CITY COUNCIL

MEMBERS:
JOY GLAD
COREY THOMAS
SHARLA BYNUM
NICK MITCHELL
IRVIN JONES
RAY DEWOLFE
CLARISSA WILLIAMS

ARIEL ANDRUS
CITY RECORDER
220 E MORRIS AVE
SUITE 200
SOUTH SALT LAKE
UTAH
84115
P 801.483.6019
F 801.464.6770
SSLC.GOV

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, August 26, 2026,** in the City Council Chambers, 220 East Morris Avenue, Suite 200, commencing at **7:00 p.m.,** or as soon thereafter as possible.

To watch the meeting live click the link below to join:
https://zoom.us/j/93438486912

Watch recorded City Council meetings at: youtube.com/@SouthSaltLakeCity

Conducting	Joy Glad, District 1
Council Chair	Sharla Bynum
Sergeant at Arms	South Salt Lake PD

Opening Ceremonies
1. Welcome/Introductions — Joy Glad, District 1
2. Pledge of Allegiance — Nick Mitchell, District 4

Approval of Minutes
July 8th, Work Meeting
July 8th, Regular Meeting
August 11th, Truth in Taxation Public Hearing

No Action Comments
1. Scheduling — City Recorder
2. Public Comments/Questions
    a. Response to Comments/Questions
    (at the discretion of the conducting Council Member)
3. Mayor Comments
4. City Attorney Comments
5. City Council Comments

Action Items
Unfinished Business
1. An Ordinance of the South Salt Lake City Council to Amend the South Salt Lake Zoning Map from Commercial Corridor to R-1 Single Family Residential District for the Property Located at 116 E Garden Ave, South Salt Lake City, Utah — Jed Shum

2. A Resolution of the South Salt Lake City Council Adopting an Updated South Salt Lake Storm Drainage Master Plan — Corby Talbot

Motion for Closed Meeting

Adjourn

See page two for continuation of Agenda

Posted August 21, 2026

Those needing auxiliary communicative aids or other services for this meeting should contact Ariel Andrus at 801-483-6019, giving at least 24 hours' notice.

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

Public Comments/Question Policy

The public is invited to address the Council and/or Mayor concerning City business. Speakers must come to the podium and state their name and city of residence. ***Comments are limited 3 minutes, or less, at the discretion of the conducting Council Member, who will inform you when your time has expired.*** All remarks must be pertinent to City business, free of personal attacks and argumentative questions, and align with the City-adopted Dignity Index. The conducting Council Member determines whether a response will be given. The Council may choose to respond at a future regularly scheduled meeting. City employee grievances must be processed according to adopted personnel rules.

Have a question or concern? Call the connect line 801-464-6757 or email connect@sslc.gov

ORDINANCE NO. 2026-_____

AN ORDINANCE OF THE SOUTH SALT LAKE CITY COUNCIL TO AMEND THE SOUTH SALT LAKE ZONING MAP FROM COMMERCIAL CORRIDOR TO R-1 SINGLE FAMILY RESIDENTIAL DISTRICT FOR THE PROPERTY LOCATED AT 116 E GARDEN AVE, SOUTH SALT LAKE CITY, UTAH.

WHEREAS, South Salt Lake City Council (the "Council") is authorized to enact and amend ordinances governing the City of South Salt Lake, including land use and zoning ordinances; and

WHEREAS, Tyson Curtis ("City") is the owner of the property located at 116 E Garden Ave (the "Property") and has petitioned the Council for a Zoning Map Amendment of the Property, requesting the Property be rezoned from Commercial Corridor ("CC") to Single Family Residential ("R-1"); and

WHEREAS, on July 22, 2026, notice for the petition was posted at the property, and notices were posted at City Hall, the City Website, and on the Utah Public Notice Website pursuant to the requirements of Title 17 and as stated in Utah Code § 10-9a-205; and

WHEREAS, on August 6, 2026, the South Salt Lake Planning Commission ("Planning Commission") held a properly noticed public hearing, where the public had the opportunity to be heard on amending the South Salt Lake Zoning Map for the Property; and

WHEREAS, the Planning Commission, after careful review of the proposed Zoning Map Amendment and consideration of staff comments and public comments provided, determined the Zoning Map Amendment is in the best interest of the City and unanimously voted to forward a recommendation of approval to the City Council; and

WHEREAS, on July 8, 2026 in a properly noticed work meeting and again on August 26, 2026, during a properly noticed regular meeting, the Council reviewed the petition and the Planning Commission's recommendation to approve the Zoning Map Amendment, and any public comment included; and

WHEREAS, the Council considered the impact this ordinance may have on family, health, stability, and formation; and

WHEREAS, the Council ensured the amendment was consistent with the General Plan and goals established by the City, and determined the Zoning Map Amendment is in the best interest of the City.

NOW, THEREFORE, BE IT ORDAINED by the City Council of the City of South Salt Lake as follows:

SECTION I: <u>Approval</u>. The South Salt Lake City Zoning Map for the property located at 116 E Garden Ave is amended from Commercial Corridor to R1 Single Family Residential (R1), as shown in Exhibit A, which is incorporated herein by this reference.

SECTION II: <u>Severability</u>. If any section, subsection, sentence, clause, phrase, or portion of this ordinance is, for any reason, held invalid or unconstitutional by any court of competent jurisdiction, such provision shall be deemed a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of this ordinance.

SECTION III. **Conflict with Existing Ordinances, Resolutions, or Policies**. Except as otherwise specifically provided herein, this Ordinance shall not repeal, modify or affect provision of the City Code or unless expressly referenced in this Ordinance and its attachments. To the extent that any ordinance, resolution, or policy of the City of South Salt Lake conflicts with the provisions of this ordinance, this ordinance shall prevail.

SECTION IV: **Effective Date.** This ordinance shall become effective upon the Mayor's signature and publication, or after fifteen (15) days of transmission to the office of the Mayor I neither approved nor disapproved by the Mayor and thereafter, publication.

(signatures on the following page)

Dated this____________day of __________ 2026.

BY THE CITY COUNCIL:

____
Sharla Bynum, Council Chair

ATTEST:

____
Ariel Andrus, City Recorder

City Council Vote as Recorded:

Glad	_______
deWolfe	_______
Thomas	_______
Bynum	_______
Mitchell	_______
Jones	_______
Williams	_______

Transmitted to the Mayor's office on this______day of _____________________2026.

____
Ariel Andrus, City Recorder

MAYOR'S ACTION:______________________

Dated this____________day of_____________________, 2026.

____
Cherie Wood, Mayor

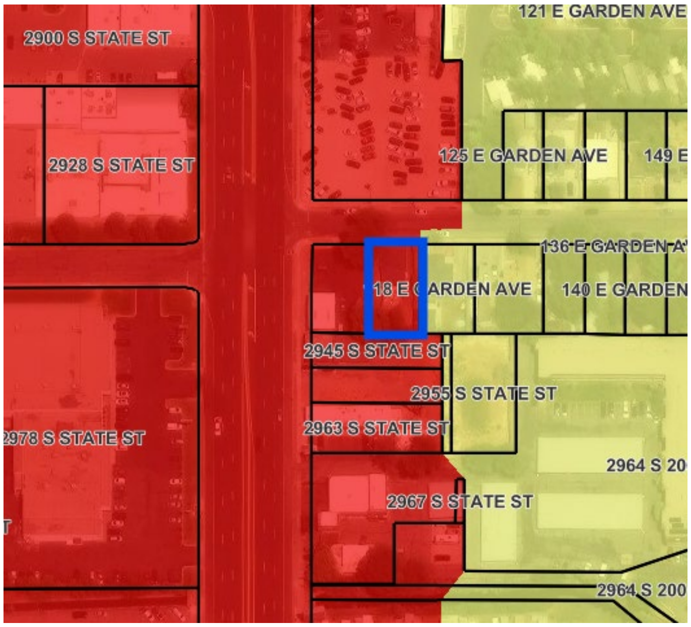
ATTEST:

____
Ariel Andrus, City Recorder

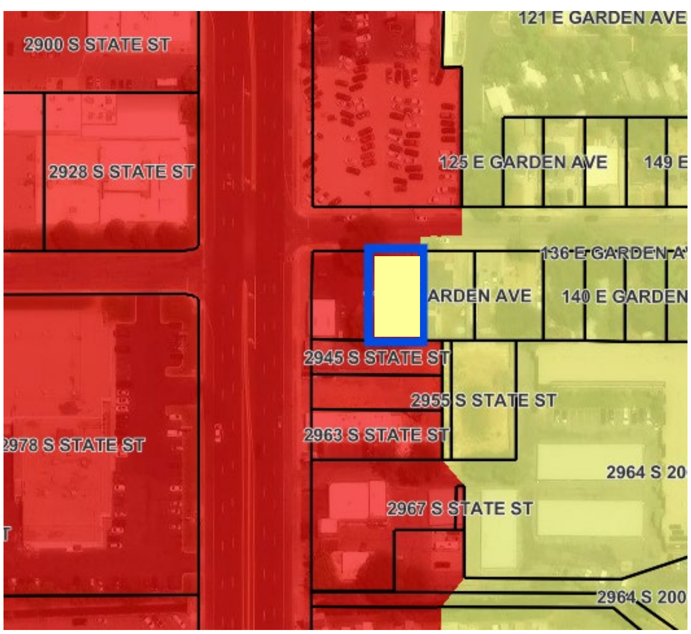
EXHIBIT A

The area outlined in red, 116 E Garden Ave, currently zoned as Commercial Corridor (CC), will be amended to the R-1 District on the South Salt Lake Zoning Map as shown below:

Existing Zoning Map:



Proposed Zoning Map:



SOUTH SALT LAKE

CITY COUNCIL STAFF REPORT

MEETING DATE:	August 26, 2026
PROJECT NUMBER:	OA26-0005
REQUEST:	A petition to the South Salt Lake City Council to amend the South Salt Lake Zoning Map for one lot located at 116 E Garden Ave, from Commercial Corridor (CC) to R1 Single Family Residential (R1).
APPLICANT:	Tyson Curtis
FEE TITLE OWNER:	Curtis, Tyson B
ADDRESS:	116 E Garden Ave
LOT NUMBER:	16-30-155-002-0000

SYNOPSIS:

The applicant is seeking to amend the South Salt Lake Zoning Map for an existing lot located at 116 E Garden Avenue for financial purposes, including mortgage and loan purposes. There is an existing single-family home on the lot. The lot is currently located within the Commercial Corridor land use district. The Commercial Corridor land use district prohibits residential dwelling units. The subject lot abuts dwelling units in the East and commercial developments in the West, South, and North. The property abutting to the East is zoned R1 Residential. The properties abutting to the West, North and South are zoned Commercial Corridor. If the applicant's petition is granted, there will be more options for potential buyers, or the single-family home unit might be used for residential purposes, including short-term rental (STR). The property at 116 E Garden Ave meets all R1 land use district minimum lot standards. The existing home does not meet current residential unit street frontage and front setback standards.

The Planning Commission is the recommending body. The City Council is the Land Use Authority on all zoning amendment petitions.

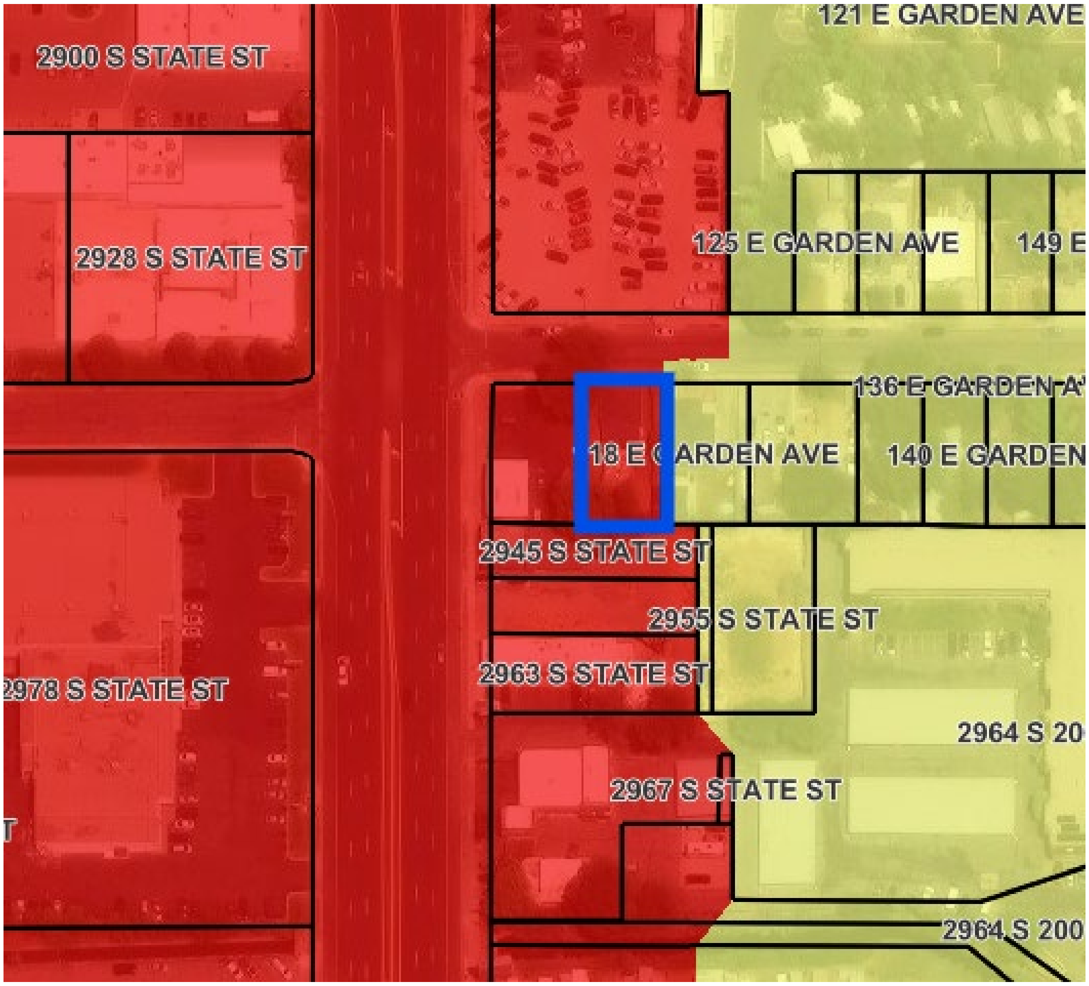
PLANNING COMMISSION RECOMMENDATION:

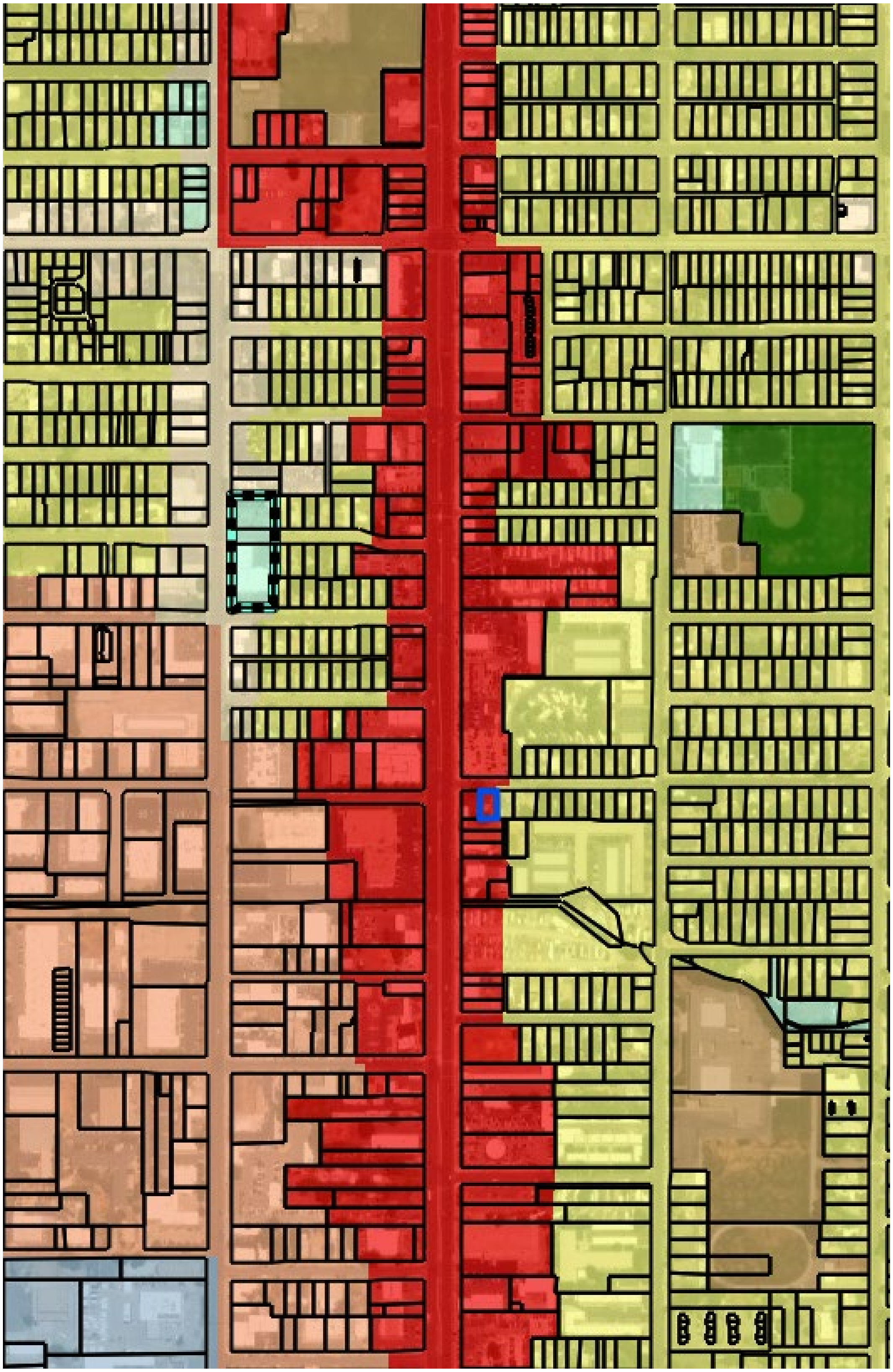
On August 06, 2026, the Planning Commission reviewed the petition and held a public hearing. There were no public comments during the hearing. The Commission expressed that this rezone makes complete sense especially since the property touches R1 to the East. Planning Commission unanimously forwarded a positive recommendation to the City Council to amend the zoning map for the property located at 116 E Garden Ave to the R1 Land Use District.

EXISITING ZONING	EXISTING USE	SIZE OF PROPERTY	SURROUNDING LAND USES	PETITION
Commercial Corridor	Single-Family Residential Unit	0.14 acres (Approx. 6098 sq ft)	North: Commercial South: Commercial East: Single Family West: Commercial	Commercial Corridor (CC) to Single Family Residential (R1)

GENERAL INFORMATION:

Figure 1: Subject Property





(Zoomed out)

Figure 2: Existing and Proposed Zoning

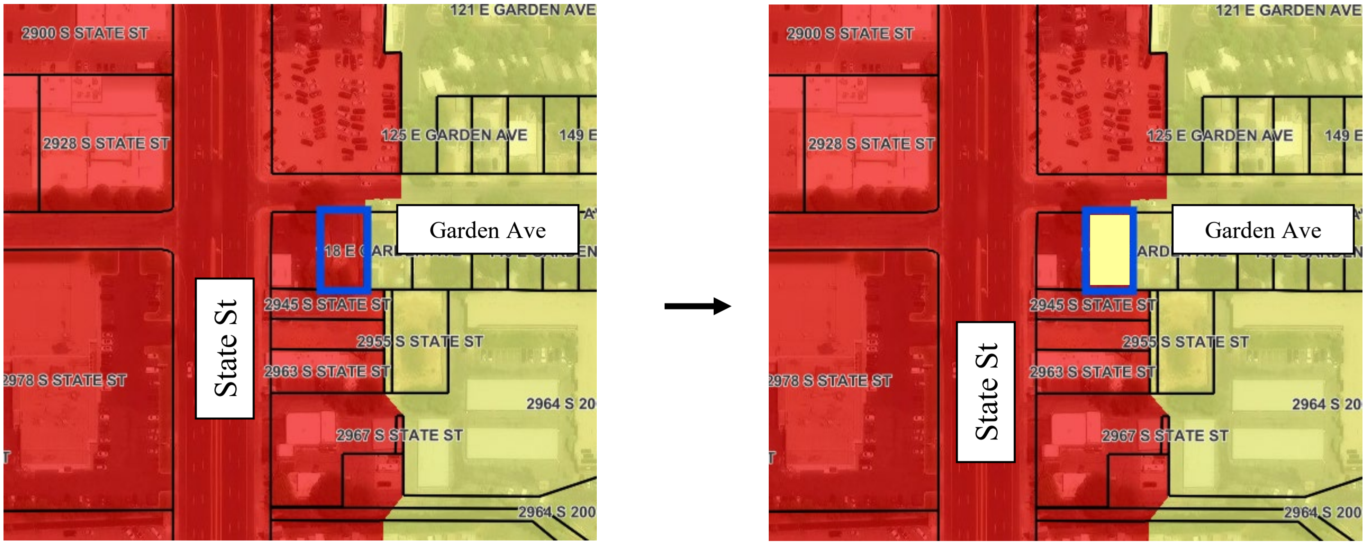


Figure 3: Subject Property – Current Conditions

PLANNING COMMISSION AUTHORITY:

17.11.010. Establishment and Duties of Planning Commission.

K. Responsibilities.

1. The Planning Commission makes recommendations to the **City Council** for:
   a. The general plan and amendments to the general plan;
   b. **The Land Use Map, and amendments to the Land Use Map**;
   c. Amendments to land use ordinances;

d. Proposed Application processes and the delegation of power under the land use ordinance.

GENERAL PLAN CONSIDERATION:

Future Land Use Map & Descriptions

Neighborhood Character Areas - Areas with existing residential and/or neighborhood-serving commercial where current neighborhood character, defined by building mass, street orientation and overall density, is to continue.

Analysis: With this zoning map amendment, the existing residential unit will be preserved and prevent changes to the existing neighborhood character on Garden Ave.

PLANNING COMMISSION REVIEW:

Utah Code Ann. § 10-20-502. Preparation and adoption of land use regulation states:

1. A planning commission shall:
   a. provide notice as required by Subsection 10-20-205(1)(a) and, if applicable, Subsection 10-20-205(4);
   b. hold a public hearing on a proposed land use regulation;
   c. if applicable, consider each written objection filed in accordance with Subsection 10-20-205(4) prior to the public hearing; and
   d. i. review and recommend to the legislative body a proposed land use regulation that represents the planning commission's recommendation for regulating the use and development of land within all or any part of the area of the municipality; and
   ii. forward to the legislative body all objections filed in accordance with Subsection 10-20-205(4).

CITY COUNCIL AUTHORITY:

2.08.060. Powers and Duties

C. The City Council shall have the power to pass resolutions and ordinance concerning matters such as:

5. Zoning and building regulations.

STAFF ANALYSIS:

The Applicant is petitioning the City Council for a zoning map amendment to the subject property to change the zone from Commercial Corridor to R1 Residential. If granted, the map amendment will allow the land use district to match the existing structure and provide more land use options for the property owner.

The properties located to the East are conforming single-family homes that are zoned R1 residential. Garden Ave mainly serves as a residential street; this proposed petition will help in preserving the overall residential environment of the area.

The existing lot size is 0.14 acre, well under the 1-acre minimum lot size requirement in the Commercial Corridor Land Use District. With the current Commercial Corridor Land Use District status, the proposed location will have a very difficult time redeveloping.

The existing subject lot is approximately 60 feet wide and 6,098 square feet to meet the R-1 minimum standards. However, the existing residential structure does not meet the current street frontage and front yard setback requirements. The proposed petition will provide more land use flexibility for the property owner as the zoning will match up with the existing structure on the property and turning the current residential use from a non-conforming status to a conforming status.

With the current zoning map, the existing single-family residential property is considered a non-conforming use. This proposed zoning map amendment would change the status of the house from non-conforming to conforming.

If the applicant's petition is granted, it will provide more options for potential buyers. Additionally, the single-family home could then be utilized for all permitted and conditionally permitted uses, including short-term rentals (STR), as the existing house meets all R-1 land use district and STR requirements.

Critical items for consideration by the Planning Commission and City Council, in the event of approving the project:

1. Consideration of the 2021 South Salt Lake General Plan:

    a. According to the Future Land Map in the 2021 Sout Salt Lake General Plan, the area that Garden Ave is in is identified as a Neighborhood Character Area. Neighborhood Character Areas means areas with existing residential and/or neighborhood-serving commercial where current neighborhood character, defined by building mass, street orientation and overall density, is to continue. With this zoning map amendment, the existing residential unit will be preserved and prevent changes to the existing neighborhood character.

2. Consideration of Commercial Development Standards in the Commercial Corridor Land Use District:

    a. The Commercial Corridor Land Use District requires a minimum lot area of 1 acre. The current property size is only 0.14, if the property owner wanted to pursue a larger commercial redevelopment, ultimately additional property would need to be acquired to meet the 1-acre minimum lot size requirement. Such action might also ultimately affect the existing neighborhood character along the rest of Garden Ave.

3. Consideration of Residential Development Standards in the R1 Land Use District:

    a. The R1 Residential Land Use District requires a minimum lot size of 6,000 square feet and a minimum frontage of 50 feet. The subject property is approximately 6,098 square feet in size and has a frontage width of 60 feet. The subject properties size is consistent with existing abutting single family residential lots to the East of the property.

    b. If the applicant's petition is granted, it will provide more land use and financial options for potential buyers. Additionally, the single-family home unit could be utilized for all permitted and conditionally permitted uses, including short-term rentals (STR), as the existing house meets all R-1 land use district requirements.

FINDINGS OF FACT:

1. *The subject property is located in the Commercial Corridor land use district.*
2. *The proposed zoning map amendment will change the property's designation from Commercial Corridor to R1.*
3. *The property is occupied by an existing single family residential unit.*
4. *The Commercial Corridor zoning is intended for State Street-oriented commercial uses and does not permit single family residential dwelling.*
5. *The proposed R1 zoning is to provide for low Density Single-Family, residential housing neighborhoods on Lots not less than six thousand (6,000) square feet in size.*
6. *The purpose of the map amendment is to turn the existing house of the property from a non-conforming use to a conforming use, also to protect and preserve the existing neighborhood character of the area.*
7. *This zoning map amendment will enable more land use and financial flexibility for the property owner.*
8. *With this zoning map amendment, short term rental and other allowed uses under the R1 district will also become available for this property.*
9. *All items of the Staff Report.*

CONCLUSIONS OF LAW:

1. The proposed South Salt Lake Zoning Map Amendment is consistent with the General Plan and Title 17 of the South Salt Lake Municipal Code, Land Use and Development.

2. The proposed South Salt Lake Zoning Map Amendment is consistent with applicable Utah state law.

3. The proposed South Salt Lake Zoning Map Amendment furthers the purposes of Utah Code § 10-20-101(1)

CITY COUNCIL OPTIONS:

Option 1: Approval

Move to amend the South Salt Lake Zoning Map for one lot located at 116 E Garden Ave, from Commercial Corridor (CC) to R1 Single Family Residential (R1), based on the analysis and findings set forth in the staff report.

Option 2: Recommendation of Denial

Move to deny the South Salt Lake Zoning Map amendment for one lot located at 116 E Garden Ave, from Commercial Corridor (CC) to R1 Single Family Residential (R1), based on the analysis and finding set forth on the record.

Option 3: Continuance

Move to table the South Salt Lake Zoning Map for one lot located at 116 E Garden Ave, to a date certain to allow staff to provide information necessary to make a decision.

116 E Garden Ave
Zoning Map Amendment

116 E Garden Ave

Planning Commission

August 06, 2026

SOUTH SALT LAKE

Application Timeline

July 08, 2026

- This application was presented to City Council in a Work Meeting

August 06, 2026

- Public Hearing during Planning Commission Meeting
- No public comments
- Planning Commission recommended approval unanimously

July 26, 2026

- City Council Regular Meeting for approval

SOUTH SALT LAKE

General Information

- Zoning map amendment to change the zoning from Commercial Corridor to R1 Residential.

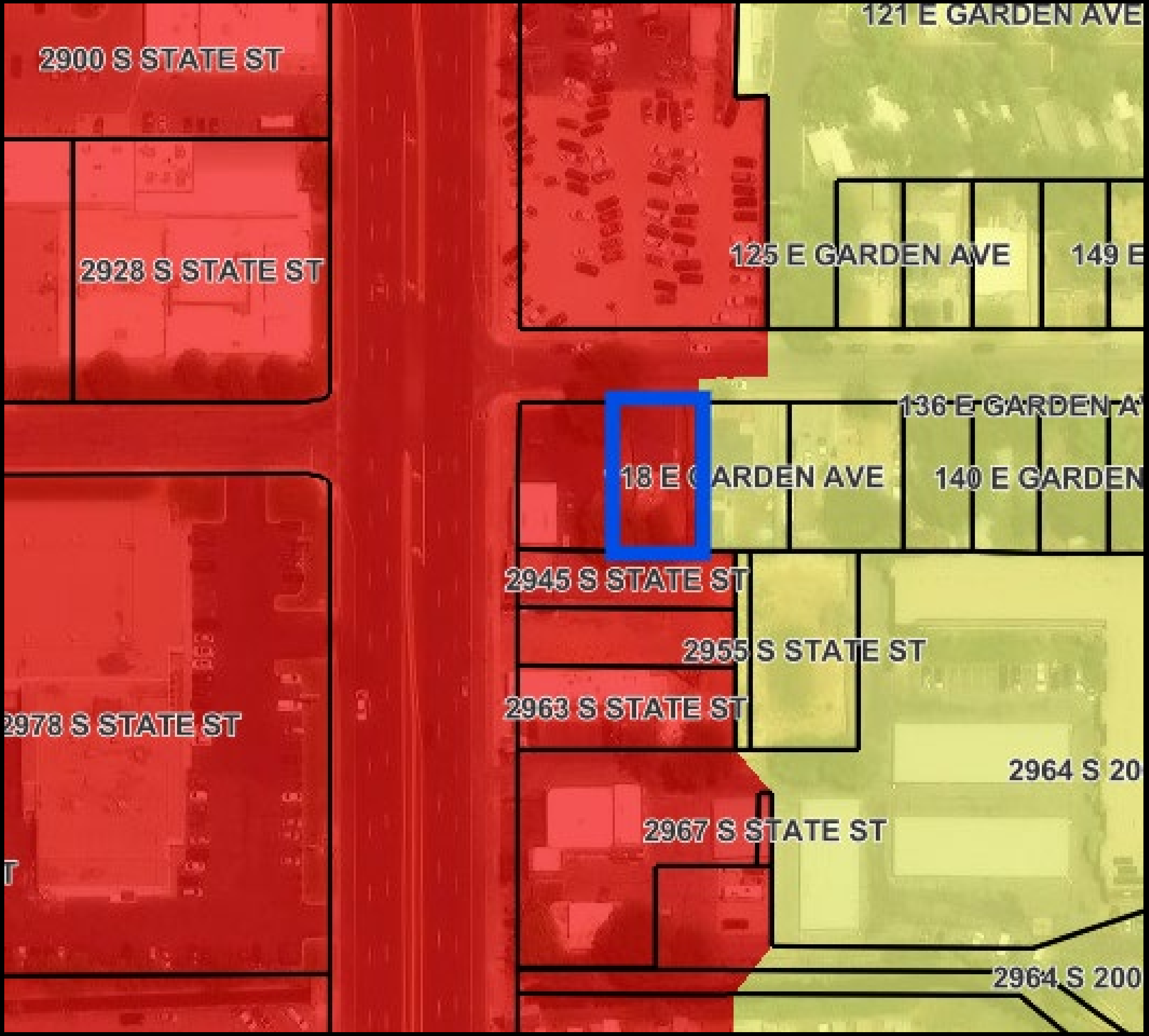
- The purpose of the zoning map amendment is to allow the owner to refinance or utilize the property for residential purposes.

SOUTH SALT LAKE

General Information

- R-1 Residential Use includes Dwelling, long-term rental, and short-term rental (STR).

- STR Status in SSL:
  1. 60 STR out of 200 permitted
  2. 3 new STR applied in 2026
  3. 3 complaints last year



SOUTH SALT LAKE

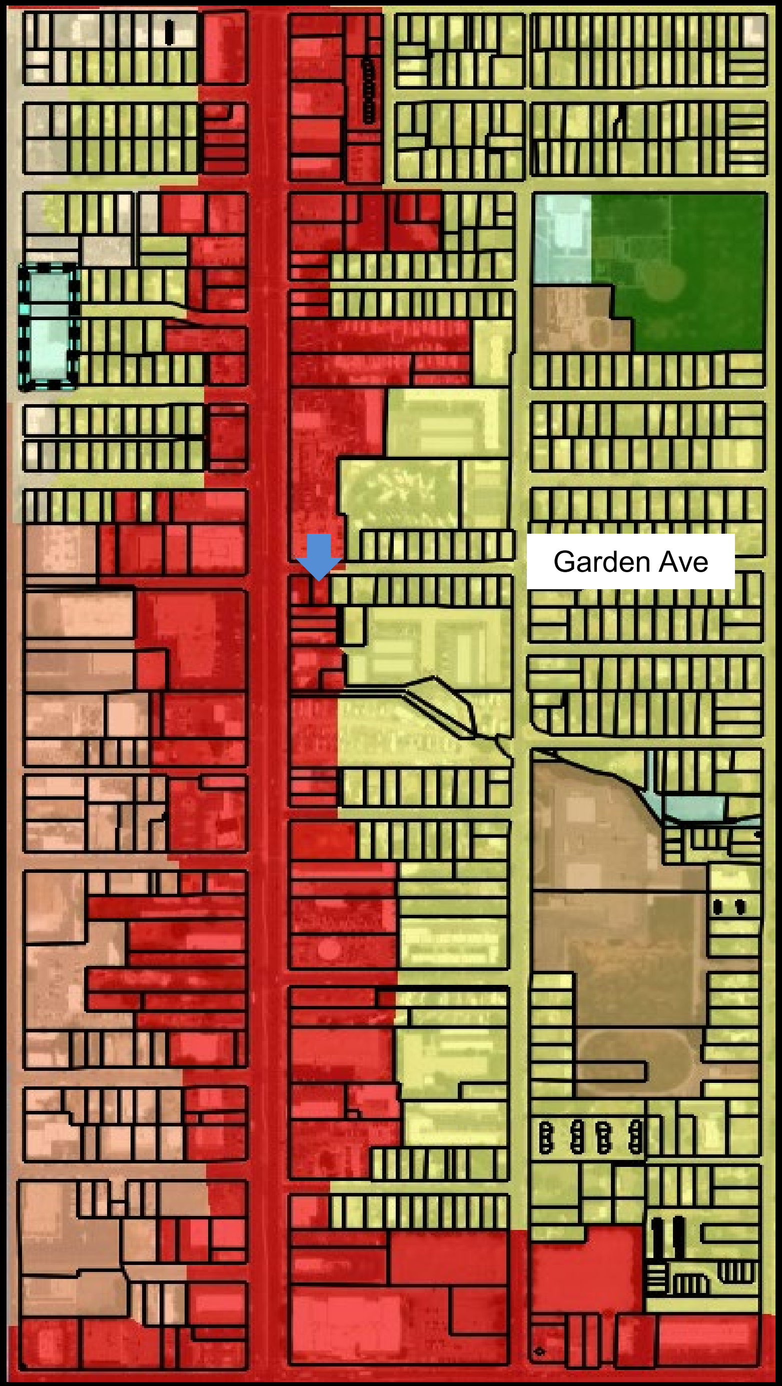
General Information

- Lot size: 0.14 acre (6098 sq ft)
- Lot width: 60 ft
- Existing residential unit on property
- One of the only single-family dwelling that has underlying CC zoning on the East side of State St that does not face State St.

General Plan Consideration:

Neighborhood Character Areas - *Areas with existing residential…where current neighborhood character, defined by building mass, street orientation and overall density, is to continue.*

Analysis: With this zoning map amendment, the existing residential unit will be preserved and prevent changes to the existing neighborhood character on Garden Ave.



City Council Options

Option 1: Approval

Move to amend the South Salt Lake Zoning Map for one lot located at 116 E Garden Ave, from Commercial Corridor (CC) to R1 Single Family Residential (R1), based on the analysis and findings set forth in the staff report.

Option 2: Denial

Move to deny the South Salt Lake Zoning Map amendment for one lot located at 116 E Garden Ave, from Commercial Corridor (CC) to R1 Single Family Residential (R1), based on the analysis and finding set forth on the record.

Planning Commission Options

Option 3: Continuance

Move to table the South Salt Lake Zoning Map for one lot located at 116 E Garden Ave, to a date certain to allow staff to provide information necessary to make a decision.

RESOLUTION NO. R2026-___

A RESOLUTION OF THE SOUTH SALT LAKE CITY COUNCIL ADOPTING AN UPDATED SOUTH SALT LAKE STORM DRAINAGE MASTER PLAN.

WHEREAS, the City of South Salt Lake (the "City") is a political subdivision of the State of Utah, authorized and organized under the provisions of Utah law;

WHEREAS, the City owns and operates an existing storm drainage system consisting of pipes, box culverts, gutters, detention basins, ditches, canals, and streams in order to manage and regulate storm runoff and to help mitigate flooding and environmental impacts;

WHEREAS, the City previously adopted a storm drainage system master plan and is undertaking this proposed updated master plan, as shown in Exhibit A, in order to provide education and information about the capability and needs of the City's storm drainage system;

WHEREAS, the City recognizes an updated storm drainage system master plan is beneficial: a) to examine the existing storm drainage system, b) to identify system deficiencies and improvements needed, and c) to present preferred solutions alternatives with conceptual cost estimates; and

WHEREAS, the City has considered the impact this resolution may have on the health, safety, and welfare of the City and the impact this ordinance may have on family health, stability, and formation and finds that this ordinance is in the best interest of the City.

NOW, THEREFORE, BE IT RESOLVED, by the South Salt Lake City Council that the updated South Salt Lake Storm Drainage Master Plan, attached as Exhibit A, is hereby approved and adopted.

BE IT FURTHER RESOLVED, that a copy of the updated South Salt Lake Storm Drainage System Master Plan be publicly available at the City offices and published on the City website.

(signatures on following page)

DATED this _________ day of______________ 2026.

BY THE CITY COUNCIL:

____
Sharla Bynum, Council Chair

City Council Vote as Recorded:

Bynum	_______
deWolfe	_______
Mitchell	_______
Thomas	_______
Williams	_______
Glad	_______
Jones	_______

ATTEST:

____
Ariel Andrus, City Recorder

Exhibit A

UPDATED SOUTH SALT LAKE STORM DRAINAGE MASTER PLAN

STORM DRAINAGE MASTER PLAN

(HAL Project No.: 126.35.200)

June 2026

HANSEN ALLEN & LUCE INC
ENGINEERS

CITY OF SOUTH SALT LAKE

STORM DRAINAGE MASTER PLAN

(HAL Project No.: 126.35.200)

PROFESSIONAL ENGINEER
No. 12420228
KAI
KRIEGER
6/11/26
STATE OF UTAH

Kai Krieger, P.E.
Project Manager

HANSEN ALLEN & LUCE INC
ENGINEERS

June 2026

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 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

Joy Glad
Corey Thomas
Sharla Bynum
Nick Mitchell
Irvin Jones
Ray deWolfe
Clarissa Williams

City Staff

Chris Merket P.E., City Engineer
Corby Talbot, Stormwater/Wastewater Division Manager, Capital Improvement Plan/ Accreditation Manager
Micah Semon, Stormwater Division Supervisor
Craig Giles, Public Works Director
Jacob Moser, Engineer

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CHAPTER 1 - INTRODUCTION

PURPOSE

This Storm Drainage Master Plan (Master Plan) for the City of South Salt Lake presents technical activities to manage and regulate storm runoff and to help mitigate flooding and environmental impacts. The Master Plan will educate developers, private property owners, City staff, and elected officials regarding the capability and needs of the City's storm drainage system. The Master Plan examines the existing storm drainage system, identifies deficiencies, and presents preferred solution alternatives with conceptual cost estimates. A Capital Improvement Plan (CIP) is developed with Master Plan projects.

The results of this study are limited by the accuracy of the inventory data and other assumptions used in preparing the study. It is expected that the City will review and update this Master Plan every 5-6 years, or more frequently if the assumptions included in this effort change significantly.

BACKGROUND

The City of South Salt Lake is in Salt Lake County. The City was incorporated in 1938 due to the need for water and sewer services. In 1998 the City annexed an area south of the City. The City of South Salt Lake is located along Interstate 15 and is bounded by 500 East (between 2100 South and approximately 2900 South), 700 East (between approximately 2900 South and 3900 South), the Jordan River, 2100 South, and 3900 South. It consists of commercial, industrial, and residential development. The City is mostly developed and contains only a few large undeveloped parcels near the Jordan River. The City is also experiencing growth through redevelopment efforts.

The two major channels that receive storm water runoff from the City of South Salt Lake area include Mill Creek and the Jordan River. Mill Creek runs from east to west, bisecting the City into north and south halves, and then discharges into the Jordan River. The Jordan River forms the western boundary to the City. Major topographic relief is from the east to the west toward the Jordan River, with the Jordan River being the downstream terminus of all storm water runoff from within the City. In general, the City's storm drainage system must convey collected runoff from the City to discharge points along Mill Creek and the Jordan River.

AUTHORIZATION

The City of South Salt Lake selected Hansen, Allen & Luce, Inc. (HAL) to assist them in preparation of this Master Plan. This study has been completed in accordance with an agreement between the City of South Salt Lake and HAL dated April 2, 2025. Development of the Master Plan was completed under the direction of, and in cooperation with City staff. Work began on the Master Plan in June 2025.

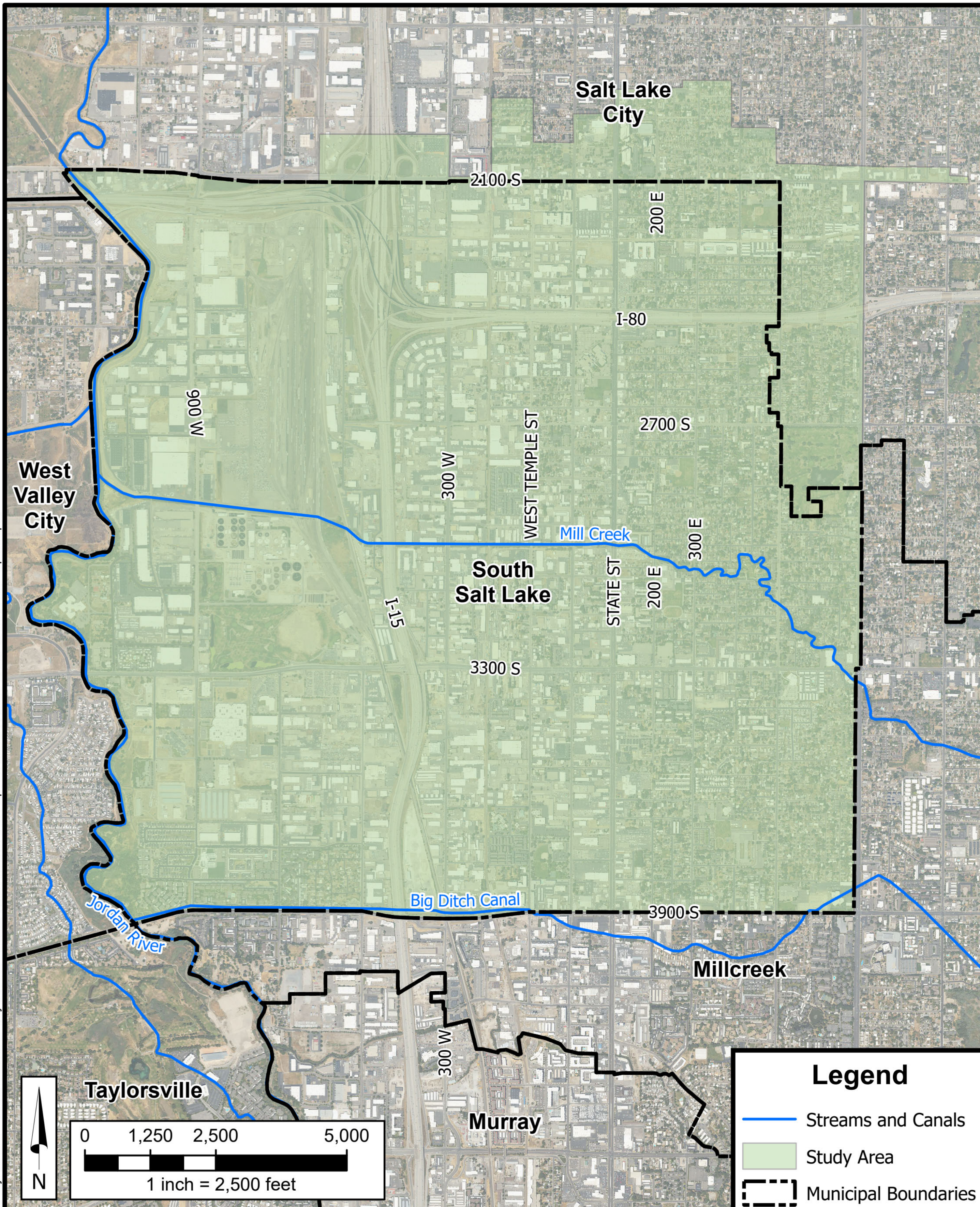
SCOPE

The scope of this Master Plan includes the following:

1. **Collect and review storm drainage data**, including geographic information system (GIS) inventory data from the City, the City's Land Use Master Plan, GIS inventory data from the previous Master Plan, detention basin data from the City, and any known storm drainage deficiencies from the City.
2. **Develop a storm drainage system model** by selecting model software, selecting design storms and methodology, reviewing and updating subbasin characteristics from the previous Master Plan, reviewing and updating detention basin characteristics from the previous Master Plan, selecting the pipe network to be modeled, importing GIS data into the model, inputting hydrologic data into the model, and troubleshooting the model.
3. **Analyze the hydrologic and hydraulic features of the storm drainage system** by using the storm drainage system model, developing Master Plan criteria, holding a workshop with the City to review deficiencies identified in the system, calibrating the model from feedback received during the workshop, reviewing current city code concerning storm drainage, analyzing the impact of future growth on the existing system, developing solutions to the deficiencies in cooperation with the City, developing a CIP, and reviewing storm water quality management considerations.
4. **Prepare stormwater CIP and Master Plan Report**

STUDY AREAS

The study area for this Master Plan includes all the area in the City of South Salt Lake and an additional area bounded by 700 West, 900 East, Westminster Avenue, 2910 South, and 2100 South. The study area can be seen on Figure 1-1.



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HANSEN ALLEN & LUCE inc ENGINEERS

SOUTH SALT LAKE STORM DRAINAGE MASTER PLAN - STUDY AREA

FIGURE 1-1

CHAPTER 2 - EXISTING STORM DRAINAGE SYSTEM

This section discusses the features that convey storm drainage through the study area seen on Figure 1-1. The existing storm drainage system is made up of pipes, box culverts, gutters, detention basins, ditches, canals, and streams. Data about the storm drainage system were compiled in GIS to represent a storm drainage inventory. Features in the storm drainage system are managed by the City of South Salt Lake, the Utah Department of Transportation (UDOT), the Utah Transit Authority (UTA), and Salt Lake County.

NATURAL DRAINAGES

The natural drainages act as the outfalls for the City's storm drainage system and for features of the UDOT storm drainage system that accept flow from South Salt Lake Drainage. Flows in the natural drainages are mainly determined by events upstream of the City of South Salt Lake. Runoff from the City represents a relatively small portion of the flows in the natural drainages. This Master Plan does not analyze the hydrology of the entire tributary area of the natural drainages. Therefore, the natural drainages are not modeled as conveyances but are instead represented as outfall points for the modeled system. The natural drainages are managed by Salt Lake County Flood Control.

Mill Creek

Mill Creek bisects the City of South Salt Lake, running from approximately 3300 South and 700 East to the Jordan River at approximately 2800 South. Approximately 53% of the study area flows into Mill Creek before reaching the Jordan River. High flows in Mill Creek have led to backwater effects on the City storm drainage system.

Jordan River

The Jordan River runs along the westernmost edge of the City of South Salt Lake. It is the terminus for all runoff from the study area. Only 12% of the study area flows directly to the Jordan River, with 53% flowing to Mill Creek, 33% flowing through the UDOT detention basins at the Spaghetti Bowl (Intersection of I-15, I-80, and the 201 Highway), and 2% flowing to other facilities in 3900 South (Salt Lake County) before reaching the Jordan River.

OTHER AGENCY FACILITIES

UDOT has facilities in 3300 South, 2100 South, State Street, and I-80, all of which receive flow from South Salt Lake storm drainage facilities. UDOT also has several large detention basins, one at approximately 3300 South and I-15, several detention basins at the Spaghetti Bowl, and one at 900 West and 2100 South. UDOT facilities were modeled in this Master Plan to account for some backwater effects that may be experienced if UDOT pipes are at or above capacity. UDOT facilities in I-80 and 2100 South most likely receive flows from outside the study area. This should be taken into consideration during later stages of the design process for projects associated with these facilities. Flows from portions of State Street flow into South Salt Lake facilities before returning to UDOT managed conveyances. Some deficiencies identified in the model are in UDOT managed drainage pipes. Coordination with UDOT by the City to verify conveyance sizes, deficiencies, and further develop the recommended solutions proposed in this Master Plan should be pursued.

UTA has some drainage facilities along 200 West. The UTA facilities flow into UDOT facilities or into Mill Creek. The UTA conveyances receive flow from portions of the City and from some City storm drainage pipes.

SOUTH SALT LAKE STORM DRAINAGE FACILITIES

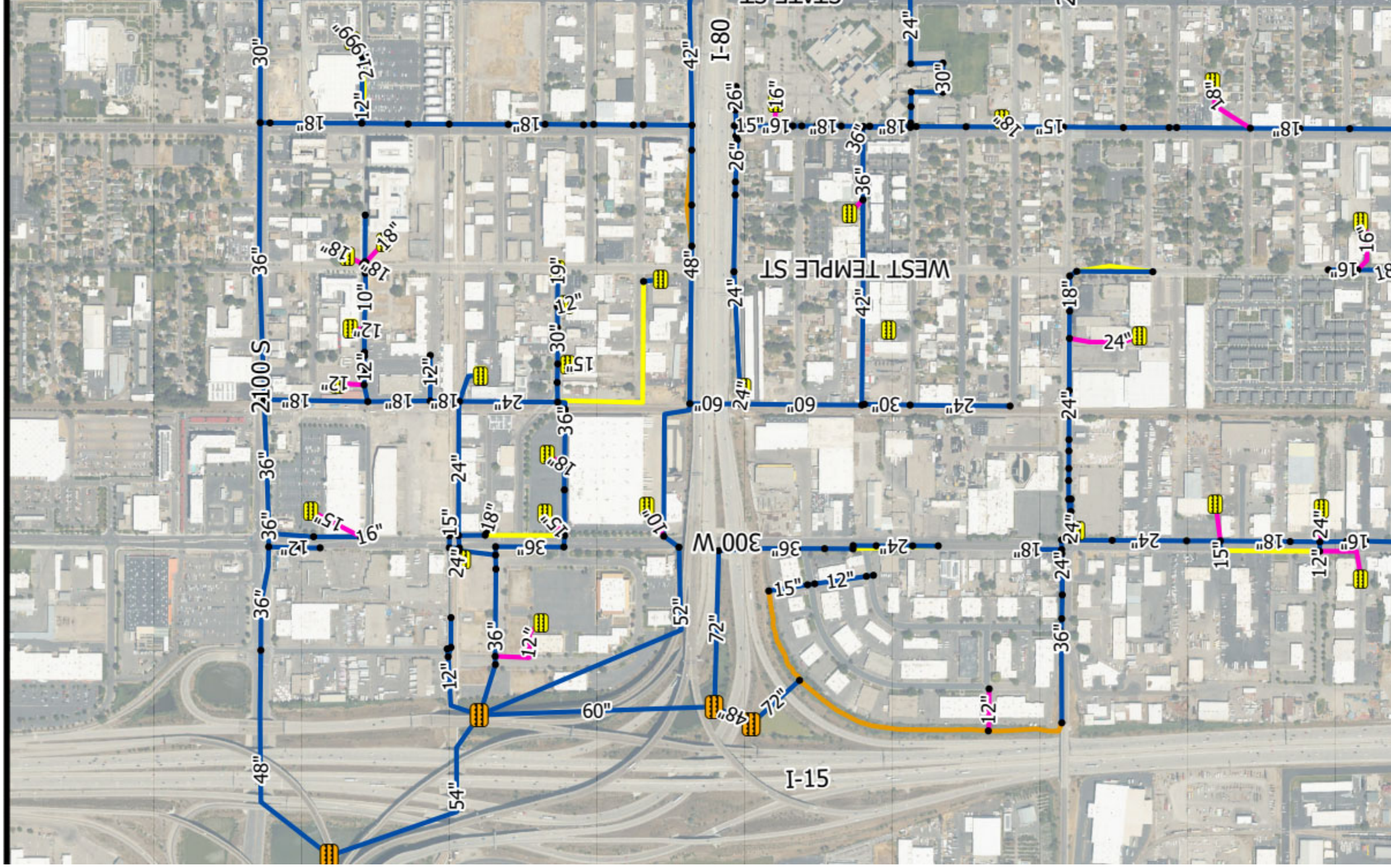
Collection and Conveyance

The City of South Salt Lake has over 30 miles of storm drain conveyances with a wide range of sizes. Over 41 miles of conveyances were modeled to account for facilities managed by UDOT and older facilities from Salt Lake County. The inventory includes 1,017 nodes representing storm drain inlets, manholes, junctions, culvert inlets & outlets, detention basins, and outfalls.

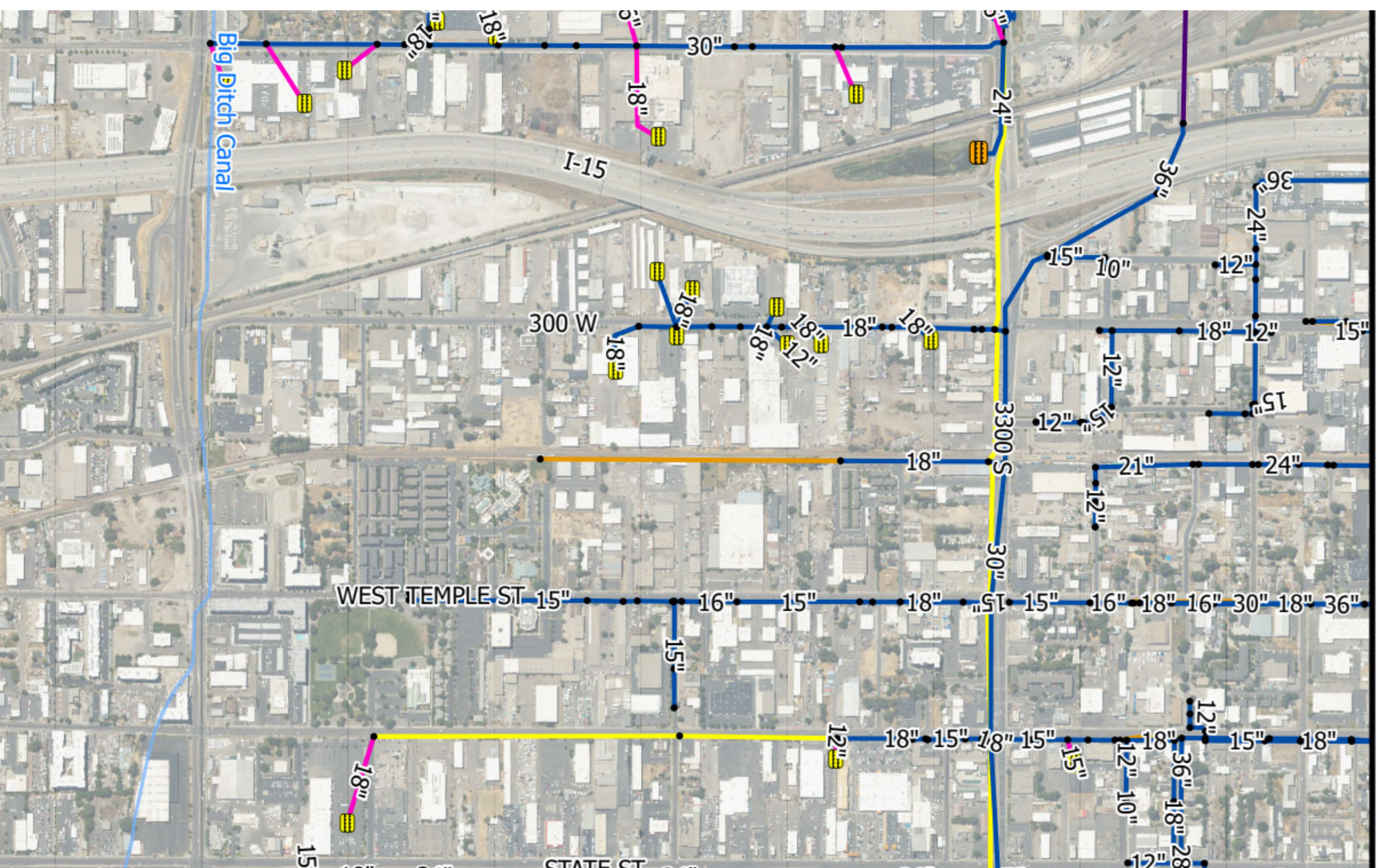
Available data in the inventory consists of point locations, point elevations, measure-down depths at each point, conveyance location, conveyance shape, and conveyance size. The collection and conveyance system with associated pipe diameters can be seen in Figures 2-1 and 2-2.

Detention

The inventory included three detention basins managed by the City, seven detention basins managed by UDOT, and 77 private detention basins to account for required detention in commercial areas. Detention basin volumes were determined from 1-foot contours generated from the 2013-2014 LiDAR raster. Private detention basins often lack proper maintenance, so installed orifice plates may not represent the actual outlet capacity due to sediment buildup. The private detention basins were added to the model to account for ponding in commercial areas and the outlet structures' capacities were set to match capacities of identified downstream pipes. This method avoids identifying private detention basins as flooding problems while retaining the ability to analyze the storm drainage system with peak flows from commercial areas.



I-80
WEST TEMPLE ST
2100 S
300 W
I-15



Big Ditch Canal
I-15
300 W
3300 S
WEST TEMPLE ST
STATE ST

CHAPTER 3 - METHODOLOGY

The project team adopted a workshop approach with City staff to determine the design criteria, study areas, analysis processes, deficiencies, alternatives, and solutions. This section describes the methodology followed in developing the Master Plan.

HYDROLOGY

Design Frequencies

The City selected design storm frequencies of 10-year (10% chance of being equaled or exceeded in any given year) and 100-year (1% chance of being equaled or exceeded in any given year) for this study. Criteria included:

- 10-year minimum capacity for minor system (pipes, ditches, etc.).
- 100-year capacity for detention and protection against structures flooding.

Design Storms

Storm distributions used in this plan were derived from the Modified Farmer–Fletcher distribution for 3-hour storms.

Thirteen separate gauging stations in the Great Basin Experimental Area, ranging in elevation from 5,500 ft to over 10,000 ft, were maintained for varying periods of time from 1919 to 1965. Fifteen gauging stations were maintained in the Davis County Experimental Watershed (ranging in elevation from 4,350 ft to 9,000 ft) for varying periods of time between 1939 and 1968. After analyzing the data, Farmer and Fletcher (1971) found that “more than 50 percent of the storm rainfall depth occurs in 25 percent of the storm periods” and that “usually more than half of the total depth of rain is delivered as burst rainfall.” Farmer and Fletcher developed design storm distributions which have been accepted by governmental entities including Salt Lake County and Davis County as the characteristic distributions for storms in Utah of short duration (generally 6-hour or less). The 10-Year 3-Hour Modified Farmer Fletcher 2nd Quartile distribution can be seen on Figure 3-1.

The Modified Farmer Fletcher distribution is based on the standard 1-hour, first-quartile Farmer–Fletcher rainfall distribution, which produces a high-intensity rainfall peak early in the storm. In the modified approach, this 1-hour distribution is placed within the second hour of a 3-hour storm event. Lower-intensity rainfall “tails” are added before and after the peak hour to represent storm buildup and recession.

This results in a storm that preserves the intense 1-hour peak rainfall characteristics of the Farmer Fletcher distribution, while expanding the total storm duration to three hours, allowing the event to represent both peak intensity and total storm volume.

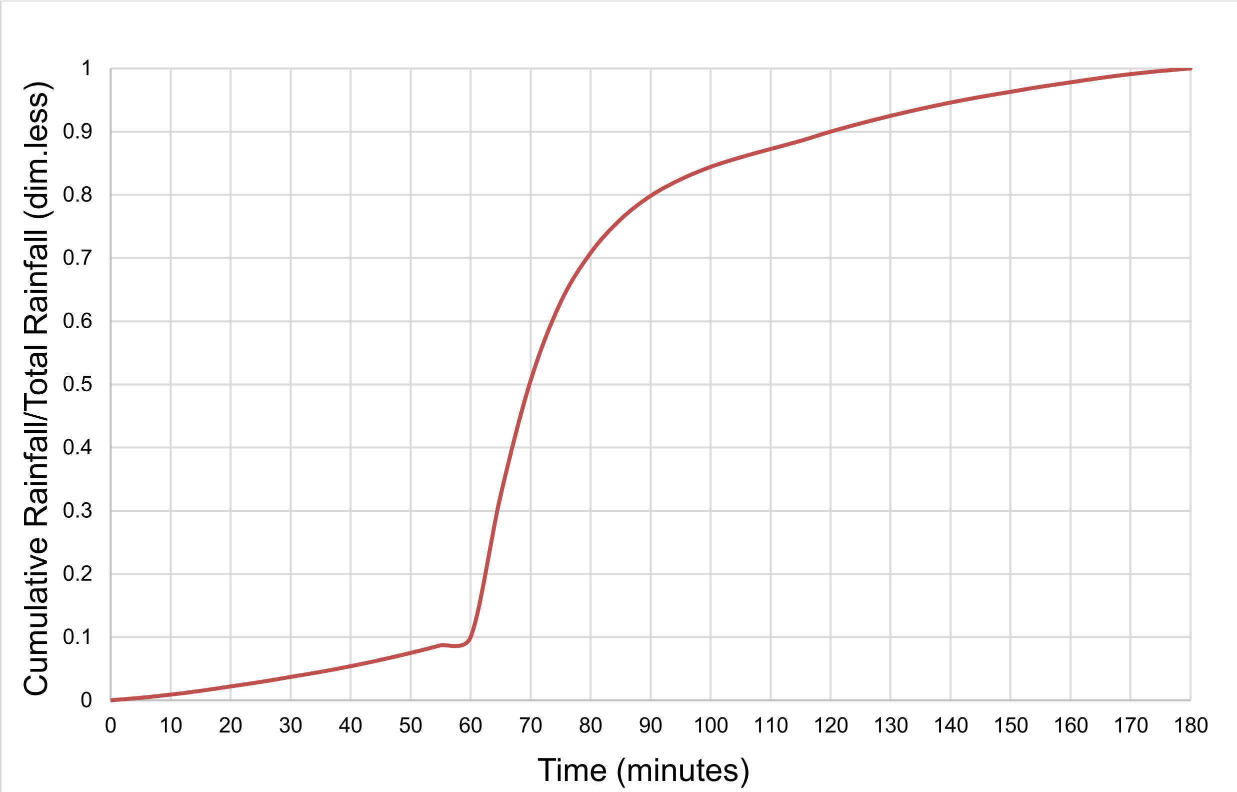


Figure 3-1 Modified Farmer Fletcher 2nd Quartile Dimensionless Distribution

The City's detention basins were designed to detain 100-year storms. The three regional detention basins that are managed by the City were analyzed by comparing the detention basin storage volumes with the computed volume of water that each detention basin would need to detain the 100-year storm. Based on the data, the detention basin located near 200 E Oakland Avenue appears to be too small to detain the 100-year storm. The model indicates a maximum volume of about 0.62 acre-feet, and it's estimated to require 0.71 acre-feet. The two other detention basins, located at 400 E Beryl Ave. and McCall Park, were estimated to be large enough to detain the 100-year storm.

Precipitation depths were obtained from the *NOAA Atlas 14: Precipitation-Frequency Atlas of the United States* (Bonnin et al. 2004; NOAA 2014). To account for future increases in rainfall, the upper limit was used (see Appendix A).

The design storm rainfall depths modeled for this master plan are seen in Table 3-1.

Table 3-1
Modeled Rainfall Depths

Storm Frequency	3-Hr
10-yr Rainfall Amount (in)	1.17
100-yr Rainfall Amount (in)	1.87

DEVELOPMENT OF THE HYDROLOGIC MODELS

As part of the master plan, HAL developed computer models to simulate runoff during storm events for both existing and buildout conditions. During discussions with the City, it was determined that Autodesk's Storm and Sanitary Analysis (SSA) software be used to model the storm drainage system. SSA utilizes the United States EPA Storm Water Management Model (SWMM) software for hydrologic and hydraulic modeling and allows importation of GIS inventories to create the models.

A drainage basin (also called a subbasin, watershed or catchment) is an area in which all rainfall or snowmelt runoff will collect to a common point (the lowest point in the basin). Subbasin characteristics developed for this plan were based on attributes calculated for each subbasin, aerial imagery, GIS mapping, land use information from the City, and engineering literature. Important subbasin characteristics described below include 1) area, 2) percentage of impervious area, 3) SCS curve number, and 4) overland flow characteristics. Much of the methodology is documented in Technical Release 55: Urban Hydrology for Small Watersheds (NRCS, 1986), hereafter referred to as TR-55.

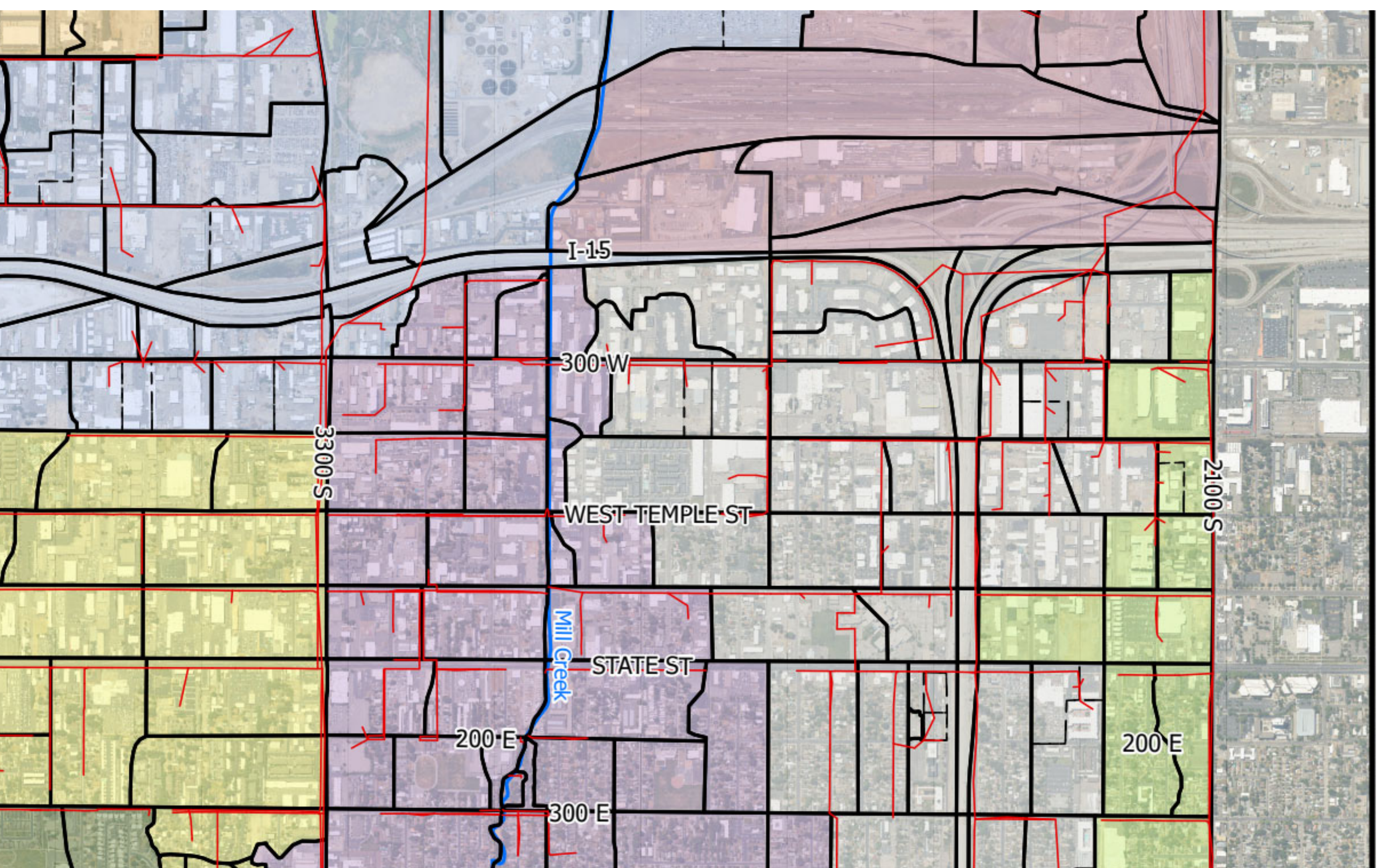
Subbasin Area

The amount of runoff is proportional to the area of the subbasin. Subbasin boundaries depend upon both topography and location of storm drainage facilities. Subbasin boundaries for most of the study area remained the same as in the previous Master Plan. Aerial imagery and contours derived from the 2013-2014 0.5-meter LiDAR data were used to update the subbasin boundaries. The previous master plan had 203 subbasins. That number was increased to 227 subbasins by splitting existing subbasins to reflect more detailed updates. The subbasins and the major basins can be seen in Figure 3-2. See Appendix B for subbasin characteristics.

The 2013-2014 LiDAR data are from the Utah Automated Geographic Reference Center (AGRC) and are comprised of 1,422 square miles of very detailed elevation data. The LiDAR data are in 0.5-meter resolution and have a 9.25 cm vertical RMSE (root mean square error) accuracy (AGRC, 2014). The available data provides an adequate level of detail for master planning analyses.

Impervious Area

Impervious area in a subbasin has a significant effect on the runoff volume and peak flow rate. Impervious areas were updated since the previous Master Plan. Impervious areas are defined as hard impervious surfaces that have essentially no infiltration. Impervious areas throughout the City were delineated using remote sensing data. Figure 3-3 below shows how areas were classified as pervious or impervious. Grass, turf, and yards for example are highlighted in green and assumed to be pervious, whereas structures like roads, buildings, and parking lots are colored in grey and assumed to be impervious.


I-15
300 W
3300 S
2100 S
WEST TEMPLE ST
Mill Creek
STATE ST
200 E
200 E
300 E

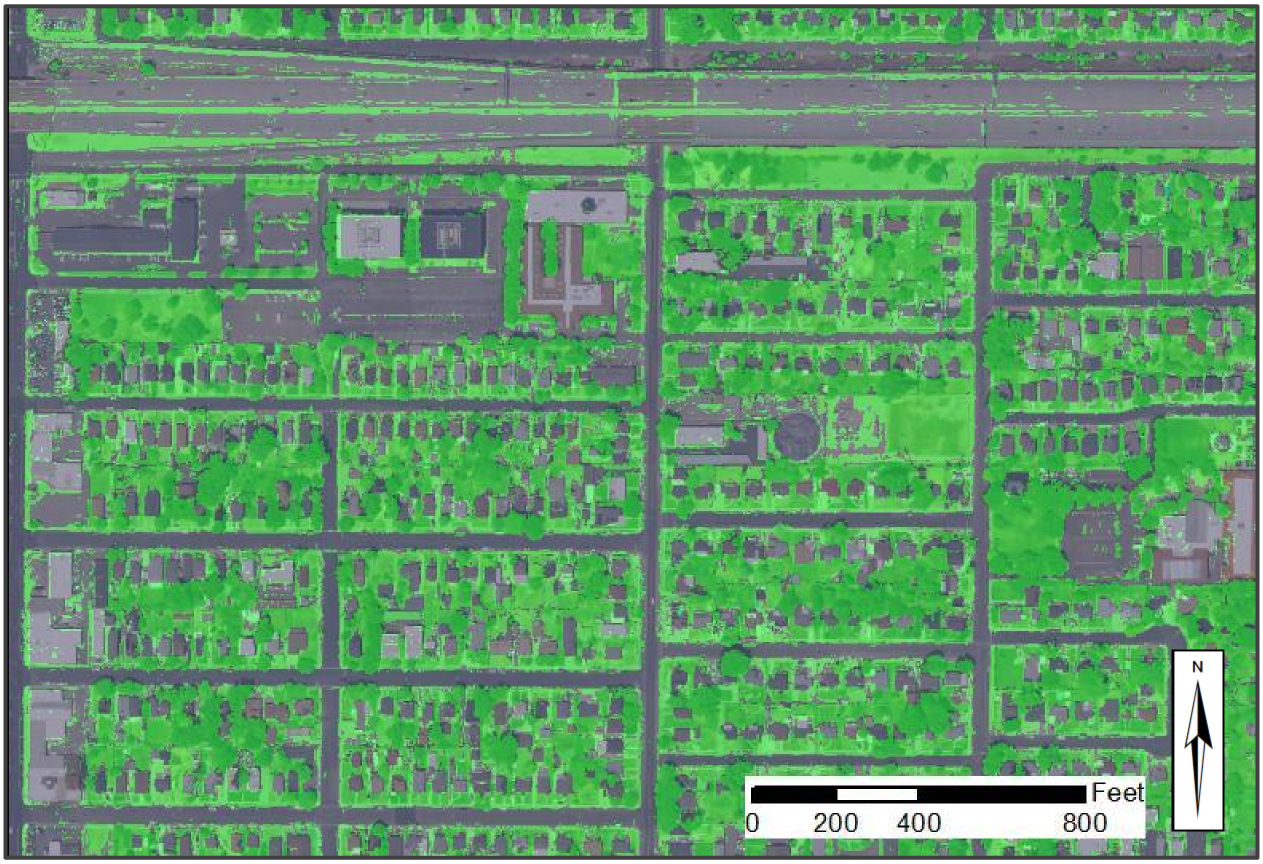


Figure 3-3 Impervious Area Found Using Remote Sensing Data

Directly connected impervious areas (DCIA) flow directly into channels or inlets of the drainage system. Unconnected impervious areas flow onto pervious surfaces before reaching a channel or inlet. Table 3-2 shows the assumed percent impervious area that is DCIA per land use type.

Table 3-2
Percent Impervious by Land Use Type

Land Use Type	% Impervious That is DCIA
Commercial Neighborhood	0.70
School	0.80
Mixed Use	0.75
Residential Single Family	0.50
Commercial Corridor	0.90
City Facility	0.80
Flex	0.90
Commercial General	0.90
TOD Overlay	0.90
East Streetcar Neighborhood	0.90
Master Planned Mixed Use	0.75

Land Use Type	% Impervious That is DCIA
Downtown District	0.90
Residential Multiple	0.50
Open Space	0.25
Jordan River	0.25
Business Park	0.80
Tracy Aviary's Jordan River Nature Center	0.25
TOD Overlay Core	0.90
Granite Lofts Townhome	0.80
Historical & Landmark	0.50

The hydrology methodology was changed, and updates were made to the impervious delineations for this master plan. Changes include using a newer version of software, HEC-HMS, to compute the runoff hydrographs which were then fed into SSA. Previously the SWMM hydrology methodology was applied which uses less intuitive parameters to determine peak flow and timing of peak flow from the subbasins. The HMS hydrology utilizes straightforward lag time and curve number calculations that are widely used in the engineering community. The updated impervious areas were compared to the previous master plan and were found to be generally higher. To calibrate flows to be more comparable to the previous master plan and to typical flowrates that are found along the Wasatch Front, a global reduction of 5% was made to the percent DCIA for all subbasins.

Soil Conservation Service Curve Number

The Soil Conservation Service (SCS) curve number describes the relationship between precipitation and runoff for the pervious and unconnected impervious portions of the subbasin. Curve numbers range from 0 to 100. Areas that are more pervious have lower curve numbers. For example, a well vegetated subbasin with sandy soils and little unconnected impervious area would have a lower curve number than a poorly vegetated subbasin with clay soils and a significant amount of unconnected impervious area.

Curve numbers were updated from the previous master plan and developed based on the combination of hydrologic soil group (Soil Survey Geographic Database (SSURGO) dataset) and land cover.

Lag Time

The SCS curve number and SCS unit hydrograph were used to calculate runoff hydrographs which were then routed in the SSA model. This was done to better evaluate and calibrate model results based on subbasin characteristics, such as lag time, instead of subbasin width. Lag time represents the delay in time between the peak of a rainfall event to the peak discharge of the subbasin. Lag time illustrates how quickly a subbasin responds to a rainfall event. Shorter lag times indicate faster runoff, whereas longer lag times indicate slower runoff.

The Carter equation was used to calculate lag times for all subbasins. Modeled results were compared to the previous master plan and other previous studies by dividing subbasin peak flows by area (cfs/acre). The Carter equation and a 5% reduction to DCIA were used as adjustment factors to achieve reasonable flow rates based on our previous experience and knowledge of local urban hydrology.

Links

Conveyances (called links in SSA) convey runoff between the junctions in the model. Typical conveyances include pipes, box culverts, ditches, canals, natural channels, outlet pipes, orifice plates, weirs, pumps, and in some cases gutters. Conveyance characteristics for the model were defined using aerial imagery, 1-foot contours, and data from the system inventory which identified conveyances. This information is used in the model to perform the hydraulic analysis for routing storm runoff hydrographs through the system.

Some uncertainty is associated with modeled drainage paths. Flow paths in facilities managed or inherited by other entities are not as well defined as the inventory that was provided by the City. Incorrect data in other facilities can cause backwater effects in the model, identifying problems that potentially do not exist.

Unlike HEC-HMS, SSA will limit flow through conduits based on the conduit's capacity. For example, if a subbasin has a peak flow of 10 cfs while the conduit only has a capacity of 6 cfs, flooding would occur at the upstream node, and the conduit would be limited to its peak capacity under surcharged conditions. The upstream node would experience flooding near a rate of 4 cfs. This is helpful when analyzing how the system actually functions but can hinder efforts to determine the potential peak flows at a point. During the design process, upstream flooding should be closely scrutinized to ensure that the proposed project has the capacity to convey all the flow contributing to the project.

Nodes

In the model, nodes are points where conveyances or subbasins connect. Nodes generally represent manholes, inlets, outfalls, detention basins, or points where multiple conveyances combine. Nodes contain elevation data which determine the elevation of attached conveyances. Nodes also have maximum depth data to determine if the point is experiencing flooding due to surcharging conditions.

Flooding at nodes can be handled in several ways. If the surface ponding option is used, the volume of water at a node above the maximum depth is stored at the node and released back into the system once surcharging conditions recede. If the surface ponding option is not used, any flooding is lost from the system. In order to conservatively estimate the volume of water entering storage nodes, the surface ponding option was used in this Master Plan. This method will help estimate ponding that may occur around inlets on sag (on sag describes situations where flooding ponds around the inlet and does not flow to another point). However, for on-grade inlets where curb and gutter convey bypass flow away from the inlet, accurate representation in a 1-D model under surcharged conditions requires the addition of conveyance elements to simulate the curb and gutter system. A schematic of the urban storm drainage criteria is shown on Figure 3-4.

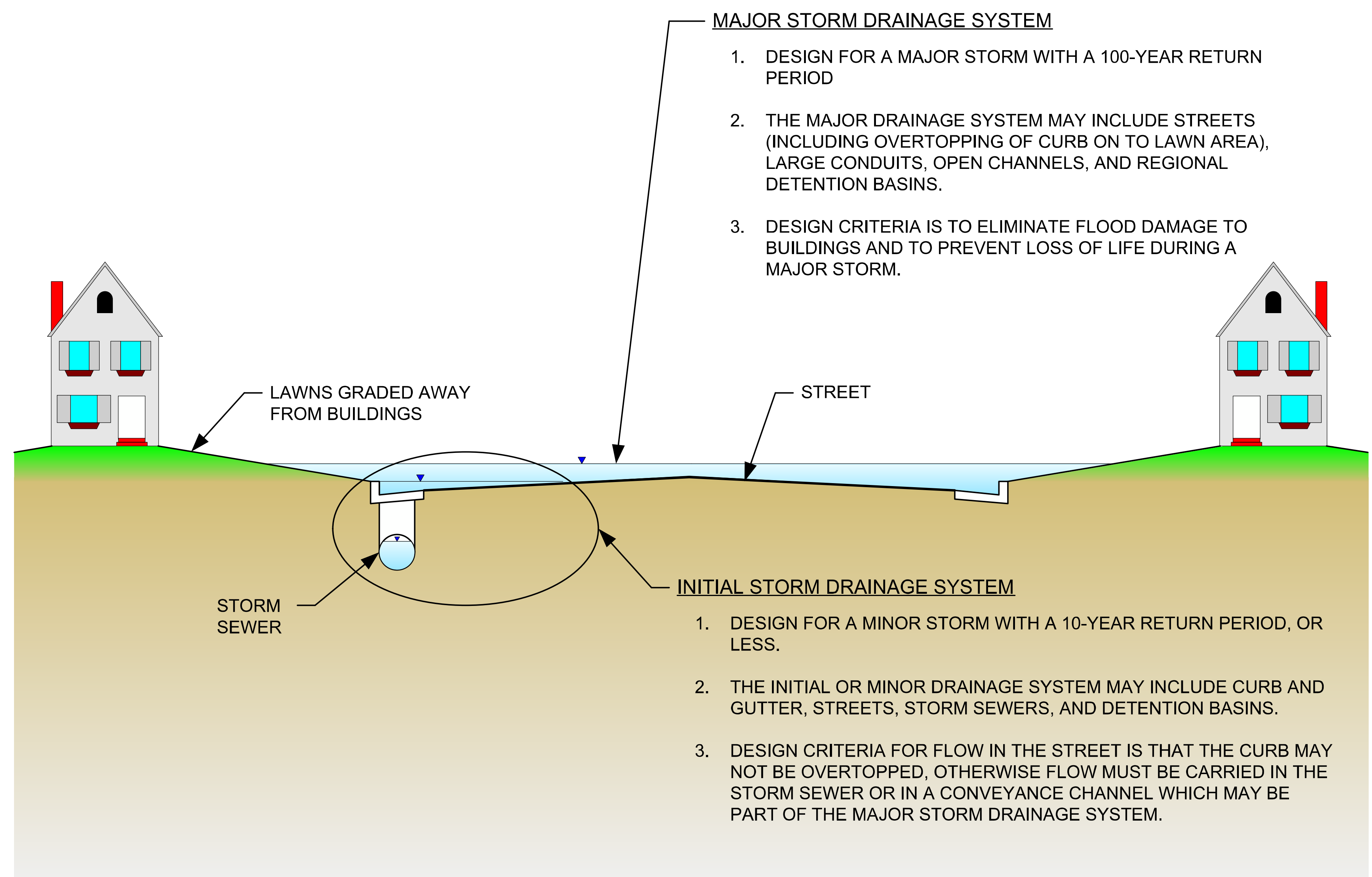
FUTURE CONDITIONS

The City is currently experiencing growth and is expected to redevelop some areas into high-density regions. Estimated subbasin characteristics in the growth areas were developed based on the best available data and in cooperation with City personnel. Growth is mostly focused in areas of redevelopment called Transit Oriented Development (TOD) areas. Anticipated growth areas can be seen in Figure 3-5.

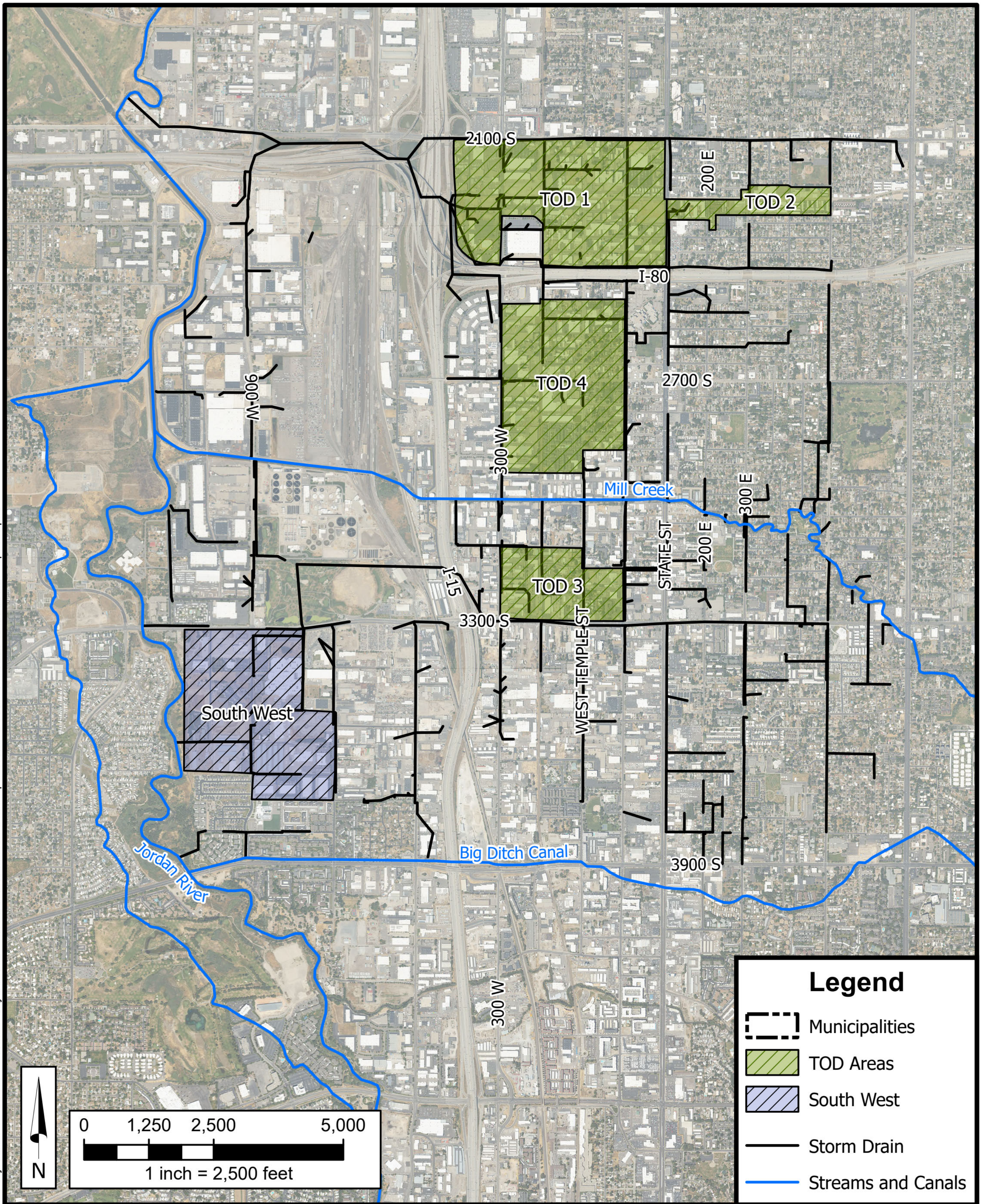
To analyze the potential impacts of future growth on the City's stormwater infrastructure, subbasin characteristics, such as curve number and percent DCIA, were updated in the buildout scenario model for subbasins located in future growth areas. Detention basins in these subbasins were also revised to be large enough to detain the 100-year storm and release at a rate of 0.2 cfs/acre.

CAPACITY ANALYSIS

The SSA models can determine the water depth, flow rate, and capacity of conveyances during a precipitation event. This detailed analysis includes calculating surcharged conditions and backwater effects when the Hydrodynamic Wave routing method is selected. This capability makes the SWMM engine a very useful tool in analyzing the hydraulic capability of a storm drainage system. Results from the models were compiled and used in workshops with the City to identify deficiencies in the storm drainage system, as further discussed in the next chapter.



HANSEN ALLEN & LUCE inc ENGINEERS	SOUTH SALT LAKE STORM DRAINAGE MASTER PLAN	URBAN STORM DRAINAGE CRITERIA	FIGURE 3-4



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SOUTH SALT LAKE
STORM DRAINAGE MASTER PLAN
FUTURE GROWTH AREAS

FIGURE
3-5

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CHAPTER 4 - STORM DRAINAGE ANALYSIS

EXISTING DEFICIENCIES

Existing deficiencies were identified based on input from City staff and on the results from the storm drainage system model. Locations where the City has experienced flooding were analyzed in the model to determine the cause of the flooding. For example, an area that frequently floods could have issues with inlet capacity, pipe capacity, backwater effects, runoff from areas not initially associated with the tributary, pipe configuration, or the curb and gutter configuration. The advanced hydraulic routing in the model is very useful in determining the causes of flooding.

Generally, storm drainage systems are designed to carry the peak 10-year runoff event, with the 100-year runoff event being conveyed in the storm drain and in the roadway. It was determined that for the existing South Salt Lake storm drainage system, full pipe flow is acceptable with minor surcharging being contained in the curb and gutter system. It was decided that if a node was modeled to have 3 acre-inches of flooding or more, then it was considered deficient.

Table 4-1 and Figures 4-1 through 4-2 summarize the drainage deficiencies identified in this study. Each deficiency has an ID (used in this study), a location description, and a description of the problem.

Not all deficiencies necessitate capital improvements. Because storm drainage systems are designed to convey the 10-year event, a 10-year event will produce flows at or near the pipe capacity of the system. Some nodes in the model identified areas of surcharging which were determined to not be a deficiency because the surcharging is contained in the curb and gutter system. A pipe at capacity or a surcharged node in the model was only added to the deficiency list if greater than 3 acre-inches of flooding occurred in the model and/or City staff had identified previous flooding at the location. After identifying the deficiencies from the model, the project team and City staff met in a series of workshops to discuss which deficiencies warranted action. Deficiencies identified as not warranting action will be monitored by City staff for flooding and included in a watch list.

Table 4-1
Storm Drain Existing Deficiencies

Deficiency ID	Location	Problem Description
D1	300 West from Utopia Street to 2100 South and along 2100 S from 300 West to 400 East	The City has noted flooding in this area. The model suggests the flooding is due to capacity issues in the UDOT facilities in 2100 South and due to the inlets being a low point in the surrounding area. It is possible that runoff in 2100 South bubbles up and contributes to flooding at this point. The existing storm drain is less than 18 inches in diameter in 300 W. Flat slopes may also contribute to local flooding.
D2	West Temple Street from approximately 3730 South to approximately 3395 South	The City and model have identified flooding in this area. The existing storm drain does not have sufficient capacity to convey runoff from this area and is less than 18 inches in diameter. Flat and adverse slopes may contribute to flooding.

Deficiency ID	Location	Problem Description
D3	300 West from approximately 3550 South to approximately 3490 South	The City and model have identified flooding in this area. The existing storm drain does not have sufficient capacity to convey runoff from this area and is less than 18 inches in diameter.
D4	300 East from Wentworth Avenue to 2100 South	The model identified flooding in this area. The existing storm drain does not have sufficient capacity to convey runoff from this area and is less than 18 inches in diameter. Development south of the streetcar line is expected to contribute flows from a sump pump to the storm drain. Adverse slopes contribute to flooding.
D5	Through private lots at approximately 450 East from 3300 South to Woodland Avenue, Woodland Avenue from 450 East to 400 East	The model identified flooding in this area. The existing storm drain does not have sufficient capacity to convey runoff from this area and is less than 18 inches in diameter. Flat and adverse slopes may contribute to flooding.
D6	Utopia Avenue from 50 West to 200 West	The model identified flooding in this area. Existing pipes are in poor condition and are less than 18 inches in diameter. Adverse slopes contribute to flooding.
D7	300 West from 3490 South to 3300 South	The City and model have identified flooding in this area. Existing storm drain does not have enough capacity to convey runoff. Flat and adverse slopes contribute to flooding.
D8	State Street from Claybourne Avenue to Mill Creek (approximately 2980 South)	The model shows flooding in this area. Flat slopes contribute to flooding. Some sections of storm drain may be less than 18 inches in diameter. This area experiences significant flows from 2700 South and 300 East. This is a UDOT managed area.
D9	Between 460 and 466 Lawndale Drive straight west to the drainage ditch along I-15	The model identified flooding in this area. The existing storm drain does not have sufficient capacity to convey runoff from this area and is less than 18 inches in diameter.
D10	West Temple from approximately 3395 South to 3300 South	The City and model have identified flooding in this area. The existing storm drain does not have sufficient capacity to convey runoff from this area. Flat and adverse slopes may contribute to flooding.
D11	300 West from 2925 South to Mill Creek (approximately 2980 South)	The model identified flooding in this area. The existing storm drain does not have sufficient capacity to convey runoff from this area and is less than 18 inches in diameter. Flat slopes contribute to flooding. Significant backwater effects from Mill Creek have caused additional flooding further north on 300 West through this storm drain.
D12	2700 South from West Temple Street to 300 West	The model identified flooding in this area. The configuration and size of existing storm drain across 300 West creates capacity issues in this area. Flat slopes may contribute to flooding. A topographic low spot exists near 201 West.
D13	Main Street from 3410 South to 3300 South	The model identified flooding in this area. The existing storm drain does not have sufficient capacity to convey runoff from this area. Adverse slops contribute to flooding. This area receives a significant amount of curb and gutter flow from the south on Main Street.

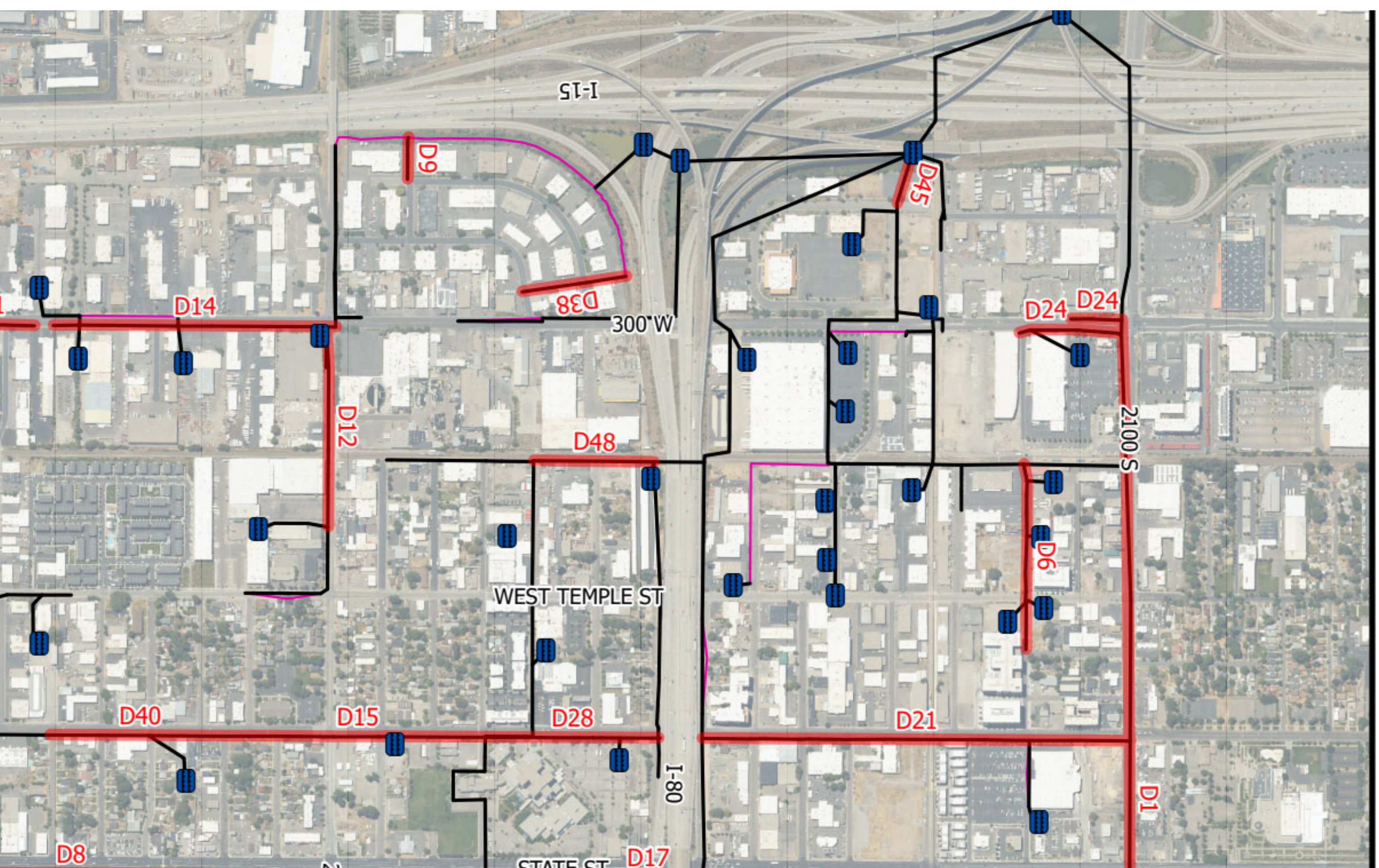
Deficiency ID	Location	Problem Description
D14	300 West from 2880 South to 2700 South	The model identified flooding in this area. The existing storm drain does not have sufficient capacity to convey runoff from this area. The configuration and size of the existing storm drain across 300 West at 2700 South create capacity issues in this area. Flat slopes may contribute to flooding.
D15	Main Street from Claybourne Avenue to Stratford Avenue	The City and model have identified flooding in this area. This area has storm drains less than 18 inches in diameter and small inlet boxes that restrict inflow into the storm drains.
D16	3400 South at 450 East	The model has identified flooding at this location. This is a topographic low spot. The existing storm drain does not have sufficient capacity to convey runoff from this area. Flat slopes may contribute to flooding.
D17	State Street from Truman Avenue to Stratford Avenue	The model shows that the existing storm drain does not have sufficient capacity to convey runoff from this area. Flat slopes may contribute to flooding. This is a UDOT managed area.
D18	State Street from 3820 South to 3300 South	The model identified flooding near the southern point of this deficiency. The existing storm drain does not have sufficient capacity to convey runoff from this area. Flat slopes may contribute to flooding. This is a UDOT managed area.
D19	500 East from Millcreek Way to Scott Avenue	The pipe inventory shows a 36-inch pipe reducing down to an 18-inch pipe before entering a 24-inch pipe. The 18-inch section does not have sufficient capacity to convey runoff from this area. The pipe sizes should be verified in this area.
D20	500 West from 3900 S to 3400 South	The model shows that the existing storm drain does not have sufficient capacity to convey runoff from this area. Flat slopes may contribute to flooding. The area is missing some curb and gutters. Noted as a problem area by the City.
D21	Main Street from I-80 to 2100 South	The City and model have identified minor flooding in this area. The existing storm drain does not have sufficient capacity to convey runoff from this area and small inlets along the storm drain restrict inflow to the storm drain. Flat slopes contribute to flooding.
D22	500 East at approximately 3030 South to Mill Creek	The City has noted that the corrugated metal pipe (CMP) is failing and needs replacement. The pipe is also less than 18 inches in diameter.
D23	300 West from 3200 South to Gregson Avenue	The model shows that the existing storm drain does not have sufficient capacity to convey runoff from this area. Flat slopes may contribute to flooding.
D24	300 West from 2140 South to 2100 South	The City has noted flooding in this area. The model suggests the flooding is due to capacity issues in the UDOT facilities in 2100 South and due to the inlets being a low point in the surrounding area. It is possible that runoff in 2100 South actually bubbles up and contributes to flooding at this point. The existing storm drain is less than 18 inches in diameter.
D25	300 West from 3900 South to approximately 3550 South	The City has noted flooding in this area. Storm drains do not exist in this area.
D26	Main Street from 3790 South to 3410 South	The City has noted flooding in this area. Storm drains do not exist in this area.

Deficiency ID	Location	Problem Description
D27	West Temple Street from approximately 3840 South to approximately 3730 South	Storm drains do not exist in this area.
D28	Along Main Street from I-80 to Stratford Ave and the intersection of Whitlock Avenue and Main Street	The City has noted flooding in this area. Inlets on this storm drain are small and restrict flow to the pipes. The pipe configuration through the intersection may contribute to flooding.
D29	200 East from 3300 South to 3440 South; 3440 South from 200 East to approximately 150 E; Ford Ave. from 200 E to State St.	Storm drains do not exist in this area, and curb and gutters do not exist on portions of the roads. Deficiency provided by the City.
D30	3300 South from 460 East to 440 East	The model has identified that the existing storm drain does not have sufficient capacity to convey runoff from this area and pipes are less than 18 inches in diameter. Excess runoff flows west on 3300 South in gutters. This is a UDOT managed area.
D31	From 600 E, down Mansfield Ave, Green St, and over to Spring View Drive at approximately 3155 South	The existing storm drain is less than 18 inches in diameter. This is a topographic low spot. The City has noted that the area requires vigilant maintenance to remove debris from the inlets and outlets to the pond. Storm drains do not exist upstream of this area.
D32	Secord Street from Rigdon Avenue to 3750 South	This cul-de-sac has a slightly downhill grade. The model shows that the existing storm drain does not have sufficient capacity to convey runoff from this area.
D33	200 West (TRAX line) from Finlay Drive to 3300 South	The model shows that the existing storm drain does not have sufficient capacity to convey runoff from this area. This is a UTA managed area.
D34	Fine Drive from 650 West to 500 West	The City has identified flooding in the area and that the existing storm drain does not have sufficient capacity to convey runoff from this area. The storm drain is less than 18 inches in diameter. The City has noted the area requires increased maintenance to clear plugged grates.
D35	700 West from 3620 South to County Jail Street	The model shows that the existing storm drain does not have sufficient capacity to convey runoff from this area.
D36	200 West (TRAX line) from Walton Avenue to Angelo Avenue	The model shows that the existing storm drain does not have sufficient capacity to convey runoff from this area. This is a UTA managed area.
D37	Eldredge Avenue from 3200 South to 3270 South	Capacity issues in the downstream 36-inch pipe cause backwater effects that flood the area according to the model. The size and capacity of downstream trunk lines should be verified to confirm this deficiency. The existing storm drain is less than 18 inches in diameter and is near a topographic low spot.

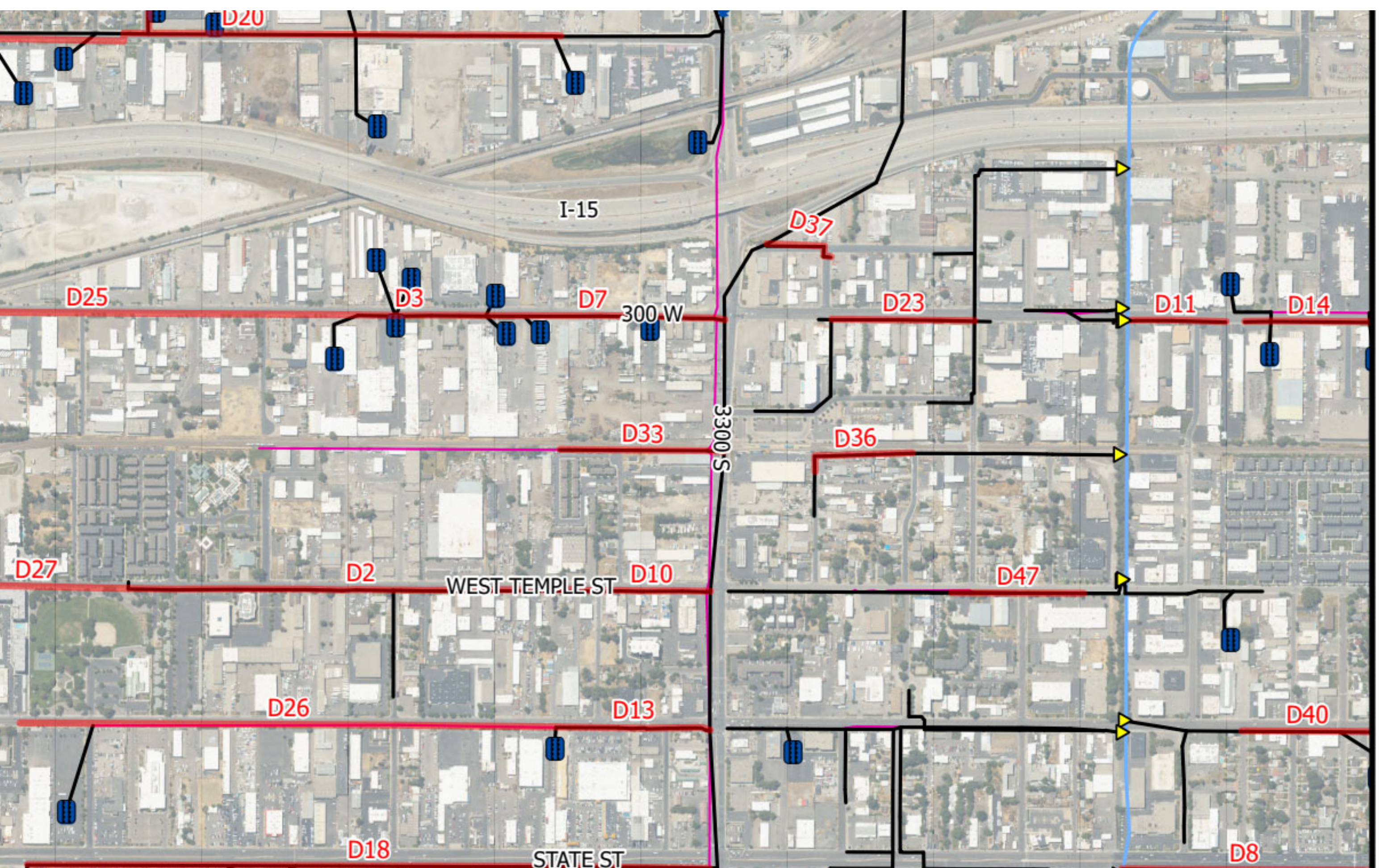
Deficiency ID	Location	Problem Description
D38	Through private lots from approximately 320 Ironwood Drive to the UDOT drainage ditch behind 350 Lawndale Drive	The model shows that the existing storm drain does not have sufficient capacity to convey runoff from this area and is less than 18 inches in diameter.
D39	Riviera Drive from 3355 South to the outfall on Mill Creek at 3300 South and approximately 670 East	This is a topographic low spot and has potential flooding as identified by the City.
D40	Main Street from Claybourne Ave to Cordelia Ave	The City identified this area as a known problem.
D41	800 W from 2500 S to approximately 2320 S	The City identified this area as a known problem.
D42	Wendell Drive and Wendell Way	The City identified this area as a known problem. No storm drain systems exist in the area.
D43	3300 S and 700 W	The model identified flooding in this area.
D44	900 W and Central Valley Rd	The model identified flooding in this area.
D45	400 W and Andy Ave	The UDOT storm drain from the parking lot area to the outfall is potentially undersized.
D46	610 E from 3650 S to 3610 S	The model shows that the existing storm drain does not have sufficient capacity to convey runoffs from this area. The City indicated that curb and gutter improvements may be required.
D47	W Temple from Angelo Ave to Mill Creek	The City and the model have identified problems in this area.
D48	Railroad from Stratford Ave to I-80	The model identified flooding along the railroad tracks.
D49	300 E from 2700 S to 3050 S	There is no infrastructure in the area.

EXTERNAL INFLOWS FROM SALT LAKE CITY

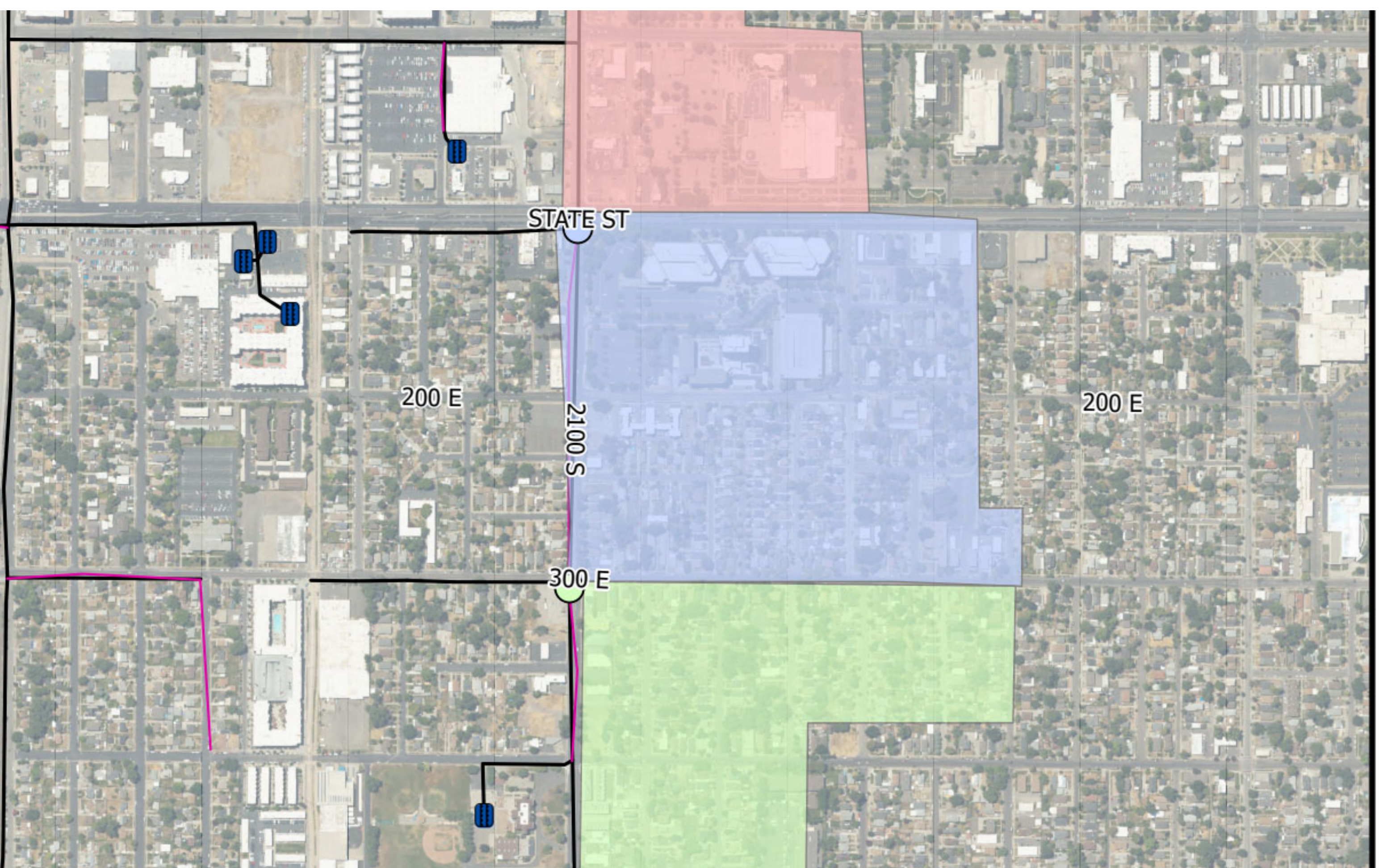
City staff emphasized significant deficiencies in the area at 2100 S from 300 West to about 400 East due to external inflows from Salt Lake City. Salt Lake City's 1993 master plan was used to determined which subbasins in that area would drain into the South Salt Lake storm drainage system. A regression model, based on a study on Urban Drainages Along the Wasatch Front by Lindskov and Thompson (1989), was used to estimate the 10-year peak flows of these subbasins based on the subbasin area, slope, and impervious area. Figure 4-3 illustrates where external inflows were added to the model to simulate the contributions from Salt Lake City.



I-15
D9
D45
D38
300 W
D14
D24
D24
D12
D48
2100 S
D6
WEST TEMPLE ST
D40
D15
D28
D21
I-80
D1
D8
STATE ST
D17



D20
I-15
D37
D25
D3
D7
300 W
D23
D11
D14
D33
3300 S
D36
D27
D2
WEST TEMPLE ST
D10
D47
D26
D13
D40
D18
STATE ST
D8



STATE ST
200 E
2100 S
200 E
300 E

FUTURE DEFICIENCIES

A future scenario was developed to assess the effect of redevelopment in some areas of South Salt Lake. The future scenario was prepared under the assumption that any new development will install proper on-site detention to release at a rate of 0.2 cfs per acre for a 100-yr 3-hour storm event. The deficiencies that were identified based on the results from the future scenario model largely coincide with the deficiencies found from the existing model scenario.

CHAPTER 5 - CAPITAL IMPROVEMENT PLAN

This CIP presents the problems and recommendations identified in the study to improve storm drainage in the City of South Salt Lake. The CIP was developed from the hydrologic models, deficiency analysis, previous Master Plan, and workshops with City personnel.

PREFERRED DRAINAGE PLAN DEVELOPMENT

The project team held a series of workshops with City staff to evaluate the need for drainage improvements based on the deficiencies identified in Chapter 4. Selection of the preferred alternative for each problem was a process of evaluation and refinement rather than a simple choice between alternatives.

The process of selecting a preferred alternative included:

- reviewing the list of storm drainage deficiencies,
- pre-screening drainage deficiencies,
- brainstorming possible solutions,
- screening alternatives based on feasibility and public acceptance,
- developing alternatives,
- comparing cost and function, and
- selecting the preferred alternative.

Design criteria included:

- 10-year minimum capacity for minor system (pipes, ditches, etc.).
- 100-year capacity for detention and protection against structures flooding.

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. However, this level of precision can be greatly impacted by the bidding climate at the time of bid. If contractors are extremely busy, costs may be significantly higher. If contractors are not busy and want to keep their employees occupied, costs could be significantly less.

The flows and pipe diameters provided in the following CIP descriptions are approximate and are for planning purposes only. A detailed hydrologic and hydraulic analysis should be performed during the design process of the projects to identify final design and sizing.

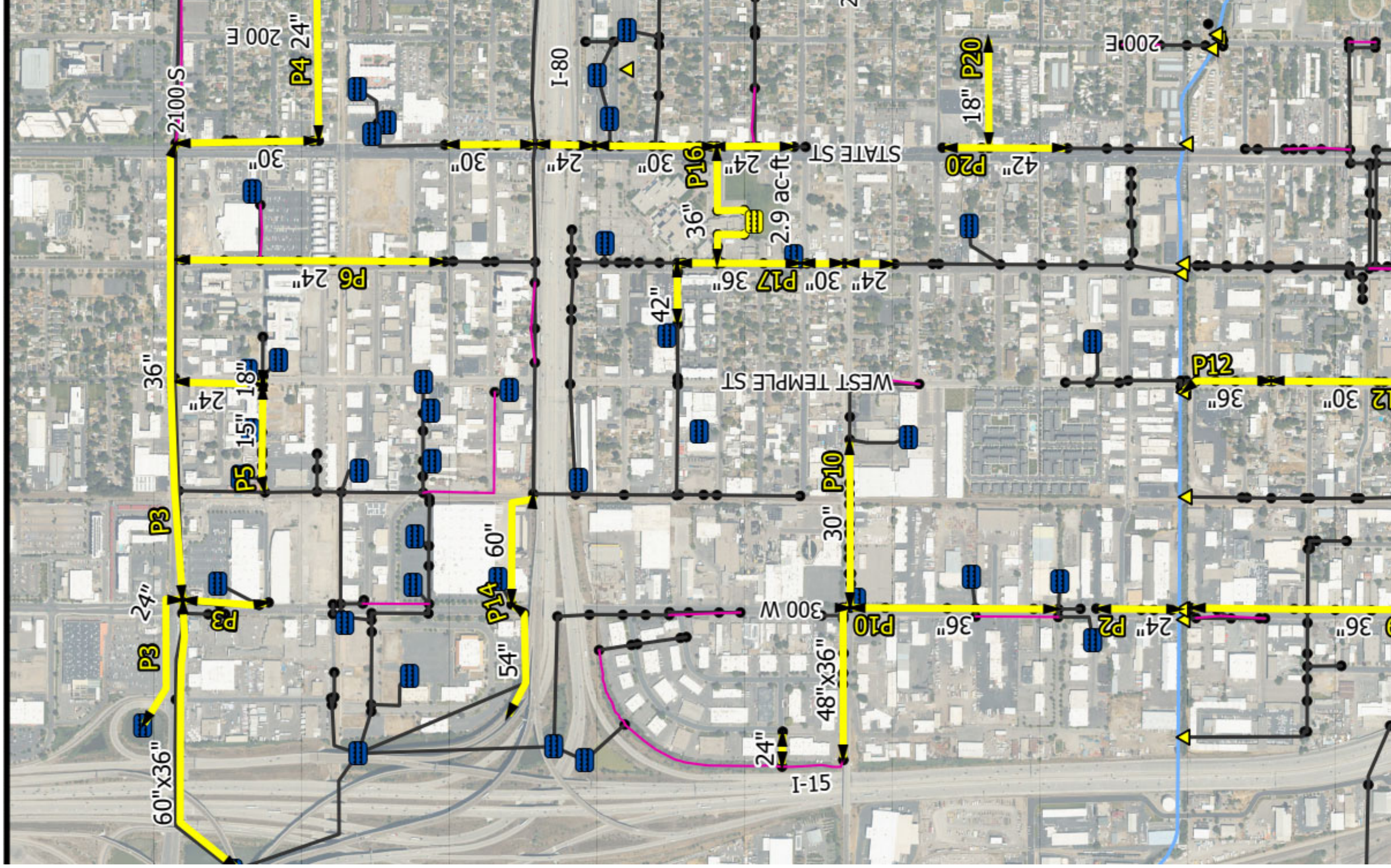
ESTIMATED CONSTRUCTION COSTS

Cost estimates are based on conceptual-level engineering. Unit construction costs were estimated based on communication with material suppliers, heavy construction data references (RSMeans, 2025), and contractor bids from other similar construction projects. Engineering cost estimates given in this study should be regarded as conceptual and appropriate for use as a planning guide. Only during final design can a definitive and more accurate estimate be provided. A cost estimate of each CIP project is provided in Appendix C.

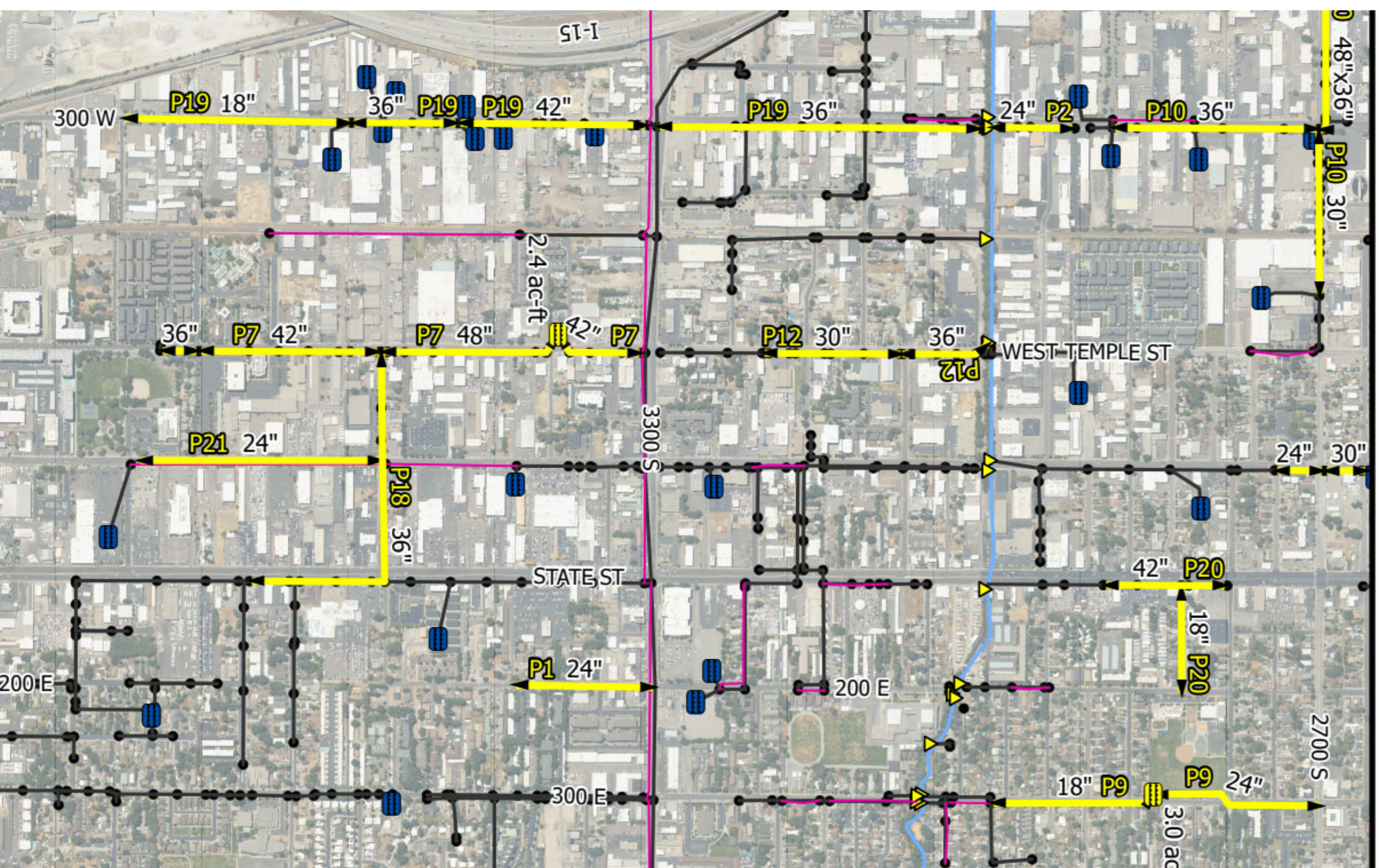
CAPITAL IMPROVEMENT PLAN

Table 5-1 presents the recommended capital improvements which are shown in Figure 5-1 and Figure 5-2. Some deficiencies were determined to not require a project at the time of this master plan. However, City personnel are closely monitoring these areas in case the conditions warrant a project. These areas and any potential projects, if applicable, are included in Table 5-1 as watch list items. Watch list projects are also shown in Figure 5-3. Projects from the previous Master Plan were reviewed and included in the CIP in cases where they had not already been addressed.

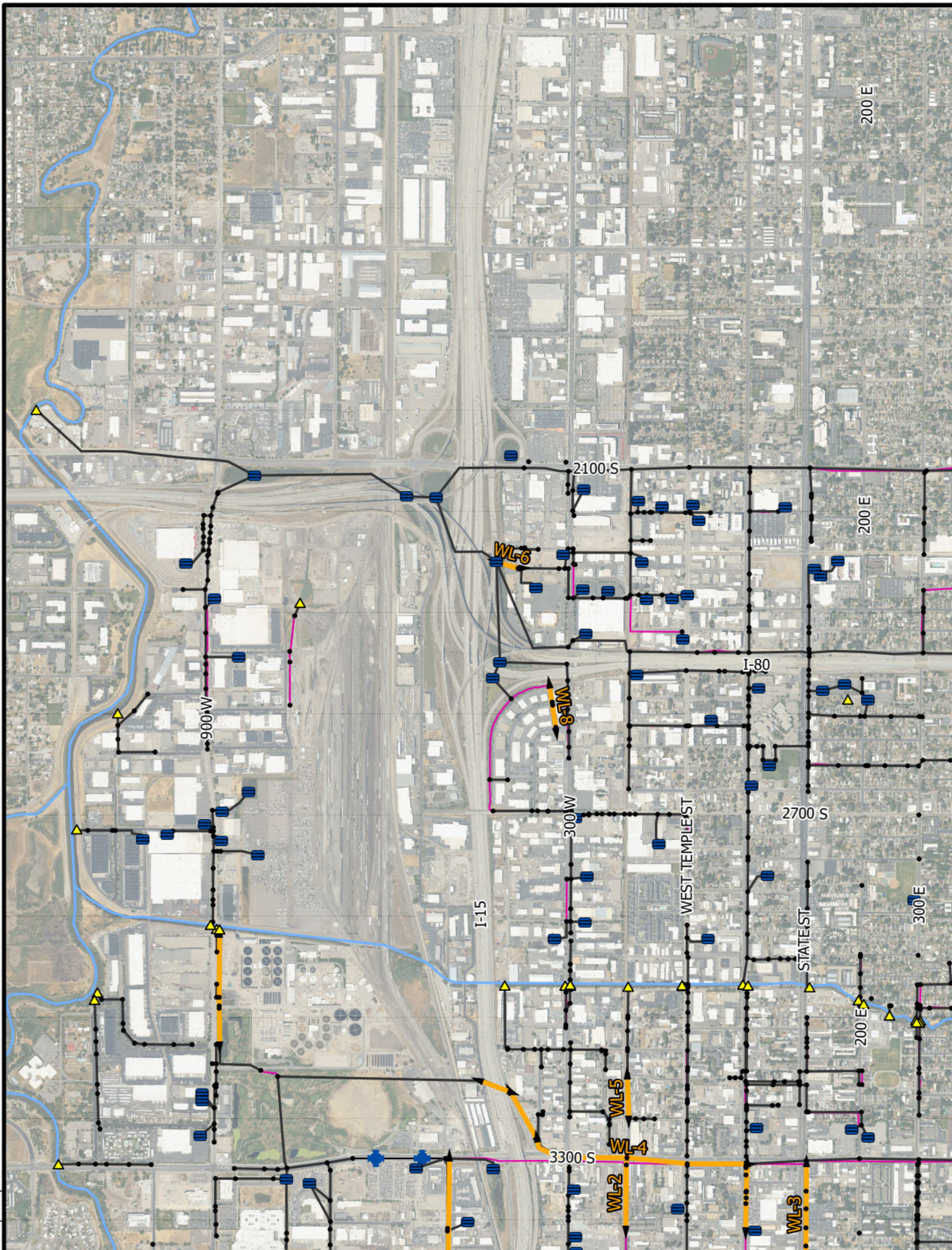
The criteria for determining the priority of a project were based on if the City had noticed flooding, the extent of flooding and if the project was identified in the previous Master Plan. The final priority number was approved by the City.



2100 S
200 E
P4
24"
30"
P6
24"
36"
24"
18"
15"
P5
P3
24"
P3
P3
60"x36"
I-80
30"
24"
30"
P16
24"
STATE ST
36"
2.9 ac-ft
42"
36"
P17
30"
24"
WEST TEMPLE ST
P10
30"
60"
P14
54"
300 W
P10
36"
P2
24"
48"x36"
24"
I-15
P20
18"
P20
42"
200 E
P12
36"
30"
36"



300 W
P19 18"
36"
P19
P19 42"
P19 36"
24" P2
P10 36"
48"x36"
P10 30"
I-15
2.4 ac-ft
36"
P7 42"
P7 48"
42"
P7
P12 30"
36"
P12
WEST TEMPLE ST
3300 S
P21 24"
P18
36"
24"
30"
STATE ST
42" P20
18" P20
P1 24"
200 E
200 E
2700 S
300 E
18" P9
P9 24"
3.0 ac



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The projects are listed in order of priority and were also assigned a schedule. The schedule for the CIP is divided into four timeframes: Projects to be completed within 5 years, projects to be completed between 5 and 10 years, projects to be completed between 10 and 15 years, and projects to be completed beyond 15 years. Some projects involve facilities that are managed by UDOT. The cost estimates for projects involving South Salt Lake and UDOT facilities were split based on the Right of Way (ROW) entity. The segment(s) of the projects that are in South Salt Lake's ROW were assigned to South Salt Lake, and likewise, the segment(s) of the projects that involve UDOT's ROW were assigned to UDOT. However, it is important to note that this only serves to show which projects will require coordination and potential cost splitting between the two entities. If a project, or parts of a project, are in UDOT's ROW, it does not mean that UDOT will be solely responsible for that project or the parts of the project that are in UDOT's ROW.

Table 5-1
Capital Improvement Plan

Project ID		Deficiency ID	Location	Preferred Solution	So
P1		D29	200 East from Ford Avenue to 3300 South	Install 24-inch pipe in 200 East from Ford Avenue to 3300 South in conjunction with curb and gutter improvements.	
P2	P2a	D11	300 West from 2925 South to Mill Creek (2980 South)	Install a backflow preventer valve in the existing pipes. Installation of a backflow preventer valve in the existing pipe may temporarily relieve some flooding.	
	P2b	D11	300 West from 2925 South to Mill Creek (2980 South)	Replace existing 12-inch and 15-inch pipe with 24-inch pipe in 300 West from 2925 South to Mill Creek (2980 South). Install a backflow preventer valve in the replaced pipes.	
P3	P3a	D24	300 West from Utopia Street to 2100 South and 2100 South from State Street to the UDOT Detention Basins	Replace 15-inch pipe on the east side of 300 West with 24-inch pipe and install a backflow preventer valve. Reroute the storm drain in the east side of 300 West to go across 2100 South and to the detention pond on the east side of I-15. Installation of a backflow preventer valve in the existing 15-inch pipe may help temporarily relieve flooding issues. Install a 12-inch backflow preventer valve in the 12-inch pipe in the west side of 300 West.	
	P3b	D1		Significant upgrades along 2100 South are required to drain external inflows from Salt Lake City. It is recommended to improve the drainage capacity by adding new storm drains in parallel to the existing facilities. Recommend that UDOT increase the capacity of the storm drain in 2100 South from 300 West to 400 West to match the capacity of two 36-inch by 48-inch box culverts in parallel. In coordination with UDOT, increase the capacity of the storm drain in 2100 South from 400 West to the UDOT detention basins to that of two 36-inch by 60-inch box culverts parallel. Increase the capacity of the storm drain in 2100 S from 300 West to State Street to two 36-inch pipes in parallel.	
P4		D4	Wentworth Avenue from 300 East to State Street, State Street from Wentworth Avenue to 2100 South	Install 24-inch pipe in Wentworth Avenue from 300 East to State Street, in coordination with UDOT upsize storm drain in State Street with 30-inch pipe from Wentworth Avenue to 2100 South. Project could be done in coordination with Zellerbach property developers due to sump flows from the development. Increase storm drain in 300 East from Wentworth Avenue to Commonwealth Avenue from 12-inch to 18-inch. This project is to be completed after Project P3 to ensure sufficient downstream capacity is available.	
				Replace 12-inch pipe across the intersection of West Temple Street and Utopia Avenue with 18-inch pipe and install 24-inch pipe in West Temple Street from	

Project ID		Deficiency ID	Location	Preferred Solution	So
P7		D2, D10, D27	West Temple Street from 3700 South to 3300 South	Replace existing storm drain in West Temple Street with 36-inch pipe from 3750 South to 3700 South, with 42-inch pipe from 3700 South to Guest Avenue, and with 48-inch pipe from Guest Avenue to approximately 3400 South. Purchase property at approximately 3400 South on the west side of the road and construct a detention basin with 2.4 ac-ft of volume. Due to the small size of the available property, it is recommended to construct the proposed detention basin sub surface. Replace storm drain in West Temple with 42-inch pipe from the proposed detention basin to 3300 South.	
P8		D5	Woodland Avenue from 450 East to 400 East, 400 East from Woodland Ave to Mansfield Avenue, and the outfall in 400 East to Mill Creek	Install a backflow preventer valve in the 30-inch outfall to Mill Creek in 400 East, replace 15-inch pipe in Woodland Avenue with 30-inch pipe from 450 East to 400 East and in 400 East from Woodland Avenue to Mansfield Avenue.	
P9		D8	300 East from 2700 South to Mill Creek at approximately 3050 South	Install 24-inch pipe in 300 East from 2700 South to Claybourne Avenue. Install a minimum 3 acre-foot detention basin at the school at 2825 South 200 East with 18-inch low flow piping through the detention basin. Install 18-inch pipe in 300 East from the south end of the detention basin (2840 South) to Mill Creek (3050 South).	
P10	P10a	D12	2700 South from 150 West to I-15 and 300 West from 2880 South to 2700 South	Replace storm drain in 2700 South with 30-inch pipe from 150 West to 300 West. Replace storm drain in 2700 South with a 48-inch by 36-inch box culvert or a hydraulically equivalent conveyance from 300 West to the drainage ditch along I-15.	
	P10b	D14		Replace storm drain in 300 West with 36-inch pipe from 2880 South to 2700 South	
P11		D22	500 East from approximately 3030 South to Mill Creek (3050 South)	Replace the existing storm drain with 18-inch pipe from 500 East and approximately 3030 South to Mill Creek (3050 South).	
P12		D47	West Temple Street from 3170 South to Mill Creek (2980 South)	Replace the existing storm drain in West Temple Street with 30-inch pipe from 3170 South to Gregson Avenue. Replace the existing storm drain in West Temple Street with 36-inch pipe from Gregson Avenue to Mill Creek (2980 South).	
P13		D46	610 East from approximately 3650 South to 3610 South and 3610 South from 610 East to 500 East	Replace the existing storm drain with 24-inch pipes in 610 East from 3650 South to 3610 South and with 30-inch pipes in 3610 South from 610 East to 500 East in conjunction with curb and gutter improvements.	
P14		D48	Private lots immediately north of I-80 from TRAX (200 West) to the UDOT	Replace existing 30-inch storm drain with 60-inch pipe or a conveyance with equivalent capacity from 2400 South and TRAX (200 West) to 300 West and with 54-inch pipe or a conveyance with equivalent capacity from 300 West to	

Project ID	Deficiency ID	Location	Preferred Solution	So
P16	D17	State Street from Truman Avenue to Leslie Avenue and Stratford Avenue from State Street to Main Street and Whitlock Avenue from Main Street to 50 West	Replace storm drain in State Street with 30-inch pipe from Truman Avenue to approximately 2450 South. Replace storm drain in State Street with 30-inch pipe from approximately 2450 South to Stratford Avenue. Replace storm drain in State Street with 24-inch pipe from Leslie Avenue to Stratford Avenue. Replace storm drain in Stratford Avenue with 36-inch pipe from State Street around the Granite School District buildings to Main Street and install 2.9 ac-ft detention pond in the open playing fields south of the Granite School District Buildings. Increase storm drain in Whitlock Avenue from Main Street to 50 West from 36-inch to 42-inch. This project is only recommended if UDOT increases the capacity of their conveyances in State Street as included in this project. This project should be completed in coordination with Project P17.	
P17	D15, D28, D40	Main Street from Southgate Avenue to Whitlock Avenue	Replace 15-inch pipe in Main Street with 24-inch pipe from Southgate Avenue to 2700 South. Replace 15-inch pipe in Main Street with 30-inch pipe from 2700 South to Malvern Avenue. Replace existing storm drain in Main Street with 36-inch pipe from Malvern Avenue to Whitlock Avenue, and reconfigure the storm drain network in the intersection of Main Street and Whitlock Avenue to improve hydraulic conductivity.	
P18	D13, D18	State Street from Baird Avenue to Guest Avenue and Guest Avenue from State Street to West Temple Street	Coordinating with UDOT, replace existing pipes in State Street from Baird Avenue to Guest Avenue with 36-inch pipes. Connect to the storm drain in State Street and replace/install 36-inch pipe in Guest Avenue from State Street to West Temple Street. This project is to be completed after Project P7 to ensure sufficient downstream capacity is available.	
P19	D3, D7, D25	300 West from Plymouth Avenue to Mill Creek (approximately 2980 South)	In 300 West install an 18-inch pipe from Plymouth Avenue to 3550 South, replace storm drain from 3550 South to 3500 South with 36-inch pipe, replace storm drain from 3500 South to 3300 South with 42-inch pipe and connect to existing storm drain in 3300 South. In 300 West install 36-inch storm drain from 3300 South to Mill Creek.	
P20	D8	Sunset Avenue from 200 East to State Street	Install 18-inch pipe in Sunset Avenue from 200 East to State Street in conjunction with road improvements. Increase storm drain in State Street from Claybourne Avenue to Cordelia Avenue from 36-inch to 42-inch.	
P21	D26	Main Street from 3610 South to storm drain in Guest Avenue	Install 24-inch pipe in Main Street from 3610 South to storm drain in Guest Avenue.	
P22	D9	Between 460 and 466 Lawndale Drive straight west to the drainage ditch along I-15	Replace existing storm drain with a 24-inch pipe in the parking lot between 460 and 466 Lawndale drive straight west to the I-15 drainage ditch.	

Project ID	Deficiency ID	Location	Preferred Solution	So
WL-2	D33	Railroad from 3440 South to 3300 South	Replace the existing storm drain along the railroad from 3440 South to 3300 South with 27-inch pipes.	
WL-3	D18	State Street from Pershire Drive to 3300 South	Replace the existing storm drain in State Street from Pershire Drive to 3300 South with 36-inch pipes.	
WL-4	D13, D37	Main Street from 3440 South to 3300 South and 3300 South from Main Street to I-15.	Replace the existing storm drain in Main Street with 24-inch pipes from 3440 South to 3300 South. Replace the existing storm drain in 3300 South from Main Street across I-15 with 42-inch pipes.	
WL-5	D36	Railroad from Walton Avenue to Angelo Avenue	Replace the existing storm drains along the railroad from Walton Avenue to Angelo Avenue with 24-inch pipes.	
WL-6	D45	400 West and Andy Avenue parking lot to outfall.	The UDOT storm drain from the parking lot area to the outfall is potentially undersized.	
WL-7	D43, D44	900 West from 3160 South to Mill Creek outfall	The storm drains in 900 West are potentially undersized and shall be closely monitored.	
WL-8	D38	Ironwood Drive to channel along I-80	Replace existing storm drain from Ironwood Drive to the ditch at the I-80/I-15 interchange with 24-inch pipes.	
WL-9	D20	500 West from Fine Drive to 3300 South	The storm drains along 500 West were recently replaced and upsized to improve the capacity. If the capacity of these storm drains is determined to be insufficient in the future, the pipes could be lined to improve hydraulic conductivity.	
			WATCH LIST TOTAL	
			TOTAL OF CIP AND WATCH LIST PROJECTS	

SUMMARY OF CAPITAL IMPROVEMENTS

Costs of capital improvements by schedule are summarized in Table 5-2. Table 5-3 shows capital improvements that rely on coordination and potential cost splitting with UDOT.

Table 5-2
Summary of Capital Improvements by Schedule

Project IDs	Schedule	Cost by ROW Entity		Total Cost
		South Salt Lake	UDOT Roads	
P1-P6	Within 5 years	$2,148,000	$7,479,000	$9,627,000
P7-P12	5-10 years	$10,203,000	2,542,000	$12,745,000
P13-P18	10-15 years	$7,522,000	$4,413,000	$11,935,000
P19-P23	Beyond 15 years	$1,200,000	$6,253,000	$7,453,000
	Total	**$21,074,000**	**$20,687,000**	**$41,761,000**

Table 5-3
Capital Improvements in Coordination with UDOT

Project ID	Schedule	Cost by ROW Entity		Total Cost
		South Salt Lake	UDOT Roads	
P2a	Within 5 years	$52,000	$0	$52,000
P2b	Within 5 years	$296,000	$0	$296,000
P3a	Within 5 years	$20,000	$737,000	$757,000
P3b	Within 5 years	$0	$4,879,000	$4,879,000
P4	Within 5 years	$951,000	$617,000	$1,568,000
P5	Within 5 years	$331,000	$306,000	$637,000
P6	Within 5 years	$0	$938,000	$938,000
P9	5-10 years	$755,000	$1,194,000	$1,949,000
P10a	5-10 years	$1,501,000	$0	$1,501,000
P10b	5-10 years	$0	$1,231,000	$1,231,000
P11	5-10 years	$0	$116,000	$116,000
P15	10-15 years	$0	$1,091,000	$1,091,000
P16	10-15 years	$2,808,000	$1,420,000	$4,228,000
P17	10-15 years	$0	$1,094,000	$1,094,000
P18	10-15 years	$1,377,000	$808,000	$2,185,000
P19	Beyond 15 years	$0	$4,576,000	$4,576,000
P20	Beyond 15 years	$330,00	$819,000	$1,149,000
P21	Beyond 15 years	$0	$858,000	$858,000

OPERATIONAL RECOMMENDATIONS

Minimum Pipe Diameter

Many of the storm drain pipes in the City of South Salt Lake are less than 18 inches in diameter. Modeling of the system shows that generally pipes less than 18 inches in diameter do not have the capacity to convey the 10-year 3-hour flows. Current City standards require a minimum of 18-inch diameter pipe for all trunk lines and 15-inch diameter pipe for storm drain laterals. It is therefore recommended that the City review locations with pipes smaller than 18 inches and plan on replacing the pipe depending on the convenience of other street improvements or in coordination with the CIP. Locations with laterals less than 18 inches in diameter should be monitored for flooding. Figure 5-4 shows the location of pipes smaller than 18 inches in the storm drainage system.

Inventory

This Master Plan consolidated different inventories to account for the facilities of the storm drainage system. Multiple inventories increase the likelihood of incorrect or outdated information being used and also require more time to maintain. Therefore, it is recommended that the City maintain and update a master GIS inventory of the storm drainage system. Because the City storm drainage system is intertwined with UDOT facilities, efforts should be made to accurately include known UDOT facilities that City storm drainage flow into, or from, in the inventory. Keeping track of pertinent UDOT facilities will allow the City to understand how UDOT’s system may impact theirs.

Watch and Maintenance Recommendations

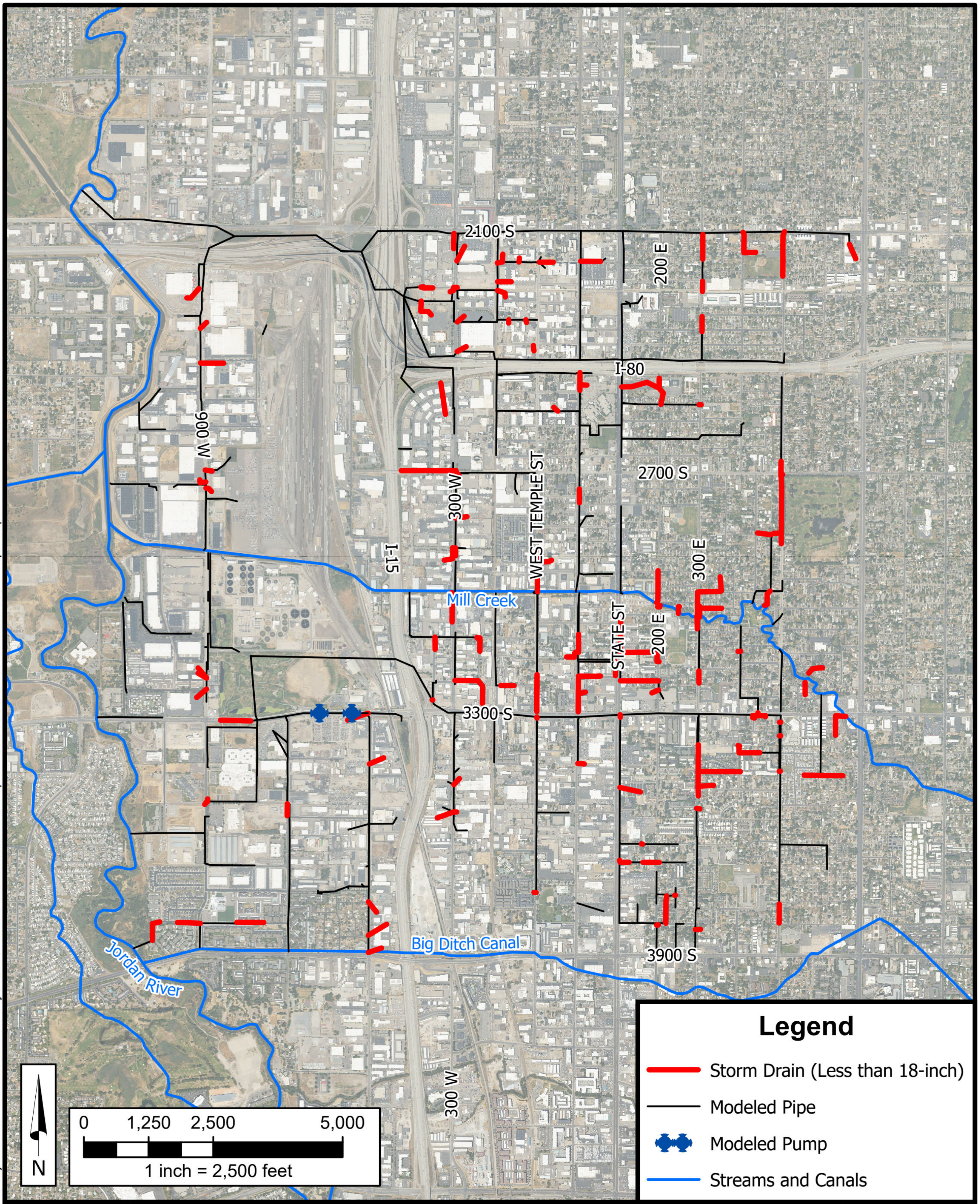
In addition to the existing storm drainage system maintenance, some of the identified deficiencies (e.g. D9, D41) may be addressed through frequent maintenance. A maintenance schedule for these deficiencies could include removing debris, sediment, and clearing weed growth as needed to keep the drainage facilities functioning until corrective CIP projects can be completed, if justified.

Deficiencies identified as not warranting immediate action include D20, D32, D33, D36-D38, and D42-D45. These deficiencies are addressed by the watch list and should be monitored for future flooding. If conditions become unacceptable, a project should be added to the CIP to remedy the deficiency.

Backflow Preventer Valves

Several projects (P2a, P3a, P8) include backflow preventer valves. In the case that the complete recommended project cannot be constructed within a reasonable time, separate installation of backflow preventer valves may alleviate or prevent flooding at the location.

The valves identified in the cost estimate are CheckMate Inline Check Valves manufactured by Tideflex Technologies. The valves were identified because they can be installed in existing



HANSEN ALLEN & LUCE INC ENGINEERS

SOUTH SALT LAKE STORM DRAINAGE MASTER PLAN - PIPES LESS THAN 18 INCH IN DIAMETER

FIGURE 5-4

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systems and require very little pressure head to actuate. A different type of valve can be substituted if it has an equivalent function and installation capability.

Storm Drainage Master Plan Updates

The Master Plan should be periodically reviewed and updated dependent upon change and new development, at least every 5 years.

RECOMMENDATIONS

1. Maintain and monitor the "Watch List" deficiencies for potential flooding shown on Figure 5-3.
2. Complete the CIP with the preferred solutions.
3. Implement a program to replace storm drains smaller than 18 inches in diameter with a minimum 18-inch pipe as projects become convenient through road improvements or other utility work.
4. Maintain an accurate storm drain inventory with known UDOT and UTA facilities that affect the City's storm drainage system.

REFERENCES

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APPENDIX A

Precipitation Data

NOAA Atlas 14, Volume 1, Version 5
Location name: Salt Lake City, Utah, US*
Latitude: 40.7081°, Longitude: -111.8968°
Elevation: 4246 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.122 (0.107-0.142)	0.154 (0.136-0.179)	0.211 (0.185-0.246)	0.265 (0.228-0.309)	0.352 (0.295-0.414)	0.434 (0.354-0.516)	0.531 (0.418-0.640)	0.646 (0.487-0.794)	0.832 (0.594-1.05)	1.00 (0.683-1.30)
10-min	0.186 (0.163-0.215)	0.234 (0.207-0.272)	0.321 (0.282-0.374)	0.402 (0.347-0.470)	0.535 (0.450-0.630)	0.661 (0.538-0.785)	0.808 (0.636-0.973)	0.983 (0.741-1.21)	1.27 (0.904-1.60)	1.53 (1.04-1.98)
15-min	0.230 (0.202-0.267)	0.291 (0.256-0.337)	0.398 (0.349-0.463)	0.498 (0.430-0.582)	0.663 (0.558-0.781)	0.819 (0.667-0.973)	1.00 (0.788-1.21)	1.22 (0.919-1.50)	1.57 (1.12-1.98)	1.89 (1.29-2.45)
30-min	0.310 (0.272-0.359)	0.391 (0.344-0.454)	0.536 (0.470-0.624)	0.671 (0.579-0.784)	0.893 (0.751-1.05)	1.10 (0.898-1.31)	1.35 (1.06-1.63)	1.64 (1.24-2.02)	2.11 (1.51-2.67)	2.55 (1.74-3.30)
60-min	0.384 (0.336-0.444)	0.484 (0.426-0.561)	0.664 (0.581-0.772)	0.831 (0.717-0.970)	1.11 (0.929-1.30)	1.37 (1.11-1.62)	1.67 (1.31-2.01)	2.03 (1.53-2.50)	2.62 (1.87-3.30)	3.16 (2.15-4.09)
2-hr	0.493 (0.443-0.558)	0.612 (0.549-0.689)	0.796 (0.709-0.902)	0.970 (0.854-1.10)	1.26 (1.08-1.44)	1.52 (1.27-1.76)	1.84 (1.48-2.17)	2.21 (1.71-2.67)	2.83 (2.06-3.52)	3.39 (2.36-4.33)
3-hr	0.573 (0.523-0.638)	0.704 (0.644-0.784)	0.884 (0.802-0.983)	1.05 (0.946-1.17)	1.32 (1.16-1.49)	1.56 (1.34-1.78)	1.87 (1.56-2.19)	2.23 (1.80-2.70)	2.84 (2.19-3.55)	3.40 (2.50-4.37)
6-hr	0.737 (0.683-0.802)	0.901 (0.833-0.982)	1.09 (1.01-1.19)	1.27 (1.16-1.39)	1.53 (1.38-1.68)	1.75 (1.55-1.94)	2.00 (1.74-2.25)	2.30 (1.95-2.73)	2.89 (2.37-3.59)	3.42 (2.72-4.41)
12-hr	0.914 (0.844-0.992)	1.11 (1.03-1.21)	1.34 (1.24-1.47)	1.54 (1.41-1.69)	1.84 (1.66-2.03)	2.09 (1.85-2.32)	2.35 (2.05-2.65)	2.64 (2.25-3.02)	3.09 (2.56-3.62)	3.46 (2.79-4.46)
24-hr	1.06 (0.962-1.17)	1.30 (1.18-1.43)	1.55 (1.40-1.70)	1.76 (1.59-1.93)	2.04 (1.84-2.23)	2.26 (2.03-2.48)	2.48 (2.22-2.73)	2.71 (2.41-3.05)	3.12 (2.66-3.66)	3.49 (2.85-4.50)
2-day	1.18 (1.08-1.29)	1.45 (1.32-1.59)	1.72 (1.56-1.88)	1.95 (1.77-2.13)	2.25 (2.04-2.45)	2.47 (2.23-2.70)	2.70 (2.43-2.96)	2.93 (2.63-3.23)	3.23 (2.87-3.70)	3.53 (3.06-4.55)
3-day	1.26 (1.15-1.37)	1.54 (1.41-1.68)	1.83 (1.67-1.99)	2.07 (1.89-2.26)	2.39 (2.18-2.61)	2.64 (2.40-2.88)	2.89 (2.61-3.17)	3.15 (2.83-3.46)	3.48 (3.10-3.91)	3.77 (3.31-4.57)
4-day	1.33 (1.22-1.45)	1.62 (1.49-1.77)	1.94 (1.78-2.11)	2.19 (2.01-2.38)	2.54 (2.32-2.76)	2.81 (2.56-3.06)	3.08 (2.80-3.37)	3.36 (3.03-3.69)	3.73 (3.33-4.12)	4.02 (3.56-4.59)
7-day	1.53 (1.41-1.66)	1.87 (1.72-2.03)	2.22 (2.05-2.41)	2.51 (2.31-2.71)	2.89 (2.66-3.13)	3.19 (2.92-3.45)	3.48 (3.17-3.78)	3.78 (3.43-4.10)	4.16 (3.75-4.54)	4.44 (3.98-4.88)
10-day	1.71 (1.57-1.87)	2.10 (1.93-2.28)	2.48 (2.28-2.69)	2.78 (2.56-3.01)	3.18 (2.92-3.44)	3.46 (3.17-3.75)	3.75 (3.42-4.06)	4.02 (3.65-4.36)	4.36 (3.94-4.75)	4.60 (4.15-5.03)
20-day	2.23 (2.05-2.42)	2.73 (2.51-2.96)	3.22 (2.96-3.48)	3.59 (3.29-3.88)	4.05 (3.71-4.38)	4.38 (4.01-4.74)	4.70 (4.29-5.08)	4.98 (4.54-5.40)	5.33 (4.85-5.80)	5.57 (5.05-6.06)
30-day	2.68 (2.48-2.88)	3.27 (3.03-3.52)	3.83 (3.54-4.11)	4.25 (3.93-4.56)	4.78 (4.42-5.13)	5.15 (4.76-5.54)	5.51 (5.08-5.93)	5.83 (5.36-6.29)	6.23 (5.71-6.74)	6.49 (5.93-7.04)
45-day	3.28 (3.05-3.52)	4.00 (3.71-4.29)	4.67 (4.33-4.99)	5.18 (4.81-5.54)	5.83 (5.41-6.22)	6.28 (5.83-6.70)	6.71 (6.21-7.15)	7.09 (6.56-7.57)	7.54 (6.97-8.06)	7.82 (7.22-8.38)
60-day	3.90 (3.62-4.21)	4.76 (4.41-5.13)	5.55 (5.15-5.98)	6.15 (5.71-6.62)	6.91 (6.41-7.43)	7.44 (6.89-8.00)	7.94 (7.34-8.54)	8.39 (7.76-9.05)	8.91 (8.22-9.62)	9.25 (8.52-10.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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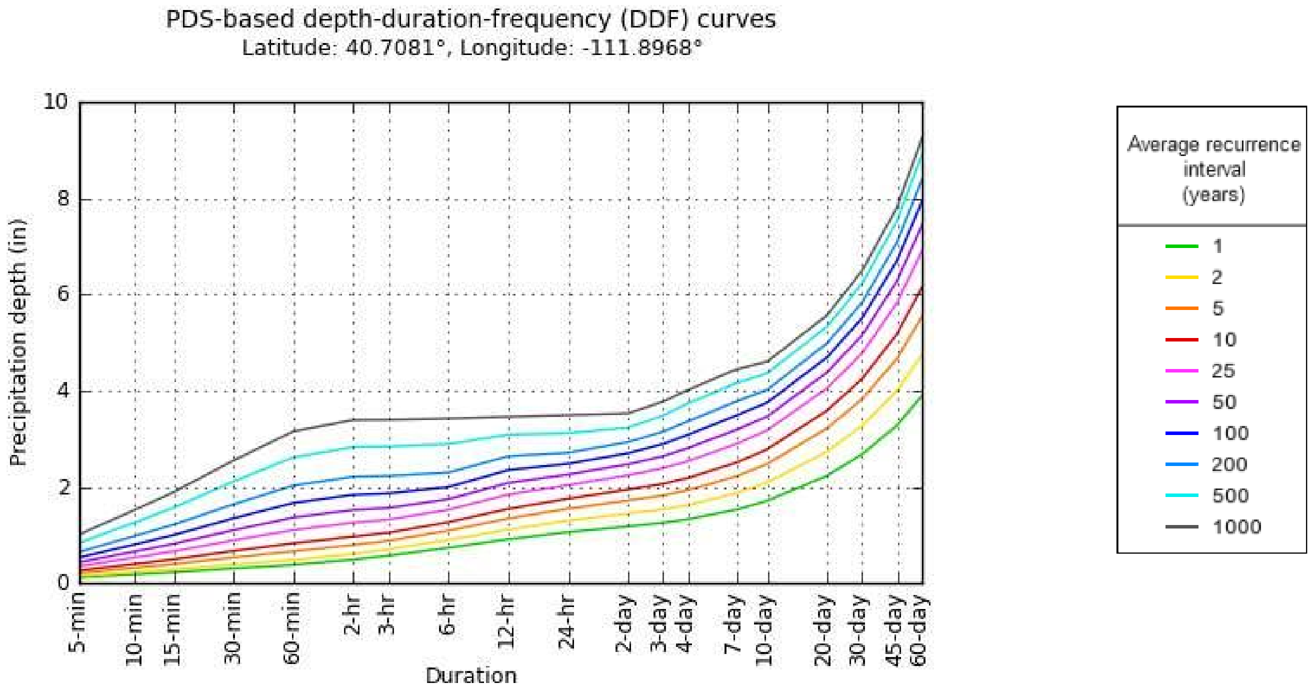
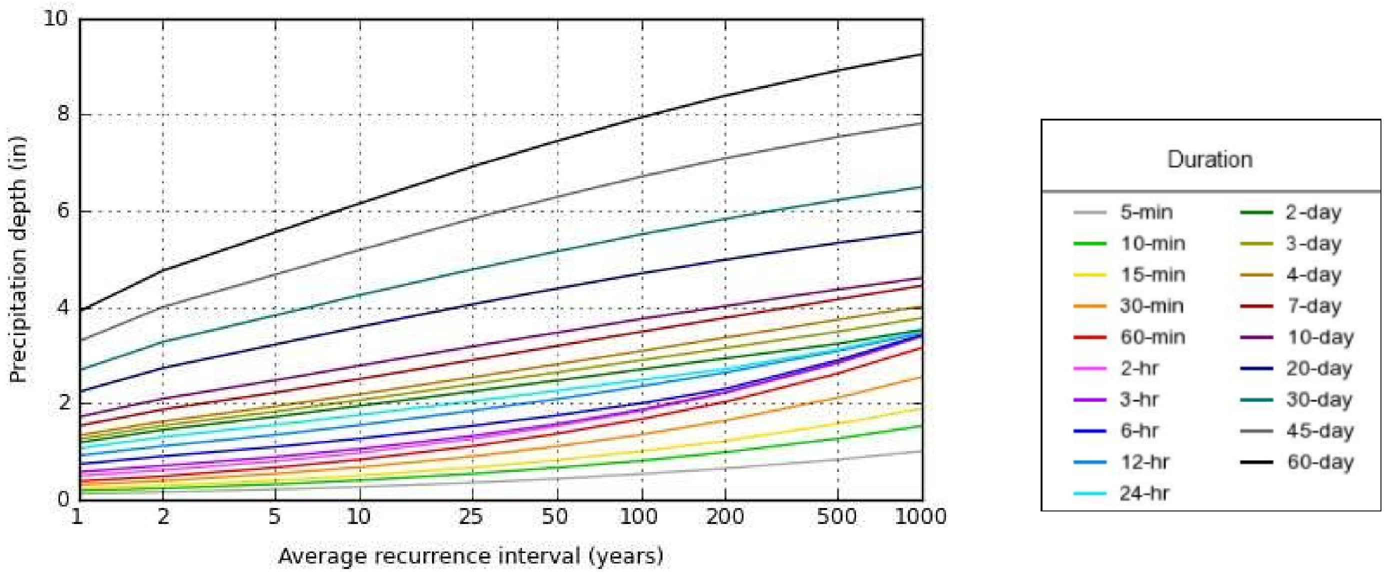
PF graphical





NOAA Atlas 14, Volume 1, Version 5 Created (GMT): Tue Apr 26 21:27:30 2016

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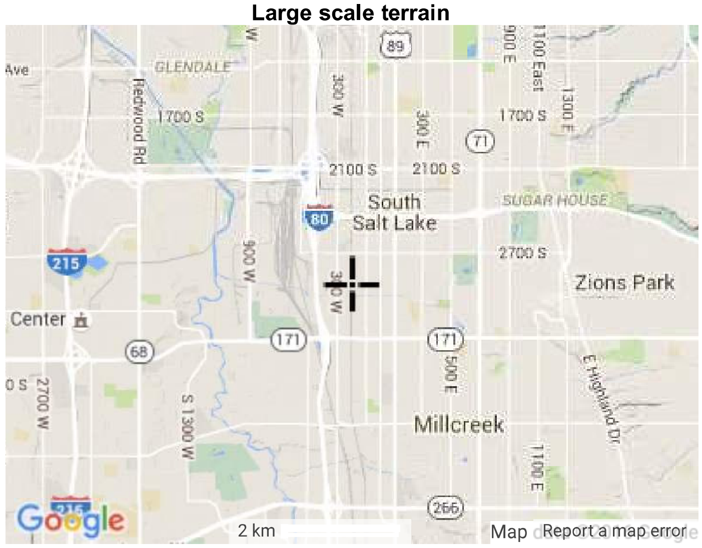
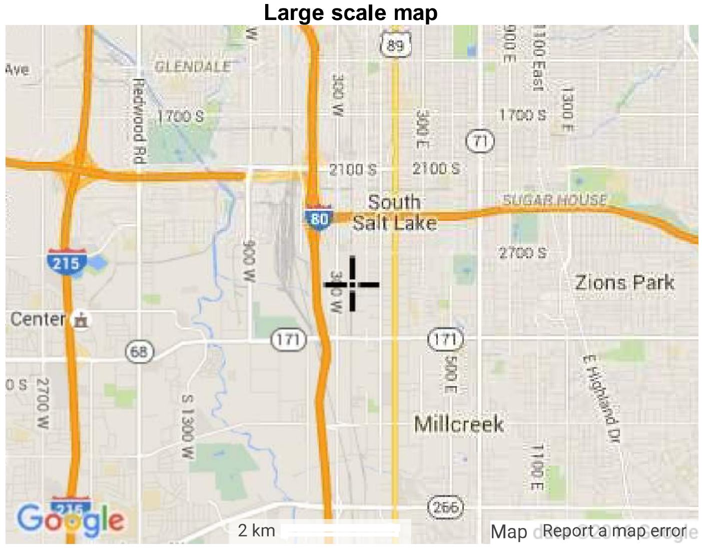
Maps & aerials

Small scale terrain

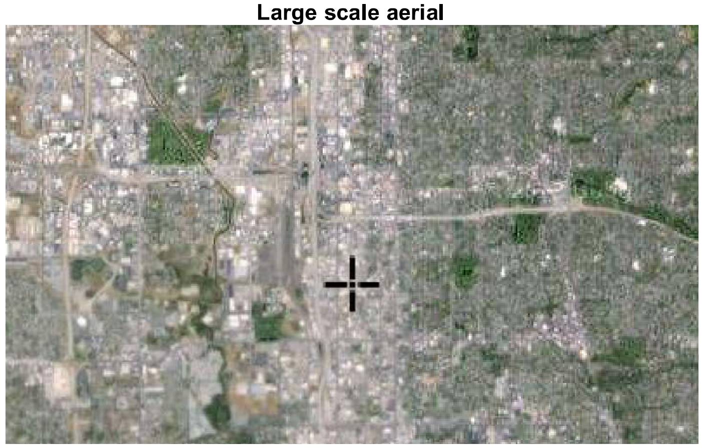
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX B

Subbasin Characteristics

South Salt Lake City
Storm Water Master Plan Update
126.35.200
Appendix B - Subbasin Characteristics

Existing Model Characteristics

Subbasin	CN	% DCIA	Lag Time (min)	Lag Time (hr)
SB1	77.2	29	16.47	0.27
SB10	80.6	29	28.47	0.47
SB100	78.6	22	21.90	0.36
SB101	81.8	43	7.26	0.12
SB102	84.6	70	9.86	0.16
SB103	83.7	63	10.12	0.17
SB104	83.3	17	19.76	0.33
SB104a	81.2	18	14.03	0.23
SB104b	77.7	22	7.94	0.13
SB105	82.5	14	19.55	0.33
SB106	78.6	60	6.07	0.10
SB107	80.4	64	18.75	0.31
SB108	82.6	58	5.47	0.09
SB109	81.6	65	34.51	0.58
SB11	80.3	55	15.60	0.26
SB110	80.4	64	32.40	0.54
SB111	84.7	67	14.73	0.25
SB112	83.8	62	17.11	0.29
SB113	81.0	57	33.29	0.55
SB114	85.0	72	13.57	0.23
SB115	81.4	58	21.06	0.35
SB116	81.4	67	25.30	0.42
SB117	80.9	21	13.92	0.23
SB118	80.1	36	12.24	0.20
SB119	81.0	22	13.67	0.23
SB12	80.1	55	18.67	0.31
SB120	81.6	35	11.99	0.20
SB121	80.7	28	22.99	0.38
SB122	81.5	39	14.83	0.25
SB123	81.3	32	20.95	0.35
SB124	81.5	55	24.20	0.40
SB125	79.6	64	13.65	0.23
SB126	83.5	74	19.41	0.32
SB127	81.5	70	16.20	0.27
SB128	80.8	68	20.45	0.34
SB129	77.7	25	13.04	0.22
SB13	84.5	34	21.88	0.36
SB130	71.6	22	23.92	0.40
SB131	79.4	45	16.23	0.27
SB131a	78.3	64	20.04	0.33
SB131b	75.1	45	13.13	0.22
SB132	42.9	1	17.64	0.29

SB133	74.3	25	21.34	0.36
SB134	60.7	1	4.00	0.07
SB135	83.4	46	12.46	0.21
SB135a	79.4	48	21.21	0.35
SB136	78.5	11	20.44	0.34
SB138	80.5	11	7.13	0.12
SB139	80.5	10	18.28	0.30
SB14	82.5	52	21.81	0.36
SB142	62.4	20	15.35	0.26
SB143	81.3	42	20.37	0.34
SB143a	80.0	49	27.47	0.46
SB144	76.9	33	30.67	0.51
SB145	85.5	73	33.97	0.57
SB146	67.6	39	7.87	0.13
SB147	70.8	55	24.98	0.42
SB15	83.4	60	25.69	0.43
SB152	77.4	53	23.14	0.39
SB154	82.7	54	20.71	0.35
SB155	79.8	63	25.34	0.42
SB156	85.5	75	75.18	1.25
SB159	79.8	18	17.37	0.29
SB16	81.2	66	31.27	0.52
SB160	83.6	18	20.35	0.34
SB162	82.7	9	13.32	0.22
SB163	83.5	15	17.24	0.29
SB164	81.6	8	10.32	0.17
SB165	84.5	19	24.44	0.41
SB166	83.1	18	26.03	0.43
SB168	79.8	12	16.65	0.28
SB169	65.6	41	15.99	0.27
SB17	79.1	15	18.38	0.31
SB170	73.6	14	19.13	0.32
SB172	62.4	11	16.53	0.28
SB174	79.2	54	26.06	0.43
SB175	83.3	66	35.49	0.59
SB176	76.8	48	14.09	0.23
SB177	80.6	50	21.23	0.35
SB178	78.4	50	15.08	0.25
SB179	81.1	65	51.57	0.86
SB17a	79.3	16	18.12	0.30
SB180	79.8	62	13.76	0.23
SB181	76.2	56	18.78	0.31
SB182	74.1	61	28.29	0.47
SB183	79.7	20	19.09	0.32
SB184	79.2	17	17.75	0.30
SB185	70.8	43	22.91	0.38
SB186	81.5	51	21.09	0.35
SB186a	83.0	50	5.25	0.09
SB187	80.8	29	21.07	0.35

SB188	80.1	34	21.63	0.36
SB188a	80.2	21	24.60	0.41
SB189	79.5	18	16.57	0.28
SB189a	80.5	36	16.41	0.27
SB190	80.1	19	22.54	0.38
SB191	81.5	23	17.47	0.29
SB192	93.5	43	4.00	0.07
SB193	86.2	63	10.05	0.17
SB194	81.1	69	8.36	0.14
SB195	79.1	62	8.26	0.14
SB196	78.8	61	6.64	0.11
SB197	78.3	58	6.86	0.11
SB198	76.3	42	10.09	0.17
SB199	78.5	33	10.33	0.17
SB2	78.6	35	22.10	0.37
SB200	78.0	57	10.15	0.17
SB201	75.4	32	9.76	0.16
SB202	78.6	41	16.50	0.27
SB203	76.9	5	25.67	0.43
SB204	80.7	21	22.86	0.38
SB205	80.4	42	18.91	0.32
SB206	79.1	37	19.81	0.33
SB21	83.0	35	26.36	0.44
SB22	84.8	42	30.49	0.51
SB23	80.9	39	28.13	0.47
SB24	84.0	50	24.21	0.40
SB25	85.2	28	23.62	0.39
SB26	82.6	33	30.39	0.51
SB27	80.4	25	26.96	0.45
SB28	80.4	40	18.54	0.31
SB29	78.9	36	29.10	0.49
SB3	81.8	51	21.56	0.36
SB30	80.9	55	19.22	0.32
SB31	76.9	49	27.74	0.46
SB32	79.1	62	23.52	0.39
SB33	77.4	52	26.30	0.44
SB34	77.7	55	20.39	0.34
SB35	79.9	41	16.75	0.28
SB36	77.2	51	29.22	0.49
SB37	84.6	66	20.55	0.34
SB38	79.1	56	28.46	0.47
SB39	81.0	61	20.87	0.35
SB39b	71.9	51	15.46	0.26
SB4	77.2	52	24.20	0.40
SB41	82.7	25	4.26	0.07
SB41a	81.4	38	26.29	0.44
SB42	79.3	28	32.14	0.54
SB43	80.1	31	22.24	0.37
SB44	80.6	35	19.91	0.33

SB45	77.7	49	32.01	0.53
SB46	81.3	41	27.17	0.45
SB47	80.1	19	25.78	0.43
SB47a	79.3	31	11.23	0.19
SB47b	80.4	33	14.63	0.24
SB48	79.3	52	32.60	0.54
SB49	80.5	67	30.78	0.51
SB5	81.9	71	15.93	0.27
SB50	79.7	65	27.03	0.45
SB51	80.8	68	18.02	0.30
SB52	76.4	61	27.24	0.45
SB53	76.8	62	30.05	0.50
SB54	74.4	36	24.77	0.41
SB55	66.6	51	22.00	0.37
SB56	66.6	54	27.63	0.46
SB57	65.8	51	19.61	0.33
SB58	68.7	62	27.82	0.46
SB59	69.2	63	23.20	0.39
SB6	78.8	61	22.33	0.37
SB60	66.3	49	27.06	0.45
SB61	68.3	55	27.38	0.46
SB62	70.7	63	29.61	0.49
SB63	65.9	41	20.99	0.35
SB64	81.0	54	65.42	1.09
SB65	77.6	37	15.93	0.27
SB66	82.8	60	37.56	0.63
SB67	82.6	64	34.54	0.58
SB68	84.3	67	43.74	0.73
SB69	81.3	58	20.57	0.34
SB7	82.4	72	20.80	0.35
SB70	80.2	50	29.05	0.48
SB71	83.3	65	50.87	0.85
SB72	78.8	54	26.26	0.44
SB73	81.0	33	25.38	0.42
SB74	80.0	13	31.86	0.53
SB75	83.2	64	19.10	0.32
SB76	72.1	61	18.71	0.31
SB77	72.4	55	28.96	0.48
SB78	72.6	61	33.63	0.56
SB78b	73.9	69	20.89	0.35
SB8	78.9	62	24.37	0.41
SB80	70.6	43	26.68	0.44
SB81	77.6	62	15.56	0.26
SB82	78.9	26	27.39	0.46
SB83	79.8	65	16.20	0.27
SB84	78.2	58	15.55	0.26
SB85	80.1	66	19.16	0.32
SB86	78.7	61	16.03	0.27
SB87	80.6	22	16.35	0.27

SB88	80.4	22	14.44	0.24
SB88a	78.1	31	9.51	0.16
SB89	80.2	21	17.48	0.29
SB90	80.5	20	21.21	0.35
SB91	80.4	21	16.54	0.28
SB91a	79.6	31	19.34	0.32
SB91b	81.9	23	13.43	0.22
SB92	81.5	23	15.67	0.26
SB93	81.0	22	14.08	0.23
SB94	79.3	29	20.85	0.35
SB95	80.8	44	6.78	0.11
SB97	79.4	17	26.85	0.45
SB98	82.0	28	21.14	0.35
SB98a	81.4	30	29.78	0.50

Future Model Characteristics

Future Growth Region	Subbasin	CN	% DCIA	Lag Time (hr)
TOD 1	SB127	82.7	76.5	0.27
TOD 1	SB128	82.7	76.5	0.341
TOD 1	SB126-1	82.7	76.5	0.236
TOD 1	SB126-2	82.7	76.5	0.087
TOD 1	SB8-1	82.7	76.5	0.316
TOD 1	SB8-2	82.7	76.5	0.09
TOD 1	SB7	82.7	76.5	0.347
TOD 1	SB85-1	82.7	76.5	0.105
TOD 1	SB85-2	82.7	76.5	0.215
TOD 1	SB86	82.7	76.5	0.267
TOD 1	SB84	82.7	76.5	0.259
TOD 1	SB5	82.7	76.5	0.265
TOD 1	SB6	82.7	76.5	0.372
TOD 1	SB83	82.7	76.5	0.27
TOD 1	SB3	82.7	76.5	0.359
TOD 1	SB4	82.7	76.5	0.359
TOD 2	SB124-1	82.7	76.5	0.249
TOD 2	SB124-2	82.7	76.5	0.033
TOD 2	SB124-3	82.7	76.5	0.121
TOD 3	SB38	83.7	76.5	0.474
TOD 3	SB36	82.8	76.5	0.487
TOD 3	SB34	82.7	76.5	0.34
TOD 4	SB16	83.8	76.5	0.521
TOD 4	SB110-1	85.1	76.5	0.253
TOD 4	SB110-2	82.7	76.5	0.093
TOD 4	SB110-3	82.7	76.5	0.194
TOD 4	SB14	86.2	76.5	0.364
TOD 4	SB15	86.5	76.5	0.428
TOD 4	SB109	84.8	76.5	0.575
TOD 4	SB12	84.3	76.5	0.031
TOD 4	SB13	86.3	76.5	0.365
TOD 4	SB25	86.4	76.5	0.394
Southwest Area	SB136	81.4	76.5	0.341
Southwest Area	SB139	83.9	76.5	0.305
Southwest Area	SB168	79	76.5	0.278
Southwest Area	SB169	74.9	76.5	0.267
Southwest Area	SB170	81.2	76.5	0.319
Southwest Area	SB172	74.4	76.5	0.275
Southwest Area	SB80	78.4	76.5	0.445
Southwest Area	SB81	81.4	76.5	0.259
Southwest Area	SB135a	80.5	76.5	0.354

APPENDIX C
Cost Estimate Data

South Salt Lake - Stormwater Master Plan Update
Capital Facility Plan - Preliminary Cost Estimates

Project ID	Item	ROW Entity	Unit	Unit Price	Quantity	Total Cost	Engineering (10%)	Contingency (20%)	Cost by ROW Entity		
									South Salt Lake	UDOT	Total
P1	**200 E from Ford Avenue to 3300 S**										
	Install 24" pipe in 200 E from Ford Ave to 3300 S in conjunction with curb and gutter improvements	South Salt Lake	LF	$386	995	$384,090	$38,409	$76,818	**$499,316**	**$0**	**$499,316**
P2a	**300 W from 2925 S to Millcreek**										
	Install a backflow preventer in the new pipe	South Salt Lake	EA	$40,000	1	$40,000	$4,000	$8,000	**$52,000**	**$0**	**$52,000**
P2b	**300 W from 2925 S to Millcreek**										
	Install 24" pipe in 300 W from 2925 S to Millcreek	South Salt Lake	LF	$386	590	$227,752	$22,775	$45,550	**$296,077**	**$0**	**$296,077**
P3a	**300 W from Utopia Ave to 2100 S & 2100 from State St to UDOT Detention**										
	Install a backflow preventer valve in the existing 12" pipe in the west side of 300 W	South Salt Lake	EA	$15,000	1	$15,000	$1,500	$3,000	**$19,500**	**$737,684**	**$757,184**
	Install 24" pipe in the east side of 300 W across 2100 S and to UDOT detention basin.	UDOT	LF	$386	1,470	$567,449	$56,745	$113,490			
P3b	**300 W from Utopia to 2100 S & 2100 from State St to UDOT Detention**										
	Install 36"x60" box culvert or pipe with equivalent capacity in 2100 S from 400 W to the UDOT detention basins parallel to the existing storm drain.	UDOT	LF	$1,165	970	$1,129,788	$112,979	$225,958	**$0**	**$4,879,400**	**$4,879,400**
	Install 36"x48" box culvert or pipe with equivalent capacity in 2100 S from 300 W to 400 W parallel to the existing storm drain.	UDOT	LF	$868	620	$538,456	$53,846	$107,691			
	Install new 36" pipe in 2100 S from 300 W to State St parallel to the existing storm drain.	UDOT	LF	$658	3,170	$2,085,141	$208,514	$417,028			
P4	**Wentworth Ave from 300 E to State St & State St from Wentworth Ave to 2100 S**										
	Install 24" pipe in Wentworth Ave from 300 E to State Street	South Salt Lake	LF	$386	1,525	$588,680	$58,868	$117,736	**$950,601**	**$617,230**	**$1,567,832**
	Install 30" pipe in State Street from Wentworth Ave to 2100 S	UDOT	LF	$480	990	$474,793	$47,479	$94,959			
	Install 18" pipe in 300 E from Wentworth Ave to Commonwealth Ave	South Salt Lake	LF	$332	430	$142,552	$14,255	$28,510			
P5	**West Temple from Utopia Ave to 2100 S**										
	Install 18" pipe across West Temple and Utopia Ave intersection	South Salt Lake	LF	$332	65	$21,549	$2,155	$4,310	**$330,841**	**$306,114**	**$636,954**
	Install 24" pipe in West Temple from Utopia Ave to 2100 S	UDOT	LF	$386	610	$235,472	$23,547	$47,094			
	Install 15" pipe in Utopia Ave from West Temple to TRAX	South Salt Lake	LF	$311	750	$232,944	$23,294	$46,589			
P6	**Main Street from Truman Ave to 2100 S**										
	Install 24" pipe in Main Street from Truman Ave to 2100 S	UDOT	LF	$386	1,870	$721,857	$72,186	$144,371	**$0**	**$938,414**	**$938,414**
P7	**West Temple from 3700 S to 3300 S**										
	Install 42" pipe in West Temple from 3400 S to 3300 S	South Salt Lake	LF	$759	530	$402,326	$40,233	$80,465	**$5,946,520**	**$0**	**$5,946,520**
	Install 36" pipe in West Temple from 3750 S to 3700 S	South Salt Lake	LF	$658	270	$177,599	$17,760	$35,520			
	Install 42" pipe in West Temple from 3700 S to Guest Avenue	South Salt Lake	LF	$759	1,265	$960,269	$96,027	$192,054			
	Install 48" pipe in West Temple from Guest Avenue to 3400 S	South Salt Lake	LF	$868	1,300	$1,129,021	$112,902	$225,804			
	Construct a detention basin with a volume of at least 2.4 ac-ft on the west side of W Temple at approximately 3400 S.	South Salt Lake	LS	$1,905,031	1	$1,905,031	$190,503	$381,006			
P8	**Woodland Ave from 450E to 400 E & 400E from Woodland Ave to Mansfield Ave**										
	Install 30" pipe in Woodland Ave from 400 E to 450 E	South Salt Lake	LF	$480	345	$165,458	$16,546	$33,092	**$831,331**	**$0**	**$831,331**
	Install 30" pipe in 400 E from Woodland Ave to Mansfield Ave	South Salt Lake	LF	$480	905	$434,028	$43,403	$86,806			
	Install a backflow preventer in the 24" outfall to Millcreek in 400 E	South Salt Lake	EA	$40,000	1	$40,000	$4,000	$8,000			
P9	**300 E from 2700 S to Mill Creek**										
	Install 24" pipe in 300 E from 2700 S to the proposed detention pond at 2840 S	UDOT	LF	$449	1,220	$547,197	$54,720	$109,439	**$754,750**	**$1,194,043**	**$1,948,793**
	Install 18" pipe in 300 E from the proposed detention pond to Welby Ave	UDOT	LF	$332	1,120	$371,297	$37,130	$74,259			
	Construct a minimum 3 ac-ft detention pond at the school at approximately 2840 S and 300 E	South Salt Lake	LS	$580,577	1	$580,577	$58,058	$116,115			
P10a	**2700 S from 150 W to I-15 & 300 W from 2880 S to 2700 S**										
	Install a 36"x48" box culvert or pipe with equivalent capacity in 2700 S from 300 W to drainage ditch along I-15	South Salt Lake	LF	$537	1,110	$595,832	$59,583	$119,166	**$1,500,918**	**$0**	**$1,500,918**
	Install 30" pipe in 2700 S from 150 W to 300 W	South Salt Lake	LF	$480	1,165	$558,721	$55,872	$111,744			
P10b	**2700 S from 150 W to I-15 & 300 W from 2880 S to 2700 S**										
	Install 36" pipe in 300 W from 2880 S to 2700 S	UDOT	LF	$658	1,440	$947,193	$94,719	$189,439	**$0**	**$1,231,351**	**$1,231,351**
P11	**500 E from 3030 S to Mill Creek**										
	Install 18" pipe from 500 E and 3030 S to Milcreek	UDOT	LF	$332	270	$89,509	$8,951	$17,902	**$0**	**$116,362**	**$116,362**
P12	**West Temple from 3170 S Mill Creek**										
	Install 30" pipe in West Temple from 3170 S to Gregson Ave	South Salt Lake	LF	$480	985	$472,395	$47,239	$94,479	**$1,169,931**	**$0**	**$1,169,931**
	Install 36" pipe in West Temple from Gregson Ave to Millcreek (2980 S)	South Salt Lake	LF	$658	650	$427,553	$42,755	$85,511			
P13	**610 E from 3650 S to 3610 S & 3610 S from 610 E to 500 E**										
	Install 24" pipe in 610 E from 3665 S to 3635 S	South Salt Lake	LF	$386	285	$110,016	$11,002	$22,003	**$822,597**	**$0**	**$822,597**
	Install 30" pipe in 610 E and 3610 S from 3635 S to 500 E	South Salt Lake	LF	$480	1,090	$522,752	$52,275	$104,550			
P14	**2400 S from TRAX (200 W) to 300 W**										
	Install 60" pipe or equivalent capacity facility from TRAX (200 W) to 300 W	South Salt Lake	LF	$1,165	890	$1,036,610	$103,661	$207,322	**$2,514,636**	**$0**	**$2,514,636**
	Install 54" pipe or equivalent capacity facility from 300 W to UDOT ponds (400 W)	South Salt Lake	LF	$1,044	860	$897,726	$89,773	$179,545			
P15	**500 E from Mill Creek Way to 3300 S**										
	Install 30" pipe in the east side of 500 E from Millcreek Way to 3300 S	UDOT	LF	$480	1,750	$839,280	$83,928	$167,856	**$0**	**$1,091,064**	**$1,091,064**
P16	**State St from Truman Ave to Leslie Ave, Stratford Ave from State St to Main St & Whitlock Ave from Main St to 50 W**										
	Install 30" pipe in State Street from Truman Ave to 2450 S	UDOT	LF	$480	630	$302,141	$30,214	$60,428	**$2,808,075**	**$1,419,536**	**$4,227,611**
	Install 24" pipe in State Street from 2450 S to Oakland Ave	UDOT	LF	$386	410	$158,268	$15,827	$31,654			
	Install 30" pipe in State Street from Oakland Ave to Stratford Ave	UDOT	LF	$480	850	$407,650	$40,765	$81,530			
	Install 24" pipe in State Street from Stratford Ave to Leslie Ave	UDOT	LF	$386	580	$223,891	$22,389	$44,778			
	Install 36" pipe across school property from State Street to Main Street and connect to proposed detention pond south of the school buildings	South Salt Lake	LF	$658	1,240	$815,639	$81,564	$163,128			
	Construct a 2.9 ac-ft detention pond south of the school buildings and connect proposed 36" pipe accordingly	South Salt Lake	LS	$1,021,799	1	$1,021,799	$102,180	$204,360			
	Install 42" pipe in Whitlock Ave from the Social Security Administration Office to Main Street	South Salt Lake	LF	$759	425	$322,620	$32,262	$64,524			
P17	**Main St from Southgate Ave to Whitlock Ave**										
	Install 24" pipe in Main Street from Southgate Ave to 2700 S	UDOT	LF	$386	345	$133,177	$13,318	$26,635	**$0**	**$1,094,401**	**$1,094,401**
	Install 30" pipe in Main Street from 2700 S to Malvern Ave	UDOT	LF	$480	305	$146,275	$14,627	$29,255			
	Install 36" pipe in Main Street from Malvern Ave to Whitlock Ave and reconfigure the storm drain network at the intersection of Main Street and Whitlock Ave	UDOT	LF	$658	855	$562,396	$56,240	$112,479			
P18	**State St from Baird Ave to Guest Ave & Guest Ave from State St to West Temple**										
	Install 36" pipe in Guest Ave from State Street to West Temple	South Salt Lake	LF	$658	1,610	$1,059,015	$105,901	$211,803	**$1,376,719**	**$808,074**	**$2,184,793**
	Install 36" pipe in State Street from Baird Ave to Guest Ave	UDOT	LF	$658	945	$621,596	$62,160	$124,319			

P19	**300 W from Plymouth Ave to Mill Creek**										
	Install 18" pipe in 300 W from Plymouth Ave to 3550 S	UDOT	LF	$332	1,600	$530,425	$53,042	$106,085	**$0**	**$4,575,912**	**$4,575,912**
	Install 36" pipe in 300 W from 3550 S to 3440 S	UDOT	LF	$658	745	$490,041	$49,004	$98,008			
	Install 42" pipe in 300 W from 3440 S to 3300 S	UDOT	LF	$759	1,330	$1,009,611	$100,961	$201,922			
	Install 36" pipe in 300 W from 3300 S to Mill Creek	UDOT	LF	$658	2,265	$1,489,856	$148,986	$297,971			
P20	**Sunset Ave from 200 E to State St**										
	Install 18" pipe in Sunset Ave from 200 E to State Street	South Salt Lake	LF	$332	765	$253,609	$25,361	$50,722	**$329,692**	**$819,075**	**$1,148,767**
	Install 42" pipe in State Street from Claybourne Ave to Cordelia Ave	UDOT	LF	$759	830	$630,058	$63,006	$126,012			
P21	**Main Street/Guest Ave**										
	Install 24" pipe in Main Street from 3610 S to Guest Ave	UDOT	LF	$386	1,710	$660,094	$66,009	$132,019	**$0**	**$858,122**	**$858,122**
P22	**Lawndale Dr**										
	Install 24" pipe in the parking lot between 460 and 466 Lawndale Dr straight to the I-15 drainage ditch	South Salt Lake	LF	$386	245	$94,575	$9,457	$18,915	**$122,947**	**$0**	**$122,947**
P23	**Wendell Way & Wendell Drive**										
	Install 18" pipes in Wendell Way & Wendell Drive to convey flows to 500 E	South Salt Lake	LF	$332	1,735	$575,179	$57,518	$115,036	**$747,733**	**$0**	**$747,733**
WL-1	**Rigdon Ave from Secord St to State St & State St from Rigdon Ave to Helm Ave**										
	Replace the existing storm drains in Rigdon Avenue from Secord Street to State Street with 24-inch pipes.	South Salt Lake	LF	$386	350	$135,107	$13,511	$27,021	**$175,639**	**$757,510**	**$933,149**
	Replace the existing storm drains in State Street from Rigdon Avenue to Helm Avenue with 30-inch pipes.	UDOT	LF	$480	1,215	$582,700	$58,270	$116,540			
WL-2	**Railroad from 3440 S to 3300 S**										
	Install 27" pipe from 3440 S to 3300 S along railroad tracks.	South Salt Lake	LF	$449	960	$430,581	$43,058	$86,116	**$559,756**	**$0**	**$559,756**
WL-3	**State Street from Pershire Dr to 3300 S**										
	Install 36" pipe from Pershire Dr to 3300 S	UDOT	LF	$658	960	$631,462	$63,146	$126,292	**$0**	**$820,901**	**$820,901**
WL-4	**Main Street from 3440 S to 3300 S & 3300 S from Main Street to I-15**										
	Install 24" pipe in Main Street from 3440 S to 3300 S	UDOT	LF	$386	895	$345,488	$34,549	$69,098	**$0**	**$4,519,838**	**$4,519,838**
	Install 42" pipe in 3300 S from Main Street all the way across I-15	UDOT	LF	$759	4,125	$3,131,311	$313,131	$626,262			
WL-5	**Railroad from Walton Ave to Angelo Ave**										
	Install 24" pipe along railroad from Walton Ave to Angelo Ave	South Salt Lake	LF	$386	895	$345,488	$34,549	$69,098	**$449,134**	**$0**	**$449,134**
WL-6	**400W & Andy Ave**										
	N/A	-	-	-	-	-	-	-	-	-	-
WL-7	**900 W from 3160 S to Mill Creek**										
	N/A	-	-	-	-	-	-	-	-	-	-
WL-8	**Ironwood Dr**										
	Install 24" pipe from Ironwood Dr to the ditch at the I-80/I-15 interchange	South Salt Lake	LF	$386	615	$237,402	$23,740	$47,480	**$308,623**	**$0**	**$308,623**
WL-9	**500 W from Fine Dr to 3300 S**										
	If the capacity of these storm drains is determined to be insufficient in the future, the pipes could be lined to improve hydraulic conductivity.	UDOT	LF	$480	3,300	$1,584,000	$158,400	$316,800	**$0**	**$2,059,200**	**$2,059,200**