WEST JORDAN
UTAH

STORM DRAINAGE MASTER PLAN

(HAL Project No.: 089.31.100)

April 2023

THE CITY OF WEST JORDAN

STORM DRAINAGE MASTER PLAN

(HAL Project No.: 089.31.100)

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ABBREVIATIONS AND UNITS

ac	acre
ac-ft	acre-foot
cfs	cubic foot per second (ft^3/s)
CIP	Capital Improvement Plan
CMP	corrugated metal pipe
E	east
EPA	US Environmental Protection Agency
FF	Farmer–Fletcher (1971) storm distribution
ft	foot
GBEA	Great Basin Experimental Area
GIS	geographic information system
HAL	Hansen, Allen & Luce, Inc.
HEC	Hydrologic Engineering Center (U.S. Army Corps of Engineers)
HMS	Hydrologic Modeling System
ID	identification
in.	inch
irr	irrigation
mi	mile
N	north
NOAA	National Oceanic and Atmospheric Administration
NRCS	National Resources Conservation Service (formerly SCS)
RR	railroad
s	second
S	south
SCS	Soil Conservation Service (now NRCS)
SWMM	Storm Water Management Model
TR-55	Technical Release 55 (NRCS 1986)
USGS	U.S. Geological Survey
W	west
w/	with
w/o	without
xing	crossing
yr	year

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CHAPTER 1 – INTRODUCTION

PURPOSE

This Storm Drainage Master Plan (Master Plan) for the City of West Jordan (City) presents technical activities to manage and regulate stormwater runoff caused by development 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 stormwater system. The Master Plan examines the existing storm drainage system. Existing deficiencies are identified, and the preferred solution alternatives are presented with conceptual cost estimates. A Capital Improvement Plan (CIP) is developed with master plan projects.

Computer models were developed as part of the Master Plan to simulate runoff during storm events in the City. Not only were the models vital tools in analyzing the stormwater situation for the master plan, but they will allow the City to continue to update and analyze for potential drainage deficiencies and facilitate conceptual design of future projects.

BACKGROUND

Located along the Wasatch Front in central Salt Lake County, Utah, the City of West Jordan extends from the Jordan River to the Oquirrh Mountains and from 6200 South to 10200 South. The terrain has a vertical relief of approximately 1,300 ft from the foothills to the West to the Jordan River on the East. Soil types range from permeable desert sands to fine lacustrine silts and clays. Land use varies from dense urban developments to undeveloped farmland and foothills. The City of West Jordan was incorporated in 1941 and continues to experience growth and development, particularly to the West. In an ongoing effort to regulate growth and redevelopment, the City desires to plan an effective drainage system to manage nuisance water, prevent flooding, and protect downstream waters from adverse quality and quantity impacts.

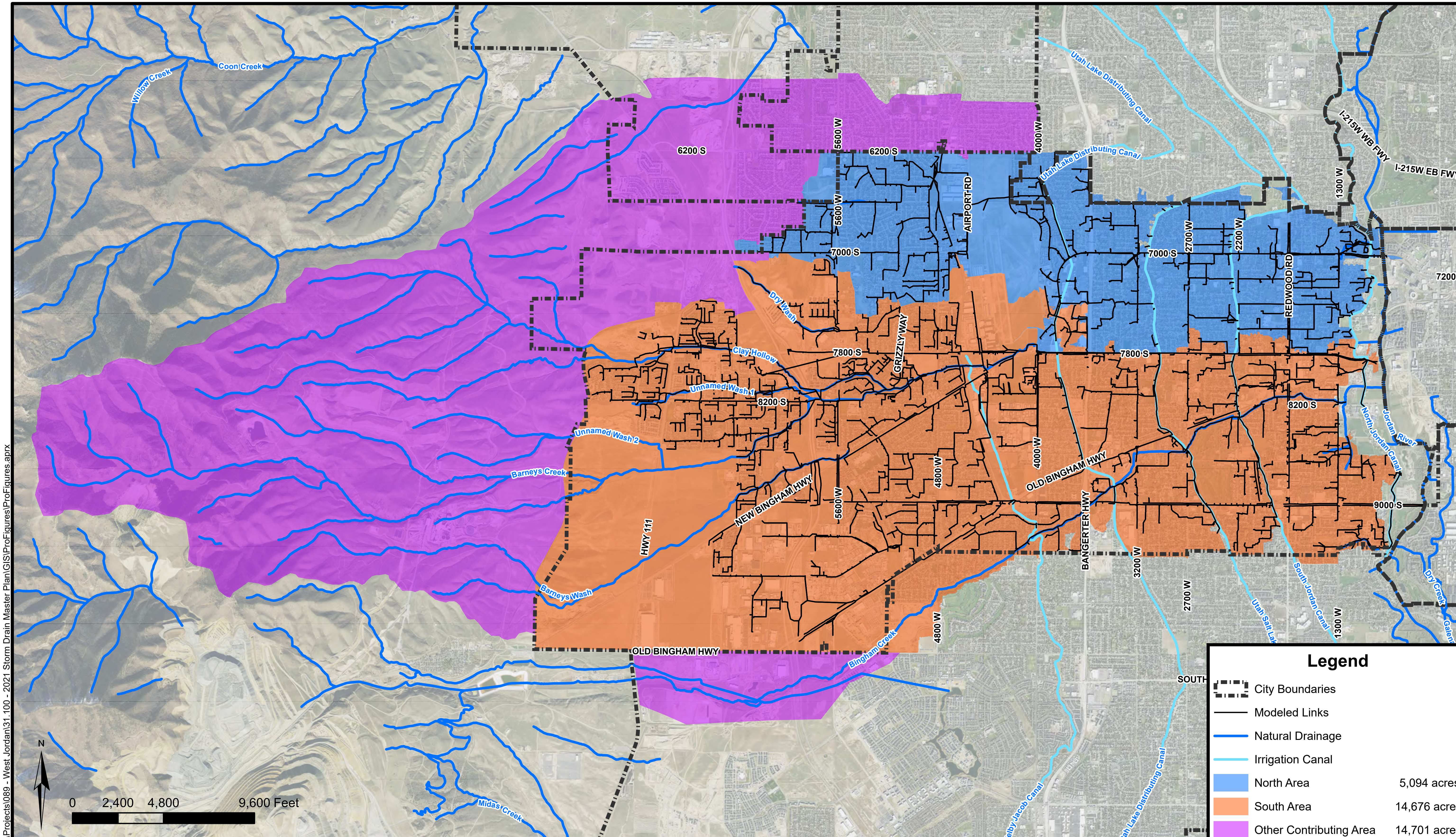
AUTHORIZATION

The City of West Jordan selected Hansen, Allen & Luce to prepare the Master Plan. The Master Plan has been completed in accordance with the agreement between the City of West Jordan and HAL dated May 11, 2021. The Master Plan was completed under the direction of and in cooperation with City staff.

STUDY AREAS

The study area for the Master Plan includes the incorporated area of West Jordan, flows from West Valley City, Taylorsville, South Jordan, and unincorporated areas of Salt Lake County. Approximately 19,700 acres directly tributary to the City's storm drainage system are hydrologically modeled to determine the runoff. Areas outside of the City boundaries including four different canal systems are introduced into the storm drainage system as hydrographs based on hydrologic studies for their respective areas. The study area and major drainage boundaries are shown on Figure 1-1.

This Master Plan is an update of the prior Master Plan, which was completed in 2015.



CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

STUDY AREA AND MAJOR BASINS

FIGURE 1-1

HANSEN ALLEN & LUCE INC ENGINEERS

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CHAPTER 2 – EXISTING STORM DRAINAGE SYSTEM

This section discusses the features that make up the storm drainage facilities in West Jordan. Figure 2-1 shows the existing storm drainage system including natural drainages and major irrigation facilities.

NATURAL DRAINAGES

The City of West Jordan incorporates several natural drainages in the storm drain system. Natural drainages in the City generally flow from west to east or from south to north. The natural drainages serve as outlets for the City's storm drainage system, but in some locations the natural drainages contribute flow to the City's storm drainage system.

Jordan River

The Jordan River is the largest natural drainage in Salt Lake County and is the final outlet for all storm runoff from the City. The Jordan River runs from south to north on the far east side of the City.

Barney's Creek

Barney's Creek originates in the Oquirrh Mountains and terminates at the Airport Detention Basin near 7800 South and Jordan Landing Boulevard where the flows enter the City's storm drainage system. Barney's Creek receives flow from the Unnamed Wash 2, Unnamed Wash 1, Clay Hollow, Barney's Wash, and Dry Wash. After flows from Barney's Creek discharge into the Airport Detention Basin, they are conveyed to the Jordan River in a storm drainage trunk line in 7800 South.

Barney's Wash

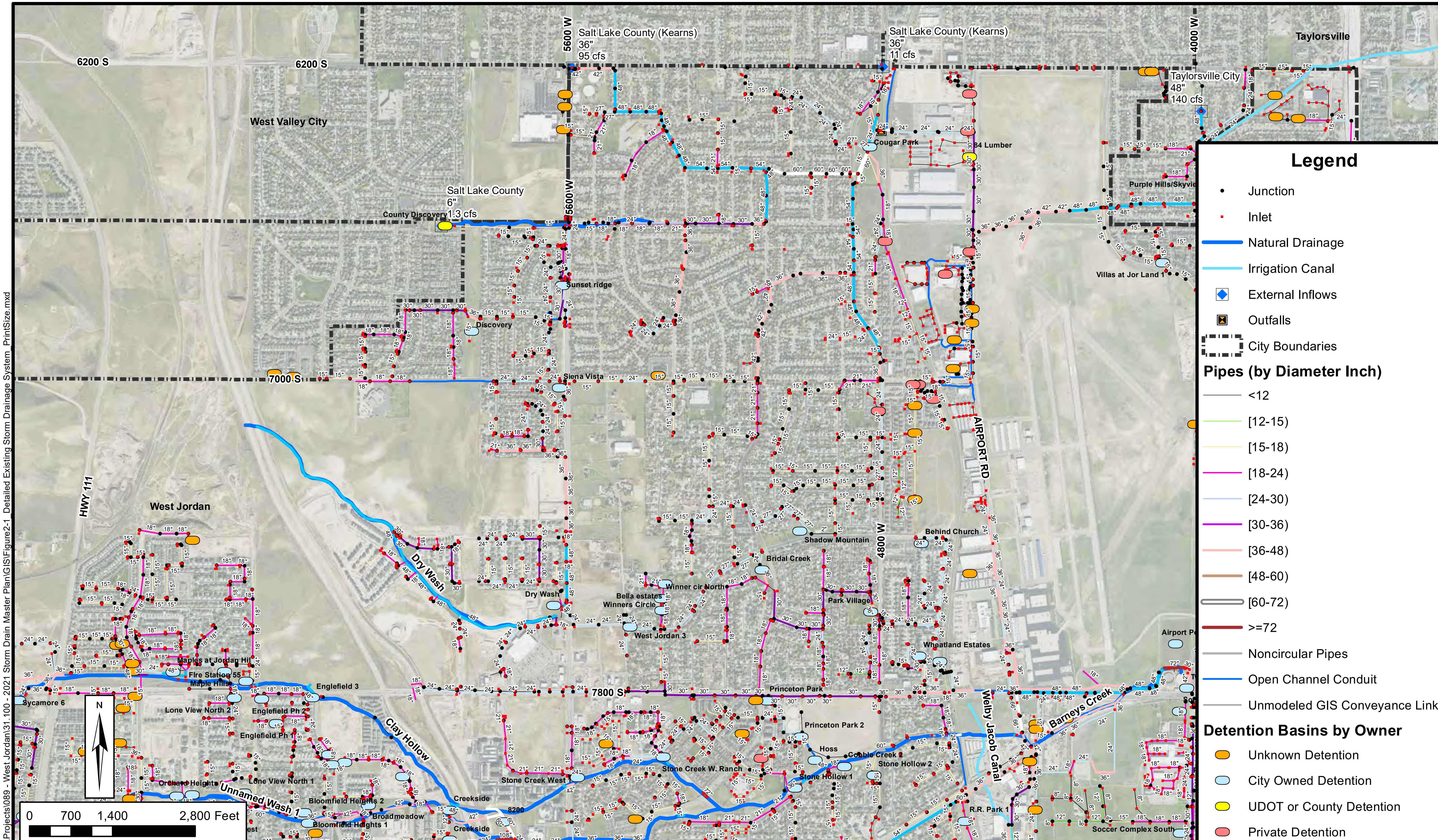
Barney's Wash originates in the lower Oquirrh Mountains and flows northeast where it enters the City's storm drain system at approximately 5600 West and New Bingham Highway. Flows from Barney's Wash converge with Barney's Creek near Airport Road and New Bingham Highway.

Dry Wash

Dry Wash is a small drainage that originates in the foothills of the Oquirrh Mountains in the northwest corner of the City. Dry Wash enters the City's storm drain system near 5600 West 7600 South at a newly constructed detention basin (Oquirrh Mountains Sledding Bowl). The Dry Wash flows are then conveyed through the storm drain system to Barney's Creek and the Airport Detention Basin.

Clay Hollow

Clay Hollow originates in the Oquirrh Mountains and terminates at a confluence with Barney's Creek. Clay Hollow flows into a detention basin at 8200 South and 5800 West with Barney's Creek, but continues on separately from Barney's Creek as an overflow channel.



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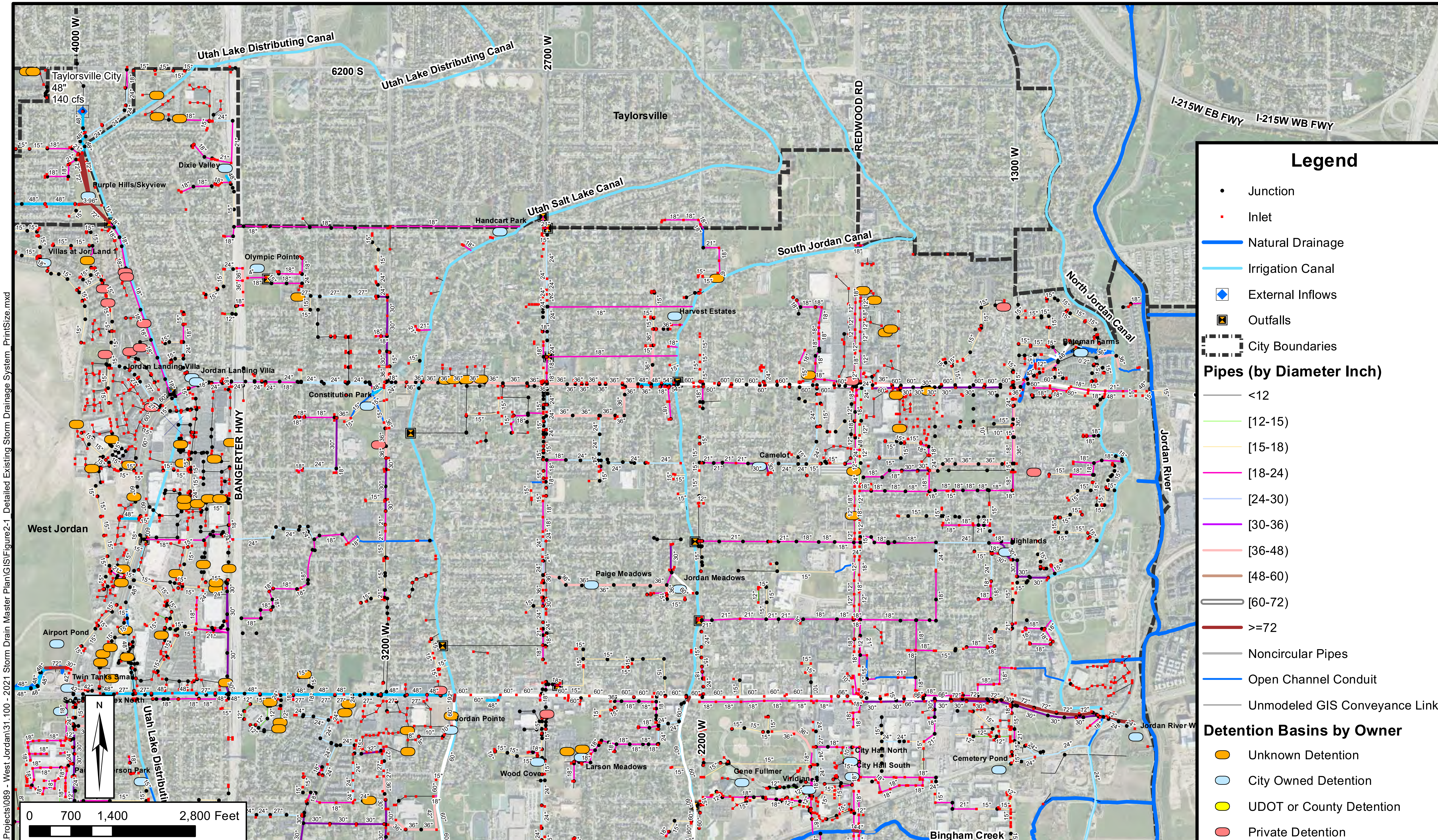
CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

DETAILED EXISTING STORM DRAINAGE SYSTEM
NORTH MODEL - 6700W TO 3700W

FIGURE 2-1.1



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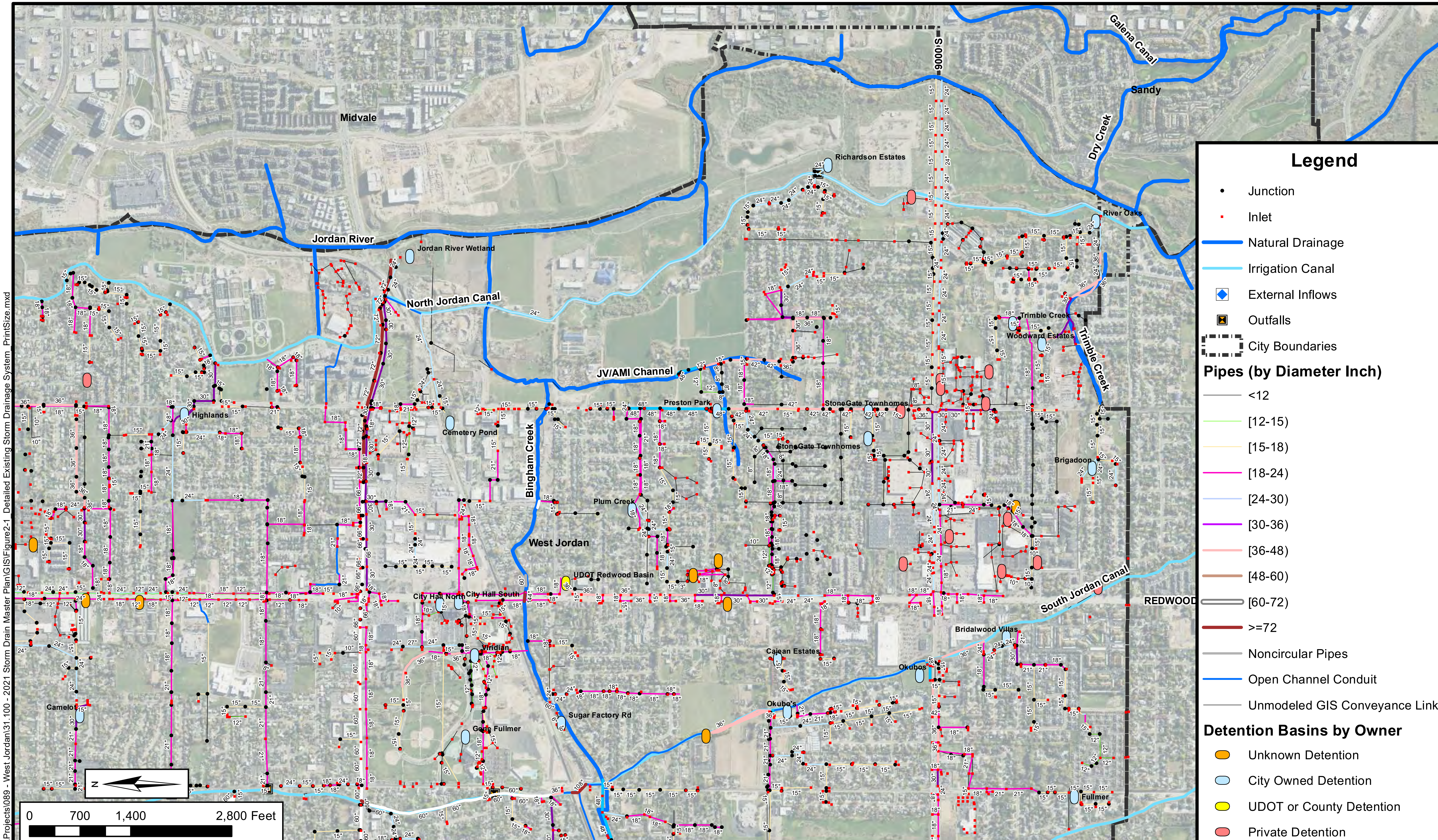
CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

DETAILED EXISTING STORM DRAINAGE SYSTEM
NORTH MODEL - 4000W TO 800W

FIGURE
2-1.2



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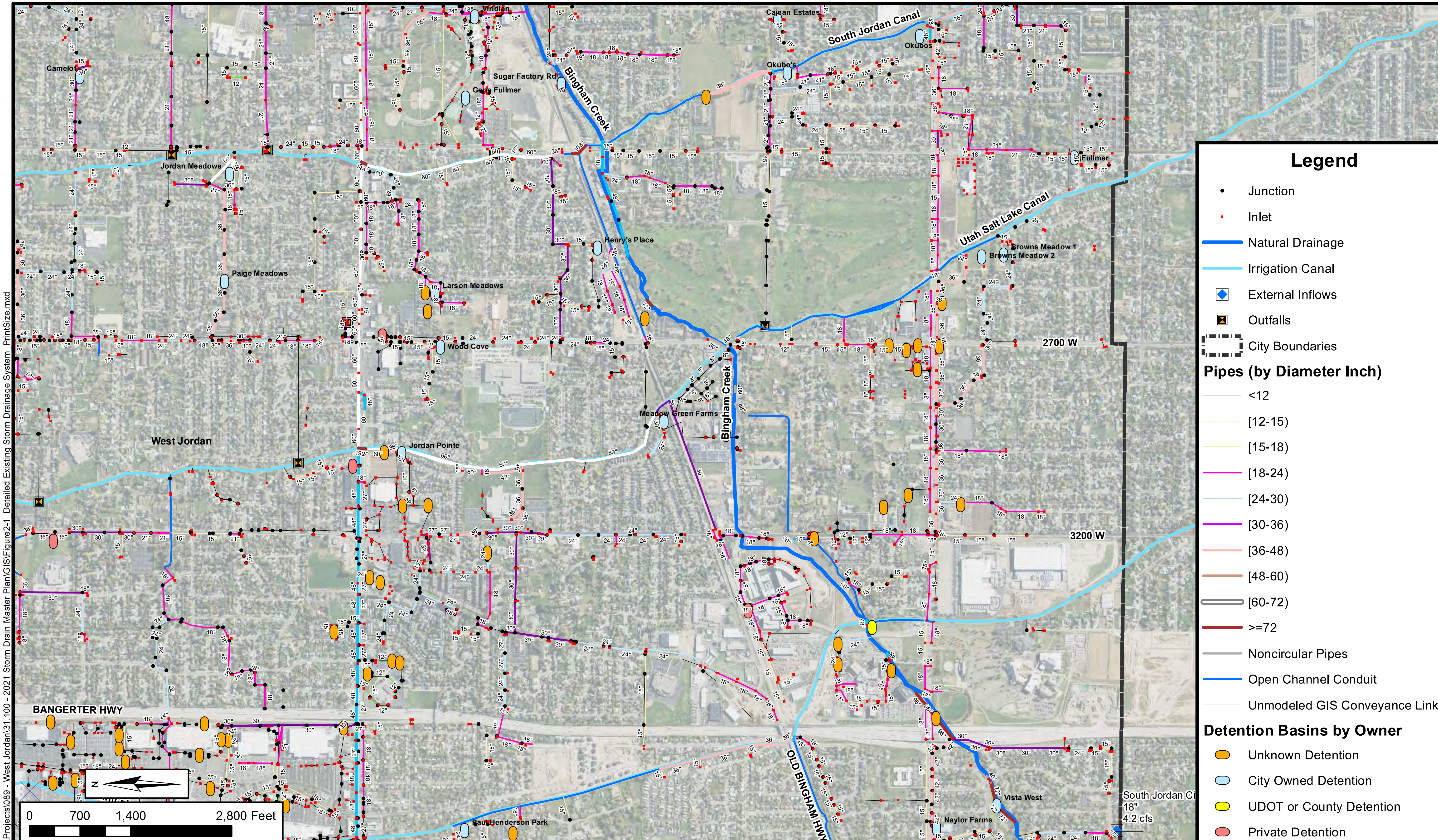
CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

DETAILED EXISTING STORM DRAINAGE SYSTEM
SOUTH MODEL - 2000W TO 800W

FIGURE
2-1.3



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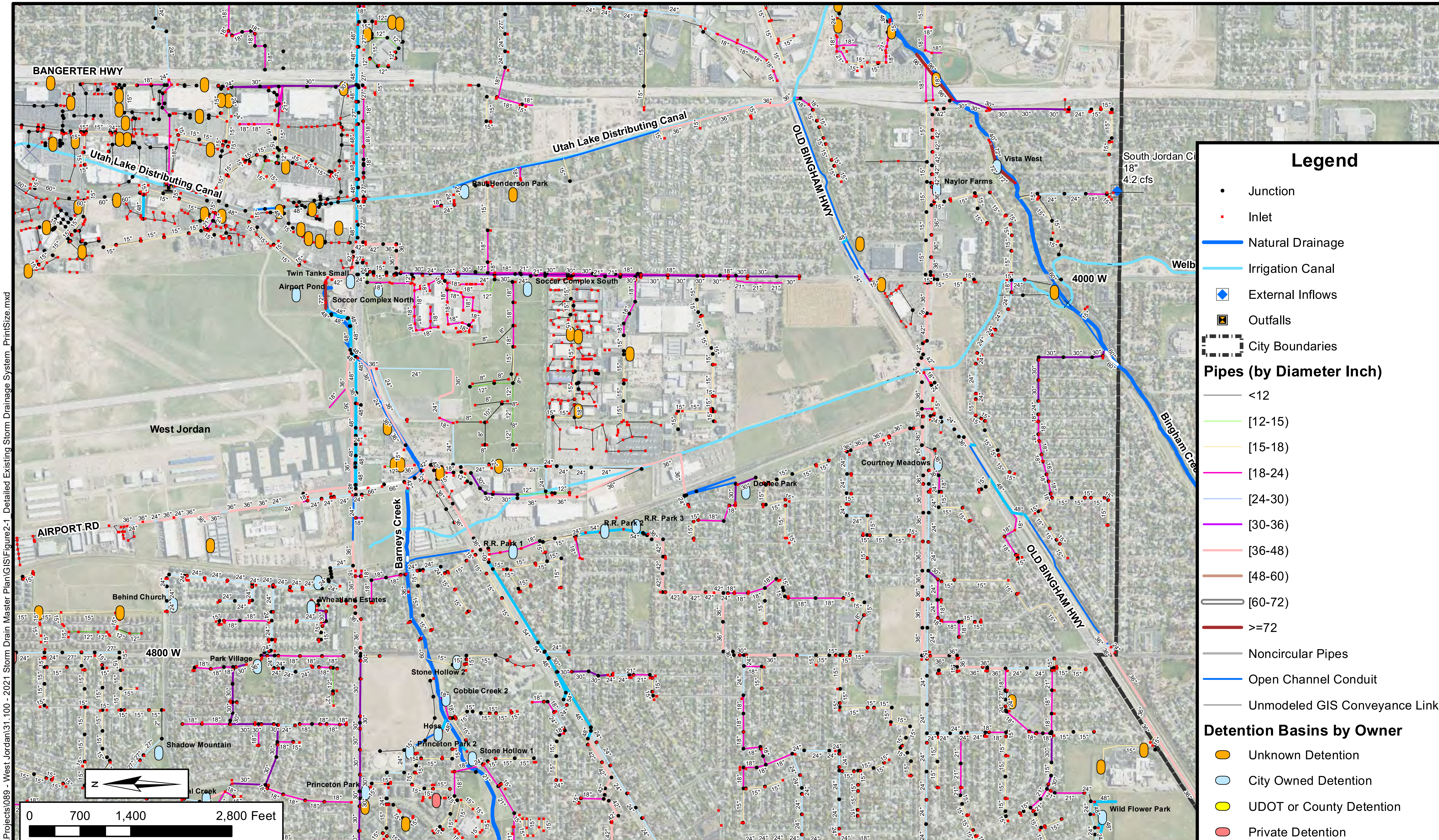
CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

DETAILED EXISTING STORM DRAINAGE SYSTEM
SOUTH MODEL - BANGERTER HWY TO 2000W

FIGURE
2-1.4



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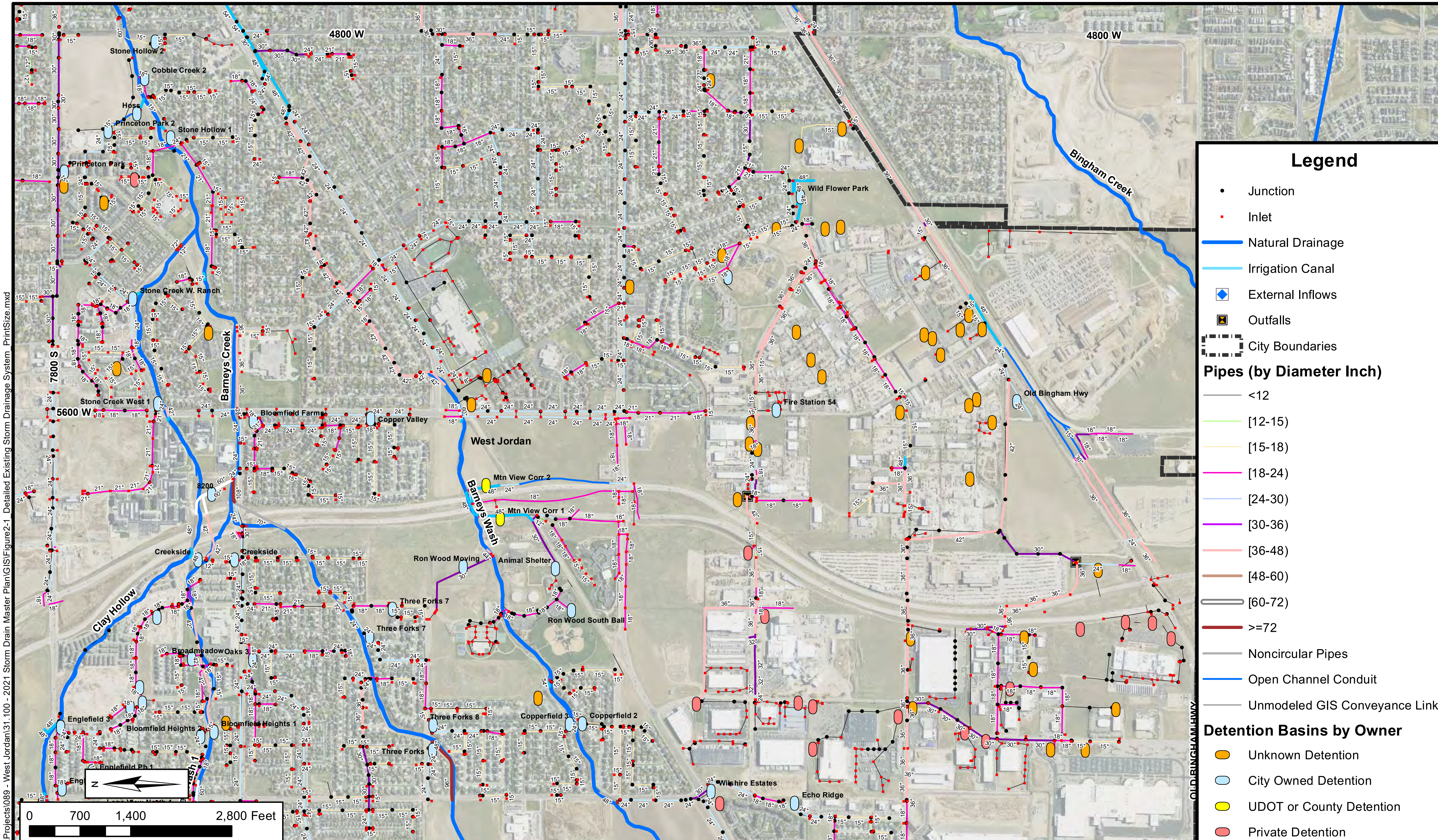
CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

DETAILED EXISTING STORM DRAINAGE SYSTEM
SOUTH MODEL - 5000W TO BANGERTER HWY

FIGURE 2-1.5



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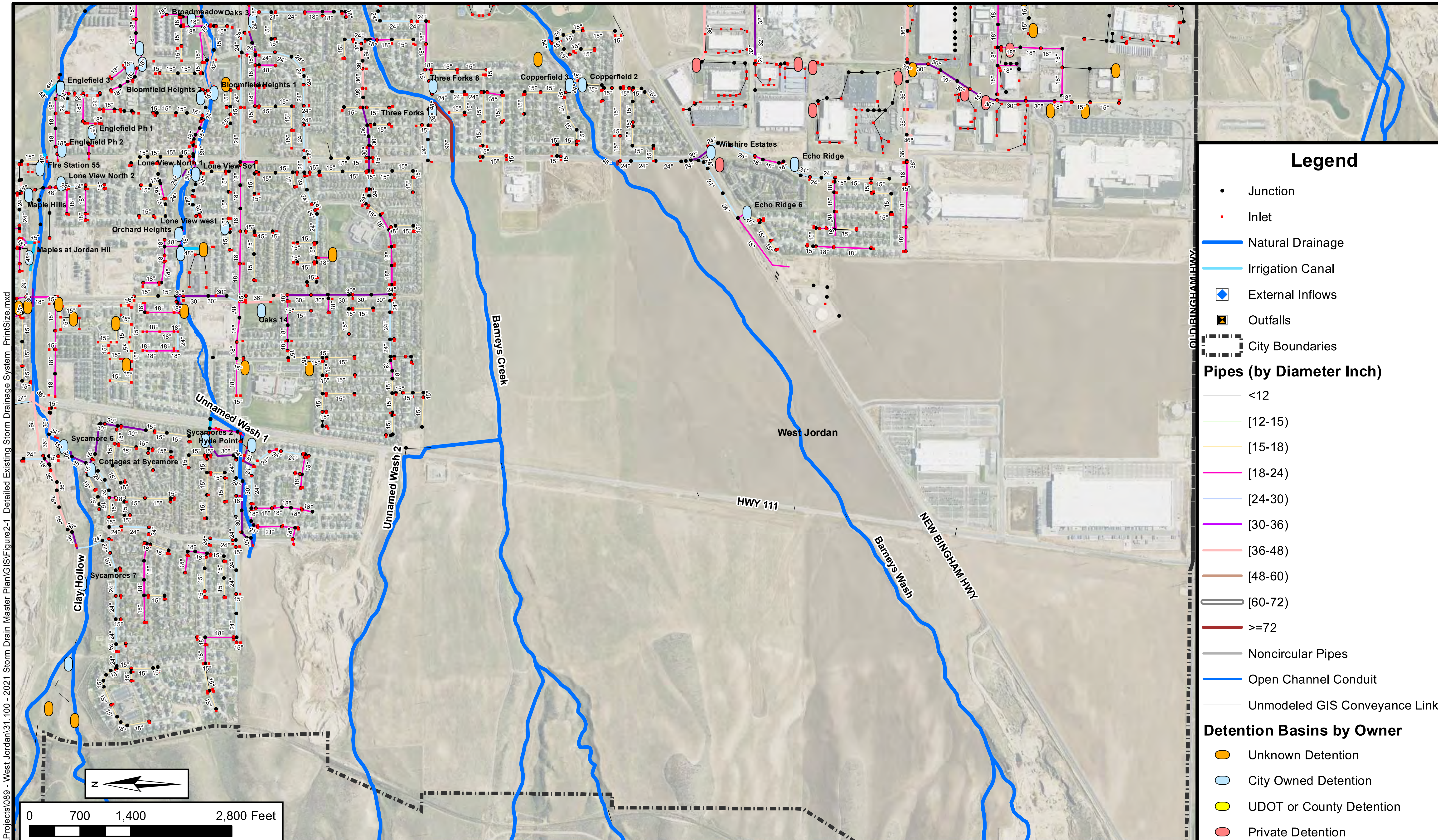
STORM DRAINAGE MASTER PLAN

DETAILED EXISTING STORM DRAINAGE SYSTEM
SOUTH MODEL - 6300W TO 5000W

FIGURE 2-1.6



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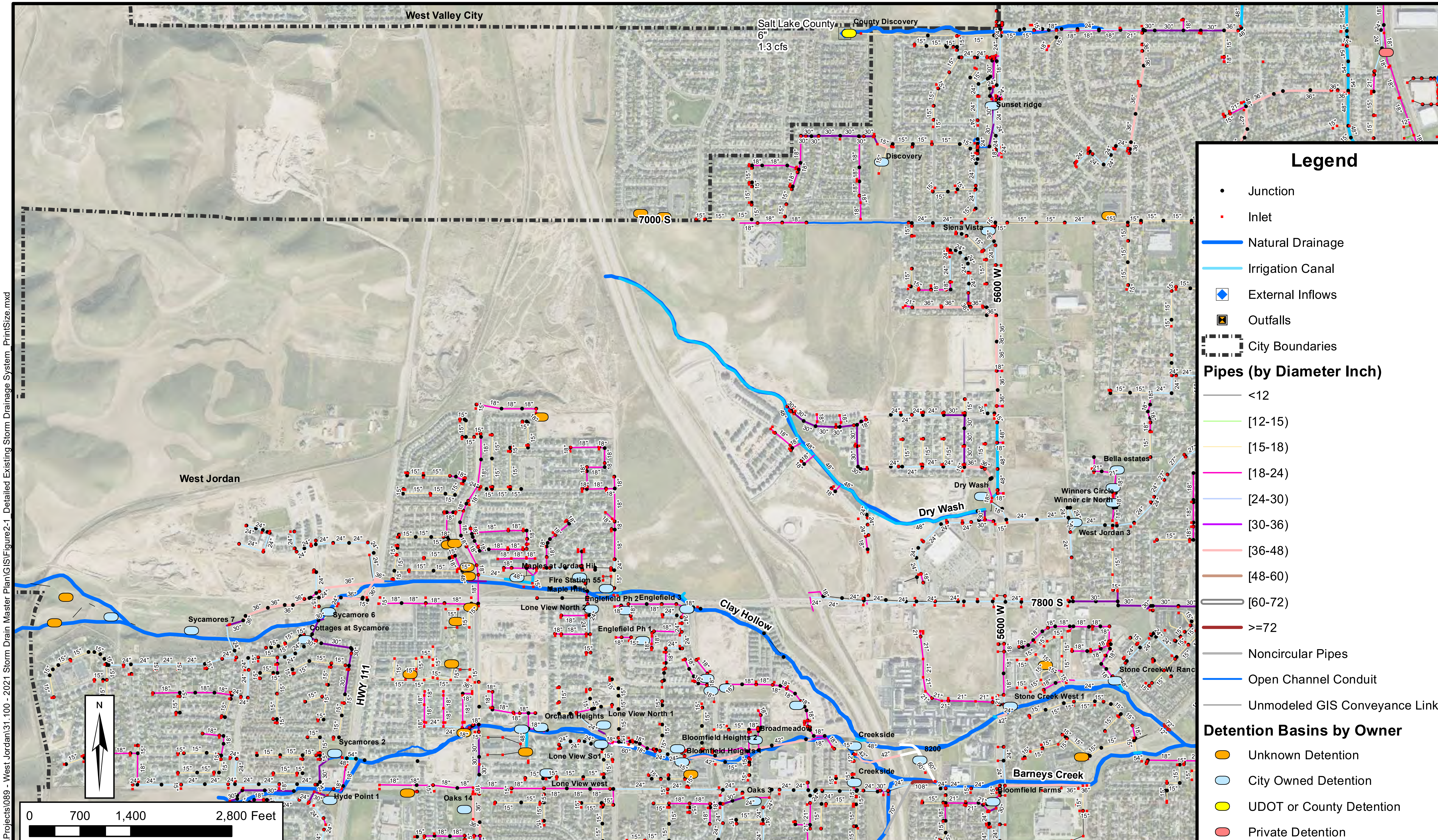
STORM DRAINAGE MASTER PLAN

DETAILED EXISTING STORM DRAINAGE SYSTEM
SOUTH MODEL - 7600W TO 6300W

FIGURE 2-1.7



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CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

DETAILED EXISTING STORM DRAINAGE SYSTEM
SOUTH/NORTH MODEL - U-111 HWY TO 4900W

FIGURE 2-1.8

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Unnamed Wash 1

Unnamed Wash 1 is defined for the purposes of this master plan to be the drainage south of Clay Hollow and north of Unnamed Wash 2 terminating at Barney's Creek upstream from the detention basin at 5800 West and 8200 South.

Unnamed Wash 2

Unnamed Wash 2 is defined for the purposes of this master plan to be the drainage south of Unnamed Wash 1 and north of Barney's Creek, terminating at Barney's Creek just east of Highway 111.

Bingham Creek

Bingham Creek originates high in the Oquirrh Mountains and flows east through the Kennecott Copper Pit, South Jordan, and West Jordan where it terminates at the Jordan River. In order to control the water quality of the creek downstream of the copper mine, Rio Tinto Kennecott retains all flows leaving the copper pit in several large retention ponds. Consequently, only areas downstream of the retention ponds contribute to flows entering West Jordan in Bingham Creek. Although Bingham Creek is conveyed in several locations through box culverts and pipes, it generally retains the same alignment as the original drainage and is an open channel conveyance.

Trimble Creek

Trimble Creek originates at the outfall of the City's storm drain system at 1300 West and approximately 9350 South. It runs east to discharge in the Jordan River.

Jordan Valley/AMI channel

The Jordan Valley/AMI channel Jordan Canal originates at the outfall of the City's storm drain system at 8450 South north of the Riverside Elementary School. It runs north parallel to and west of 1300 West until it reaches its confluence with Bingham Creek just north of 8200 South. It receives additional flow from City runoff at approximately 8350 South.

IRRIGATION CONVEYANCES

Irrigation canals, ditches, and diversion structures are common in West Jordan. In older parts of the City, irrigation ditches and pipes also act as storm drain conveyances during storm events. Several of the irrigation canals also act as outlets for parts of the storm drain system. Many of the canals have overflow structures where the canals cross large storm drain lines. The overflow structures remove flows from the canals to compensate for storm drain discharge to the canals upstream of the structures. This protects the structural integrity of the canals by helping to protect against canal overflows.

Irrigation ditches are not ideal conveyances for stormwater because they are designed to distribute irrigation water rather than collect stormwater. Ditch capacities decrease from upstream to downstream, while runoff flows increase from upstream to downstream. Water quality, debris, sediment, liability, and canal maintenance are problems associated with use of the ditches to convey stormwater.

Welby Jacob Canal

The Welby Jacob Canal enters the south side of West Jordan at 4000 West. The canal has an overflow structure where it crosses the trunk storm drain in 9000 South. The canal terminates into the City's storm drain system at approximately 8200 South where any excess irrigation flows exit the canal and route through the Airport Detention Basin to ultimately discharge in the Jordan River.

Utah Lake Distributing Canal

The Utah Lake Distributing Canal enters West Jordan's southern boundary at approximately 3200 West and leaves the City at 6200 South and 3800 West. The canal delivers irrigation water to lands south of 7400 South. The canal north of this point is used to detain runoff until it is reintroduced into the storm drainage system near 7000 South. The canal has overflow structures into Bingham Creek and into the trunk storm drain in 7800 South. The canal terminates at 3700 West and Jordan Landing Boulevard where it enters the City's storm drain system, before flowing through Constitution Park on to the Jordan River.

Utah Salt Lake Canal

The Utah Salt Lake Canal enters West Jordan near Tanya Avenue at approximately 9350 South and leaves the City near Handcart Park at 2700 West and 6600 South. The canal has overflow structures into Bingham Creek and into storm drains in 7800 South and 7000 South. The Utah Salt Lake Canal has several storm drains that outfall to the canal, as well as several irrigation turnouts from the canal.

South Jordan Canal

The South Jordan Canal enters West Jordan near Redwood Road and 9400 South and leaves the City near Redwood Road and Cole Lane. The canal has overflow structures into Bingham Creek and into storm drains in 7800 South and 7000 South. The South Jordan Canal has several storm drains that outfall to the canal, as well as several irrigation turnouts from the canal.

North Jordan Canal

The North Jordan Canal originates near the southeast corner of West Jordan and parallels the Jordan River until it leaves the City near Bateman Point Drive and 6800 South. The Canal has overflow structures near 8750 South, near 8500 South, near 7400 South, and into the storm drains in 7800 South and 7000 South.

FLOWS OUTSIDE OF WEST JORDAN

There are several locations where flow from entities bordering West Jordan enters the West Jordan storm drain system. Table 2-1 shows the locations where significant inflows into the West Jordan storm drain system were modeled.

Additional flow rates were determined from the Copper City Master Storm Drain Plan (Bush and Gudgell, Inc., 1979) and were input as external flow hydrographs. If flow rate data was unavailable, the incoming pipe was modeled with full flow to simulate an assumed peak flow condition.

Table 2-1
Additional Flows

Location*	Pipe Diameter	Originating Entity	10-Year Peak Flow
6305 S and 3980 W	48 inch	Taylorsville City	140 cfs
6610 S and 2200 W	18 inch	Taylorsville City	16 cfs**
6200 S and Cougar Ln	36 inch	Salt Lake County (Kearns)	11 cfs
6200 S and 5600 W	36 inch	Salt Lake County (Kearns)	95 cfs
Basin at Cedar Hill Rd and Empress Ln	6 inch orifice	Salt Lake County	1.3 cfs
Angus Dr and Westland Dr	18 inch	South Jordan City	4.2 cfs

*The location refers to the point where inflow was added to the model as an external inflow.
**This is a model output which evaluates the contributing basins and pipes in Taylorsville.

STORM DRAINAGE FACILITIES

As part of the previous Master Plan, efforts were made to complete an inventory of the storm drainage facilities in West Jordan. The City had compiled inventory data prior to July 28, 2014 (original inventory), and identified manholes and inlets in the original inventory that needed to be surveyed. Hansen, Allen, and Luce, Inc. completed a select inventory survey of over 1,700 manholes and inlets identified by the City in order to provide data for new developments and obtain elevation data on missing manhole elevations. The storm drain inventory was updated with a GIS inventory from the City and direction from the Stormwater Supervisor. Additional surveying was performed by the City on some of the storm drainage facilities.

City staff provided HAL GIS files that included any and all updates to their storm water facility inventory since the last master plan was completed including developments. HAL used this dataset to identify missing information and data gaps. HAL created a list of detention facilities that appeared to have been added since the last master plan that did not have adequate information for modeling purposes. City personnel went through development drawings and extracted the detention basin details so they could be included in the model. If the details were unavailable assumptions were made that the facilities meet current City detention requirements.

Some pipe diameters and invert elevations were not able to be determined by City Staff due to facility accessibility, so simplifying assumptions were made to create the model. Junctions and links with estimated values are identified in the GIS inventory. No inventory or survey was conducted as part of this Master Plan. Efforts should be made to continue to update and correct the inventory with surveyed values.

Collection and Conveyance

The City of West Jordan has over 200 miles of storm drain pipes with a wide range of sizes. The City has an estimated 7,700 inlets that introduce runoff into the storm drains. The storm drain system also relies on natural drainages, roadside swales, and irrigation conveyances to convey runoff to the Jordan River.

Data collected by HAL in the select inventory survey consisted of point locations, point descriptions, point elevations, measure down depths at each point, conveyance location, conveyance shape, and conveyance size. The select inventory information was used to update the conveyance elements in the GIS database. The collection and conveyance system with associated pipe diameters can be seen on Figure 2-1.

A combination (combo) box is a feature that acts as a manhole and a curb inlet. The original inventory treated combo boxes as two separate nodes with a connecting link. However, combo boxes are a single feature and do not contain a pipe between the inlet grate and the manhole lid. In the updated inventory combo boxes are treated as a single feature in order to reduce the inventory size and better model hydraulics through the system.

Detention

The City maintains several detention facilities. Detention facilities are designed to store the 100-year event. Stage storage curves for the detention basins were estimated using the 2013-2014 0.5 meter LiDAR data (AGRC, 2014). For detention basins newer than this LiDAR data, and as possible, the City provided data including stage-storage curves. Where not possible, stage storage data for critical detention facilities was developed using assumptions that detention basins typically have side slopes of 3H:1V and a depth of 3.0 feet. In the northern half of the City 32 detention basins are modeled while 101 detention basins are modeled in the southern half of the City. Some detention basins were not modeled because basin attributes could not be determined from available information. If the detention basin attributes could not be determined, runoff from the area was modeled to be detained to approximately 0.2 cfs per acre. Also, some detention basins did not have information about the orifice size. The modeled detention basins can be seen on Figure 2-1. The detention basins are colored based on the entity that owns or manages the basin. City Owned Detention basins are owned and managed by West Jordan City, Other Entity's Detention basins are owned or managed by the County, nearby Cities, or UDOT, Private Detention basins are installed by private developers, and the ownership status of the Unknown Detention basins could not be readily determined from the provided GIS data. While several of the ponds in West Jordan serve Low Impact Development (LID) purposes, the impact to water quality was not modeled. LID ponds were still modeled hydraulically the same as ponds serving little or no LID function.

CHAPTER 3 – METHODOLOGY

The project team adopted a workshop approach with City engineering 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

Hydrology is the study of the movement, distribution, and accumulation and management of water. For this Master Plan, the hydrology performed includes selecting a rainfall design frequency and storm distribution, subbasin area delineations and calculations, calculating runoff potential using soil data, land cover, and impervious surface estimates, and estimating the timing of peak runoff. The first portion of this chapter details these methods in greater detail.

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 design capacity for the initial drainage system. The initial drainage system includes storm drains, gutters, and roadside ditches.
- 100-year capacity where flooding of homes may occur.
- 100-year capacity on all detention/retention limited to storm drain hydraulic capacities.
- 100-year capacity with a freeboard of 2 feet for natural drainages as defined in Chapter 2.

Design Storms

How the precipitation falls throughout a storm of a particular duration is called the storm's distribution. Selection of an appropriate storm distribution is important because it determines peak flows through pipes and channels and peak storage volumes in detention ponds. These results, determined in part by storm distribution, ultimately dictate what is flagged as a deficiency and what projects are planned for capital improvement.

The storm distribution selected in the previous Master Plan was the Farmer Fletcher (FF) distribution. The storm distribution selected for use in this Plan is the 24-hour SCS Type II distribution which can be seen in Figure 3-1. This distribution was selected to remove the need for the duration sensitivity analyses which is required of the FF distributions while maintaining an appropriately intense event. Additionally, the City desired to use a standardized 24-hour storm distribution that would be recognized by FEMA. The SCS Type II distribution is a more intense event than the FF, and typically increases peak flows by 20 percent as compared with the FF for urbanized subbasins.

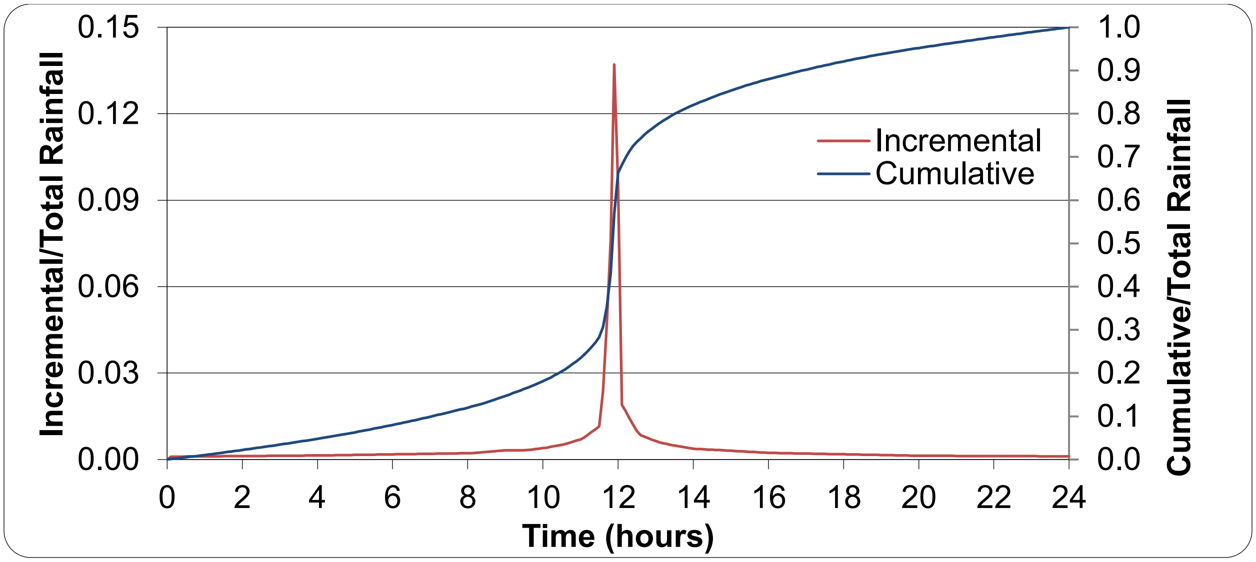


Figure 3-1 24-hour SCS Type-II Dimensionless Distribution

Precipitation depths were obtained from *NOAA Atlas 14: Precipitation-Frequency Atlas of the United States* (Bonnin et al. 2004; NOAA 2013). The design storm rainfall depths modeled for this Master Plan are seen in Table 3-1.

Table 3-1
Modeled Rainfall Depths

Storm Frequency	24 hr
10-yr Rainfall Amount (in)	1.76
100-yr Rainfall Amount (in)	2.50

DEVELOPMENT OF THE HYDROLOGIC MODELS

As part of the Master Plan, HAL developed a computer model for each study area to simulate runoff during storm events. The City requested that Innovyze's InfoSWMM software be used to model the storm drainage system. InfoSWMM is a "fully dynamic, geospatial…hydrologic, hydraulic, and water quality simulation model for the management of urban stormwater drainage and wastewater collection systems" (Innovyze, 2021). InfoSWMM utilizes the EPA's SWMM model for its hydrologic and hydraulic engine and combines that with an ArcMap interface where geographic information systems (GIS), specifically ESRI's ArcGIS, can be used for mapping and schematic purposes. One prerequisite for accessing InfoSWMM's full advantage is that the GIS database is updated and maintained within InfoSWMM; for example, if stormwater related GIS files are updated outside of InfoSWMM those changes will not be reflected in the model.

Subbasins

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). Drainage basin boundaries depend upon both the topography and the location of storm drainage facilities. Subbasin characteristics developed for this plan were based on field observation, aerial imagery, soil data, GIS mapping, land use information from the City, and engineering literature. Important subbasin characteristics described below include 1) area, 2) hydrologic soil group, 3) percentage of impervious area, 4) SCS curve number (CN), 5) Subbasin width, and 6) 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. The previous Master Plan completed a delineation by inlet using 2013-2014 0.5 meter LiDAR data from the Utah Automated Geographic Reference Center (AGRC, 2014) and InfoSWMM's Subcatchment Manager Watershed delineation tool. During this Master Plan, areas of recent development were subdivided per inlet. Data revised since the last Master Plan can be seen on Figure 3-2. The median subbasin size for the 6,148 delineated subbasins in the City is approximately 0.9 acres.

Hydrologic Soil Group

Hydrologic soil group is a general indication of a soil's infiltration capacity and is a key determinant of runoff behavior. The Natural Resources Conservation Service (NRCS) has classified soils into four hydrologic groups A, B, C, and D. Soils of group A have the highest infiltration rate and therefore produce the least amount of runoff. Group A soils include permeable gravels and well-drained sands. Group B soils have moderate infiltration rates and moderately fine or coarse textures. Group C soils have a lower infiltration rate and finer textures, sometimes with a layer that impedes infiltration. Soils of group D have the lowest infiltration rate and produce the highest amount of runoff. Group D soils include fine silts, fine, clays, and other soils with low infiltration rates. Soil groups are described in TR-55 (NRCS, 1986).

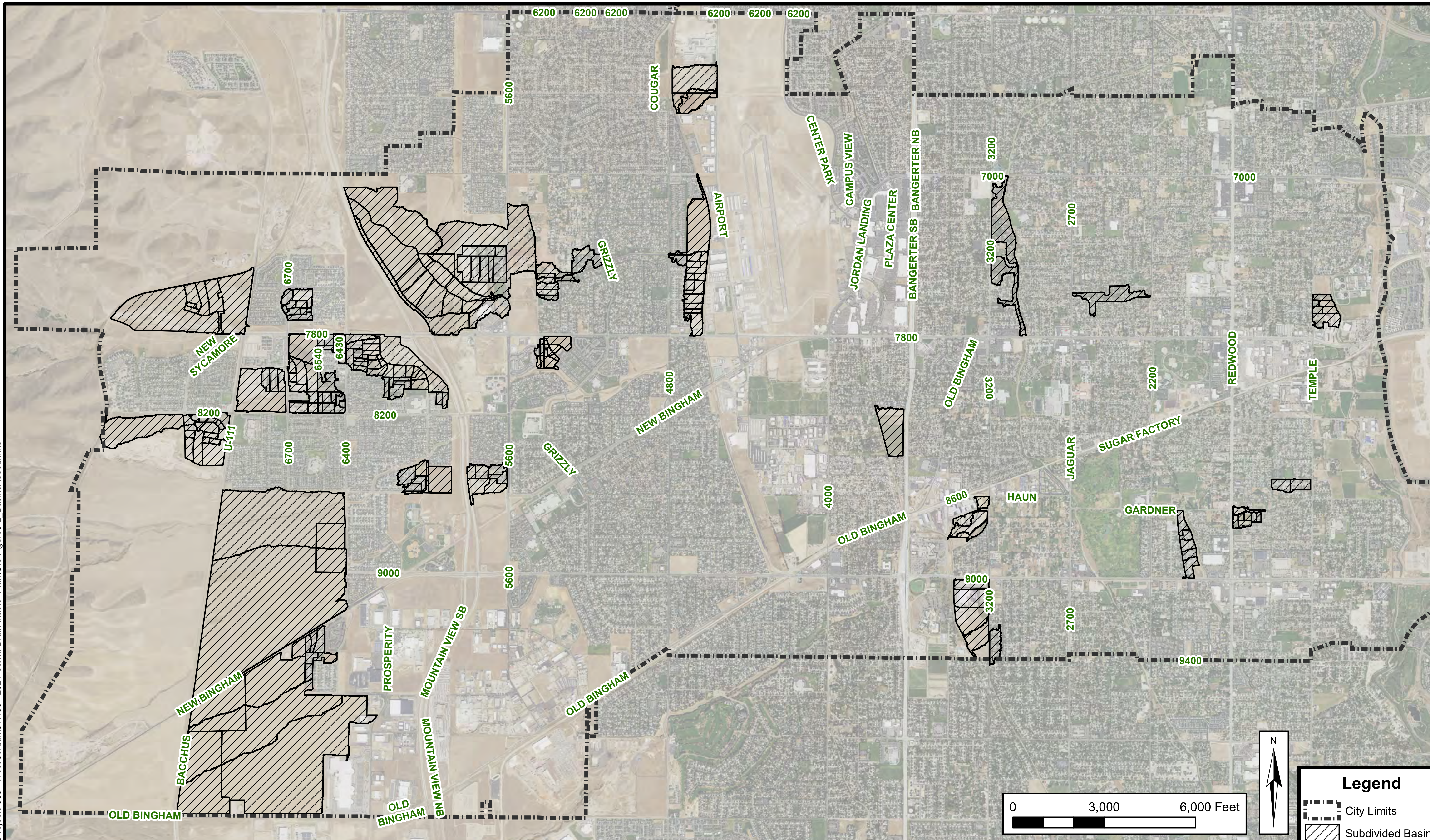
Although all four soil groups are found in the City, Group C and D soils are the most prevalent in the City, comprising approximately 80% of the soil within City limits. Soil data for this study originated from the NRCS Web Soil Survey (NRCS 2020). A soil map of the City is shown in Figure 3-3. The hydrologic soil group is a factor used to determine the CN for each subbasin.

Land Use

The primary data source for land use in this Master Plan is the Land use was the Meter-Scale Urban Land Cover (MULC) dataset released publicly in 2018 by the US Environmental Protection Agency (EPA). It was created using 2014 National Agricultural Imagery Program 1-meter resolution ortho imagery and LiDAR data collected in 2006-2007, 2011, and 2013-2014. The dataset is approximately 80% accurate and displays land cover at a higher resolution than previously available. The MULC was used to compute Curve Number and percent impervious for areas which have developed prior to the date it was flown. The secondary data source for land use in this master plan is a City-provided GIS shapefile showing the designated land uses for West Jordan. The land use shapefile was coupled with assumptions and was used for areas which have developed since the 2014 NAIP or will develop in the future. Figure 3-4 shows a simplified land use map and Table 3-2 shows the general mapping of Land use types to their simplified land use and assumptions based on a West Jordan case study of their total percent impervious and percent of impervious which is directly connected. Land use types not listed in Table 3-2 (e.g. Planned Community Zone, Professional Office, Public Facilities Research Park, etc.) did not appear to fit in a single simplified land use and were categorized individually.

Impervious Area

Impervious areas within each subbasin were estimated using the type of land uses within each subbasin as specified below in Table 3-2. There are two types of impervious area: directly connected impervious areas and unconnected impervious areas. Directly connected impervious



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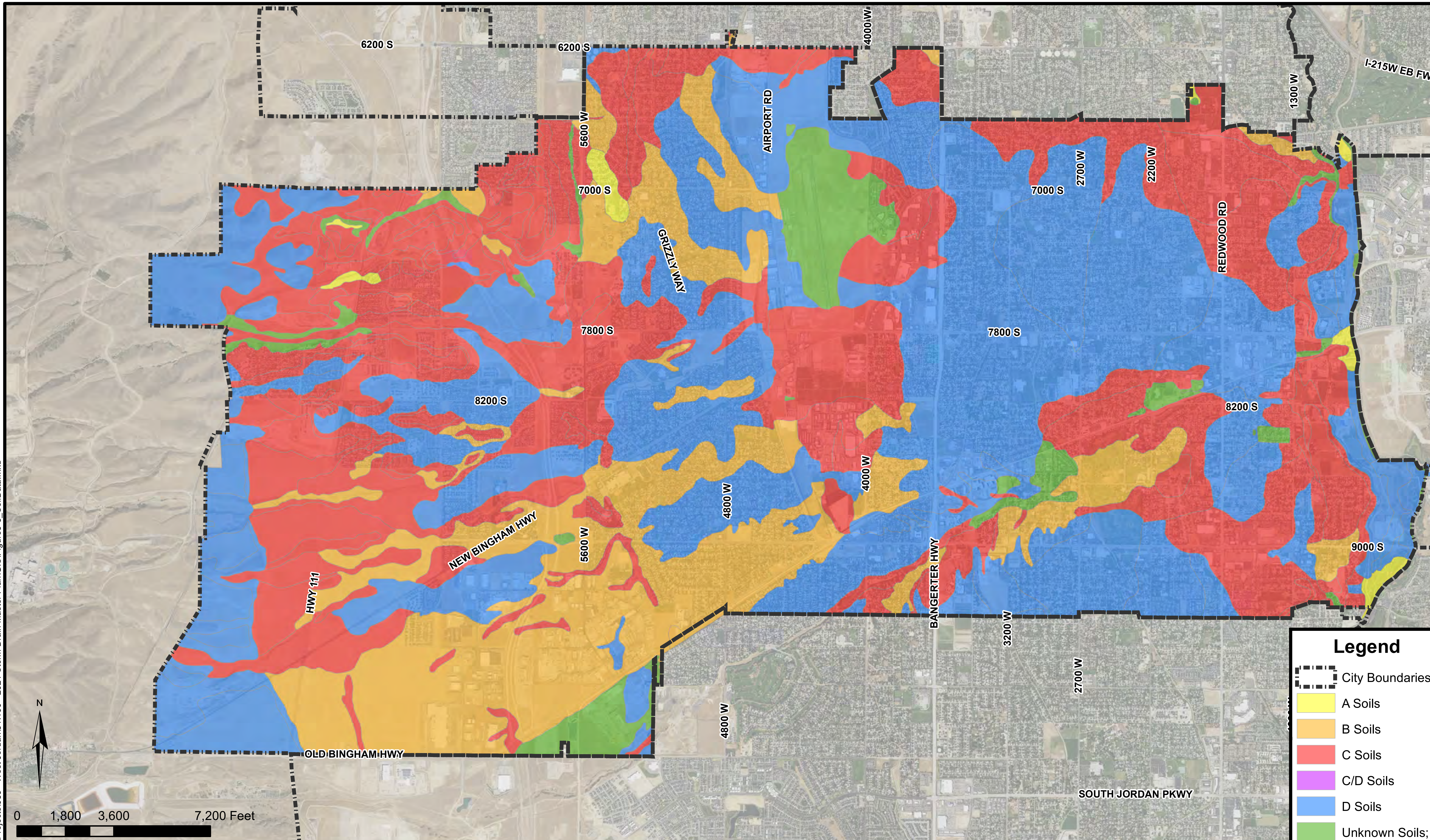
STORM DRAIN MASTER PLAN

BASINS SUBDIVIDED
BASED ON RECENT GROWTH

FIGURE
3-2



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NATURAL RESOURCES CONSERVATION SERVICE SOIL DATA
(SURVEYED JUNE 2020)

FIGURE
3-3

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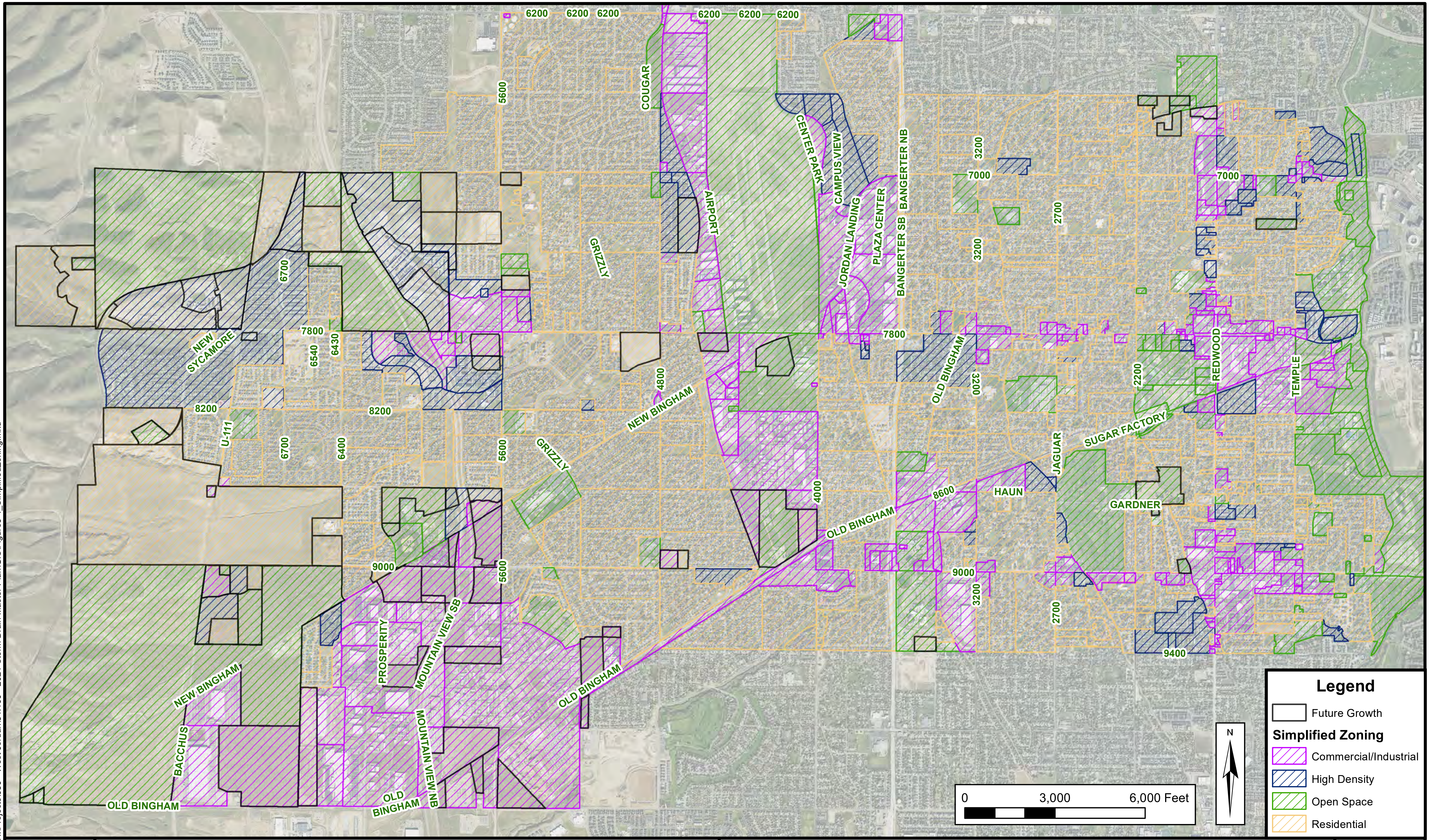

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STORM DRAIN MASTER PLAN

SIMPLIFIED ZONING

FIGURE 3-4

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areas provide a direct path for runoff to a conveyance such as a pipe, gutter, or channel. Directly connected impervious areas often include roadways, parking lots, driveways, and roofs. Runoff from unconnected impervious areas must cross a pervious area before reaching the drainage node for the subbasin. Examples of unconnected impervious areas include sidewalks that are not adjacent to the curb, patios, sheds, and usually some portion of house roofs.

Table 3-2
Land Uses in West Jordan

Land Use Type	Simplified Land Use Type	Percent of Area which is Impervious	Percent of Impervious which is Directly Connected
Agricultural Open Space	Open Space	10%	50%
Open Space			
Parks and Open Land			
Residential Low Density	Residential	50%	55%
Residential Very Low Dens			
Residential Medium Density	High Density Residential	60%	65%
Residential High Density			
Residential Very High Dens			
Commercial	Commercial	85%	90%
Industrial			

It is important to distinguish between directly connected and unconnected impervious areas. Runoff from the directly connected impervious areas reaches the drainage conveyance system quickly and usually determines the magnitude of the peak flow rate. Impervious areas such as backyard patios which drain to grassed or landscaped areas have much less impact on peak runoff.

Unconnected impervious area for residential land use is included in the pervious area with a composite curve number based on an area-weighted average. Impervious percentages for non-residential land use areas were estimated by case study on the four simplified land uses specified in Table 3-2. These percentages also closely correspond to those published in TR-55. The directly connected impervious area is included explicitly in the subbasin characteristics as a percentage. See Figure 3-5 below for an example of the MULC case study in a residential neighborhood.

Figure 3-5 MULC Residential Case Study (red is DCIA, pink is UCIA)

SCS Curve Number

Each subbasin was assigned an SCS curve number based on hydrologic soil group, land use, and ground cover type as outlined in Chapter 2 of TR-55 (NRCS, 1986). The curve number describes the relationship between precipitation and runoff for the pervious and unconnected impervious portions of the subbasin. Practical curve numbers range from 30 to 98. 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. The vegetation condition and unconnected impervious area were determined based on the land use. See Table 3-3 for the criteria for the curve number assignment.

Table 3-3
Curve Number Assignment Table

MULC gridcodes*	Model	Development Time Frame	Land Cover Data Source	Curve Number by Soil Type			
				A	B	C	D
30, 40, 52, or 70	Existing	Pre 2015	MULC	39	61	74	80
30, 40, 52, or 70	Existing	Recent	Zoning†	39	61	74	80
30, 40, 52, or 70	Existing	Future	MULC	49‡	69‡	79‡	84‡
30, 40, 52, or 70	Future	Pre 2015	MULC	39	61	74	80
30, 40, 52, or 70	Future	Recent	Zoning†	39	61	74	80
30, 40, 52, or 70	Future	Future	Zoning†	39	61	74	80
10 or 20	Existing	Pre 2015	MULC	98	98	98	98
10 or 20	Existing	Recent	Zoning†	98	98	98	98
10 or 20	Existing	Future	MULC	98	98	98	98
10 or 20	Future	Pre 2015	MULC	98	98	98	98
10 or 20	Future	Recent	Zoning†	98	98	98	98
10 or 20	Future	Future	Zoning†	98	98	98	98

*Grid codes 10 and 20 represent water and developed (impervious) respectively. 30 is Barren, 40 is Forest, 52 is Shrub/Scrub, 70 is Herbaceous.

†The zoning case study was used to determine how much area is impervious and how much of that impervious is directly connected. Unconnected impervious and pervious CN is based on TR-55, cover description of Open space, good condition.

‡In the existing model, the CN for land which will develop in the future was assumed to be Open Space, fair condition from TR-55.

Subbasin Width

The subbasin width is calculated using the subbasin area and the longest overland flow length within the subbasin. The longest overland flow length is the longest distance runoff would travel before becoming channelized in a natural drainage or curb and gutter. In residential areas this is usually defined as the distance from the back of a lot to the curb and gutter. In non-urban areas the maximum suggested overland flow length is 500 feet (Rossman, 2010). As part of the basin parameter recalculation, HAL performed a case study on 28 typical residential subbasins with the objective to define a reasonable mapping from acreage to equivalent width. The length was digitized for each case study basin and the width was calculated as the area divided by 1.3 times the length. Typical denominator coefficients range from 1 to 2. (Rossman and Huber, 2016). See Figure 3-6.

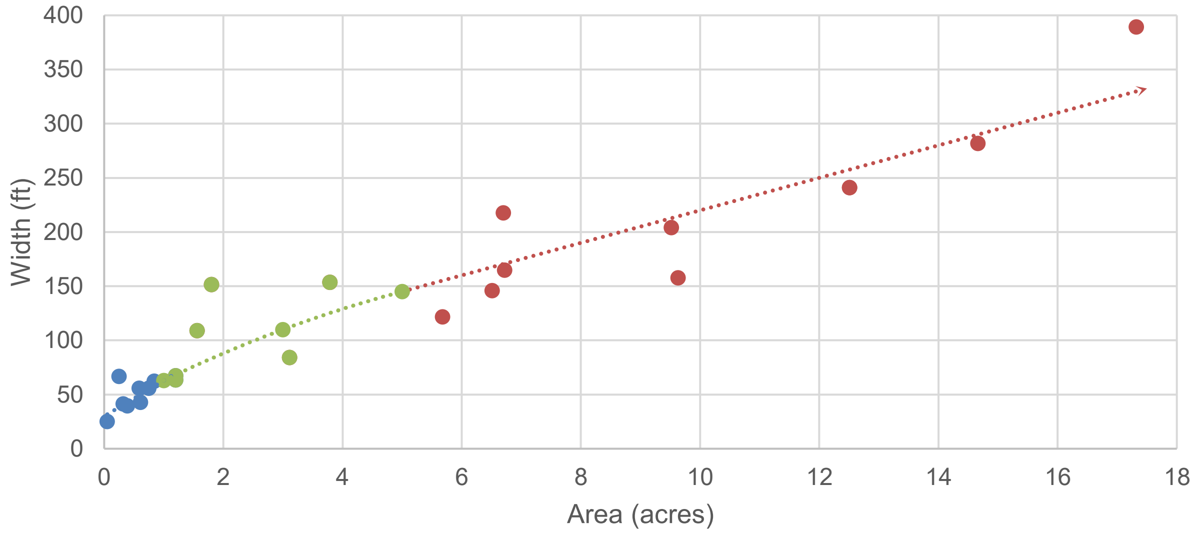


Figure 3-6 Equivalent Width by Subbasin Area - Case Study

Equation 3-1 is the piece-wise equation used to assign equivalent width (in feet) and is based on the trendline shown above in Figure 3-6. The variable A represents basin area (in acres).

$$Equivalent\ width\ (ft) = \begin{cases} 33A + 30 & 0 \le A \le 1 \\ -1.5A^2 + 29.5A + 35 & 1 \le A \le 5 \\ 15A + 70 & 5 \le A \le 50 \\ 0.025A^{0.7125} & A > 50 \end{cases}$$

Equation 3-1

After testing this empirical relationship in the model, it was determined that an additional criteria needed to be added; namely, the length over width ratio should not be less than 2 for very small basins. This criteria was added as these basins were contributing more than their expected runoff. Figure 3-7 presents the resultant L/W ratio curve against area in acres.

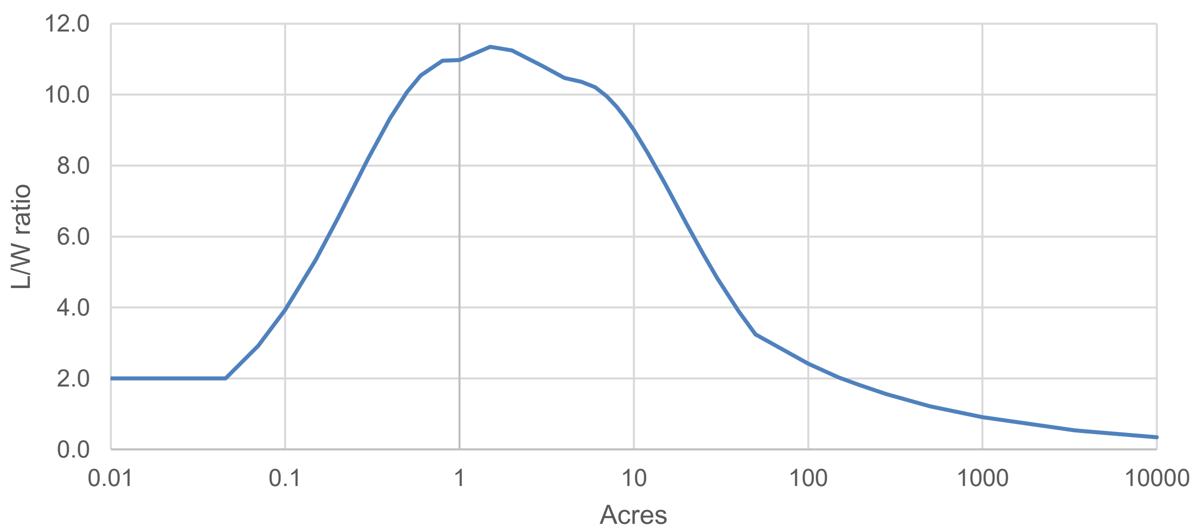


Figure 3-7 Mapping Used to Assign Equivalent Width – L/W by Area

DEVELOPMENT OF THE HYDRAULIC MODELS

Links

Conveyances (called links in SWMM and InfoSWMM) 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 each model were defined using City input, aerial imagery, 1 ft contours, and data from the system inventory which identified conveyances. This information is used in the model to perform the hydraulic analysis for timing and routing of storm runoff hydrographs.
Some uncertainty is associated with modeled drainage paths. In the eastern part of the City stormwater conveyances frequently coincide with irrigation pipes and ditches. Flow paths in irrigation conveyances can be altered by gates and diversions, complicating the modeling of flow paths.

Unlike HEC-HMS, SWMM and InfoSWMM 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 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 conveyances can be modified with a group edit to drastically increase the size of the conduits so that the peak flows are not restricted and specific points in the system experience the maximum possible flows during a precipitation event. This method was used for identifying master plan projects in order to better represent the potential flow from upstream runoff.

Nodes

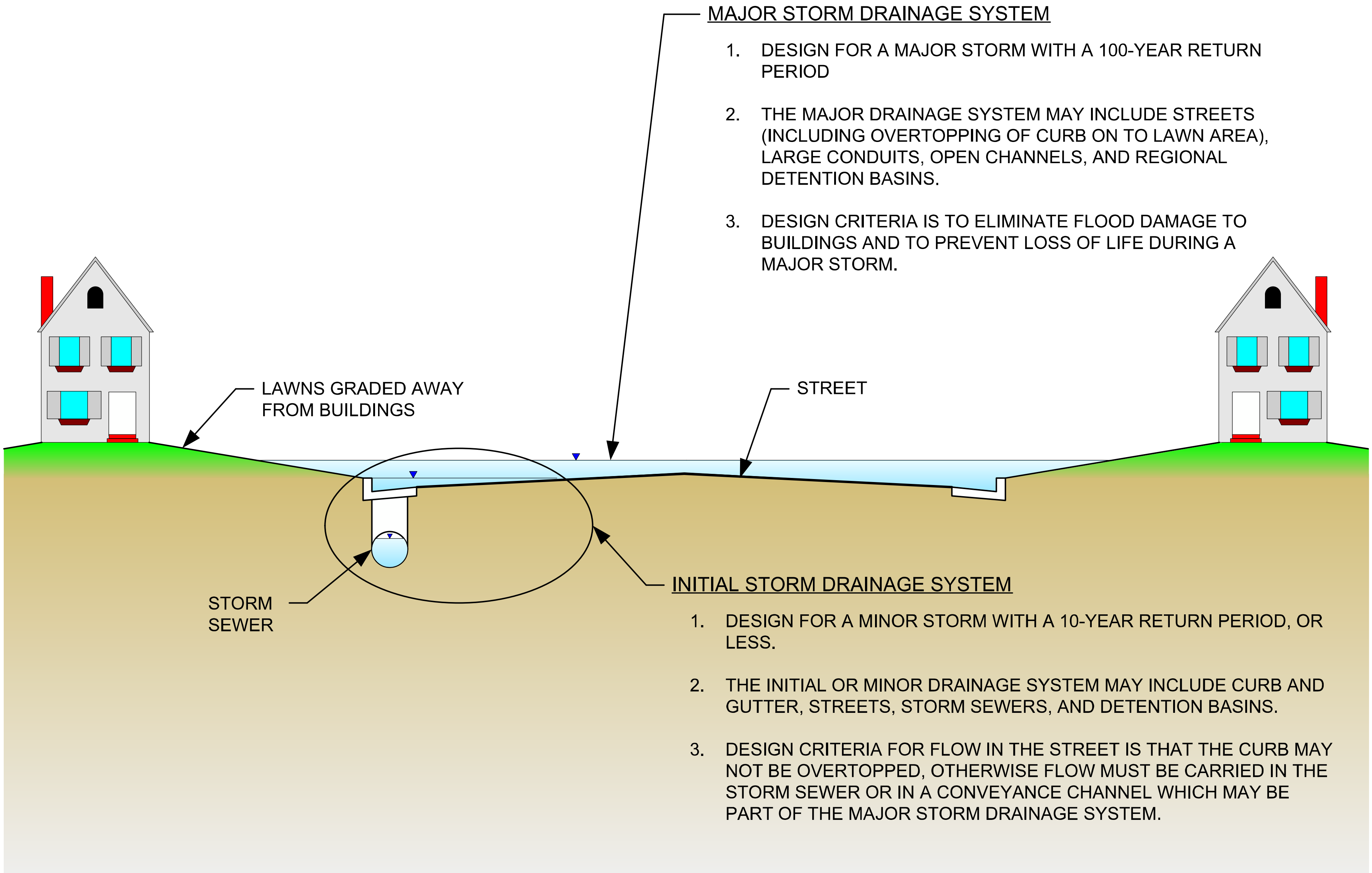
In the model, nodes are points where conveyances or subbasins connect. Nodes generally represent manholes, inlets, outfalls, dividers, detention basins, or points where multiple conveyances combine. Nodes contain elevation data which determines the elevation of attached conveyances. Nodes also have depth 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.

DESIGN FLOW RATES

The model computes hydrographs for each subbasin, conveyance, and junction. The City storm drainage system was analyzed with the 10-year 24-hour precipitation event for the majority of the system. Because of the way the model handles flooding at nodes, 100-year storms are only modeled for features expected to carry 100-year storm flows (i.e. detention facilities). Most storm drain systems anticipate surcharging during 100-year storm events and rely on gutter and surface flow to convey excess runoff to the outlet.

A schematic of the urban storm drainage criteria is shown on Figure 3-8.



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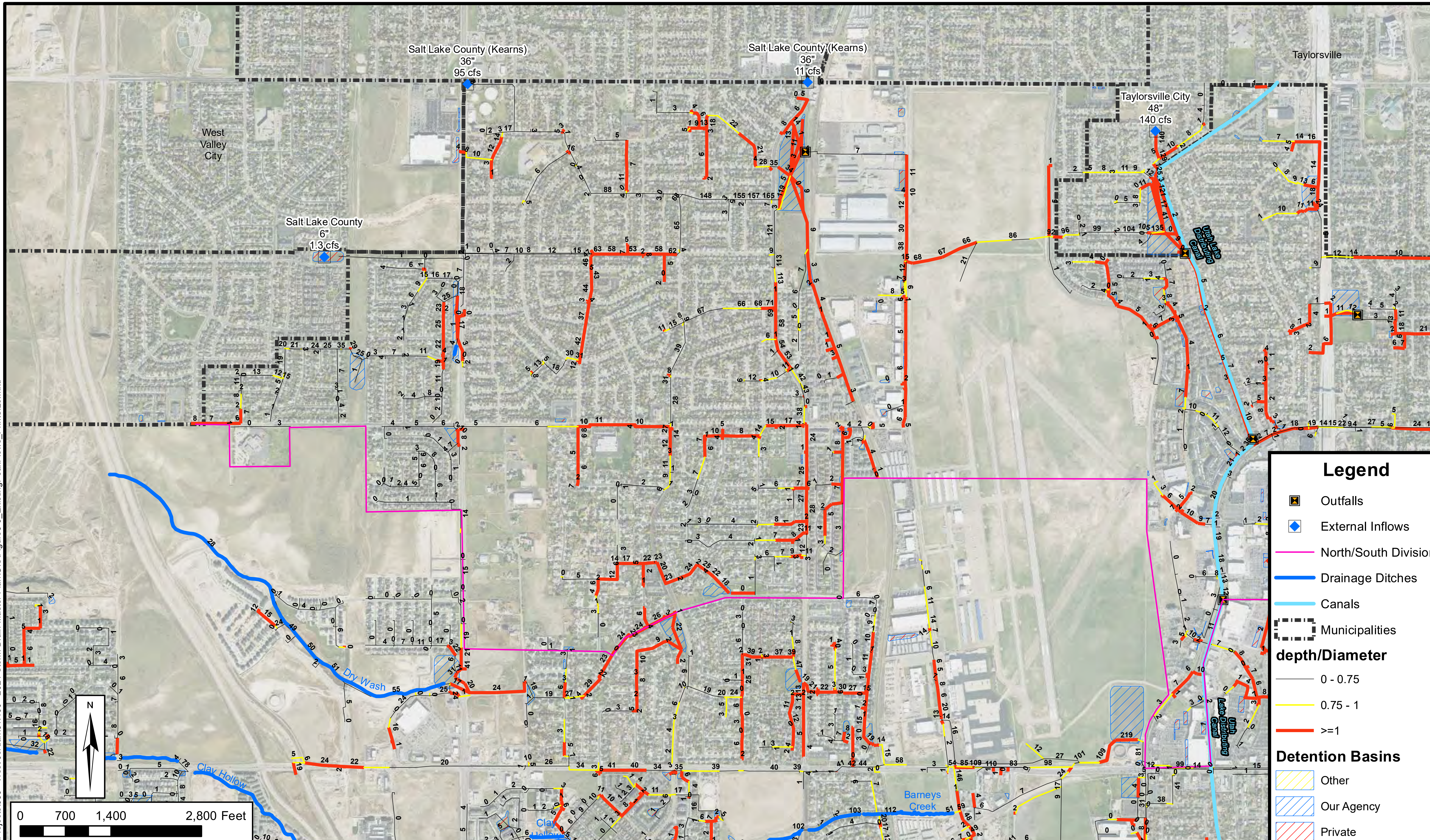
CAPACITY ANALYSIS

The SWMM and InfoSWMM model can determine the water depth, flow rate, and capacity of conveyances during the precipitation event. This detailed analysis includes calculating surcharged conditions and backwater effects if the Dynamic 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. Figure 3-9 shows the maximum flow in the modeled conduits for the 10-year frequency storms. Figure 3-10 shows the capacity of the lines against the theoretical maximum existing flow provided all system constrictions were to be removed. A 100-year capacity analysis was conducted for detention basins and natural drainages which is discussed in more detail in Chapter 4.



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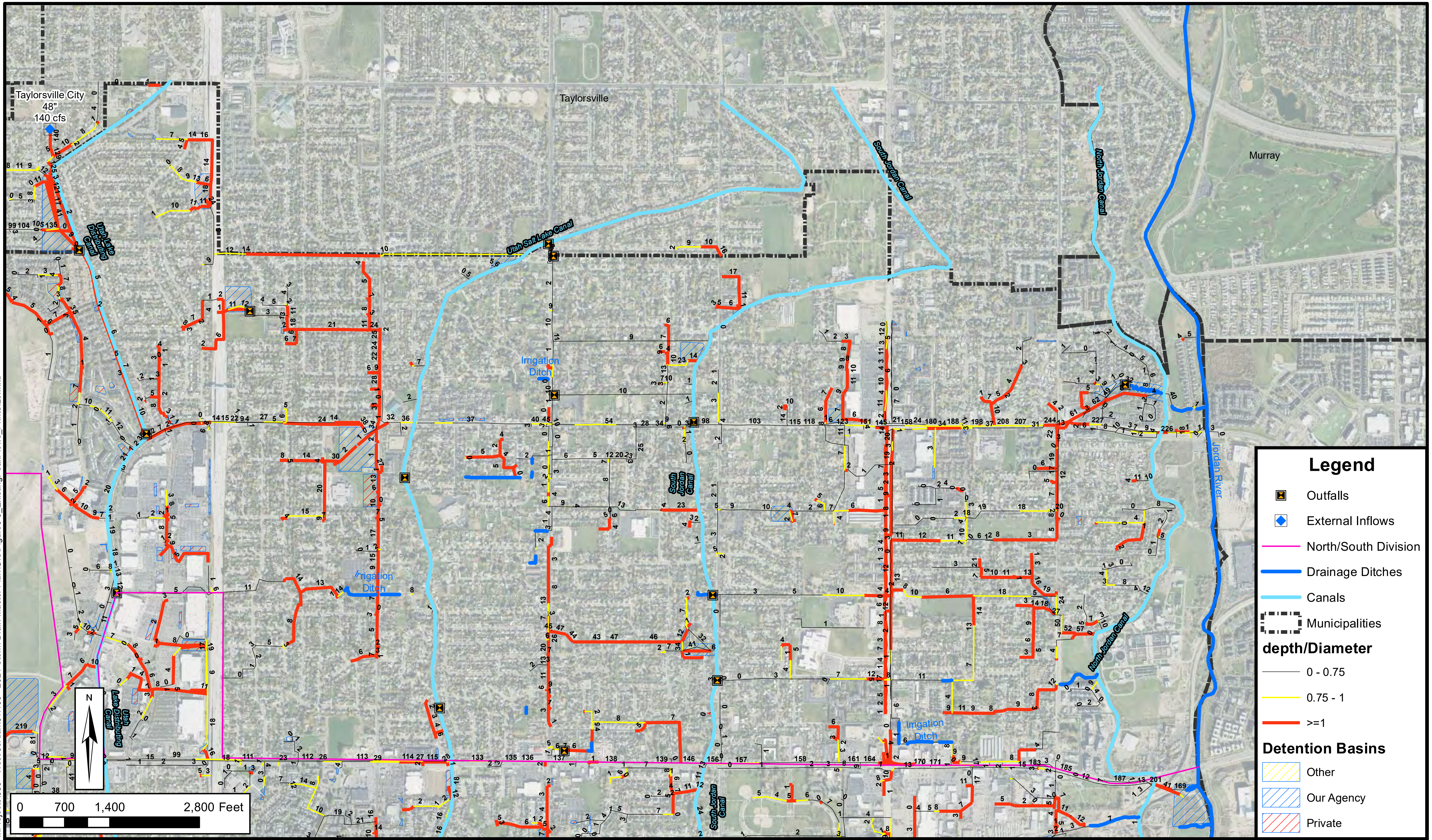
STORM DRAINAGE MASTER PLAN

EXISTING PEAK FLOWS
NORTH MODEL - 6700W TO 3700W

FIGURE 3-9.1



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STORM DRAINAGE MASTER PLAN

EXISTING PEAK FLOWS
NORTH MODEL - 4000W TO 800W

FIGURE
3-9.2

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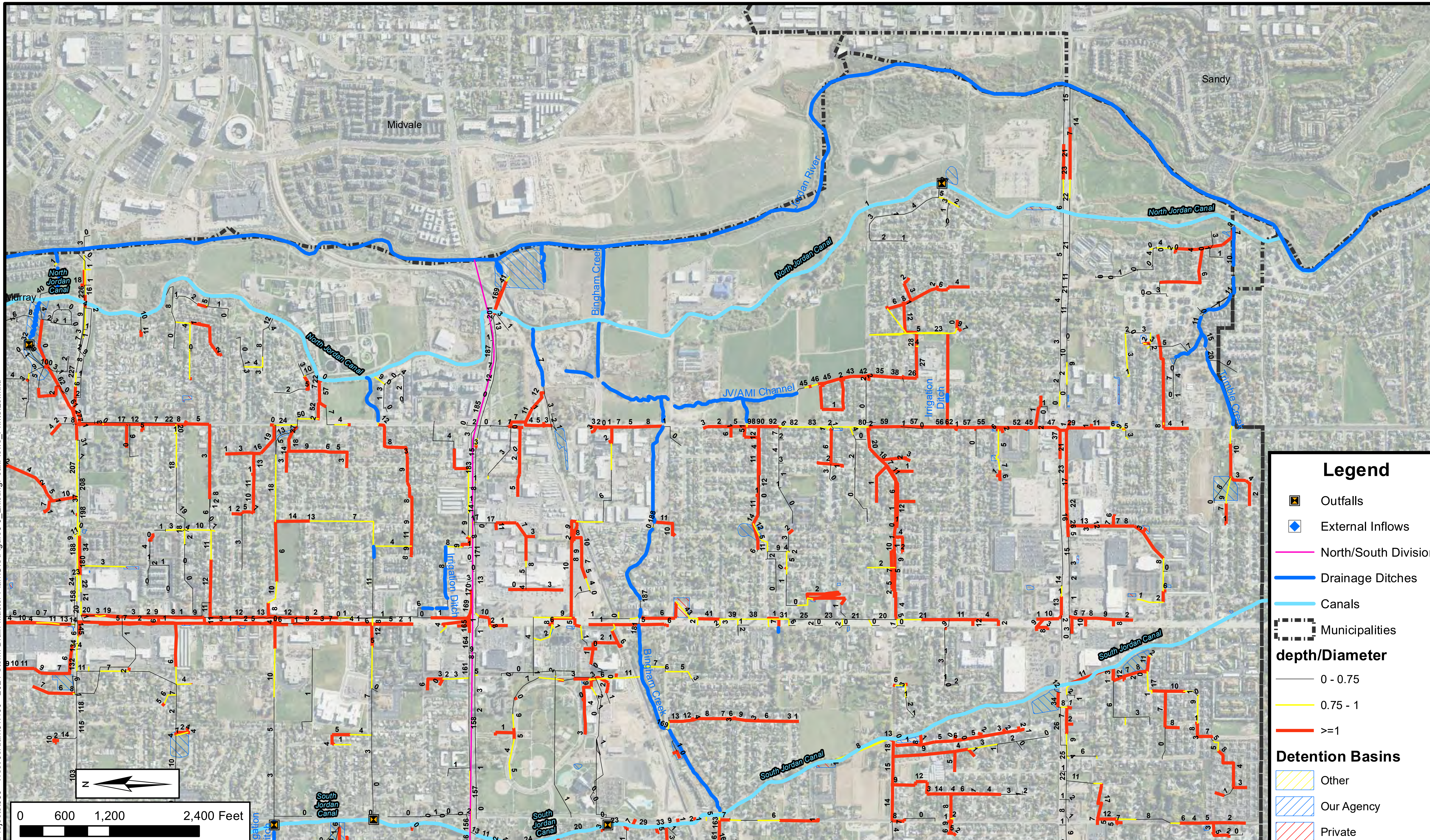

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STORM DRAINAGE MASTER PLAN

EXISTING PEAK FLOWS
SOUTH MODEL - 2000W TO 800W

FIGURE 3-9.3

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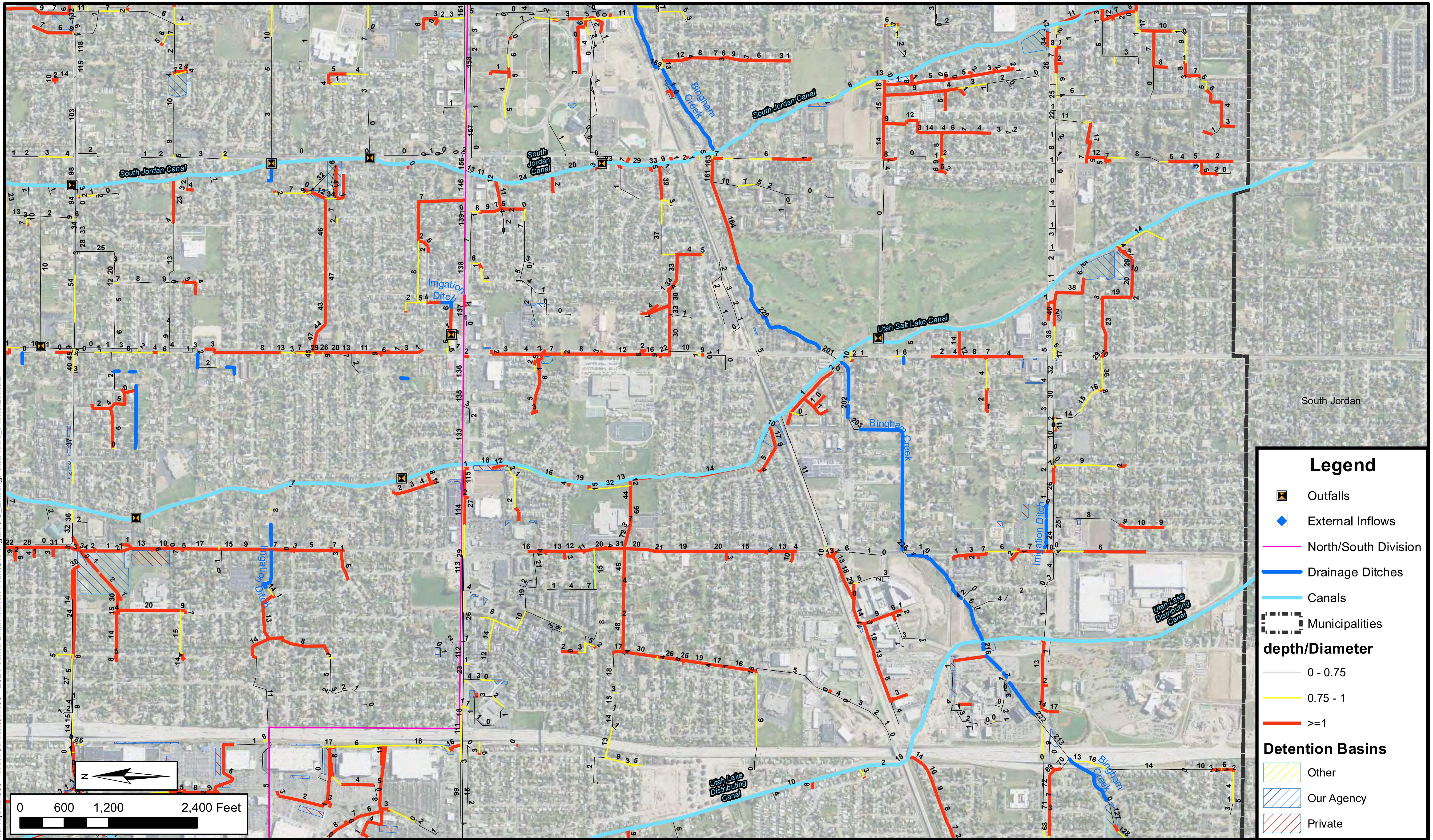

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STORM DRAINAGE MASTER PLAN

EXISTING PEAK FLOWS
SOUTH MODEL - BANGERTER HWY TO 2000W

FIGURE
3-9.4

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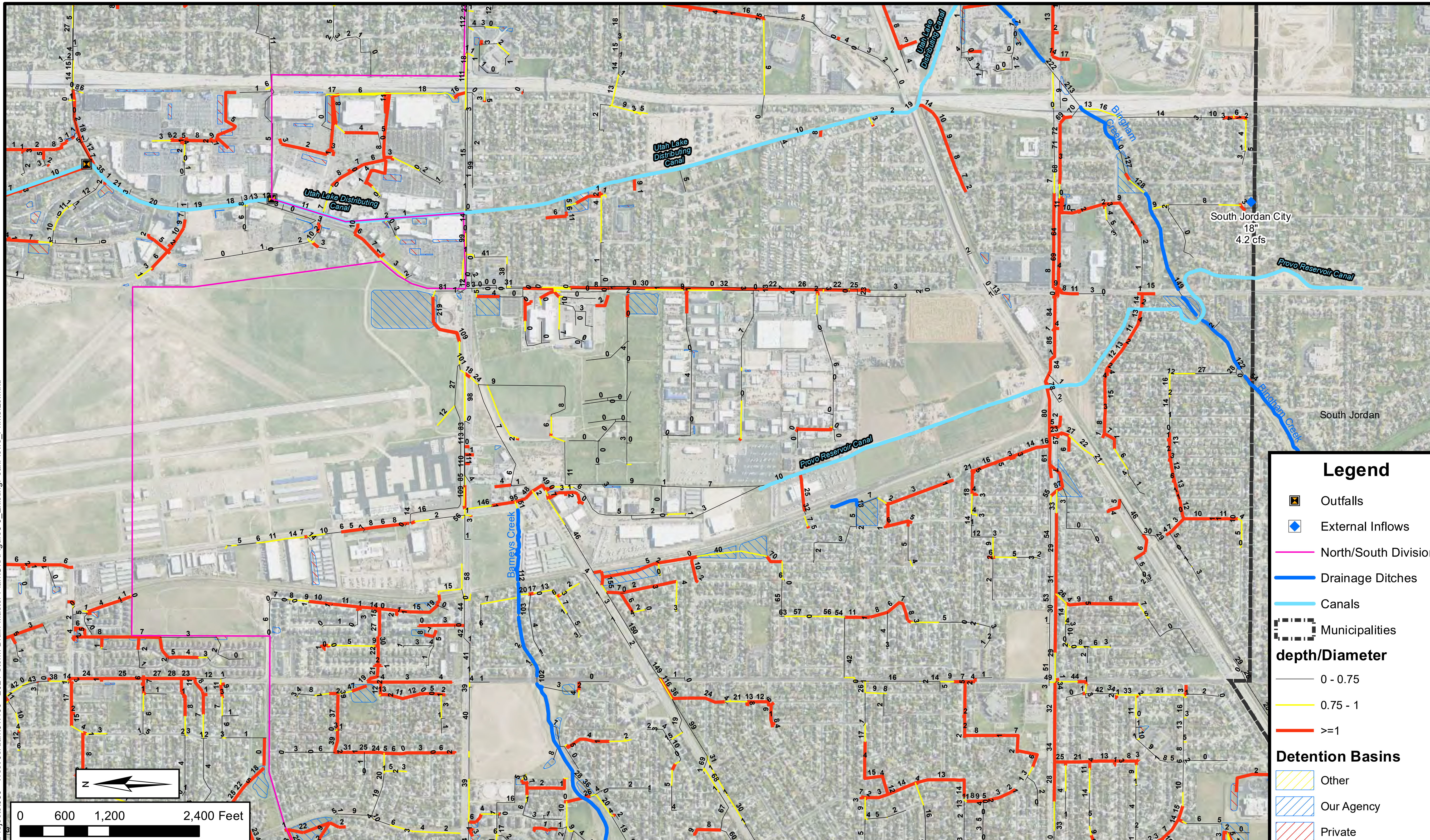

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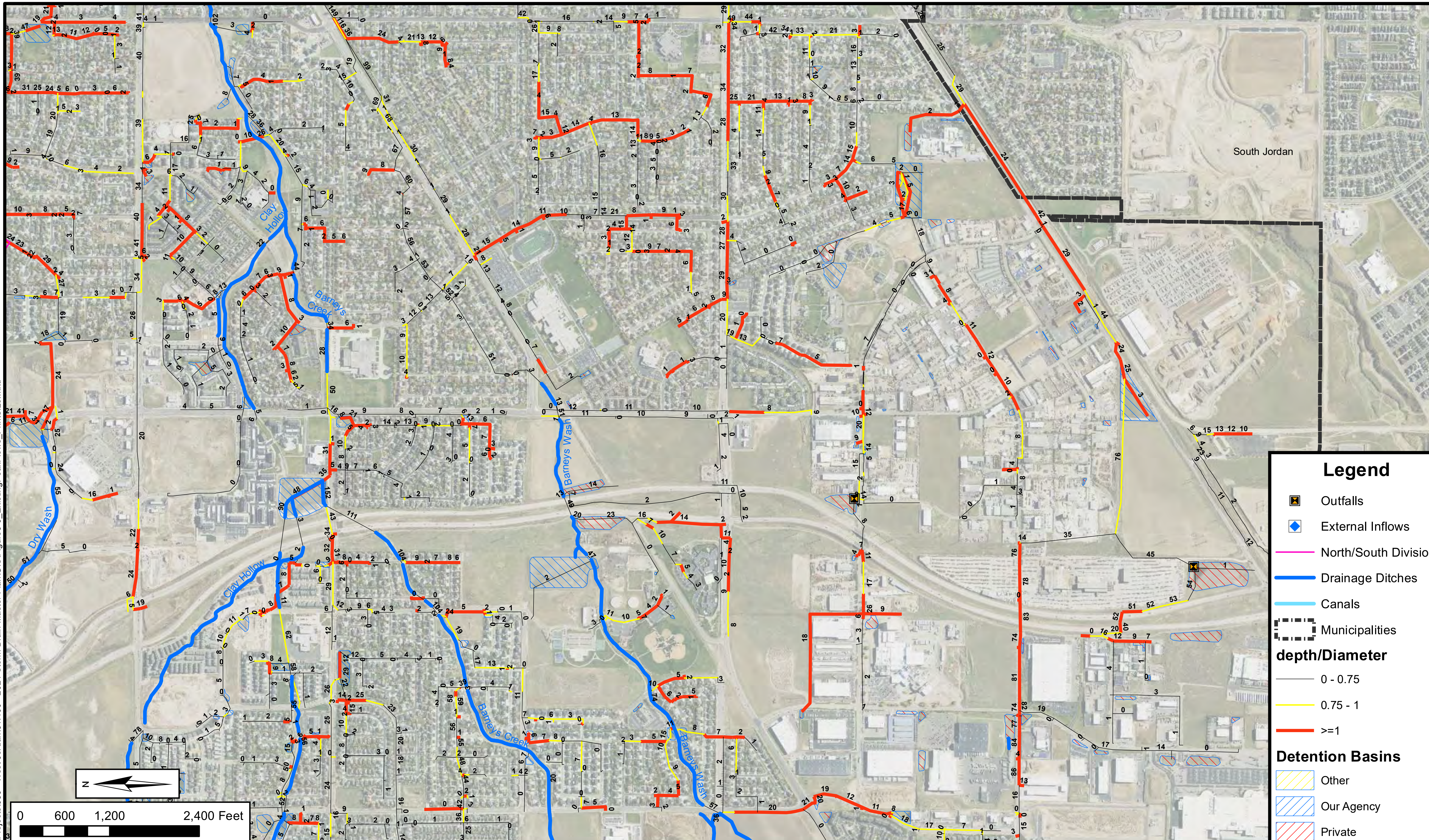
CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

EXISTING PEAK FLOWS
SOUTH MODEL - 5000W TO BANGERTER HWY

FIGURE
3-9.5



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STORM DRAINAGE MASTER PLAN

EXISTING PEAK FLOWS
SOUTH MODEL - 6300W TO 5000W

FIGURE 3-9.6

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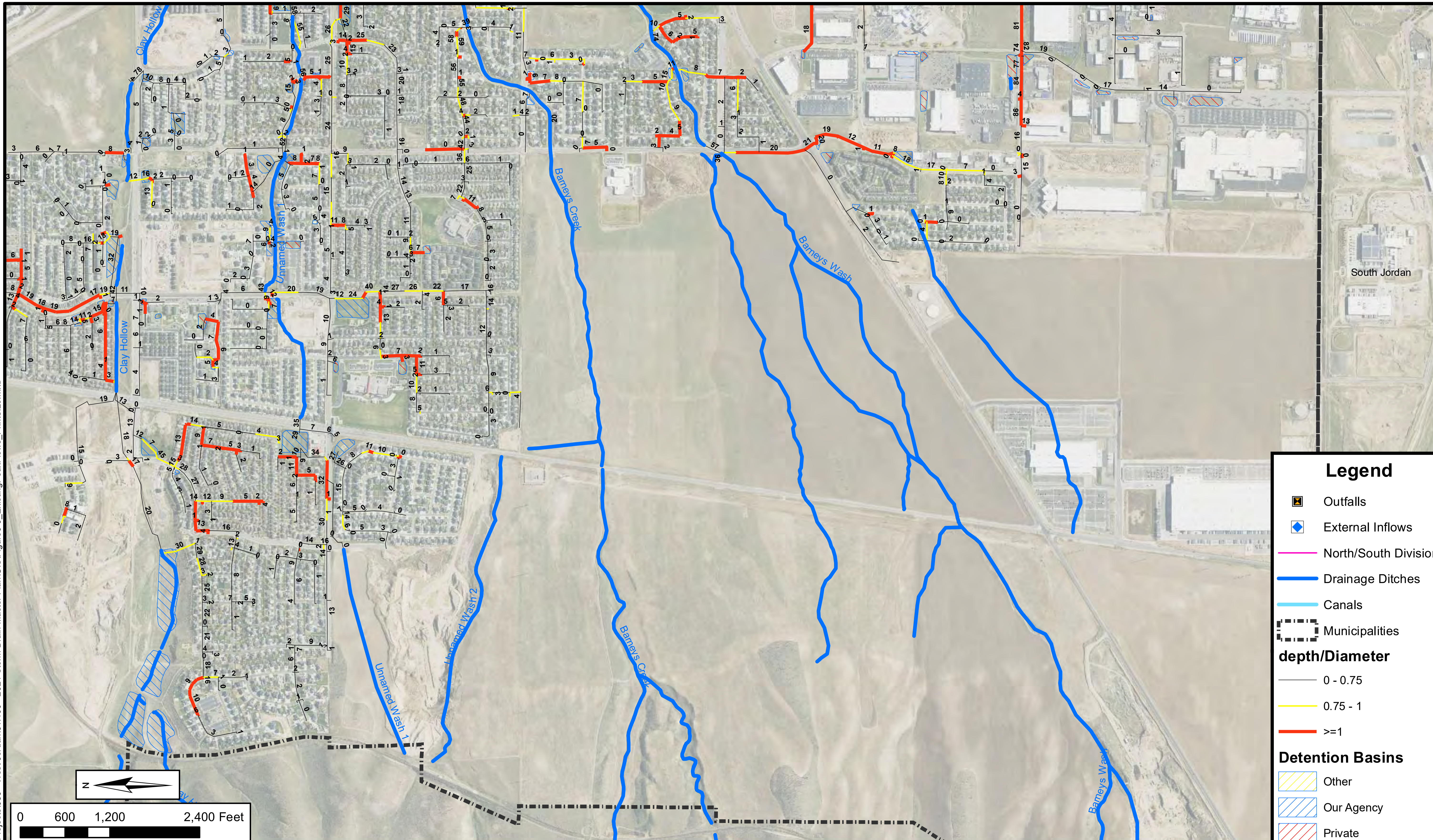

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EXISTING PEAK FLOWS
SOUTH MODEL - 7600W TO 6300W

FIGURE
3-9.7

Date: 2/22/2022
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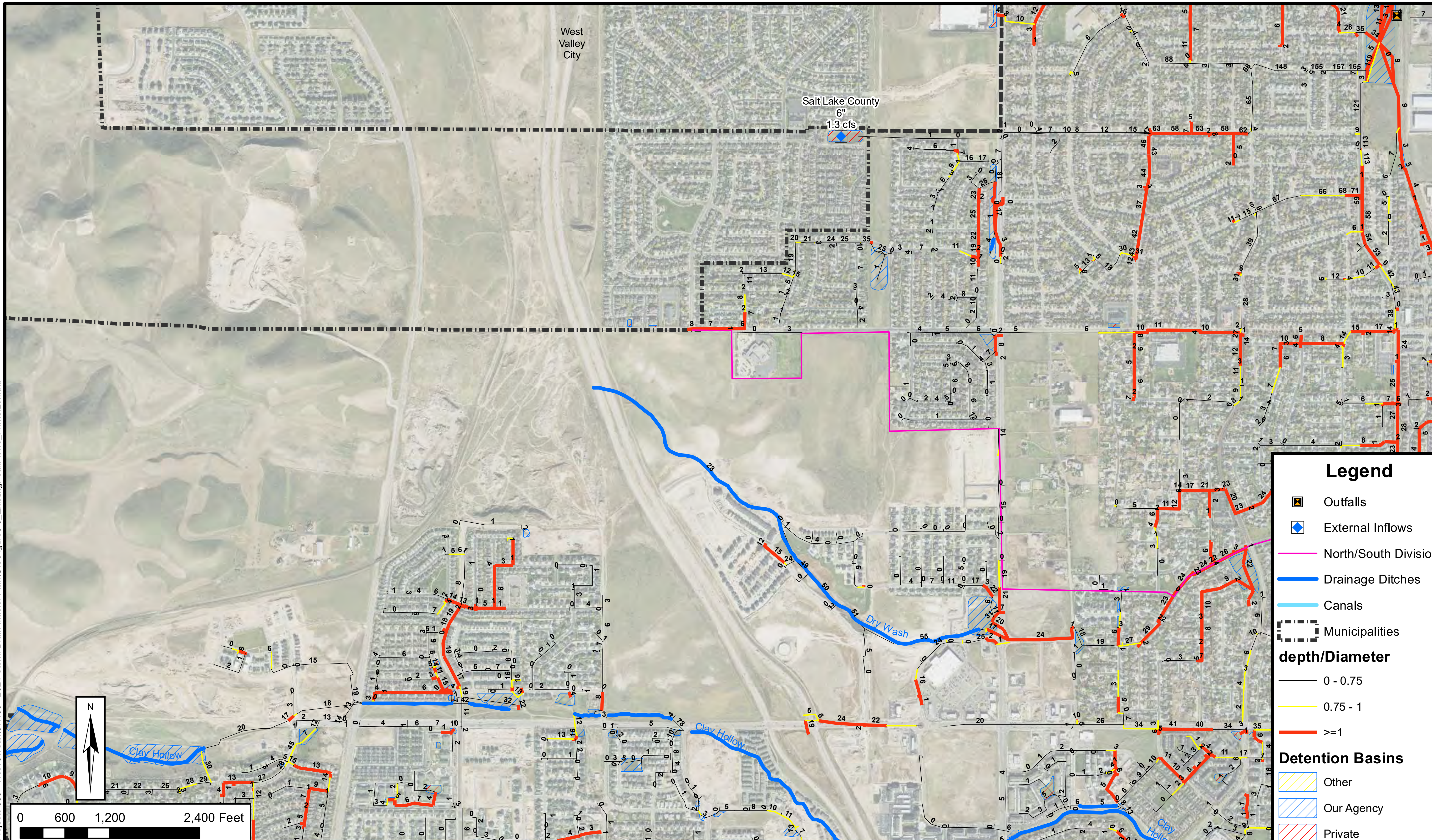

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STORM DRAINAGE MASTER PLAN

EXISTING PEAK FLOWS
SOUTH/NORTH MODEL - U-111 HWY TO 4900W

FIGURE 3-9.8

Date: 2/22/2022
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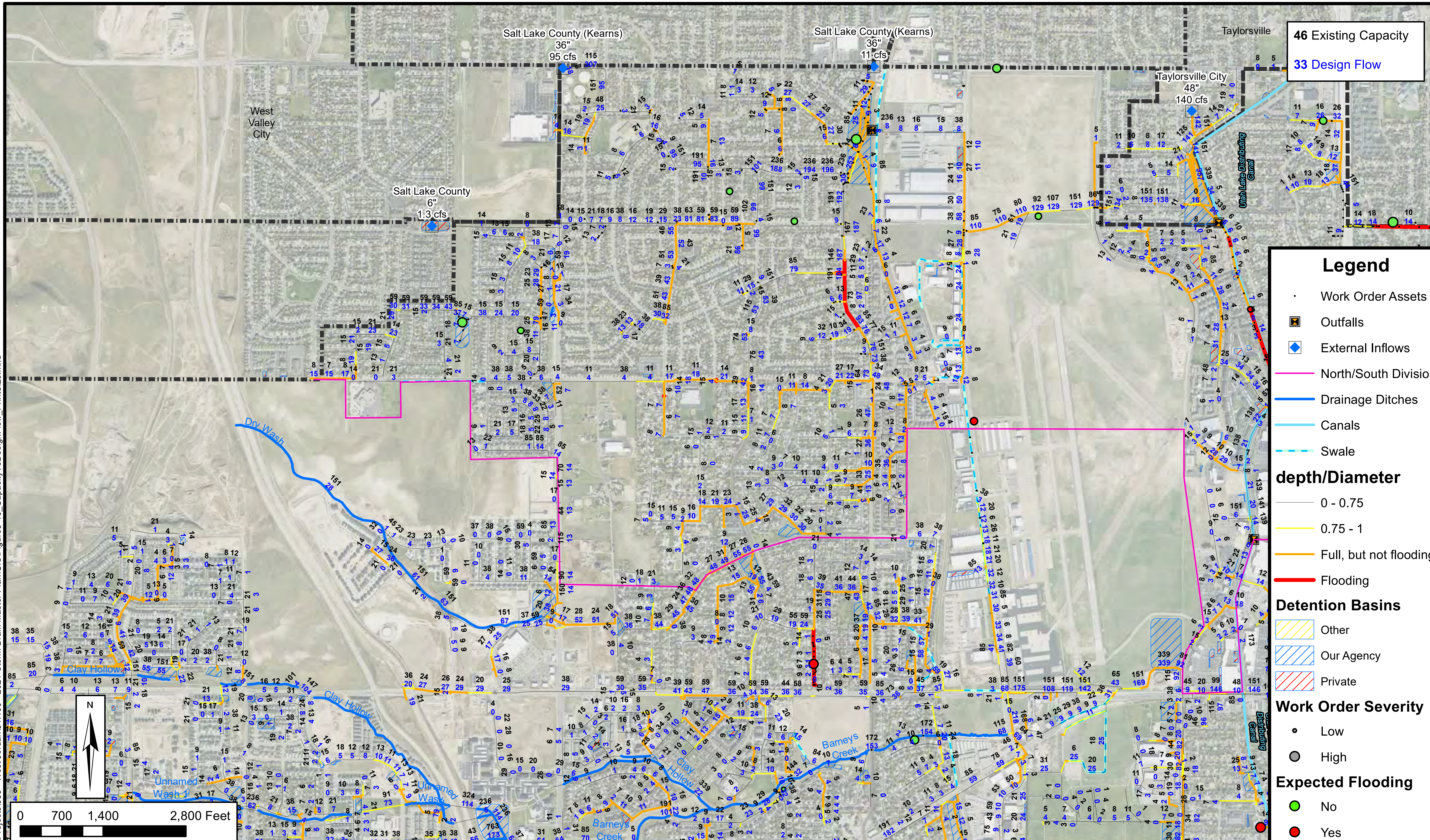

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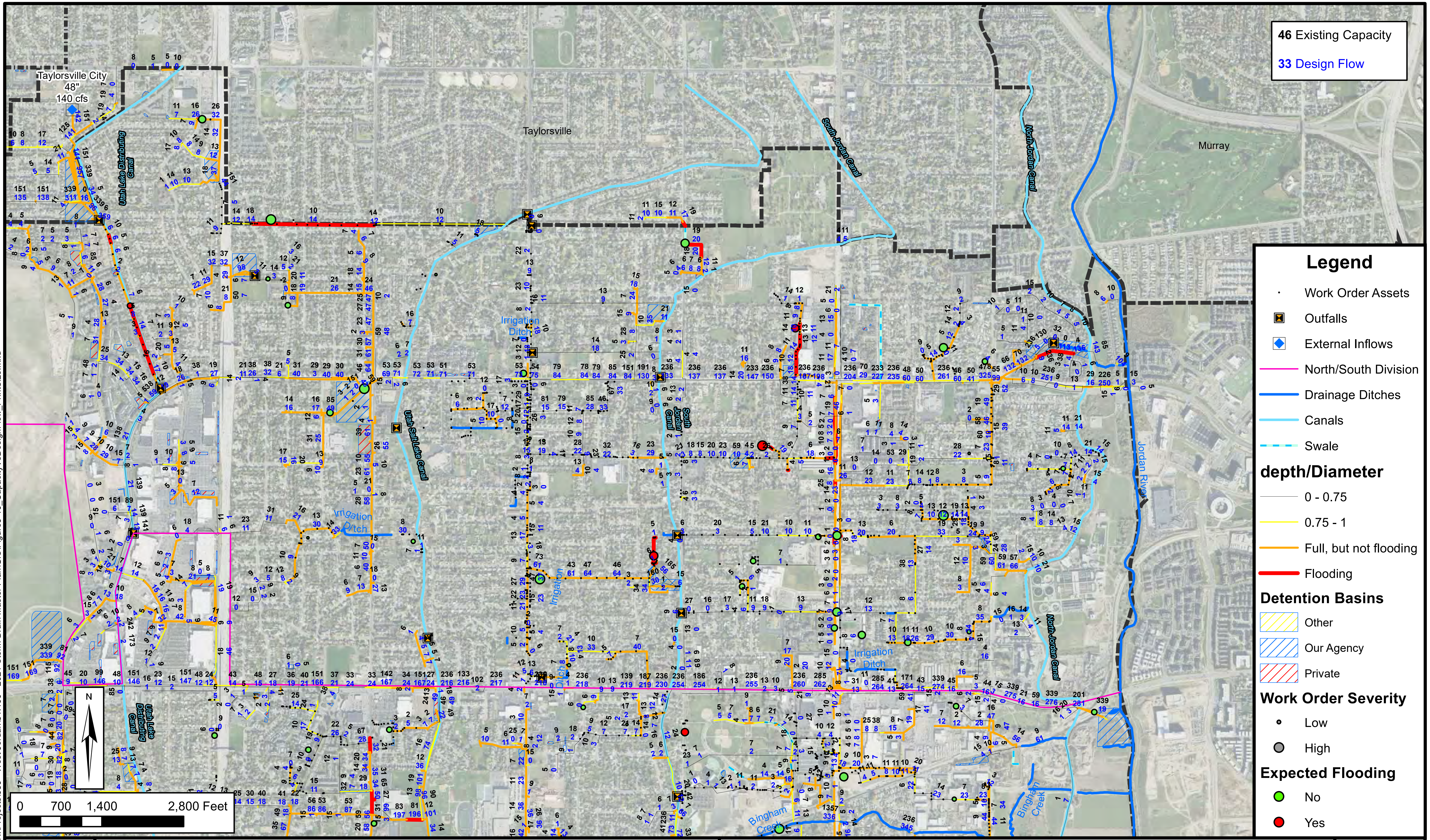
STORM DRAINAGE MASTER PLAN

CAPACITY VERSUS DESIGN FLOWS
NORTH MODEL - 6700W TO 3700W

FIGURE
3-10.1



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STORM DRAINAGE MASTER PLAN

CAPACITY VERSUS DESIGN FLOWS
NORTH MODEL - 4000W TO 800W

FIGURE 3-10.2

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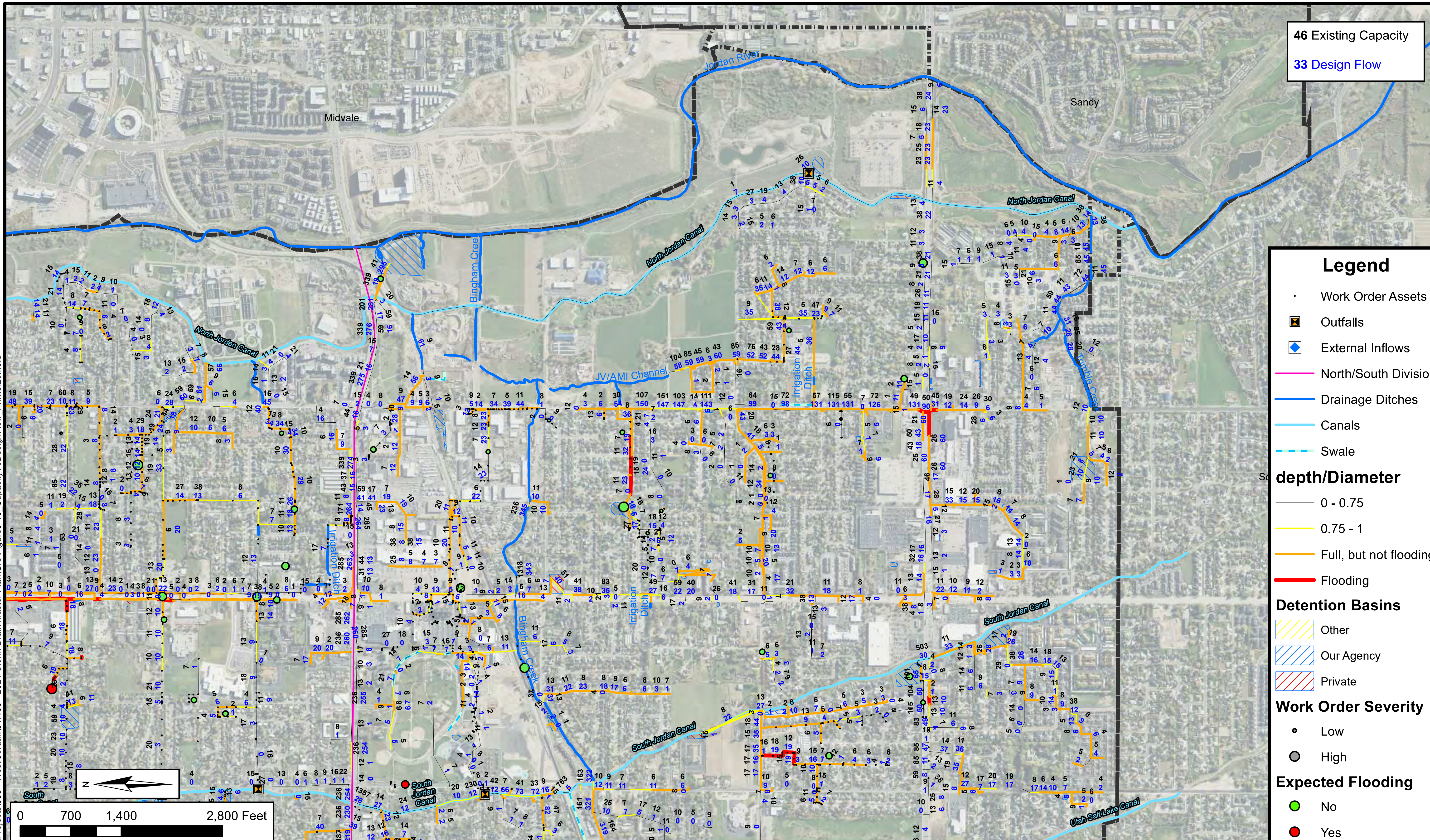

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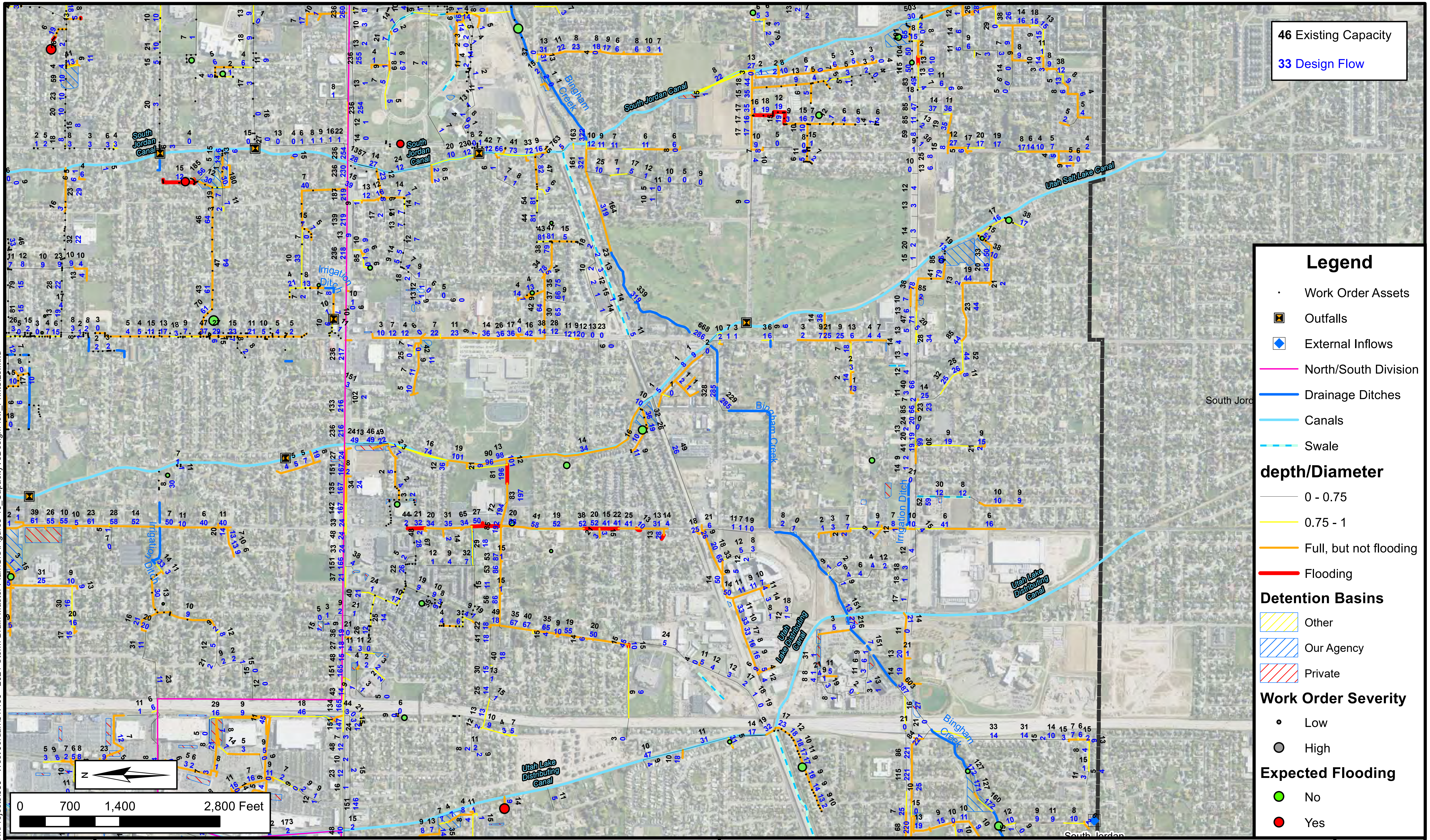
STORM DRAINAGE MASTER PLAN

CAPACITY VERSUS DESIGN FLOWS
SOUTH MODEL - 2000W TO 800W

FIGURE
3-10.3



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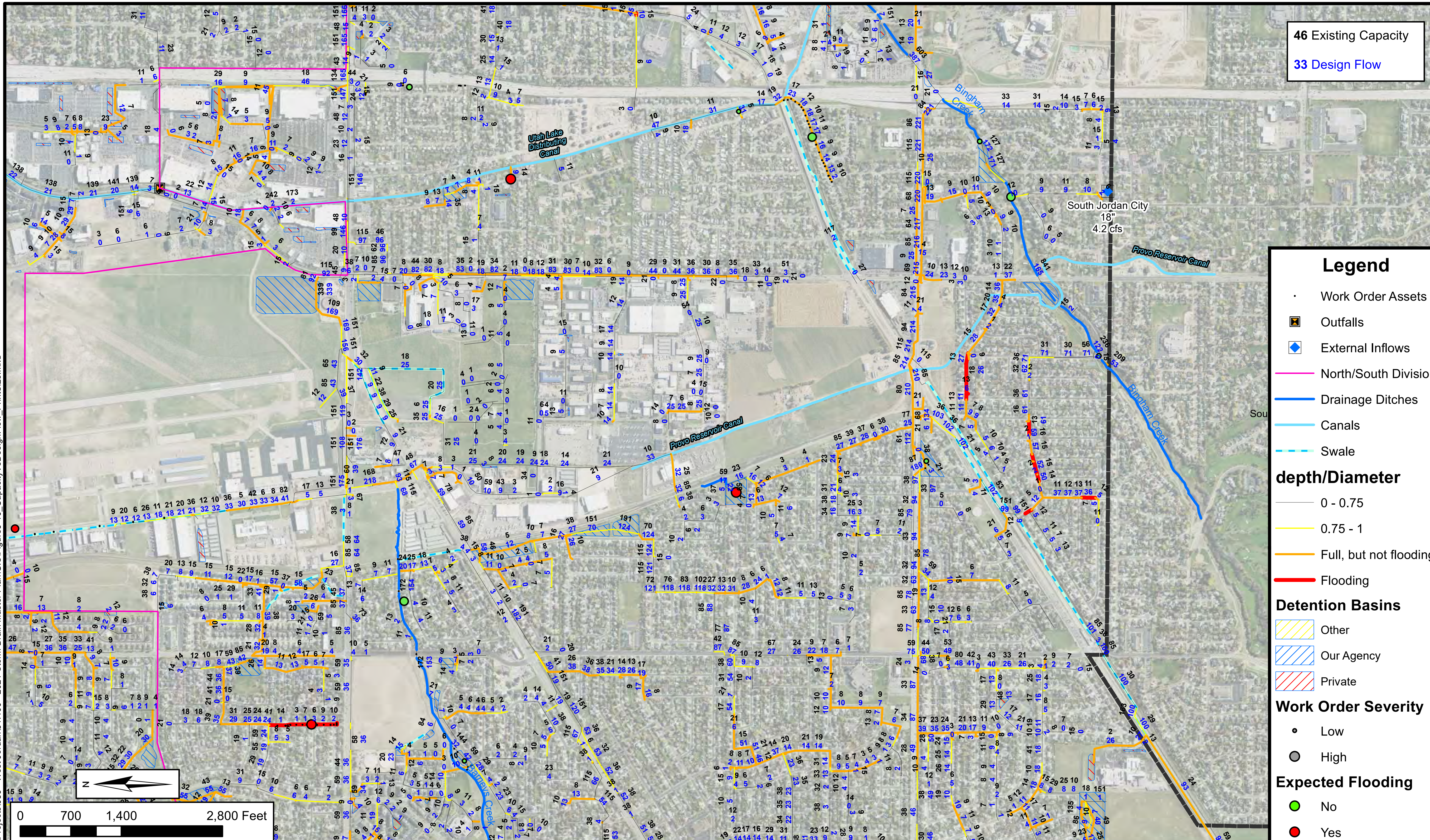
CITY OF WEST JORDAN STORM DRAINAGE MASTER PLAN	CAPACITY VERSUS DESIGN FLOWS SOUTH MODEL - BANGERTER HWY TO 2000W	FIGURE 3-10.4



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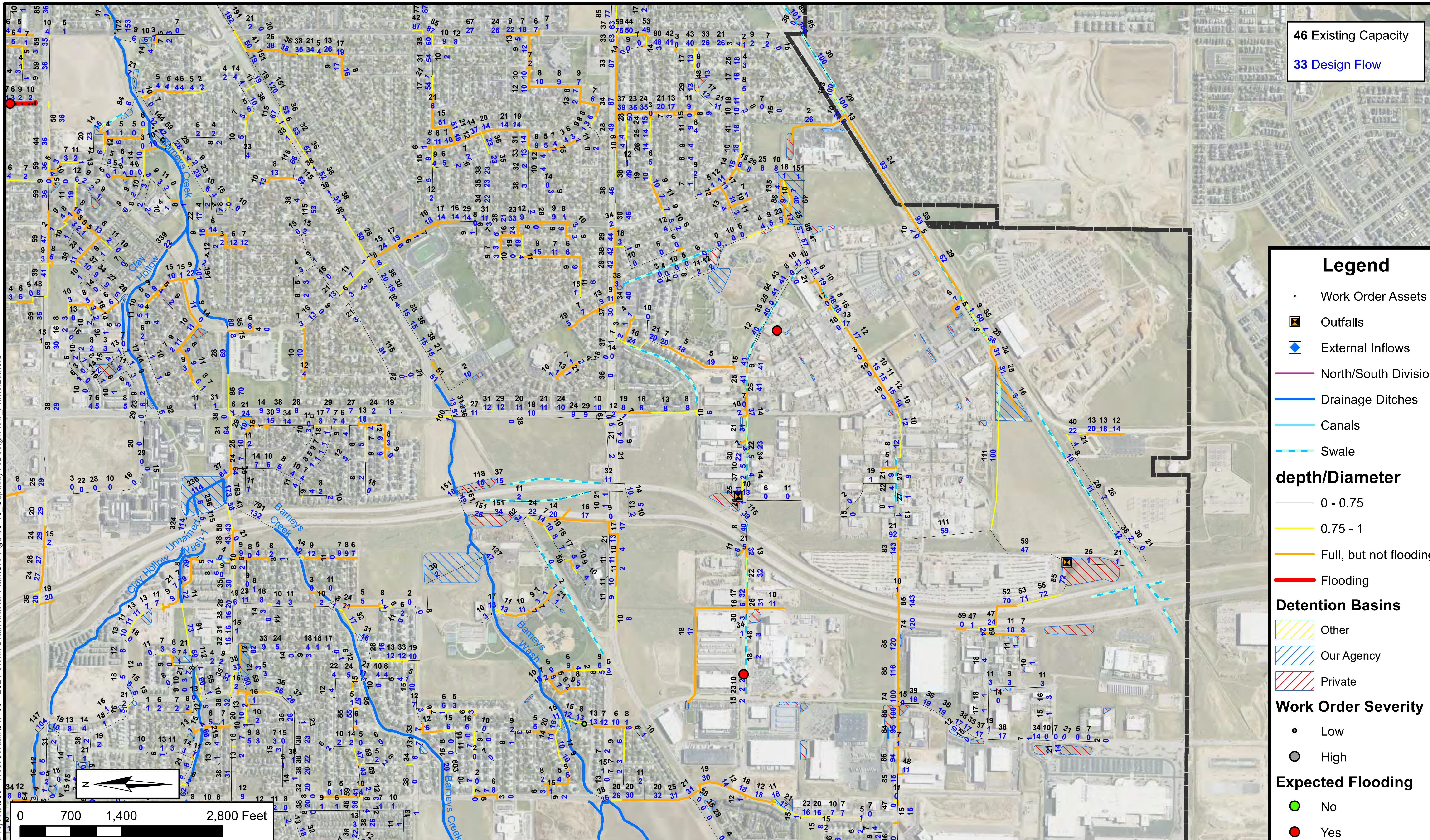
CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

CAPACITY VERSUS DESIGN FLOWS
SOUTH MODEL - 5000W TO BANGERTER HWY

FIGURE 3-10.5



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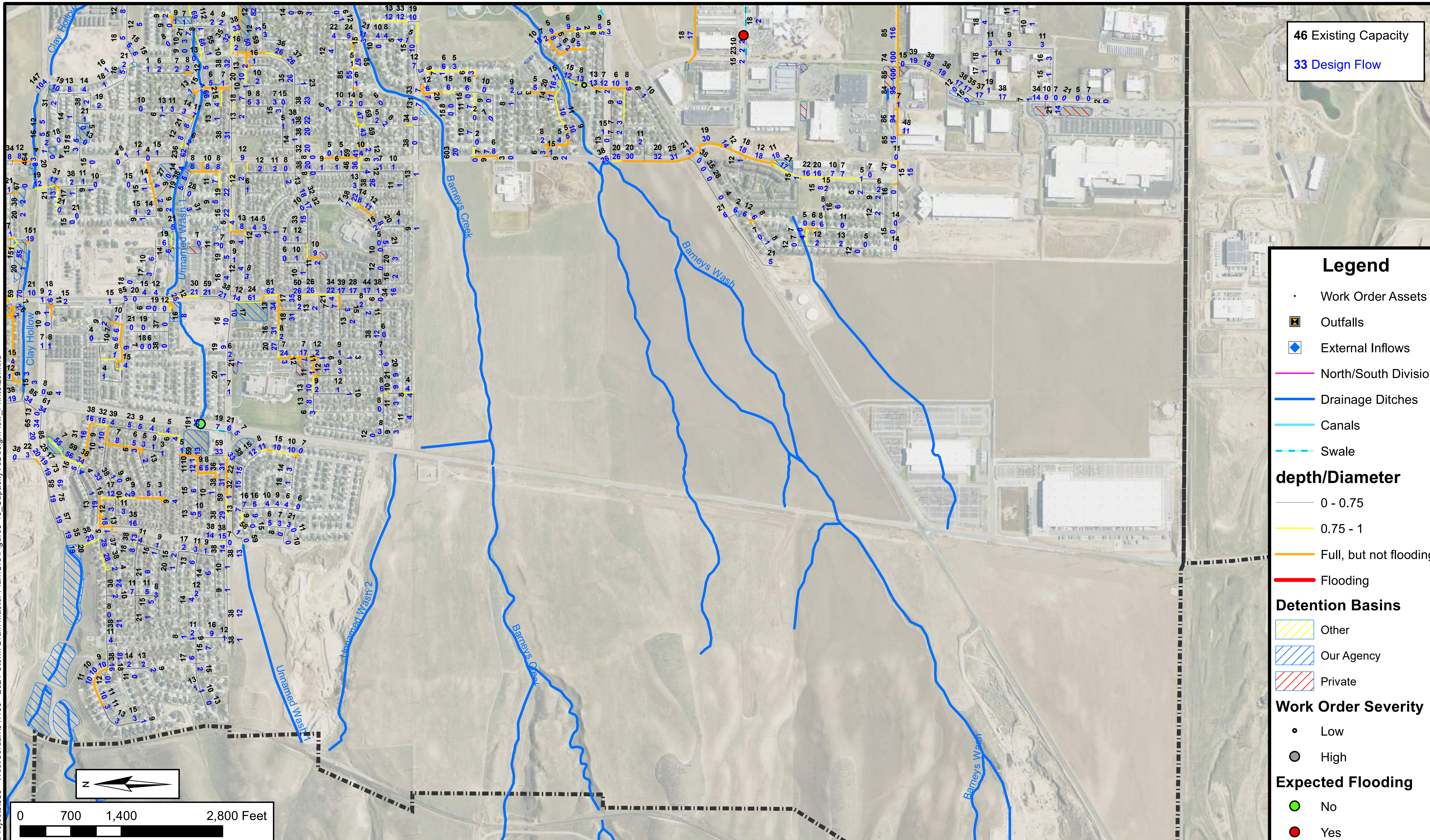
CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

CAPACITY VERSUS DESIGN FLOWS
SOUTH MODEL - 6300W TO 5000W

FIGURE
3-10.6



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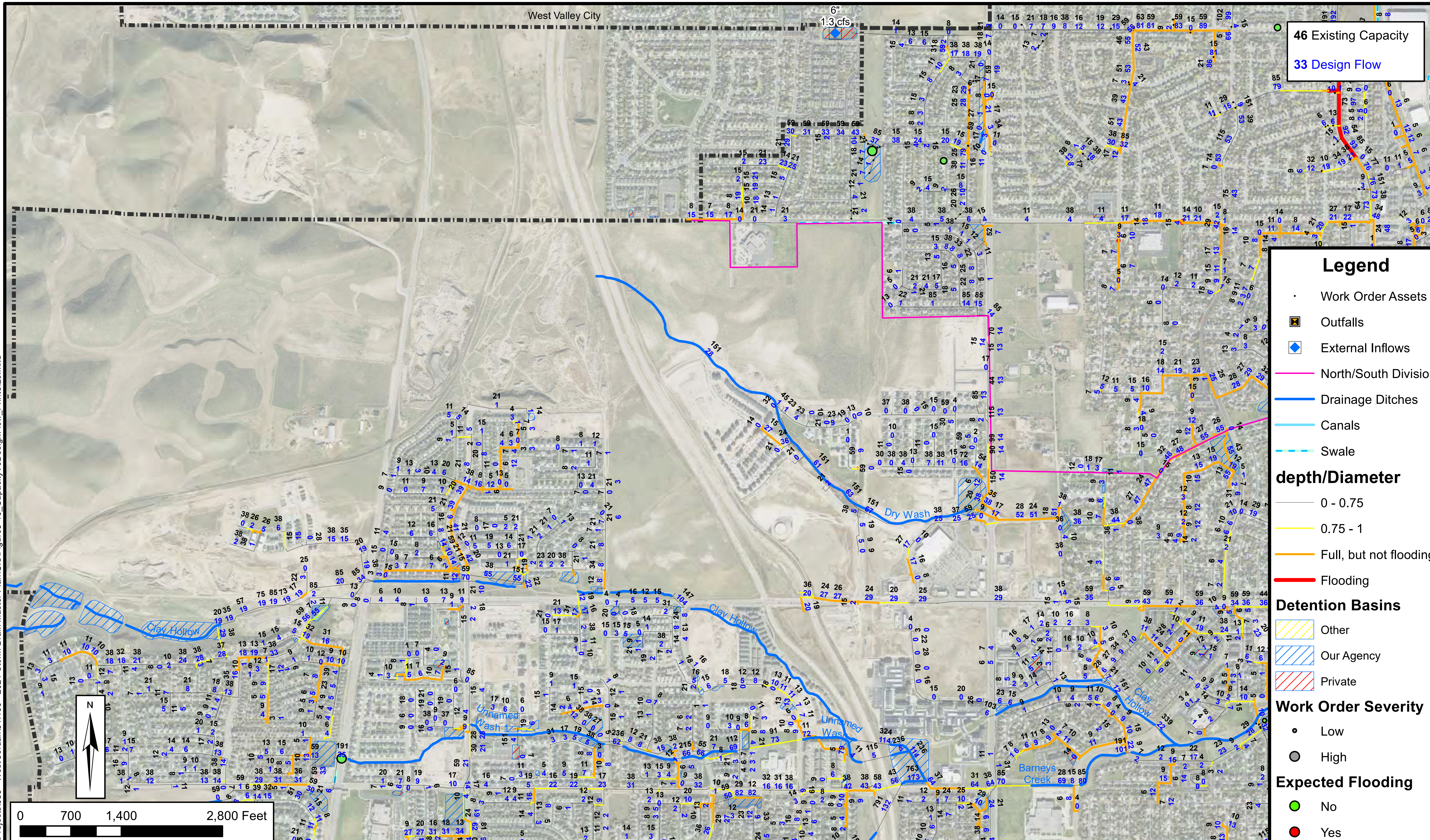
CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

CAPACITY VERSUS DESIGN FLOWS
SOUTH MODEL - 7600W TO 6300W

FIGURE
3-10.7



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CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

CAPACITY VERSUS DESIGN FLOWS
SOUTH/NORTH MODEL - U-111 HWY TO 4900W

FIGURE
3-10.8

CHAPTER 4 – STORM DRAINAGE ANALYSIS

The West Jordan Storm Drain System was analyzed using the model, observations from City staff and best management practices for the industry.

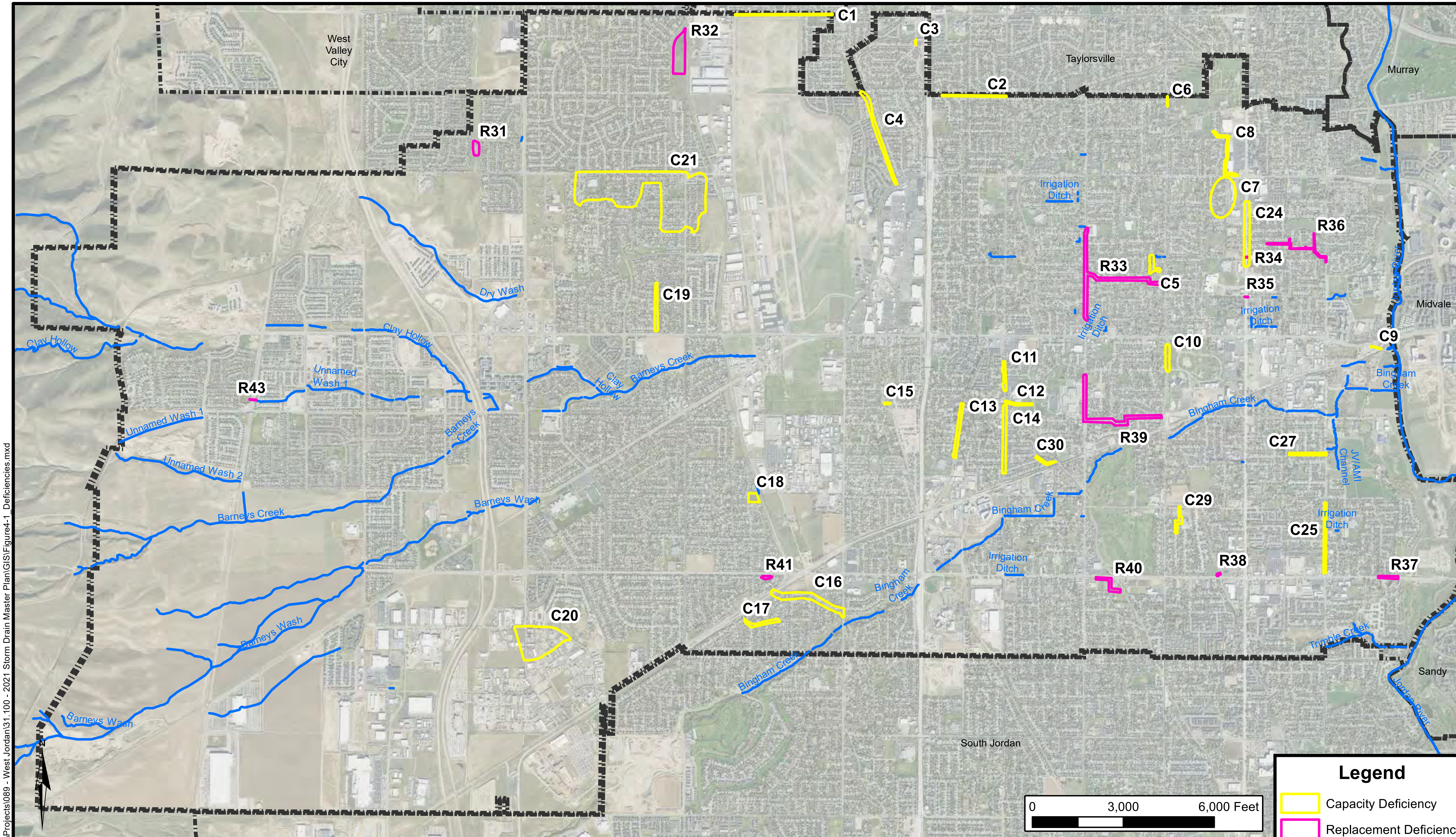
DEFICIENCIES

Deficiencies were identified based on input from City staff and on results from the model. Locations where the City had experienced flooding were analyzed in the model to determine the cause of the flooding. For example, a cul-de-sac that frequently floods could have issues with inlet capacity, pipe capacity, backwater effects, runoff from areas not directly tributary to the cul-de-sac, or the curb and gutter configuration.

Generally, storm drain 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 to and through natural channels to the discharge point (in the City's case, the Jordan River). It was determined that for the existing West Jordan Storm Drainage system, full pipe flow is acceptable with minor surcharging being contained in the curb and gutter system.

Tables 4-1, 4-2, and 4-3 and Figures 4-1, 4-2 and 4-3 summarize the drainage deficiencies identified in this study. Table 4-1 and Figure 4-1 describe the 10-year storm drain deficiencies, Table 4-2 and Figure 4-2 describe the 100-year storage deficiencies, and Table 4-3 and Figure 4-3 describe the 100-year conveyance deficiencies. Each deficiency has a Deficiency ID (used in this study), a location description, and problem definition. The Deficiency ID naming convention for Table 4-1 indicates what the type of deficiency is whether capacity related (C) or replacement (age, condition, etc) related (R). The storage deficiencies use the name of the detention basin which is deficient and the 100-year conveyance deficiencies use the name of the model element.

Not all deficiencies necessitate capital improvements. Because storm drain systems are designed to convey the minor (in this case 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 flooding was significant in the model and/or City staff had identified previous flooding at the location. After identifying the deficiencies, 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. Figure 4-4 shows the location of modeled and City identified maintenance deficiencies that were deemed as not requiring action at this time. These locations should be monitored by City personnel to determine if any of these projects need to be added to future Capital Improvement Plans.



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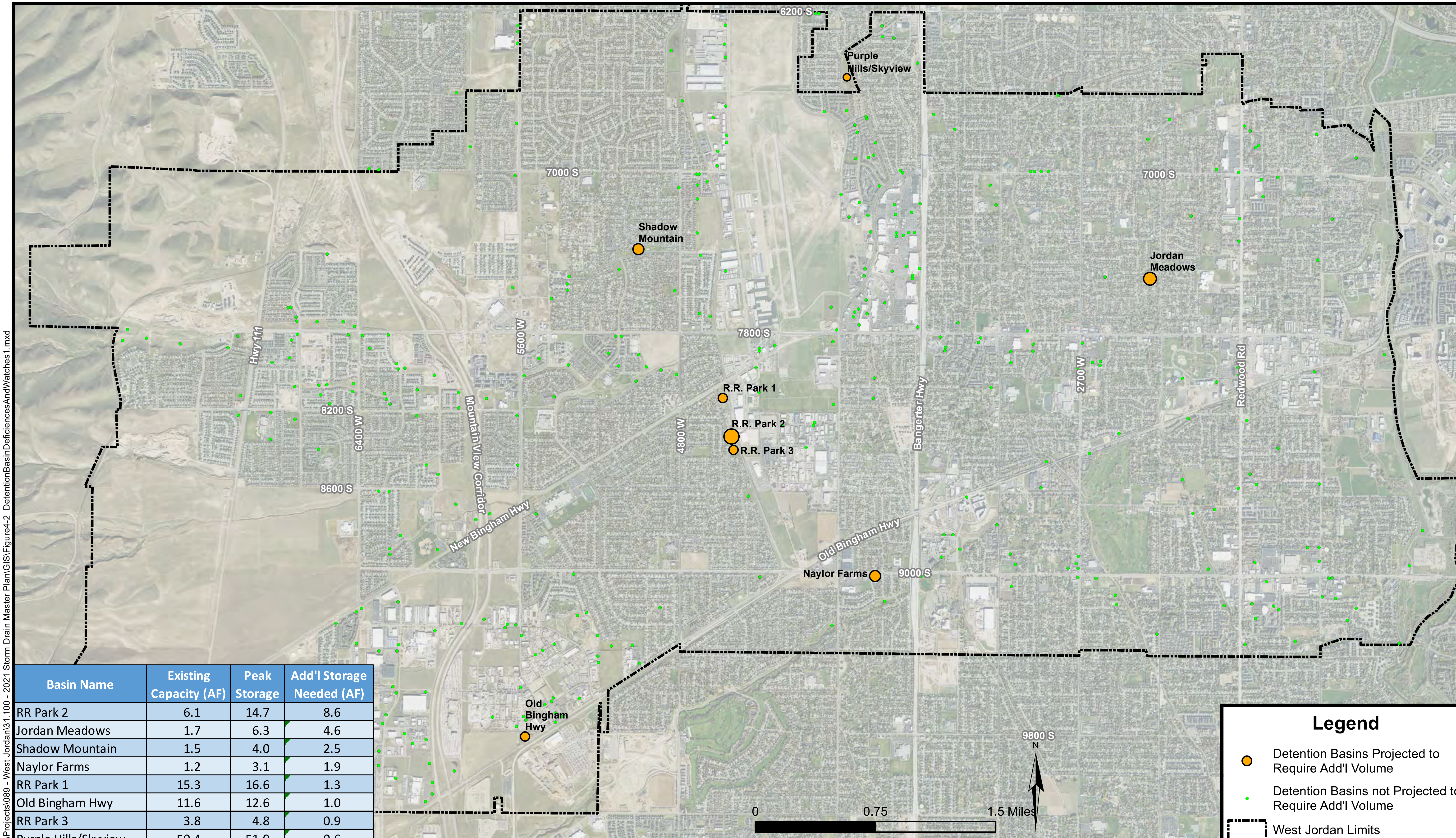
STORM DRAINAGE MASTER PLAN

10-YEAR STORM DRAINAGE DEFICIENCIES

FIGURE 4-1



Basin Name	Existing Capacity (AF)	Peak Storage	Add'l Storage Needed (AF)
RR Park 2	6.1	14.7	8.6
Jordan Meadows	1.7	6.3	4.6
Shadow Mountain	1.5	4.0	2.5
Naylor Farms	1.2	3.1	1.9
RR Park 1	15.3	16.6	1.3
Old Bingham Hwy	11.6	12.6	1.0
RR Park 3	3.8	4.8	0.9
Purple Hills/Skyview	50.4	51.0	0.6

Legend

- Detention Basins Projected to Require Add'l Volume
- Detention Basins not Projected to Require Add'l Volume
- West Jordan Limits

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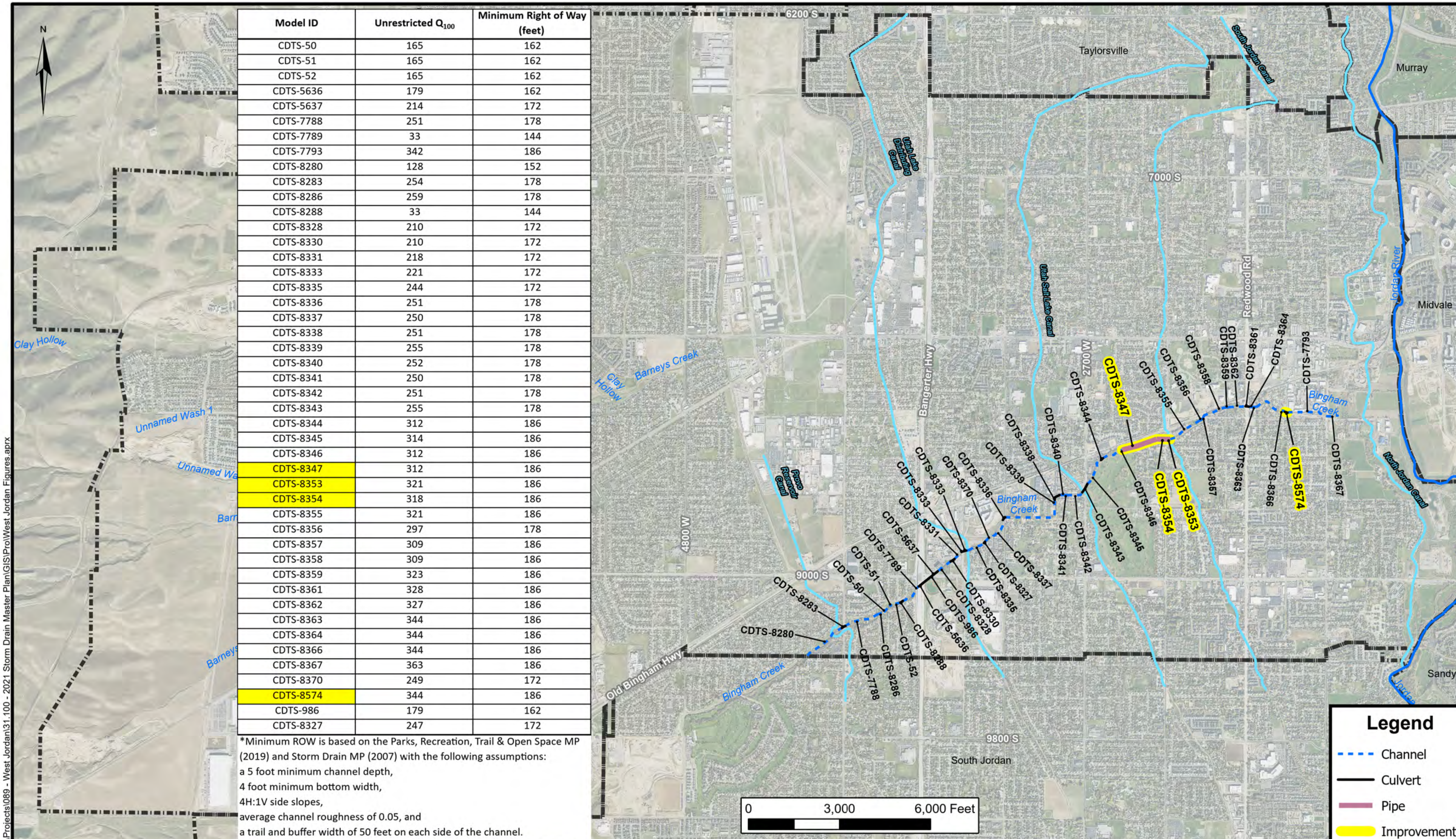
STORM DRAINAGE MASTER PLAN

EXISTING DETENTION BASINS REQUIRING ADDITIONAL VOLUME FOR THE 100-YEAR EVENT

FIGURE 4-2



Model ID	Unrestricted Q_{100}	Minimum Right of Way (feet)
CDTS-50	165	162
CDTS-51	165	162
CDTS-52	165	162
CDTS-5636	179	162
CDTS-5637	214	172
CDTS-7788	251	178
CDTS-7789	33	144
CDTS-7793	342	186
CDTS-8280	128	152
CDTS-8283	254	178
CDTS-8286	259	178
CDTS-8288	33	144
CDTS-8328	210	172
CDTS-8330	210	172
CDTS-8331	218	172
CDTS-8333	221	172
CDTS-8335	244	172
CDTS-8336	251	178
CDTS-8337	250	178
CDTS-8338	251	178
CDTS-8339	255	178
CDTS-8340	252	178
CDTS-8341	250	178
CDTS-8342	251	178
CDTS-8343	255	178
CDTS-8344	312	186
CDTS-8345	314	186
CDTS-8346	312	186
CDTS-8347	312	186
CDTS-8353	321	186
CDTS-8354	318	186
CDTS-8355	321	186
CDTS-8356	297	178
CDTS-8357	309	186
CDTS-8358	309	186
CDTS-8359	323	186
CDTS-8361	328	186
CDTS-8362	327	186
CDTS-8363	344	186
CDTS-8364	344	186
CDTS-8366	344	186
CDTS-8367	363	186
CDTS-8370	249	172
CDTS-8574	344	186
CDTS-986	179	162
CDTS-8327	247	172

*Minimum ROW is based on the Parks, Recreation, Trail & Open Space MP (2019) and Storm Drain MP (2007) with the following assumptions:
a 5 foot minimum channel depth,
4 foot minimum bottom width,
4H:1V side slopes,
average channel roughness of 0.05, and
a trail and buffer width of 50 feet on each side of the channel.

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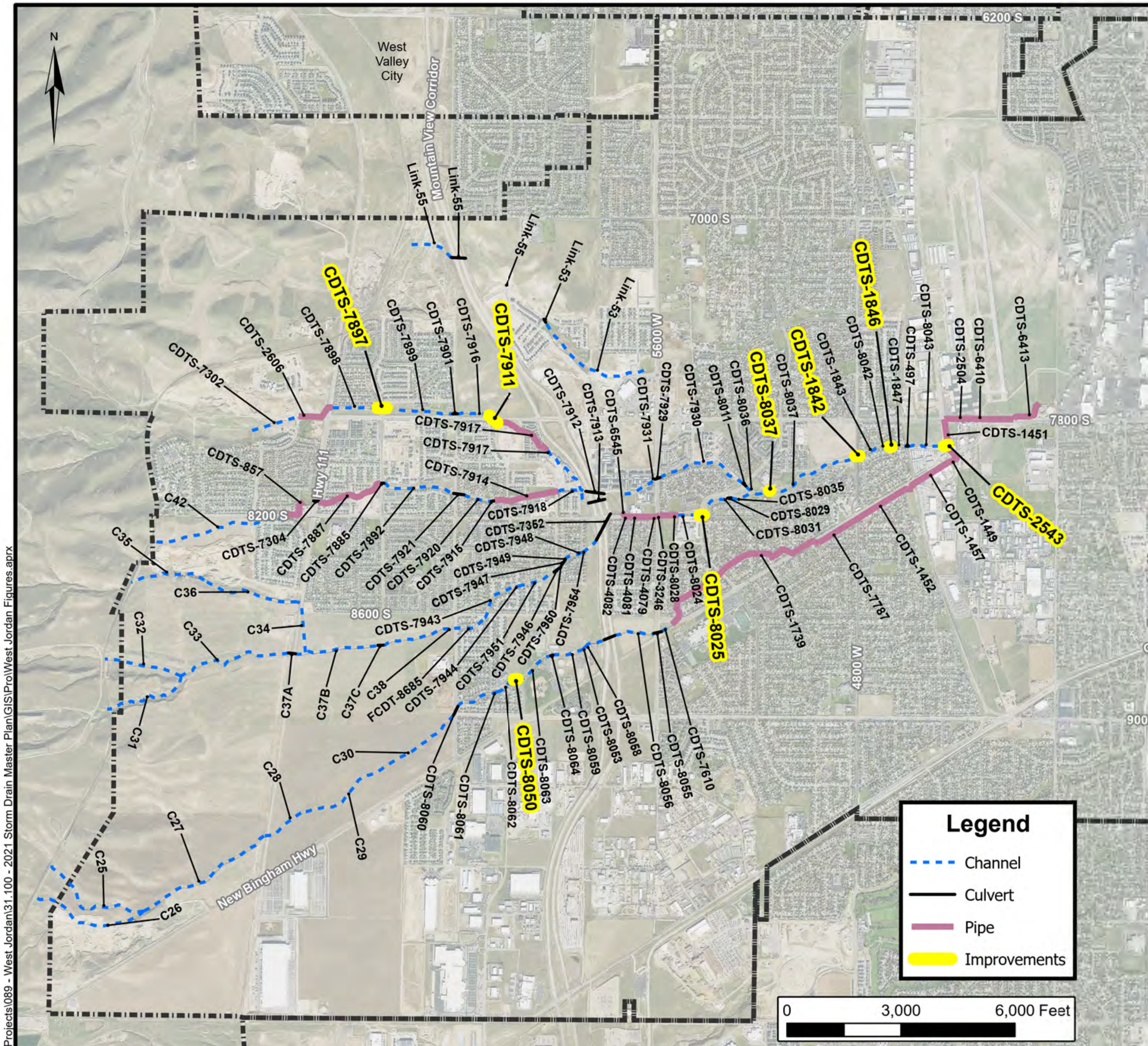
STORM DRAINAGE MASTER PLAN

100-YEAR CONVEYANCES

FIGURE 4-3



Model ID	Unrestricted Q_{100}	Minimum Right of Way (feet)	Model ID	Unrestricted Q_{100}	Minimum Right of Way (feet)
CDTS-1449	50	146	CDTS-8024	72	146
CDTS-1451	167	162	CDTS-8028	72	146
CDTS-1452	219	172	CDTS-8029	107	152
CDTS-1457	48	144	CDTS-8031	83	148
CDTS-1739	120	152	CDTS-8035	107	152
CDTS-1842	202	172	CDTS-8036	102	152
CDTS-1843	202	172	CDTS-8037	140	156
CDTS-1846	200	162	CDTS-8043	214	172
CDTS-1847	200	172	CDTS-8050	214	172
CDTS-2504	104	152	CDTS-8053	137	156
CDTS-2543	159	156	CDTS-8056	133	156
CDTS-2606	2	144	CDTS-8057	140	156
CDTS-3246	22	144	CDTS-8058	137	156
CDTS-4079	20	144	CDTS-8059	223	172
CDTS-4081	17	144	CDTS-8060	206	172
CDTS-4082	9	144	CDTS-8061	206	172
CDTS-497	215	172	CDTS-8062	214	172
CDTS-6410	131	156	CDTS-8063	220	172
CDTS-6413	119	152	CDTS-8064	220	172
CDTS-6545	9	144	FCDT-8685	38	144
CDTS-7302	20	144	CDTS-8055	142	156
CDTS-7352	150	156	CDTS-8025	84	148
CDTS-7610	133	156	CDTS-7304	43	144
CDTS-7787	182	162	CDTS-857	287	178
CDTS-7887	43	144	C42	7	144
CDTS-7892	63	146	C34	11	144
CDTS-7897	93	148	C36	68	146
CDTS-7898	77	148	C33	166	162
CDTS-7899	92	148	C32	126	152
CDTS-7901	194	162	C31	29	144
CDTS-7911	198	162	C37A	23	144
CDTS-7912	218	172	C37B	33	144
CDTS-7913	85	148	CDTS-7944	38	144
CDTS-7915	88	148	CDTS-7946	139	156
CDTS-7916	197	162	C30	199	162
CDTS-7917	207	172	C29	163	162
CDTS-7918	89	148	C28	148	156
CDTS-7919	88	148	C27	107	152
CDTS-7920	82	148	C25	58	146
CDTS-7921	82	148	C26	25	144
CDTS-7929	99	148	Link-53	253	178
CDTS-7930	99	148	Link-55	194	162
CDTS-7931	95	148	Link-55	194	162
CDTS-7943	38	144	Link-53	253	178
CDTS-7947	139	156	Link-55	194	162
CDTS-7948	139	156	CDTS-7917	207	172
CDTS-7949	139	156	CDTS-7917	207	172
CDTS-7950	139	156	CDTS-8037	140	156
CDTS-7951	104	152	C35	54	146
CDTS-7954	150	156	C38	38	144
CDTS-8011	103	152	C37C	33	144

*Minimum ROW is based on the Parks, Recreation, Trail & Open Space MP (2019) and Storm Drain MP (2007) with the following assumptions:
a 5 foot minimum channel depth,
4 foot minimum bottom width,
4H:1V side slopes,
average channel roughness of 0.05, and
a trail and buffer width of 50 feet on each side of the channel.

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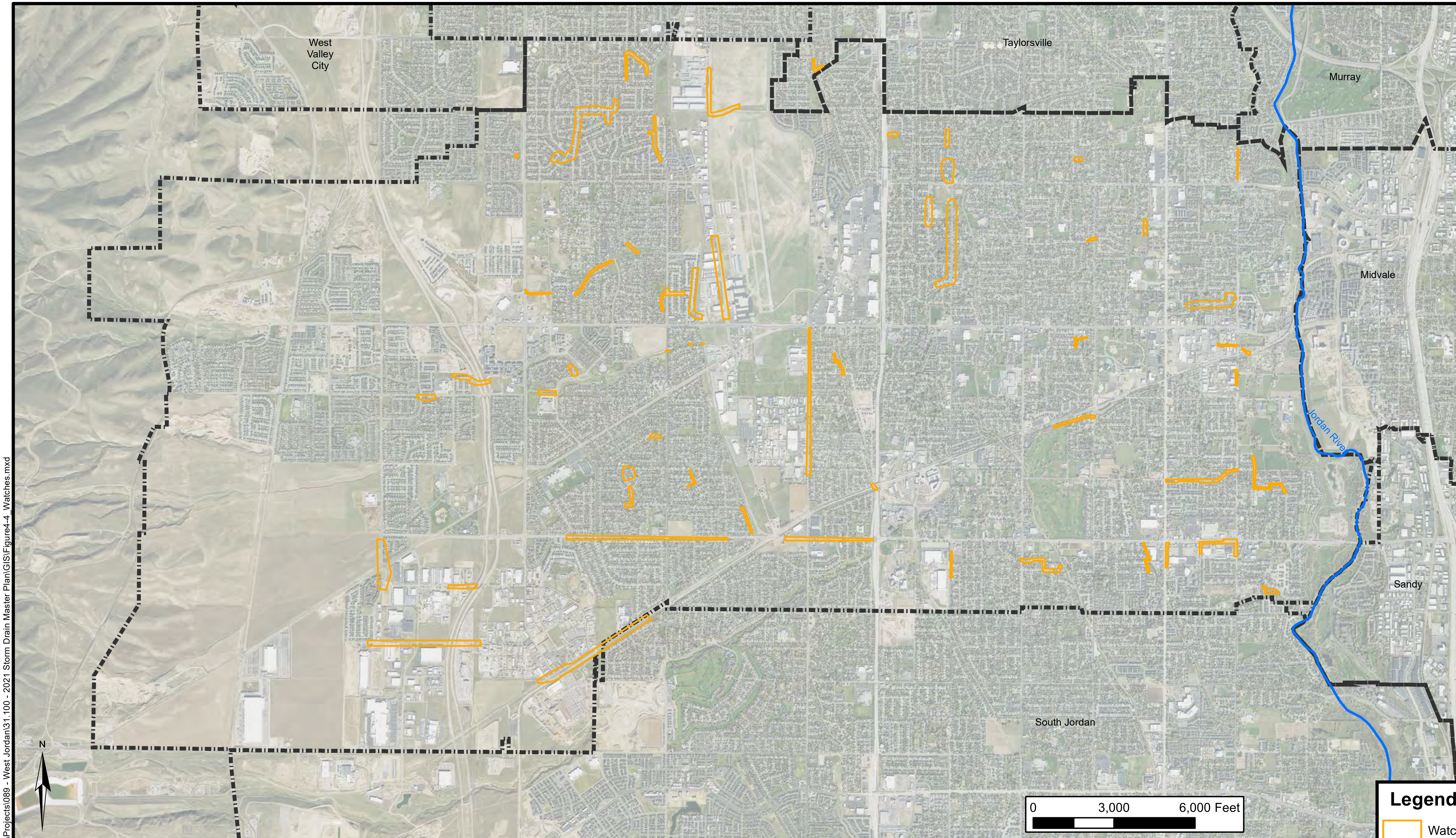
CITY OF WEST JORDAN STORM DRAINAGE MASTER PLAN

100-YEAR CONVEYANCES

FIGURE 4-3



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CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

AREAS TO WATCH

FIGURE 4-4

Date: 3/30/2023
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Table 4-1
10-Year Storm Drainage Deficiencies

Deficiency ID	Location	Problem Description
C1	6200 South from Airport Rd through Fairwind Dr	West Jordan has expressed concerns regarding flooding and the age of this line. They share 6200 S with Taylorsville; however, the only runoff to this line from West Jordan is from the road. West Jordan City is responsible for approximately 10% of the runoff in this line.
C2	Approximately 6600 South from Gold Medal Dr through USL Canal	This line receives all the outside-City runoff from the north up through 6200 South. The City has experienced significant flooding in the backyards of homes. West Jordan flows are approximately 10 cfs, Taylorsville flows are unknown but approximately 300 acres drain to this line from Taylorsville.
C3	6337 South Dixie Drive to Dixie Valley Park	Pipeline is in the easement and is corrugated metal pipe (CMP). Flooding occurs in Dixie Dr.
C4	From Skyview Park to 7200 South along Utah Lake Distributing Canal	Pipe has insufficient capacity during design event.
C5	Harvest Ridge Drive between 7400 South and Jordan Meadows Lane	Some flooding along Harvest Ridge Dr including where it intersects Jordan Meadows Ln. City has identified flooding issues here in the past. The existing storm drain has low slopes and the required head to spill into the Jordan Meadows detention basin creates backwater effects. The area also has a rolling curb and gutter system and needs high back curb installed. When the pond is full, backwater will flood this line out and cause issues for homeowners on Harvest Ridge Dr.
C6	2200 West and approx. 6645 South	Piped storm drain daylights to an open ditch which is frequently clogged with weeds, debris, and leaves.
C7	Camelot Way and Executive Drive	City has identified flooding in a low spot of curb and gutter. The inlets tie into irrigation/storm drain lines in backyards and lack access to manholes. City has identified flooding issues here in the past. The existing storm drain has low slopes. Modeling reveals that 10-year flows are over pipe capacity. The area is a low spot in the curb and gutter system, and ponding flows flood downhill driveways on the east side of the road. There are also connection issues between dual irrigation and storm drain lines.
C8	Between Redwood Dr and Heather Way (behind commercial district)	City has stated that flooding occurs behind businesses.
C9	Near 7800 South Wetland Ponds	Discharge into the Jordan River off 7800S; pipe network nearing capacity. Easement line and corrugated pipe. Maintenance staff has noted excessive sediment collection between the 2nd and 3rd ponds. Ponds do not have an effective access to remove sediment.

Deficiency ID	Location	Problem Description
C10	2200 West from 7970 South to 7850 South	Several small diameter drain pipes open flow into the Veterans Memorial Park and are frequently clogged causing road flooding.
C11	3200 West from ~7900 to 8100 South	Many small surface losses along 3200S between 7800S and Joel P. Jensen Middle School; losses occur at T junctions as well as inability of inlets to collect peak discharge; pipes may also be undersized. Combination system and easement line.
C12	South of Joel P Jensen Middle School from 3200 West to U&SL Canal	This 36" diameter pipe bottlenecks the flow coming from above. To solve C11 and C14, an upsize is required to lower the outlet HGL for projects C11 and C14.
C13	Old Bingham Hwy from 8395 South through Starlite Dr	Inlet and lines near between Terra Linda Elementary School are insufficient to capture and carry flow. Flooding occurs as it turns onto Old Bingham Hwy and at several laterals in Old Bingham Hwy.
C14	3200 West from 8525 South through approx. Starlite Dr	Pipe capacity in 3200 West is exceeded. Flooding issues have been confirmed by City.
C15	Approx 8135 South from Lynn Ln to Utah Lake Distributing Canal	Pipeline is in the easement and is CMP. Flooding Area.
C16	Teton Estates Dr from Uinta Hills Dr through 4000 West	Some flooding occurring along Teton Estates Dr particularly next to Old Bingham Hwy directly west of Teton Estates Dr.
C17	Wasatch Meadows Dr from Bingham Park Dr through Welby Hills Dr	Pipe is at capacity and experiences minor surface losses along Wasatch Meadows Dr.
C18	Dorilee Park	The City has identified Dorilee Park as an area which has flooded in the past. This is likely due to insufficient storage volume which both lets the pond spill to downstream properties and increases the HGL for upstream properties.
C19	4950 West from Park Vale Drive to 7670 South	Insufficient grade and pipe capacities on 4950 W prevent flows in 4950 West south of Wood Spring Drive from flowing north. This line has flooded several times and has easement line and valley inlet issues. Low slopes and pipe capacities in 4950 W Drive
C20	Dannon Way, Bagley Park Rd, and Leo Park Rd	Many surface losses along Bagley Park Rd. Road flooding occurs.
C21	From 7000 South to approx. Thrush Hill Dr and from approx. Brittany Town Dr to Orion Hill Dr	Lots of small surface losses, surface collection path, flood prone, 70th S approaching 4800 W and Beargrass Rd south of 70th.
C22	Clay Hollow Wash Trail, approx. 5650 West and approx. 8060 South	Emergency overflow pipe has insufficient capacity during the 100-year design event.

Deficiency ID	Location	Problem Description
C23	Between Hayden Peak Elementary and Barney's Creek Trail	Culvert has insufficient capacity during the 100-year design event.
C24	Redwood Road crossing at Drake Lane, approx 7250 South, and Deseret Industries	City has identified that ADS pipes crossing Redwood Road are damaged and need to be replaced. Additionally, the capacity of the lines in Redwood is insufficient to carry the design flows. The inverts at JCT-5190 and JCT-2972 cause the lines south of them to back up and create flooding on the west side of Redwood Rd..
C25	1300 West from 9000 to 8600 South	Line along 1300S between 8600 and 9000 S is at capacity.
C26	4800 West and Hayden Peak Drive	Culvert has insufficient capacity during the 100-year design event.
C27	8380 South from Stratford Lane to 1300 West	Many small surface losses along 8380 S near 1300 W. This is the line leaving Plum Creek Wetland and ADS pipe.
C28	Excaliber Way from Bandana Circle to South Jordan Canal	The system here has corrugated metal pipes.
C29	Approx. Long Dr (2070 West) from 8770 South to Gardner Lane (8660 South)	Minor flooding at Long Dr and Eagle Court intersection. Easement lines and ADS pipe.
C30	2975 West and Green Meadow Park near 8565 South	Meadow Green Farms Park relieves Utah and Salt Lake Canal under peak flows. Easement line, Corrugated Pipe and Basin work.
C31	4660 West and Hayden Peak Drive	Culvert has insufficient capacity during the 100-year design event.
C32	Approx. 8140 South and Approx. 1250 West	Culvert has insufficient capacity during the 100-year design event.
R33	Approx. 7500 South and 2700 West	Corrugated pipe, combination system and easement lines.
R34	Drake Lane and Redwood Road	City has identified that ADS pipe crossing Redwood Road are damaged and need to be replaced.
R35	7600 South and Redwood Road	City has identified that ADS pipes crossing Redwood Road are damaged and need replaced.
R36	Bora Bora Dr from 1300 West to approx 1600 West	Easement Lines. Combination system and Corrugated Pipe.
R37	9000 South and approx. 1075 West	Separate combination system and easement line.
R38	9000 South Detention Basin	The basin always has water in it and sediment issues because of the elevation of the outlet structure in relation to the South Jordan Canal.

Deficiency ID	Location	Problem Description
R39	Jaguar Drive from north of WJHS to Bueno Vista Dr to South Jordan Canal	Line is near or at capacity with minor losses throughout collection main until discharge into South Jordan Canal. Easement lines Corrugated pipe and combination system.
R40	9000 South and approx. 2585 West	Pipe running along 9000 S reaches capacity prior to discharge into detention basin (north end of Browns Meadow Park). Basin, corrugated pipe and Easement line.
R41	9000 South and 4400 West Barrington Drive	Vehicular access to the basin is challenging. The system becomes pressurized here.
R42	Cougar Park (west of Cougar Ln at 6400 South)	Water from Kearns comes through this basin. Corrugated pipe exists on north side of basin and easement line. Sediment is filling the detention pond, and the low flow piping system.
R43	U-111 and approx 8100 South	This is a corrugated pipe under U-111 which needs to be replaced.
R44	Southwest corner of Discovery Drive and 5820 West	This basin is dangerous to maintain with a Vactor truck. Inlet box cracks and box grate bends under too much pressure

Models were created from the existing models which contain dramatically upsized detention basins; the basins were upsized by adding a large amount of storage at the top of the existing storage curve. The results of these models represent the volume recommended for City design as they report how much water the existing basins would capture in a 100-year design event if they were large enough. The results from those models were compared against the existing physical capacity of the basins and deficiencies are listed in Table 4-2.

Table 4-2
100-Year Existing Storage Deficiencies (values in Acre-Feet)

Basin Name	Current Storage	Required Additional Storage
RR Park 2	6.1	8.6
Jordan Meadows	1.7	4.6
Shadow Mountain	1.5	2.5
Naylor Farms	1.2	1.9
RR Park 1	15.3	1.3
Old Bingham Hwy	11.6	1.0
RR Park 3	3.8	1.0
Purple Hills/Skyview	50.4	0.6

Costs per detention volume were developed using a hypothetical three-acre-foot detention basin assuming the following: the basin is 3 feet deep, $250,000 per acre of land, excavation costs of $20,000 per acre-foot, mobilization/demobilization costs of $5,000 per acre-foot, revegetation (native, non-irrigated) costs of $0.50/square foot. A basin holding 3 acres at 3 feet deep will have an area of approximately one acre. Therefore, the equation is as follows: $250k/acre * 1 acre + ($20k (exc)+ $5k (mob))/AF * 3 AF + $0.50/sq ft * 43,560 sq ft = $346,780 for the hypothetical three-acre-foot basin. The cost for one acre-foot is therefore $115,593 and including 30% engineering and contingency brings this cost to $150,271 per acre-foot of detention storage. For simplicity, this cost estimate was rounded to $150k/AF.

The 100-year conveyances were also modeled by applying the 100-year design event to the existing model and evaluating where spill was occurring. These segments were identified as 100-year conveyance deficiencies and can be seen in Table 4-3. Appendix A shows the restrictions in the existing conditions and the improved capacity with the Master Plan Projects.

Table 4-3
100-Year Conveyance Deficiencies

Model ID	Problem Description
CDTS-2543	Barney's Creek experiences major backwater in Airport Road causing capacity issues for dual 42" culverts.
CDTS-2543	
CDTS-8037	Culvert has inadequate capacity to carry unrestricted 100-year flow of 140 cfs.
CDTS-1846	Culvert has inadequate capacity to carry unrestricted 100-year flow of 200 cfs.
CDTS-1842	Culvert has inadequate capacity to carry unrestricted 100-year flow of 202 cfs.
CDTS-8025	Culvert has inadequate capacity to carry unrestricted 100-year flow of 84 cfs.
CDTS-8050	Culvert has inadequate capacity to carry unrestricted 100-year flow of 214 cfs.
CDTS-8574	Culvert has inadequate capacity to carry unrestricted 100-year flow. The FEMA flow for this culvert is 480 cfs.
CDTS-8347	Culvert has inadequate capacity to carry unrestricted 100-year flow. The FEMA flow for this culvert is 480 cfs.
CDTS-8354	Culvert has inadequate capacity to carry unrestricted 100-year flow. The FEMA flow for this culvert is 480 cfs.
CDTS-8353	Culvert has inadequate capacity to carry unrestricted 100-year flow. The FEMA flow for this culvert is 480 cfs.
CDTS-7897	Culvert has inadequate capacity to carry unrestricted 100-year flow of 93 cfs.
CDTS-7911	Culvert has inadequate capacity to carry unrestricted 100-year flow of 200 cfs.

CHAPTER 5 – CAPITAL IMPROVEMENT PLAN

This Capital Improvement Plan (CIP) presents the problems, alternatives, and recommendations identified in the study to improve storm drainage in the City of West Jordan. The CIP was developed from the hydrologic models, deficiency analysis, and workshops with City personnel.

PREFERRED DRAINAGE PLAN DEVELOPMENT

Which resolution a deficiency merits is based on what type of deficiency it is. Some deficiencies such as maintenance or replacement have a straightforward linear resolution. Resolving a deficiency related to flooding has more than a singular solution option. Where these deficiencies existed, HAL evaluated possible alternatives and whether it could be resolved with upstream detention and/or required a pipe or inlet improvement. 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 inadequacies,
- brainstorming possible solutions,
- screening alternatives based on feasibility and public acceptance,
- developing alternatives,
- coordinating phasing of other master planned projects (water, sewer, transportation)
- comparing cost, function, human safety, and damage prevention, and
- selecting the preferred alternative.

Design criteria included:

- 10-year minimum capacity
- 100-year capacity where homes may be frequently flooded
- 100-year capacity on regional detention basins (limited to hydraulic capacity of existing pipe)
- 100-year capacity for natural drainages as defined in Chapter 2

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 several 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 10% 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.

The flows and pipe diameters provided in the following Capital Improvement Plan (CIP) descriptions are approximate and are for planning purposes only. A detailed hydrologic and hydraulic analysis shall 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 construction cost indices (ENR 2022), communication with material suppliers, heavy construction data references (RSMeans 2022), and HAL's experience with similar construction. 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 detailed cost estimate of each alternative is provided in Appendix B.

IMPACT FEE ESTIMATE

Several of the projects are required in part or in full due to runoff generated from future development. To equitably share the cost of the improvements found in the Capital Improvement Plan, the proportion of the improvement associated with future development must be assigned. To estimate this, HAL created three models which accumulate areas by type: total drainage area, outside area draining through the City, and future West Jordan development area. The models were used together to estimate the proportion of area which could be associated with future growth. Projects which visually had negligible contributing future growth area were listed as impact fee ineligible. Projects which visually had all contributing drainage area associated with future growth were assigned a proportion of 100% impact fee eligible. Nonnegligible impact fee proportions were rounded to the nearest five percent. Previous impact fee proportions were not reevaluated and were left at their prior estimate. Calculations for impact fee estimates can be found in Appendix C.

CITY WORK ORDERS

The City has compiled a database of stormwater projects (also called work orders). They prioritize these according to the impact to public safety, system capacity, maintenance, pipe type, and the number of agencies involved. In this way, the City seeks to implement those projects which have the highest criticality. The rankings have been performed by the City; a full list of the work orders and their rankings can be found in Appendix D.

SUMMARY OF CAPITAL IMPROVEMENTS

Costs of the Capital Improvements are summarized in Table 5-1. These costs (as well as the ones in Table 5-2) include 30% for Engineering and Contingency.

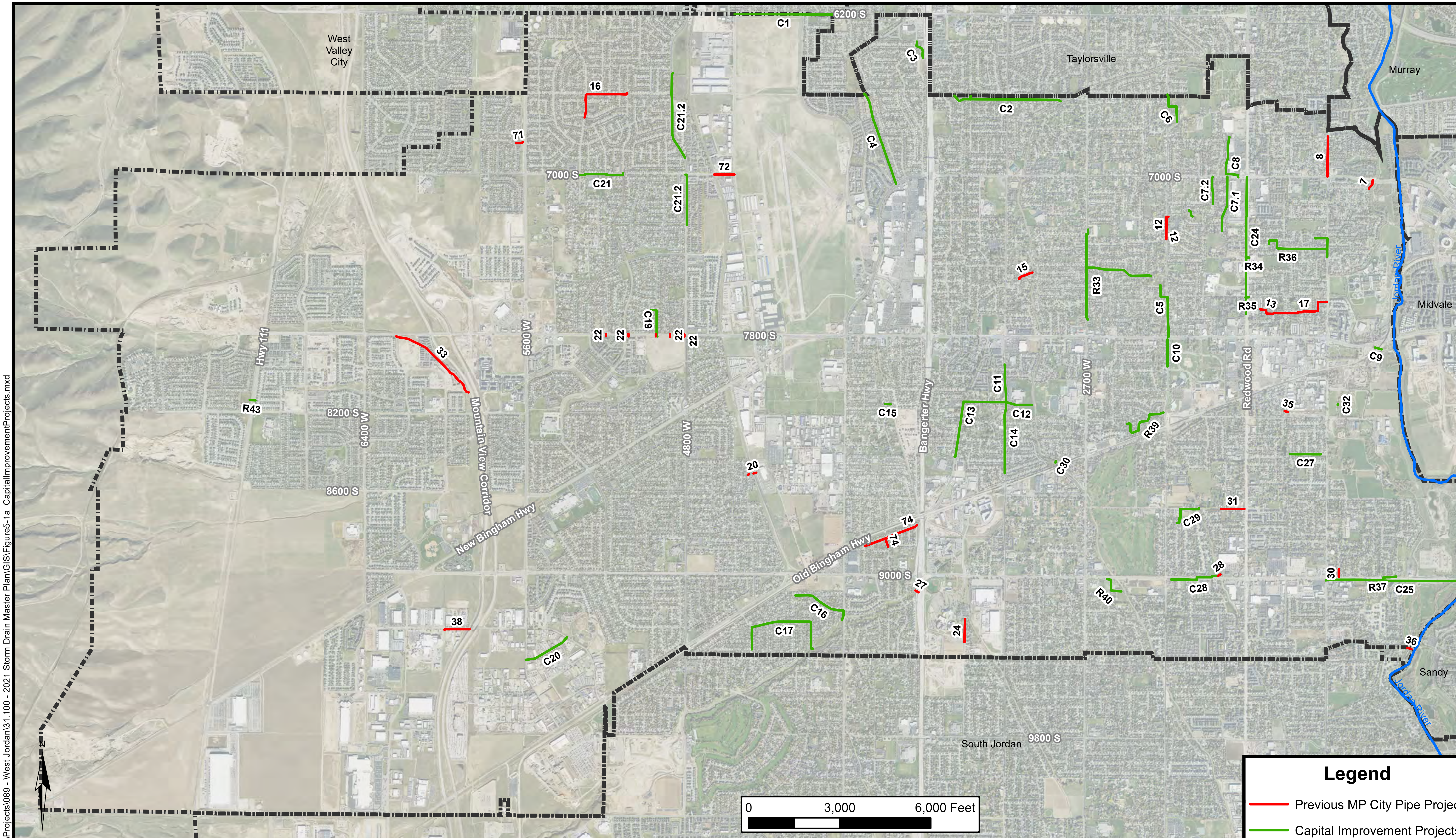
Table 5-1
Capital Improvement Plan Summary

Projects	Cost ($)	Impact Fee Eligible
10-Year West Jordan City Projects	$31,352,000	$1,159,650
100-Year West Jordan City Projects	$38,697,000	$30,677,650
2007 and 2015 Master Plan West Jordan City Projects	$11,484,000	$3,236,520
Developer Projects	$12,998,000	$12,998,000
2007 Master Plan Other Agency Projects	$3,021,000	$0
Total Cost	**$97,552,000**	**$48,071,820**

CAPITAL IMPROVEMENT PLAN

Table 5-2 presents the recommended capital improvements which are shown on Figure 5-1. Projects from the 2007 and 2015 Master Plan were reviewed and included in the CIP. Current additions to the West Jordan City projects were developed from the updated models and from City work orders and feedback. Costs were updated to June 2022 dollars using the ENR Cost Index (ENR, 2022).

The criteria for determining the priority of a project was based on existing flooding, detention storage problems, combined storm drain and irrigation issues, replacement of corrugated metal pipe, development roads, and capacity, in that order. Additional criteria taken into account included system performance (25%), economic development (10%), timing and coordination with UDOT and other road projects (10%), operational control (10%), safety and potential damage (25%), and funding (20%). The priority number and fiscal year (FY) was provided by West Jordan City.



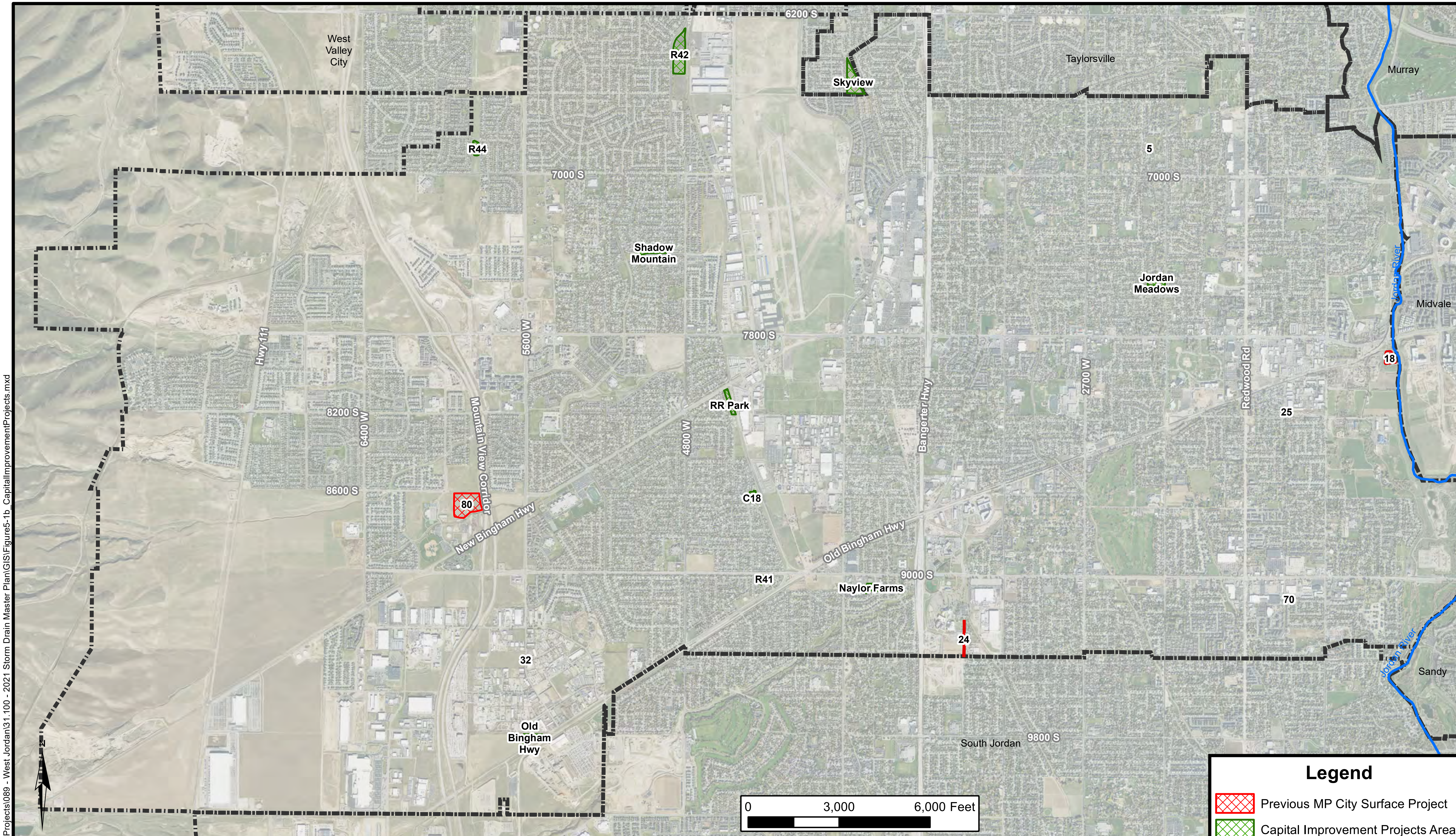
HANSEN ALLEN & LUCE inc ENGINEERS

CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

CAPITAL IMPROVEMENT PROJECTS
CITY CONVEYANCE PROJECTS

FIGURE
5-1 A

Date: 3/29/2023
Document Path: H:\Projects\089 - West Jordan\31.100 - 2021 Storm Drain Master Plan\GIS\Figure5-1a_CapitalImprovementProjects.mxd



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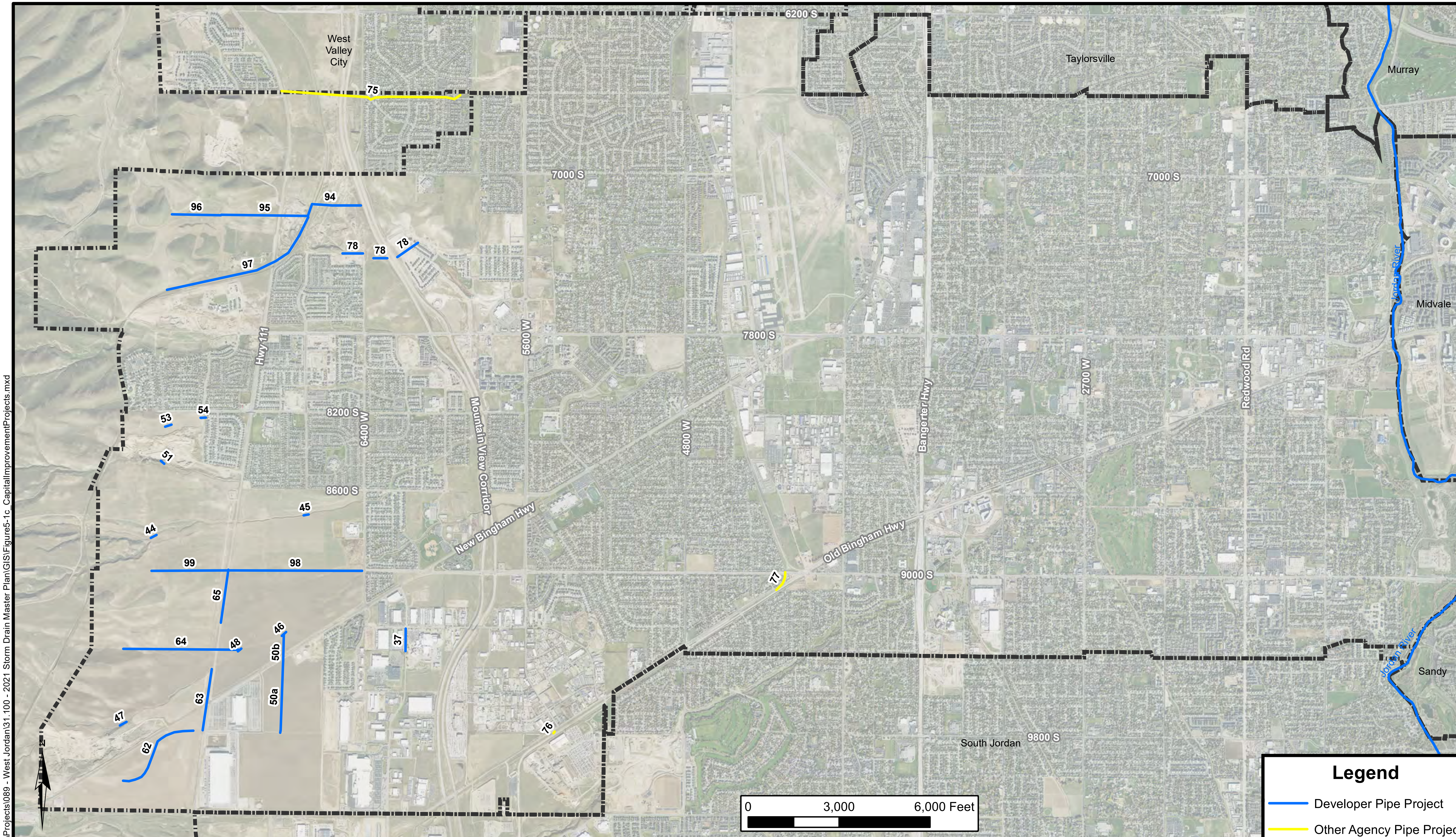
HANSEN ALLEN & LUCE INC ENGINEERS

CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

CAPITAL IMPROVEMENT PROJECTS
CITY SURFACE PROJECTS

FIGURE
5-1 B



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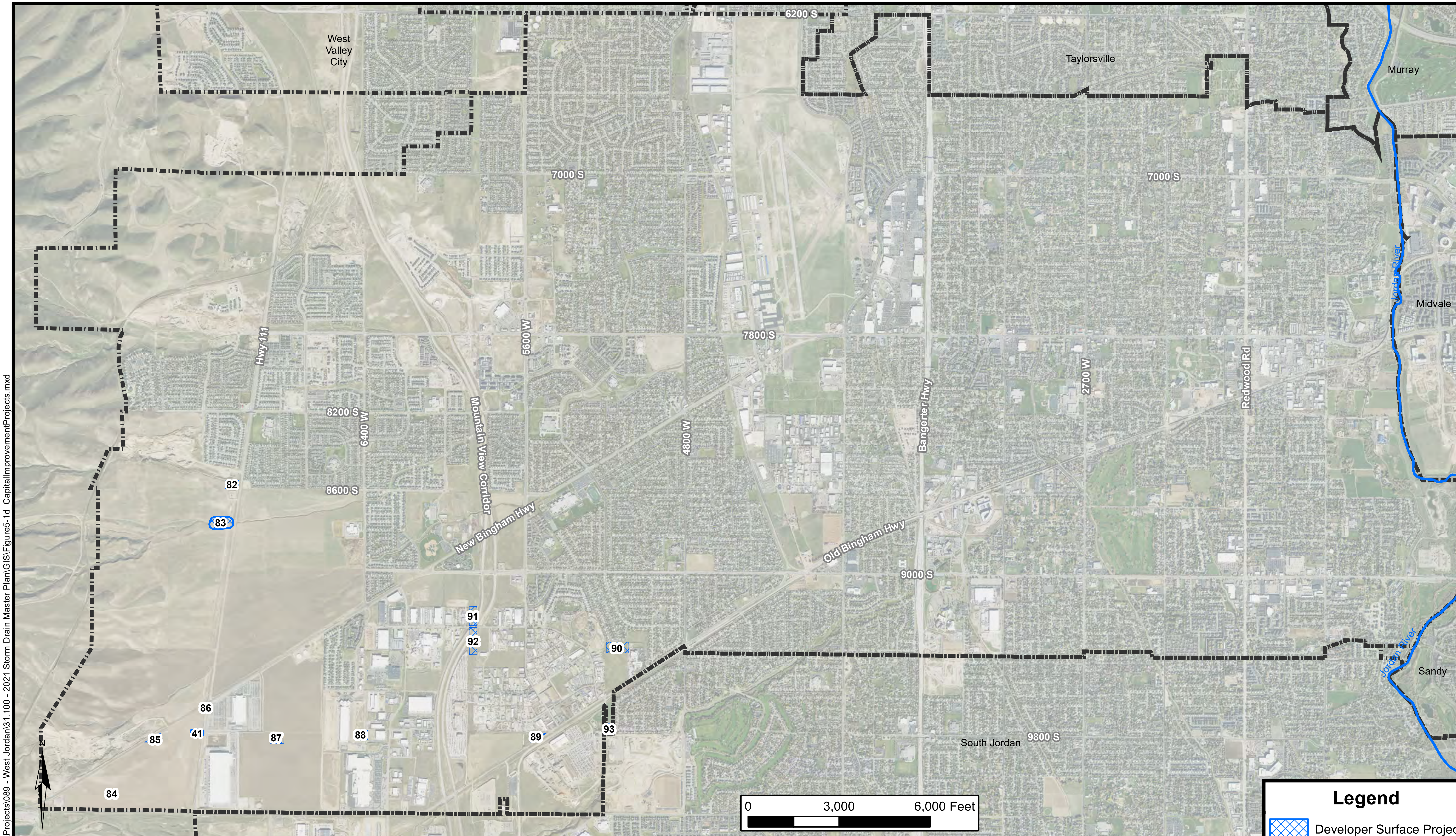
HANSEN ALLEN & LUCE INC ENGINEERS

CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

CAPITAL IMPROVEMENT PROJECTS
DEVELOPER OR OTHER AGENCY CONVEYANCE PROJECTS

FIGURE
5-1 C



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HANSEN ALLEN & LUCE INC ENGINEERS

CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

CAPITAL IMPROVEMENT PROJECTS
DEVELOPER SURFACE PROJECTS

FIGURE 5-1 D

Table 5-2
Capital Improvement Plan

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
10-Year West Jordan City Projects						
C1	C1	6200 South from Airport Rd through Fairwind Dr	West Jordan has expressed concerns regarding flooding and the age of this line. They share 6200 S with Taylorsville; however, the only runoff to this line from West Jordan would be from the road. No inlets are evident.	It is recommended to replace or upsize the line in 6200 South; coordination with Taylorsville is required for sizing the line and paying for most of the cost as they contribute nearly all the runoff to this line.	$1,305,000	Not eligible
C2	C2	Approximately 6600 South from Gold Medal Dr through USL Canal	This line receives all the outside-City runoff from the north up through 6200 South. The City has experienced significant flooding in the backyards of homes. West Jordan flows are only 5 cfs, Taylorsville flows are unknown but approximately 300 acres drain to this line from Taylorsville.	Tie into existing line at Gold Medal Dr, route down Luge Ln, 6610 S, and 6620 S. Discharge to Utah and Salt Lake Canal.	$1,015,000	Not eligible
C3	C3	6337 South Dixie Drive to Dixie Valley Park	Easement lines and corrugated pipe. Flooding occurs in Dixie Dr.	Install line from eastern inlet boxes in Dixie Dr down Dixie Dr and Tuscaloosa Way to Dixie Valley Park detention. Install adequate inlets (14 cfs) in Dixie Dr to counter road sag. Abandon existing lines which cross private property from Dixie Dr to the detention pond.	$213,000	Not eligible
C4	C4	From Skyview Park to 7200 South along Utah Lake Distributing Canal	Pipe has insufficient capacity during design event.	Upsize line. 2-inch gate opening releases 7 cfs and local inflows contribute another 14 cfs.	$1,280,000	Not eligible

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
C5	C5	Harvest Ridge Drive between 7400 South and Jordan Meadows Lane	Some flooding along Harvest Ridge Dr including where it intersects Jordan Meadows Ln. City has identified flooding issues here in the past. The existing storm drain has low slopes and the required head to spill into the Jordan Meadows detention basin creates backwater effects. The area also has a rolling curb and gutter system and needs high back curb installed. When the pond is full, backwater will flood this line out and cause issues for homeowners on Harvest Ridge Dr.	Install a 24" line from the Jordan Meadows detention basin to 7800 S down 2200 West. This will reduce the backwater effects experienced in Harvest Ridge Dr. Excavate ~2' from the Jordan Meadows basin.	$623,000	Not eligible
C6	C6	2200 West and approx. 6645 South	Piped storm drain daylights to an open ditch which is frequently clogged with weeds, debris, and leaves.	Install a 24" pipe in place of the existing open ditch to reduce clogging by debris. Route down 2200 West to avoid private properties.	$376,000	20%
C7.1	C7	Camelot Way and Executive Drive	City has identified flooding in a low spot of curb and gutter. The inlets tie into irrigation/storm drain lines in backyards and lack an access manhole.	Install new 24-inch storm drain with inlets in Camelot Way from 7125 South to the new trunk line in 7000 South. Install new 18-inch storm drain with inlets in Camelot Way and 2075 West to discharge through 2075 West to Camelot Park detention.	$436,000	Not eligible
C7.2	C7	Executive Drive between 7265 South and Richland Circle	City has identified flooding issues here in the past. The existing storm drain has low slopes. Modeling reveals that 10-year flows are over pipe capacity. The area is a low spot in the curb and gutter system, and ponding flows flood downhill driveways on the east side of the road. There are also connection issues between dual irrigation and storm drain lines.	Increase street inlet capacity. Upsize and deepen existing 24-inch pipe to a 30 inch pipe with a new 18-inch pipe at the south end of Executive Drive.	$584,000	Not eligible

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
C8	C8	Between Redwood Dr and Heather Way (behind commercial district)	City has stated that flooding occurs behind businesses.	Upsize line. Install 24" from south of the 6842 S Redwood Rd building to the northwest corner of 6936 S Redwood Rd building, then 30" to the manhole south of 6936 S Redwood Rd building, then 36" to 7000 South. Reduce outlet offset into 7000 South.	$548,000	25%
C9	C9	Near 7800 South Wetland Ponds	Discharge into the Jordan River off 7800S; pipe network nearing capacity. Easement line and corrugated pipe. Maintenance staff has noted excessive sediment collection between the 2nd and 3rd ponds. Ponds do not have an effective access to remove sediment.	Rehabilitate 96" pipe with reinforced cured-in-place concrete pipe.	$850,000	40%
C10	C10	2200 West from 7970 South to 7850 South	Several small diameter drain pipes open flow into the Veterans Memorial Park and are frequently clogged causing road flooding.	Install 18-inch pipe in 2200 West from 7970 South (the southernmost existing 6-inch drain) to 7800 South.	$226,000	Not eligible
C11	C11	3200 West from ~7900 to 8100 South	Many small surface losses along 3200S between 7800S and Joel P. Jensen Middle School; losses occur at T junctions as well as inability of inlets to collect peak discharge; pipes are slightly undersized. Combination system and easement line.	Upsize existing 21 and 24" lines to a 36". Increase inlet capacity where needed.	$697,000	Not eligible
C12	C12	South of Joel P Jensen Middle School from 3200 West to U&SL Canal	This 36" diameter pipe bottlenecks the flow coming from above. To solve C11 and C14, an upsize is required to lower the outlet HGL for projects C11 and C14.	Upsize existing 36" to a 54".	$656,000	Not eligible

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
C13	C13	Old Bingham Hwy from 8395 South through Starlite Dr	Inlet and lines near between Terra Linda Elementary School are insufficient to capture and carry flow. Flooding occurs as it turns onto Old Bingham Hwy and at several laterals in Old Bingham Hwy.	Add conveyance to total the equivalent of a 36" as existing infrastructure does not carry design flows.	$1,826,000	Not eligible
C14	C14	3200 West from 8525 South through approx. Starlite Dr	Pipe capacity in 3200 West is exceeded. Flooding issues have been confirmed by City.	Replace existing 24" with 36" from T-junction near school south to approximately 8260 south then with a 30" from there to the intersection of 8525 South.	$1,314,000	Not eligible
C15	C15	Approx 8135 South from Lynn Ln to Utah Lake Distributing Canal	Easement line, Corrugated pipe and valley gutter. Flooding Area.	Add two inlets to the south of the existing inlets to capture excess runoff. Tie these into existing inlets with 18". Replace rotting pipe to canal with 24" RCP.	$47,000	Not eligible
C16	C16	Teton Estates Dr from Uinta Hills Dr through 4000 West	Some flooding occurring along Teton Estates Dr particularly next to Old Bingham Hwy directly west of Teton Estates Dr.	Upsize 24" to 36".	$823,000	Not eligible
C17	C17	Wasatch Meadows Dr from Bingham Park Dr through Welby Hills Dr	Pipe is at capacity and experiences minor surface losses along Wasatch Meadows Dr.	Upsize along existing alignment to 42" from Targhee Dr and Bingham Creek to Uinta Hills Dr in Wasatch Meadows Dr. Upsize the remainder of Wasatch Meadows Dr to 36". Upsize 4400 W to 24 inch from Wasatch Meadows Dr to Black Elk Way.	$2,021,000	Not eligible
C18	C18	Dorilee Park	The City has identified Dorilee Park as an area which has flooded in the past. This is likely due to insufficient storage volume which both lets the pond spill to downstream properties and increases the HGL for upstream properties.	Dig basin 2 to 3 feet deeper (between 3 to 5 AF) to better use the available storage space. Disconnect the passthrough line from the west so it discharges to the pond prior to moving eastward through the pond outlet (at the least install a bubble up).	$163,000	Not eligible

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
C19	C19	4950 West from Park Vale Drive to 7670 South	Insufficient grade and pipe capacities on 4950 W prevent flows in 4950 West south of Wood Spring Drive from flowing north. This line has flooded several times and has easement line and valley inlet issues. Low slopes and pipe capacities in 4950 W Drive	Disconnect 4950 W line between 7670 S and Wood Spring Dr and disconnect 4980 W at the same south. Lay a 18-24" line from 4980 W down to 4950 W then from 7670 S to 7800 S. Additional inlet capacity for the 4950 W sage just north of 7800 S is needed.	$351,000	70%
C20	C20	Dannon Way, Bagley Park Rd, and Leo Park Rd	Many surface losses along Bagley Park Rd.	Put in an 18" storm drain system in the public right of way in Leo Park Dr to alleviate road flooding.	$419,000	10%
C21	C21	From Grizzly Way to Orion Hill Dr	Lots of small surface losses, surface collection path, flood prone, 70th S approaching 4800 W and Beargrass Rd south of 70th.	Upsize existing line to 24" except for the short line across in 7000 S from Orion Hill Rd to Grizzly Way.	$498,000	50%
C21.2	C21	From 7000 South to approx. Thrush Hill Dr	Lots of small surface losses, surface collection path, flood prone, 70th S approaching 4800 W and Beargrass Rd south of 70th.	Upsize existing line to a 60" from Cougar Detention Basin to 6820 South to 60", then to 54" through Old Villa Way, and then upsize to a 36" from 7000 South to 7230 South.	$3,922,000	Not eligible
C24	C24	Redwood Road crossing at Drake Lane, approx. 7250 South, and Deseret Industries	City has identified that ADS pipes crossing Redwood Road are damaged and need to be replaced. Additionally, the capacity of the lines in Redwood is insufficient to carry the design flows. The inverts at JCT-5190 and JCT-2972 cause the lines south of them to back up and create flooding on the west side of Redwood Rd..	Relay lines so grade is consistent. Generally, 24" at 0.2% slope will address this inadequacy. Most of the lines are currently 18"	$1,606,000	Not eligible
C25	C25	9000 South from 1300 West to Jordan River	Line along 1300S between 8600 and 9000 S is at capacity.	Connect to an upsized 30" pipe running down 90th South.	$1,847,000	Not eligible

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
C27	C27	8380 South from Stratford Lane to 1300 West	Many small surface losses along 8380 S near 1300 W. This is the line leaving Plum Creek Wetland and ADS pipe.	Upsize line to 30” from outlet of Plum Creek Park Pond to where it runs into the existing 48”.	$367,000	Not eligible
C28	C28	9000 South from 2200 West to South Jordan Canal	The system here has corrugated metal pipes.	Replace CMP with RCP.	$1,142,000	Not eligible
C29	C29	Approx. Long Dr (2070 West) from 8770 South to Gardner Lane (8660 South)	Minor flooding at Long Dr and Eagle Court intersection. Easement lines and ADS pipe.	Upsize to 36”.	$548,000	Not eligible
C30	C30	2975 West and Green Meadow Park near 8565 South	Meadow Green Farms Park relieves Utah and Salt Lake Canal under peak flows. Easement line, Corrugated Pipe and Basin work.	Upsize outfall from 24" to 36". Consider digging basin deeper if bottom is not located at canal high water line.	$75,000	Not eligible
C32	C32	Approx. 8140 South and Approx. 1250 West	Culvert has insufficient capacity during the 100-year design event.	Replace with 12’x5’ box culvert.	$57,000	15%
R33	R33	Approx. 7500 South and 2700 West	Corrugated pipe, combination system and easement lines.	Separate the combined storm drain and irrigation systems.	$2,469,000	Not eligible
R34	R34	Drake Lane and Redwood Road	City has identified that ADS pipe crossing Redwood Road are damaged and need to be replaced.	Replace pipe.	$30,000	Not eligible
R35	R35	7600 South and Redwood Road	City has identified that ADS pipes crossing Redwood Road are damaged and need replaced.	Replace the pipes.	$36,000	Not eligible
R36	R36	Bora Bora Dr from 1300 West to approx. 1600 West	Easement Lines. Combination system and Corrugated Pipe.	Separate the combo systems. Replace the corrugated pipe.	$909,000	Not eligible

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
R37	R37	9000 South and approx. 1075 West	Excessive inflow to irrigation system during storms.	Slip-line upstream and downstream manholes and the pipe to stop the leaking.	$195,000	Not eligible
R39	R39	Bueno Vista Dr to South Jordan Canal	Line is near or at capacity with minor losses throughout collection main until discharge into South Jordan Canal. Easement lines Corrugated pipe and combination system.	Reroute line down public right-of-way to avoid easement issues. Disconnect from existing line at near intersection of 2440 W and 8230 S.	$777,000	Not eligible
R40	R40	9000 South and approx. 2585 West	Pipe running along 9000 S reaches capacity prior to discharge into detention basin (north end of Browns Meadow Park). Basin, corrugated pipe and Easement line.	Acquire easement with property owner. Replace metal pipe with RCP.	$616,000	Not eligible
R41	R41	9000 South and 4400 West Barrington Drive	Vehicular access to the basin is challenging. The system becomes pressurized here.	Do a project to fix the access, install sumps and add a bigger grate so that the system isn't pressurized.	$75,000	10%
R42	R42	Cougar Park (west of Cougar Ln at 6400 South)	Water from Kearns comes through this basin. Corrugated pipe exists on north side of basin and easement line.	Redesign the basin. The manholes and boxes are undersized.	$195,000	Not eligible
R43	R43	U-111 and approx. 8100 South	Corrugated pipe under U-11.	Replace with RCP.	$137,000	40%
R44	R44	Southwest corner of Discovery Drive and 5820 West	This basin is dangerous to maintain with a Vactor truck. Inlet box cracks and box grate bends under too much pressure.	Redesign inlet system on the north side of the basin. Construct vehicular access ramp.	$78,000	Not eligible
				10-Year West Jordan City Projects Subtotal	**$31,352,000**	**$1,159,650**
100-Year West Jordan City Projects						
CDTS-2543	Fig 4-3	Airport Rd and Barney's Creek	Barney's Creek experiences major backwater in Airport Road causing capacity issues for dual 42" culverts.	Install 1,400 feet of new 30" line that will route flood flows down New Bingham Hwy. Replace 112 feet of the dual 42s with a 6'W by 5'H box.	$747,000	25%

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
CDTS-8037	Fig 4-3	5140 West and Barney's Creek	Culvert has inadequate capacity to carry unrestricted 100-year flow of 140 cfs.	Replace existing with 23 feet of 8'Wx4'H box.	$37,000	40%
CDTS-1846	Fig 4-3	4660 West and Barney's Creek	Culvert has inadequate capacity to carry unrestricted 100-year flow of 200 cfs.	Replace existing with 61 feet of a 8'Wx4'H box.	$98,000	40%
CDTS-1842	Fig 4-3	4800 West and Barney's Creek	Culvert has inadequate capacity to carry unrestricted 100-year flow of 202 cfs.	Replace existing with 111 feet of a 8'Wx4'H box.	$179,000	40%
CDTS-8025	Fig 4-3	5420 West and Barney's Creek	Culvert has inadequate capacity to carry unrestricted 100-year flow of 84 cfs.	Replace existing with 114 feet of a 48" line.	$86,000	45%
CDTS-8050	Fig 4-3	Duck Ridge Way and Barney's Wash	Culvert has inadequate capacity to carry unrestricted 100-year flow of 214 cfs.	Replace existing with 107 feet of a 10' wide by 4' high box.	$251,000	85%
CDTS-8574	Fig 4-3	1500 West and Bingham Creek	Culvert has inadequate capacity to carry unrestricted 100-year flow. The FEMA flow for this culvert is 480 cfs.	Replace existing with 102 feet of a 12' wide by 5' high box.	$164,000	15%
CDTS-8347	Fig 4-3	2500 West and Bingham Creek	Culvert has inadequate capacity to carry unrestricted 100-year flow. The FEMA flow for this culvert is 480 cfs.	Replace existing with 1195 feet of a 12' wide by 5' high box.	$3,385,000	15%
CDTS-8354	Fig 4-3	2250 West and Bingham Creek	Culvert has inadequate capacity to carry unrestricted 100-year flow. The FEMA flow for this culvert is 480 cfs.	Replace existing with 320 feet of a 12' wide by 5' high box.	$695,000	15%
CDTS-8353	Fig 4-3	2250 West and Bingham Creek	Culvert has inadequate capacity to carry unrestricted 100-year flow. The FEMA flow for this culvert is 480 cfs.	Replace existing with 128 feet of a 12' wide by 5' high box.	$234,000	15%
CDTS-7897	Fig 4-3	6700 W and Clay Hollow	Culvert has inadequate capacity to carry unrestricted 100-year flow of 93 cfs.	Replace existing 30" with 240 feet of 48" pipe with headwalls.	$343,000	85%
CDTS-7911	Fig 4-3	Clay Hollow at 7800 South and Fallwater Drive	Culvert has inadequate capacity to carry unrestricted 100-year flow of 198 cfs.	Replace existing with 240 feet of 60" pipe with headwalls.	$295,000	60%
RR Park 2	Fig 4-2	8300 S and Festive Way	Basin has inadequate storage to contain the incoming volume.	Excavate 8.6 additional acre-feet.	$1,290,000	Not Eligible

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
Jordan Meadows	Fig 4-2	7550 S and 2230 W	Basin has inadequate storage to contain the incoming volume.	Excavate 4.6 additional acre-feet.	$690,000	Not Eligible
Shadow Mountain	Fig 4-2	7380 S and Opal Hill Dr	Basin has inadequate storage to contain the incoming volume.	Excavate 2.5 additional acre-feet.	$375,000	Not Eligible
Naylor Farms	Fig 4-2	9000 S and Naylor Farm Dr	Basin has inadequate storage to contain the incoming volume.	Excavate 1.9 additional acre-feet.	$285,000	Not Eligible
RR Park 1	Fig 4-2	8200 S and Summit Valley Dr	Basin has inadequate storage to contain the incoming volume.	Excavate 1.3 additional acre-feet.	$195,000	Not Eligible
Old Bingham Hwy	Fig 4-2	Old Bingham Hwy and 5600 W	Basin has inadequate storage to contain the incoming volume.	Excavate 1.0 additional acre-feet.	$150,000	Not Eligible
RR Park 3	Fig 4-2	8400 S and Festive Way	Basin has inadequate storage to contain the incoming volume.	Excavate 0.9 additional acre-feet.	$135,000	Not Eligible
Skyview	Fig 4-2	4000 W and 6550 S	Basin has inadequate storage to contain the incoming volume.	Excavate 0.6 additional acre-feet.	$90,000	Not Eligible
82	Future (Fig 5-1)	Bacchus and 8600 So	Basin will be required to detain future flows.	Provide 17 acre-feet.	$2,550,000	100%
83	Future (Fig 5-1)	Bacchus and Barney's Creek	Basin will be required to detain future flows.	Provide 60 acre-feet.	$9,000,000	100%
84	Future (Fig 5-1)	Btwn New Bingham and Old Bingham, approx. 7500 W	Basin will be required to detain future flows.	Provide 5.9 acre-feet.	$885,000	100%
85	Future (Fig 5-1)	New Bingham Hwy and approx. 7200 W	Basin will be required to detain future flows.	Provide 5.4 acre-feet.	$810,000	100%
86	Future (Fig 5-1)	New Bingham Hwy and Bacchus Hwy	Basin will be required to detain future flows.	Provide 1.7 acre-feet.	$255,000	100%
87	Future (Fig 5-1)	9800 S and approx. 6800 W	Basin will be required to detain future flows.	Provide 13.5 acre-feet.	$2,025,000	100%
88	Future (Fig 5-1)	9800 S and approx. 6400 W	Basin will be required to detain future flows.	Provide the remaining half of the required 13.3 acre-feet.	$998,000	100%

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
89	Future (Fig 5-1)	9800 S and approx. 5600 W	Basin will be required to detain future flows.	Provide 7.9 acre-feet.	$1,185,000	100%
90	Future (Fig 5-1)	9400 S and approx. 6400 W	Basin will be required to detain future flows.	Provide 21.5 acre-feet.	$3,225,000	100%
91	Future (Fig 5-1)	Dannon Way and Mtn View Corridor Trail	Basin will be required to detain future flows.	Provide 13.5 acre-feet.	$2,025,000	100%
92	Future (Fig 5-1)	Dannon Way and Feulner Park Rd	Basin will be required to detain future flows.	Provide 32.0 acre-feet.	$4,800,000	100%
93	Future (Fig 5-1)	5200 W and 9800 S	Basin will be required to detain future flows.	Provide 8.1 acre-feet.	$1,215,000	100%
				100-Year West Jordan City Projects Subtotal	**$38,697,000**	**$30,677,650**
2007 and 2015 Master Plan West Jordan City Projects						
5	2015 MP[1]	Straw Circle	West Jordan City Surface Conveyance Project Identified in 2015 Master Plan	Construct a street-to-detention spillway with regrading near impacted homes	$34,000	Not Eligible
7	2015 MP[1]	7055 South and 1115 West	West Jordan City Replacement Project Identified in 2015 Master Plan	Replace inlets and connect to new 7000 South storm drain.	$70,000	Not Eligible
8	2015 MP[1]	Temple Drive from 6790 South to Storm Drainage near 7000 South	West Jordan City Trunkline Project Identified in 2015 Master Plan	Install and upsize storm drains in 1300 West from Bateman Point Dr to 7000 South to 18 inch pipe.	$282,000	Not Eligible
12	2015 MP[1]	Harvest Lane from 2200 West to 2290 West	West Jordan City Surface Conveyance Project Identified in 2015 Master Plan	Install new 21-inch storm drain in 2200 West with inlets at the intersection of 2200 West and Harvest Lane.	$199,000	Not Eligible
13	2015 MP[1]	Sunrise Place 1655 West	West Jordan City Access Project Identified in 2015 Master Plan	Install new 18-inch storm drain from the existing bubble up grate in Sunrise Place to the existing storm drain in Sunrise Place East.	$118,000	Not Eligible

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
15	2015 MP[1]	7480 South and Autumn Drive	West Jordan City Trunkline Project Identified in 2015 Master Plan	Upsize existing 15-inch outfall to the canal with a 30-inch with increased inlet capacity and add 18-inch storm drain with inlets in Spring Drive	$101,000	Not Eligible
16	2015 MP[1]	6600 South and Clematis Drive	West Jordan City Maintenance Project Identified in 2015 Master Plan	Upsize piping from 30-inch to 42-inch in the area.	$1,241,000	Not Eligible
17	2015 MP[1]	Approximately 7660 South from Sunrise Place to Temple Drive	West Jordan City Surface Conveyance Project Identified in 2015 Master Plan	Upsize to 21-inch storm drain following the existing storm/irrigation alignment.	$509,000	Not Eligible
18	2015 MP[1]	7800 South Wetland Ponds	West Jordan City Access Project Identified in 2015 Master Plan	Stabilize slope, add access road between the 2nd and 3rd ponds, and fix control gate from the North Jordan Canal	$130,000	Not Eligible
20	2015 MP[1]	8518 South and Festival Way	West Jordan City Surface Conveyance Project Identified in 2015 Master Plan	Replace culverts and pipes, increase inlet capacity and lower the detention basin at Dorilee Park. Evaluate proper orifice plate sizing at Dorilee Park.	$338,000	Not Eligible
22	2015 MP[1]	4950 West from Park Vale Drive to 7670 South	West Jordan City Access Project Identified in 2015 Master Plan	Add 5 18-inch storm drain pipes with inlets. Evaluate proper orifice plate sizing at Bridal Creek detention basin.	$90,000	Not Eligible
24	2015 MP[1]	3400 West from Lady Dove Lane to 9200 South	West Jordan City Trunkline Project Identified in 2015 Master Plan	Install curb and gutter and 18-inch pipe in 3400 West and connect to the existing storm drain east of the SLCC.	$205,000	Not Eligible
25	2015 MP[1]	8200 South and 1500 West	West Jordan City Maintenance Project Identified in 2015 Master Plan	Cut back outlet and install outlet structure with apron.	$9,000	Not Eligible
27	2015 MP[1]	Heritage Park Detention Basin	West Jordan City Detention Project Identified in 2015 Master Plan	Install 18-inch pipe from the Heritage Park Detention Basin to Bingham Creek.	$18,000	Not Eligible

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
28	2015 MP[1]	Okubos (9000 So) Detention Basin	West Jordan City Detention Project Identified in 2015 Master Plan	Replace outlet structure and install a check valve to prevent backflow.	$39,000	Not Eligible
30	2015 MP[1]	8948 South and 1240 West	West Jordan City Surface Conveyance Project Identified in 2015 Master Plan	Install 18-inch pipe from the bubble up in 1240 West to the existing storm drain in 9000 South.	$56,000	Not Eligible
31	2015 MP[1]	8660 South and 1841 West	West Jordan City Access Project Identified in 2015 Master Plan	Install 18-inch pipe from Gardner Lane near Shulsen Lane to the storm drain in Redwood Road.	$165,000	100%
32	2015 MP[1]	Leo Park Road and Hawley Park Road	West Jordan City Surface Conveyance Project Identified in 2015 Master Plan	Replace existing waterway and resurface roadway.	$13,000	Not Eligible
33	2015 MP[1]	Clay Hollow from the Mountain View Corridor upstream to the box culvert under 7800 South	West Jordan City Maintenance Project Identified in 2015 Master Plan	Install 6-foot by 4-foot box culvert in Clay Hollow from the Mountain View Corridor upstream to the box culvert under 7800 South.	$2,290,000	Not Eligible
35	2007 MP[1]	1500 West	West Jordan City Culvert Project Identified in 2007 Master Plan	Install 12-foot by 5-foot box culvert (BINC23B)	$439,000	Not Eligible
36	2007 MP[1]	9300 South 800 West	West Jordan City Culvert Project Identified in 2007 Master Plan	Install 24-inch RCP Canal Crossing (TR28B)	$208,000	Not Eligible
37	2007 MP[1]	Prosperity Road	West Jordan City Trunkline Project Identified in 2007 Master Plan	Install 18-inch RCP (T420)	$213,000	100%
38	2007 MP[1]	Dannon Way	West Jordan City Trunkline Project Identified in 2007 Master Plan	Install 30-inch RCP (T426, T431)	$242,000	6%
70	2015 MP[1]	9100 South 1510 West	West Jordan City Retention Project Identified in 2015 Master Plan	Install underground retention chamber	$84,000	100%

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
71	2015 MP[1]	Discovery and Charter Roads to 5600 West Pond	West Jordan City Retention Project Identified in 2015 Master Plan	Install vault and 24 and 30-inch pipe to the 5600 West Pond	$97,000	Not Eligible
72	2015 MP[1]	7000 South and 4600 West to Airport Road	West Jordan City Surface Conveyance Project Identified in 2015 Master Plan	New 24-inch storm drain pipe under the railroad tracks to Airport Road	$357,000	Not Eligible
74	2015 MP[1]	Valleywest Drive from 3900 West to 3715 West	West Jordan City Surface Conveyance Project Identified in 2015 Master Plan	Install 1,850 LF of 18-inch pipe in Valley West, 284 LF in 3780 West, and 12 inlets	$487,000	Not Eligible
80	2007 MP[1]	Ron Wood Detention West of Mountain View Corridor at 8700 South	Detention basin design does not adequately detain 100 year storm at the discharge rate of 65 cfs controlled by downstream UDOT structures. Deficiencies identified in the 2007 Master Plan.	Increase the detention capacity to manage the 100 year storm (approximately 53 ac-ft) with the peak discharge rate of 65 cfs. Detention volume may change based on the basin shape and outlet structure.	$3,450,000	80%
				2007 and 2015 Master Plans West Jordan City Projects Subtotal	**$11,484,000**	**$3,236,520**
Developer Projects						
41	2007 MP[1]	9800 South Hwy 111	Developer Detention Project Identified in 2007 Master Plan	Construct 5.6 ac-ft detention basin (DB404)	$822,000	100%
44	2007 MP[1]	7400 West	Developer Culvert Project Identified in 2007 Master Plan	Install 54-inch RCP (BARC277)	$269,000	100%
45	2007 MP[1]	6600 West	Developer Culvert Project Identified in 2007 Master Plan	Install 24-inch RCP (BARC281)	$208,000	100%
46	2007 MP[1]	6800 West	Developer Culvert Project Identified in 2007 Master Plan	Install 48-inch RCP (BARW291)	$257,000	100%
47	2007 MP[1]	7600 West	Developer Culvert Project Identified in 2007 Master Plan	Install 42-inch RCP (BARW297)	$243,000	100%
48	2007 MP[1]	9400 South	Developer Culvert Project Identified in 2007 Master Plan	Install 42-inch RCP (BARW300)	$243,000	100%

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
50a	2007 MP[1]	6800 West	Developer Trunkline Project Identified in 2007 Master Plan	Install 900 LF of 24-inch RCP (T300B, T291B)	$304,000	100%
50b	2007 MP[1]	6800 West	Developer Trunkline Project Identified in 2007 Master Plan	Install 1,900 LF of 30-inch RCP (T406)	$734,000	100%
51	2007 MP[1]	7300 West	Developer Culvert Project Identified in 2007 Master Plan	Install 36-inch RCP (UNW2273)	$229,000	100%
53	2007 MP[1]	7300 West	Developer Culvert Project Identified in 2007 Master Plan	Install 30-inch RCP (UNW1272A)	$218,000	100%
54	2007 MP[1]	7200 West	Developer Culvert Project Identified in 2007 Master Plan	Install 30-inch RCP (UNW1272B)	$218,000	100%
62	2007 MP[1]	9800 South	Developer Culvert Project Identified in 2007 Master Plan	Install 24-inch RCP (T404)	$185,000	100%
63	2007 MP[1]	Hwy 111	Developer Culvert Project Identified in 2007 Master Plan	Install 18-inch RCP (T405, T299A)	$550,000	100%
64	2007 MP[1]	9400 South	Developer Trunkline Project Identified in 2007 Master Plan	Install 24-inch RCP (T299B, T300A)	$1,347,000	100%
65	2007 MP[1]	Hwy 111	Developer Trunkline Project Identified in 2007 Master Plan	Install 36-inch RCP (T292B)	$744,000	100%
78	2015 MP[1]	7400 South from 6500 West to 6200 West	Developer Trunkline in Future Road	Install 500 LF of 15, 630 LF of 18, and 970 LF of 24-inch pipe in 7400 South, connect to existing pipe under the Mountain View Corridor	$389,000	100%
94	Future (Fig 5-1)	7180 South from the railroad to Mountain View Corridor	Project will be required as development occurs.	Install 42-inch RCP	$1,076,000	100%
95	Future (Fig 5-1)	7200 South	Project will be required as development occurs.	Install 30-inch RCP	$968,000	100%
96	Future (Fig 5-1)	7200 South	Project will be required as development occurs.	Install 24-inch RCP	$420,000	100%

Project ID	Deficiency ID	Location	Problem Description	Preferred Solution	Project ($)	Impact Fee
97	Future (Fig 5-1)	Along the Union Pacific Railroad from 7600 South to 7200 South	Project will be required as development occurs.	Install 24-inch RCP	$1,448,000	100%
98	Future (Fig 5-1)	9000 South	Project will be required as development occurs.	Install 30-inch RCP	$1,471,000	100%
99	Future (Fig 5-1)	9000 South	Project will be required as development occurs.	Install 24-inch RCP	$655,000	100%
				Developer Projects Subtotal	**$12,998,000**	**$12,998,000**
2007 Master Plan Other Agency Projects						
75	2007 MP[1]	6600 South	Other Agency Trunkline Project Identified in 2007 Master Plan	Install 24 and 30-inch RCP (T203, T303, T304)	$2,356,000	NA
76	2007 MP[1]	5450 West Old Bingham Hwy	Other Agency Culvert Project Identified in 2007 Master Plan	Replace with 42-inch RCP (OBH3A)	$230,000	NA
77	2007 MP[1]	9000 South Old Bingham Hwy	Other Agency Culvert Project Identified in 2007 Master Plan	Replace with 36-inch RCP (OBH81B)	$435,000	NA
				2007 Master Plan Other Agency Projects Subtotal	**$3,021,000**	**$0**
				Total Cost	**$97,552,000**	**$48,071,820**

1. Project description, location, and cost from the 2007 Storm Drainage Plan Update (Bowen, Collins & Associates, 2007) or the 2015 Storm Drainage Master Plan (HAL, 2015). Costs were updated to June 2022 dollars using the ENR Cost Index (ENR, 2022).

OPERATIONAL RECOMMENDATIONS

Flow Outside of West Jordan

As discussed in Chapter 2, several surrounding areas outside of West Jordan City have runoff that enters the West Jordan storm drain system. The inflows at 6305 South and 3980 West enters Taylorsville's Skyview detention basin. However, Skyview detention basin drains into West Jordan Storm Drain facilities. Therefore, the operations of Skyview detention basin and the incoming flows north of 6200 South affects West Jordan's storm drain system. Currently, outflow from the Skyview detention basin is controlled by a submerged 15-inch diameter gate valve which is opened slightly to control flows. If the gate valve is fully open flooding downstream will occur during storm events. Conversely, if the gate valve is closed, large storm events could fill and spill out of Skyview detention.

It is therefore recommended that the City of West Jordan enter into interlocal agreement with Taylorsville regarding operations of Skyview Detention Basin and seek their cooperation concerning a future study on the outlet works of the basin (Deficiency 22). The same efforts should be made to enter interlocal agreements with other storm drain entities that have runoff which enters West Jordan's storm drain system and could adversely impact the system. One other example of this is C2 at approximately 6610 South where runoff from Taylorsville enters the West Jordan storm drain system.

Minimum Pipe Diameter

Many of the storm drain pipes in West Jordan are 15 inches in diameter or less. Modeling of the system shows that generally the 15 inch pipes do not have the capacity to convey the 10-year 1 hr flows. It is therefore recommended that the City make 18 inch pipe the minimum for City owned storm drain systems.

Inventory

The previous Master Plan consolidated different inventories of the West Jordan Storm Drain Master Plan. The previous inventories included an inventory contained in an InfoSWMM model and a GIS inventory of the system. Multiple inventories increase the likelihood of incorrect or outdated information being used and require more time to maintain. For example, as part of this Master Plan, the City sent HAL their GIS data and the models from the previous Master Plan. Both datasets were evaluated and it became evident that neither dataset was current. This required additional time to put all the updated GIS data into the previous model.

Therefore, it is recommended that the City maintain and update a master GIS inventory of the storm drainage system. The storm drainage model should be maintained and updated based upon the master GIS inventory. The GIS inventory should be maintained separate from the InfoSWMM model to increase accessibility to the inventory by City personnel. Updates should occur as information about additional land use, conveyance, capacity, and detention data become available.

We also recommend that as development occurs that the City require developers to provide as-built GIS data for all storm drainage related features that would include pipe size, material, and invert elevations to ease the burden of City GIS staff in keeping the storm drain system data up to date.

Irrigation and Storm Drain Conveyances

Several older areas of the West Jordan Storm Drainage System have conveyances which serve as both storm drain facilities and irrigation facilities. The dual storm drain and irrigation conveyances generally lack the capacity to convey the 10-year flow through the system. Therefore, it is recommended that an ongoing effort be made to separate storm drainage conveyances from local irrigation conveyances in addition to the recommended projects in the Capital Improvement Plan.

Watch and Maintenance Recommendations

It is recommended that the City continue to follow a regular maintenance schedule to provide additional longevity to their existing system. In particular, the work orders identified by the City as found in Appendix D demonstrate where routine maintenance would provide the greatest benefit. A maintenance schedule for these areas could include removing debris, sediment, and clearing weed growth as needed to keep the drainage facilities functioning or until corrective CIP projects can be completed.

Deficiencies identified as not warranting action include those shown in Figure 4-4 and classified as areas to watch. These deficiencies should be monitored for future flooding. If conditions become unacceptable, a project should be added to the CIP to remedy the deficiency.

Protected Channel Right-of-Ways

The City desires to protect existing and future growth by maintaining a minimum right of way for all natural drainages. These minimum right-of-way top widths were established in a previous Master Plan. Since then, the City has selected a flatter side slope (4H:1V) than originally analyzed (originally 3H:1V). The updated top widths per the 4H:1V can be found in Figure 4-3.

Storm Drainage Master Plan Updates

The storm drainage master plan should be periodically reviewed and updated dependent upon change and new development, at least every 5 years.

CHAPTER 6 – BARNEY'S CREEK CONSIDERATIONS

While the City's storm drainage master plan was in progress, a separate study was being completed by Salt Lake County (County) Flood Control District that has been titled "Southwest Canal and Creeks Study" (SWCCS) (see Appendix E). As part of that study, the capacity and condition of many of the County Flood Control facilities in the southwest portion of the County were evaluated. A memorandum summarizing the results from the SWCCS analysis specific to Barney's Creek was provided to the City by the County.

The SWCCS included the following statement: "It is recommended that West Jordan City representatives review the Technical Memorandum in (SWCCS) Appendix F in Section 3 of this report and select the recommended alternative to manage storm water runoff from future development in the Barney's Creek drainage basin. The recommended alternative should be reviewed with Salt Lake County. This process should be completed while West Jordan is updating their storm drain master plan." This Chapter is in response to this recommendation and will detail the plan of action that West Jordan City would like to incorporate to manage runoff within their City.

SWCCS AND WEST JORDAN STORM DRAIN MASTER PLAN COMPARISON

SWCCS Summary

The SWCCS provided the following recommendations for managing future stormwater runoff to Barney's Creek.

- **Limiting the peak discharge from Future Development** –The final recommended discharge rate may be the pre-development discharge rate of 0.02 cfs/ac, or a different rate selected by the City as part of their more detailed master planning process. The proposed discharge rate should be analyzed in the comprehensive model of Barneys Creek and the West Jordan Storm Drain System.

- **Additional Regional Detention Facilities** – The 2003 and 2012 storm drain master plans recommended large regional detention facilities to limit the peak discharge in Barneys Creek. As part of their storm drain master planning process, West Jordan City should analyze different areas where regional detention facilities could be constructed to limit the peak discharge in Barneys Creek. Alternative detention facility improvements should be analyzed in the comprehensive model of Barney Creek and should be incorporated into the West Jordan Storm Drain Master Plan.

- **Improving Culverts on Barneys Creek** – At least three culverts need to be improved or replaced to safely convey the estimated 100-year peak discharge associated with existing development conditions. There may be more improvements to the West Jordan Storm Drain System, depending on proposed regional facilities or the required peak discharge rate for future development.

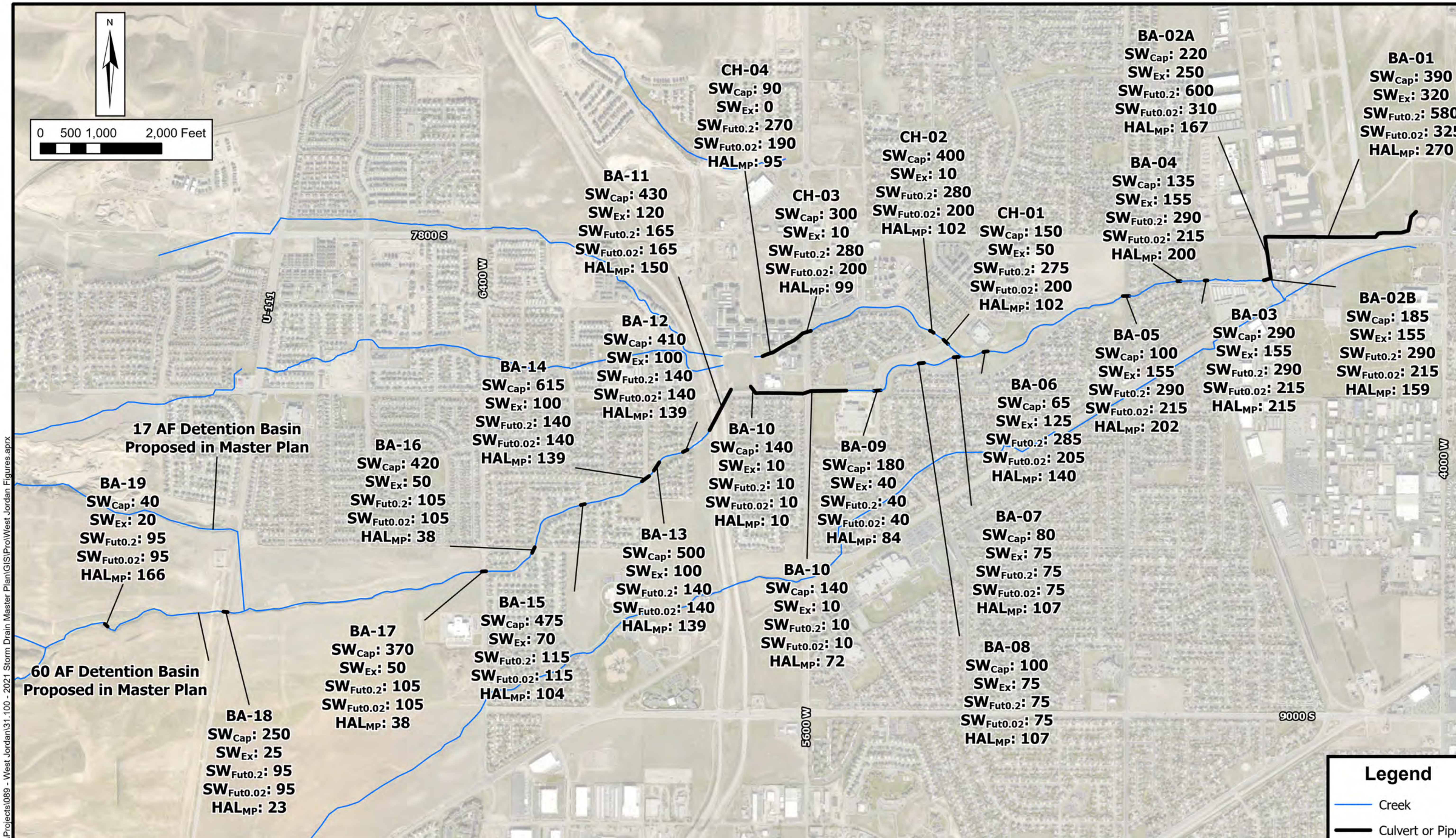
The SWCCS notes that previous West Jordan Storm Drainage Master Plans had identified several large regional detention facilities that would limit runoff from the mountain watershed areas and development west of Bacchus Highway (SR-111) that have not yet been constructed. The SWCCS indicates their analysis did not include these facilities because they have not been constructed yet. This Storm Drainage Master Plan reaffirms West Jordan's intent to construct those facilities as development occurs.

West Jordan Storm Drain Master Plan Summary

West Jordan City plans to implement the following actions to manage future stormwater runoff to Barney's Creek.

- Limiting peak discharge from future development to 0.1 cfs/acre for all development west of Mountain View Corridor.
- Constructing regional detention facilities identified in the Master Plan to limit mountain watershed flows and development west of SR-111.
- Improve culverts along Barney's Creek that master plan has identified as deficient.

Figure 6-1 provides a comparison between the results of the SWCCS and the current West Jordan Storm Drainage Master Plan along Barney's Creek. Key differences to note as these are compared is that the SWCCS did not account for the regional detention facilities being constructed whereas the West Jordan Master Plan results do include those facilities. Additionally, there are differences in modeling software, design storms, level of detail, and other assumptions that can yield different results. Hydrologic modeling is a science that involves uncertainty and engineering judgment, these often result in differences in model results.



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HANSEN ALLEN & LUCE INC ENGINEERS

CITY OF WEST JORDAN
STORM DRAINAGE MASTER PLAN

BARNEY'S CREEK COMPARISON OF FLOWS
SWCCS AND MASTER PLAN

FIGURE 6-1

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