. The Report identifies the locations of the lowest pressures within the distribution system, and areas identified by the hydraulic model as not meeting each scenario of the minimum pressure requirements in *R309-105-9, Minimum Pressure Requirements*. *[R309-511-7(6)]* ☑ _____

17. The Hydraulic Model Design Elements Report identifies the hydraulic modeling method, and if computer software was used, the Report identifies the software name and version used. *[R309-511-6(1)(f)]* ☑ _____

18. For community water system models, the community water system management has been provided with a copy of input and output data for the hydraulic model

with the simulation that shows the worst case results in terms of water system pressure and flow. *[R309-511-6(2)(c)]* ☑ SA

19. The hydraulic model predicts that new construction will not result in any service connection within the new expansion area not meeting the minimum distribution system pressures as specified in *R309-105-9, Minimum Pressure Requirements. [R309-511-6(1)(c)]* ☑ SA

20. The hydraulic model predicts that new construction will not decrease the pressures within the existing water system to such that the minimum pressures as specified in *R309-105-9, Minimum Pressure Requirements* are not met. *[R309-511-6(1)(d)]* ☑ SA

RESOLUTION NO. R2014-12

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SOUTH SALT LAKE ADOPTING THE DRINKING WATER SYSTEM MASTER PLAN.

WHEREAS, the City provides culinary water to residents and businesses located within the municipality, and

WHEREAS, the City needs to plan for the continued and increased use of water, including the preservation of water rights for future use and the infrastructure necessary to deliver water to users; and

WHEREAS, the *City of South Salt Lake Drinking Water System Master Plan* has been prepared by the engineering firm Hansen, Allen, & Luce, Inc.; and

WHEREAS, the master plan has been reviewed and discussed during City Council meeting; and

WHEREAS, the City has allowed public comment on the proposed plan,

NOW THEREFORE, BE IT RESOLVED by South Salt Lake Council that South Salt Lake adopts the *City of South Salt Lake Drinking Water Master Plan* as this jurisdiction's plan.

(signatures appear on next page)

APPROVED AND ADOPTED by the City of South Salt Lake City Council, South Salt Lake, Utah, on this 30th day of July, 2014.

BY THE CITY COUNCIL:

~~Irvin H. Jones, Jr.~~ LeRoy R. Turner
Council ~~Chair~~ Vice Chair

City Council Vote as Recorded:

Beverly	Aye
Gold	Aye
Jones	~~Absent~~
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

ATTEST:

Craig D. Burton
City Recorder

CITY OF SOUTH SALT LAKE
CORPORATE
Seal
SALT LAKE COUNTY, UTAH

RESOLUTION No. R2014-13

A RESOLUTION OF THE CITY OF SOUTH SALT LAKE CITY COUNCIL AUTHORIZING EXECUTION OF THE ATTACHED INTERLOCAL COOPERATION AGREEMENT WITH SALT LAKE COUNTY FOR THE GRANTING OF A PERPETUAL EASEMENT RELATED TO THE CONSTRUCTION OF AN URBAN RECREATIONAL TRAIL.

WHEREAS, the City, Salt Lake County ("County") and Utah Transit Authority have partnered to construct a portion of an urban recreational trail connecting Sugerhouse Park to the Jordan River Trail along UTA's new S-Line; and

WHEREAS, the County desires to obtain a perpetual easement on, over, and across a portion of a parcel of real property located at approximately 2200 South and 500 East, which is owned by the City, so that the County may construct, maintain and repair thereon a portion of the trail; and

WHEREAS, the City and County desire to enter into an Interlocal Cooperation Agreement ("Agreement") with each other, and the City is willing to convey a perpetual easement to the County, subject to the terms and conditions set forth in the Agreement attached hereto as Exhibit A; and

WHEREAS, the City has determined that it is in the public interest to enter into this Agreement, benefiting both citizens of the City and the County generally; and

WHEREAS, pursuant to the Interlocal Cooperation Act (Utah Code Ann. § 11-13-101 et seq.), the County and City are permitted to contract with one another in order to make efficient use of their powers and resources.

BE IT RESOLVED, therefore, by the City Council of the City of South Salt Lake that the Interlocal Cooperation Agreement, attached as Exhibit "A", is hereby approved by the City Council, and the Mayor is authorized to execute the Agreement. The Council directs that a copy of the executed agreement be filed with the Office of the City Recorder and the Office of the Lieutenant Governor.

(signatures appear on separate page)

DATED this 30th day of July, 2014.

BY THE CITY COUNCIL:

~~Irvin H. Jones, Jr., Council Chair~~

LeRoy R. Turner, Council Vice-Chair

ATTEST:

Craig D. Burton, City Recorder

City Council Vote as Recorded:

Beverly	Aye
Gold	Aye
Jones	Absent
Rapp	Aye
Rutter	Aye
Snow	Aye
Turner	Aye

Recorded on this 31st day of July, 2014.

Craig D. Burton, City Recorder

CITY OF SOUTH SALT LAKE
CORPORATE
Seal
SALT LAKE COUNTY, UTAH

EXHIBIT A

So Salt Lake Contract #_____
County Contract #_____
DA # 14-01000

Interlocal Cooperation Agreement
For
Perpetual Easement

THIS INTERLOCAL COOPERATION AGREEMENT (this "*Agreement*") is made effective _____ date of _____, 2014, by and between **SALT LAKE COUNTY**, a body corporate and politic of the state of Utah (the "County"), and **SOUTH SALT LAKE CITY**, a municipal corporation of the State of Utah, (the "City").

RECITALS:

A. The City and the County are public agencies as contemplated in the referenced sections of the Utah Code (more specifically referred to as UTAH CODE ANN. § 11-13-101, *et seq.* - Interlocal Cooperation Act).

B. UTAH CODE ANN. § 11-13-202 provides that any two or more public agencies may enter into an agreement with one another for joint or cooperative actions.

C. UTAH CODE ANN. § 11-13-214 provides that any public agency may convey property to or acquire property from any other public agencies for consideration as may be agreed upon.

D. The County and City have partnered with Utah Transit Authority ("UTA") to construct the portion of an urban recreational trail connecting Sugarhouse Park to the Jordan River Trail along UTA's new S-Line.

E. The City owns a parcel of real property located at approximately 2200 South and 500 East, South Salt Lake, Utah (the "SSL Property").

F. The County desires to obtain a perpetual easement on, over, and across a portion of the SSL Property (the "Easement Area") to allow the County to construct, maintain, and repair thereon an urban recreational trail and appurtenant parts thereof. The legal description of the Easement Area is more particularly described on Exhibit A of Exhibit 1 attached hereto and incorporated herein by this reference.

G. The City is willing to convey the easement to the County, subject to and in conformance with the terms and conditions set forth in this Agreement.

A G R E E M E N T:

NOW, THEREFORE, in consideration of the premises and for other good and valuable consideration, the receipt and legal sufficiency of which is hereby acknowledged, the parties hereby agree as follows:

ARTICLE 1
PERPETUAL EASEMENT

The City shall grant and convey to the County a perpetual easement on, over, and across the Easement Area for the purpose of constructing, operating, maintaining, inspecting, cleaning, repairing and altering thereon an urban recreational trail and appurtenant parts thereof ("Trail") as provided in the Perpetual Easement attached hereto as Exhibit 1.

ARTICLE 2
CONSIDERATION

The County agrees, without cost to the City, to design and construct the Trail. Upon completion of these improvements, the County will own and be solely responsible to maintain these improvements. The County and the City agree that in consideration of the mutual benefit afforded the citizens of the City and the County from the grant of the Perpetual Easement, and the exchange of other agreed upon consideration as described in this Article 2 above and in accordance with Section 11-13-214 of the Interlocal Cooperation Act, the City will grant the Perpetual Easement to the County without fee.

ARTICLE 3
ADDITIONAL PROVISIONS

Section 3.1 **Access.** The County and its agents, employees, consultants and contractors (the "Permitted Users") shall have the right to enter upon the Easement Area for the purposes permitted by this Agreement. Permitted Users will enter upon the Easement Area at their sole risk and hazard. The County and its successors and assigns, hereby release the City from any claims relating to the condition of the Easement Area and/or the entry upon the Easement Area by Permitted Users.

Section 3.2 **Reservation.** The City reserves the right to use the Easement Area for any use not inconsistent with the County's use of the Easement Area, as granted herein.

Section 3.3 **Condition of the Easement Area.** The County accepts the Easement Area and all aspects thereof in "AS IS", "WHERE IS" condition, without warranties, either express or implied, "with all faults," including but not limited to both latent and patent defects, and the existence of hazardous materials, if any. The County hereby waives all warranties,

express or implied, regarding the title, condition, and use of the Easement Area, including but not limited to any warranty of merchantability or fitness for a particular purpose.

Section 3.4 **General Provisions**. The following provisions are also integral parts of this Agreement:

(a) *Binding Agreement*. This Agreement shall be binding upon and shall inure to the benefit of the successors and assigns of the respective parties hereto.

(b) *Captions*. The headings used in this Agreement are inserted for reference purposes only and shall not be deemed to define, limit, extend, describe, or affect in any way the meaning, scope or interpretation of any of the terms or provisions of this Agreement or the intent hereof.

(c) *Counterparts*. This Agreement may be signed in any number of counterparts with the same effect as if the signatures upon any counterpart were upon the same instrument. All signed counterparts shall be deemed to be one original.

(d) *Severability*. The provisions of this Agreement are severable, and should any provision hereof be void, voidable, unenforceable or invalid, such void, voidable, unenforceable or invalid provision shall not affect the other provisions of this Agreement.

(e) *Waiver of Breach*. Any waiver by either party of any breach of any kind or character whatsoever by the other, whether such be direct or implied, shall not be construed as a continuing waiver of or consent to any subsequent breach of this Agreement.

(f) *Cumulative Remedies*. The rights and remedies of the parties hereto shall be construed cumulatively, and none of such rights and remedies shall be exclusive of, or in lieu or limitation of, any other right, remedy or priority allowed by law.

(g) *Amendment*. This Agreement may not be modified except by an instrument in writing signed by the parties hereto.

(h) *Time of Essence*. Time is the essence of this Agreement.

(i) *Interpretation*. This Agreement shall be interpreted, construed and enforced according to the substantive laws of the state of Utah.

(j) *Notice*. Any notice or other communication required or permitted to be given hereunder shall be deemed to have been received (a) upon personal delivery or actual receipt thereof or (b) within three (3) days after such notice is deposited in the United States mail, postage prepaid and certified and addressed to the parties at their respective addresses set forth above.

(k) *No Interlocal Entity*. The parties agree that they do not by this Agreement create an interlocal entity.

(l) *Joint Board*. As required by UTAH CODE ANN. § 11-13-207, the parties agree that the cooperative undertaking under this Agreement shall be administered by a joint board consisting of the County's designee and the City's Mayor or designee. Any real or personal property used in the parties' cooperative undertaking herein shall be acquired, held, and disposed of as determined by such joint board.

(m) *Financing Joint Cooperative Undertaking and Establishing Budget*. There is no financing required for this joint or cooperative undertaking and no budget shall be established or maintained.

(n) *Exhibits and Recitals*. The Recitals set forth above and all exhibits to this Agreement are incorporated herein to the same extent as if such items were set forth herein in their entirety within the body of this Agreement.

(o) *Liability and Indemnification*. The County and the City are governmental entities under the Governmental Immunity Act of Utah, Utah Code Ann. Title 63G, Chapter 7 (the "Act"). Consistent with the terms of the Act, and as provided herein, it is mutually agreed that each Party is responsible and liable for its own wrongful or negligent acts which are committed by it or its agents, officers, or employees. Neither Party waives any defenses otherwise available under the Act, nor does any Party waive any limits of liability currently provided by the Act. The Parties agree to indemnify each other and hold each other harmless from any damages or claims for damages occurring to persons or property as a result of the negligence or fault of their own officers, employees or agents involved in the Project.

(p) *Third Parties*. Nothing herein expressed or implied is intended or shall be construed to confer upon or give any person, board, or entity, other than the Parties hereto and their successors and assigns, any right or remedies by reason of this Agreement, as a third party beneficiary or otherwise.

(q) *Relationship of the Parties*. Nothing contained in this Agreement shall constitute or be construed to create any partnership or agency relationship between the Parties, or to create any new entity.

(r) *Assignment*. The Parties shall not assign, sublease, or transfer any interest in this Agreement.

(s) *Entire Agreement*. This Agreement and the applicable laws, regulations, and policies referenced herein, constitute the entire Agreement between the Parties regarding the subject matter hereof and is intended to be a final expression of their Agreement. No promise, representation, warranty or covenant not included in this document has been or is relied upon by any Party. Each Party has relied upon its own examination of the full Agreement and the counsel of its own advisors.

(t) *Costs.* Except as otherwise specifically provided herein, each Party shall be responsible for its own costs of any action done pursuant to this Agreement, and for any financing of such costs.

(u) *Attorney Review.* This Agreement shall be submitted to the authorized attorneys for the County and City for approval in accordance with Utah Code Ann. § 11-13-202.5.

(v) *Abandonment Due to Non-Use.* If, for the continuous period of two years, this Easement ceases to be used as an urban recreational trail and appurtenant parts thereof, the County shall be deemed to have abandoned this Easement, regardless of intent.

IN WITNESS WHEREOF, the City, by resolution duly adopted by its Council, a copy of which is attached hereto, caused this Agreement to be signed by its Mayor; and the County, by resolution of its council, a copy of which is attached hereto, caused this Agreement to be signed by the Mayor, or his designee.

SALT LAKE COUNTY

By:_____
Mayor or Designee

Approved as to form and legality:

Melanie F. Mitchell
Deputy District Attorney

Date: 2 June 14

SOUTH SALT LAKE CITY

By: _____
Mayor or Designee

Approved as to form and legality:

~~Lyn Creswell~~ Paul Roberts
South Salt Lake City Attorney (Deputy)

Date: 6 June 2014

ATTEST:

_____
City Recorder

Exhibit 1
Perpetual Easement

WHEN RECORDED RETURN TO:
Salt Lake County Real Estate
2001 South State Street
Salt Lake City, Utah 84190

Space above for County Recorder's use

Tax Serial No. 1619207011
Project: Parleys Trail

PERPETUAL EASEMENT
South Salt Lake City

THE CITY OF SOUTH SALT LAKE, a body corporate and politic of the State of Utah, GRANTOR, of Salt Lake County, State of Utah, hereby Grant(s) and Convey(s) to SALT LAKE COUNTY, a body corporate and politic of the State of Utah, GRANTEE, for the sum of Ten Dollars ($10.00) and other good and valuable consideration, a perpetual easement for the purpose of constructing thereon an urban recreational trail and appurtenant parts thereof, over and across the following described parcel of real property in Salt Lake County, Utah, to wit:

(SEE EXHIBIT "A")

IN WITNESS WHEREOF, said _____ has caused this instrument

to be executed by its proper officers hereunto duly authorized this ____day of _____, 20 ____.

STATE OF UTAH)
)ss.
COUNTY OF)

SOUTH SALT LAKE CITY

By _____

On the date first above written personally appeared before me_____,
who, being duly sworn, did say that __he is the _____of South Salt Lake City,
and that the foregoing instrument was signed on behalf of said South Salt Lake City, by authority of law.

WITNESS my hand and official stamp the date in this certificate first above written:

My Commission Expires _____ _____
Notary Public

Residing in: _____

(EXHIBIT "A")

A perpetual easement being part of Block 1, Dundee Place Subdivision as platted and recorded in Book B, Page 134 and described in that Warranty Deed recorded in Book 10061, Page 950 in the Office of the Salt Lake County Recorder. Said subdivision is located in the Northeast Quarter of Section 19, Township 1 South, Range 1 East, Salt Lake Base and Meridian, and in Lot 11, Block 42, 10 Acre Plat "A" Big Field Survey. The boundary of said perpetual easement is described as follows:

Beginning at the southeasterly corner of Lot 1 of said Block 1, Dundee Place Subdivision on the westerly right of way line of 500 East Street; thence N. 0°12'50" E. 11.58 feet along the easterly line of said Lot and westerly right of way line, thence N. 89°53'20" W. 92.92 feet; thence S. 73°05'50" W. 10.46 feet; thence N. 89°53'20" W. 63.03 feet to the center of the vacated alley abutting the westerly line of said Lot, thence S. 0°12'50" W. 8.90 feet along the center of said alley to a westerly prolongation of the southerly line of said Lot and the northerly right of way line of UTA as described in Book 8651, Page 3967 in the office of said Recorder;, thence N. 89°58'50" E. 165.95 (Record = 165 feet) along said prolongation, southerly lot line, and northerly right of way line to the point of beginning.

The above described perpetual easement contains 1745 square feet in area or 0.04 acres, more or less.

The Basis of Bearing is S. 0°11'38" W. along the monument line between the city monument located at the intersection of 2100 South Street and 500 East Street and the city monument located at the intersection of 2700 South Street and 500 East Street.

SOUTH SALT LAKE

SANITARY SEWER MASTER PLAN

PROJECT No.: 126.28.100

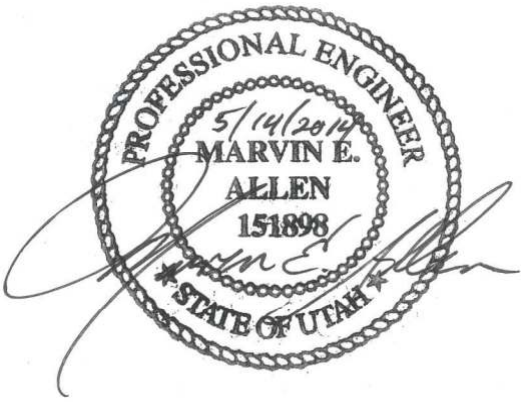
May 2014

HANSEN ALLEN & LUCE inc
ENGINEERS

CITY OF SOUTH SALT LAKE

SANITARY SEWER MASTER PLAN

(HAL Project No.: 126.28.100)



Marvin E. Allen, P.E.
Principal, Project Engineer

HANSEN ALLEN & LUCE INC
ENGINEERS

May 2014

ACKNOWLEDGEMENTS

Successful completion of this master plan was made possible by the cooperation and assistance of many individuals, including the Mayor of South Salt Lake, City Council Members, and City Staff personnel as shown below. We sincerely appreciate the cooperation and assistance provided by these individuals.

City of South Salt Lake

Mayor

Cherie Wood

City Council

Debbie A. Snow
Mike Rutter
Ryan Gold
Kevin Rapp
Sharla Beverly
Roy Turner
Irvin Jones

City Staff

Dennis Pay, Public Works Director
Ed Rufener, Deputy Director of Public Works
Corby Talbot, Wastewater/Stormwater Department Supervisor
Tory Laws, Wastewater Department Technician
Niels Melville, GIS Specialist

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CHAPTER I

INTRODUCTION

PURPOSE

The purpose of this master plan is to provide direction to The City of South Salt Lake (SSLC) regarding decisions that will be made during the next 35 years to provide an adequate sanitary sewer system for customers at the most reasonable cost.

The results of this study are limited by the accuracy of the development projections and other assumptions used in preparing the study. It is expected that the City will review and update this master plan every 5-10 years, or more frequently if the assumptions included in this effort change significantly.

BACKGROUND

The City of South Salt Lake is located in Salt Lake County. The City was incorporated in 1938 due to the need for water and sewer services (City of South Salt Lake, 2011). In 1998 SSLC annexed an area south of the City. The SSLC Sanitary Sewer System services areas of the City between Mill Creek and 2100 South.

The SSLC sanitary sewer system collects wastewater from a diverse mix of single and multi-family residences, commercial, and industrial areas. All wastewater collected by the sewer system is conveyed to Central Valley Water Reclamation Facility (CVWRF) where it is treated. CVWRF charges SSLC for treatment based on the flow quantity and the flow composition. The sewer system provides services to approximately 2,600 connections. Drinking water in the sewer service area is provided by South Salt Lake's Water Department, the Salt Lake City Department of Public Utilities, and private wells.

The 2010 US census states that SSLC's population in 2010 was above 23,600 (U.S. Census Bureau, 2010). Growth estimations used in the Drinking Water System Master Plan from the Governor's Office of Planning and Budget project a population of 44,560 for the year 2050 in SSLC (GOPB, 2008). This growth is expected to occur in four redevelopment areas in SSLC. The redevelopment areas are expected to add approximately 6,340 Equivalent Residential Connections (ERCs) to the City, 4,700 of which will contribute to the sanitary sewer system. Currently the population contributing to the sanitary sewer system is 7,780.

SCOPE

The scope of this Sanitary Sewer Master Plan includes the following:

1. Obtain and review existing sewer collection system data and information, review City staff goals for the project, and establish project management protocol.
2. Evaluate the existing wastewater collection system, develop and implement a flow monitoring plan, develop existing model, and identify deficiencies.
3. Project wastewater collection demand for the 5, 10, 15, and 35-year planning horizon.
4. Analyze available alternatives for system improvements through a future system model.
5. Prepare a capital improvement plan for the 5, 10, 15, and 35-year planning horizon, including operation and maintenance costs.
6. Make recommendations for more efficient operation of the wastewater collection system and identify any regulatory concerns for the collections system and facilities.
7. Review and update the sewer use ordinance.

AUTHORIZATION

The City of South Salt Lake selected Hansen, Allen, & Luce, Inc. (HAL) during August 2013 to complete a master plan of the City's wastewater system. Work began on the master plan during August 2013.

CHAPTER II

EXISTING WASTEWATER SYSTEM

SERVICE AREA

The service area of South Salt Lake's sanitary sewer system includes the area in the northern half of the City, extending south to Mill Creek (approximately 3000 South). The service area of the sewer system is not expected to expand, although future redevelopment will increase the loading in specific areas of the City.

EXISTING WASTEWATER SYSTEM

Information describing the sanitary sewer was compiled from GIS data provided by SSLC, a manhole survey provided by SSLC, and a manhole survey completed by Hansen, Allen, & Luce, Inc. The data were sorted and merged into GIS shapefiles of sewer manholes and sewer pipes. Additional features such as collection areas and pump locations were added to the GIS data by HAL. The existing SSLC sanitary sewer system is shown on Figure II-1.

Pipe Network

The existing SSLC sanitary sewer collection system consists of nearly 38 miles of pipeline and over 557 manholes as shown on Figure II-1. The pipe sizes range from 6-inch diameter to 33-inch diameter pipe. The system also has force main piping ranging from 4-inch diameter to 18-inch diameter pipe.

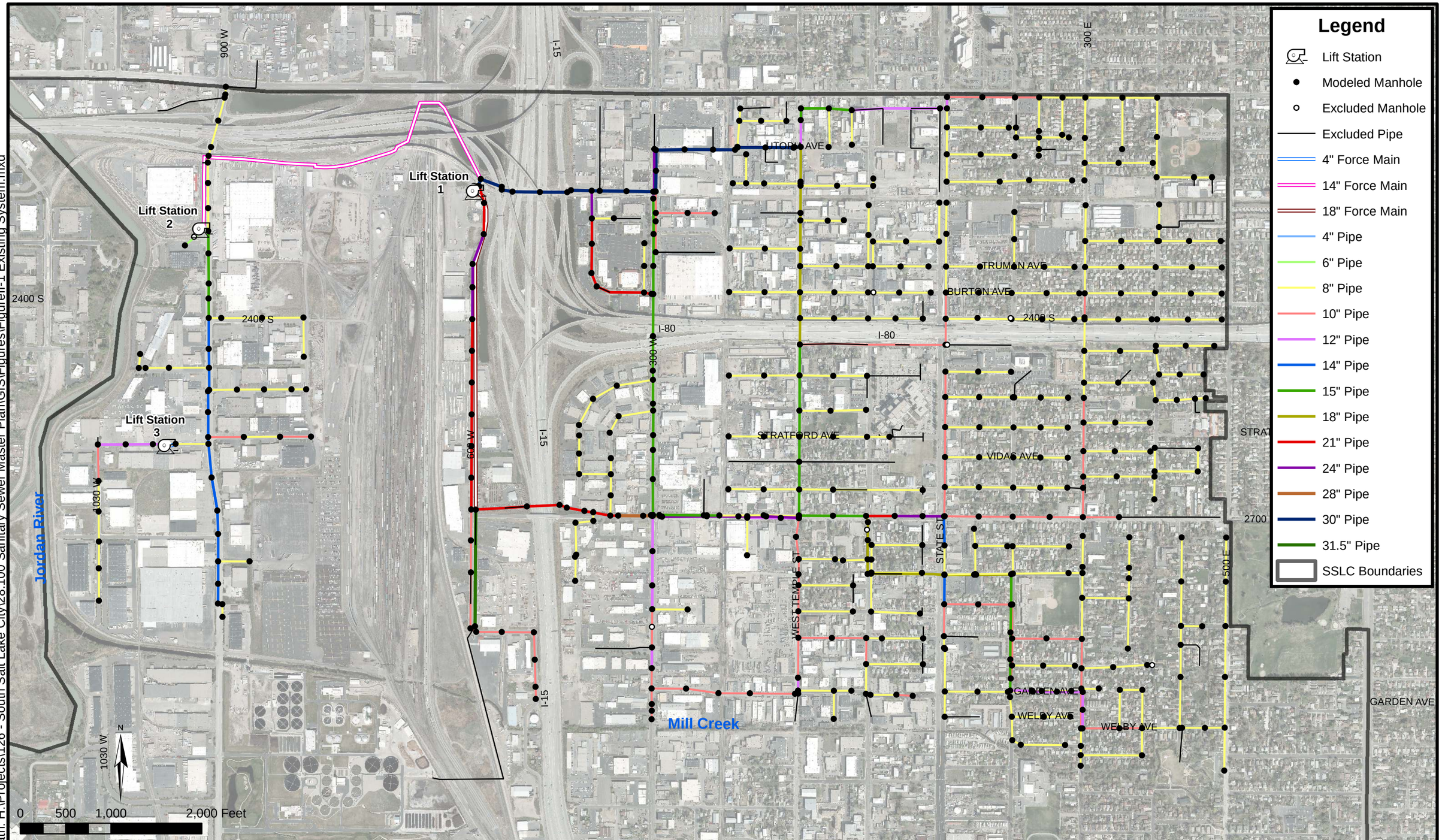
HAL met with SSLC staff to determine the correct flow direction in areas where bypass connections made the flow direction unclear.

Treatment Plant

The wastewater in the sanitary sewer system flows to the Central Valley Water Reclamation Facility (CVWRF) located at approximately 800 West Central Valley Road in SSLC. CVWRF was organized in 1978 and has a current capacity of 75 million gallons per day (CVWRF, 2008). CVWRF treats wastewater from Cottonwood Improvement District, Granger Hunter Improvement District, Kearns Improvement District, Murray City, Mt. Olympus Improvement District, The City of South Salt Lake, and Taylorsville-Bennion Improvement District.

Pump Stations

Due to the relatively flat topography of SSLC and the configuration of the original sewer system, the sanitary sewer system has three pump stations. All three pump stations are in a series with the third pump station upstream from the second pump station which is upstream from the main lift station. The locations of the pump station are shown on Figure II-1. Approximately 40% of the service area flows by gravity to the CVWRF with the rest of the service area flowing through pump stations before reaching the water reclamation facility. Table II-1 is a list of each pump station with addresses, pump capacities in gpm, the total dynamic head (TDH) at the pump in feet of water, and the pump horsepower.



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HANSEN ALLEN & LUCE inc ENGINEERS

SOUTH SALT LAKE CITY
SANITARY SEWER MASTER PLAN

EXISTING SYSTEM

FIGURE
II-1

TABLE II-1
PUMP STATION INVENTORY

ID	PUMP TYPE	LOCATION	PUMP CAPACITY	PUMP TDH (ft)	HORSEPOWER (hp)
1	ABS	2250 S 600 W	4,100 gpm	39 ft	67 hp
	ABS		4,100 gpm	39 ft	67 hp
2	Flygt	2280 S 900 W	1,100 gpm	40 ft	15 hp
3	Flygt	949 W 2610 S	260 gpm	15 ft	2.3 hp

CHAPTER III

FLOW MONITORING

COLLECTION AREAS

A collection area is defined as a geographic area that contributes flow to a common point in the collection system. Collection areas were delineated using sewer manholes, topography, parcels, and water meters. Water meters were used in the collection area delineation because sewer flow rates were estimated using winter water use data. The collection areas provide information on where the flow from each existing water meter was assigned in the wastewater collection system model.

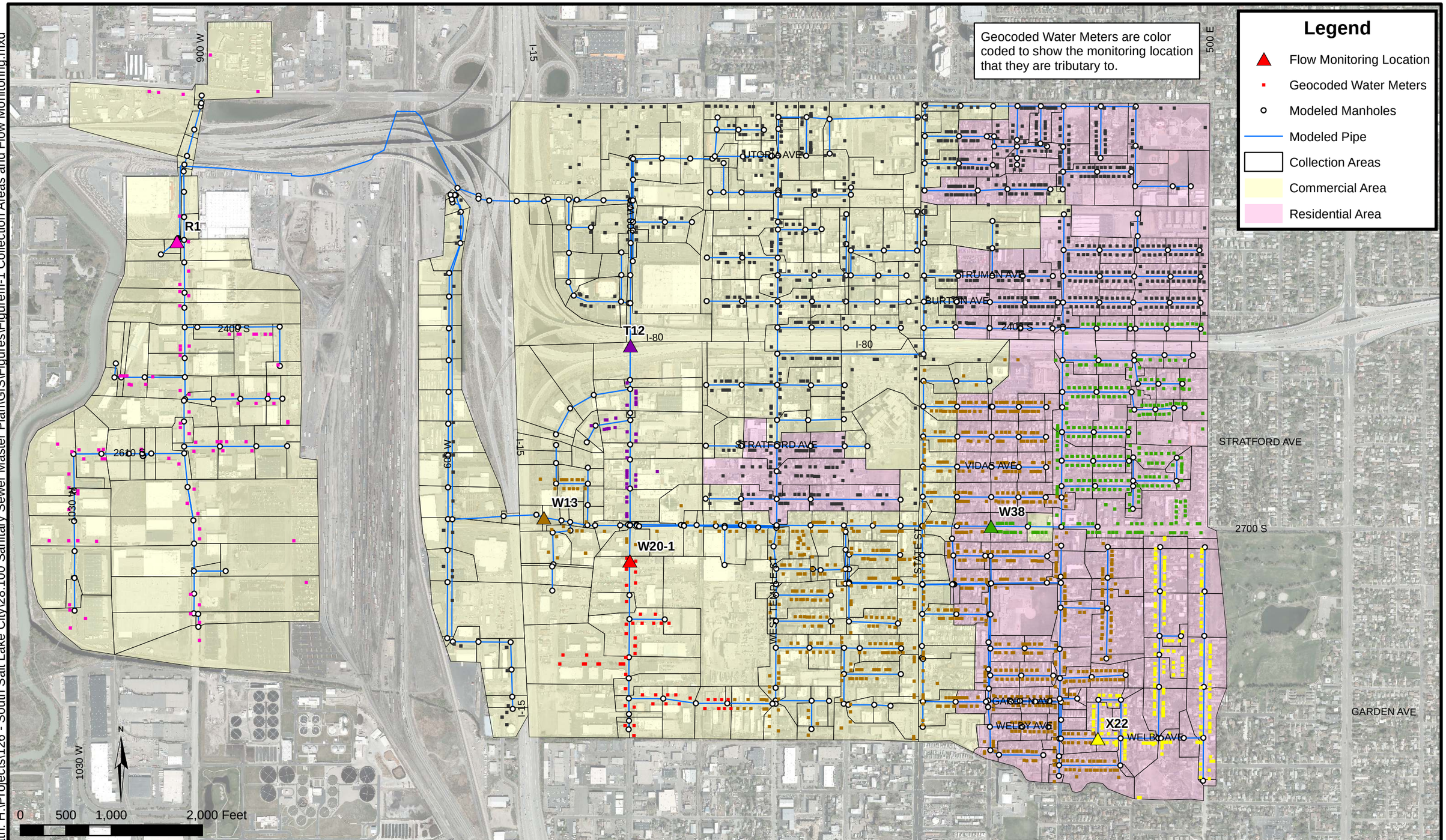
City personnel reviewed the collection areas to verify the water meters were in the correct collection area. The delineated collection areas are shown on Figure III-1.

FLOW MONITORING

The purpose of flow monitoring is to obtain flow data at several locations throughout the city to provide the basis for flow characterization, construction of a model, and calibration of the model to real values. Flow monitoring sites for this master plan were selected by the City and HAL to provide representative data to achieve the stated purposes. Selected flow monitoring locations are shown on Figure III-1.

The flow monitoring was accomplished using one American Sigma 910 Flow Meter owned by Hansen, Allen, & Luce, Inc. and five Marsh-McBirney FLO-DAR meters with HACH FL900 Flow Loggers procured by SSLC. Both the Sigma 910 and the FLO-DAR meters determine average flow velocity and flow depth. The flow rate Q is calculated based on the equation $Q = VA$, where V is the velocity and A is the flow area calculated from the measured depth of flow and the diameter of the pipe. A typical Sigma 910 meter installation is shown on Figure III-2 and a typical FLO-DAR meter installation is shown on Figure III-3. The Sigma 910 includes a data logger and a sensor connected by a data cable with an air tube. The sensor is attached to a ring that is inserted in the pipe. The ring is adjusted to fit tightly against the inner walls of the pipe with the pressure sensor located at the flow line or invert of the pipe. The FLO-DAR meter uses digital Doppler radar to sense the velocity in the open channel and ultrasonic pulse echo sensing to measure the depth in the open channel. This information is sent to the flow logger where the flow rate is calculated based on the flow area and velocity.

A flow meter was installed at each site for approximately one week. Metering data were used to create the diurnal curve used in the model and to calibrate the model. Graphs showing the recorded flow data used in the report for the six monitoring locations are located in Appendix A.



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Document Path: H:\Projects\126 - South Salt Lake City\28.100 Sanitary Sewer Master Plan\GIS\Figures\FigureIII-1 Collection Areas and Flow Monitoring.mxd

HANSEN ALLEN & LUCE inc ENGINEERS

SOUTH SALT LAKE CITY
SANITARY SEWER MASTER PLAN

COLLECTION AREAS AND FLOW MONITORING LOCATIONS

FIGURE III-1

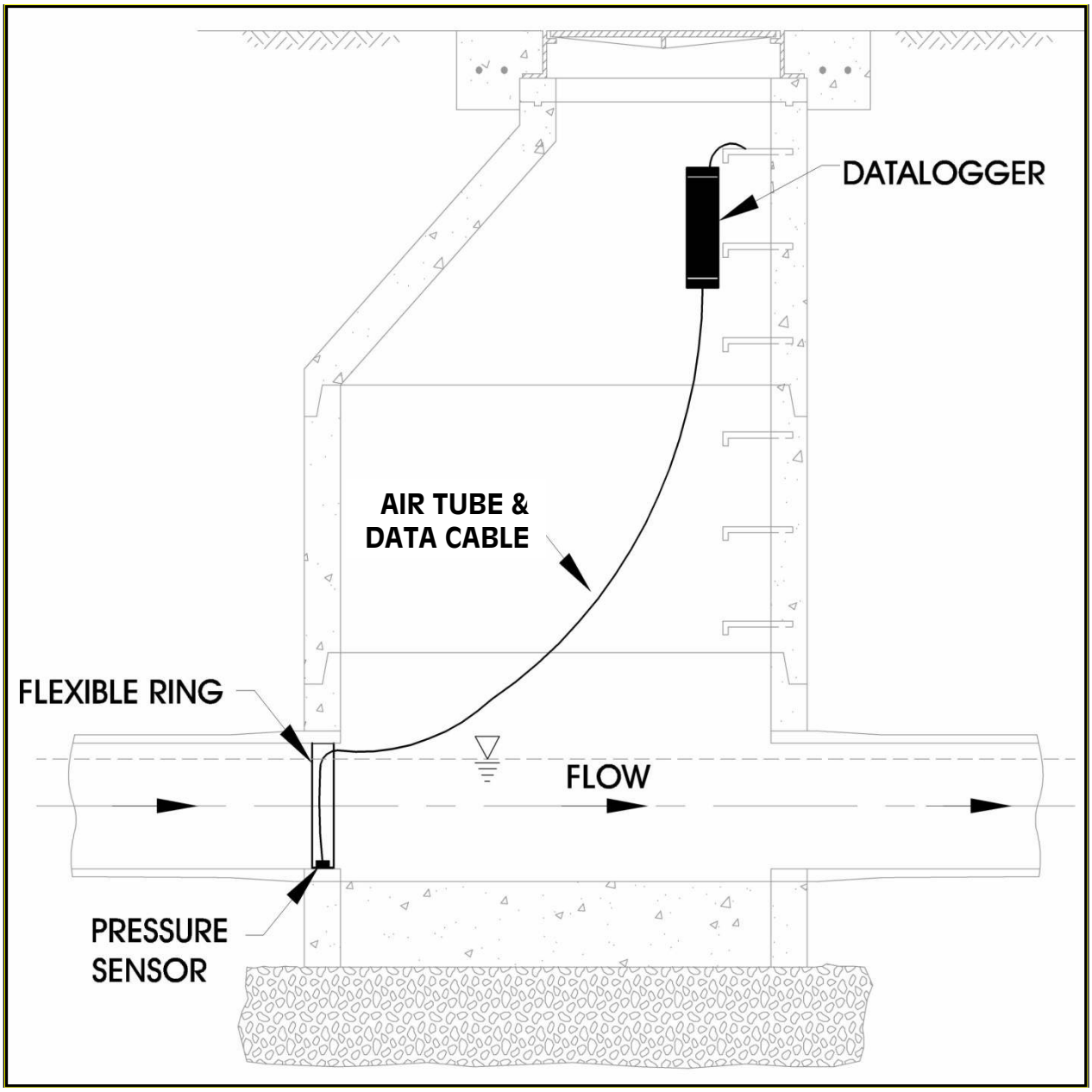


FIGURE III-2: TYPICAL SIGMA 910 FLOW METER INSTALLATION

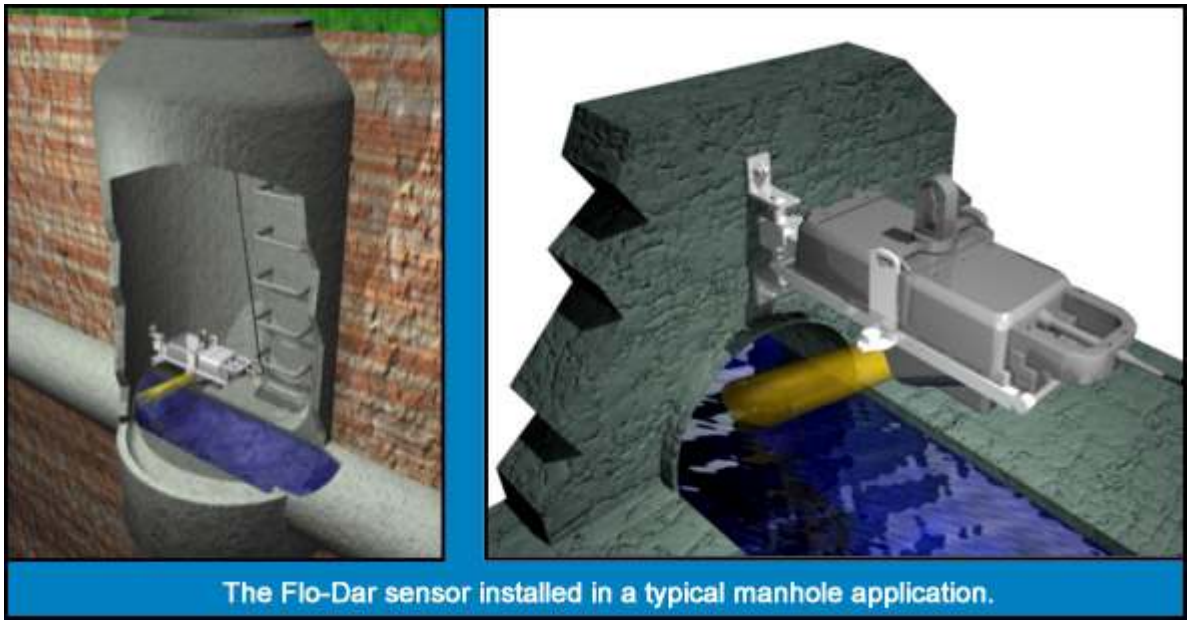


FIGURE III-3: TYPICAL FLO-DAR METER INSTALLATION (HACH COMPANY, 2014)

CHAPTER IV

FLOW CHARACTERIZATION

METHODOLOGY

The purpose of flow characterization is to determine the flow patterns and variations that may be experienced by a wastewater system so that pipelines, pump stations, and the treatment facility can be evaluated and sized appropriately. The methodology used in this master planning effort included evaluation of the following wastewater flow characteristics:

- Unit Flows
- Daily Flow Variation
- Annual Flow Variation
- Long Term Flow Variation
- Extraordinary Flows

UNIT FLOWS

Unit flows were calculated and compared to the State Requirements which are in units of gallons per capita per day (gpcd). Because only a fraction of SSLC's population contributes to the sanitary sewer system, the Equivalent Residential Connections (ERCs) were calculated for the entire sewer system based on the ERC to connection ratio developed in the Drinking Water System Master Plan (Hansen, Allen, & Luce, Inc., 2013). Once the ERCs were calculated for the sewer system, the design system flow per ERC could be calculated. Average flow per capita per day was calculated using the average household size of 2.46 people per household (U.S. Census Bureau, 2010). The average flow was calculated to be over 250 gpcd based on the total system measured flow. This can be compared to the less conservative design requirement of 100 gpcd according to the Utah Administrative Code R317-3-2. Therefore, the actual system loading with additional baseflow was used as the design flow for the sanitary sewer system.

DAILY FLOW VARIATION

Flow in a wastewater collection system varies continuously throughout the day. In SSLC the minimum flow generally occurs during the early morning between 1:00 and 5:00 AM. Maximum or peak flow typically occurs during the morning between 7:00 AM and 11:00 AM with a smaller peak in the evening between 5:00 and 8:00 PM.

Peaking factors were used to determine whether SSLC's daily flow variation was in agreement with those of other similar entities in the State and to create diurnal curves for the Autodesk Storm and Sanitary Analysis (SSA) model. Diurnal curves were used to quantify daily flow variations in the model.

Peaking Factors

The peaking factor is the ratio between the peak instantaneous flow and the average daily flow. Flow monitoring data downstream of residential and commercial areas were evaluated to determine the flow patterns at each flow monitoring site. The data were averaged throughout the week to create an average day pattern made of 15-minute increments. The flow rates were then divided by the average daily flow to determine a peaking factor at each time interval, essentially creating a diurnal curve. The diurnal curves were input into the model and adjusted

to account for attenuation until the model hydrograph at the flow monitoring location matched the flow monitoring data. The diurnal curves can be seen on Figure IV-1.

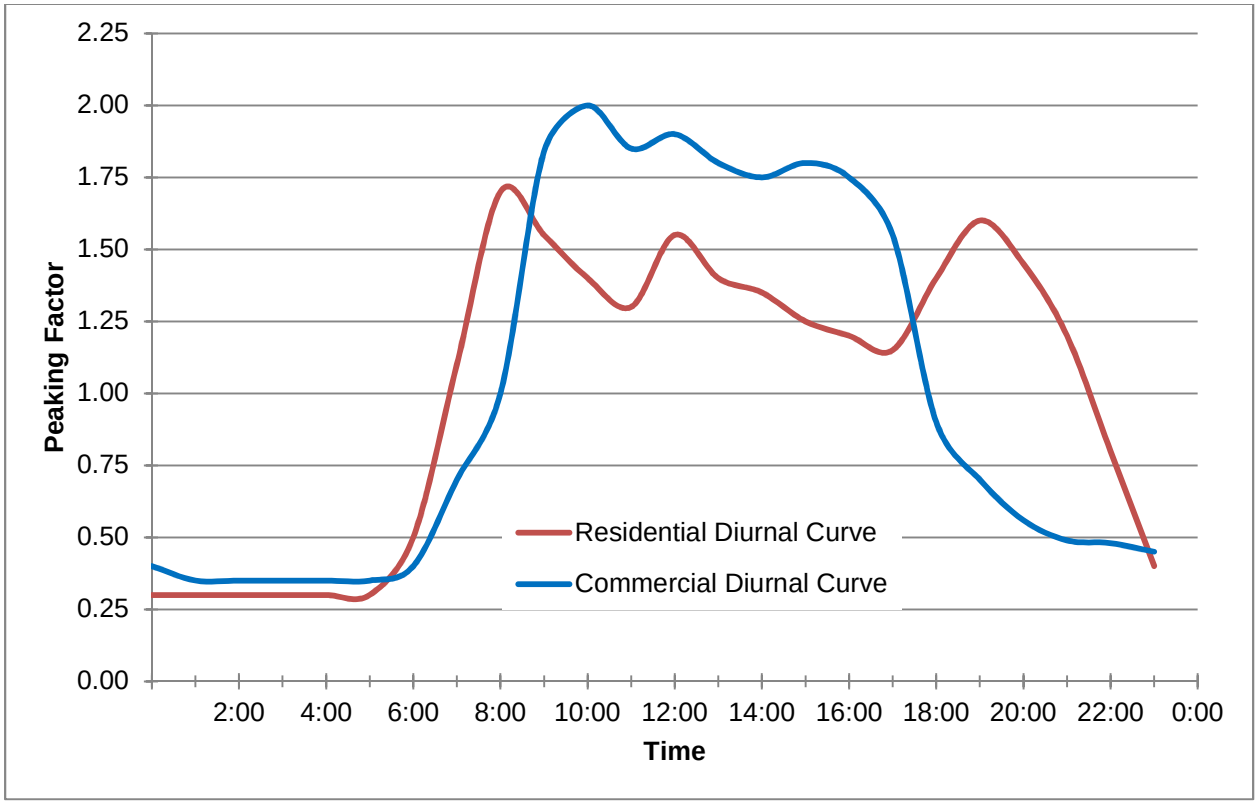


FIGURE IV-1 DIURNAL CURVES

Peaking factors based on average flow for each flow monitoring site were plotted against the average daily flow on a log-log graph. The SSLC peaking factors were compared to peaking factors developed for past HAL master planning efforts for Murray City, Springville City, Orem City, and Granger Hunter Improvement District as shown on Figure IV-2. Differences between communities can be explained by a variety of factors, including variations in infiltration and water use patterns. Possible explanations for the lower peaking factors seen in SSLC include a larger than average infiltration rate and an average household size smaller than the other cities.

Hydrographs

The loading for the model was developed by averaging the winter drinking water use for individual water meters throughout the City, and then assigning those flows to a wastewater manhole based on the collection areas. This method assumes that winter water use is representative of indoor water use, and that there is little consumptive use of water indoors allowing us to equate the sewer loading and the indoor water use. The diurnal curves developed for the residential and commercial areas are then applied to each sewer manhole load. Additional baseflows representing infiltration and inflow were also added to each manhole based on the measured baseflow at the flow monitoring location and the size of the manhole's collection area. The diurnal curves for each of the hydrographs can be seen on Figure IV-1. Graphs showing the calibration of the model to actual flows at the monitoring locations can be seen in Appendix A.

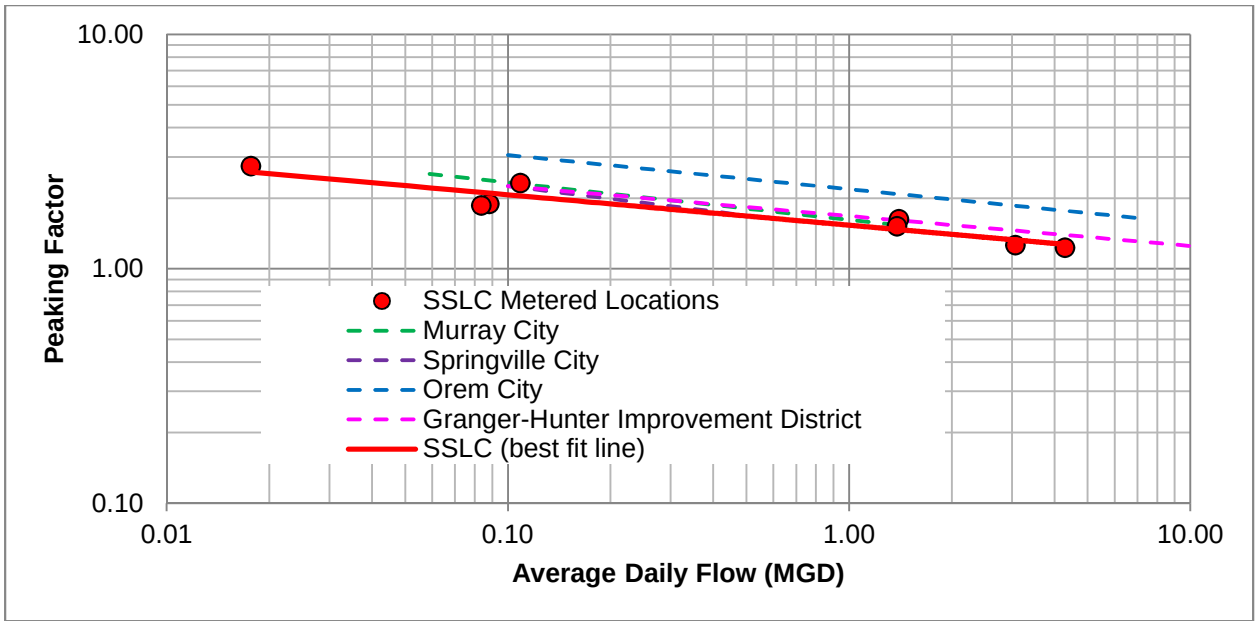


FIGURE IV-2 PEAKING FACTOR CITY COMPARISON

ANNUAL FLOW VARIATION

Wastewater systems can experience annual flow variation due to infiltration and other seasonal inflows such as irrigation or precipitation events. SSLC experiences a significant amount of annual flow variation due to infiltration and inflow. Daily flows from the SSLC sanitary sewer system between March 2013 and December 2013 were plotted against daily precipitation recorded at the Salt Lake International Airport on Figure IV-3 to determine the magnitude and variation of annual flows due to infiltration and inflow.

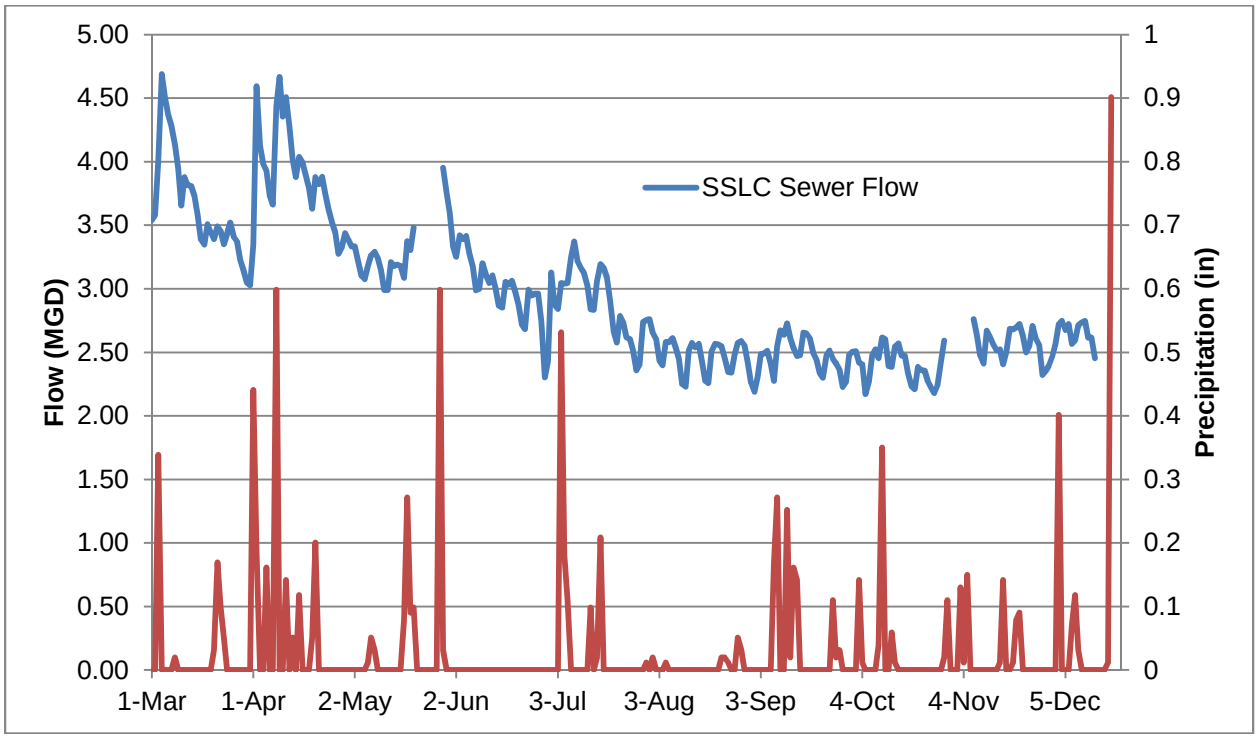


FIGURE IV-3 2013 SSLC SEWER FLOW VS. PRECIPITATION

The highest flows in the SSLC sanitary sewer system occur during significant precipitation events during the spring runoff when the water table is seasonally high. The existing system design flow was chosen to conservatively represent seasonally high flows seen in April.

According to R317-3-2, an average per capita per day flow rate of 100 gallons is required when sizing sewer pipes which "includes an allowance for infiltration/inflow." However, the actual flow, including baseflow, throughout the City exceeds the flow rate of 100 gallons per capita per day. A more conservative value representing measured baseflows during spring precipitation events was used in the SSLC sanitary sewer model.

Infiltration

Figure IV-4 shows hourly flow data during April of 2012. Water use in most systems is very minimal during the night. Therefore, the majority of flow below the lowest amount of system flow is made up of inflow and infiltration. This figure shows the large amount of baseflow, approximately 1.5 times as large as the fluctuation seen in the system.

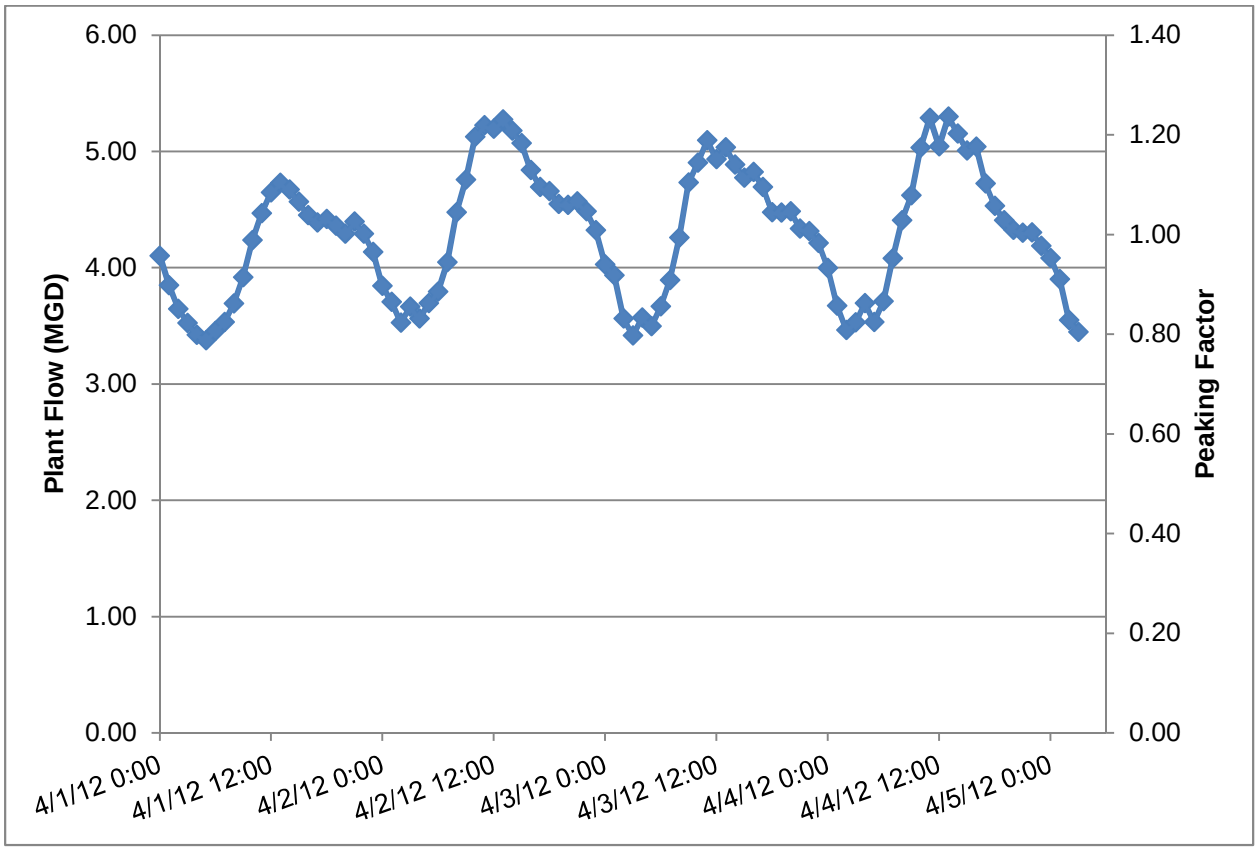


FIGURE IV-4 CVWRF HOURLY FLOWS FROM SSLC

Infiltration is defined as groundwater which enters a sewer system through pipe joints, cracks in the pipe, and leaks in manholes or building connections. Upon review of Figure IV-3 it is clear that high water table levels during the spring melt contribute to infiltration into the sanitary sewer system. Precipitation events that raise the water table contribute to infiltration.

Infiltration does not occur uniformly throughout the sanitary sewer system. The flow monitoring at the six different locations throughout the City showed that infiltration amounts depended upon the water table depth, proximity to surface water, sewer depth, and condition of the sewer pipe.

The average flow monitored was compared to the loading based on winter water use to determine the amount of baseflow (predominantly from infiltration).

Inflow

Inflow is defined as surface water that enters a sewer system (including building connections) through roof leaders, cellars, foundations, yards, area drains, cooling water discharges, manhole covers, cross connections from storm drains, etc. According to SSLC personnel, the wastewater collection system does experience inflow due to precipitation events. Inflow was especially noticeable during flow monitoring for the Market Station Sewer (Hansen, Allen, & Luce, Inc., 2008) when a precipitation event of 0.8 inches drastically peaked flows through the area. Although precipitation events did not affect the flow monitoring collected for this master plan, general precipitation inflow was accounted for when choosing a design flow for the model.

LONG TERM FLOW VARIATION

Average annual wastewater flows usually vary from year to year, although the variation between years is typically not extreme. The most predictable changes in average annual flows are typically associated with changes in population. Long term flow variations may also be caused by changes in weather patterns which may last several years.

Changes in weather patterns can result in changes in infiltration and water use patterns. Decreased precipitation results in lower groundwater levels and less infiltration. Water conservation measures implemented during droughts result in reduction in both indoor and outdoor water use. A reduction in indoor use results in less domestic wastewater. A reduction in outside use for watering lawns and gardens may lead to lowering of the groundwater table and less infiltration. Weather pattern changes are not expected to significantly impact the long term flow rates of the SSLC sanitary sewer system.

Population change is the largest factor in estimating long term flow variation. The population projection for SSLC for the year 2050 is 44,560 (GOPB, 2008). This population projection was used with the winter water meter usage and baseflow to assess the system's ability to handle future loading and design for new growth.

EXTRAORDINARY FLOWS

Extraordinary flows may include flow anomalies such as the "Superbowl Sunday halftime flush," and holidays such as Thanksgiving. According to Utah Regulation 317-3-2, "laterals and collectors shall be designed for 400 gallons per capita per day," and "interceptor and outfall sewers shall be designed for 250 gallons per capita per day." HAL was able to determine the peak loading per capita using the ERC per connection ratio in the Drinking Water System Master Plan, the average number of people per household, the design flow rates, and the diurnal curves created for the model. Peak flows were conservatively estimated to be above the state standards. Therefore, when considering extraordinary flows the April design flows were used to represent the projected peak flow for SSLC. Calculations of the per capita flow based on actual flow rates can be seen in Appendix B.

CHAPTER V

WASTEWATER FLOW PROJECTIONS

PLANNING PERIOD

It was determined that the planning period for the Sanitary Sewer Master Plan should match the planning period for the Drinking Water System Master Plan. Both Master Plans project system growth through the year 2050. To better manage Capital Improvement Projects, system deficiencies were identified for the 5, 10, 15, and 35 year loading conditions.

Years modeled included 2013 for existing loading conditions and 2050 for future conditions. Areas of future growth were designated in cooperation with City Staff during the creation of the Drinking Water System Master Plan. Growth is focused in areas of redevelopment called Transit Oriented Development (TOD) areas.

EXISTING CONNECTIONS AND LOADING

Wastewater typically consists of two components: sewage directly from the connection and inflow/infiltration. Wastewater loading was calculated using winter water use and the area contributing to each manhole to account for inflow and infiltration.

Drinking water usage data were obtained from SSLC and Salt Lake City for the winter of 2012-2013. Sewer billing data were also obtained from SSLC to show users that provide their own water through private wells and are connected to the SSLC sewer system. The drinking water usage data and sewer billing data were geocoded to create a point shapefile showing the address based location and the amount of winter water use.

Geocoded water use data were linked to sewer manholes based on relative location. The compiled water use data were used to represent direct sewer loads at each individual manhole. Monitoring data were used to determine inflow and infiltration loads at each manhole based on the size of the manhole's collection area.

Equivalent Residential Connections

Equivalent Residential Connection (ERC) is a measure used to compare flow from non-residential connections to residential connections. For example, a nonresidential connection that had a winter water bill with water usage twice that of the residential average would have an ERC of 2.

Direct calculation of ERCs for the SSLC sewer system proved to be difficult because the sewer system does not service the entire City and because the sewer system provides services to many commercial and industrial customers. Therefore, ratios developed in the Drinking Water System Master Plan were used to calculate ERCs for the sewer system. The Drinking Water System Master Plan found that there were approximately 1.91 ERCs per drinking water connection (Hansen, Allen, & Luce, Inc., 2013). The City has approximately 2,590 water meter connections that contribute to the sewer system. The water meter connections and ERC per connection ratio were multiplied to calculate 4,954 ERCs for the existing sewer system (See Appendix B for calculations).

ERCs were calculated to compare the overall system flow to the state standards seen in R317-3, but were not used to represent actual loads in the model. Model loads were created from water meter and calibration data.

CONNECTIONS PROJECTED IN 2050

Future loading projections were developed to match the future number of ERCs estimated in the Drinking Water System Master Plan (Hansen, Allen, & Luce, Inc., 2013). However, the state standards for drinking water are not directly applicable to sewer flows. State standards require an average loading of 100 gpcd for sewer design, which includes inflow and infiltration. However, redevelopment in the TOD areas is not expected to increase inflow and infiltration. In coordination with SSLC it was determined that 80 gpcd would realistically estimate average sewer use from future users. With approximately 2.5 people per household in SSLC (U.S. Census Bureau, 2010), it was determined that the future loading be 200 gallons per future ERC.

The TOD areas can be seen on Figure V-1. The number of estimated new ERCs contributing to the sewer system in the year 2050 based on growth estimated in the Drinking Water System Master Plan was calculated to be approximately 4,700 (Hansen, Allen, & Luce, Inc., 2013).

FLOW PROJECTIONS

Actual flow rates were compared to the state standards to determine which flow rates would be the most conservative for future and existing model loading. As mentioned above, 4,954 existing ERCs were calculated to be tributary to the sewer system. With approximately 2.5 people per household in SSLC a virtual existing population of 12,188 was calculated for the sewer system loading. The design flow for the model was approximately 4.3 MGD. Therefore, the average flow per capita in April of 2012 was 350 gpcd which can be compared to the state design standard of 100 gpcd. The peak flow at the outfall of the existing model was 5.2 MGD or 423 gpcd, which is greater than the state outfall standard of 250 gpcd and greater than the state lateral standard of 400 gpcd. The flow rates exceed the state standards significantly because of the very large amount of inflow and infiltration seen in SSLC. Past studies performed by HAL show that the average flow of 100 gpcd has an inflow and infiltration component of approximately one third of the direct wastewater from the customer. SSLC has an inflow and infiltration component estimated to be over 3 times the direct wastewater from customers during the spring runoff season. It was determined that actual flow data should be used as the design flow instead of the less conservative state standards due to inflow and infiltration.

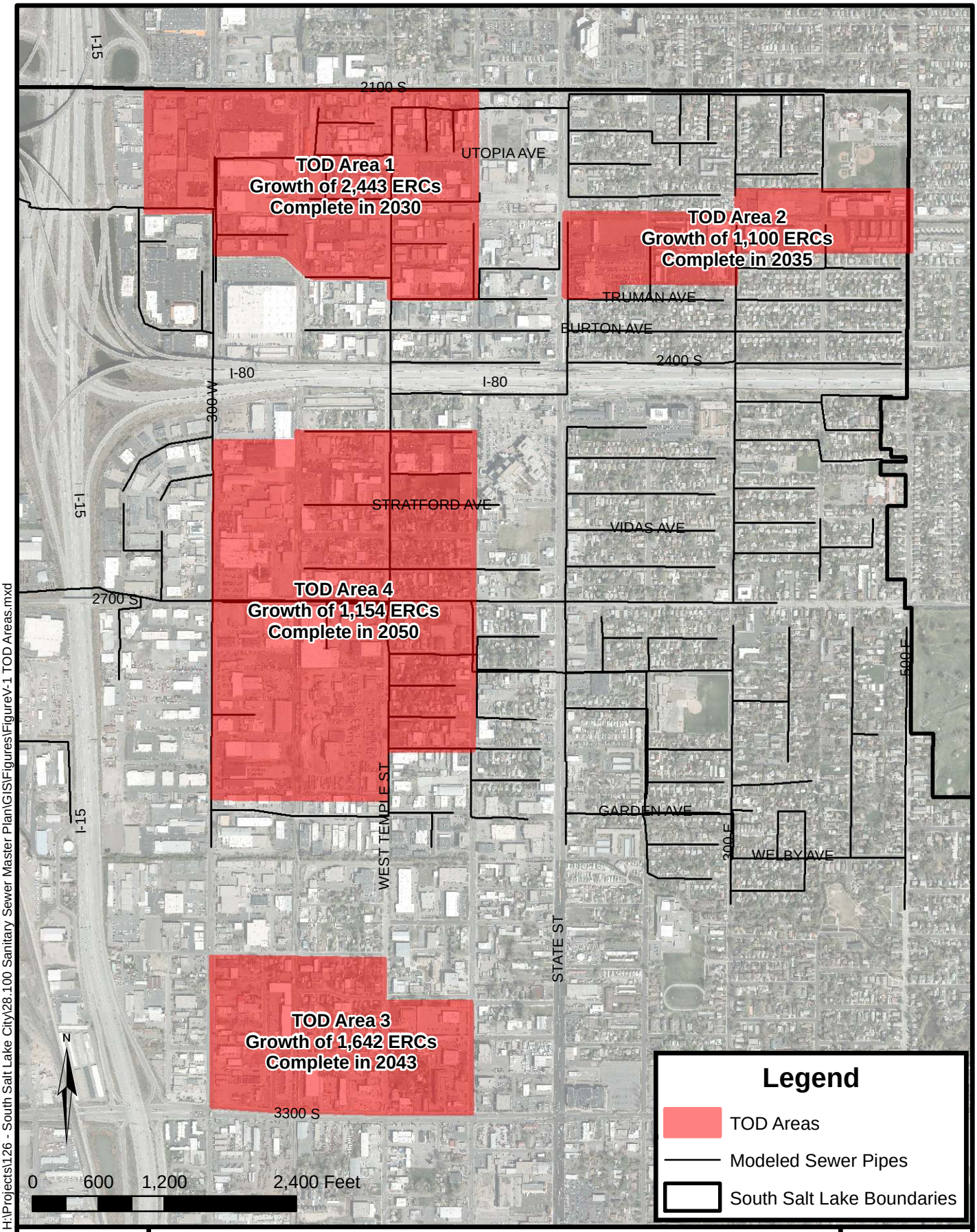
Table V-1 shows the existing and future flows per capita compared with the state standards seen in R317-3. The average flow per capita and peak flows were generated by the model using the calibrated system loading and the diurnal curves.

TABLE V-1
SYSTEM FLOW RATES

Flow Condition	Existing Model	State Standard
Average Flow per Capita (gpcd)	171	100
Peak Flow at Outfall per Capita (gpcd)	415	250
Peak Flow at Lateral per Capita (gpcd)	423	400

System Flow Projections

Sewer flow rates for 2050 from SSLC are projected to reach about 5.4 MGD from the current April flow rates of 4.3 MGD. It is important to note that flow rates to the plant fluctuate significantly throughout the year due to inflow and infiltration which can be seen in Figure IV-3.



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SSLC SANITARY SEWER MASTER PLAN
TRANSIT ORIENTED DEVELOPMENT (TOD) AREAS

FIGURE
V-1

April flows were conservatively selected as the design flow because of the large amount of inflow and infiltration. Central Valley Water Reclamation Facility is expected to have enough capacity to handle growth in SSLC through the year 2050.

Pump Station Flow Projections

Table V-2 shows the capacities of the pump stations compared to the future projected flow rates to the pump stations. Because no redevelopment is expected west of I-15, only flow rates to the Main Lift are expected to increase due to future growth. The projected design flows are expected to be within the capacity of each pump station. It is recommended that SSLC monitor flows to the pump stations in order to analyze pump capacities during precipitation events.

TABLE V-2
PUMP STATION FLOW RATE PROJECTIONS

ID	Pump Station	Pump Manufacturer	Capacity	Existing Modeled Peak Flow	Future Modeled Peak Flow
1	Main Lift	ABS	4,100 gpm	2,545 gpm	3,582 gpm
2	2280 S. Lift	Flygt	1,100 gpm	673 gpm	673 gpm
3	2610 S. Lift	Flygt	260 gpm	92 gpm	92 gpm

Projection Schedule

System ERC growth will occur at the same rate as the population growth seen on the Governor's Office of Planning and Budget Population Projects (GOPB, 2008). System growth over the planning horizon and at complete redevelopment of the TOD areas can be seen on Table V-3. Calculations of the year in which growth will be complete in the TOD areas can be seen in Appendix B. The projected growth completion year can also be seen on Figure V-1.

TABLE V-3
SYSTEM ERC PROJECTIONS

Projected Years	Approximate Year	Additional ERCs	Total ERCs	Description
0	2015	0	4,954	Existing System
5	2020	897	5,851	Partial Re-development in TOD 1
10	2025	746	6,596	Partial Re-development in TOD 1
15	2030	746	7,342	Partial Re-development in TOD 1
15.3	2030	55	7,397	Full Re-development in TOD 1
20.5	2035	1100	8,497	Full Re-development in TOD 2
28.8	2043	(1642) Out of Service Area	8,497	Full Re-development in TOD 3 Out of Service Area
35	2050	1,154	9,651	Full Re-development in TOD 4

As stated in the Scope, wastewater collection loads will be projected to 5, 10, 15, and 35-year planning horizon. However, capacity issues and projects will be determined by the completely re-developed TOD areas instead of the less conservative 5, 10, 15, and 35-year planning horizons.

CHAPTER VI

WASTEWATER COLLECTION SYSTEM EVALUATION

MODEL SELECTION

It was decided by HAL and South Salt Lake's personnel to use Autodesk Storm and Sanitary Analysis (SSA) Model for the Master Plan because of the model's ability to import GIS data, export models to EPA SWMM, and because the model runs on an Autodesk platform.

SYSTEM LAYOUT

The layout of the wastewater collection system was provided by SSLC based on a GIS data inventory of the collection system. A map of the SSLC wastewater collection system, as included in the model, is shown on Figure II-1. Wastewater loading allocation within the model was performed using GIS. Billing addresses were used to link winter drinking water meter demand data to meter location, which were then linked to sewer manholes as a load. Inflow and infiltration loads were determined using flow data from the monitoring locations and the size of each manhole's collection area. HAL met with SSLC personnel to determine flow direction in locations with bypass pipes and multiple connections. HAL also collaborated with SSLC to retrieve additional system data during the model creation.

Pipe and manhole data were imported into the SSA model from GIS Shapefiles. The SSA files were exported to an EPA SWMM format and are on a CD in Appendix C. Some of the smaller collectors and laterals were not modeled because of the lack of survey data for less significant manholes (see Figure III-1).

MODELING CRITERIA

A range of potential modeling criteria and values were suggested by HAL and reviewed by SSLC. The criteria and values adopted for this modeling effort are included in Table VI-1.

TABLE VI-1
MODELING CRITERIA

CRITERIA	VALUE OR ASSUMPTION
System Loading	System loading was developed using winter water use data for each meter and inflow/infiltration based on the tributary area of each manhole with flow data for collection areas. This was determined to be more conservative than the design unit flow of 100 gpcd per State Code R317-3-2.
Daily Flow Variation	Diurnal curves were developed from flow monitoring (see Figure IV-1)
Peak Flow	Peaking factors were developed with diurnal curves and peak flows were developed from the AutoCAD SSA model
Inflow and Infiltration	SSLC experiences very significant inflow and infiltration due to the seasonal water table fluctuation and precipitation. Inflow and infiltration were estimated using meter data for collection areas and the size of areas tributary to each manhole.
Extraordinary Flows	Due to the significant amount of inflow and infiltration, extraordinary flows were modeled using a design flow representative of a high water table with a recent precipitation event. The design flow, based on historic flows, was determined to be more conservative than the state standards of 400 gpcd for laterals and 250 gpcd for interceptors (R317-3-2).

(TABLE VI-1 CONTINUED)

CRITERIA	VALUE OR ASSUMPTION
Model Calibration	The model was calibrated by comparing the modeled flow rates to the measured flow rates at the metered locations throughout the City
Planning Period	~5 years, ~10 years, ~15 years, ~35 years (2020, 2025, 2030, 2050)
Land Use & Population Projections	Provided by SSLC for the 2013 Drinking Water System Master Plan (Hansen, Allen, & Luce, Inc., 2013)
Wastewater Flow Projections	Estimated from future ERC projections from the Drinking Water System Master Plan and created using 80 gpcd as the average flow to eliminate the inflow and infiltration component, with the residential diurnal curve to estimate the peak flow rates
Pipe Capacity	Roughness Coefficient = 0.013 Manning's n Recommended Maximum d/D = 0.75 for pipe diameters over 12 inches Recommended Maximum d/D = 0.50 for pipe diameters 12 inches and less
Pipe Velocity	Sewer pipe design generally recommends slopes where flows reach a velocity of 2 fps during high flow periods to remove any deposited sediment in the pipe. However, because of the age of the SSLC sewer system and minimal elevation drop across the system, many pipes in the system do not experience velocities of 2 fps during normal operations. Existing connections make it implausible to change slopes in most areas. Therefore, sediment deposition is managed through system cleaning instead of flow velocity.
Pump Stations	Pump types and curves were provided by the City in the Operation and Maintenance Manual (Hansen, Allen, & Luce, Inc., 2010). Because the two larger pumps in the system have variable speed drives, they were modeled as theoretical pumps.

MODEL CALIBRATION

Model calibration includes comparing hydrographs generated by the model with actual flows measured in the collection system, followed by making adjustments to the model to better reflect measured flows. The model was calibrated to December 2013 flow rates to match the metering data and then was amplified and calibrated to April 2013 flows to match the overall system flow to the design flow. As discussed in Chapter III, flow data observations and the total wastewater flow were available at each of the flow monitoring sites. Flow monitoring locations can be seen on Figure III-1. Graphs showing the measured flows compared to metered flows can be seen in Appendix A.

Metered Location R1

Metering at this location was not used to determine diurnal curves, but was used to determine the total flow to pump station 2 (2280 South Lift), especially the inflow and infiltration component. Flow in this area is often sporadic due to use pattern variations in industrial areas.

Metered Location T12

Metering at this location was used to determine the diurnal curve for commercial areas as well as amounts of inflow and infiltration for the area. Variations between weekend and weekday commercial usage are easily seen at this location. This site also has a bypass pipe connected to pipes in 2700 S. No extreme bypass flows were noticed in the metering data. The model reflects the recorded flows closely at this site.

Metered Location W13

Metering at location W13 was used to determine inflow and infiltration contributing to the 2700 S pipeline. This location was not used to determine diurnal curve because of the mixed water use contributing to this site, but the meter data give an honest assessment of the validity of the diurnal curves and system loading.

Metered Location W20-1

Metering at location W20-1 was used to develop diurnal curves for commercial use areas. The model hydrographs for this area very closely match the meter data at this site. Because of the low flow at this location, some metered peaks exceed the model hydrograph but do not represent general flow patterns.

Metered Location W38

Metering at location W38 was used to develop diurnal curves for residential use areas. Flow data at this site show the variation in use between weekday and weekends. The model flows closely match the metered flows at this site.

Metered Location X22

This metering location used a Sigma 910 meter while monitoring flow while the other locations used Flo-Dar. Data from the Sigma 910 had more “noise” or unstable readings than the Flo-Dar meters, so the data were only used to determine inflow and infiltration.

Other Metering

Meter data from CVWRF were used to determine system-wide sewer loads. Flow was also metered at 48 East Robert Avenue and in West Temple underneath I-80 to verify flow amounts projected in flagged problem areas.

MODEL SCENARIOS

Four modeling scenarios were developed and evaluated for the SSLC wastewater collection system as shown in Table VI-2.

TABLE VI-2
MODEL SCENARIOS

SCENARIO	DESCRIPTION
Existing	The Existing scenario was used to identify deficiencies in the wastewater collection system under April and December 2013 development conditions, and to establish a baseline for evaluation of future conditions.
Future	The Future scenario was used to identify deficiencies in the wastewater collection system under 2050 development conditions.
Projects	This scenario was used to verify the effectiveness of the primary capital improvements recommended in Chapter VIII under 2050 development conditions.
Upsize	This scenario was used to verify the effectiveness of alternative capital improvements recommended in Chapter VIII under 2050 development conditions.

EXISTING DEFICIENCIES

Deficiencies were identified through modeling, past maintenance, and CCTV inspections. Pipe capacity deficiencies identified in the Existing Scenario model are summarized in Table VI-3. Maintenance issues noted by SSLC personnel are summarized in Table VI-4. Deficiencies with an ID starting with "CE" refer to an existing capacity deficiency. Deficiencies with an ID starting with "M" refer to a maintenance issue. Pipe capacity deficiencies and maintenance issues are shown on Figure VI-1.

Many of the maintenance issues are due to low velocities. In places where the maximum pipe velocity is less than 2 feet per second, sediment will begin to settle out of the flow. Figure VI-2 shows the existing maximum pipe velocities from the model and the maintenance issues. The figure demonstrates the many low velocities throughout the entire system. Due to elevation restrictions, replacement of the pipes will not always increase the maximum velocities. Therefore, it is recommended that SSLC continue their system cleaning schedule to manage sedimentation in the system, with select locations cleaned more frequently as needed.

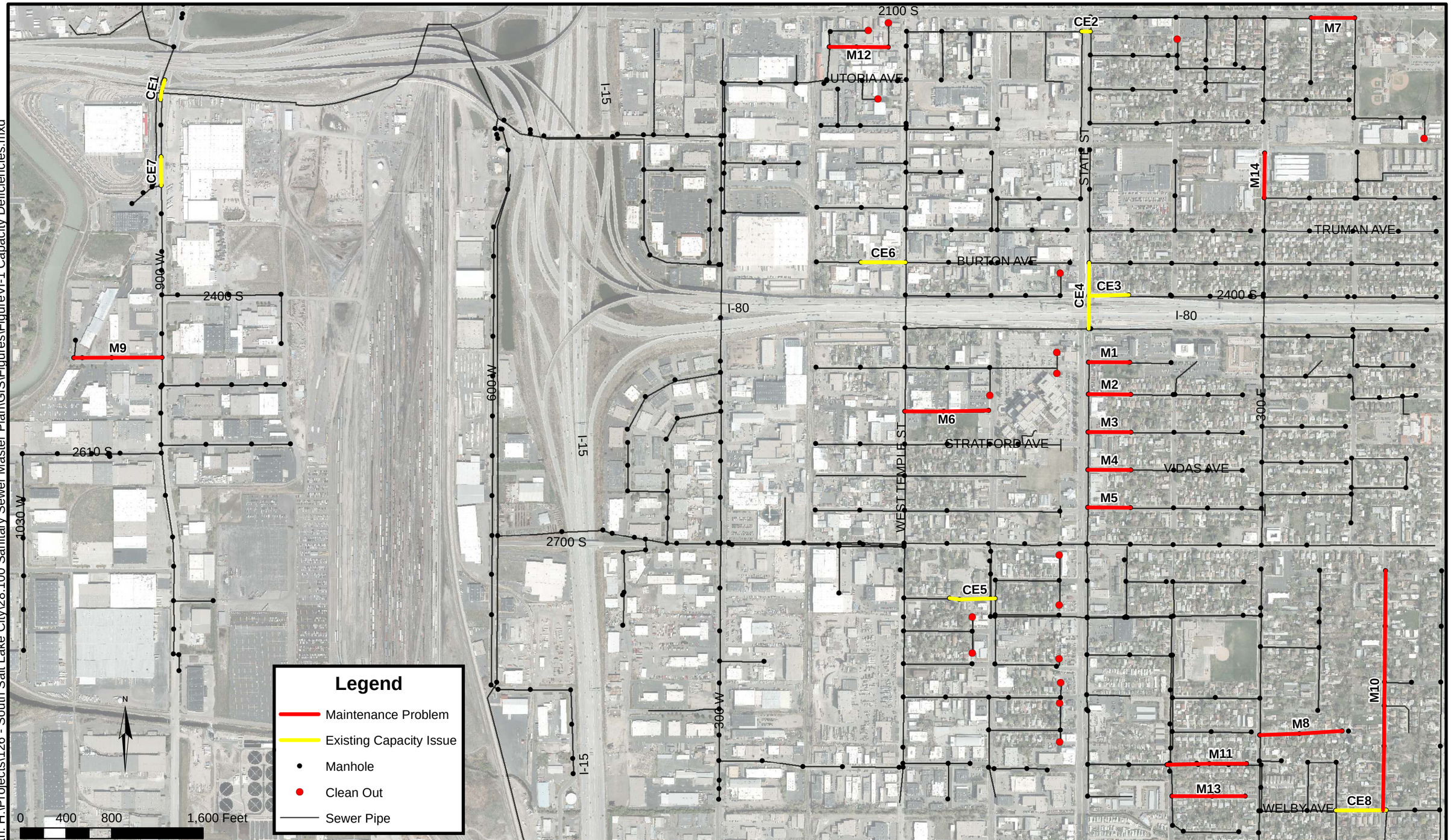
According to the repair data from SSLC there are 9 pipes which need to be replaced (3,170 ft), 60 pipes which need liners (18,025 ft), and 39 pipe which need point repairs (244 ft of repair lengths). The repair locations can be seen on Figure VI-3.

The maximum depth ratio is the ratio of the maximum depth in the pipe and the diameter of the pipe. The maximum depth ratio was collected from the Existing Model and was used to evaluate the capacity of the pipe. A flow depth of 50% is considered full for sewers 12 inches in diameter and smaller while a flow depth of 75% is considered full for sewers larger than 12 inches in diameter.

TABLE VI-3
EXISTING PIPE CAPACITY DEFICIENCIES

ID	LOCATION	DIAMETER LENGTH	ISSUE	MAX DEPTH RATIO
CE1	900 West and approximately 2200 South at manhole R2-3	8-in 175 ft	Manhole elevation creates flatter slopes and concerning depths in the manhole	0.57 (Manhole)
CE2	State Street and approximately 2125 South	12-in 80 ft	Minor adverse slope creates capacity issues across State St.	0.51
CE3	2400 South from 50 East to State St.	8-in 350 ft	Higher flows create capacity issues	0.51
CE4	State St. from Burton Ave. to Robert Ave.	10-in 575 ft	Flatter slopes and higher flows create capacity issues	0.52, 0.55*
CE5	Shelley Ave. from Main St. to 50 West	8-in 400 ft	Flatter slopes create minor capacity issues	0.54, 0.55*
CE6	Burton Ave. from 150 West to West Temple St.	8-in 395 ft	Flatter slopes create minor capacity issues	0.59
CE7	900 West from approximately 2200 South to 2225 South	8-in 250 ft	High flows create capacity issues	0.60
CE8	Welby Ave from Adams Cir. to Blair St.	8-in 445 ft	Flatter slopes create minor capacity issues	0.63, 0.52*

*Multiple Max Depth Ratios for multiple pipes. Ratio ranges from upstream to downstream are shown.



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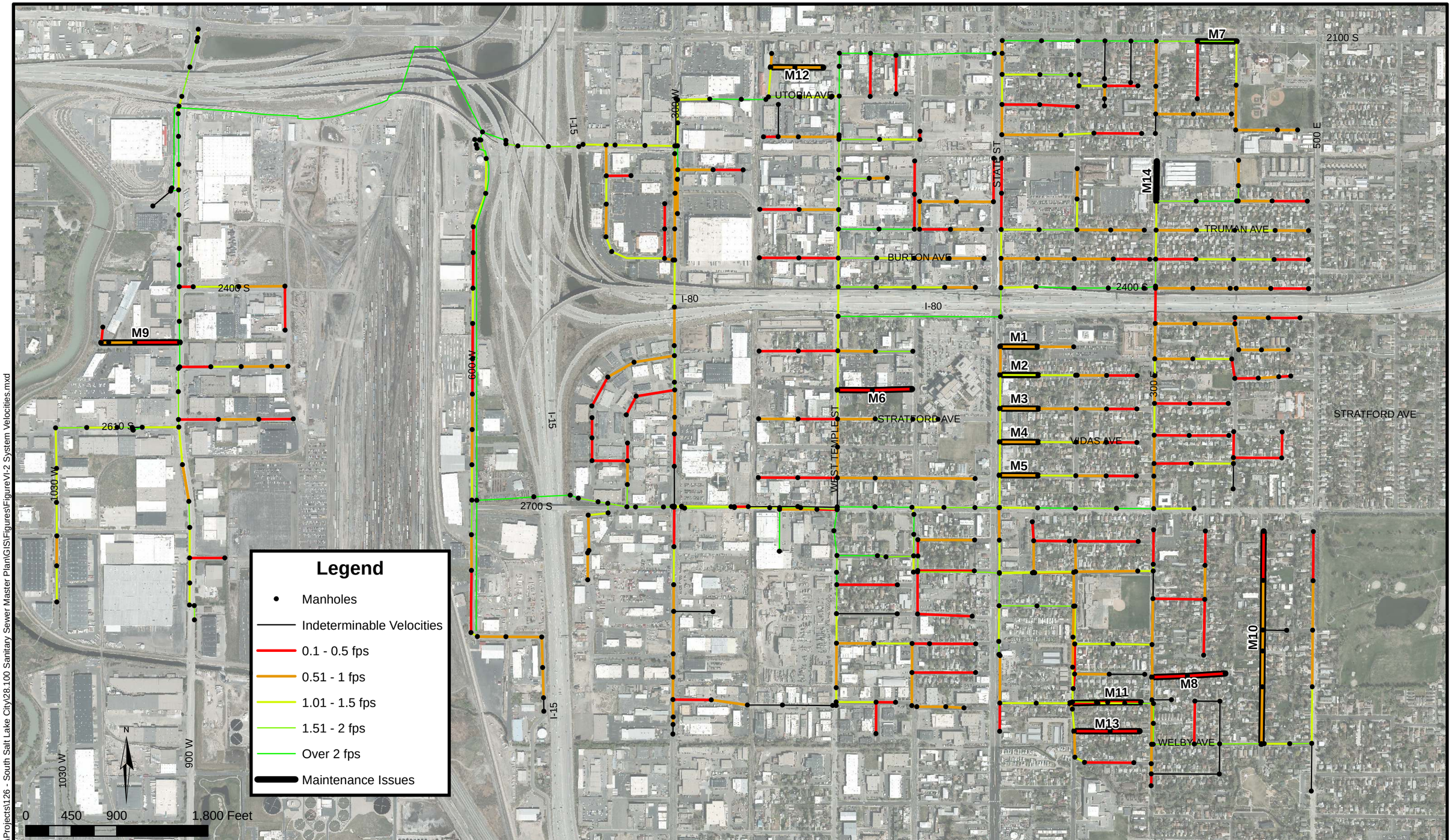
HANSEN ALLEN & LUCE INC ENGINEERS

SOUTH SALT LAKE CITY
SANITARY SEWER MASTER PLAN

EXISTING CAPACITY DEFICIENCIES AND MAINTENANCE ISSUES

FIGURE VI-1



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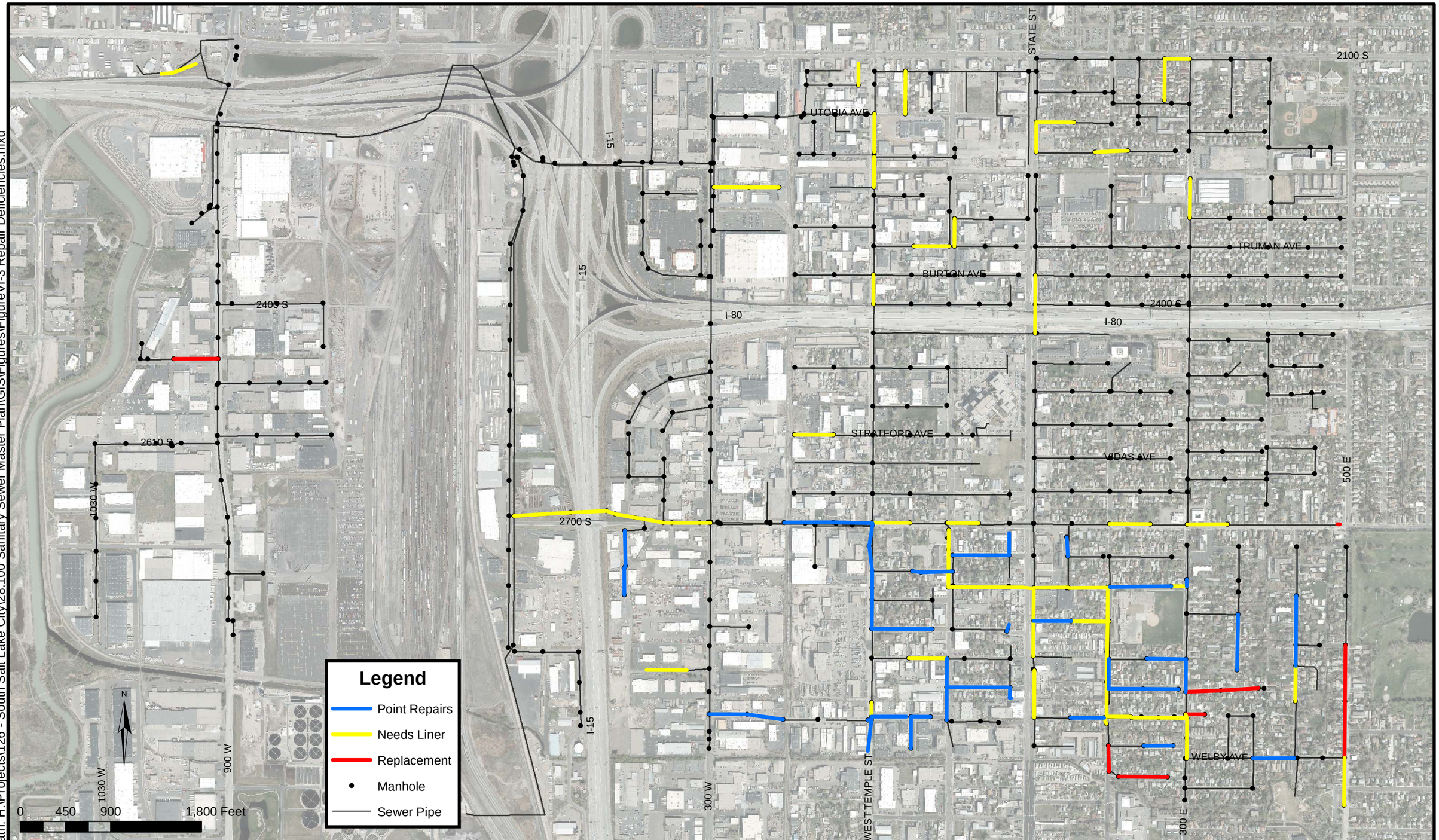
SOUTH SALT LAKE CITY
SANITARY SEWER MASTER PLAN

EXISTING SYSTEM VELOCITIES

FIGURE
VI-2



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HANSEN ALLEN & LUCE inc ENGINEERS

SOUTH SALT LAKE CITY
SANITARY SEWER MASTER PLAN

REPAIR ISSUES

FIGURE VI-3

TABLE VI-4
EXISTING MAINTENANCE ISSUES

ID	LOCATION	DIAMETER LENGTH	MAINTENANCE ISSUES
M1	Oakland Ave. from 150 East to State St.	8-in 360 ft	Flat slope and presence of roots require frequent cleaning
M2	Whitlock Ave. from 150 East to State St.	8-in 370 ft	Flat slope requires frequent cleaning
M3	Beryl Ave. from 150 East to State St.	8-in 375 ft	Flat slope requires frequent cleaning
M4	Vidas Ave. from 150 East to State St.	8-in 375 ft	Flat slope requires frequent cleaning
M5	Leslie Ave. from 150 East to State St.	8-in 375 ft	Flat slope requires frequent cleaning
M6	Whitlock Ave. from Main St. to West Temple St.	8-in 735 ft	High grease load requires frequent cleaning
M7	2100 South from 400 East to Blair St.	8-in 385 ft	Flat slope requires frequent cleaning
M8	Maxwell Ln. from 400 East to 300 East	8-in 725 ft	Flat slope requires frequent cleaning
M9	Beardsley Pl. from 1000 West to 900 West	8-in 775 ft	Flat slope requires frequent cleaning
M10	Adams St. from 2725 South to Welby Ave.	8-in 2,095 ft	Flat slope requires frequent cleaning
M11	Garden Ave. from 290 East to 200 East	8-in 700 ft	Flat slope requires frequent cleaning
M12	Commonwealth Ave. from 125 East to 175 East	8-in 520 ft	High grease load requires frequent cleaning
M13	Welby Ave. from 290 East to 200 East	8-in 645 ft	Flat slopes and high grease load require frequent cleaning
M14	300 East from 2200 South to Haven Ave.	8-in 390 ft	60 ft long belly in pipe requires frequent cleaning

FUTURE DEFICIENCIES

The deficiencies identified in the Future Scenario model are predicted problems that will occur if development occurs as projected by the City, without system improvements. Pipe capacity deficiencies identified in the future scenario model are shown on Figure VI-4 and summarized in Table VI-5. All of the previously identified existing deficiencies, maintenance issues, and repair issues are also problems in the future scenarios although they may not be individually specified. The maximum depth ratios of existing deficiencies are often larger for future deficiencies due to increased flow from future redevelopment. Deficiencies with an ID starting with “CF” refer to a future capacity deficiency.

TABLE VI-5
FUTURE DEFICIENCIES

ID	LOCATION	DIAMETER LENGTH	ISSUE	MAX DEPTH RATIO
CF1	900 West and approximately 2200 South at manhole R2-3	8-in 175 ft	Manhole elevation creates flatter slope and concerning depths in the manhole	0.57 (Manhole)
CF2	State Street and approximately 2125 South	12-in 80 ft	Minor adverse slope creates minor capacity issues across State St.	0.58
CF3	2400 South from 250 East to State St.	8-in 1,065 ft	Higher flows create capacity issues	0.50, 0.73*
CF4	State St. from Haven Ave. to Robert Ave.	8-in, 10-in 1,220 ft	Flat slopes and higher flows create capacity issues	0.61, 0.77*
CF5	Shelley Ave. from Main St. to 50 West	8-in 400 ft	Flatter slopes create minor capacity issues	0.55
CF6	Burton Ave. from 150 West to West Temple St.	8-in 391 ft	Flatter slopes create minor capacity issues	0.67
CF7	900 West from approximately 2200 South to 2225 South	8-in 250 ft	High flows create minor capacity issues	0.60
CF8	Welby Ave from Adams Cir. to Blair St.	8-in 445 ft	Flatter slopes create minor capacity issues	0.63, 0.52*
CF9	Robert Ave. from State St. to West Temple St.	10-in 1,610 ft	High flows create minor capacity issues	0.54
CF10	300 East from Haven Ave. to Burton Ave.	8-in 575 ft	Flatter slopes create minor capacity issues	0.62, 0.66*
CF11	Truman Ave. from 150 East to State St.	8-in 375 ft	Minor Capacity Issue – Downstream depths create backwater effect	0.69
CF12	State St. from 2100 South to 2125 South	12-in 125 ft	High flows and downstream issues create minor capacity issue	0.50
CF13	West Temple from Senior Way to 2260 South	18-in 80 ft	High flows and flat slope create capacity issue	0.76

*Multiple Max Depth Ratios for multiple pipes. Ratio ranges from upstream to downstream are shown.

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SOUTH SALT LAKE CITY
SANITARY SEWER MASTER PLAN

FUTURE CAPACITY DEFICIENCIES

FIGURE
VI-4

CHAPTER VII

IMPROVEMENT ALTERNATIVES & PROJECTS

SYSTEM AGING

Pipe age can be used to identify areas that might require more repairs. The typical design life for a sanitary sewer is between 50 and 100 years. Factors affecting design life may include pipe material, soil conditions and quality of construction. Because of the variability of these factors, it is difficult to determine the condition of the wastewater collection system based on age alone. SSLC uses sewer video inspection technology to evaluate the structural integrity of the pipes in the sewer network. SSLC personnel record the sewer network every four years. Sewer video inspection is very useful at identifying cracks, holes, offset joints, erosion, low points in pipes, and significant inflow/infiltration. It is recommended that SSLC continue the system video schedule and use the inspection to plan for future repair projects.

PIPELINE IMPROVEMENTS

The following improvement alternatives are typically considered when addressing pipeline deficiencies.

Cleaning

If the slope of the pipe is insufficient to provide adequate flow velocity, deposition of solids will occur. Solids deposition lessens pipe capacity. Many locations in SSLC are relatively flat where sewers have slopes less than desired. It is recommended that SSLC continue their cleaning schedule where the entire system is cleaned every other year, with specific locations being cleaned more frequently as needed.

Clean outs are sometimes installed to clean sewer pipes. However, cleanouts are easily buried or often become unusable. Access manholes are preferred for cleaning and maintenance purposes. According to the GIS data provided by the city, there are 17 locations through the system where sewer laterals dead-end without an access manhole. It is recommended that access manholes be installed at any clean out locations for cleaning and maintenance purposes. The locations of the clean outs can be seen on Figure VI-1.

Replacement Sewers

Historically, where pipe capacity has been identified as being insufficient, the typical solution has been to provide additional capacity by replacing the existing sewer with a larger sewer. Several of the recommended projects are replacement projects.

Bypass Sewers/Re-routing Flows

While replacement of an existing sewer may be appropriate when the existing sewer is structurally inadequate, construction of a bypass or parallel sewer to supplement the capacity of the existing sewer is generally a less expensive alternative.

SSLC has several existing locations where bypass sewer connections allow excessive flow to be carried in alternate sewer lines.

New Sewers

New sewers are often the only option to collect flows from future development or previously inaccessible areas. Because future growth in SSLC is expected to occur in areas of the City with existing sewer networks, new sewer networks are not necessary in SSLC for the foreseeable future.

Alternative Construction Technologies

Within the last few years, several alternative technologies have become popular when sewers need to be replaced, when pipeline capacity needs to be increased, or when there are significant constraints to more conventional construction methods. Typical alternative technologies include:

<u>New Construction</u>

- Steered Auger Boring (Directional Drilling)
- Micro-tunneling

<u>Sewer Pipe Rehabilitation</u>

- Cured-in-Place Pipe
- Slip Lining
- Pipe Bursting
- Pipe Eating
- Thermoforming (Fold and Form)

A description of these alternative construction technologies is included in Appendix D.

COMPARISON OF IMPROVEMENT ALTERNATIVES

Sewers

For the purposes of this report, most of the sewer replacements were assumed to be open-cut to provide conservative cost estimates for budgeting purposes. Locations where alternative construction methods were assumed are specified. Replacement sewers, bypass sewers and re-routing of flow were discussed with the City and recommendations were made on a case by case basis.

Pump Stations

The three pump stations in SSLC have sufficient capacity with the design April flow for both existing and future scenarios. However, the design flows were determined from daily flow data for 2013 which are not refined enough to show sudden peaks from direct precipitation inflow. No significant precipitation events occurred during the calibration metering period. Therefore, sudden peaks due to direct inflow during precipitation events are still a concern. It is recommended that SSLC install meters at pump stations 1 and 2 to monitor flows during significant precipitation events. Peak inflows should be compared to the existing capacity of the pump stations.

Efforts should also be made to identify any cross connections between storm drains and the sewer system. Some cities implement smoke detection programs to find illegal or old drain

connections. However, smoke detection can be controversial and is generally viewed negatively by the public. Any use of smoke detection should include a strong public awareness campaign to inform the public of the process.

Future Considerations

During design of the recommended improvements, the City will review all assumptions, compare improvement alternatives, and will decide on the most cost-effective and appropriate improvement method at that time.

RECOMMENDED SYSTEM PROJECTS

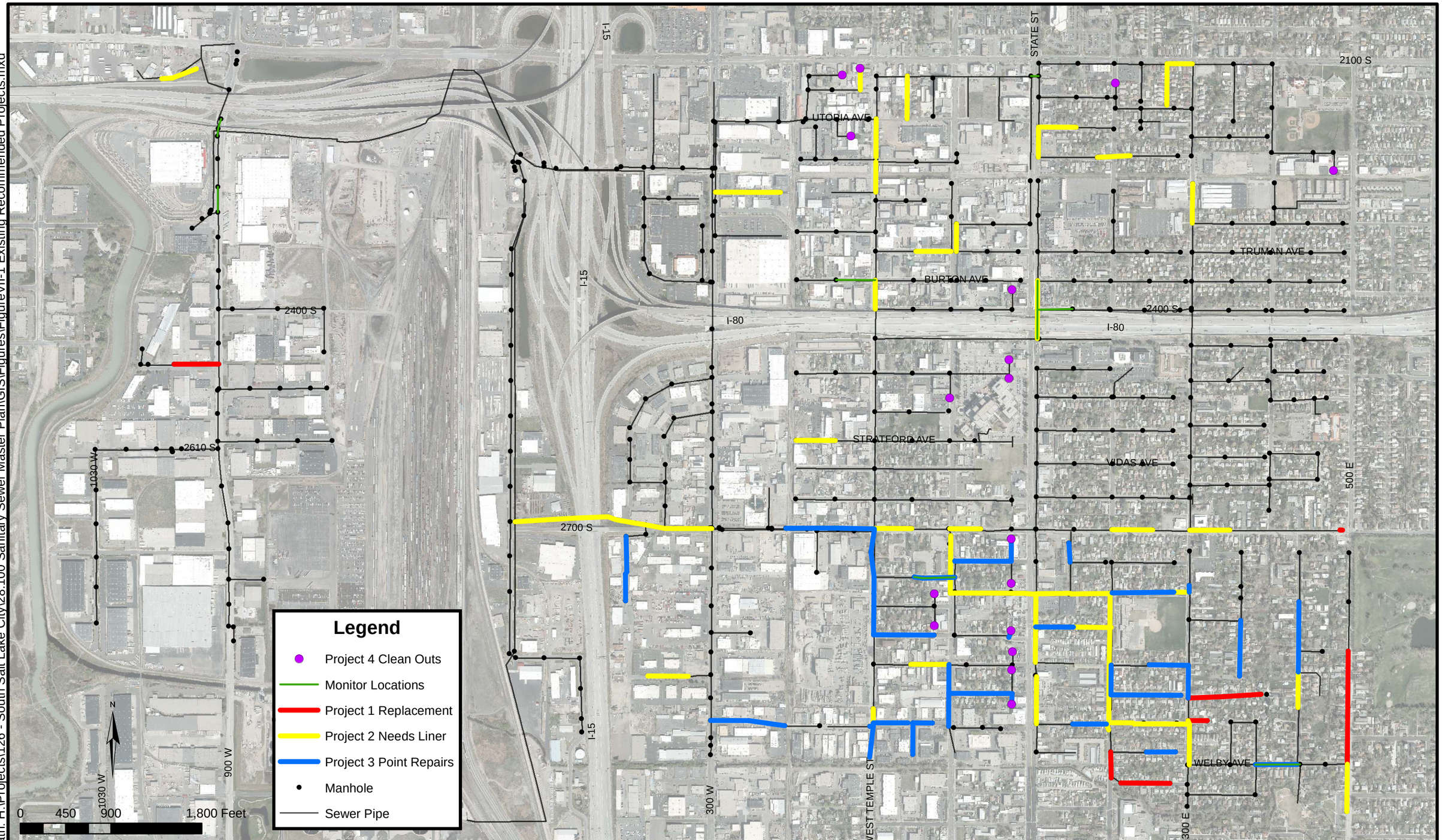
Tables VII-1 and VII-2 present the suggested projects to solve existing and future deficiencies in the City. The projects can also be seen on Figures VII-1 and VII-2.

Priority of the existing recommended projects should be determined by the severity of the problem and the severity of the system impact if a failure occurred. The project priority should be determined by the Wastewater Department Supervisor in conjunction with the mapping and additional projects provided in this Master Plan. HAL recommends that the projects be completed within the designated time frame phase. The rate study should be consulted to determine funding availability and to verify project timing for the existing recommended projects.

TABLE VII-1
EXISTING RECOMMENDED PROJECTS

PROJECT ID	DESCRIPTION	SOLUTION	ADDRESSED DEFICIENCY	PHASE
1	Replace 3,170 feet of pipe identified by SSLC at approximately 9 different locations	Replacement	Repair Issues	5-yr
2	Install liner in 18,025 feet of pipe identified by SSLC at approximately 60 different locations	Liner	Repair Issues	5-yr
3	Repair approximately 73 different locations in need of point repairs as identified by SSLC	Point Repair	Repair Issues	5-yr
4	Replace 17 clean outs with access manholes	Replacement	Maintenance	35-yr
5	Monitor minor capacity issues identified in existing deficiencies. If issues become significant, implement future recommended project	Monitor	CE1-CE8	Ongoing

The future recommended projects are comprised of A alternatives and B alternatives (denoted after the Project ID with an “a” or “b”). A alternatives are preferred due to the lower cost. However, some of the B alternatives may prove to be more beneficial over the A alternatives if complications arise with the A alternative or if the B alternative coincides with a repair or maintenance issue.



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SOUTH SALT LAKE CITY
SANITARY SEWER MASTER PLAN

EXISTING RECOMMENDED PROJECTS

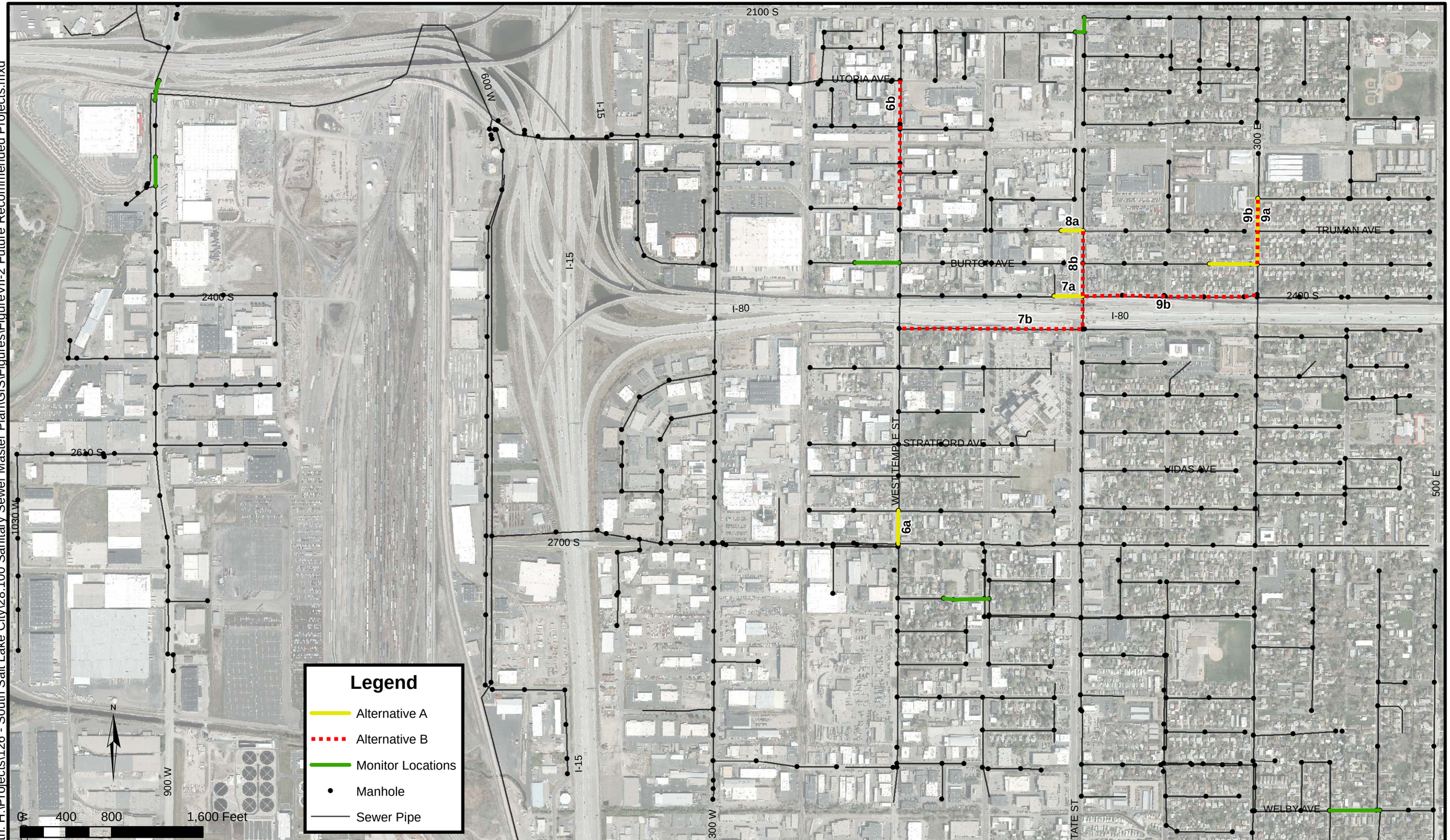
FIGURE
VII-1

TABLE VII-2
FUTURE RECOMMENDED PROJECTS

PROJECT ID	DESCRIPTION	SOLUTION	ADDRESSED DEFICIENCY	PHASE
6a	Replace 292 ft of 15-in pipe in West Temple St. from Malvern Ave. to 2700 South to reverse the grade so that Malvern Ave. flows to 2700 South	Change Slope/Re-Routing	CF13	15-yr
6b	Replace 1,121 ft of 18-in pipe with 24-in pipe in West Temple St. from Haven Ave. to Utopia Ave. to increase pipe capacity, repair cracks, and prevent I&I	Increase Diameter	CF13 Liner Repairs	15-yr
7a	Install 252 ft of 8-in pipe across State St. in 2400 South using trenchless technology to divert partial flows west	New Pipe/Re-Routing	CF3, CF4, CF9	15-yr
7b	Replace 1,608 ft of 10-in pipe with 12-in pipe in Robert Ave. from State St. to West Temple to increase pipe capacity	Increase Diameter	CF4, CF9	15-yr
8a	Install 193 ft of 8-in pipe across State St. in Truman Ave. using trenchless technology to divert partial flows west	New Pipe/Re-Routing	CF4, CF11	15-yr
8b	Replace 862 ft of 10-in and 8-in pipe with 12-in pipe in State St. from Truman Ave. to Robert Ave. to increase pipe capacity, repair cracks, and prevent I&I	Increase Diameter	CF3, CF4, CF11 Liner Repairs	15-yr
9a	Replace 995 ft of 8-in pipe in 300 East from Haven Ave. to Burton Ave. and in Burton Ave. from 300 East to 250 East to increase the grade and re-route flows west	Change Slope/Re-Routing	CF10	15-yr
9b	Replace 575 ft of 8-in pipe with 10-in pipe in 300 East from Haven Ave. to Burton Ave and replace 1,531 ft of 8-in pipe with 10-in pipe in 2400 South from 300 East to State St to increase pipe capacity	Increase Diameter	CF3, CF10	15-yr
10	Monitor minor issues identified in future deficiencies. If issues become significant, increase pipe capacity or re-route flows to alleviate issues	Monitor	CF1, CF2, CF5, CF6, CF7, CF8, CF12	Ongoing

Recommended Project Schedule

As discussed in Chapter V, the rate of growth of the future ERCs will match the rate of growth of the population (GOPB, 2008). As growth in one TOD area is completed, it is expected to continue in the next TOD area. Therefore, projects due to growth in an area need to be completed before growth starts in that area. All projects due to growth are due to TOD Area 2's Growth. Growth is expected to stop in TOD area 1 and continue into the TOD area 2 in 15 years (2030), so the dependent projects should be completed before the year 2030.



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SOUTH SALT LAKE CITY
SANITARY SEWER MASTER PLAN

FUTURE RECOMMENDED PROJECTS

FIGURE
VII-2

CHAPTER VIII

CAPITAL IMPROVEMENTS PLAN

ACCURACY OF COST ESTIMATES

When considering cost estimates, there are several levels or degrees of accuracy, depending on the purpose of the estimate and the percentage of detailed design that has been completed. The following levels of accuracy are typical:

Type of Estimate	Accuracy
Master Plan	-50% to +50%
Preliminary Design	-30% to +30%
Final Design or Bid	-10% to +10%

For example, at the master plan level (or conceptual or feasibility design level), if a project is estimated to cost $1,000,000, then the accuracy or reliability of the cost estimate would typically be expected to range between approximately $500,000 and $1,500,000. While this may not seem very accurate, the purpose of master planning is to develop general sizing, location, cost and scheduling information on a number of individual projects that may be designed and constructed over a period of many years. Master planning also typically includes the selection of common design criteria to help ensure uniformity and compatibility among future individual projects. Details such as the exact capacity of individual projects, the level of redundancy, the location of facilities, the alignment and depth of pipelines, the extent of utility conflicts, the cost of land and easements, the construction methodology, the types of equipment and material to be used, the time of construction, interest and inflation rates, permitting requirements, etc., are typically developed during the more detailed levels of design.

At the preliminary design level, some of the aforementioned information will have been developed. Major design decisions such as the size of facilities, selection of facility sites, pipeline alignments and depths, and the selection of the types of equipment and material to be used during construction, will typically have been made. At this level of design the accuracy of the cost estimate for the same $1,000,000 project would typically be expected to range between approximately $700,000 and $1,300,000.

After the project has been completely designed, and is ready to bid, all design plans and technical specifications will have been completed and nearly all of the significant details about the project should be known. At this level of design, the accuracy of the cost estimate for the same $1,000,000 project would typically be expected to range between approximately $900,000 and $1,100,000.

PROJECT COST ESTIMATES

As discussed in Chapter VII, for cost estimating purposes it was assumed that most of the sewer improvements would be completed utilizing conventional (open-cut) construction.

Typical representative unit costs were used to develop the project construction cost estimates. Sources of typical unit costs included HAL's bid tabulation records for similar recent projects in Utah, and the RS Means 2014 Heavy Construction Cost Data. SSLC provided cost estimates for select projects. Project cost estimates and related material are included in Appendix E.

RECOMMENDED IMPROVEMENT PROJECTS

Development of the recommended improvement projects includes consideration of a number of factors including the following:

- Input by City sewer system operation personnel regarding their experience with, and opinions regarding, the deficiency and potential solutions
- Input from City management regarding a wide range of issues including: development schedules, budgeting issues, coordination with other public works projects, etc.
- Priority indicated by the consulting engineer's modeling efforts and by the operational personnel's experience with the repair projects
- Consulting engineer's project cost estimates

Tables VIII-1 through VIII-4 identify the recommended improvement projects to correct deficiencies in the wastewater system and the estimated cost associated with each project.

TABLE VIII-1
EXISTING RECOMMENDED IMPROVEMENT PROJECTS

PROJECT ID	DESCRIPTION	COST[1]
1	Replace 3,170 feet of pipe identified by SSLC at approximately 9 different locations	**$ 840,000**
2	Install liner on 18,025 feet of pipe identified by SSLC at approximately 60 different locations	**$ 1,184,000**
3	Repair approximately 73 different locations in need of point repairs as identified by SSLC	**$ 198,000**
4	Replace 17 clean outs with access manholes	**$ 91,000**
5	Monitor minor capacity issues identified in existing deficiencies. If issues become significant, implement future recommended project	**NA**
	TOTAL	**$ 2,313,000**

1 All costs include 30% for engineering, administrative costs, and contingencies. Costs are shown in 2014 dollars.

TABLE VIII-2
ALTERNATIVE A RECOMMENDED IMPROVEMENT PROJECTS

PROJECT ID	DESCRIPTION	COST[1]
6a	Replace 292 ft of 15-in pipe in West Temple St. from Malvern Ave. to 2700 South to reverse the grade so that Malvern Ave. flows to 2700 South	**$ 102,000**
7a	Install 252 ft of 8-in pipe across State St. in 2400 South using trenchless technology to divert partial flows west	**$ 100,000**
8a	Install 193 ft of 8-in pipe across State St. in Truman Ave. using trenchless technology to divert partial flows west	**$ 84,000**
9a	Replace 995 ft of 8-in pipe in 300 East from Haven Ave. to Burton Ave. and in Burton Ave. from 300 East to 250 East to increase the grade and re-route flows west	**$ 256,000**
10	Monitor minor issues identified in future deficiencies. If issues become significant, increase pipe capacity or re-route flows to alleviate issues	**NA**
	TOTAL	**$ 542,000**

1 All costs include 30% for engineering, administrative costs, and contingencies. Costs are shown in 2014 dollars.

TABLE VIII-3
ALTERNATIVE B RECOMMENDED IMPROVEMENT PROJECTS

PROJECT ID	DESCRIPTION	COST[1]
6b	Replace 1,121 ft of 18-in pipe with 24-in pipe in West Temple St. from Haven Ave. to Utopia Ave. to increase pipe capacity, repair cracks, and prevent I&I	**$ 442,000**
7b	Replace 1,608 ft of 10-in pipe with 12-in pipe in Robert Ave. from State St. to West Temple to increase pipe capacity	**$ 497,000**
8b	Replace 862 ft of 10-in and 8-in pipe with 12-in pipe in State St. from Truman Ave. to Robert Ave. to increase pipe capacity, repair cracks, and prevent I&I	**$ 251,000**
9b	Replace 575 ft of 8-in pipe with 10-in pipe in 300 East from Haven Ave. to Burton Ave and replace 1,531 ft of 8-in pipe with 10-in pipe in 2400 South from 300 East to State St to increase pipe capacity	**$ 589,000**
	TOTAL	**$ 1,779,000**

1 All costs include 30% for engineering, administrative costs, and contingencies. Costs are shown in 2014 dollars.

TABLE VIII-4
RECOMMENDED IMPROVEMENT PROJECTS SUMMARY

PROJECT IDs	PROJECTS	COST
1-5	**Existing Recommended Improvement Projects**	**$ 2,313,000**
6a-9a, 10	**Alternative A Future Recommended Improvement Projects**	**$ 542,000**
6b-9b	**Alternative B Future Recommended Improvement Projects**	**$ 1,779,000**

WASTEWATER COLLECTION SYSTEM CLEANING

Wastewater collection system maintenance problems can occur in sewers with flatter slopes that need cleaning regularly, sewers with root problems, and sewers with grease problems. Costs for maintenance and replacement of these sewers should be included in the sewer budget.

SEWER SYSTEM OPERATION AND MAINTENANCE

SSLC has budgeted $974,500 for 2014 to operate and maintain the sewer system. This budget includes the cost of wastewater treatment at the CVWRF, employee compensation, equipment costs, office expenses, line repair costs, professional services, training costs, and utility costs. The line repair costs are budgeted at $77,000 and is used to maintain the system (cleaning, video inspection, emergency repairs, pump repairs, etc.).

UTAH SEWER MANAGEMENT PROGRAM

The State of Utah Water Quality Board has developed a Utah Sewer Management Program (USMP) to reduce sanitary sewer overflows (SSO) by giving added emphasis to collection system maintenance, collection system analysis and program documentation. The USMP is intended to meet forthcoming Capacity, Management, Operation, and Maintenance requirements (CMOM) of the Environmental Protection Agency (EPA). The USMP prohibits SSOs, outlines enforcement, and guidelines for reporting SSOs when they occur. It requires all public agencies that own or operate sanitary sewer collection systems in Utah to enroll for

coverage with the Utah State Division of Water Quality (DEQ) under the USMP. The enrollees are required to provide a plan and schedule to properly manage, operate, and maintain all parts of the sanitary sewer system to help reduce and prevent SSOs as well as mitigate any SSOs that do occur. Enrollees must prepare, submit, and certify this Sewer System Management Plan (SSMP) to the DEQ within the time period specified in the USMP after its adoption. Enrollees must then take all feasible steps to comply with the conditions of the USMP and follow their own SSMP including: report SSOs, submit an annual report as part of the Utah Municipal Wastewater Planning Program, and resubmit an updated SSMP at least every five years (R317-801). It is recommended that SSLC enroll in and comply with the USMP.

Sewer Ordinance

It is recommended that SSLC add text to municipal code 13.36.020 specifying that the size, slope alignment, materials of construction of a POTW sewer, and the methods to be used in excavating, placing of the pipe, jointing, testing and backfilling the trench shall all conform to the requirements set forth in Utah Administrative Code R317-3.

It is also recommended that SSLC update municipal code 13.24.040 so it is in agreement with the findings and recommendations of the rate study. Municipal code 13.24.040 defines the terms and conditions for sewer billings and rates, including the minimum monthly charge, the monthly charge for new customers, and the charge for customers with their own water supply (City of South Salt Lake, 2013).

ELIMINATE UNNECESSARY WASTEWATER

One way to increase capacity in the wastewater collection system is to identify and eliminate the unnecessary generation of wastewater. Wastewater is made up of inflow, infiltration, and direct sewage. A meaningful effort should be made to reduce inflow and infiltration because the sewer system experiences a significant amount of inflow and infiltration. Eliminating unnecessary wastewater will not only increase the capacity of the system, but it will also lower the expected treatment costs from CVWRF.

Inflow

Inflow often occurs from cross connections with storm drains, accidental drainage into the system, or from illegal connections at homes. Strategic metering will often reveal the general location of precipitation related inflow. Smoke testing can also identify problematic connections to the sewer system. If connections to the storm drain are identified, efforts should be made to separate storm drain and sewer piping.

Infiltration

Locations where significant infiltration enters the system can be identified through metering and videoing sewer pipes. Because infiltration appears to be the largest unnecessary wastewater source, it is recommended that efforts should be undertaken to identify and repair locations with infiltration. Many locations with infiltration have already been identified in the Repair Issues and are identified in Appendix E.

Direct Sewage

Another example of eliminating unnecessary wastewater is to offer incentives to homeowners for replacing older water wasting fixtures and appliances with new water efficient models. Not

only do efficient fixtures and appliances save drinking water, they also reduce wastewater flow. It is recommended that SSLC offer incentives for installing water wise fixtures and appliances.

FUNDING OPTIONS

Funding options for the recommended projects, in addition to sewer use fees, could include the following options: general obligation bonds, revenue bonds, State/Federal grants and loans, and impact fees. In reality, the City may need to consider a combination of these funding options. The following discussion describes each of these options.

Sewer Service Fees

The sewer service fee is used to pay for the operation and maintenance of the sewer system. As part of the maintenance of the sewer system, it is recommended that sewer systems set aside a part of the budget (including depreciation) into a capital facilities replacement account.

Zions Bank has prepared a rate study for the SSLC Sanitary Sewer System in collaboration with this Master Plan. A more detailed description of the sewer service fees can be seen in the rate study.

General Obligation Bonds

This form of debt enables the City to issue general obligation bonds for capital improvements and replacement. General Obligation (GO) Bonds would be used for items not typically financed through the Revenue Bonds. GO bonds are debt instruments backed by the full faith and credit of the City which would be secured by an unconditional pledge of the City to levy assessments, charges or ad valorem taxes necessary to retire the bonds. GO bonds are the lowest-cost form of debt financing available to local governments and can be combined with other revenue sources such as specific fees, or special assessment charges to form a dual security through the City's revenue generating authority. These bonds are supported by the City as a whole, so the amount of debt issued for the sewer system is limited to a fixed percentage of the real market value for taxable property within the City.

Revenue Bonds

This form of debt financing is also available to the City for utility related capital improvements. Unlike GO bonds, revenue bonds are not backed by the City as a whole, but constitute a lien against the sewer service charge revenues of a Sewer Utility. Revenue bonds present a greater risk to the investor than do GO bonds, since repayment of debt depends on an adequate revenue stream, legally defensible rate structure and sound fiscal management by the issuing jurisdiction. Due to this increased risk, revenue bonds generally require a higher interest rate than GO bonds, although current interest rates are historically very low. This type of debt also has very specific coverage requirements in the form of a reserve fund specifying an amount, usually expressed in terms of average or maximum debt service due in any future year. This debt service is required to be held as a cash reserve for annual debt service payment to the benefit of bondholders. Typically, voter approval is not required when issuing revenue bonds.

State/Federal Grants and Loans

Historically, both local and county governments have experienced significant infrastructure funding support from state and federal government agencies in the form of block grants, direct grants in aid, interagency loans, and general revenue sharing. Federal expenditure pressures and virtual elimination of federal revenue sharing dollars are clear indicators that local government may be left to its own devices regarding infrastructure finance in general. However,

state/federal grants and loans should be further investigated as a possible funding source for needed sewer system improvements.

It is also important to assess likely trends regarding federal/state assistance in infrastructure financing. Future trends indicate that grants will be replaced by loans through a public works revolving fund. Local governments can expect to access these revolving funds or public works trust funds by demonstrating both the need for and the ability to repay the borrowed monies, with interest. As with the revenue bonds discussed earlier, the ability of infrastructure programs to wisely manage their own finances will be a key element in evaluating whether many secondary funding sources, such as federal/state loans, will be available to the City.

Impact Fees

Impact fees can be applied to water related facilities under the Utah Impact Fees Act. The Utah Impacts Fees Act is designed to provide a logical and clear framework for establishing new development assessments. It is also designed to establish the basis for the fee calculation which the City must follow in order to comply with the statute. However, the fundamental objective for the fee structure is the imposition on new development of only those costs associated with providing or expanding water infrastructure to meet the capacity needs created by that specific new development.

SUMMARY OF RECOMMENDATIONS

1. Continue to clean the entire system every other year.
2. Continue to use video inspection on the entire system every four years to identify repair and inflow/infiltration issues.
3. Work to conform to the proposed Utah Sanitary Sewer Management Plan to minimize sewer overflows.
4. Monitor pump stations 1 and 2 to analyze capacity during significant precipitation events.
5. Implement the recommended improvement projects to solve existing and future issues in the Capital Facilities Plan (Tables VII-1 and VII-2).
6. Identify sources of infiltration into the wastewater collection system and work on eliminating or reducing points of infiltration.
7. Identify and eliminate sources of precipitation based inflow into the wastewater collection system.
8. Offer incentives for installing water wise fixtures.
9. Work on installing manholes to replace clean-outs as identified in project 4 during road maintenance and other opportunities of convenience.
10. It is recommended that SSLC add text to municipal code 13.36.020 specifying that the size, slope alignment, materials of construction of a POTW sewer, and the methods to be used in excavating, placing of the pipe, jointing, testing and backfilling the trench shall all conform to the requirements set forth in Utah Administrative Code R317-3. It is also recommended that the City update the sewer ordinance to reflect the findings and recommendations provided in the rate study.

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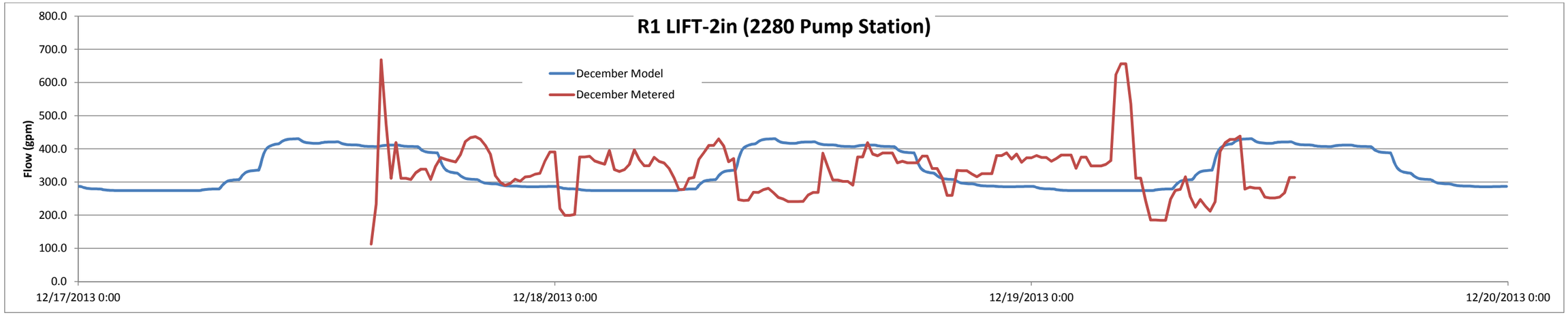
APPENDIX A

System Flow and Calibration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December Model
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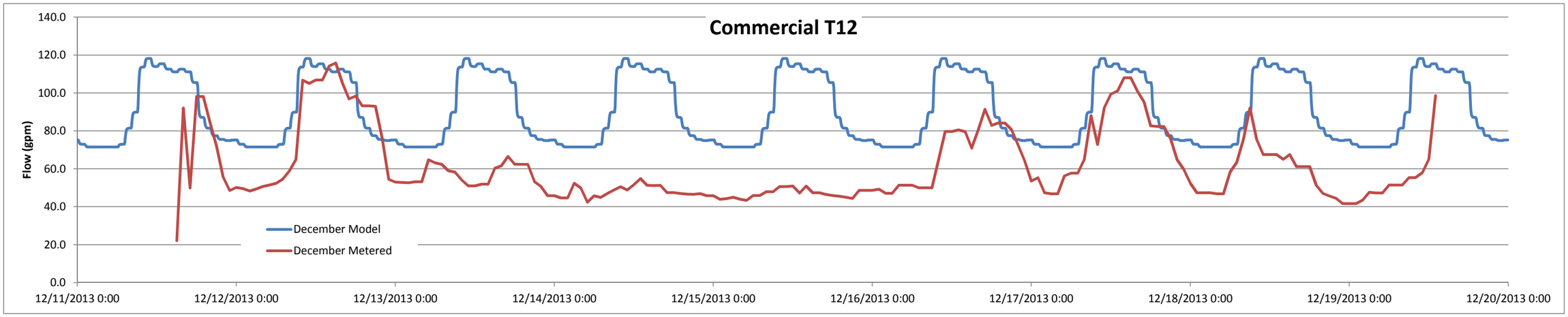
Commercial T12
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80.0
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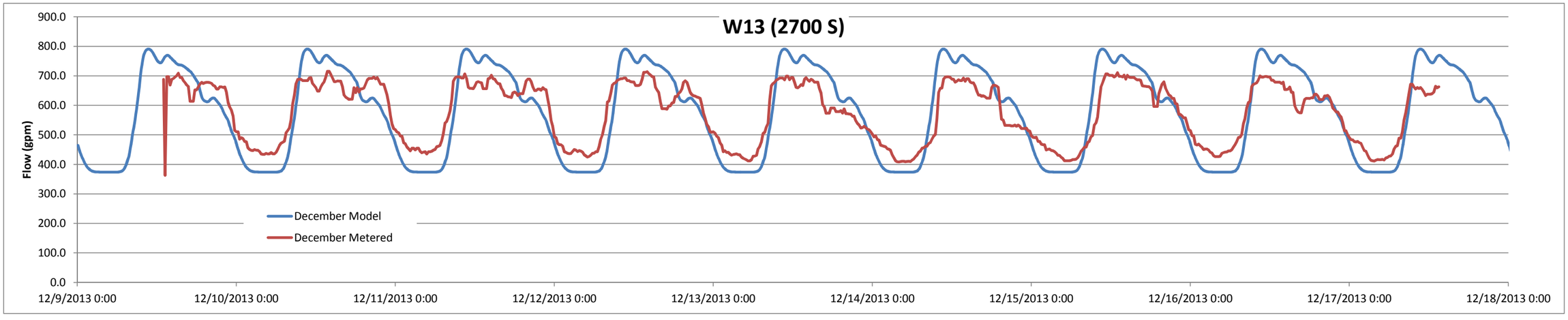
20.0
0.0
December Model
December Metered
12/11/2013 0:00
12/12/2013 0:00
12/13/2013 0:00
12/14/2013 0:00
12/15/2013 0:00
12/16/2013 0:00
12/17/2013 0:00
12/18/2013 0:00
12/19/2013 0:00
12/20/2013 0:00


W13 (2700 S)
Flow (gpm)
900.0
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
December Model
December Metered
12/9/2013 0:00
12/10/2013 0:00
12/11/2013 0:00
12/12/2013 0:00
12/13/2013 0:00
12/14/2013 0:00
12/15/2013 0:00
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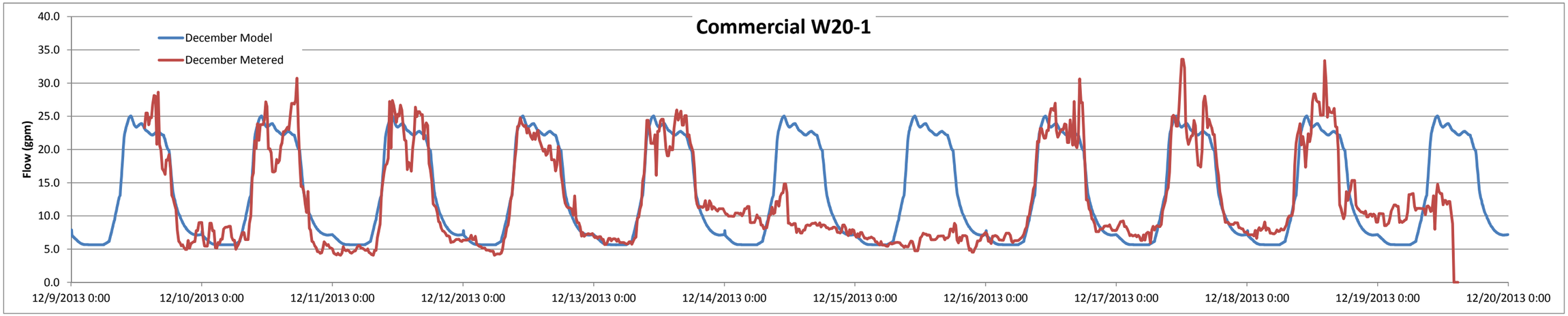
12/17/2013 0:00
12/18/2013 0:00


Commercial W20-1
December Model
December Metered
Flow (gpm)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
12/9/2013 0:00
12/10/2013 0:00
12/11/2013 0:00
12/12/2013 0:00
12/13/2013 0:00
12/14/2013 0:00
12/15/2013 0:00
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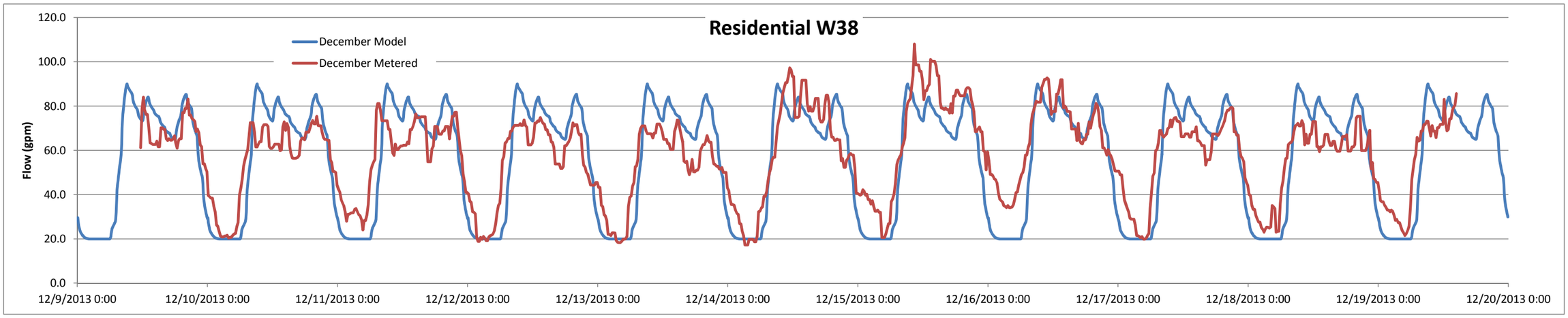
12/19/2013 0:00
12/20/2013 0:00


Residential W38
December Model
December Metered
Flow (gpm)
120.0
100.0
80.0
60.0
40.0
20.0
0.0
12/9/2013 0:00
12/10/2013 0:00
12/11/2013 0:00
12/12/2013 0:00
12/13/2013 0:00
12/14/2013 0:00
12/15/2013 0:00
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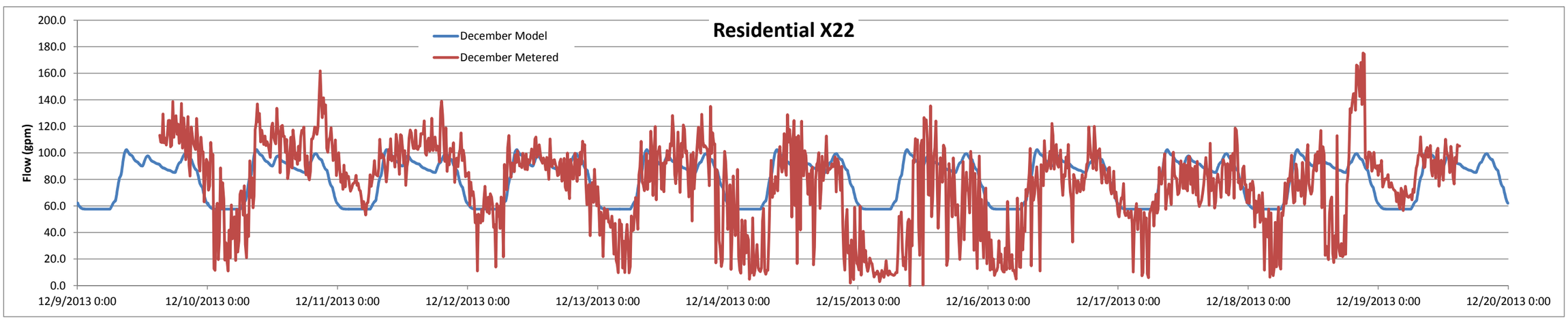
12/19/2013 0:00
12/20/2013 0:00


Residential X22
December Model
December Metered
Flow (gpm)
200.0
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
12/9/2013 0:00
12/10/2013 0:00
12/11/2013 0:00
12/12/2013 0:00
12/13/2013 0:00
12/14/2013 0:00
12/15/2013 0:00
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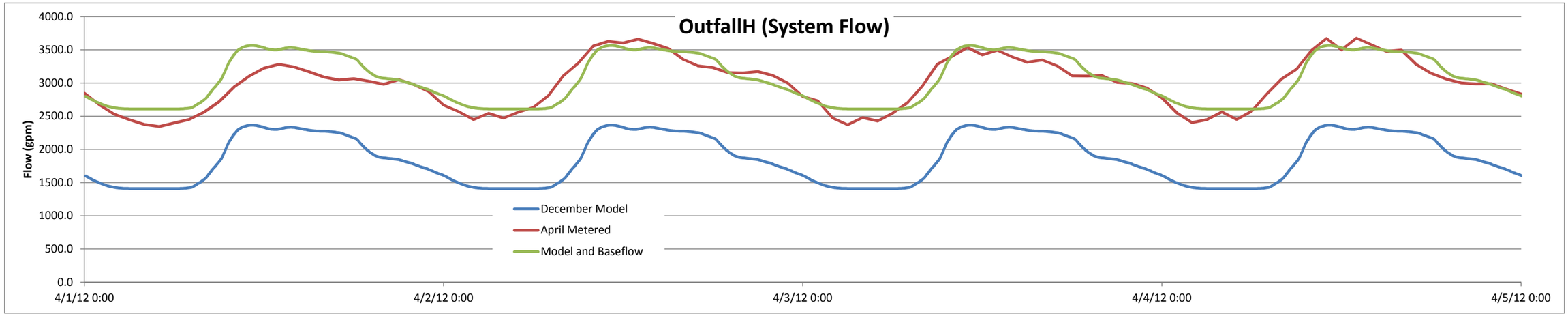
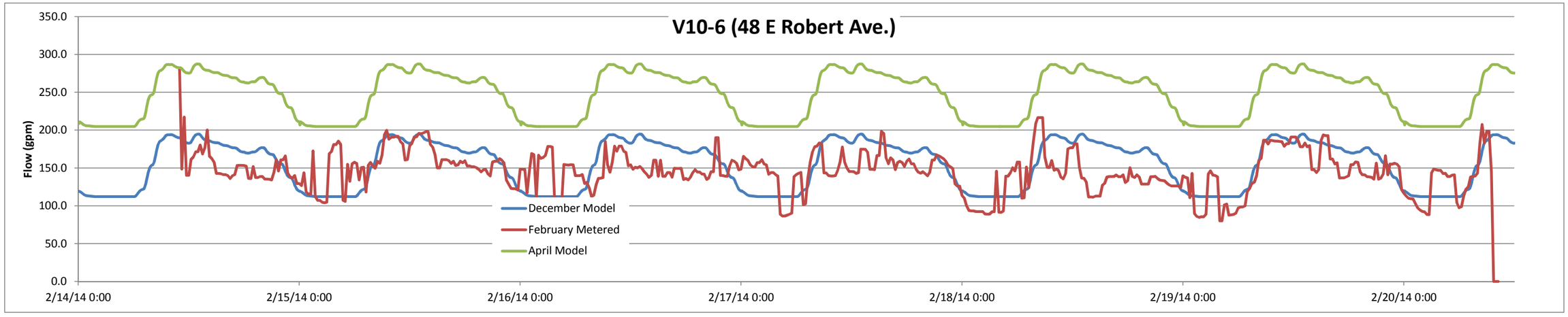
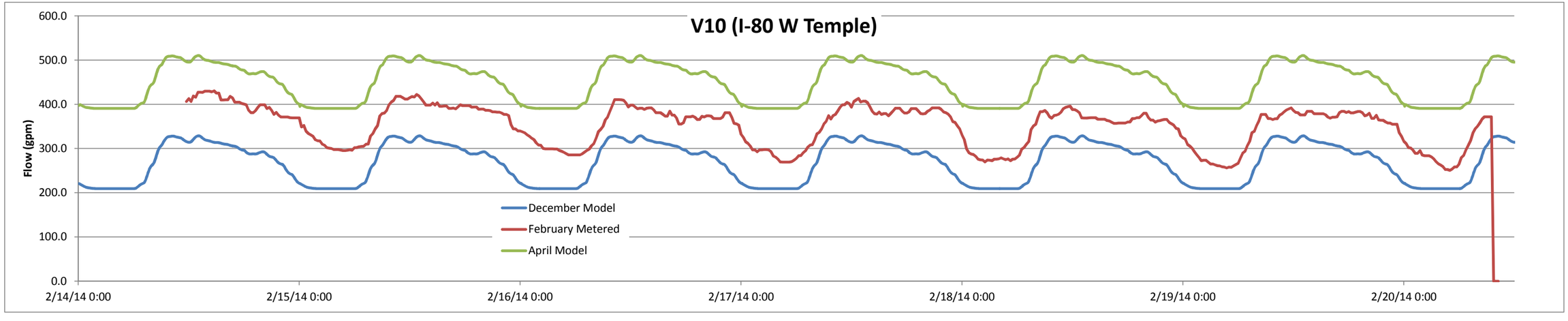
12/19/2013 0:00
12/20/2013 0:00


OutfallH (System Flow)
Flow (gpm)
4000.0
3500.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
4/1/12 0:00
4/2/12 0:00
4/3/12 0:00
4/4/12 0:00
4/5/12 0:00
December Model
April Metered
Model and Baseflow


V10-6 (48 E Robert Ave.)
Flow (gpm)
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
2/14/14 0:00
2/15/14 0:00
2/16/14 0:00
2/17/14 0:00
2/18/14 0:00
2/19/14 0:00
2/20/14 0:00
December Model
February Metered
April Model


V10 (I-80 W Temple)
Flow (gpm)
600.0
500.0
400.0
300.0
200.0
100.0
0.0
2/14/14 0:00
2/15/14 0:00
2/16/14 0:00
2/17/14 0:00
2/18/14 0:00
2/19/14 0:00
2/20/14 0:00
December Model
February Metered
April Model

South Salt Lake City
Sanitary Sewer Master Plan
Calculations of per Capita Flow
126.28.100

3/11/2014

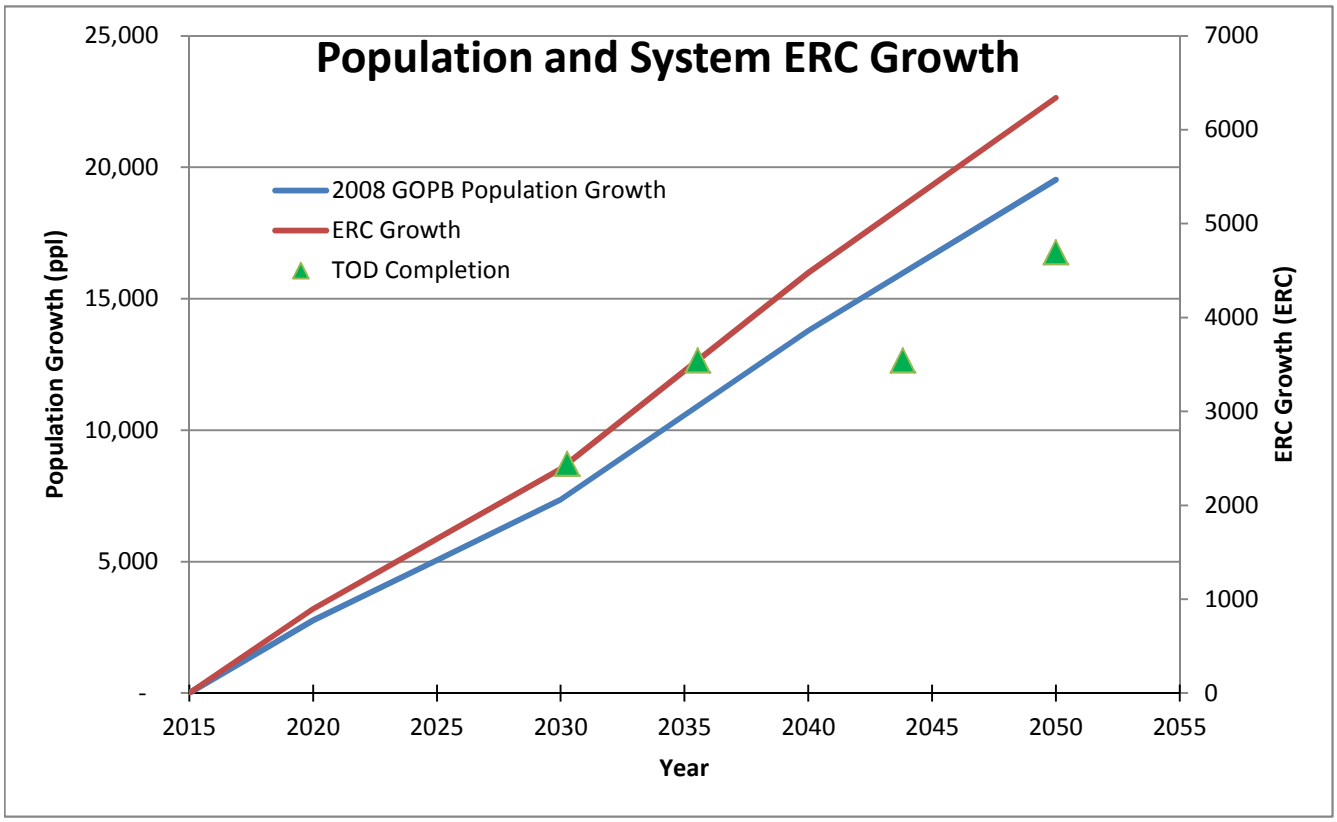
Existing System Comparison to R317 Standards			
Drinking Water System Connections	3,314	conn.	
Drinking Water ERCs	6,337	ERCs	
Drinking Water ERC/Connection	1.91	ERC/conn.	Drinking Water ERCs / Drinking Water System Connections
Actual Meter Connections	2,591	conn.	
Sewer System ERCs	4,954	ERCs	Actual Contributing Meter Connections x Drinking Water ERC/Connection
Average Household Size 2010	2.46	ppl	(U.S. Census Bureau, 2010)
Calculated Virtual Capita	12,188	ppl	Sewer System ERCs x Average Household Size 2010
April 2012 Design Average Flow	4.30	MGD	
Average Flow per Capita	**352.5**	**gpcd**	April 2012 Design Average Flow x 1,000,000 gal per MGD / Calculated Capita
R317 Average Standard	**100**	**gpcd**	
Model Peak Flow at Outfall	5.1	MGD	
Model Peak Flow per Capita	**415**	**gpcd**	Model Peak Flow at Outfall x 1,000,000 gal per MGD / Calculated Capita
R317 Outfall Standard	**250**	**gpcd**	
Local Peaking Load	5.2	MGD	
Local Peak Flow per Capita	**423**	**gpcd**	Local Peaking Load x 1,000,000 gal per MGD / Calculated Capita
R317 Lateral Standard	**400**	**gpcd**	

2008 Baseline City Population Projections
Governor's Office of Planning & Budget
All data is based off of January 2008

3/11/2014

South Salt Lake Population and ERC Growth Estimates

	Census		Interpolate		Interpolate			
	2000	**2010**	2015	2020	2025	2030	2040	**2050**
Population	**22,038**	**22,274**	25,036	**27,799**	30,095	**32,391**	**38,818**	**44,560**
Population Growth (Pop. - Pop. 2015)			-	2,762	5,059	7,355	13,782	19,524
% Total Growth			0	0.14	0.26	0.38	0.71	1.00
Incremental % Growth			0	0.14	0.12	0.12	0.33	0.29
ERC Growth			0	897	746	746	2,087	1,864
Cumulative ERCs			0	897	1,642	2,388	4,475	6,339
years			0	5	10	15	25	35



TOD Growth Schedule

	Growth ERC	System ERCs	Total ERCs	*Years Out	Year	
Area 1	2443	2443	2443	15.3	2030.3	
Area 2	1100	3543	3543	20.5	2035.5	
Area 3	1642	3543	5185	28.8	2043.8	Doesn't Contribute to Sewer
Area 4	1154	4697	6339	35	2050	

*Years to complete calculated by interpolating along ERC Growth Line

APPENDIX B

System Flow Calculations

South Salt Lake City
Sanitary Sewer Master Plan
Calculations of per Capita Flow
126.28.100

3/11/2014

Existing System Comparison to R317 Standards			
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Drinking Water ERCs	6,337	ERCs	
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3/11/2014

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	2000	**2010**	2015	2020	2025	2030	2040	**2050**
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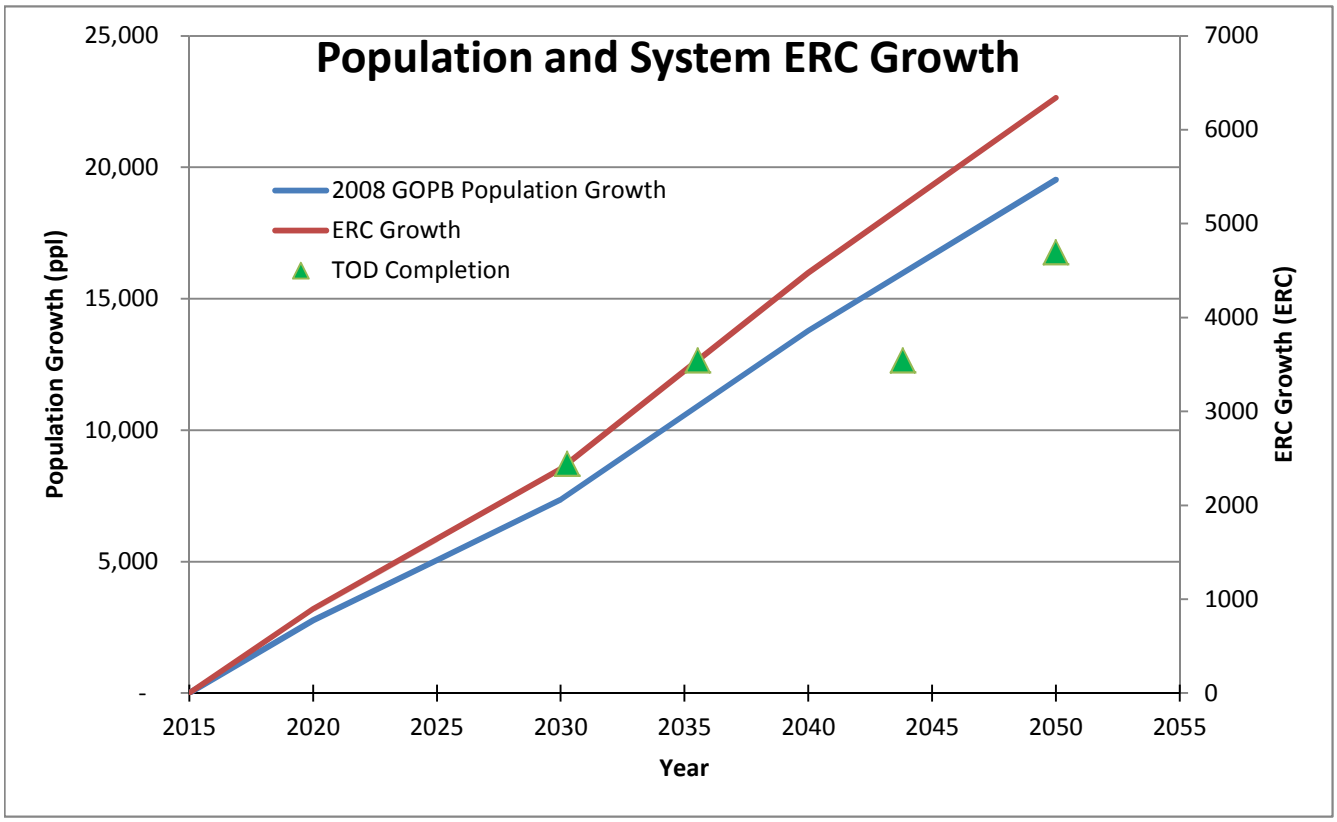
ERC Growth			0	897	746	746	2,087	1,864
Cumulative ERCs			0	897	1,642	2,388	4,475	6,339
years			0	5	10	15	25	35



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Area 4	1154	4697	6339	35	2050	

*Years to complete calculated by interpolating along ERC Growth Line

APPENDIX C

Electronic Data

SEE DISK

APPENDIX D

Trenchless Technologies

TRENCHLESS TECHNOLOGIES

TRENCHLESS TECHNOLOGIES OVERVIEW

Trenchless technologies are divided into two main categories, construction methods and renewal methods. Construction methods involve installation of a new pipeline, while renewal methods involve rehabilitating existing pipelines. The various technologies used in gravity flow applications on small to mid-size pipe diameters are briefly described in the following sections.

NEW PIPE CONSTRUCTION

Steered Auger Boring (Directional Boring)

Steered auger boring is a method of installing a steel casing pipe where it crosses a road, highway, or railroad track. This process simultaneously jacks a steel casing from a drive pit through the earth while removing the spoil inside the encasement by means of a rotating flight auger. The auger is a flighted tube having couplings at each end that transmit torque to the cutting head from the power source located in the bore pit and transfers spoil back to the machine. The casing supports the soil around it as spoil is being removed. Usually, after installation of the casing, a product pipe is installed and the annular space is filled with grout.

Microtunneling

Microtunneling boring machines are mainly used for installation of a gravity pipeline for wastewater or storm drain. These machines are laser-guided, remotely controlled, and permit accurate monitoring and adjusting of the alignment and grade as the work proceeds so that the pipe can be installed on a precise line and grade.

Microtunneling is not commonly used in Utah.

PIPE RENEWAL

Cured-In-Place

The cured-in-place process involves the insertion of a resin-impregnated fabric tube into an existing pipe by the use of water or air inversion or winching. Usually, the fabric is polyester felt material, fiberglass reinforced, or similar. Normally, water or air is used for the inversion process with hot water or steam used for the curing process. The pliable nature of the resin-saturated fabric prior to curing allows installation around curves, filling of cracks, bridging of gaps, and maneuvering through pipe defects. The cured-in-place process can be applied for structural and non-structural purposes. Additionally, systems using felt impregnated polyester resin or fiberglass provide very good corrosion resistance. The cured-in-place process also has excellent strength, and can be designed as a stand-alone system to sustain entire loading on an existing pipe.

Advantages

- Grouting is not normally required.
- No joints, so very smooth interior improves hydraulic capacity.
- Conforms to non-circular shapes, bends, and deformations.
- Can be inserted via existing manholes or through minor excavations.

Limitations

- The tube or hose must be custom-constructed for each project.
- The existing flow must be rerouted during the installation process.
- Sealing may be required at liner pipe ends to prevent infiltration.
- The amount and type of resin is a contractor's function, so specifications and inspection are required to ensure proper resin quality and handling.
- The curing process must be carefully monitored, inspected, and tested.
- Chemical contaminants are introduced into the curing water during the curing process that cannot be discharged into the environment. Discharging the curing water to a POTW is acceptable.
- Obstructions in the existing pipeline inhibit the lining process.
- The cost of the cured-in-place process is relatively expensive.

Slip Lining

Slip lining is mainly used for structural applications when the existing pipe does not have joint settlements or misalignments. In this method, a new pipeline of smaller diameter is inserted into the existing pipeline and usually the annulus space between the existing pipe and new pipe is grouted.

Advantages

- No specialized equipment is required.
- The same jacking pipes and fittings, as used in other trenchless construction methods, may be used.
- It is a conceptually simple technique.
- It can be used for structural and non-structural applications.
- The existing flow can be maintained (live insertion) during the installation process.

Limitations

- Less hydraulic capacity, due to smaller diameter, than the original larger pipeline had when it was new.
- Pit excavation is required.
- Grouting is generally required.

Pipe Bursting

Pipe bursting is considered when the capacity of an existing pipeline is determined to be inadequate. Pipe bursting uses a hammer to break the old pipe and force particles into the surrounding soil while a new pipe is simultaneously pulled and/or pushed in its place.

Advantages

- It can be used on a wide range of existing pipe materials and diameters.
- The new pipeline can be larger than the existing pipeline if there is enough cover.
- The existing pipeline serves as a guide to for the new pipeline.

Limitations

- Drive and reception excavations are required.
- Above-ground working space is required for ancillary construction equipment.
- Laterals must be replaced by open excavations.
- The existing flow must be rerouted during the installation process.
- Ground movement and vibration could damage nearby facilities.

Pipe Eating

Pipe eating is considered when the capacity of an existing pipeline is determined to be inadequate. Pipe eating is performed using a boring machine. In this method, the old pipe is broken into small pieces and taken out by means of slurry or auger.

Advantages

- It can be used on a wide range of existing pipe materials and diameters.
- The new pipeline can be larger than the existing pipeline if there is enough cover.
- The existing pipeline serves as a guide to for the new pipeline.

Limitations

- Drive and reception excavations are required.
- Above-ground working space is required for ancillary construction equipment.
- Laterals must be replaced by open excavations.
- The existing flow must be rerouted during the installation process.

Thermoforming

Thermoforming involves inserting a folded (for reduced cross section) pipeline into an existing pipeline and subsequently heating the inserted pipeline to conform to the existing pipeline dimensions. The inserted folded pipeline is made of either polyvinyl chloride or polyethylene.

Advantages

- Very smooth interior improves hydraulic capacity.

- Few field joints, so construction is faster.
- It is a chemically-inert process.
- It solves corrosion problems.
- It controls groundwater infiltration, product exfiltration, and root intrusion.
- The new pipe is structurally-independent.
- Installation can be accomplished via existing manholes.
- It can be used on large radius bends.
- Internal lateral connections are possible

Limitations

- A large above-ground working space is required for laying out the string of butt-fused pipeline.
- The existing flow must be rerouted during the installation process.
- For water mains, valves and connections usually require excavation.

SUMMARY OF BENEFITS OF TRENCHLESS TECHNOLOGY

- Minimizes the need to disturb the existing environment, traffic, or congested living and working areas.
- Uses predetermined paths provided by existing piping, thereby reducing the steering and control problems associated with open-cut.
- Requires less space underground, thereby minimizing chances of interfering with existing utilities or abandoned pipelines.
- Provides the opportunity to upsize a pipeline (within technology limits) without open trench construction.
- Requires less-exposed working area, and therefore, is safer for both workers and the community
- Eliminates the need for spoil removal and minimize damage to the pavement (the life expectancy of pavements have been observed to be reduced by up to 60 percent with open-cut repairs), and disturbance to other utilities.

TABLE 1 - COMPARISON OF TRENCHLESS TECHNOLOGIES

Method	Diameter Range (in)	Maximum Installation (ft)	Pipe Material[1]	Accuracy (in)
New Pipe Construction				
Steered Auger Boring	4 to 60	600	Steel	± 12
Microtunneling	6 to 136	500 to 1,500	RCP, GRP, VCP, DIP, Steel, PCP	± 1
Pipe Renewal				
Cured-In-Place	4 to 108	3,000	All	Not Applicable
Slip Lining	4 to 63	1,000	PE, PP, PE/EPDM, PVC	Not Applicable
Pipe Bursting	4 to 48	1,500	PE, PP, PVC, GRP	Not Applicable
Pipe Eating	4 to 36	300	PE, PP, PVC, GRP	Not Applicable
Thermoform	4 to 30	1,500	HDPE, PVC	Not Applicable

1. RCP = Reinforced Concrete Pipe
   GRP= Glass Reinforced Plastic
   VCP=Vitrified Clay Pipe
   DIP=Ductile Iron Pipe
   PCP=Polymer Concrete Pipe
   PE=Polyethylene
   PP=Polypropylene
   EPDM=Ethylene Propylene Diene Monomer
   PVC=Polyvinyl Chloride
   HDPE=High Density Polyethylene

APPENDIX E

Cost Estimates

AVERAGE SEWER PIPE COST PER FOOT 2014

Diameter (in)	Diameter (ft)	Outside Diameter (ft)	Pipe Material & Installation (1)	Excavation	Imported Bedding Installed	Hauling Excess Native Mat'l	Trench Backfill Installed (3)	Trench Box per Day (2)	Average Daily Output	Trench Box Cost	Top Trench Width (ft)	Road Repair Width (ft)	Asphalt Cost	Manhole Cost	Trench Dewatering (4)	Total Cost per Foot of Pipe	Adjusted Cost per foot	Cost Out of Street (3)	No Manhole	No Manhole Adjusted
DIA_IN	DIA_FT	OD_FT	MAT_INST	EXCAVATION	BEDDING	HAULING	BACKFILL	TRCHBX_DAY	TRCHBX_OUT	TRCHBX_FT	TRENCHW_FT	ROAD_FT	ROAD_DPFT	MH_DPFT		TOTAL_DPFT	ADJ_DPFT			
4	0.3	0.39	$5.65	10.08	13.36	12.39	70.42	210.00	190	1.11	5.19	9.19	36.51	**22.53**	14.30	$186.34	$162.00	$161.75	$163.81	$142.00
6	0.5	0.58	$7.95	10.71	15.31	13.17	73.69	210.00	190	1.11	5.38	9.38	37.17	**22.53**	14.79	$196.43	$170.00	$171.62	$173.90	$151.00
8	0.7	0.78	$12.10	11.36	17.29	13.97	76.96	210.00	190	1.11	5.58	9.58	37.83	**22.53**	15.28	$208.43	$181.00	$183.41	$185.90	$161.00
10	0.8	0.97	$18.50	12.03	19.30	14.78	80.24	210.00	130	1.62	5.77	9.77	38.50	**22.53**	18.41	$225.90	$196.00	$200.66	$203.37	$177.00
12	1.0	1.17	$20.00	12.71	21.35	15.62	83.51	210.00	115	1.83	5.97	9.97	39.16	**22.53**	19.99	$236.70	$205.00	$211.24	$214.17	$186.00
15	1.3	1.46	$22.50	13.76	24.50	16.92	88.43	210.00	100	2.10	6.26	10.26	40.16	**22.53**	22.14	$253.02	$220.00	$227.24	$230.49	$200.00
18	1.5	1.75	$26.50	14.85	27.71	18.26	93.34	210.00	94	2.23	6.55	10.55	41.15	**22.53**	23.57	$270.15	$234.00	$244.04	$247.62	$215.00
21	1.8	2.04	$33.50	15.98	31.01	19.65	98.25	210.00	88	2.39	6.84	10.84	42.15	**22.53**	25.09	$290.55	$252.00	$264.11	$268.02	$233.00
24	2.0	2.33	$40.50	17.15	34.38	21.08	103.16	210.00	88	2.39	7.13	11.13	43.15	**22.53**	25.83	$310.18	$269.00	$283.41	$287.65	$250.00
30	2.5	2.92	$36.50	19.60	41.36	24.09	112.99	210.00	72	2.92	7.72	11.72	45.14	27.33	30.05	$339.97	$295.00	$312.56	$312.65	$271.00
36	3.0	3.50	$46.50	22.21	48.65	27.29	122.81	210.00	72	2.92	8.30	12.30	47.13	27.33	31.53	$376.36	$327.00	$348.30	$349.04	$303.00

Reference: 2014 RS Means Heavy Construction Cost Data Updated By: JGH

Assumptions:

y	**Total Import Trench Backfill? (Y/N)**	
y	**Dewatering? (Y/N)**	
y	**Manholes? (Y/N)**	
	One side of street C&G is regraded (30' street).	
10	v :1h trench side slope (use trench boxes)	
10	' average depth to top of pipe	
0.33	' thick asphalt road covering	
0.75	' thick untreated base course	
200	' Average distance between manholes	
3	+ Outside Diameter = Bottom trench width	
1	' bedding over pipe	
0.5	' bedding under pipe	
87%	Salt Lake City Total Cost Index	

Costs:

$ 57.42	/CY Import Trench Backfill - use Imported Select Fill
$ 57.42	/CY Imported Select Fill - sec 31 23 23.16 (0200, 0500) 31 23 23.20 (4022): Sand, dead or bank w/ hauling (20 CY, 6 mi) and compaction. ($32.00/LCY + $5.35/LCY)*1.39 LCY/ECY + $5.50/ECY
$ 6.05	/CY Excavation - sec 31 23 16.13 (1375): 10-14 ft deep, 1 CY excavator, Trench Box.
$ 30.73	/SY 4" Asphalt Pavement -sec 32 11 23.23 (0390) 32 12 16.13 (0130, 0390) 31 23 23.20 (4022): 9" Bank Run GravelBase Course ($8.00/SY), 2" Binder ($9.50/SY), 2" Wear ($10.55/SY [4"=$20/SY]) and Hauling ($5.35/LCY * 1.39LCY/ECY * 0.361CY/SY)
$ 2.56	/LF 4" Asphalt cutting - sec 02 41 19.25 (0015): Saw cutting asphalt up to 3" deep ($1.67/LF), each additional inch of depth ($0.93/LF)
$ 3,380.00	/EA 4' Manhole (for pipes =< 2.5' diameter) - sec 33 49 13.10 (1130, 1140, 1300): Precast 8' deep ($2,325/ea), Slab top 8" thick ($505/ea), each add'l foot of depth ($275/VLF)
$ 5,465.00	/EA 5' Manhole (for pipes > 2.5' and <= 3.5') - sec 33 49 13.10 (1170, 1180, 1400): Precast 8' deep ($3,850/ea), Slab top 8" thick ($695/ea), each add'l foot of depth ($460/VLF)
$ 7,570.00	/EA 6' Manhole (for pipes > 3.5' and <= 4.5') - sec 33 49 13.10 (1210, 1220, 1500): Precast 8' deep ($5,325/ea), Slab top 8" thick ($955), each add'l foot of depth ($645/VLF)
$ 10,000.00	/EA 6'x9' Cleanout Box (for pipes > 4.5') From Murray Winchester Project ($10,000/ea)
$ 210.00	/day Trench Box sec 31 52 16.10 (4500): 7' deep, 16' x 8'
$ 7.44	/CY Hauling - sec 31 23 23.20 (4022): 20 CY dump truck, 6 mile round trip and conversion from loose to compacted volume. $5.35/LCY * 1.39 LCY/ECY
$ 68.54	/CY Stabilization Gravel - sec 31 23 23.16 (0050, 0500) 31 23 23.20 (4022): Bank Run Gravel ($40/LCY * 1.39 LCY/ECY) plus compaction ($5.50/ECY) and hauling ($5.35/LCY * 1.39 LCY/ECY)
$ 1,082.00	/day Dewatering - sec 31 23 19.20 (1000, 1020): 4" diaphram pump, 2 hrs attended ($955/day). Second pump ($127/day)

NOTES:

(1) Assumes PVC SDR 35 for 4" to 24" (sec 33 31 13.25) and HDPE Type S (sec 33 31 13.20) for 30" and larger.

(2) 7' deep trench box (16' x 8') - on page 274 31 52 16.10

(3) Backfill Material & Installation assumes in street. For out of street unit costs, the backfill material cost has been added in place of base course and asphalt.

(4) Dewatering assumes 1' stabilization gravel at the bottom of the trench plus dewatering pumps

(5) Conversion from loose to compacted volumes assumes 125 PCF for compacted density and 90 PCF for loose density. Or (125 PCF/ECY)/(90 PCF/LCY) = 1.39 LCY/ECY

(6) Conversion from cubic yards to square yards for hauling of asphalt paving assumed a total thickness of 13". 3 ft x 3 ft x (13 in)/(12 in/ft) = 0.361 CY/SY

Abbreviations:

VLF	vertical lineal foot
PCF	pounds per cubic foot
LCY	loose cubic yard
ECY	embankment cubic yard

RSMeans
33 01 30.72
Relining Sewers

With Cement, Including Bypass and Cleaning

87% Salt Lake City Total Cost Index

Code	Diameter in	Cost $/LF	Adjusted Cost $/LF
0020	6	$57.00	$49.48
0020	8	$57.00	$49.48
0020	10	$57.00	$49.48
0050	12	$61.00	$52.95
0070	14	$65.50	$56.85
0070	15	$65.50	$56.85
0070	16	$65.50	$56.85
0100	18	$78.50	$68.14
0100	20	$78.50	$68.14
0100	21	$78.50	$68.14
0200	24	$83.50	$72.48
0200	28	$83.50	$72.48
0200	30	$83.50	$72.48
0200	36	$83.50	$72.48

Cured in Place Pipe Cost Estimates From PEC, Inc.

Diameter in	Cost/ Foot
8	26
10	28
12	32
15	50
21	75
24	110
27	140

3-Mar-14

33 01 30.74
HDPE Pipe Lining
Excludes cleaning and video inspection

Pipe relined with one size smaller than original

Code	Original Dia. in	Cost $/LF	Adjusted Cost $/LF
0100	6	$10.85	$9.42
0150	8	$15.30	$13.28
0200	10	$18.00	$15.62
0250	12	$31.50	$27.34
0300	14	$34.00	$29.51
Extrp.	15	$35.25	$30.60

Power Rodder Cleaning

Code	Cost $/LF	Adjusted Cost $/LF		Total Adjusted Cost $/LF
6140	$3.90	$3.39		$12.80
6140	$3.90	$3.39		$16.67
6140	$3.90	$3.39		$19.01
6140	$3.90	$3.39		$30.73
6190	$4.56	$3.96		$33.47
	$4.56	$3.96		$34.56
6110, 6120	$5,700	$4,948	Mobilization	
9060	$820	$712	Video	

REPLACEMENT REPAIR PROJECTS FROM SSLC PERSONNEL									
Upstream MH	**Downstream MH**	**Section Length**	**Size in**	**Mat.**	**Comments**	**Cost/ LF**	**Pumping Cost**	**Cost/lf +Pumping**	**Project Cost**
R9-1	R9	440	8	VCP	Bad repair/Belly	$181	7%	$194	$85,215
X12-7	X12-6	362	8	VCP	Maxwell	$181	7%	$194	$70,109
X12-6	X12-5	343.8	8	VCP	Maxwell	$181	7%	$194	$66,584
X19-2	X19-1	191.3	8	VCP	Maxwell	$181	7%	$194	$37,049
X8-13	X8-10	239.5	8	VCP	Lots of repairs	$181	7%	$194	$46,384
W40-4		MH	8	VCP	Lower flowline	NA	7%	NA	$3,911
X26-2	X26	553.7	8	VCP	Cracks and I&I, Belly	$181	7%	$194	$107,235
X8-15	X8-14	483	8	VCP	CRACKS, BELLY, I & I	$181	7%	$194	$93,543
X26-3	X26-2	554.5	8	VCP	Cracks and I&I	$181	7%	$194	$107,390
	Total Length	**3,168**						**Total Cost**	**$617,419**

LINER REPAIR PROJECTS FROM SSLC PERSONNEL						
Upstream MH	**Downstream MH**	**Section Length**	**Size in**	**Mat.**	**Comments**	**Project Cost**
X24-2	X24-1	350.6	8	VCP	Cracks and I&I	**$9,116**
W27-19	w27-18	378	10	VCP	Surfrace Agg. Cracks and I&I	**$10,584**
X8-34	X8-33	213.4	8	VCP	Surface Aggregate	**$5,548**
X8-15	X8-5	26.2	8	VCP	Surface Aggregate	**$681**
X19	X18	279.8	12	RCP	Surface Aggregate	**$8,954**
X19-1	X19	36.5	8	RCP	Surface Aggregate	**$949**
X2	X1	210.5	8	RCP	Surface Aggregate	**$5,473**
W30	W29	370.1	15	RCP	Cracks and I&I	**$18,505**
V3	V2	298.5	18	VCP	Cracks and I&I	**$18,806**
V10-9	V10-6	283.2	10	VCP	Cracks and I&I	**$7,930**
S9-3	S9-2	348.1	10	NRCP	I%I	**$9,747**
S18-1	S18	396.8	8	VCP	Roots and Cracks	**$10,317**
S13-6	S13-3	213.9	8	VCP	Cracks and I&I	**$5,561**
X26-1	X26	451.1	8	VCP	SurfaceAgg. Cracks and I&I	**$11,729**
X21	X20	203.2	12	RCP	Surface Aggregate	**$6,502**
X20	X19	195	12	RCP	Surface Aggregate	**$6,240**
X18	X17	264.2	12	RCP	Surface Aggregate	**$8,454**
X12	X11	326.8	15	RCP	Surface Aggregate	**$16,340**
X11	X10	382.1	15	RCP	Surface Aggregate	**$19,105**
X10	X8-25	21.1	15	RCP	Surface Aggregate	**$1,055**
X8-25	X8-24	324.7	15	RCP	Surface Aggregate	**$16,235**
X8-24	X7	117.8	15	RCP	Surface Aggregate	**$5,890**
X5	X4	40.9	15	RCP	Surface Aggregate	**$2,045**
X4	X3	155.9	15	RCP	Surface Aggregate	**$7,795**
X3	X2	210.5	15	RCP	Surface Aggregate	**$10,525**
X8-1	W35-2	318.5	12	VCP	Cracks and I&I	**$10,192**
X8-3	X8-18	463.1	8	VCP	Cracks and I&I	**$12,041**
V6-2	V6-1	346.3	8	VCP	Cracks and I&I	**$9,004**
V1	S15	377.4	18	VCP	Cracks and I&I	**$23,776**
V13-2	V13-1	386.2	8	VCP	Cracks and I&I	**$10,041**
V10-34	V10-9	286.7	10	VCP	Cracks and I&I	**$8,028**
W40-1	W40	395.6	10	VCP	Cracks and I&I	**$11,077**
W33	W32	305.2	15	VCP	I &I	**$15,260**
W39	W38	405.4	12	VCP	Cracks and I&I	**$12,973**
S9-4	S9-3	297	10	NRCP	Cracks and I&I	**$8,316**
R2-10	R2-7	340.8	8	NRCP	Surface Aggregate, broken pipe	**$8,861**
PS2	R2-10	308.3	8	NRCP	Surface Agg.	**$8,016**
S23-25	S23-23	249.4	10	VCP	Cracks and I&I	**$6,983**
X12-1	X12	17.2	8	RCP	Surface Aggregate	**$447**
s23-14	s23-11	297.6	8	VCP	Cracks and I&I	**$7,738**
V10-33	V10-25	389.2	8	VCP	Cracks and I&I	**$10,119**
X8-21	X8-2	357.6	10	VCP	I&I	**$10,013**
X17	X16	16.4	8	RCP	Surface Aggregate	**$426**
X16	X15	232.5	12	RCP	Surface Aggregate	**$7,440**
X15	X14	341.7	12	RCP	Surface Aggregate	**$10,934**
X14	X13	295.9	15	RCP	Surface Aggregate	**$14,795**
X13	X12	302.3	15	RCP	Surface Aggregate	**$15,115**
X7	X6	345.6	15	RCP	Surface Aggregate	**$17,280**
X6	X5	337.1	15	RCP	Surface Aggregate	**$16,855**
W27-29	W27-28	140.9	12	VCP	Surface Aggregate	**$4,509**
W20-10	W20-9	395.7	8	VCP	Surface Aggregate	**$10,288**
X8-16	X8-1	347.2	8	VCP	Cracks and I&I	**$9,027**
S23-12	S23-11	372.1	8	VCP	Cracks and I&I	**$9,675**
S23-24	S23-23	406.5	8	VCP	Cracks and I&I	**$10,569**
S23-16	S23-15	324.1	8	VCP	Cracks and I&I	**$8,427**
V8	V7	283.6	18	VCP	Cracks and I&I	**$17,867**
V6-8	V6-5	272	8	VCP	Cracks and I&I	**$7,072**
W12	W11	361	21		Surface Aggregate Significant	**$27,075**
W20	W12	1042	28		Surface Aggregate	**$145,880**
W11	W9	565	21		Surface Aggregate	**$42,375**
	Total Length	**18,022**			**Total Cost**	**$773,000**
					With Contingency	**$870,000**

POINT REPAIR PROJECTS FROM SSLC PERSONNEL														
Upstream MH	Downstream MH	Section Length	Size in	Mat.	Comments	2'	4'	6'	8'	10 foot Length	Cost/ Foot	Pump Cost	Cost/ Foot	Project Cost
C/O	W27-45	104.7	8	VCP	Only one access point	1				10	$181	7%	$194	$1,937
W15-3	W15-2	344.3	8	VCP		1	2			30	$181	7%	$194	$5,810
W15-4	W15-3	27	8	VCP	Cracks and I&I		1			10	$181	7%	$194	$1,937
W15-5	W15-4	258.7	8	RCP	One at lat	2				20	$181	7%	$194	$3,873
W19-7	W19-9	365.6	8	RCP	Large Hole		1			10	$181	7%	$194	$1,937
W20-16	W20-12	376.5	10	RCP	Cracks		1			10	$196	7%	$210	$2,097
W20-17	W20-16	357.2	10	RCP	Hole	1				10	$196	7%	$210	$2,097
W27-13	W27-50	282.5	10	VCP	8' by lat	1	1		1	30	$196	7%	$210	$6,292
W27-15	W27-13	282.5	10	VCP	By lat capped		1			10	$196	7%	$210	$2,097
W27-16	W27-15	595.2	8	VCP	I&I /cracks/ by lats	4	1			50	$181	7%	$194	$9,684
W27-2	W27-1	205.7	10	VCP	Cracks		1	1		20	$196	7%	$210	$4,194
W27-21	W27-19	284.2	8	VCP	Cracks and holes		2			20	$181	7%	$194	$3,873
W27-23	W27-21	324.2	8	VCP	Offset repair		1			10	$181	7%	$194	$1,937
W27-3	W27-2	241.1	10	VCP	Both by lat			2		20	$196	7%	$210	$4,194
W27-31	W27-30	191.3	8	VCP	Both by lat		2			20	$181	7%	$194	$3,873
W27-32	W27-30	308	8	VCP	At lat		1			10	$181	7%	$194	$1,937
W27-36	W27-34	301.6	8	VCP	Offset joint / cracks	1	1			20	$181	7%	$194	$3,873
W27-39	W27-8	211.5	8	VCP	Cracks		1			10	$181	7%	$194	$1,937
W27-45	W27-21	620.7	8	PVC	Tie from manhole to pcv pipe			2		20	$181	7%	$194	$3,873
W27-46	W27-34	340.9	8	VCP	By lat		1			10	$181	7%	$194	$1,937
W27-50	W27-3	165.4	10	VCP	By lat		1			10	$196	7%	$210	$2,097
W27-6	W27-4	334.8	8	VCP	Cracks one at lat		4			40	$181	7%	$194	$7,747
W27-8	W27-7	554.1	8	VCP	Cracks		1			10	$181	7%	$194	$1,937
X12-10	X12-9	348.3	8	VCP	Offset joint	1				10	$181	7%	$194	$1,937
X12-14	X12-13	543.5	8	VCP	Cracks and holes	2	2			40	$181	7%	$194	$7,747
X12-4	X12-3	390	10	VCP	Both by lat	1	1			20	$196	7%	$210	$4,194
X12-5	X12-4	320.6	10	VCP	Hole	1				10	$196	7%	$210	$2,097
X12-8	X12-2	292	8	VCP	Offset joint	1				10	$181	7%	$194	$1,937
X12-9	X12-8	338.9	8	VCP	By lat		1			10	$181	7%	$194	$1,937
X24	X23	409.2	10	VCP	Cracks	1	3			40	$196	7%	$210	$8,389
X24-6	X24-2	206	8	VCP	Cracks			1		10	$181	7%	$194	$1,937
X24-8	X24-6	484.4	8	VCP	One at lat tap	2				20	$181	7%	$194	$3,873
X5-3	X5-2	7.1	8	VCP	Hole	1				10	$181	7%	$194	$1,937
X8-12	X8-11	284	8	VCP	Hole	1				10	$181	7%	$194	$1,937
X8-2	X8-1	371.6	10	VCP	I&I	7				70	$196	7%	$210	$14,680
X8-28	X8-27	168.2	8	VCP	I&I / Hole	1	1			20	$181	7%	$194	$3,873
X8-33	X8-30	606.3	8	VCP	By lat one I&I at lat	1	1			20	$181	7%	$194	$3,873
X8-35	X8-34	64.6	8	VCP	At lat hole	1				10	$181	7%	$194	$1,937
X8-5	X8-4	329	8	VCP	By lat		1			10	$181	7%	$194	$1,937
									Total Length	**730**			**Total Cost**	**$145,392**

South Salt Lake City
Sanitary Sewer Master Plan
Initial Project Costs
2/24/2014

Recommended Projects

Project ID	Length ft	Dia. in	# MH	Cost $/LF	Pipe Cost	MH Cost	Boring Length ft	Boring Cost $25/"/lf	Carrier Material Installation	Add. Length ft	Pipe Cost	**Cost (det)**	**Cost + 7 % Pumping**	**Total Cost +36% Contingency**
6a	292	15	3	$200	$58,300	$11,734						$70,034	$74,936	$102,000
7a	252	8	2	$161		$7,823	110	$33,000	$1,331	142	$26,008	$68,161	$72,933	$100,000
8a	193	8	2	$161		$7,823	110	$33,000	$1,331	83	$15,241	$57,395	$61,413	$84,000
9a	995	8	4	$161	$160,131	$15,645						$175,776	$188,080	$256,000
													Subtotal	**$542,000**
6b	1121	24	6	$250	$280,150	$23,468						$303,618	$324,871	$442,000
7b	1608	15	5	$200	$321,580	$19,557						$341,137	$365,016	$497,000
8b	862	12	3	$186	$160,239	$11,734						$171,973	$184,011	$251,000
9b	1531	10	5	$177	$271,040	$19,557						$290,597	$310,939	$423,000
9b	575	10	3	$177	$101,775	$11,734						$113,509	$121,455	$166,000
													Subtotal	**$1,779,000**

South Salt Lake City Sewer Budget

Row Labels	Sum of 2012	Sum of 2013	Sum of 2014
Capital Projects	**-**	**-**	**269,000**
Capital Projects	-	-	75,000
CVWRF Contribution	-	-	110,000
Land Acquisition	-	-	-
Machinery & Equiment	-	-	84,000
Office Expense	-	-	-
O&M	**812,831**	**786,135**	**974,500**
CVWRF Treatment	493,729	479,949	550,000
Employee Benefits	77,885	82,013	75,000
Employee Expense	2,134	1,930	2,500
Equiment	10,072	4,314	19,000
Fuel	5,018	6,323	6,000
Insurance	-	-	-
Line Repairs	5,235	2,415	77,000
Misc Expense	601	704	1,000
Office Expense	16,952	17,319	18,000
Professional Services	1,395	1,197	50,000
Salaries/Wages	171,317	162,766	143,000
Supplies	13,027	9,844	14,000
Training	1,495	3,527	3,000
Utilities	13,973	13,834	16,000
Revenues	**1,232,636**	**1,246,279**	**1,475,000**
Cash Transfer	-	-	141,000
Connection Fees	1,740	8,730	8,000
CVWRF Rental Income	17,645	21,594	14,000
Industrial Fees	110,197	105,416	107,000
Interest	3,361	4,140	5,000
Misc Revenue	-	-	-
Transfers	-	-	-
User Fees	1,099,693	1,106,400	1,200,000
Other Revenues	**-**	**-**	**-**
Industrial Waste Monitoring	**140,211**	**144,774**	**136,000**
CVWRF Pretreatment	140,211	144,774	136,000
Non-Departmental	**354,738**	**598,397**	**-**
Bond Expense	-	-	-
Debt Service	-	-	-
Depreciation CVWRF	237,138	479,567	-
Depreciation SSLC	102,603	103,830	-
Insurance	14,000	15,000	-
Misc Expense	997	-	-
Debt Service	**11,263**	**10,609**	**95,500**
Debt Service	11,263	10,609	95,500
Transfers	**-**	**-**	**-**
Extraordinary	**-**	**-**	**-**
Grand Total	**2,551,678**	**2,786,195**	**2,950,000**

SOUTH SALT LAKE

WATER CONSERVATION PLAN

(HAL Project No.: 126.24.200)

June 2014

HANSEN ALLEN & LUCE inc
ENGINEERS

CITY OF SOUTH SALT LAKE

WATER CONSERVATION PLAN

(HAL Project No.: 126.24.200)

PROFESSIONAL ENGINEER
6/13/2014
No. 354085-2202
J LANCE
NIELSEN
STATE OF UTAH

J. Lance Nielsen, P.E.
Project Engineer

HANSEN ALLEN & LUCE inc
ENGINEERS

June 2014

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CHAPTER 1 – INTRODUCTION

Recognizing the need for proactive planning to meet the water needs of its citizens, the City of South Salt Lake (City) has prepared this 2014 update of its Water Conservation Plan (Plan). The original Plan was completed in 2000 and was updated in 2009. The Plan describes the drinking water system, reviews historical water use, assesses water conservation measures available to the City, sets goals to conserve water, and identifies existing and proposed water conservation measures to be implemented.

This Plan is submitted to the Division of Water Resources under the requirements of Utah Code 73-10-32.

CHAPTER 2 – WATER SYSTEM DESCRIPTION

The City of South Salt Lake is located in the heart of Salt Lake County. It had an estimated population of 24,366 in 2012, a moderate increase over its 2010 population of 23,617 and its 2000 population of 22,038. Attractive to both businesses and residents, the City is nearing its build-out capacity and will experience significant growth only with higher-density redevelopment.

SERVICE AREA

Three entities provide drinking water to South Salt Lake (Figure 2-1). In part of South Salt Lake, the City operates its own system, whose service area extends from 3300 South to 2100 South and from 700 East to the Jordan River. Salt Lake City serves a portion in the northwest corner of South Salt Lake. The area south of 3300 South is served directly by Jordan Valley Water Conservancy District.

The City's system serves an estimated 13,300 residents based on an analysis of 2010 census block data within the service area. The 2000 service population was 14,500, indicating a decline of approximately 8% by 2010. The total number of system connections has not increased since 2010, suggesting a stable service population. This report assumes a constant service population of 13,300 since 2010.

While the City is close to build-out, four transit-oriented development (TOD) overlays have been planned within the service area. According to the City's 2013 Drinking Water System Master Plan, the high-density redevelopment is expected to double the service population by 2050.

TYPES OF USE

The City's water system serves residential, commercial, and industrial customers for both indoor and outdoor water uses. Most of the residential development (single and multi-family) is concentrated on the east side of the City. The western half is largely industrial. Commercial zones are located along the major corridors of 3300 South and State Street. The City's drinking water system must meet the demands for these several types of use.

Because there is no secondary irrigation system in the City, irrigation necessary to support existing landscaping is supplied by the drinking water system. Typical landscaping at businesses, churches, and private homes consists of water-intensive features such as turf grass and other non–drought tolerant plants. The City also operates one large park and several smaller parks with large grass areas.

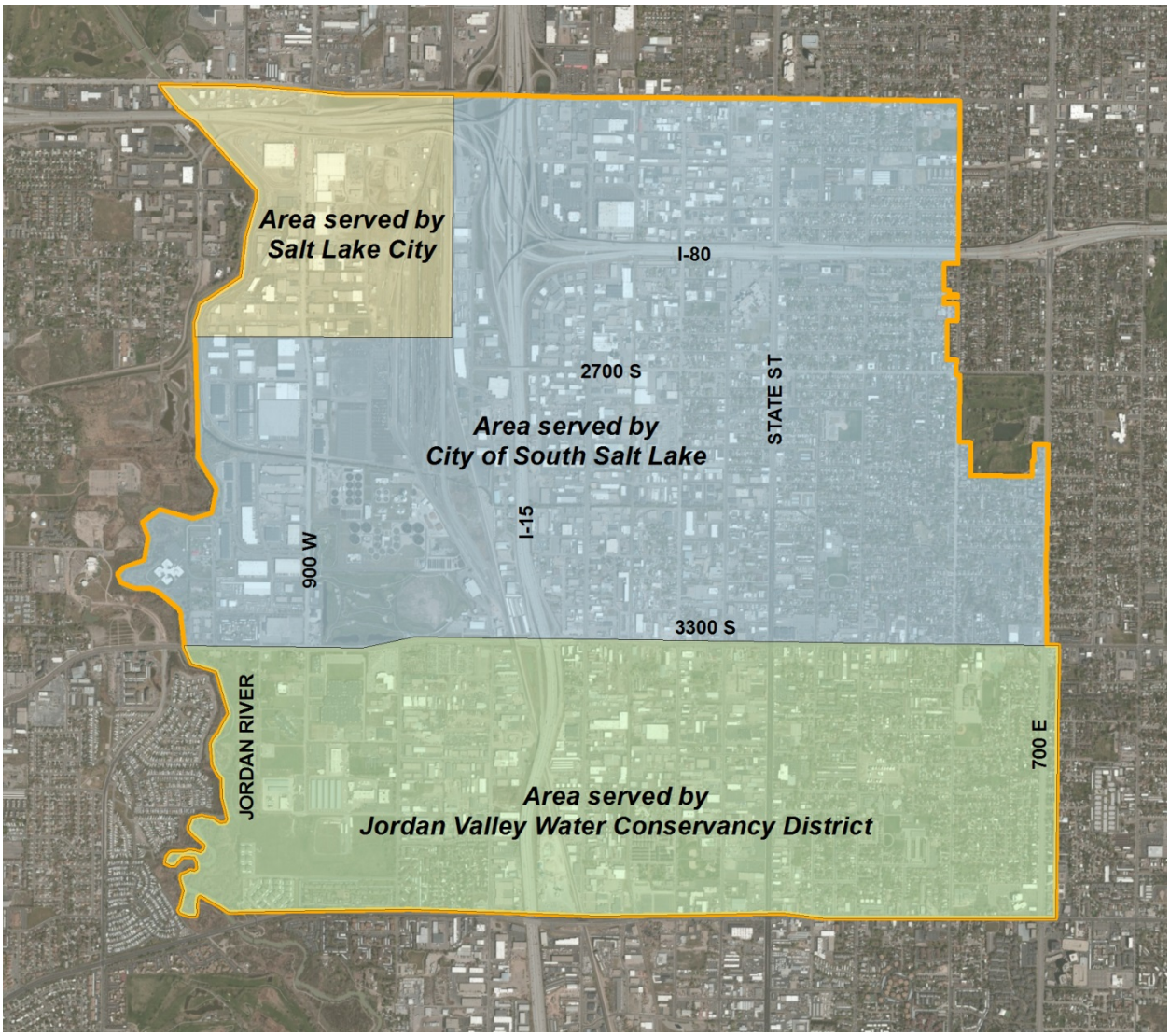

Figure 2-1: Drinking Water Service Areas

INVENTORY OF WATER SOURCES

The City currently receives drinking water from three active wells, four connections to Jordan Valley Water Conservancy District (JVWCD), and two emergency connections to Salt Lake City's (SLC) drinking water system. The City also has three additional wells that are currently not in use. Table 2-1 summarizes the City's drinking water sources.

Table 2-1
Water Sources

Source	Water Rights	Water Right / Contracted Flow	Source Capacity
300 East Well (300 E 2500 S)	57-1056, 2660	2.050 cfs	800 gpm
700 East Well (700 E 3200 S	57-8374, 8789	1.560 cfs	1,400 gpm
Davis Well (465 W 2975 S)	57-641, 727, 806, 1168, 3104, 6010, 7216, 7515, 8288, 8717	6.560 cfs	3,000 gpm
400 East Well (400 E 3050 S)	57-4246 through 4251, and 4253 through 4265	1.570 cfs	Not in use
Bolinder Well (600 W 2250 S)	57-8683, 8687	2.81 cfs	
265 West Well (265 W 2975 S)	57-818, 1056, 1057, 1058, 2660, 3113, 3157, 6010, 7515, 8037, 8288, 8374, 8684	10.665 cfs	
JVWCD (300 E 3300 S)	Contract with Jordan Valley Water Conservancy District	minimum 1,020 ac-ft/year	600 gpm
JVWCD (3300 S State St)			800 gpm
JVWCD (300 W 3300 S)			700 gpm
JVWCD (900 W 3300 S)			1,500 gpm
SLC (2775 S 900 W)	Contract with Salt Lake City Department of Public Utilities	Emergency only; no minimum or maximum	Approx. 800 gpm
SLC (2430 S 300 E)			Approx. 800 gpm

WATER BUDGETS

Water budgets for 2008, 2011, and 2013 are presented in Table 2-2.

Table 2-2
Water Budgets

Year	Produced (ac-ft)	Metered (ac-ft)	% Difference
2008[1]	2,948	2,594	12.0%
2011[2]	2,476	2,181	11.9%
2013[2]	2,908	2,464	15.2%

1. Data from 2009 Water Conservation Plan.
2. Produced and metered data provided by City.

The information in Table 2-2 indicates that a portion of the water supplied by the City's drinking water sources is consistently unaccounted for. Possible explanations include leaks, meter inaccuracies, pipeline flushing, construction activities, fire hydrant testing, and use at unmetered connections. In 2001 the City determined that leaks and backflows to JVWCD connections due to low pressures in the JVWCD system were causing losses up to 40%. The City responded by installing check valves and replacing numerous leaking pipelines, reducing the loss to around 15% in recent years.

HISTORICAL WATER USE

The City's historical water use in gallons per capita per day (gpcd) is shown in Figure 2-2. Since total water use depends on the number of customers, per capita values are a better measure of individual water use over time.

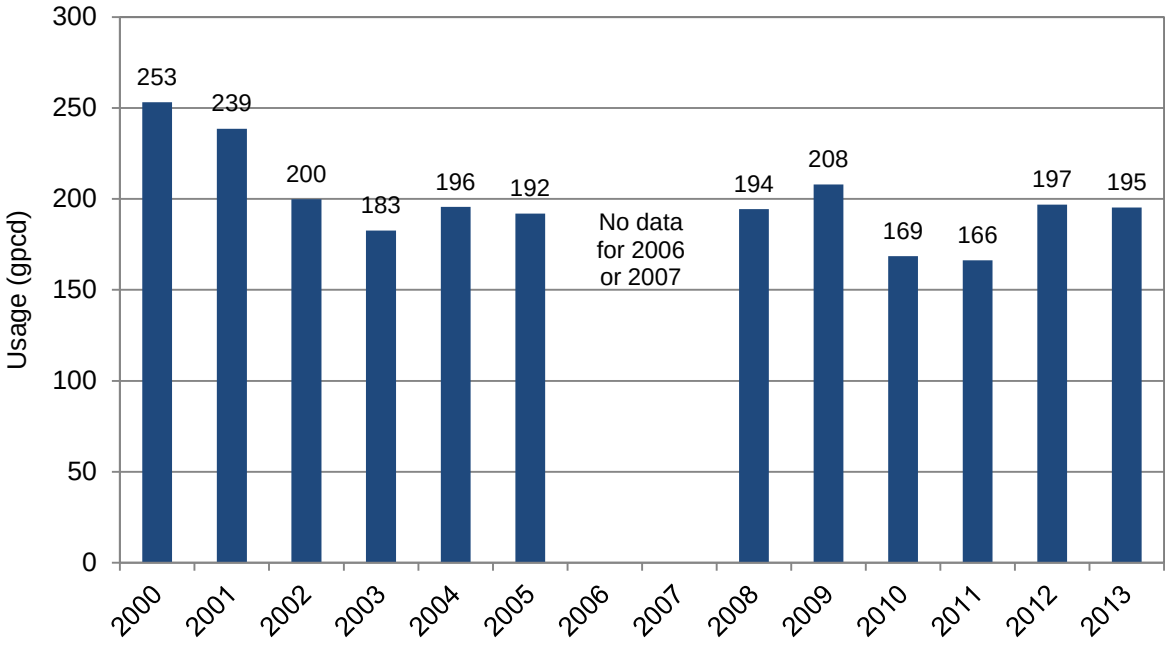

Figure 2-2: Per Capita South Salt Lake Water Use, 2000–2013

As noted above, improvements to the system were completed in 2001 to reduce serious water losses. The improvements contributed to a 21% reduction in water demand from 2000 to 2002. The City's water use has been relatively consistent since then, averaging about 190 gpcd. Use was lower in 2010 and 2011, likely attributable to more precipitation during these years compared to the drier years of 2012 and 2013. The consistent reduction since 2002 is encouraging as the City continues to implement its Water Conservation Plan.

It is important to note that the City's previous conservation plans overestimated the service population, leading to lower values of per capita water use. The results of this report should not be compared to earlier ones due to a fundamental difference in assumptions.

Water use for the period 2000–2005 averaged 3,350 ac-ft/yr. Total water use for the period 2008–2013 averaged 2,830 ac-ft/yr. The reduction may be attributed to both population decrease and water conservation.

Figure 2-3 illustrates the seasonal pattern of water use in the service area. The City delivers nearly three times as much water in July as it does in February. Conservation is most effective during summer months, where irrigation and other outdoor uses add to the overall water demand.

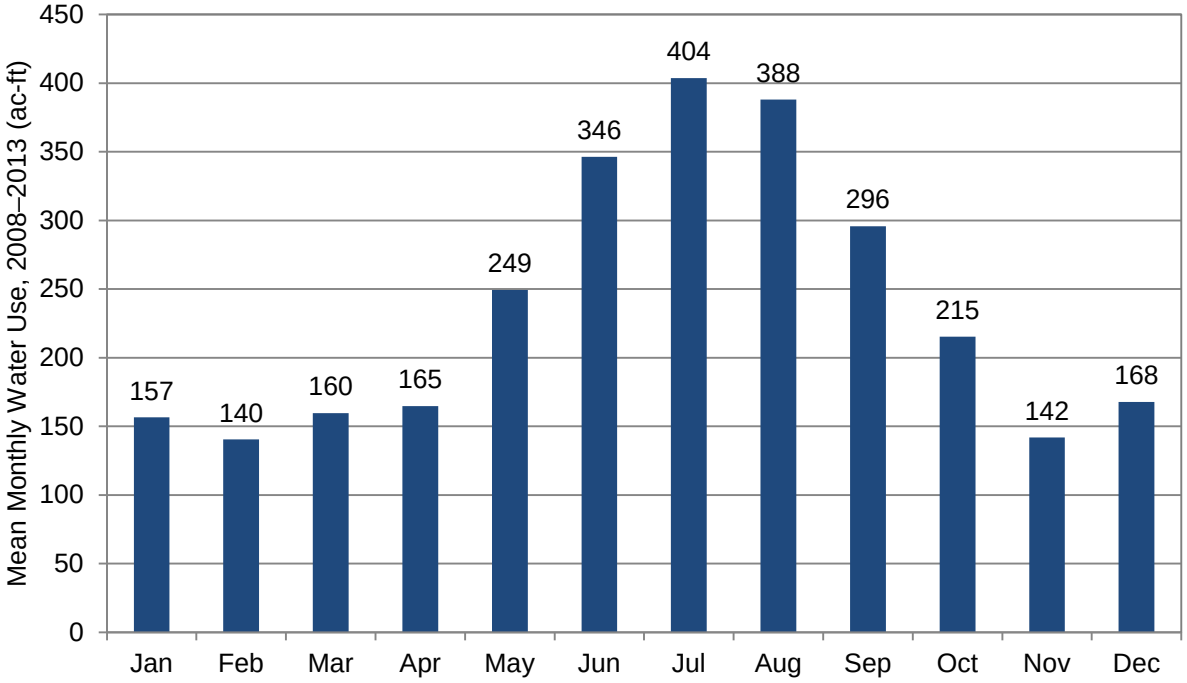

Figure 2-3: Monthly South Salt Lake Water Use, 2008–2013

FUTURE WATER USE

As described in the City's 2013 Drinking Water System Master Plan, redevelopment may double the service population by 2050. Future increases in water demand are expected to be the result of redevelopment and population growth; per capita water use is expected to be similar to recent years as presented in Figure 2-2.

CHAPTER 3 – WATER CONSERVATION GOALS

PROBLEMS

The City of South Salt Lake is concerned with the potential waste of water from inefficient indoor and outdoor water use and from system-wide losses. The following specific concerns have been identified by the City:

- Many pipes in the drinking water distribution system are old or undersized and may be leaking. A pipe replacement program addresses these issues periodically.
- Comparison of the water supplied to the distribution system and the monthly meter readings has revealed water that is unaccounted for.
- Potential for further indoor and outdoor conservation still exists.

GOALS

The City of South Salt Lake has set goals to address the identified problems and to promote conservation. The City currently supports the statewide goal set in 2000 by the Utah Division of Water Resources to reduce water use 25% by 2050. In 2013 Gov. Gary Herbert renewed the challenge: “In the year 2000 we set a target to use 25% less water by the year 2050, and we’ve already reduced our consumption by 18%. So let’s go one step further. Let’s cut the time in half, and achieve that goal by the year 2025.” South Salt Lake has already made considerable progress toward this goal, reducing per capita water use by 21% since 2000. The City will continue working to further conserve its water resources and meet or exceed the original statewide goal.

The following water conservation goals have been identified by the City:

- The City will continue to implement the water conservation measures currently in effect as defined in Chapter 4.
- The City’s water rate structure has been amended to better promote conservation. The City will consider additional rate modifications to encourage wise water use.
- The City will determine potential causes for unaccounted drinking water and attempt to reduce this water loss.
- The City will continue its pipe replacement program, replacing leaking pipelines as budget will allow.

CHAPTER 4 – WATER CONSERVATION MEASURES

EXISTING CONSERVATION MEASURES

The City of South Salt Lake is already implementing, and will continue to implement, the following water conservation measures.

- Promotion of individual water conservation measures to City residents through the City's website, the annual Water Quality Report, bill stuffers, the City's *On the Move* monthly newsletter, a booth during the City's annual "Night Out Against Crime" community event, and the annual Huck Finn Day.
- Promoted conservation measures include the following:
    - Ways to save water indoors:
        - Check all faucets, pipes, and toilets for leaks.
        - Install water-saving showerheads and low-flush toilets.
        - Take shorter showers.
        - Never use your toilet as an ashtray or wastebasket.
        - Turn off the water while brushing your teeth or shaving.
        - Defrost frozen food in the refrigerator.
        - Rinse vegetables in a full sink or pan of water.
        - Fully load your dishwasher.
        - Rinse dishes in a full sink or pan of water.
        - Wash full loads of clothes.
    - Ways to save water outdoors:
        - Don't over-water landscaping.
        - Water your lawn or garden early in the morning or late in evening.
        - Adjust sprinklers so that they don't water the sidewalk or street.
        - Don't water on cool, rainy, or windy days.
        - Equip all hoses with shutoff nozzles.
        - Use drip irrigation systems.
        - Plant drought-tolerant or low–water use plants and grasses.
        - Use shrubs and ground cover to reduce the amount of grass.
        - Place mulch around plants to reduce evaporation and discourage weeds.
        - Set your mower blades one notch higher, since longer grass means less evaporation.
        - Use a pool cover to cut down on water evaporation.
        - Use a bucket instead of a hose to wash your car.
        - Use a broom rather than a hose to clean sidewalks, driveways, loading docks, and parking lots.
- The City directs citizens to the Slow the Flow website (www.slowtheflow.org) for additional conservation ideas.
- The City directs citizens to Center for Water-Efficient Landscaping at Utah State University (http://cwel.usu.edu/) for information on efficient landscape irrigation.
- A Landscape Handbook is available on the City's website. The handbook addresses irrigation techniques and lists recommended water-efficient plants.
- The City has adopted the International Plumbing Code (IPC) which requires installation of water-saving fixtures in new construction (Municipal Code: 15.08.050). Maximum flow rates as defined by IPC 604.4 are as follows:
    - Shower head: 2.5 gpm at 80 psi
    - Sink faucet: 2.2 gpm at 60 psi
    - Toilet: 1.6 gal per flush

- The City adopted a new water rate structure effective Jan. 1, 2014. Previous rates did not promote water conservation since customers were charged similarly regardless of their use. The new rates encourage reduced water use, especially by the largest users. The 2014 monthly rates are as follows:
    - 0.75-in. service: $11.00 min.; 5,000 gal allowance
    - 1.0-in. service: $19.00 min.; 5,000 gal allowance
    - 1.5-in. service: $32.00 min.; 5,000 gal allowance
    - 2.0-in. service: $47.00 min.; 5,000 gal allowance
    - 3.0-in. service: $89.00 min.; 5,000 gal allowance
    - 4.0-in. service: $136.00 min.; 5,000 gal allowance
    - 6.0-in. service: $267.00 min.; 5,000 gal allowance
    - Metered hydrant use: $3.00 per 1,000 gal
    - Excess water: $2.25 per 1,000 gal between 5,000 and 30,000 gal and $2.75 per 1,000 gal over 30,000 gal
- The City has instituted a program to replace old galvanized steel water services with new copper water services. To date, the City has replaced about 75% of these services and will continue to replace services as leaks are detected and as budget allows. Replacing galvanized pipes in City parks has reduced water use by an estimated 15%.
- Existing City code provides for emergency limitation of water use when necessary.
    - 13.52.050 Mayor's proclamation of water use limitation.
      In time of scarcity of water or whenever it shall be deemed necessary by the City Council, the Mayor shall, by proclamation, limit the use of water to such extent as may be necessary for the public good. Providing, however, that such restrictions and limitations are not discriminatory and are made on a reasonable basis. It is unlawful for any person by himself, family, servants or agents to violate any such proclamation, and in addition to any other penalties which may be imposed, the water shall be turned off and not turned on again until the payment set by resolution of the City Council for each violation has been made.
- Existing City code prohibits the wasting of water.
    - 13.56.070 Waste prohibited.
      It is unlawful for any water user to waste water, or to allow tanks, air conditioning units or similar equipment to leak or overflow, or to wastefully run water from hydrants, faucets or stops, or through basins, water closets, urinals, sinks or other apparatus, or to use the water for purposes other than those for which he has paid or to use water in violation of the rules and regulations for controlling the water supply and the provisions of this chapter.

PROPOSED ADDITIONAL CONSERVATION MEASURES

The City of South Salt Lake proposes to implement the following additional Water Conservation measures:

- The City will consider purchasing leak detection equipment and performing a leak detection survey. This survey would be followed by the implementation of the ongoing pipeline replacement program for leaking pipelines.
- The City is currently developing a commercial landscape ordinance to encourage water conservation. Sections relevant to water conservation include the following:
    - 17.07.050.C Drought Tolerant Species.
      Climatic conditions in Salt Lake County are generally arid, and the selection of plant species suited to dry conditions is allowed and appropriate. The State of Utah has compiled a list of "WaterWise" plants which can be accessed at http://www.waterwiseplants.utah.gov. Drought tolerant plants shall be from transplants and not seeded on site.

- 17.07.050.G.8 Water Conservation.
  Landscape design pursuant to the requirements of this chapter should be done with water conservation in mind because of population growth, limited available water and the climatic limitations of Salt Lake County. While irrigation systems are required for certain landscaping and may be desirable for other applications, all irrigation systems shall be designed for efficient use of water.

- The City will consider reevaluating its water rate structure to further promote water conservation.
- The City will continue its program to replace old galvanized steel water services with copper water services.
- The City will continue to monitor overall system water loss and institute measures to address unaccounted water.

CHAPTER 5 – IMPLEMENTATION PLAN

This Water Conservation Plan renews the existing water conservation measures for at least the next five years. Existing and proposed water conservation measures will be implemented according to Table 5-1.

Table 5-1
Water Conservation Implementation Plan

Conservation Measure	Implementation Plan
Promote water conservation measures to City residents	Advertise conservation measures through: • The City's website (www.southsaltlakecity.org). • The annual Water Quality Report. • Bill stuffers. • The City's monthly newsletter, *On the Move* (http://www.southsaltlakecity.com/city-government/city-newsletter). • The annual "Night Out Against Crime" community event. • The annual Huck Finn Day.
Require new development to install water saving plumbing fixtures	Check building plans for water saving fixtures during building permit reviews and enforce compliance through building inspections for new construction.
Replacement of old leaking water services	Replace with copper water services as leaks are detected. Approximately 75% of the old galvanized steel services have been replaced to date.
Prohibit the wasting of water	City Code: 13.56.070 Waste Prohibited • Implemented when water waste is discovered
Emergency limitation of water use	City Code: 13.52.050 Mayor's Proclamation of water use limitation • Implemented in times of scarcity of water or whenever deemed necessary by the City Council
Perform leak detection survey followed by a pipeline replacement program	Public Works department will: • Evaluate necessity of a leak detection survey • Budget funding for survey as deemed necessary • Develop plan for replacement of leaking pipelines when discovered
Adopt a commercial landscaping ordinance that promotes conservation	Building department is developing the ordinance to be adopted by the City Council. Building department will enforce installation of efficient landscape irrigation design.
Assess the need to further modify water rates to promote conservation	Public Works will evaluate the effectiveness of recent water rate modifications in promoting water conservation. Public Works will evaluate the need for additional modifications to the rate structure.

CHAPTER 6 – ADOPTION OF PLAN

Pursuant to Section 73-10-32(2)(a) of the Utah Code (Appendix B), the City's governing body shall devote part of at least one regular meeting every five years to discussion and formal adoption of the Water Conservation Plan. Minutes of such meetings shall be included as an appendix to the Plan. The City shall also provide media access to the Plan and allow public comment on it. These actions serve to increase awareness of the Plan and encourage public involvement in its implementation, leading to a more effective water conservation effort.

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APPENDIX A

Drinking Water System Data

City of South Salt Lake
Drinking Water System Data

Provided by City, 5/5/2014
Calculated 5/5/2014 RBS

2008	January	February	March	April	May	June	July	August	September	October	November	December	Total
Water Produced or Purchased (gal)	59,999,167	52,756,664	55,710,869	57,565,998	86,698,021	105,503,327	140,189,736	135,629,419	90,897,312	59,772,151	47,870,324	68,023,724	960,616,711
Water Delivered (gal)	48,062,000	39,574,000	42,754,000	51,508,000	79,556,000	112,297,000	132,055,000	115,353,000	87,036,000	50,831,000	44,963,000	41,267,000	845,256,000
Difference (gal)	**11,937,167**	**4,694,664**	**16,136,869**	**14,811,998**	**35,190,021**	**25,947,327**	**27,892,736**	**3,574,419**	**-24,455,688**	**-27,263,849**	**-2,960,676**	**23,060,724**	**115,360,711**
Percent Difference	**19.9%**	**8.9%**	**29.0%**	**25.7%**	**40.6%**	**24.6%**	**19.9%**	**2.6%**	**-26.9%**	**-45.6%**	**-6.2%**	**33.9%**	**12.0%**
Water Produced or Purchased (ac-ft)	**184.1**	**161.9**	**171.0**	**176.7**	**266.1**	**323.8**	**430.2**	**416.2**	**279.0**	**183.4**	**146.9**	**208.8**	**2948.0**
Water Delivered (ac-ft)	**147.5**	**121.4**	**131.2**	**158.1**	**244.1**	**344.6**	**405.3**	**354.0**	**267.1**	**156.0**	**138.0**	**126.6**	**2594.0**
Difference (ac-ft)	**36.6**	**14.4**	**49.5**	**45.5**	**108.0**	**79.6**	**85.6**	**11.0**	**-75.1**	**-83.7**	**-9.1**	**70.8**	**354.0**
Percent Difference	**19.9%**	**8.9%**	**29.0%**	**25.7%**	**40.6%**	**24.6%**	**19.9%**	**2.6%**	**-26.9%**	**-45.6%**	**-6.2%**	**33.9%**	**12.0%**

2011	January	February	March	April	May	June	July	August	September	October	November	December	Total
Water Produced or Purchased (gal)	27,450,000	27,086,000	48,464,000	52,370,000	57,530,000	84,236,000	121,981,000	122,668,000	102,344,000	63,253,000	47,330,000	52,141,000	806,853,000
Water Delivered (gal)	39,148,000	34,096,000	38,776,000	38,546,000	52,652,000	91,170,000	105,095,000	114,063,000	81,549,000	44,821,000	43,032,000	27,811,000	710,759,000
Difference (gal)	**-11,698,000**	**-7,010,000**	**9,688,000**	**13,824,000**	**4,878,000**	**-6,934,000**	**16,886,000**	**8,605,000**	**20,795,000**	**18,432,000**	**4,298,000**	**24,330,000**	**96,094,000**
Percent Difference	**-42.6%**	**-25.9%**	**20.0%**	**26.4%**	**8.5%**	**-8.2%**	**13.8%**	**7.0%**	**20.3%**	**29.1%**	**9.1%**	**46.7%**	**11.9%**
Water Produced or Purchased (ac-ft)	**84.2**	**83.1**	**148.7**	**160.7**	**176.6**	**258.5**	**374.3**	**376.5**	**314.1**	**194.1**	**145.3**	**160.0**	**2476.1**
Water Delivered (ac-ft)	**120.1**	**104.6**	**119.0**	**118.3**	**161.6**	**279.8**	**322.5**	**350.0**	**250.3**	**137.6**	**132.1**	**85.3**	**2181.2**
Difference (ac-ft)	**-35.9**	**-21.5**	**29.7**	**42.4**	**15.0**	**-21.3**	**51.8**	**26.4**	**63.8**	**56.6**	**13.2**	**74.7**	**294.9**
Percent Water Loss	**-42.6%**	**-25.9%**	**20.0%**	**26.4%**	**8.5%**	**-8.2%**	**13.8%**	**7.0%**	**20.3%**	**29.1%**	**9.1%**	**46.7%**	**11.9%**

2013	January	February	March	April	May	June	July	August	September	October	November	December	Total
Water Produced or Purchased (gal)	58,092,000	51,419,000	55,786,000	59,999,000	94,932,000	115,268,000	128,348,000	126,697,000	90,902,000	69,716,000	39,060,000	57,235,000	947,454,000
Water Delivered (gal)	40,448,000	34,288,000	34,780,000	44,359,000	88,666,000	111,924,000	147,499,000	112,692,000	66,366,000	47,392,000	35,338,000	39,233,000	802,985,000
Difference (gal)	**17,644,000**	**17,131,000**	**21,006,000**	**15,640,000**	**6,266,000**	**3,344,000**	**-19,151,000**	**14,005,000**	**24,536,000**	**22,324,000**	**3,722,000**	**18,002,000**	**144,469,000**
Percent Difference	**30.4%**	**33.3%**	**37.7%**	**26.1%**	**6.6%**	**2.9%**	**-14.9%**	**11.1%**	**27.0%**	**32.0%**	**9.5%**	**31.5%**	**15.2%**
Water Produced or Purchased (ac-ft)	**178.3**	**157.8**	**171.2**	**184.1**	**291.3**	**353.7**	**393.9**	**388.8**	**279.0**	**214.0**	**119.9**	**175.6**	**2907.6**
Water Delivered (ac-ft)	**124.1**	**105.2**	**106.7**	**136.1**	**272.1**	**343.5**	**452.7**	**345.8**	**203.7**	**145.4**	**108.4**	**120.4**	**2464.3**
Difference (ac-ft)	**54.1**	**52.6**	**64.5**	**48.0**	**19.2**	**10.3**	**-58.8**	**43.0**	**75.3**	**68.5**	**11.4**	**55.2**	**443.4**
Percent Difference	**30.4%**	**33.3%**	**37.7%**	**26.1%**	**6.6%**	**2.9%**	**-14.9%**	**11.1%**	**27.0%**	**32.0%**	**9.5%**	**31.5%**	**15.2%**

APPENDIX B

Utah Code 73-10-32

73-10-32. Definitions -- Water conservation plan required.

(1) As used in this section:

(a) "Board" means the Board of Water Resources created under Section 73-10-1.5.

(b) "Division" means the Division of Water Resources created under Section 73-10-18.

(c) "Retail" means the level of distribution of culinary water that supplies culinary water directly to the end user.

(d) "Retail water provider" means an entity which:

(i) supplies culinary water to end users; and

(ii) has more than 500 service connections.

(e) "Water conservancy district" means an entity formed under Title 17B, Chapter 2a, Part 10, Water Conservancy District Act.

(f) "Water conservation plan" means a written document that contains existing and proposed water conservation measures describing what will be done by retail water providers, water conservancy districts, and the end user of culinary water to help conserve water and limit or reduce its use in the state in terms of per capita consumption so that adequate supplies of water are available for future needs.

(2) (a) Each water conservation plan shall contain:

(i) a clearly stated overall water use reduction goal and an implementation plan for each of the water conservation measures it chooses to use, including a timeline for action and an evaluation process to measure progress;

(ii) a requirement that each water conservancy district and retail water provider devote part of at least one regular meeting every five years of its governing body to a discussion and formal adoption of the water conservation plan, and allow public comment on it;

(iii) a requirement that a notification procedure be implemented that includes the delivery of the water conservation plan to the media and to the governing body of each municipality and county served by the water conservancy district or retail water provider; and

(iv) a copy of the minutes of the meeting and the notification procedure required in Subsections (2)(a)(ii) and (iii) which shall be added as an appendix to the plan.

(b) A water conservation plan may include information regarding:

(i) the installation and use of water efficient fixtures and appliances, including toilets, shower fixtures, and faucets;

(ii) residential and commercial landscapes and irrigation that require less water to maintain;

(iii) more water efficient industrial and commercial processes involving the use of water;

(iv) water reuse systems, both potable and not potable;

(v) distribution system leak repair;

(vi) dissemination of public information regarding more efficient use of water, including public education programs, customer water use audits, and water saving demonstrations;

(vii) water rate structures designed to encourage more efficient use of water;

(viii) statutes, ordinances, codes, or regulations designed to encourage more

efficient use of water by means such as water efficient fixtures and landscapes;

(ix) incentives to implement water efficient techniques, including rebates to water users to encourage the implementation of more water efficient measures; and

(x) other measures designed to conserve water.

(c) The Division of Water Resources may be contacted for information and technical resources regarding measures listed in Subsections (2)(b)(i) through (2)(b)(x).

(3) (a) Before April 1, 1999, each water conservancy district and each retail water provider shall:

(i) (A) prepare and adopt a water conservation plan if one has not already been adopted; or

(B) if the district or provider has already adopted a water conservation plan, review the existing water conservation plan to determine if it should be amended and, if so, amend the water conservation plan; and

(ii) file a copy of the water conservation plan or amended water conservation plan with the division.

(b) Before adopting or amending a water conservation plan, each water conservancy district or retail water provider shall hold a public hearing with reasonable, advance public notice.

(4) (a) The board shall:

(i) provide guidelines and technical resources to retail water providers and water conservancy districts to prepare and implement water conservation plans;

(ii) investigate alternative measures designed to conserve water; and

(iii) report regarding its compliance with the act and impressions of the overall quality of the plans submitted to the Natural Resources, Agriculture, and Environment Interim Committee of the Legislature at its meeting in November 2004.

(b) The board shall publish an annual report in a paper of state-wide distribution specifying the retail water providers and water conservancy districts that do not have a current water conservation plan on file with the board at the end of the calendar year.

(5) A water conservancy district or retail water provider may only receive state funds for water development if they comply with the requirements of this act.

(6) Each water conservancy district and retail water provider specified under Subsection (3)(a) shall:

(a) update its water conservation plan no less frequently than every five years; and

(b) follow the procedures required under Subsection (3) when updating the water conservation plan.

(7) It is the intent of the Legislature that the water conservation plans, amendments to existing water conservation plans, and the studies and report by the board be handled within the existing budgets of the respective entities or agencies.

Amended by Chapter 329, 2007 General Session

CITY COUNCIL STAFF REPORT

MEETING DATE:	**30 July 2014**
APPLICANT:	**Glenburn Investments, Inc**
ADDRESS:	**137 West 3030 South; 115 West 3030 South**
REQUEST:	**General Plan Amendment**
ZONE:	**Business Commercial/ TOD Overlay District**
PROJECT NUMBER:	**GP-14-003**
PREPARED BY:	**Hayley Pratt, City Planner**

SYNOPSIS:

The applicant, Glenburn Investments, is seeking a general plan amendment for the properties located at 137 West 3030 South and 115 West 3030 South in order to accommodate the future development of a six-lot townhome Planned Unit Development. The general plan amendment proposed is to change the future land use designation from general commercial, to medium density residential (9-15 units per acre). The City Council is the land use authority for General Plan Amendments, acting on a recommendation by the Planning Commission.

SUMMARY:

- Currently, one single-family home sits on a 0.25-acre parcel with frontage on 3030 south. A second 0.25-acre parcel on 3030 south shares a boundary line with the parcel where the townhomes are proposed to be constructed; a portion of this parcel will be included in the PUD, where the existing home will remain. This lot line adjustment is part of the second application before the City Council for zone change and subdivision approval.
- The existing home has a number of structural issues and is not in a habitable condition. In the past, the City has had to abate a number of code violations that occurred at the property.
- The proposal meets the minimum lot sizes and lot widths required by ordinance.
- Staff believes that this neighborhood shows promise, and supports the addition of townhome multi-family, owner-occupied housing.
- The General Plan is a guiding document for the future planning of the City.
- The Planning Commission recommended a General Plan Amendment for the proposed six-lot townhome Planned Unit Development proposed to be located at 137 west 3030 south and 115 west 3030.

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CITY COUNCIL STAFF REPORT

General Information:

Location: 137 West 3030 South & 115 West 3030 South
Property Size: 0.5 acres
Surrounding General Plan Designation and Land Uses

North: General Commercial; Single Family Detached Home
South: General Commercial; Single Family Detached Home
East: General Commercial; Single Family Detached Home
West: General Commercial; Single Family Detached Home

Zone: Business Commercial/ Transit-Oriented Development Overlay District

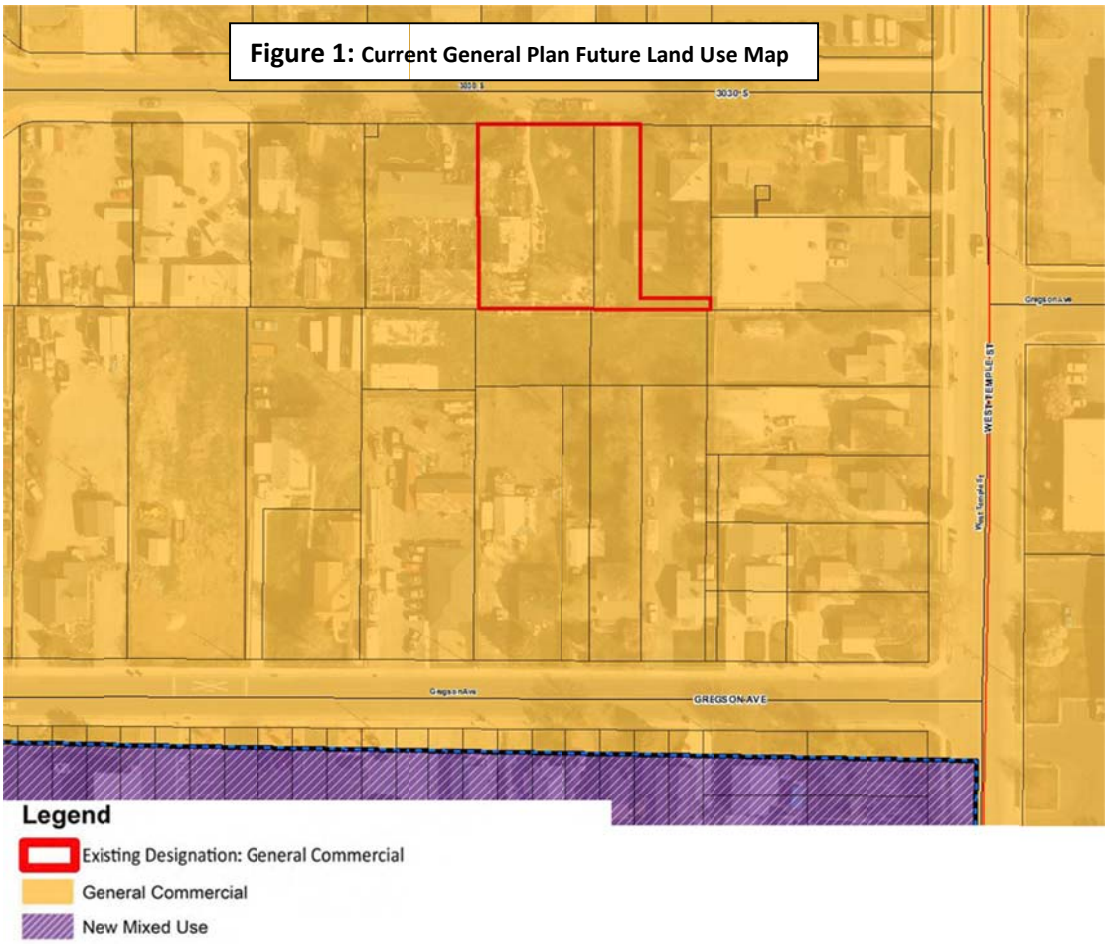


Figure 1: Current General Plan Future Land Use Map

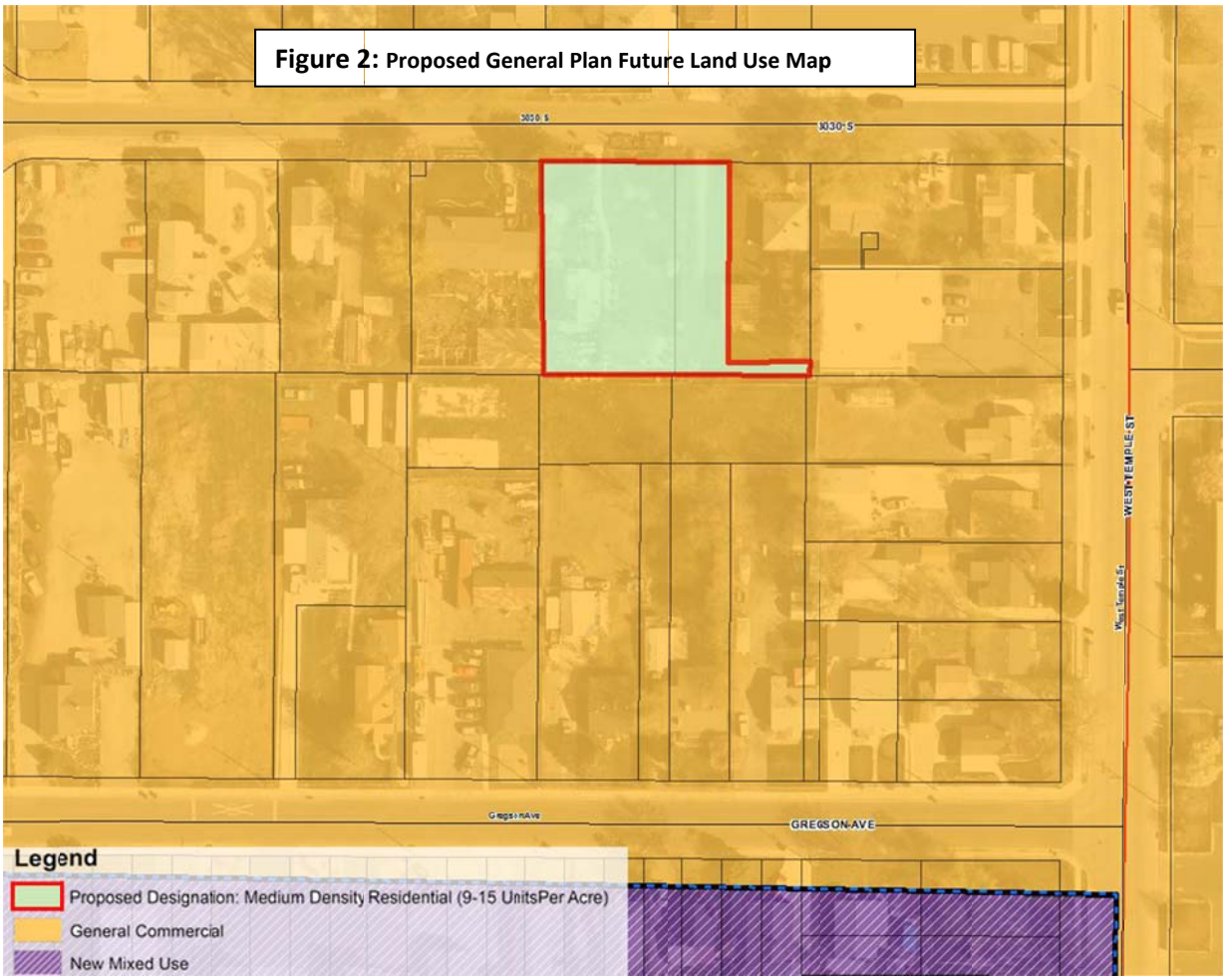


Figure 2: **Proposed General Plan Future Land Use Map**

<u>Requirements:</u>

17.07.040 Land use authority designations.

Pursuant to state law, the following administrative land use authority designations are made:

A.City Council. The city council is the land use authority on issues of: planned unit developments; the approval of development agreements; the vacation of public rights of way; and enacting or amending land use code, zoning maps and the general plan.

2.3.2 Quality Neighborhoods

The City will promote sustainability of neighborhoods with a variety of housing types, styles and sizes including transitional housing, moderate income housing, and mid range to high-end housing. South Salt Lake is highly urbanized and new development will largely be infill; but the development will complement and add to the community and will be developed only as it fits into existing neighborhoods. South Salt Lake will work to increase the rate of

home ownership and promote community pride. South Salt Lake will promote policies and actions to create safe neighborhoods and low levels of crime.

Goal LU-1. Regulate land uses based on compatibility with surrounding uses, residential areas and economic feasibility. Maintain residential, business and industrial areas that are vibrant and where the health and safety of all are protected.
As indicated on the future land use map, the intersection of 3300 South and 300 East was designated as a neighborhood commercial node. There are already a number of small-scale retail uses at this intersection, including a bakery, two distinctive restaurants, Rezoning this parcel will allow for commercial development – potentially as a small office use – that will expand the node. The parcel has been used as parking for at least 13 years, and is currently nonconforming. Rezoning will allow for a conforming commercial use to be established. Any commercial use will be subject to design standards, including buffering and height requirements, intended to minimize the impact to surrounding residential uses.

Policy LU-1.2.1: Only allow residential uses in business areas that are compatible with surrounding uses by type, scale and size.

Goal LU-8. Accommodate higher density housing in appropriate areas.
Residents and City leaders realize that South Salt Lake is in a strategic location in the Salt Lake Valley and that permitting higher density housing is not only appropriate in certain areas but also is also smart planning. Strategic areas where higher density housing should be allowed are near TRAX stations and along other major transit corridors. Permitting higher density housing can be beneficial to the City as well as the region. Quality multi-family housing adds permanent, stable, and responsible residents to the City.

Goal HE-3. Infill housing should be encouraged.
South Salt Lake is primarily a built out community. Most of the residential neighborhoods were platted between 40 and 80 years ago. Large-scale housing developments are a dwindling possibility in South Salt Lake so infill housing is the most probable option for new residential development. Some areas were platted with larger half acre lots that have been subdivided and built upon and in some cases, houses or other buildings have been removed to make way for new housing development. Infill housing introduces potential challenges such as building size and height, yard area, design, parking, and private roads. These issues can be overcome with proper design and planning and they should be, as new housing development is vital for the City.

Goal HE-4. Improve the overall home ownership ratio.
According to the 2000, Census South Salt Lake City has a home ownership level of 38 percent and a rental level of 62 percent. Increased home ownership results commitment to the community and schools, more investment in property enhancements, lower levels of crime and greater community stability. This issue has been at the forefront of other general plans for a number of years and establishment of programs to turn the tide is warranted.

Goal CV-2. The General Plan should be implemented in a reasonable period following adoption. Policy CV-2.2.2:
Use the General Plan and land use map as the guiding document in all zoning map and zoning ordinance changes.

Goal CV-3. Follow the General Plan as closely as possible.
Objective CV-3.1: The General Plan should guide all land use amendments and decisions by the Planning Commission and City Council.

Policy CV-3.1.1: Land use recommendations should always reference the General Plan.

Policy CV-3.1.2: If the General Plan is not followed, the reasons for not following the Plan should be established and recorded.

Objective CV-3.2: The General Plan should be kept as a relevant document.

Policy CV-3.2.1: If the desired land use changes are not consistent with the General Plan, an amendment to the plan should be considered.

Staff Analysis:
South Salt Lake City has long had a policy of supporting infill housing in appropriate locations. The proposed location is within a neighborhood that is a mixed use neighborhood, featuring commercial uses, and single-family homes. In order to incorporate the parcels into a townhome development, the applicant is seeking a general plan amendment to re-designate the parcel to medium-density residential (9-15 units per acre).

The applicant is proposing an owner-occupied townhome project for a property that currently consists of an abandoned home which will be demolished, and an existing single family residence which will be maintained and platted accordingly. The applicant has applied for a rezone for the establishment of a planned-unit development.

Staff believes that with appropriate amenities and buffers as suggested in **Policy LU-1.1.1** in the General Plan, a quality townhome development can add significant value to the neighborhood and can provide additional opportunities for homeownership in South Salt Lake. Permitting higher density housing in the appropriate location can be beneficial to the City as well as the region.

The General Plan gives substantial guidance when considering land use changes in the City. Staff believes that the General Plan supports a change in the future land use designation at this property or leaving the designation as-is. The critical issue at this site is a privacy concern which can be resolved through view blocking techniques that prevent the new units from visually infringing on the adjacent residential homes privacy.

CITY COUNCIL STAFF REPORT

MEETING DATE:	**30 July 2014**
APPLICANT:	**Glenburn Investments, Inc**
ADDRESS:	**115 and 137 West 3030 South**
REQUEST:	**Final Plat and Zoning Map Amendment Approval for a Six-Lot Planned Unit Development**
ZONE:	**Residential Multiple/ TOD Overlay District**
PROJECT NUMBER:	**S-14-003, Z-14-003**
PREPARED BY:	**Hayley Pratt, City Planner**

SYNOPSIS: The applicant, Glenburn Investments, is seeking final plat and zoning map amendment approval of a six-lot townhome Planned Unit Development located at 115 and 137 West 3030 South. The City Council is the final land use authority for this application; acting on a recommendation by the Planning Commission.

SUMMARY:

- Currently, one single-family home sits on a 0.25-acre parcel with frontage on 3030 south. A second 0.25-acre parcel on 3030 south shares a boundary line with the parcel where the townhomes are proposed to be constructed; a portion of this parcel will be included in the PUD, where the existing home will remain.
- The proposal meets the minimum lot sizes and lot widths required by ordinance.
- Staff believes that this neighborhood shows promise, and supports the addition of townhome multi-family, owner-occupied housing.

Planning Commission and Staff Recommendations

The Planning Commission recommended approval with the following conditions:

1. The applicant reduces any risk of infringing on the neighboring property to the west of the development through view blocking techniques such as columnar trees planted along the western property line where views into the backyard area from the townhomes are evident. The landscape plan will need to include the tree species that is proposed for the above stated requirement.
2. Prior to being issued a building permit the applicant will provide building elevations that comply with Townhome-style Multifamily Building Design Standards, found in title 17.12.090 of the South Salt Lake City Municipal Code.
3. The applicant will continue to work with City staff to make all technical corrections necessary for recoding.
4. The applicant work with the City Engineer and Fire Marshal to ensure emergency vehicles have sufficient access to the proposed residences.
5. Bonds for all common and public improvements will be submitted to the City prior to any development.
6. The applicant will work closely with staff to resolve any storm water management concerns that would result from the proposed project.
7. The final plat be approved by the City Engineer and Salt Lake County Recorder
8. All items of the staff report.

PLANNING COMMISSION STAFF REPORT

General Information:

Location: 115 and 137 West 3030 South

Surrounding Zoning and Land Uses:

North: Single Family Residential
South: Single Family Residential
East: Single Family Residential
West: Single Family Residential

Zone: Business Commercial/ Transit-Oriented Development Overlay District

Size: The proposed PUD will be approximately 0.5 acres in size.

Water, Sewer, and Other Public Utilities: The Public Works Department requires that storm water developed on a parcel be drained on that parcel. The City Engineer will review the PUD subdivision plat prior to recording. Water service will be provided by South Salt Lake City. Sewer will be provided by Mt. Olympus.

Parking and Accessibility: Each home will have a two car garage and driveways that can accommodate two additional vehicles. In addition there will be three guest parking stalls located to the south of the property that is accessed by a private drive found along 3030 south. Emergency vehicle access has been reviewed by the South Salt Lake City Fire Marshall.

Setbacks: The townhomes have a 10' setback to the east and west, between the property line and the townhome structures (rear yard setback). The setback to the south is 27.5' (side yard setback), and the setback to the north is 5', and is between the public sidewalk and the proposed townhomes (front yard setback). The Planning Commission can vary setbacks per §17.21.040 of the South Salt Lake Municipal Code, in order to ensure that new buildings are compatible within existing neighborhoods, to support and enhance walkable neighborhoods, to cultivate desirable development, to encourage long-term residency, and to facilitate innovation in building design and energy efficiency standards. The applicant is requesting a modification of the front, and rear townhome setbacks.

Staff supports the modification on the grounds that the rear yard of the townhomes backs up to the side yard of the adjacent home which reduces the risk for privacy infringement on the neighboring homes for the majority of the development, however the last townhome found to the south of the property looks down onto the back yard areas of the neighboring home to the west. This poses a privacy infringement risk which would need to be mitigated with view blocking techniques, such as planting columnar trees along the western parcel line where clear views into the neighboring backyards would be likely.

Open Space: The applicant has met the 20% open space requirement for Planned Unit Developments by including a portion of the neighboring parcel's land, which is proposed to be dedicated to community gardens. The adjacent parcel is currently owned by the applicant.

Requirements:

Article VIII. – Planned Unit Development (PUD)

15.12.810 – Purpose and Intent

A. Planned unit development (PUD) is intended to permit flexibility, to encourage new and imaginative concepts in the design of neighborhood and single-family housing projects and to provide a means of encouraging preservation and enhancement of housing ownership in the city. To this end, the PUD developments should be planned as one complex land use rather than an aggregation of individual unrelated buildings located on separate unrelated lots.

B. Substantial compliance with the zone regulations and other provisions of the zoning ordinance in requiring adequate standards related to the public health, safety, and general welfare shall be observed, without unduly inhibiting the advantages of unified site planning.

C. PUD developments are intended to be flexible yet the development must be compatible with surrounding uses. On parcels greater than five acres, PUD regulations allow for some flexibility in density and housing character; however PUD developments are not intended to promote housing that substantially alters the neighborhood in which it is to be located. PUD regulations are not intended to allow for circumvention of zoning requirements in such a way as to result in significantly higher densities in size of development in otherwise low density residential neighborhoods. All development is intended to complement and strengthen neighborhoods as a compatible component of the city's housing stock. The planning commission and city council shall determine if a PUD is deemed compatible and may deny approval if the proposal is determined to be incompatible.

(Ord. 2008-01 (part): Ord. 2005-02, Attach. A (part))
(Ord. No. 2011-01, 1-12-2011)

15.12.820 – Use and Zoning Regulations

A. Notwithstanding any other provisions of city ordinances to the contrary, PUD developments shall be permitted in all districts of the city except the LI light industrial zone. The provisions as herein set forth shall be applicable if any conflict exists.

B. An overall development plan for a PUD showing building types, location, size, heights, expected uses, number of residential units, access roads, open spaces, parking, landscaping and all other appropriate items may be approved by the planning commission and city council. If approved, building permits may be issued in accordance with such plan, even though the uses, housing types, development specifications and the location of the buildings proposed differ from the uses, housing types, and regulations governing such items in effect in the zone in which the development is proposed, provided the provisions of this chapter are complied with and a specific development plan is approved.

C. The planning commission and city council may vary all yard, setback, and similar zoning regulations, as well as vary the city's development specifications, within PUD developments approved under this chapter provided the provisions of this chapter are complied with and a specific development plan is approved for each development. The planning commission and city council may approve PUD developments with use variations provided all provisions of this chapter are complied with and the following restrictions are followed:

1. Use variations in residential districts may be for residential uses only. No commercial or industrial use variations allowed.

2. Use variations in commercial districts shall be limited to commercial and residential uses only. No industrial use variations allowed.

15.12.840 – General Requirements

A. The properties adjacent to the PUD shall not be adversely affected, and to this end, the planning commission may require, in the absence of appropriate physical boundaries or installed buffers, that uses of least intensity and greatest compatibility be arranged around the boundaries of the project. Yard and height conditions of the adjacent properties should be closely matched on the periphery of the project.

B. Minimum Scale of Projects. No subdivisions may be considered planned unit developments unless consisting of at least three lots.

C. **Setbacks**. In R-1, A-1 and R-M zones, the planning commission may vary rear and side yard setbacks. The minimum front yard setbacks in R-1, A-1 and R-M zones shall be eighteen (18) feet if the home has a front loading garage. If a home has a rear loading garage, the front setback may be reduced to eight feet as long as the yard area where the driveway is located has an eighteen-foot setback from the property line. The planning commission may vary all setbacks in all other zones.

D. **Open Space**. All planned unit developments shall include twenty (20) percent common usable open space as part of the development

1. Common use open space shall be in usable size segments not in small scattered pieces as determined by the city. Open space shall not include yard areas, required landscaping or required setback areas but shall be in addition to such areas.

2. The city council, upon recommendation of the planning commission, shall require the preservation, maintenance, and ownership of common use open space and common use facilities utilizing at the city's option one of the following methods:

3. Common use open space areas shall be landscaped and shall include amenities such as lighting, benches, walkways, playgrounds, pavilions and other gathering areas, play courts, playground equipment, tot lots and other items. The amount, size and layout of amenities shall be determined by the city as part of the approval of the development plan and shall be based on the size and configuration of the common use open space. The developer shall submit plans for landscaping and improving the common open space. The developer shall also explain the intended use of the open space and provide detailed provisions of how the improvements thereon are to be financed and the area maintained.

4. A project must generally meet the intent of the requirements of the zoning ordinances, must insure proper use, construction and maintenance of common use open space and common use facilities, and must demonstrate that the development will benefit the future residents of the project, surrounding residents, and the general public.

E. The developer shall be required to provide a bond in an amount determined by the city engineer guaranteeing the completion of the development of all common facilities or areas, including access and open space or facilities, or any phase thereof. When completed in accordance with the approved plan, the bond shall be released. If

uncompleted at the end of two years, the city will review the progress and may proceed to use the bond funds to make the improvements in accordance with the approved plan. The bond shall be approved by the community development department and shall be accompanied by a bond agreement acceptable to the department and shall be filed with the city recorder.

F. Once the overall development plan has been approved by the city council after recommendations from the planning commission, no changes or alterations to such development plans or uses shall be made without first obtaining approval of the planning commission and city council.

G. The design of the preliminary and final plans and plats in relation to streets, access, blocks, lots, common open spaces, and other design factors shall be in harmony with the intent of the city's general plan, development specifications, zoning ordinances and all applicable ordinances, laws and regulations. Streets and access shall be so designed as to take advantage of open space vistas and create drives with an open space character.

H. The city may place whatever additional conditions or restrictions it may deem necessary to insure development and maintenance of the desired residential character. Such conditions may include plans for disposition or reuse of property if common use open space and common use facilities are not maintained in the manner agreed upon or such is abandoned by the owners and may include requirements for recorded provisions which would allow the city to perform maintenance to access and infrastructure (roads and utility facilities) in the event of failure of the property owners to perform needed maintenance or repairs.

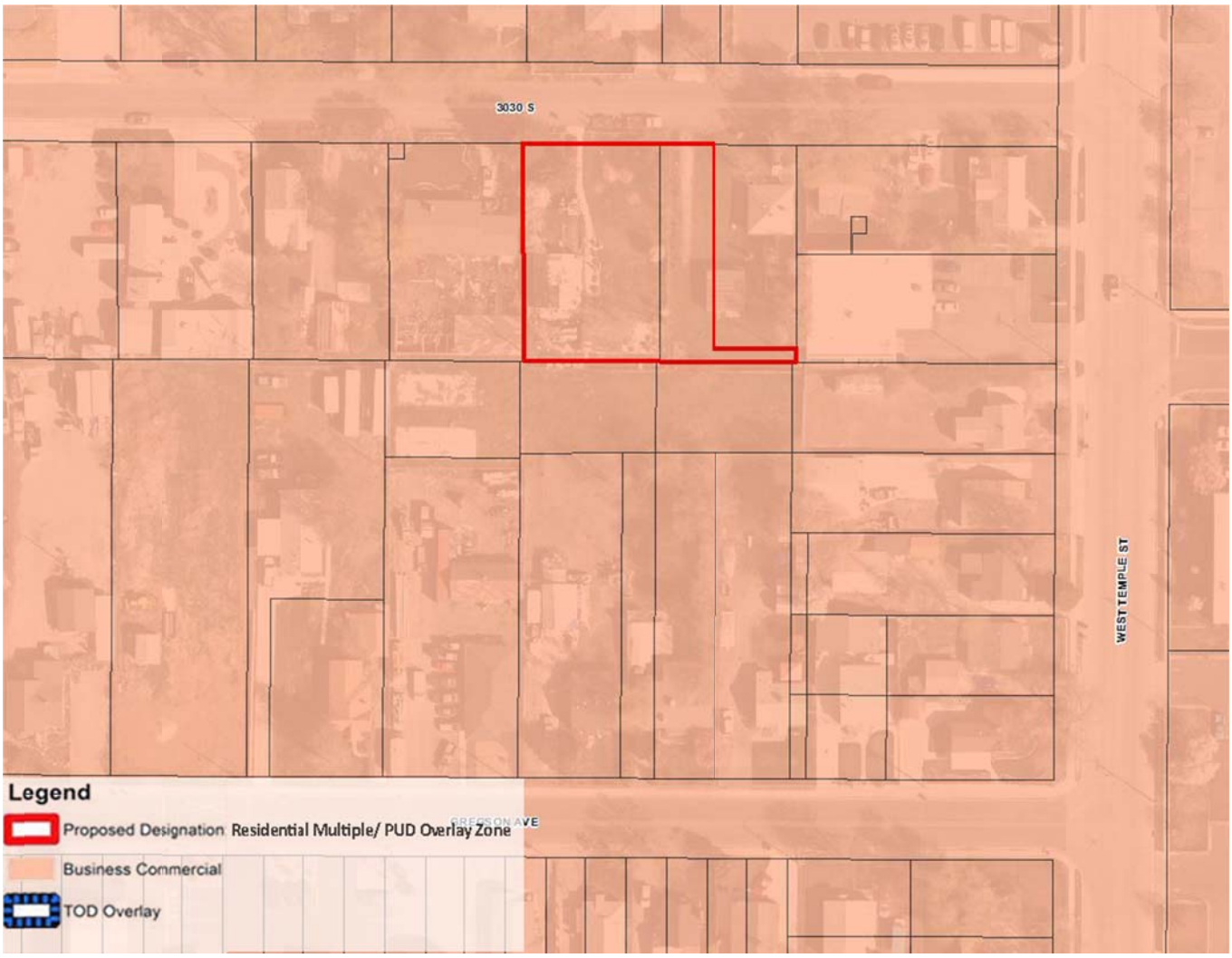
(Ord. 2008-01 (part): Ord. 2007-25: Ord. 2005-02, Attach. A (part))
(Ord. No. 2011-01, 1-12-2011)

Staff Analysis:

The proposed plat meets the City's minimum Planned Unit Development standards. Staff recommends approval of the proposed Planned Unit Development, conditioned on maintaining the architectural form and materials of the townhomes that were submitted for the preliminary plan approval, and that view blocking methods will be included into the landscape plan for the western edge of the parcel.

Attachments:

1. Zoning Map
2. Applicant's Design Guidebook



MILL CREEK TOWNHOMES

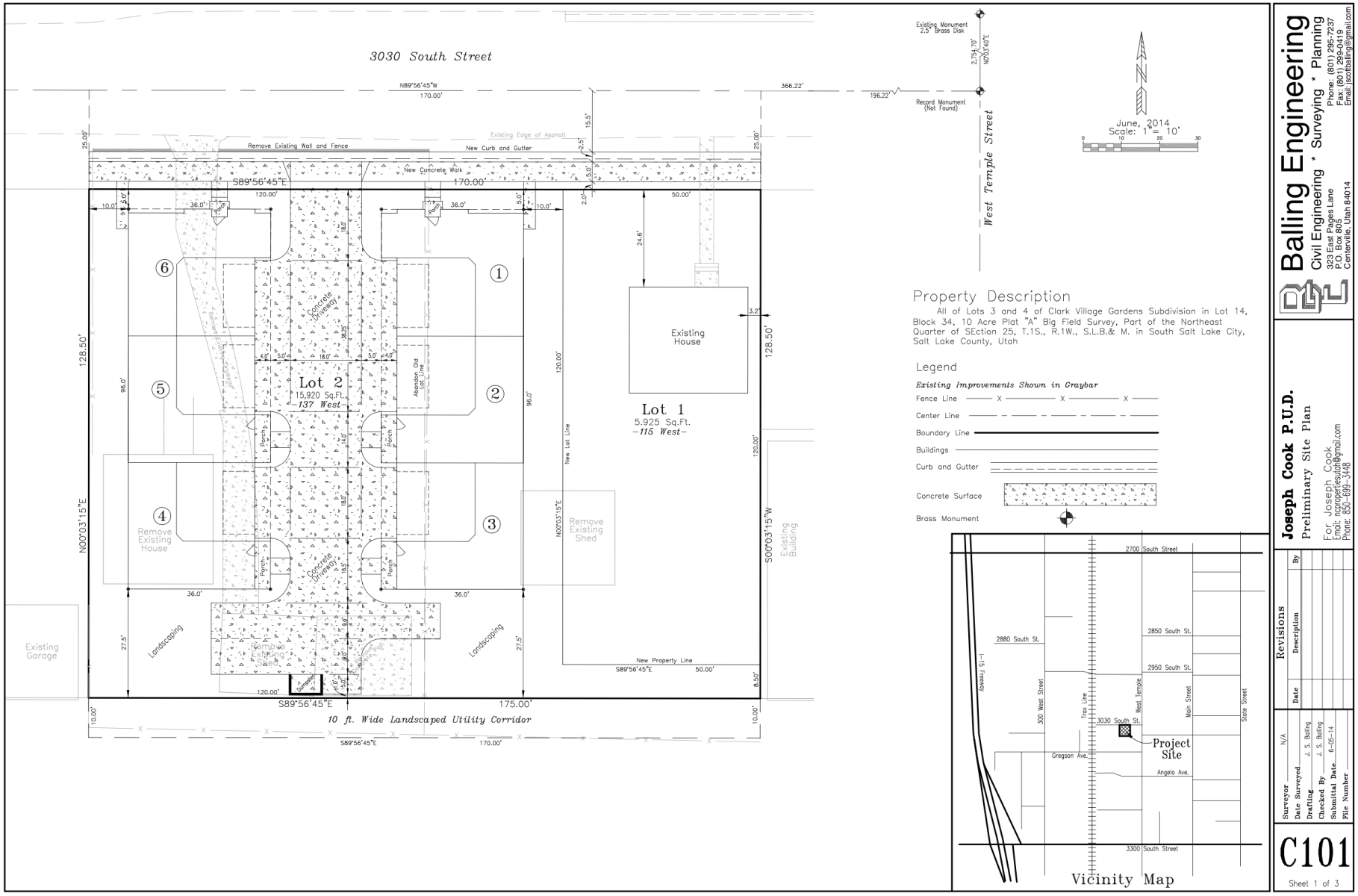
Six owner-occupied units in the heart of South Salt Lake

Glenburn Investments

Ordinary People. Extraordinary Results.

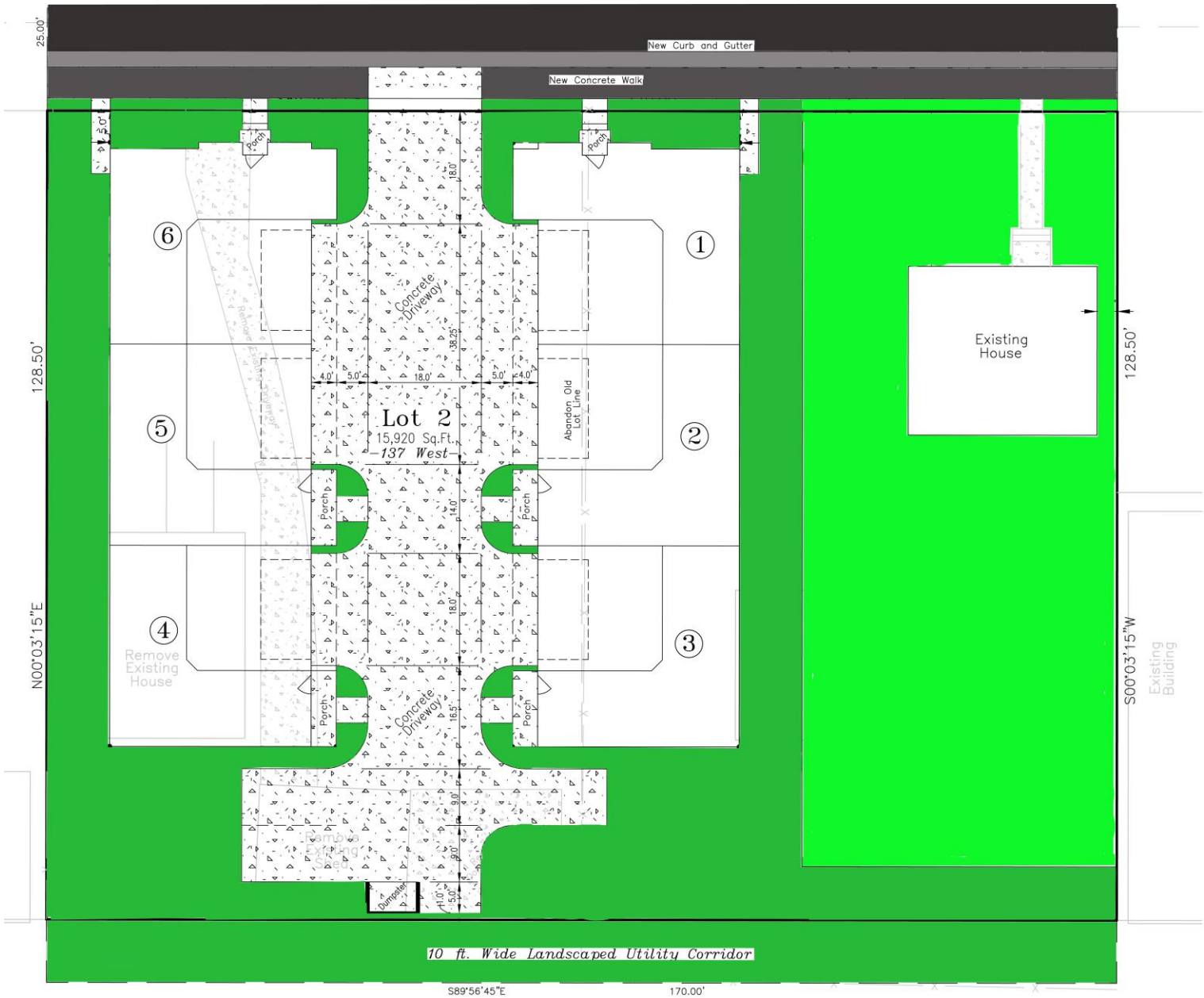
MILL CREEK TOWNHOMES

Six owner-occupied units in the heart of South Salt Lake



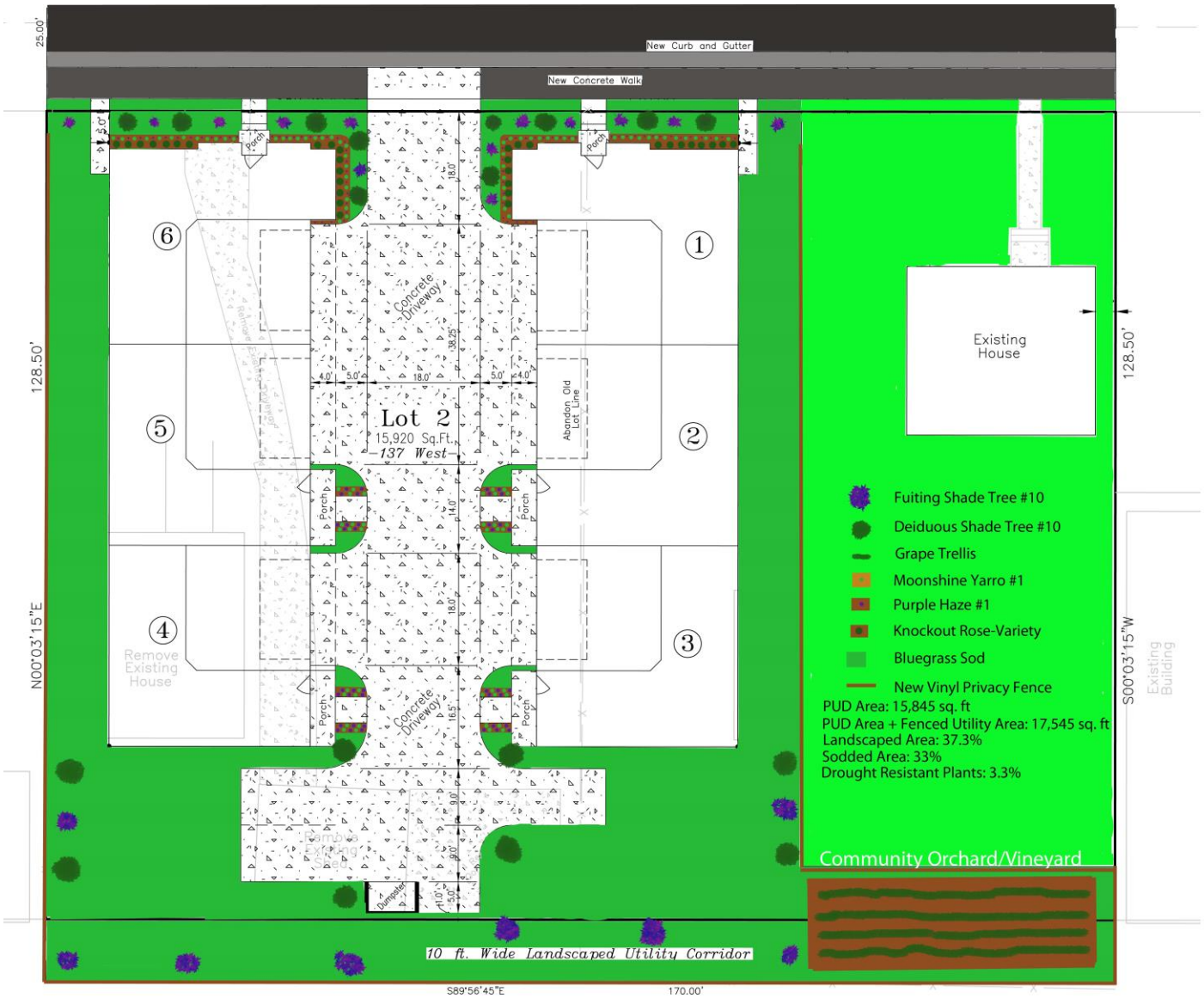
SITE PLAN—MILL CREEK TOWNHOMES

Six owner-occupied units in the heart of South Salt Lake



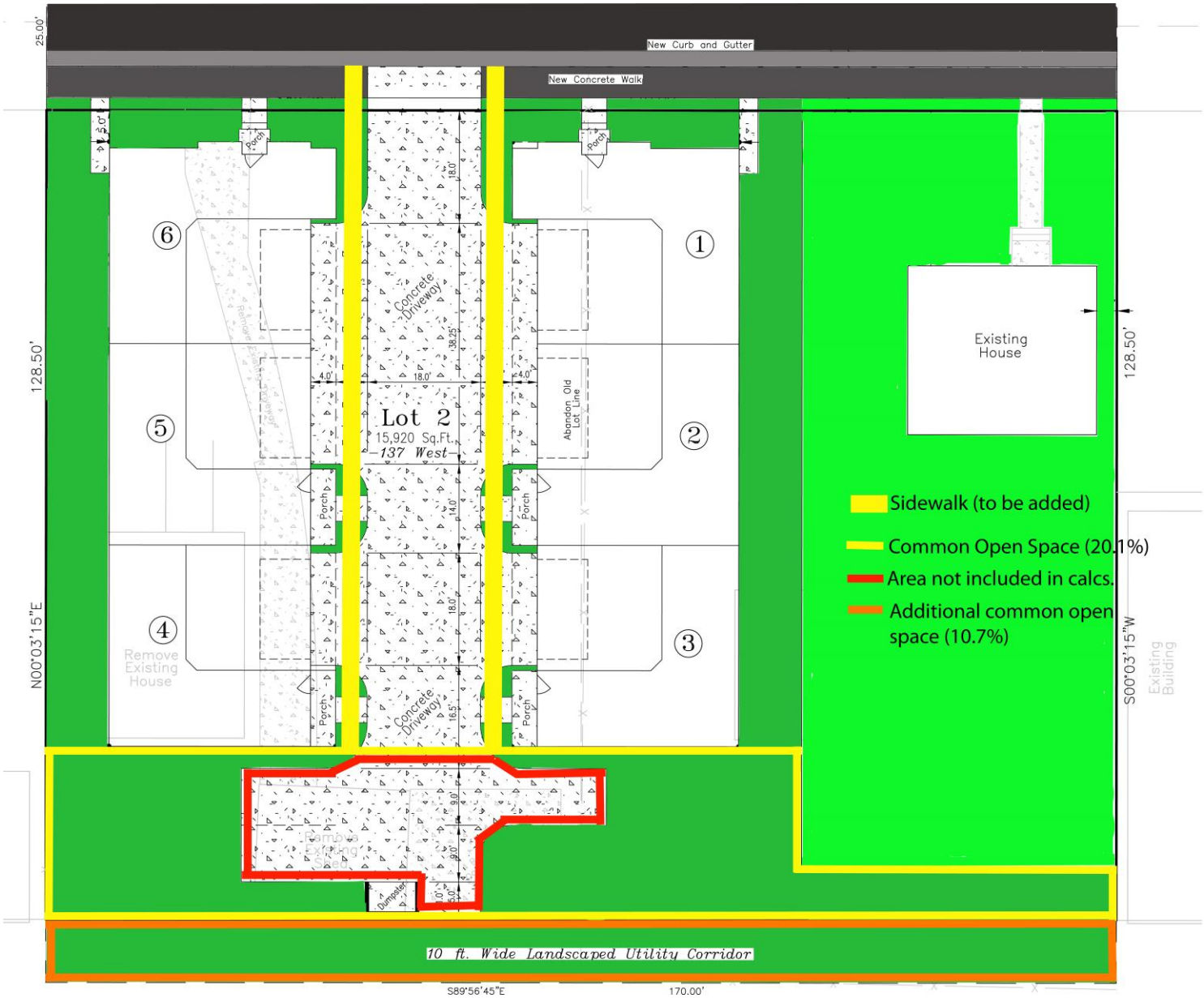
ILLUSTRATIVE SITE PLAN—MILL CREEK TOWNHOMES

Six owner-occupied units in the heart of South Salt Lake



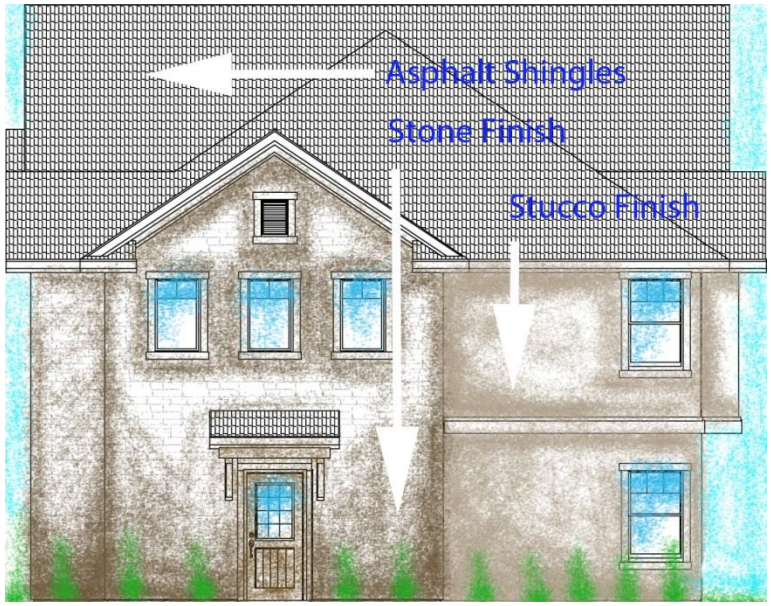
LANDSCAPING PLAN—MILL CREEK TOWNHOMES

Six owner-occupied units in the heart of South Salt Lake



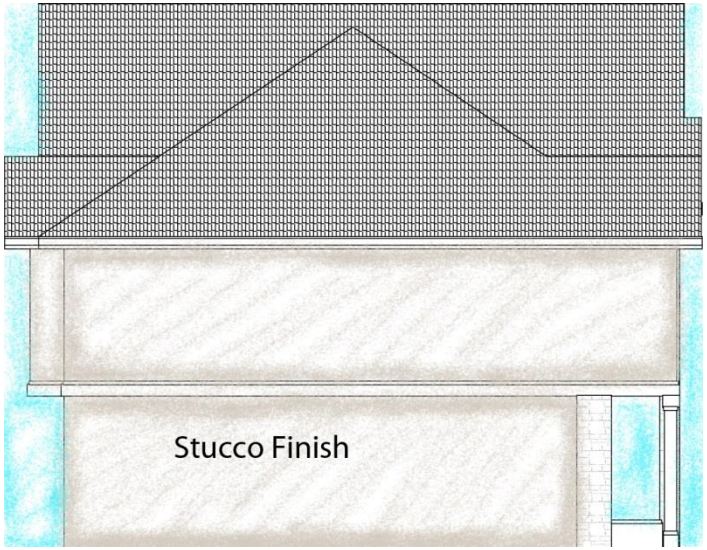
OPEN SPACE PLAN—MILL CREEK TOWNHOMES

Six owner-occupied units in the heart of South Salt Lake



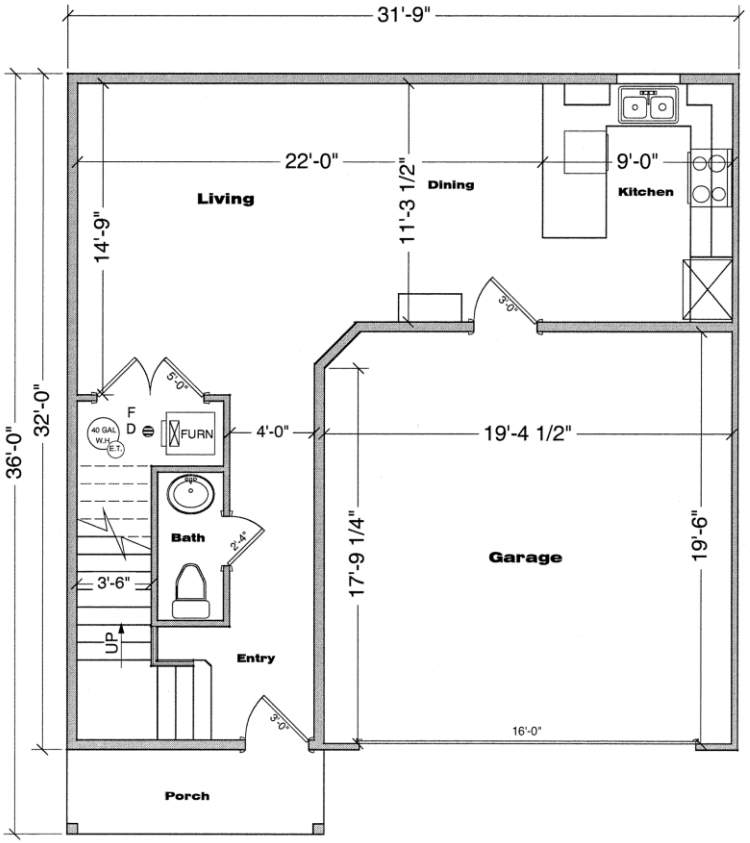
RENDERED FRONT ELEVATIONS—MILL CREEK TOWNHOMES

Six owner-occupied units in the heart of South Salt Lake

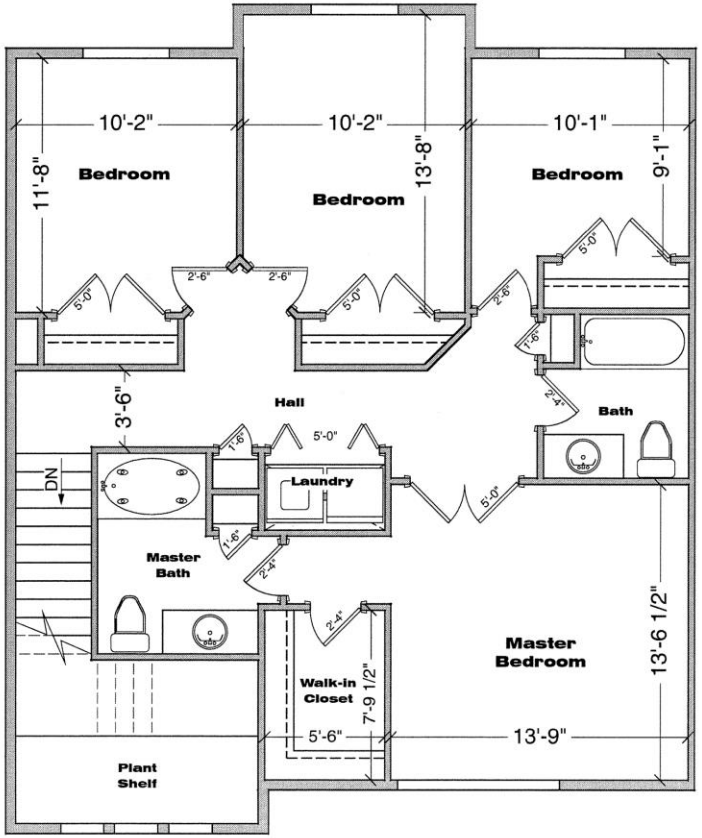


RENDERED REAR ELEVATIONS—MILL CREEK TOWNHOMES

Six owner-occupied units in the heart of South Salt Lake



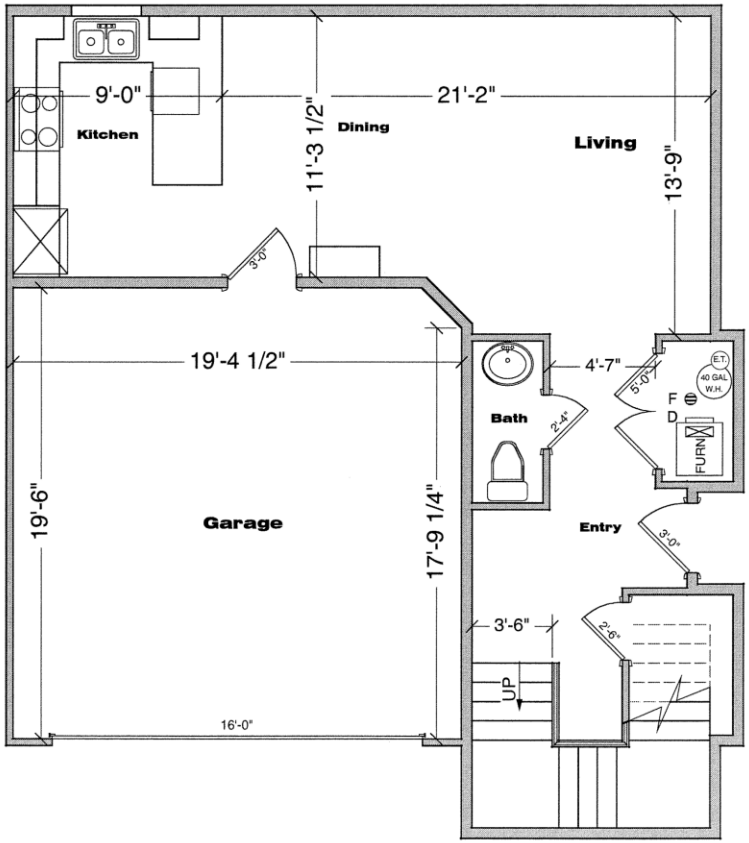
Proposed Main Floor
628 Sq. Ft.



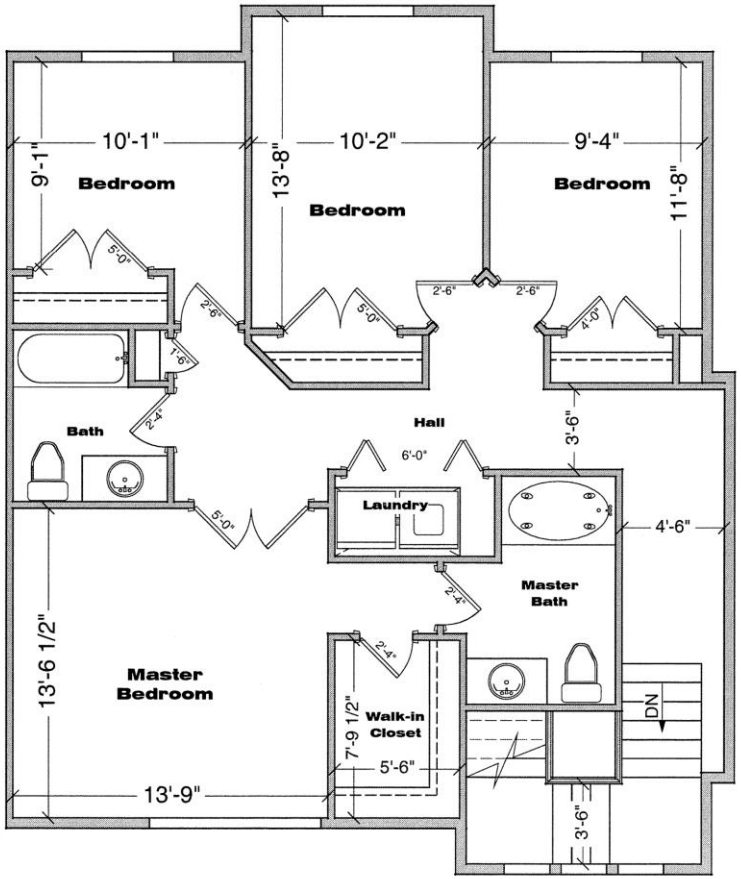
Proposed Second Floor
994 Sq. Ft.

FLOOR PLAN—REAR UNITS

Six owner-occupied units in the heart of South Salt Lake



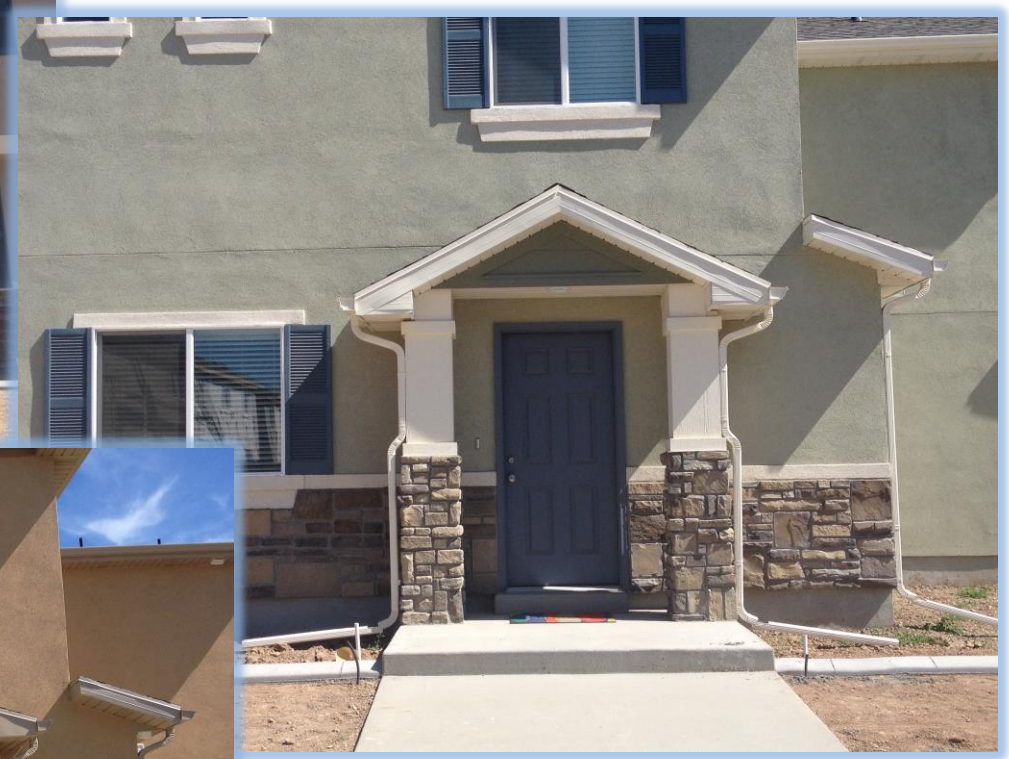
Proposed Main Floor
656 Sq. Ft.



Proposed Second Floor
1022 Sq. Ft.

FLOOR PLAN—FRONT UNITS

Six owner-occupied units in the heart of South Salt Lake



SAMPLE ELEVATIONS—MILLCREEK TOWNHOMES

Six owner-occupied units in the heart of South Salt Lake

Millcreek Townhomes

Final Plat and Zoning Amendment Approval

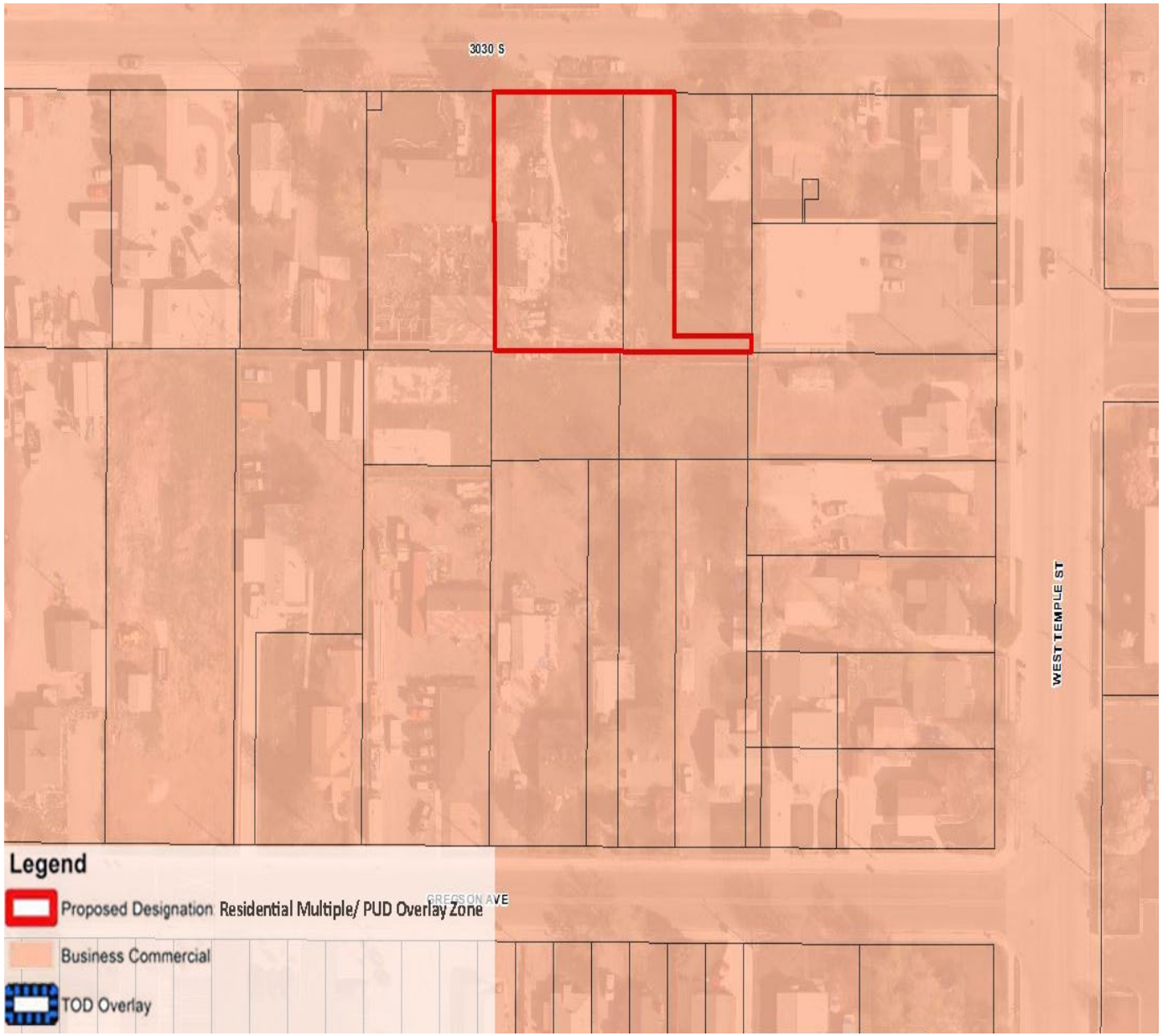
City Council Presentation

July 30, 2014

Millcreek Townhomes: Site Aerial

Millcreek Townhomes: Site Images

Millcreek Townhomes: Proposed Zoning

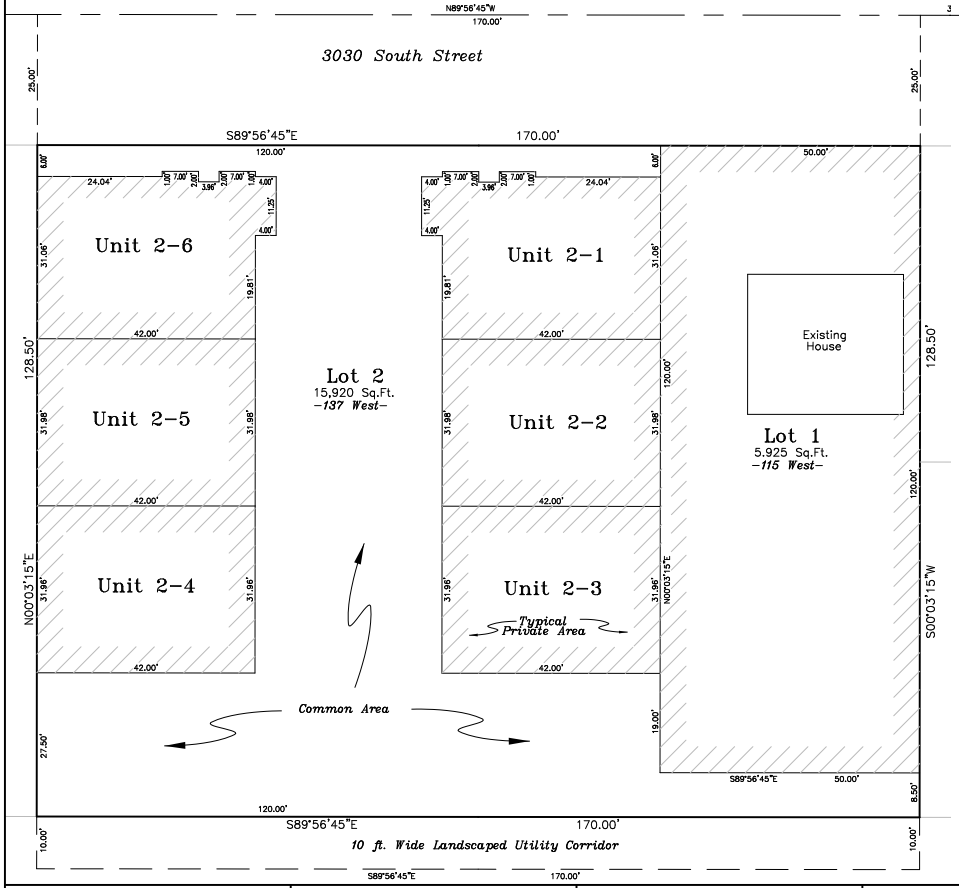


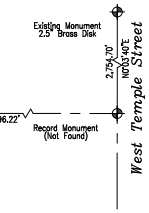
Millcreek Townhomes: Final Plat

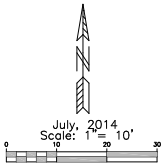
Balling Engineering
323 East Pages Lane
P.O. Box 805
Centerville, Utah 84014
Phone: (801) 295-7237
Fax: (801) 299-0419
Email: jscottballing@gmail.com

Millcreek Townhomes P.U.D.

A Planned Unit Development located in the Northeast Quarter of Section 25, T.1S., R.1W., S.L.B.& M.
South Salt Lake City, Salt Lake County, Utah







Acknowledgement

STATE OF UTAH)
) S.S.
COUNTY OF SALT LAKE)
On the _____ day of _____, 2014 Virginia May Wiece and Richard Wiece personally appeared before me the undersigned Notary Public, in and for said County of Salt Lake in the State of Utah, who after being duly sworn, acknowledged to me that they are the Trustees of the Richard Wiece Living Trust, and that he signed the Owner's Dedication freely and voluntarily for and on befalf of said Living Trust for the uses and purposes therein mentioned.

Notary Public _____

Residence _____

My Commission Expires _____

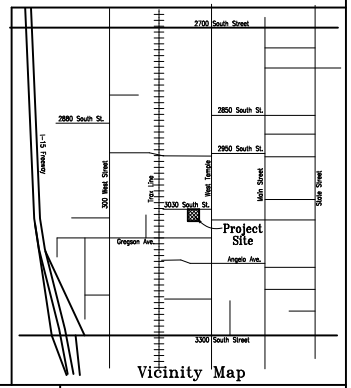
Acknowledgement

STATE OF UTAH)
) S.S.
COUNTY OF SALT LAKE)
On the _____ day of _____, 2014 Thelma Workman personally appeared before me the undersigned Notary Public, in and for said County of Salt Lake in the State of Utah, who after being duly sworn, acknowledged to me that she signed the Owner's Dedication freely and voluntarily for the uses and purposes therein mentioned.

Notary Public _____

Residence _____

My Commission Expires _____



Vicinity Map

Surveyor's Certificate

I, J. Scott Balling, do hereby certify that I am a Professional Lan Surveyor, and that I hold Certificate No. 162195 as prescribed un der the laws of the State of Utah. I further certify that by the authority o the Owners, I have made a survey of the tract of land shown on this plat and describ ed below, and have subdivisided said tract of land int lots, private and common ownership areas, hereafter to be known as

Millcreek Townhomes P.U.D.

and that same has been survyed and staked on the ground as shown c this plat.

Boundary Description

All of Lots 3 and 4 of Clark Village Gardens Subdivision in Lot 14, Block 34, 10 Acre Plat "A" Big Field Survey, Part of the Northeast Quarter of Section 25, T.1S., R.1W., S.L.B.& M. in South Salt Lake City, Salt Lake County, Utah
Containing 0.5015 Acres

July 24th, 2014
Date

J. Scott Balling
P.L.S. No. 162195

LICENSED LAND SURVEYOR
No. 162195
J. SCOTT BALLING
07-24-14
STATE OF UTAH

Owner's Dedication

Know all men by these presents that the undersigned owners of the above described tract of land having caused the same to be subdivided into lots, private ownership areas, and common ownership areas to be hereafter known as:

Millcreek Townhomes P.U.D.

do hereby dedicate for pertetual use of the public all parcels of land and easements as shown on this plat as intended for Public Use. We also dedicate all areas shown as Common Ownership to the Millcreek Townhomes Homeowners Association, Inc. for their uses as specified in their Covenants, Conditions and Restrictions.
In witness whereof we have hereunto set our hand this _____ day of _____, 2014.

Joseph M. Cook, President
3030 DEVELOPMENT INC. A Utah Corporation

Thelma Workman

Virginia May Wiece, Trustee — Richard Wiece, Trustee
RICHARD WIECE LIVING TRUST

Corporate Acknowledgement

STATE OF UTAH)
) S.S.
COUNTY OF SALT LAKE)
On the _____ day of _____, 2014 Joseph M Cook personally appeared before me the undersigned Notary Public, in and for said County of Salt Lake in the State of Utah, who after being duly sworn, acknowledged to me that he is the Presider of 3030 Development Inc., a Utah Corporation, and that he signed the Owner's Dedication freely and voluntarily for and on befalf of said Corporation for the uses and purposes therein mentioned.

Notary Public _____

Residence _____

My Commission Expires _____

Legend

Center Line

Boundary Line

Private Ownership

Common Ownership

Brass Monument

Millcreek Townhomes P.U.D.

Located in the Northeast Quarter of Section 25
T.1S., R.1W., S.L.B.& M.
South Salt Lake City, Salt Lake County, Utah

Questar Gas Approval

Questar approves this plat solely for the purposes of approximating the location, boundaries, courses and dimensions of its rights-of-way and easements and its existing facilities. This approval shall not be construed to warrant or verify the precise location of such items. The rights-of-way and easements are subject to numerous restrictions appearing on the recorded right-of-way and easement grant(s) or by prescription. Questar may require additional easements in order to serve this development. This approval does not constitute abrogation or waiver of any other existing rights, obligations or liabilities including prescriptive rights and other rights, obligations or liabilities provided by law or equity. This approval does not constitute acceptance, approval or acknowledgement of any terms contained in the plat, including those set forth in the owners dedication or the notes and does not constitute a guarantee of particular terms or conditions of natural gas service. For further information, including information related to allowed activities within rights-of-way, please contact questar's right-of-way department at 1-800-368-8532.

Approved this _____ day of _____, 2014

Questar: _____

QWEST Communications

Approved this _____ day of _____2014

QWEST

Rocky Mountain Power

Approved this _____ day of _____2014

Rocky Mountain Power

Jordan Valley Water Conservancy District

Approved this _____ day of _____2014

Jordan Valley Water Conservancy District

City Engineer's Certificate

I hereby certify that I have had this plat reviewed by this office an it is correct and in accordance with information on file and it is hereby approved.

South Salt Lake City Engineer — Date

Print Name

SLC Suburban Sanitary Sewer District

Approved this _____ day of _____2014

SLC Suburban Sanitary Sewer District

Approval as to Form

Approved this _____ day of _____2014

South Salt Lake City Attorney

Print Name

Salt Lake Valley Health Department

Approved this _____ day of _____2014

Salt Lake Valley Health Department

City Council

Approved this _____ day of _____2014

Recorder — Print Name

City Mayor — Print Name

Community Development Department

Approved this _____ day of _____2014

Community Development Director

Print Name

Salt Lake County Recorder

RECORDED _____

STATE OF UTAH, COUNTY OF SALT LAKE

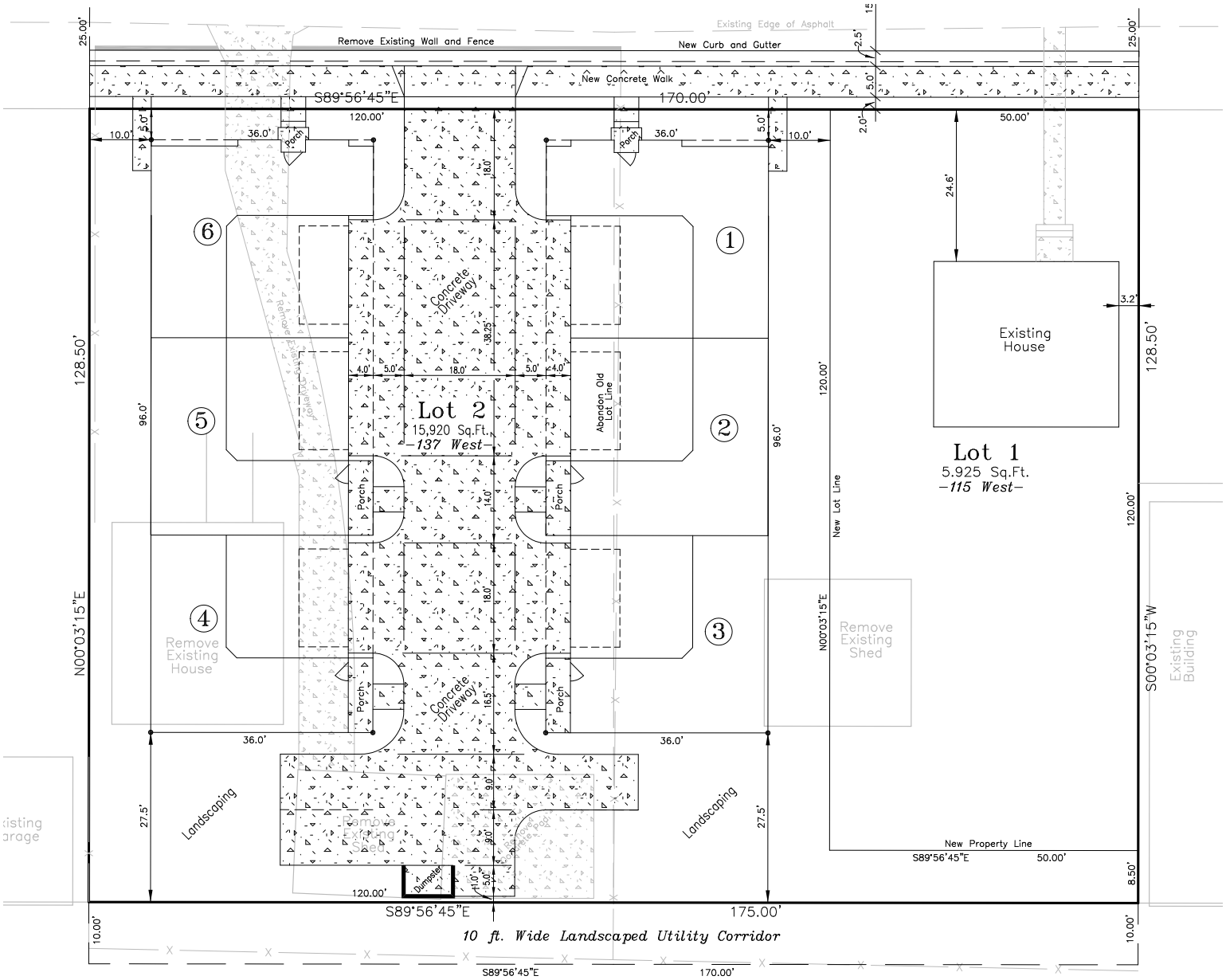
REQORDED AT THE REQUEST OF _____

DATE _____TIME_____BOOK_____PAGE_____

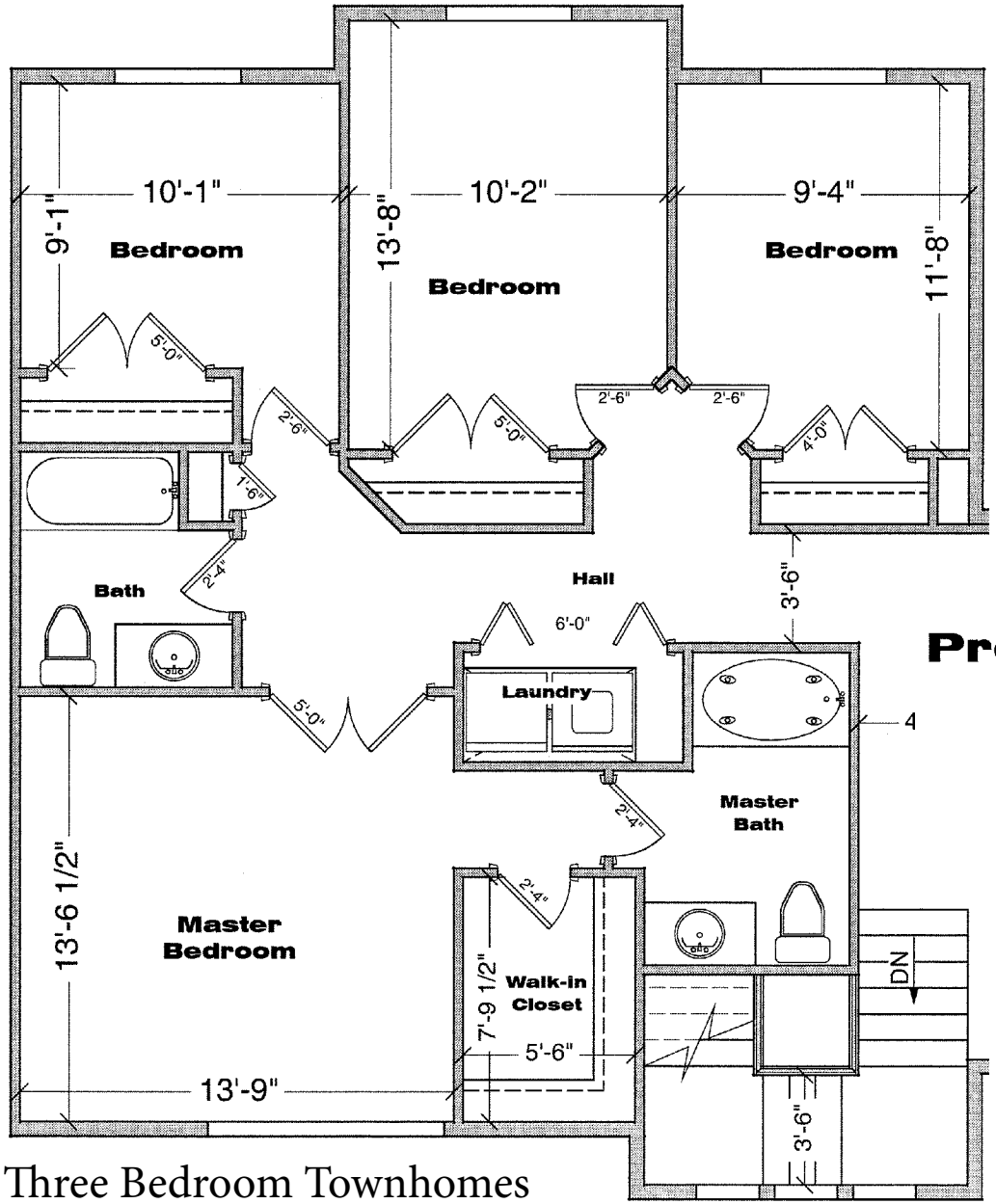
FEE — DEPUTY SALT LAKE COUNTY RECORDER

Submittal Date 7-25-1

Millcreek Townhomes: Site Plan



Millcreek Townhomes: Floor Plan

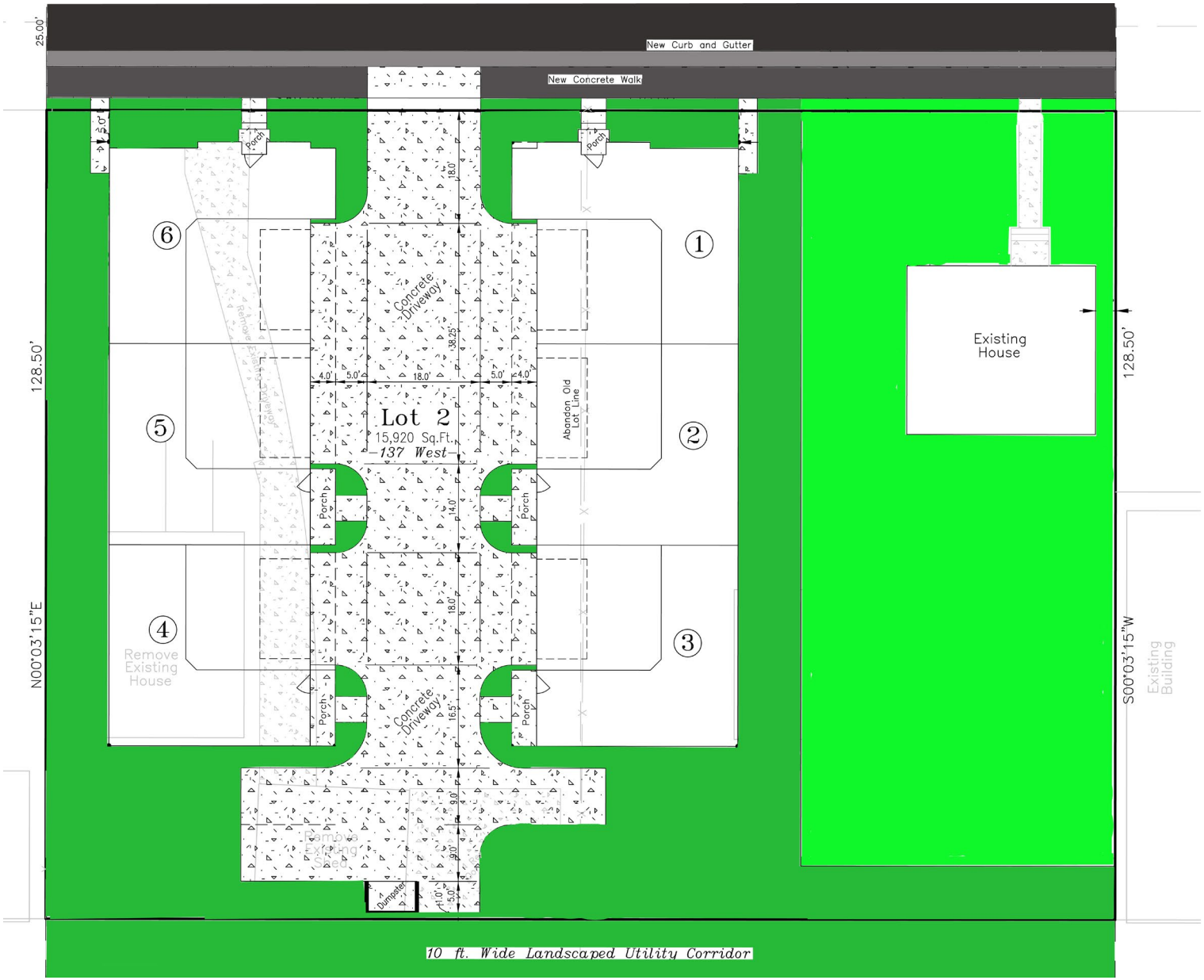


Proposed Second Floor

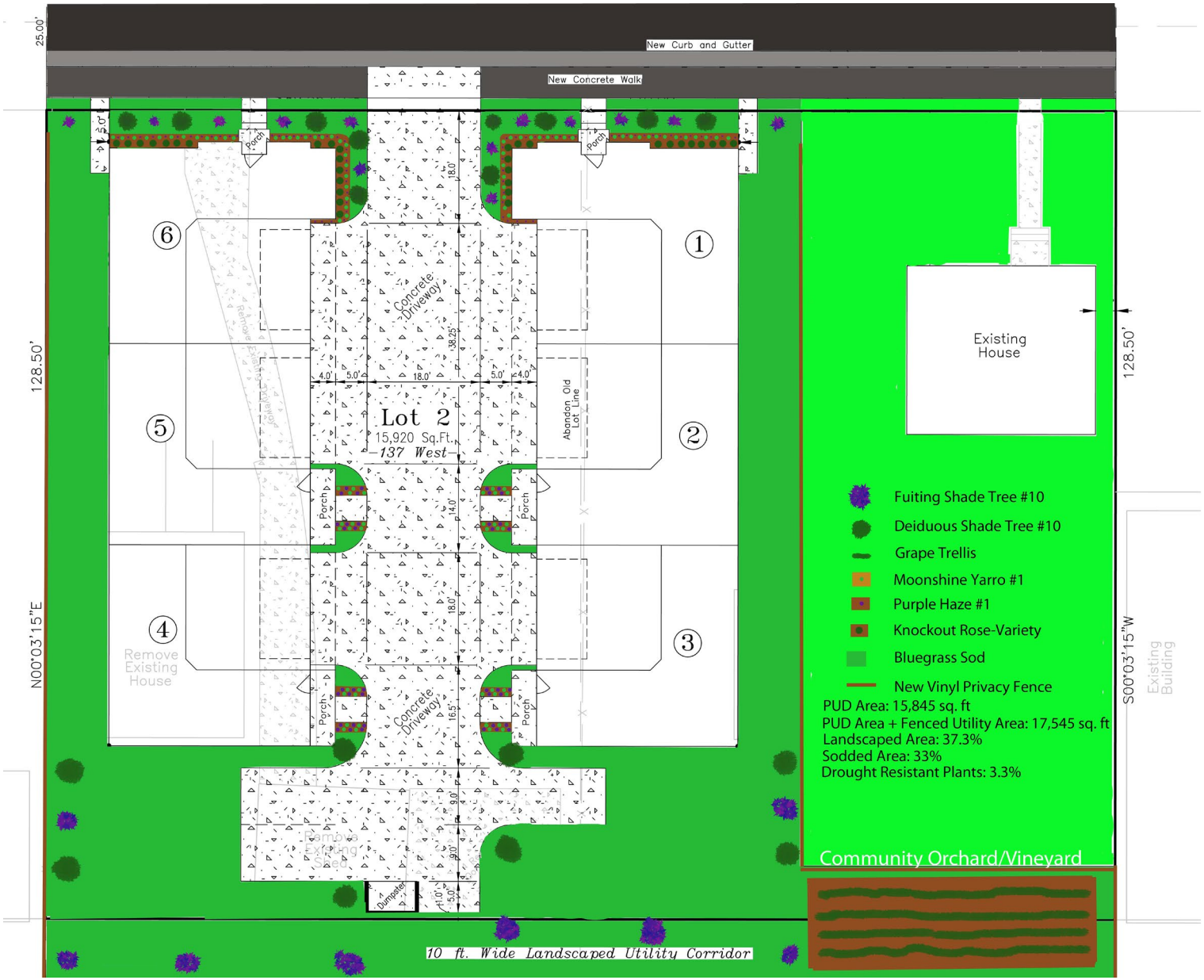
1022 Sq. Ft.

Three Bedroom Townhomes

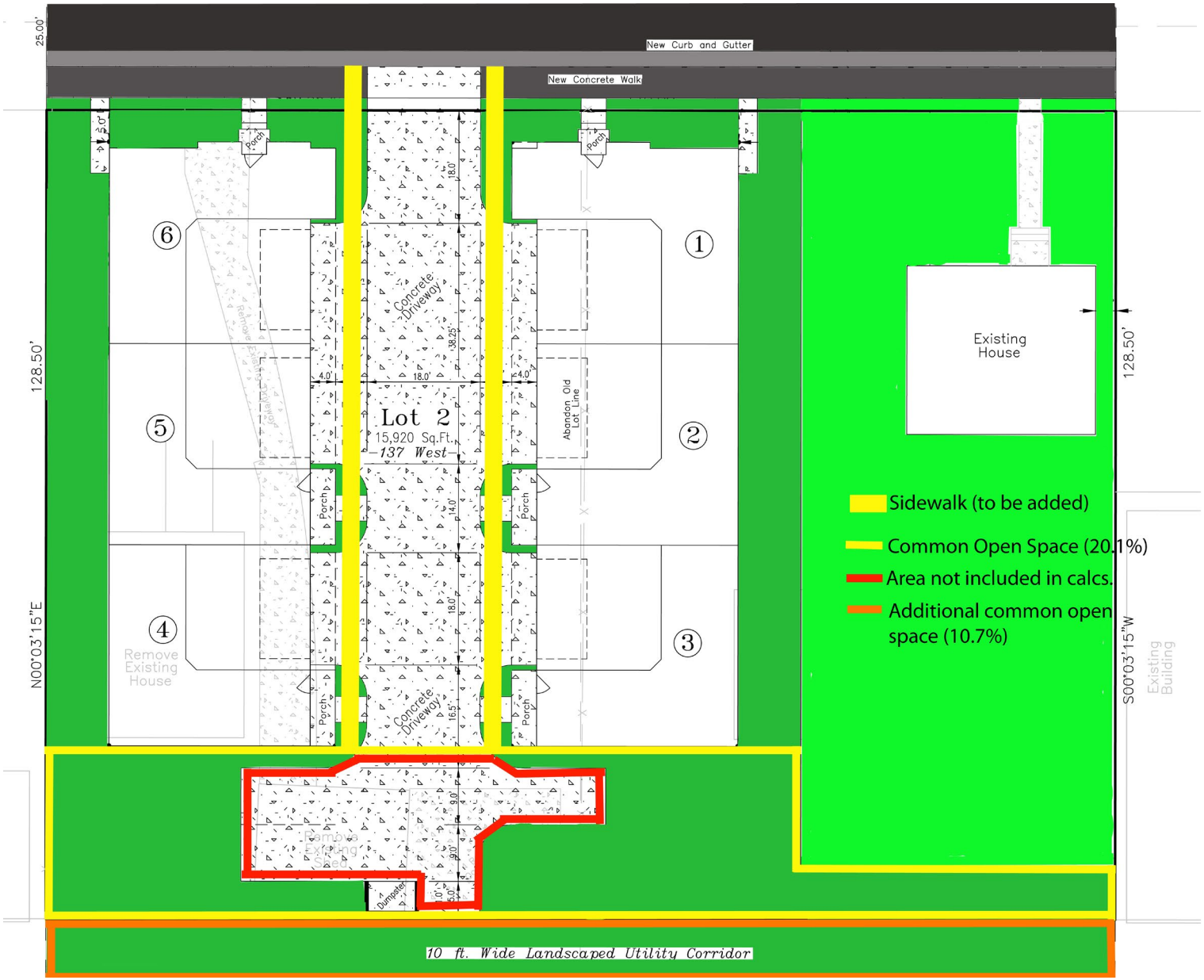
Millcreek Townhomes: Rendered Site Plan



Millcreek Townhomes: Landscape Plan

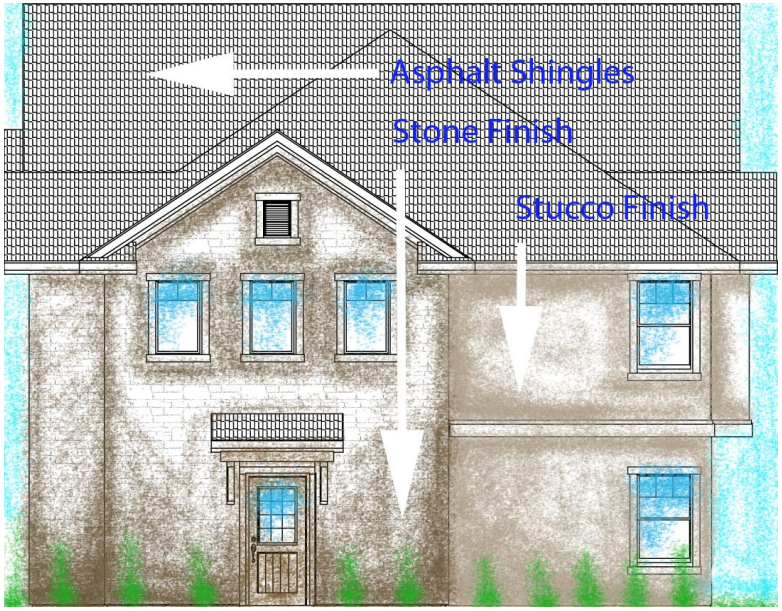


Millcreek Townhomes: Open Space Plan



Millcreek Townhomes: Facade Elevations

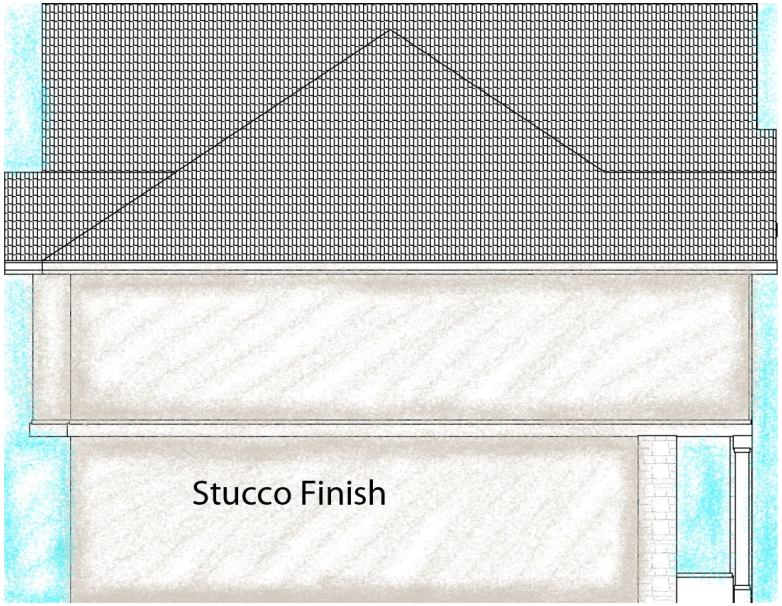
Primary Facade



Street Facing Facade - North

Millcreek Townhomes: Facade Elevations

Rear Facade



Side Facade - South

Millcreek Townhomes: Facade Elevations

Proposed Front Elevation

Option A

Millcreek Townhomes: Facade Elevations

Rear Facade

Proposed Front Elevation

Option B

Case Study/ Example Images

Planning Commission and Staff Recommendations

The Planning Commission recommeneded approval with the following conditions:

1. **The applicant reduces any risk of infringing on the neighboring property to the west of the development through view blocking techniques such as columnar trees planted along the western property line where views into the backyard area from the townhomes are evident. The landscape plan will need to include the tree species that is proposed for the above stated requirement**
2. **Prior to being issued a building permit the applicant will provide building elevations that comply with Townhome-style Multifamily Building Design Standards, found in title 17.12.090 of the South Salt Lake City Municipal Code.**
3. **The applicant will continue to work with City staff to make all technical corrections necessary for recoding.**
4. **The applicant work with the City Engineer and Fire Marshal to ensure emergency vehicles have sufficient access to the proposed residences.**
5. **Bonds for all common and public improvements will be submitted to the City prior to any development.**
6. **The applicant will work closely with staff to resolve any storm water management concerns that would result from the proposed project.**
7. **The final plat be approved by the City Engineer and Salt Lake County Recorder**
8. **All items of the staff report.**