South Weber City Corporation

Culinary Water
Capital Facilities Plan

June 2016

Prepared by
JONES & ASSOCIATES
Consulting Engineers

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CULINARY WATER
CAPITAL FACILITIES PLAN

for

SOUTH WEBER CITY

Prepared by

JONES & ASSOCIATES
Consulting Engineers

1716 East 5600 South
South Ogden, Utah 84403

(801) 476-9767

RESOLUTION 16-20

ADOPTING CULINARY WATER CAPITAL FACILITIES PLAN

WHEREAS, it is necessary for a municipality to analyze the current status and projected growth of the City's culinary water system; and

WHEREAS, South Weber City desires to update their Water System Master Capital Facilities Plan from the current plan that was created in the year 2000 by Hansen Allen; and

WHEREAS, the City Engineer of South Weber City has created a Culinary Water Capital Facilities Plan that independently analyzes and reviews the culinary water system and identifies projects necessary to bring the current system up to date while planning for future growth.

BE IT THEREFORE RESOLVED by the South Weber City Council that the attached Culinary Water Capital Facilities Plan is hereby adopted.

PASSED AND ADOPTED by the City Council of South Weber this **14th day of June 2016.**

APPROVED

Tamara Long

Tamara Long, Mayor

Attest:

Elyse Greiner

Elyse Greiner, City Recorder

SOUTH WEBER CITY * 1938 * 1971 * DAVIS COUNTY, UTAH * OFFICIAL SEAL

Roll call vote was as follows:

Mr. Taylor	yes	no
Mrs. Sjoblom	yes	no
Mr. Hyer	yes	no
Mr. Casas	yes	no
Ms. Poore	yes	no

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LIST OF ACRONYMS

ac-ft	acre-feet
AF	acre-feet
cfs	cubic feet per second
DDW	Division of Drinking Water
ERC	Equivalent Residential Connection
ERU	Equivalent Residential Unit
gal	gallon
gpd	gallons per day
gpm	gallons per minute
IFA	Impact Fee Analysis
IFFP	Impact Fee Facilities Plan
LOS	Level of Service
MG	million gallons
MGD	million gallons per day
PDD	peak day demand
PID	peak instantaneous demand
psi	pounds per square inch
UAC	Utah Administrative Code
UDEQ	Utah Department of Environmental Quality
WBWCD	Weber Basin Water Conservancy District

1.0 EXECUTIVE SUMMARY

South Weber City's potable water system was analyzed for source capacity, storage capacity, and distribution system adequacy. The existing system's supply and storage was found to be compliant with the Utah Administrative Code; however, the existing system's ability to meet fire flow was deficient in some areas. Projected build-out of the City will require additional source capacity and distribution system upgrades. Storage capacity for build-out is dependent on the size and type of buildings constructed.

The system's elements and their current and future compliance with State code are summarized in Table 1.1.

Table 1.1 – Summary of Compliance

		Compliant?	
Element		**Current**	**Projected Build-Out**
Source – flowrate	Peak Day Demand	Yes	Yes
Source – annual volume	Average Yearly Demand	Yes	No
Storage Capacity		Yes	Depends[1]
Distribution System		No	No

[1] *See Section 5.3 for discussion*.

Current compliance does not eliminate the immediate need for projects, as other factors contribute to the relevancy of the projects, such as problematic conditions (leaks, accessibility, etc.) and emergency preparedness. Advanced planning for the replacement of ageing infrastructure approaching its life expectancy is also recommended.

A full list of recommended projects is found in Section 7 of this Plan. These projects are a summary of deficiencies and potential problems in the existing system and future deficiencies based on projected growth.

Table 1.2 below gives the total costs associated with these projects.

Table 1.2 – Projects Cost Summary

	Cost Breakdown		
Estimated Total Cost	**Replacement/ Deficiency**	**Impact Fee Eligible**	**Developer Cost**
$14,117,938	$11,452,859	$2,044,178	$357,500

2.0 INTRODUCTION

2.1 Background

The Town of South Weber was originally incorporated in 1938. According to South Weber History (Bell, 1990), the motivating force behind South Weber's incorporation was the desire to construct a culinary water system. The financing for the system could not be obtained without a legal entity representing the area. Construction of the Town's water system began soon after incorporation. Over time, the Town acquired some of its water system infrastructure from the federal government which had been constructed to provide water to nearby military facilities. In 1971, the Town of South Weber became a Third Class City, thence becoming South Weber City.

South Weber City is located in northeast Davis County at the mouth of Weber Canyon, bound by the Weber River on the north and Layton City on the south. US Highway 89 and Interstate 84 are the two major transportation corridors that pass through the City. The 2010 census determined a population of 6,051 persons.

Information for this plan was gathered from previous reports and plans, South Weber City personnel, WBWCD personnel, and other sources. In 2000, Hansen Allen and Luce completed the most recently adopted Water System Master Plan. Many of the projects identified in the previous Plan have been completed or are under construction, and some are still needed. This report independently analyzes and reviews the culinary water system and identifies projects necessary to bring the current system into full compliance with regulations; update and/or repair infrastructure based on known needs and age; and plan for future growth. It also evaluates projects based on the infrastructure's condition and its importance to the overall system. Additional information is provided which will be necessary to complete an Impact Fee Facility Plan. The Impact Fee Facility Plan will be completed separately.

2.2 Study Area

South Weber City currently serves all areas within the city boundaries with culinary water and plans to eventually serve the areas identified for future annexation, as shown in Exhibit 2.1. The current city boundary encompasses approximately 4.70 sq. miles. The proposed annexation boundary includes an additional 2.9 sq. miles.

Land use is primarily residential with some agriculture and commercial/industrial uses. The City's vision for future land use remains primarily residential; however, the City would like to increase the percentage of commercial development in the future. For the purposes of this Plan, future needs have been estimated based on the South Weber City's 2014 General Plan. It is understood that the service boundary and/or the proposed land use may change depending on development. These factors may require periodic adjustments to this Plan and the recommended culinary water capital facilities projects. Exhibit 2.1 shows the future proposed land uses from the General Plan.

2.3 Water System Overview

Currently, the City owns and maintains all of the culinary water storage and distribution facilities needed to serve its customers. This includes pump lines, transmission lines, and distribution lines, four (4)

storage reservoirs, two (2) booster stations, and two (2) fluoridation systems. The City also owns and operates one (1) potable water well. The city's current water system is illustrated in Exhibit 2.2.

The City purchases the majority of its culinary water from the Weber Basin Water Conservancy District ("WBWCD") and has a reliable drinking water well that it owns and operates. In recent years, the well has provided anywhere from 1% to 19% of the drinking water needed to meet current demands. The City intends to continue to utilize the well. The City plans on meeting future demands primarily by purchasing additional water from WBWCD.

Even though the culinary water system is used to irrigate some properties, its use for irrigation is very limited since nearly all of South Weber City is serviced by secondary water. Based on individual metered water usage data, it appears that less than one percent (1%) of the culinary water connections are also used for irrigation. Therefore, irrigation demand on the culinary water system has been deemed negligible and is not included in this report.

GENERAL LEGEND

- SOUTH WEBER CITY BOUNDARY
- LAYTON CITY, UINTAH CITY, AND WEBER COUNTY BOUNDARIES
- SOUTH WEBER CITY ANNEXATION BOUNDARY
- CANAL / RIVER

JA

MAINTAIN PUBLIC ACCESS TO RIVER WHEN THIS AREA IS DEVELOPED

LAND USE LEGEND

- VISUAL BUFFER BETWEEN HOUSING AND I-84
- MIXED USE OVERLAY
- HAFB RESTRICTED DEVELOPMENT
- RESIDENTIAL PATIO - GENERAL LOCATIONS (6.00 UNITS/ACRE = APPROX. 1/5 ACRE LOTS) *10 ACRES MAX. IN EACH LOCATION
- VERY LOW DENSITY RESIDENTIAL (0.10-0.90 UNITS/ACRE = APPROX. 1 ACRE LOTS)
- LOW DENSITY RESIDENTIAL (1.45 UNITS/ACRE = APPROX. 1/2 ACRE LOTS)
- LOW MODERATE DENSITY RESIDENTIAL (1.85 UNITS/ACRE = APPROX. 1/3 ACRE LOTS)
- MODERATE DENSITY RESIDENTIAL (2.80 UNITS/ACRE = APPROX. 1/4 ACRE LOTS)
- RESIDENTIAL PATIO - SPECIFIC LOCATIONS (6.00 UNITS/ACRE = APPROX. 1/5 ACRE LOTS)
- HIGH DENSITY RESIDENTIAL - SPECIFIC LOCATIONS (13.0 UNITS/ACRE)
- COMMERCIAL
- COMMERCIAL - HIGHWAY
- BUSINESS COMMERCE
- LIGHT INDUSTRIAL
- INSTITUTIONAL
- RECREATION - SPECIFIC LOCATIONS
- COMMERCIAL RECREATION
- OPEN LANDS

SOUTH WEBER city

REFERENCE: **South Weber City General Plan Project Land Use Map Created: 09/23/2014**

SCALE: 1 in = 1,800 ft

MM/DD/YYYY 05/19/2016

DESIGNED BEB
DRAWN BEB
CHECKED BKJ

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SOUTH WEBER CITY CORPORATION
WATER CAPITAL FACILITIES PLAN

GENERAL PLAN LAND USE & BOUNDARIES

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PRESSURE ZONES

- ZONE A
- ZONE 1
- ZONE 2
- ZONE 3
- ZONE 4
- INDICATES AREAS WHERE THE PRESSURE ZONE IS NOT CONNECTED TO THE CULINARY WATER SYSTEM (OR NOT VERY CLOSE TO A FEASABLE CONNECTION), BUT COULD STILL BE SERVED IF A CONNECTION WERE MADE.

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LEGEND

- SOUTH WEBER CITY BOUNDARY
- LAYTON CITY BOUNDARY
- CANAL / RIVER
- PUMP STATION
- STORAGE RESERVOIR
- EXISTING WELL
- FIRE HYDRANTS
- EXISTING 18" PIPE
- EXISTING 16" PIPE
- EXISTING 14" PIPE
- EXISTING 12" PIPE
- EXISTING 10" PIPE
- EXISTING 8" PIPE
- EXISTING 6" PIPE
- EXISTING 4" PIPE
- EXISTING 2" PIPE
- EXISTING WEBER BASIN WATER CONSERVATION DISTRICT - TRANSMISSION LINE

SOUTH WEBER city

NOTES:

SCALE: 1 in = 1,800 ft

MM/DD/YYYY 05/19/2016

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SOUTH WEBER CITY CORPORATION
WATER CAPITAL FACILITIES PLAN
EXISTING WATER SYSTEM

SHEET: 2.2 OF 1 SHEETS
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3.0 ERCs, DDW, AND GROWTH ESTIMATES

3.1 Equivalent Residential Connection

Water use varies from connection to connection throughout a water system. In order to avoid the complexity of analyzing each connection, a simple basic unit of water use can be defined for the purposes of comparison. This basic unit is called an Equivalent Residential Connection, or ERC. An ERC quantifies the typical daily water needed for one single family residential connection within the system, the most common type of connection in the City, and is then applied to non-residential users based on water usage. This unit is needed in order to compare non-residential users and evaluate the system with one single equalizing unit of measure.

> *"Equivalent Residential Connection (ERC) is a term used to evaluate service connections to consumers other than the typical residential domicile. Public water system management is expected to review annual metered drinking water volumes delivered to non-residential connections and estimate the equivalent number of residential connections that these represent based upon the average of annual metered drinking water volumes delivered to true single family residential connections. This information is utilized in [the] evaluation of the system's source and storage capacities (refer to R309-510)." -Utah Administrative Code R309-110-4*

Metered water usage for residential customers from 2012 to 2015 was analyzed in order to calculate the equivalent residential connection usage. See Table 3.1 below.

Table 3.1 – Yearly Average Use per Residence

	Average Use per Residence (gpd)
2012[1]	244.2
2013	200.6
2014	197.4
2015	199.4
Average	**210.4**

[1] *Based on limited data for this year*

This average use per residence quantifies an ERC (1 ERC = 210.4 gpd). Once defined, an ERC can be applied to various water users within the system. The calculated use per ERC is then applied to users of the system based on consumption, which is then used to calculate the total number of ERCs for the City.

Table 3.2 – Yearly Average ERCs

	Single Family Residences	ERCs for Non-Single Family Residences	Total ERCs (consumption-based)
2012	1,694	140	1,834
2013	1,796	187	1,983
2014	1,853	267	2,120
2015	1,904	227	2,131

Water consumption from non-residential users can be described as having more or less impact than a typical residence by stating its use in ERC terms. Some commercial connections can have an impact on the water system of several typical residences.

For example, in 2014, Parson's gravel pit used an average of 46,894 gallons of water per day. This is the equivalent of approximately 238 typical South Weber homes. (46,894 ÷197.4=237.6) Similarly, other connections to the water system may serve several residences such as at the Cambridge Crossing apartment complex. Consequently, even though there were only 1,911 physical connections (residential and non-residential) to the system in 2014, the City provided water in a quantity equivalent to 2,120 residential connections.

3.1.1 Production vs. Consumption

Various factors within a water system drive the water production to be higher than consumption. In South Weber, production includes water pumped from the well and delivered from WBWCD. Consumption, or metered water actually delivered to the consumer, can be significantly less than what is produced. Assuming storage remains constant, factors that cause this difference include non-metered connections or uses, water main breaks, leaks, overflows, firefighting activities, and water line flushing.

$$Production = Consumption + Losses$$

or

$$Consumption = Production - Losses$$

By way of comparison, Table 3.3 below compares consumption per ERC versus production per ERC:

Table 3.3 – Consumption versus Production per ERC

	Consumption per ERC (gpd)	Production per ERC (gpd)
2012	244.2	265.0
2013	200.6	269.8
2014	197.4	290.6
2015	199.4	248.1
Average	**210.4**	**268.4**

3.2 Division of Drinking Water

3.2.1 Sizing Requirements

The Division of Drinking Water (DDW) provides standard minimum requirements for sizing water infrastructure, including sources, storage, and distribution facilities. The following table provides a summary of the DDW requirements per component:

Table 3.4 – DDW Component Sizing Requirements

Component	Measurement	DDW Requirement
Sources	• Flowrate • Volume	• 800 gpd/ERC for Peak Day Demand • 146,000 gallons/ERC for Average Yearly Demand (400 gpd/ERC)
Storage Facilities	• Volume	• 400 gallons/ERC
Distribution System	• Pressure	• 20 psi during conditions of fire flow and fire demand experienced during peak day demand • 30 psi during peak instantaneous demand • 40 psi during peak day demand

3.2.2 Reduction of Sizing Requirements

The Utah Administrative Code (UAC) allows for the Director of the DDW to grant a reduction of the sizing requirements on a case-by-case basis. This is detailed in UAC R309-510-5.

On February 24, 2016, representatives from South Weber City and the DDW met to discuss what would be required in order to reduce the minimum source requirements. It was determined that the current metering systems do not provide sufficient data needed to apply for a reduction in sizing requirements. After reviewing the system map, it was determined that three (3) or four (4) additional large diameter meters with daily read and recording capabilities would be needed. Then, at least three (3) years of daily data collection would be necessary for analysis.

Table 3.5 – ERC Comparison

Consumption per ERC (gpd)	Production per ERC (gpd)	DDW minimum per ERC (gpd)
210.4	268.4	400

As shown in Table 3.5, a reduction in minimum sizing may be obtained from the DDW if and when the City pursues obtaining a waiver from the standards. When granting any reduction, the DDW will include a factor of safety, which might result in being granted a reduction to 300-350 gpd/ERC. Until such time, however, the standard DDW requirements must be used. As the request for a reduction must be granted by the DDW, the City should also be aware that there is no guarantee of receiving a reduction.

Each of the large diameter meters would likely need to be installed in a vault, with power and SCADA run to each vault. This would require a significant capital expenditure which would not likely balance the cost savings in water purchases for many decades or longer. Therefore, the City Council has given direction not to include the installation of these meters as a separate project in this Plan. However, as the opportunity presents itself, these meter and SCADA upgrades should be incorporated into larger pertinent projects.

Therefore, for the purposes of this Plan, the standard DDW requirements have been used.

3.3 Growth Estimates

Current population information has been estimated from official US Census Bureau data. From 2000 to 2010 the yearly population growth rate of South Weber averaged 3.58%. This decade saw several years of artificially high growth rates. As a result, we feel that the future growth rate will be lower than the average over the previous decade. The General Plan estimates that 3,620 residential dwelling units will occupy South Weber City at build-out, based on the Projected Land Use Map as shown in Exhibit 2.1.

As of July 2015, the following was determined:

Table 3.6 – 2015 Statistics

Residential Connections	Non-Residential ERCs	Platted lots not yet built	Total ERCs
1,936	116	200	2,252

The ERC concept can also be applied to undeveloped land in order to estimate the amount of water needed in areas of growth or redevelopment. Using the Exhibit B "Developable Ground Map" from the City's 2014 General Plan, ERCs were assigned to future residential units, and commercial and industrial areas. ERC values have been applied to the undeveloped areas on the City's Land Use Map and are shown in Exhibit 3.1. Based on the 2014 General Plan, the total future number of ERCs is estimated to be 3,850. Using updated information for 2015 in conjunction with the projected ERCs shown in Exhibit 3.1, Table 3.7 gives a breakdown of projected residential versus non-residential ERCs.

Table 3.7 – Population and ERC Projections

Year	Population Projection	Projected Residential ERCs	Projected Non-Residential ERCs	Projected Total ERCs
2010	6,051*	ND	ND	ND
2015	7,015	2,136	116*	2,252*
2020	8,132	2,487	180	2,667
2025	9,427	2,838	245	3,082
2030	10,929	3,188	309	3,497
2035 (build-out)	12,669	3,539	373	3,912

**Actual data*
ND – *Data not available*

The non-residential water uses will vary greatly and can be difficult to estimate; therefore, assumptions were made in order to estimate the ERC values in these areas. All the expected future ERC values are shown in Exhibit 3.1.

It is estimated that the City will reach build-out in about 20 years and add approximately 1,660 ERCs in addition to the homes yet to be built on currently platted lots. Due to changes in the economy and growth rate, it is recommended that this plan be reviewed approximately every five (5) years.

GENERAL LEGEND

- SOUTH WEBER CITY BOUNDARY
- LAYTON CITY BOUNDARY
- SOUTH WEBER CITY ANNEXATION BOUNDARY
- CANAL / RIVER

JA

LEGEND

- VERY LOW DENSITY RESIDENTIAL (97.17 Acres - 10%) 0.10-0.90 UNITS/ACRE = 79 ERC
- LOW DENSITY RESIDENTIAL (48.97 Acres - 10%) 1.45 UNITS/ACRE = 64 ERC
- LOW MODERATE DENSITY RESIDENTIAL (113.12 Acres - 10%) 1.85 UNITS/ACRE = 188 ERC
- MODERATE DENSITY RESIDENTIAL (321.79 Acres - 10%) 2.80 UNITS/ACRE = 813 ERC
- RESIDENTIAL PATIO - SPECIFIC LOCATIONS (24.53 Acres - 10%) 6.00 UNITS/ACRE = 132 ERC
- HIGH DENSITY RESIDENTIAL (9.75 Acres) 13.0 UNITS/ACRE = 127 ERC
- COMMERCIAL = 1 ERC
- COMMERCIAL - HIGHWAY = 91 ERC
- BUSINESS COMMERCE = 150 ERC
- LIGHT INDUSTRIAL = 7 ERC
- INSTITUTIONAL
- RECREATION - SPECIFIC LOCATIONS = 1 ERC
- COMMERCIAL RECREATION = 7 ERC
- OPEN LANDS

SOUTH WEBER city

NOTES: #a / #c = # Acres / # ERC (Equivalent Residential Connections)

TOTAL FUTURE RESIDENTIAL CONNECTIONS = 1403
TOTAL FUTURE NON-RESIDENTIAL CONNECTIONS = 257

SCALE: 1 in = 1,800 ft

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SOUTH WEBER CITY CORPORATION
WATER CAPITAL FACILITIES PLAN

DEVELOPABLE GROUND & ERCs

SHEET: 3.1 OF SHEETS 0

4.0 WATER SOURCES

4.1 Water Source Requirements

Utah Administrative Code R309-510-7 states that sources shall legally and physically meet water demands under two conditions:

(a) The water system's source capacity shall be able to meet the anticipated water demand on the day of highest water consumption, which is the peak day demand (800 gpd/ERC).

(b) The water system's source capacity shall also be able to provide one year's supply of water, which is the average yearly demand (146,000 gal/ERC).

The values shown are the minimum sizing requirements that shall be used for determining the adequacy of water sources.

4.2 Existing Water Sources

South Weber obtains its water from two (2) sources: a potable water well (owned and operated by the City) and WBWCD. The following table shows a breakdown of the current culinary water sources.

Table 4.1 – Existing Water Sources

Name of Source	Priority Date	Water Right No.	Certificate No.	Flow – Nature of Use	Max. Approved Production (ac-ft/yr)	Actual Production (ac-ft/yr)
Well #1	8/1/1953	31-2524	8036	0.55 cfs Jan 1 to Dec 31 - Municipal	398.19 (by Water Right)	100.00
WBWCD	N/A	N/A	N/A	Contract Water	950.00	950.00
			TOTALS		**1,348.19**	**1,050.00**

4.2.1 Well No. 1

South Weber Well No.1 is located across from the City Offices at 1600 East South Weber Drive and pumps directly into the distribution system to the lower two pressure zones (Zones 1 and 2). This 8" diameter, 350-ft deep well was originally used for ground water observation purposes. In 1961, it was changed to a culinary water well. In 2003, it was cleaned to a depth of 336-ft. The well was originally rated to pump at a maximum flow rate of approximately 400 gpm. The annual production for the well is limited by the water right, which allows an annual withdrawal from the well of 398.19 acre feet (129.75 MG/year or 247 gpm if pumped continuously). Historically, the City has only been using about 100 ac-ft from the well annually. The reason for this reduction could be explained in two parts:

1. Contract Water first. The City typically first uses the contract water, and then supplements with the well water.

2. Well capacity reduced. It appears that the well has lost some of its capacity and is not capable of pumping its original maximum flow rate. This could be due to the pump becoming less efficient as it ages, problems with the well casing or media immediately surrounding the casing where the perforations are located, a drop in the static elevation of the aquifer, or various other issues.

Due to the uncertainty of the well's actual capacity, for the purpose of this report, we are assuming the historic use of 100 ac-ft /year.

A study of the well's capacity is beyond the scope of this report. However, a capacity analysis and pump test should be performed to verify the well's actual capacity. If, after study and testing, it is determined that the well does have the ability to pump a maximum of 400 gpm on a long-term basis with a total annual yield of 398.19 ac-ft , the Capital Facilities Plan should be updated to reflect future projections and needs.

4.2.2 WBWCD Contracts

South Weber City has purchased water from WBWCD incrementally since 1955. Currently, the City is contracted for a total of 950 ac-ft/year. A summary of the water contracts is contained in Table 4.2 below.

Table 4.2 – Existing WBWCD Contracts

Block	Contract Date	Contract Volume (ac-ft)	Total Volume by Block (ac-ft)
Project	9/26/1955	100	202
	10/3/1966	40	
	3/26/1974	26	
	2/20/1980	36	
District I	1/14/1992	58	398
	2/14/1995	50	
	10/15/1997	100	
	2/24/1998	150	
	1/2002	40	
District II	2/1/2008	100	350
	10/21/2014	110	
	9/24/2015	140	
		Total	**950**

The main connection (connection #1) to WBWCD is located at approximately 700 East 7400 South, just east of the west reservoirs. At a maximum capacity of about 3,000 gpm, this connection provides most of the water purchased from WBWCD. Connection #2 to WBWCD consists of a city-owned booster pump station which pumps water from a WBWCD connection on Church Street (in Layton), at approximately 700 gpm, to the Reservoir #4, which then feeds the upper pressure zones. The last

connection to WBWCD is located north of I-84 and serves only a few homes. This connection (#3) has been deemed negligible for the purposes of this report.

Table 4.3 – Existing Water Source Production

Source	Maximum Water Production Rate	
	GPM	MGD
Well #1	400	0.576
Weber Basin Connection #1 (700 East)[1]	3,000	4.320
Weber Basin Connection #2 (Church St)[1]	700	1.008
Totals	**4,100**	**5.904**

[1]*The City may be accessed peaking charges from WBWCD when the total flow rate from all WBWCD sources exceeds 1,178 gpm. See Table 4.6.*

Table 4.3 above provides a summary of the water sources. Overall, this shows that the City's water sources are able to yield a maximum of 4,100 gpm or 5.904 MGD.

4.3 Water Use Projections

4.3.1 Average Yearly Demand

Table 4.4 below illustrates the application of the State's source requirement of 146,000 gal/ERC (0.448 ac-ft/ERC) for the average yearly demand on the existing calculated ERCs.

Table 4.4 – Existing Water Source Required Capacity

Year	ERCs	State's Source Requirement (ac-ft/ERC/yr)	Required Source Capacity (ac-ft/yr)	Available Source Capacity (ac-ft/yr)
2015	2,252	0.448	1,009	1,050

The State's requirement of 0.448 ac-ft/ERC applied to the projected ERCs is shown in Table 4.5. The City is currently compliant in providing enough source to cover the current connections and all developments that have been recorded or received final approval from the City. However, recent development applications received by the City will exceed the available water source production. In order to serve these additional developments, more water source must be acquired. This could be done through additional "Take or Pay" contracts with WBWCD. However, we recommend a change in the approach to future water source acquisition. A detailed discussion is found in Section 4.4.1.

With 1,753 ac-ft needed for build-out, **an additional 703 ac-ft of water will be needed to support full build-out of the City**.

The viability of the City being able to drill a new well or develop another source is low due to lack of additional water rights and the possibility of interference with several WBWCD wells in the area. The existing Well No. 1 should be rehabilitated, but its total future capacity is unknown at this point.

Therefore, this study anticipates the acquisition of all future water sources through additional contract water from WBWCD, as shown in Table 4.5.

Table 4.5 – Projected Average Yearly Demand

Year	Projected ERCs	Projected Source (ac-ft/yr)		Total Projected Use (ac-ft/yr)
		Well #1	WBWCD	
2020	2,667	100	1,095	1,195
2025	3,082	100	1,285	1,385
2030	3,497	100	1,467	1,567
2035 (build-out)	3,912	100	1,653	1,753

4.3.2 Peak Day Demand

Applying the State's source requirement of 800 gpd/ERC for the peak day demand to the projected ERCs, it is apparent that the City's existing water source production rate of 5.904 MGD more than covers the required 3.130 MGD projected for build-out in 2035, as shown in Table 4.6.

Table 4.6 – Projected Peak Day Demand and Supply

Year	Projected ERCs	Projected Peak Day Demand[2] (MGD)	Existing Total Maximum Available Flow Rate[3] (MGD)	Projected Total Maximum Flow Rate[4,5] (MGD)
2015	2,252[1]	**1.802**	5.904	**2.272**
2020	2,667	**2.134**	5.904	**2.532**
2025	3,082	**2.466**	5.904	**2.870**
2030	3,497	**2.798**	5.904	**3.195**
2035 (build-out)	3,912	**3.130**	5.904	**3.528**

[1] *Actual data*

[2] *ERCs x 800 gpd/ERC ÷ 1,000,000 gal/MG*

[3] *Existing total maximum flow rate available from all sources (well and WBWCD) from Table 4.3. Includes potential peaking charges.*

[4] *Existing total maximum flow rate available in order to avoid peaking charges from WBWCD.*

[5] *Project Maximum Flow Rate includes 400 gpm of Well No. 1 + Projected WBWCD Contract Amounts with 2.0 peaking factor.*

However, it should be noted that a combined total flow rate over 1,178 gpm[1] from all WBWCD sources, under current conditions, could result in a peaking charge from WBWCD. This flow rate is calculated based on the total contract amount of water and a peaking factor of 2.0. This allowable flow rate will increase as the City contracts for additional water. If all future water needs are acquired from WBWCD,

[1] 1,178 gpm is the equivalent of 950 ac-ft/yr (City's current contract amount) converted to gpm, with a peaking factor of 2.0.

then Table 4.6 shows that the increased Projected Total Maximum Flow Rate will cover the Projected Peak Day Demand, subsequently avoiding any peaking charges from WBWCD. This table shows that the City is compliant with the State DDW's rule for Peak Day Demand both now and in the future as long as the anticipated source from WBWCD is acquired.

4.4 Future Water Source Needs

Currently, the City has adequate source capacity to meet the existing demands. As explained in section 4.3.1, it is estimated that **an additional 703 ac-ft of water will be needed to support full build-out of the City.**

4.4.1 WBWCD Water Purchase Approaches

All of the City's current contracts with WBWCD are "Take or Pay" contracts. These contracts specify that WBWCD commits to supplying the contract amount of water, and the City agrees to pay for the total contract amount annually, whether or not it is all used.

The cost per acre foot of water is made up of two portions: the "Capital" portion and the "Operation and Maintenance" (O&M) portion. The Capital portion pays for the construction part of developing that associated block of water. The O&M portion pays for the ongoing costs associated with the equipment and labor necessary to deliver the water. The Capital portion is a fixed cost, but the O&M portion varies every year. The current contracts add these two figures together and a new assessment is sent to the City annually. Table 4.7 summarizes the cost breakdown of the current contracts the City has with WBWCD.

Table 4.7 – Cost Summary for Current WBWCD Take or Pay Contracts

(As of January 2016)

	Block	Description	Years	Number of Contracts	Total Volume (AF)	Capital Portion[1] ($/AF)	O&M Portion[2] ($/AF)	Total Combined ($/AF)	Total Annual Cost
Current	1	Project Water	1955-1980	4	202	$64.21	$102.73	$166.94	$33,721.88
	2	District I Water	1992-2002	5	398	$118.35	$102.73	$221.08	$87,989.84
	3	District II Water	2008-2015	3	350	$266.03	$102.73	$368.76	$129,066.00
			Total	**12**	**950**		**Weighted Average**	**$263.98**	**$250,777.72**

[1] *Fixed*
[2] *Varies each year*

As of December 2015, there is no more District II water available to purchase from WBWCD. The current available block of water is District III. The 2016 price for a District III Take or Pay Contract is

$546.00/ac-ft. WBWCD has also done some preliminary work and estimates the initial cost of District IV water to be about $765.00/ac-ft.

Due to the high costs for purchasing this water, other options have been investigated. Appendix A contains a memo written to the South Weber City Planning Commission by Brandon Jones on September 24, 2014. This memo outlines several options available to the City for the acquisition of new water sources, including an option #4 which allows a city or service district to assess WBWCD's impact fee with the issuance of each new building permit. [WBWCD has developed an Impact Fee Facilities Plan (IFFP) and an associated Impact Fee Analysis (IFA) for the Capital portion of District III water.] Doing this would automatically contract the City for the amount of water associated with the number of ERCs for the building permit (1 ERC = 0.448 ac-ft/yr). This approach covers both residential and non-residential uses. All impact fees collected are passed on to WBWCD, who then assesses and totals the amount of water being added to the City's annual contract. Because the capital portion of the water is paid for by the impact fee, the City is only responsible for the O&M portion of the water on an annual basis thereafter. Table 4.8 below gives a brief summary of this method compared to the current rate of Take or Pay contracts.

Table 4.8 – WBWCD Water (District III Costs)

Type of Contract	Total Cost[1] (per ac-ft)	Total Cost[1] (per ERC)	WBWCD Impact Fee[2] (per ERC)	Annual Cost[1] (paid by City)	
				(per ac-ft)	(per ERC)
Take or Pay Contract	$531	$238	N.A.	$531	$238
Impact Fee Pass-Through Contract	N.A.	N.A.	$4,363	$110	$49

[1]*Cost is current as of the date of this report. WBWCD annually evaluates and updates these costs.*

[2]*The Impact Fee is a one-time fee paid* by owner *at the time of building permit issuance.*

[3]*The ERC basis is 1 ERC = 0.448 ac-ft.*

After the initial discussion with the Planning Commission, this memo was presented to and discussed with the City Council. The City Council gave direction to pursue Option #4. We recommend that the City pursue implementing this Impact Fee Pass-Through method of purchasing additional water from WBWCD for the followings reasons:

1. It has significant long-term cost savings (see Tables 4.9 and 4.10). As the above table shows, with the Impact Fee Pass-Through Contract, the City would only be responsible for paying $49/ERC/year in comparison to the Take or Pay contract price of $238/ERC/year.
2. The City does not start paying the cost of the water until a building permit is issued, the home is built, and the connection is made. This means that the City no longer has to "float" the cost of the water before a utility fee is generated to cover the on-going costs.
3. The City only acquires and pays for as much water as is needed.
4. This method eliminates the need to guess when growth and development will occur in conjunction with the timing of purchasing additional water source.

5. It allows for new development to "pay their way" as it relates to the acquisition of new water source rather than burdening the existing residents with more expensive water.
6. This method is also a benefit to new development as it will keep the annual cost of water significantly lower than the Take or Pay contract approach.

A cost analysis, comparing the traditional Take or Pay Contract with the Impact Fee Pass-Through approach, is shown in Tables 4.9 and 4.10. This analysis is provided in order to show an estimate of the long-term benefits of the Impact Fee Pass-Through approach. This analysis shows a total build-out contract water amount using today's costs. District IV costs are rough estimates and are only contained for the purpose of comparing long-term costs.

Table 4.9 – Cost Summary for Current WBWCD Take or Pay Contracts PLUS a Take or Pay Contract Purchase Approach to Build-Out

	Block	Description	Years	Number of Contracts	Total Volume (AF)	Capital Portion[1] ($/AF)	O&M Portion[2] ($/AF)	Total Combined ($/AF)	Total Annual Cost
Current	1	Project Water	1955-1980	4	202	$64.21	$102.73	$166.94	$33,721.88
	2	District I Water	1992-2002	5	398	$118.35	$102.73	$221.08	$87,989.84
	3	District II Water	2008-2015	3	350	$266.03	$102.73	$368.76	$129,066.00
Future	4	District III Water	2016-2025	N.A.	335	$436.00	$110.00	$546.00	$182,910.00
	5	District IV Water	2026-2035	N.A.	368	$515.00	$250.00	$765.00	$281,520.00
				Total	**1,653**		**Weighted Average**	**$432.67**	**$715,207.72**

[1] *Fixed*
[2] *Varies each year*

Table 4.10 – Cost Summary for Current WBWCD Take or Pay Contracts PLUS an Impact Fee Pass-Through Assessment Approach to Build-Out

	Block	Description	Years	Number of Contracts	Total Volume (AF)	Capital Portion[1] ($/AF)	O&M Portion[2] ($/AF)	Total Combined ($/AF)	Total Annual Cost
Current	1	Project Water	1955-1980	4	202	$64.21	$102.73	$166.94	$33,721.88
	2	District I Water	1992-2002	5	398	$118.35	$102.73	$221.08	$87,989.84
	3	District II Water	2008-2015	3	350	$266.03	$102.73	$368.76	$129,066.00
Future	4	District III Water	2016-2025	N.A.	335	**$0.00**	$110.00	**$110.00**	$36,850.00
	5	District IV Water	2026-2035	N.A.	368	**$0.00**	$250.00	**$250.00**	$92,000.00
				Total	**1,653**		**Weighted Average**	**$229.66**	**$379,627.72**

[1] *Fixed*
[2] *Varies each year*

At Build-Out, the total costs with the Impact Fee Pass-Through approach are nearly half of the traditional Take or Pay Contracts approach.

4.4.2 Other Water Source Needs

Water from Weber Basin connection #2 is pumped to the system via the Church Street Pump Station, located in Layton City. This pump station is critical in providing water to Reservoir #4, the upper pressure zones, and subsequent lower pressure zones (thus having the capability of serving the entire city); therefore, it is imperative that this pump station remain in service during power outages. It is recommended that the Church Street Pump Station be fitted with a back-up generator.

The most recent videoing of Well #1 shows the casing to have failed in several locations. This water source is South Weber's only certificated water right; therefore, it is recommended that this well be evaluated and rehabilitated or replaced. A back-up generator is also recommended for the well.

It would be prudent for the City to secure an additional connection to WBWCD's distribution system. Should there be a problem with connection #1, the system may fall short of providing enough water. This is further discussed in Section 6.

4.5 Projects

The following projects are recommended, in order of recommend priority:

	Project	Description/Purpose
1	WBWCD Contract for Impact Fee Pass-Through Approach	This project would put in place the recommendation of adopting the Impact Fee Pass-Through approach for acquiring additional water source from WBWCD as discussed in Section 4.4.1.
2	Automate Weber Basin Well feed to Reservoirs #1 and #2	This project involves installing SCADA controls and valving that will control the flow rate from the WBWCD Well at Connection #1. This project will help meet the demand of the system and keep Reservoirs #1 and #2 full without spilling or overtopping.
3	Church Street Pump Station Generator	This project would install a backup generator to provide power to the pump station in the case of a power interruption.
4	Well #1 Rehabilitation	This project would evaluate the current condition of the well casing, pump bowls, motor, well house piping, etc. and perform the appropriate well rehabilitation methods. It would also analyze and test the well's capacity. This project also includes a backup generator to provide power to the well in the case of a power interruption.
5	WBWCD Connection #4	This project would make another connection to WBWCD's transmission line. This connection will to be pumped into Zone 4.

5.0 WATER STORAGE

5.1 Water Storage Requirements

Utah Administrative Code R309-510-8 states:

> *Each public water system, or storage facility serving connections within a specific area, shall provide:*
> *(a) equalization storage volume, to satisfy average day demands for water for indoor use and irrigation use,*
> *(b) fire flow storage volume, if the water system is equipped with fire hydrants intended to provide fire suppression water or as required by the local fire code official, and*
> *(c) emergency storage, if deemed appropriate by the water supplier or the Director.*

Based on Table 510-4 of the aforementioned rule, 400 gallons/ERC of storage is required for equalization storage for indoor use. Since it has been previously determined that outdoor use is negligible, storage for irrigation use has not been considered.

Fire flow storage may be dictated by the local fire official or, if none is available, a minimum of 1,000 gpm for 60 minutes shall be used. For South Weber, a fire flow of 1,750 gpm for two (2) hours was used as the existing Level of Service. See section 6.2 for more information regarding how fire flow was determined.

5.2 Existing Water Storage

The South Weber City water system operates four (4) pressure zones. Zones are provided so that pressure can be more evenly distributed. In order for water storage tanks to service a zone, the tank must be located above that zone. While not all of South Weber's tanks can service all zones, the tanks are generally arranged to provide storage for each zone.

Exhibit 2.2 illustrates the locations of the City's water storage reservoirs; Table 5.1 below lists the reservoirs' capacities and which to which pressure zone each reservoir directly feeds.

Table 5.1 – Existing Water Storage

Name	Location	Zone (Direct Feed)	Zone (Capable of Feeding)	Capacity (gal)
Reservoir #1	West Bench; SW City Boundary, above canal	2	1,2	100,000
Reservoir #2	West Bench; SW City Boundary, above canal	2	1,2	1,000,000
Reservoir #3	East Bench	3	1,2,3	500,000
Reservoir #4	Upper Bench (south)	3	1,2,3,4[1]	1,000,000
			TOTAL	**2,600,000**

[1]Reservoir #4 is capable of directly serving Zone 4 if/when development occurs in that zone.

Reservoir #1 is old and is known to be leaking. Therefore, the City has taken it offline to minimize losses. Reservoir #2 is approximately 60 years old and also known to be leaking. Past repairs have been minimally successful. It is recommended that a cost/benefit analysis for repairs to this tank be performed prior to initiating any further repairs. Replacement of this 1 MG tank may be more economically feasible than continually repairing it. Reservoir #3 is approximately 35 years old but is still in good condition. Recently completed in 2011, Reservoir #4 is functioning well with no foreseeable problems.

5.3 Future Water Storage Needs

Table 5.2 details the projected storage required through buildout, including required fire storage of 210,000 gallons (1,750 gpm for 120 minutes).

Table 5.2 – Projected Required Storage Capacity

Year	Projected ERCs	Required Storage --Indoor -- (MG)	Required Storage -- Fire Flow -- (MG)	Total Required Storage (MG)
2015	2,252[1]	0.9008	0.210	1.1108
2020	2,667	1.0668	0.210	1.2768
2025	3,082	1.2328	0.210	1.4428
2030	3,497	1.3988	0.210	1.6088
2035 (build-out)	3,912	1.5648	0.210	1.7748

[1] *Actual*

Comparing the existing (2.6 MG) and projected (1.77 MG) required storage, it appears evident that the system has and will have adequate storage. However, a quick analysis of the pressure zones served by the tanks reveals that Zones 1 and 2 have, by far, the most potential for development, including the potential for a large user or high fire flow building to occupy the property at the intersection of 475 East and I-84. If, for example, a mid-sized, wood-framed hotel was constructed, it could need as much as 585,000 gallons (3,250 gpm for 3 hours) according to the Fire Code. It can be assumed that approximately half of Zone 2 is served by the west end reservoir(s). Therefore, the west end storage requirements would include: fire storage plus build-out of Zone 1 plus one-half of the build-out of Zone 2. Table 5.3 summarizes this calculation.

Table 5.3 – Zones 1 and 2 Build-Out

Area	Existing ERCs	Future ERCs	Total ERCs	Total gallons	Total gallons attributed to new tank
Zone 1	256	924	1,180	472,000	472,000
Zone 2	1,450	497	1,947	778,800	389,400
Special Fire Flow				585,000	585,000
			Zone 1 + ½ Zone 2 + Fire Flow		**1,446,400**

The following are two potential options for meeting this requirement:

1. Reservoirs #1 and #2 are replaced with a new 1.5 MG reservoir.
2. Reservoirs #1 and #2 are repaired and a new 0.5 MG reservoir is constructed.

Due to the needs of both repairing the existing reservoirs and upsizing for future growth, we recommend Option #1.

5.4 Projects

The following project is recommended:

	Project	Description/Purpose
1	West End Reservoir Project	This project would demolish the existing Reservoirs #1 and #2 and replace them with a new 1.5 MG reservoir. This project would solve the leaking problems associated with the existing reservoirs. It would also be upsized for future growth. The project will also involve increasing accessibility to the site and possibly buying additional property.

6.0 WATER DISTRIBUTION SYSTEM

6.1 Water Distribution System Requirements

Utah Administrative Code sections R309-105 and R309-510-9 describe the minimum requirements that a public water distribution system must meet.

Specifically, R309-105-9 discusses minimum water pressures under specific conditions:

> *(1) Unless otherwise specifically approved by the Director, no water supplier shall allow any connection to the water system where the dynamic water pressure at the point of connection will fall below 20 psi during the normal operation of the water system. Water systems approved prior to January 1, 2007, are required to maintain the above minimum dynamic water pressure at all locations within their distribution system. Existing public drinking water systems, approved prior to January 1, 2007, which expand their service into new areas or supply new subdivisions shall meet the minimum dynamic water pressure requirements in R309-105-9(2) at any point of connection in the new service areas or new subdivisions.*
>
> *(2) Unless otherwise specifically approved by the Director, new public drinking water systems constructed after January 1, 2007 shall be designed and shall meet the following minimum water pressures at points of connection:*
>
> *(a) 20 psi during conditions of fire flow and fire demand experienced during peak day demand;*
>
> *(b) 30 psi during peak instantaneous demand; and*
>
> *(c) 40 psi during peak day demand.*
>
> *(3) Individual home booster pumps are not allowed as indicated in R309-540-5(4)(c).*

R309-510-9 references the above and goes on to discuss the peak instantaneous demand for indoor and irrigation use and fire flow. Since irrigation use has been deemed negligible, only indoor use and fire flow were analyzed.

6.2 Fire Flow Requirements

As of the date of this study, South Weber City has adopted the 2006 International Fire Code, with some minor modifications (South Weber Municipal Code 9.03). The Fire Code states:

> ***SECTION B105 FIRE-FLOW REQUIREMENTS FOR BUILDINGS***
>
> ***B105.1 One- and two-family dwellings.***
>
> *The minimum fire-flow requirements for one- and two-family dwellings having a fire-flow calculation area which does not exceed 3,600 square feet (344.5 m^2) shall be 1,000 gallons per minute (3785.4 L/min). Fire-flow and flow duration for dwellings having a fire-flow calculation area in excess of 3,600 square feet (344.5 m^2) shall not be less than that specified in Table B105.1.*

Table B105.1 of the International Fire Code shows that for a typical wooden frame construction type home that is 3,601 to 4,800 square feet, a fire flow of 1,750 gpm for 2 hours is required. Table B105.1 is included in Appendix B.

A quick look at home data in South Weber shows that home sizes in excess of 3,600 sf are not uncommon.[2] However, few homes are greater than 4,800 sf. Therefore, based on Table B105.1, a fire flow of 1,750 gpm has been set as the existing Level of Service (LOS) in lieu of the minimum 1,000 gpm. It is recommended that homes greater than 4,800 sf be evaluated by the Fire Marshal on a case-by-case basis.

6.3 Existing Water Distribution System

Using EPANet, the existing water system model was updated based on recent development and projects and new usage data for some of the non-residential users. Average day demand (400 gpd/ERC = 0.2667 gpm/ERC) was placed on the model. The results show that the pressure does not fall below 60 psi anywhere in the distribution system.

After determining the fire flow, the model was run for each scenario listed in R309-105-9(2):

1. The fire flow (1,750 gpm) was applied in conjunction with peak day demand (800 gpd = 0.5556 gpm). The result showed several areas unable to meet the required fire flow at the minimum pressure (20 psi). See below for additional information.
2. Peak instantaneous demand was applied using a factor of 4 times average demand (4 x 400 gpd = 1600 gpd = 1.1112 gpm). No node servicing customers fell below 57 psi (30 psi minimum required).
3. Peak day demand was applied to the model. No node servicing customers fell below 60 psi (40 psi minimum required).

As expected, the worst case scenario is fire flow plus peak day demand. The State's minimum water demand for peak day use was applied to the ERCs in conjunction with a 1,750 gpm fire flow to find where the system may fall below the minimum required pressure of 20 psi. Appendix C contains a schematic of the water model as well as the output of the results of the peak day demand combined with a 1,750 gpm fire flow. The following areas failed to meet the minimum pressure or fire flow:

1. Dead end 6" line on Lincoln Lane
2. Dead end 6" line on 2750 East
3. Dead end 6" line on 2575 East, south of Deer Run Dr.
4. Dead end 6" line on 7875 South, west of Peachwood Dr.
5. Dead end 6" line on 7925 South, west of Peachwood Dr.
6. 6" water line on 8100 South, 2300 Est to Peachwood Dr.
7. Dead end 6" line on 2300 East, north of 8100 South
8. Dead end 6" line on 2175 East, south of 7875 South

[2] "www.zillow.com." Accessed May 5, 2015.

9. 6” line on 7875 South, 2100 East to 2175 East
10. 6” line on 2100 East, 7800 South to City Park
11. Dead end 6” line on 1800 East, south of 7775 South
12. Dead end 6” line on 1750 East, south of 7775 South
13. Dead end 6” line on Jensen Circle
14. Dead end 4” line on 1375 East, south of 7500 South
15. Dead end 6” line on 925 East
16. Dead end line on South Weber Drive, very west end

Development may correct a few of these deficiencies by way of looping system lines thus improving water flow. For example, should development occur on the westernmost end of South Weber Drive, the deficiency listed as item 15 may be eliminated.

> The State DDW’s Hydraulic Modeling Rule (R309-511) requires that the existing water model is updated and re-run as development occurs in order to re-evaluate the system for compliance with minimum requirements and identify any deficiencies that would result due to the proposed development. Any system improvements or upsizing necessary in order to be compliant must be done as part of the development in order to receive approval.

Additionally, the DDW [R309-400-6(8)(h) and R309-550-5(4) and (5)] rules indicate that for those lines containing fire hydrants, the minimum water line size shall be 8” (unless a hydraulic analysis indicates that required flow and pressures can be maintained by 6” lines). As a general rule, the areas of the system that had difficulty meeting the minimum flows and pressures contained lines less than 8”. Therefore, the City should start planning to replace the old 4” and 6” water lines in order to bring the system up to current regulations.

Several other projects have been identified based on maintenance issues, providing needed reliability and redundancy in the system, and emergency preparedness. These projects are considered existing deficiencies. They are as follows:

1. Re-route the feed/fill line to the East Bench Reservoir #3. The line currently winds its way through the Job Corps complex, including going through a building basement at one point.
2. Install a new supply line from the West Bench Reservoirs #1 and #2 to South Weber Drive at 475 East for a second connection/supply line to Zone 1. Zone 1 is currently only fed with one connection.
3. Replace the 4” PSV located at 8100 South and 2350 East with a 8” PRV and 8” connection line on Peachwood Drive for better flow and accessibility.
4. Replace the 6” lead joint pipe on Canyon Drive between 1375 East and 1300 East.

Since impact fees cannot be used to correct existing deficiencies, the water model was updated to “correct” all deficiencies and substandard lines prior to proceeding with the future development model. By doing this, the future model clearly shows where growth causes the system to fail to meet the minimum requirements.

6.4 Future Water Distribution System Needs

The 2014 General Plan was used to estimate where and what type of users are expected in the future. ERCs for residential areas were assigned based on the General Plan's ERUs. ERCs for the commercial areas were estimated based on the size of each parcel, as shown in Exhibit 3.1. The projected ERCs were then added to the existing "corrected" water model in order to check the capacity of the lines and the water pressures.

Assuming that future developer-installed water lines are all 8", the water model was then run to see where upsizing of the lines may be needed. A few pipes needed to be upsized in order to handle the fire flow:

1. Upsize water line connecting 7150 South down towards 7400 South to a 10" line (contingent upon the actual configuration of the development)
2. Upsize US-89 crossing at 8075 South to a 12" line

Appendix D contains the approximate future water model schematic with the appropriately sized water lines.

6.5 Projects

The following is a summarized list of the water distribution system projects listed by type: maintenance, existing system deficiency, or future system deficiency. Section 7.0 groups and prioritizes these individual pipe segments into projects. These projects are graphically represented on Exhibit 7.1 "Projects Map."

6.5.1 Existing Water System Maintenance Projects

	Project	Description/Purpose
1	Replace 6" lead joint line on Canyon Dr. between 1375 E and 1300 E	Existing line is undersized and a constant source of leaks. This line should also be replaced due to possible lead contamination.
2	Construct new supply line from West Bench Reservoirs to South Weber Dr. at 475 East	Add second connection to Zone 1
3	Relocate transmission line to East Bench Reservoir #3	New alignment will allow easier maintenance and accessibility since existing line traverses Job Corps
4	Replace PSV with new PRV and line at 2350 East 8100 South	Existing valve is too small and does not function properly; new valve will be properly sized.

6.5.2 Existing Water System Deficiencies

	Project	Description/Purpose
1	Connect Lincoln Lane and 2750 East water lines	Existing dead end lines do not support proper fire flow; loop to correct this problem.
2	Connect 925 East to S. Weber Drive, including a new PRV	Existing dead end line does not support proper fire flow; loop to existing line to correct; add PRV to interconnect pressure zones
3	Upsize to 10" line: South Weber Dr. (6650 South to end)	Existing dead end line does not support 1750 gpm fire flow; project not needed if new line (north of South Weber Dr.) loops into South Weber Dr. in the future
4	Upsize to 8" line: ○ 1800 East, south of 7775 South ○ 1750 East, south of 7775 South ○ Jensen Circle ○ 1375 East, south of Lester Dr. ○ 7600 South, west of 1375 East ○ 1250 East, S. Weber Dr. to Lester Dr. ○ Cottonwood Dr. ○ 8075 South and 2750 East –see also future project ○ 2575 East ○ 7875 South ○ 7925 South ○ Peach-wood Drive, 7925 South to Peachwood Way ○ 8100 South, Peachwood Dr. to 2300 East ○ 2300 East ○ 2175 East ○ 7875 South between 2100 and 2175 East ○ 2100 East between 7875 and City Park	Existing 4" and 6" lines do not support proper fire flow; upsize to 8" line to correct

6.5.3 Additional Existing Water System Deficiencies

	Project	Description/Purpose
1	Upsize to 8” line all other undersized water lines throughout City; approximately 30,000 lf	DDW minimum size for pipes containing fire hydrants is 8”

6.5.4 Future Deficiencies of Existing Infrastructure (may be Impact Fee Eligible)

	Project	Description/Purpose
1	Upsize US-89 crossing at 8075 South to 12”	6” water line crossing insufficient to provide proper fire flow to future development (increase from 8” to 12” Impact Fee Eligible)
2	Upsize water line connecting 7150 South down towards 7400 South to 10” (by developer; contingent upon actual configuration	Line will need to be upsized due to topography; not likely Impact Fee eligible

7.0 ASSET MANAGEMENT, PROJECTS, AND COST ESTIMATES

7.1 Asset Management System

South Weber City does not have a formal asset management system, but rather, relies on the knowledge of its public works employees. An assessment management system would track the age of existing infrastructure as well as identify problem areas in a GIS database. This would then become the basis for making decisions on repair and replacement-type projects. Due to the inevitable change in personnel and, therefore, the loss of their inherent knowledge of the system, it is recommended that the City implement an asset management program to ensure that the system's data is maintained in a central location, accessible by those who need the information, both now and in the future.

7.2 Projects and Cost Estimates

As detailed in the previous sections, the existing and future water systems have been analyzed to determine needed system improvements. These improvements have been grouped, mainly by geography and type, and prioritized based on criticality to meet/service the public and condition. The projects and their associated ratings are shown in Table 7.1.

While some of these projects will be driven by development, others are necessary to provide better efficiency and reliability of the system. Consequently, these projects may be constructed and/or funded in part or entirely by either developers or by the City. Therefore, we have attempted to evaluate the project costs and categorize them to reflect these conditions. A summarized list of the projects and their associated costs is shown in Table 7.2. An itemized cost estimate for each project is included in Appendix E. A map of the City showing a conceptual layout of each project and its location is included as Exhibit 7.1.

Table 7.1 – Project Ratings

Project No.	Project Description	Rated 1-5, with 5 being highest priority and 0 being only with development			Total Rating
		Criticality	Condition	When Needed	
1	Enter into contract with WBWCD for Impact Fee Pass-Through method of purchasing water	5	5	5	**15**
2	Upsize to 8" pipe: 1375 East, south of Lester; 7600 South, west of 1375 East; 1800 East, south of 7775 South; 1750 East, south of 7775 South; Jensen Circle; 1250 East, between South Weber Dr. and Lester Dr.; replace lead joint pipe on Canyon Dr. between 1375 E and 1300 E	4	5	4	**13**
3	Install new generator at Church Street pump station	5	1	5	**11**
4	Construct new supply line from West Bench reservoir(s) to South Weber Dr. at 475 E. for secondary feed to zone 1, including PRV; connect 925 East to S. Weber Drive	4	3	4	**11**
5	Relocate transmission line to East Bench Reservoir #3	3	4	4	**11**
6	Replace West Bench Reservoirs (#1 and #2) with new 1.5 MG West End Bench Reservoir	3	4	4	**11**
7	Connect Lincoln Lane and 2750 East; upsize to 8" 8075 South, 2575 East, and 2350 East (south of Deer Run Dr.); upsize US 89 crossing at 8075 South to 12”; abandon existing 4" PSV and replace with new 8" PRV and line on Peachwood Dr.	4	3	3	**10**
8	Automate Weber Basin well feed to Reservoirs #1 and #2 to match supply to system demand	2	4	3	**9**
9	Rehabilitate Well #1; add new generator; modify controls	2	4	3	**9**
10	Upsize Cottonwood Dr. to 8" line	3	2	2	**7**
11	Upsize to 8": 7875 South; 7925 South; Peachwood Dr. between 7925 South and Peachwood Way; 8100 South between Peachwood Drive and 2300 East; 2300 East; 2175 East; 7875 South between 2100 and 2175 East; 2100 East between 7800 South and City Park	3	2	2	**7**

Project No.	Project Description	Rated 1-5, with 5 being highest priority and 0 being only with development			Total Rating
		Criticality	Condition	When Needed	
12	Upsize remaining 4" and 6" lines to 8" (30,000 lf), as funds allow	0	3	2	**5**
13	Construct Connection #4 to WBWCD's transmission line with pump station to pump to Zone 4	4	0	0	**4**
14	Upsize developer-installed loop from 7150 S to about 7400 South	0	0	0	**0**
15	Upsize South Weber Drive (6650 South to end) to 10" line	0	0	0	**0**

Table 7.2 – Projects Cost Summary

Project No.	Project Description	Total Estimated Cost	Cost Breakdown			Proposed Budget Year
			Replace-ment/ Deficiency	Impact Fee Eligible	Developer Cost	
1	Enter into contract with WBWCD for Impact Fee Pass-Through method of purchasing water	**$13,200**	$0	$13,200	$0	2016-2017
2	Upsize to 8" pipe: 1375 East, south of Lester; 7600 South, west of 1375 East; 1800 East, south of 7775 South; 1750 East, south of 7775 South; Jensen Circle; 1250 East, between South Weber Dr. and Lester Dr.; replace lead joint pipe on Canyon Dr. between 1375 E and 1300 E	**$749,500**	$749,500	$0	$0	2017-2018
3	Install new generator at Church Street pump station	**$98,125**	$98,125	$0	$0	2017-2018
4	Construct new supply line from West Bench reservoir(s) to South Weber Dr. at 475 E. for secondary feed to zone 1, including PRV; connect 925 East to S. Weber Drive	**$524,625**	$524,625	$0	$0	2018-2019
5	Relocate transmission line to East Bench Reservoir #3	**$220,000**	$220,000	$0	$0	2018-2019

Project No.	Project Description	Total Estimated Cost	Cost Breakdown			Proposed Budget Year
			Replace-ment/ Deficiency	Impact Fee Eligible	Developer Cost	
6	Replace West Bench Reservoirs (#1 and #2) with new 1.5 MG West End Bench Reservoir	**$3,157,000**	$1,707,000	$1,276,000	$0	2019-2020
7	Connect Lincoln Lane and 2750 East; upsize to 8" 8075 South, 2575 East, and 2350 East (south of Deer Run Dr.); upsize US 89 crossing at 8075 South to 12”; abandon existing 4" PSV and replace with new 8" PRV and line on Peachwood Dr.	**$570,313**	$532,734	$37,578	$0	2019-2020
8	Automate Weber Basin well feed to Reservoirs #1 and #2 to match supply to system demand	**$76,250**	$76,250	$0	$0	2021-2022
9	Rehabilitate Well #1; add new generator; modify controls	**$298,750**	$298,750	$0	$0	2022-2023
10	Upsize Cottonwood Dr. to 8" line	**$431,750**	$431,750	$0	$0	2024-2025
11	Upsize to 8": 7875 South; 7925 South; Peachwood Dr. between 7925 South and Peachwood Way; 8100 South between Peachwood Drive and 2300 East; 2300 East; 2175 East; 7875 South between 2100 and 2175 East; 2100 East between 7800 South and City Park	**$1,065,25**	$1,065,250	$0	$0	2025-2026
12	Upsize remaining 4" and 6" lines to 8" (30,000 lf), as funds allow	**$5,266,250**	$5,266,250	$0	$0	Start in 2022-2023
13	Construct Connection #4 to WBWCD’s transmission line with pump station to pump to Zone 4	**$820,000**	$0	$730,600	$0	2020-2021
14	Upsize developer-installed loop from 7150 S to about 7400 South	**$357,500**	$0	$0	$357,500	2025-2026
15	Upsize South Weber Drive (6650 South to end) to 10" line	**$482,625**	$482,625	$0	$0	2027-2028
	TOTAL	**$14,117,938**	**$11,452,859**	**$2,044,178**	**$357,500**	

CULINARY WATER LEGEND

- EXISTING CULINARY WATER PIPES
- EXISTING WEBER BASIN WATER CONSERVATION DISTRICT - TRANSMISSION LINE
- FUTURE PROJECT
- FUTURE WATERLINE (DEVELOPMENT)
- FUTURE PRV
- PRV
- PUMP STATION
- STORAGE RESERVOIR
- EXISTING WELL
- FIRE HYDRANTS

PRESSURE ZONES

- ZONE A
- ZONE 1
- ZONE 2
- ZONE 3
- ZONE 4
- INDICATES AREAS WHERE THE PRESSURE ZONE IS NOT CONNECTED TO THE CULINARY WATER SYSTEM (OR NOT VERY CLOSE TO A FEASABLE CONNECTION), BUT COULD STILL BE SERVED IF A CONNECTION WERE MADE.

GENERAL LEGEND

- SOUTH WEBER CITY BOUNDARY
- LAYTON CITY BOUNDARY
- SOUTH WEBER ANNEXATION BOUNDARY
- CANAL / RIVER
- RAILROAD

NOTES:

PROJECT #1 - NOT SHOWN ON MAP
PROJECT #12 - ALL REMAINING 6" DIAMETER WATER LINES

SCALE: 1 in = 900 ft
MM/DD/YYYY: 05/19/2016

DESIGNED: BEB
DRAWN: BEB
CHECKED: BKJ

JONES & ASSOCIATES CONSULTING ENGINEERS
1716 East 5600 South
South Ogden, Utah 84403 (801) 476-9767

SOUTH WEBER CITY CORPORATION
WATER CAPITAL FACILITIES PLAN
PROJECTS MAP

SHEET: 7.1 OF SHEETS

SOUTH WEBER city

APPENDIX A

JONES & ASSOCIATES CONSULTING ENGINEERS

M E M O R A N D U M

TO: South Weber City Planning Commission

FROM: Brandon K. Jones, P.E.
South Weber City Engineer

CC: Duncan Murray – South Weber City Manager
Mark B. Larsen – South Weber City Public Works Director

RE: WATER SUPPLY SOURCE OPTIONS
Future Development

Date: September 24, 2014

At the request of the Planning Commission, our office was asked to research options for acquiring and securing culinary water for future use; with the specific direction to investigate options for having development "bring the water with them."

It is important to differentiate between culinary water supply and secondary (irrigation) water. Four Secondary Water Service Districts serve South Weber: Weber Basin Water Conservancy District, Davis & Weber Counties Canal Company, South Weber Secondary Water Improvement District, and South Weber Irrigation Company. Each of these Service Districts covers different parts of the City. The City currently requires all developments to have sufficient secondary water shares for their proposed development, as determined by the secondary water service provider for the area in which development is proposed. The City does not make the determination of what is "sufficient."

Culinary water source is much more limited. After some investigation and several conversations with Scott Paxman (Weber Basin Water Conservancy District), the following is a list of different culinary water source options for South Weber City. This list represents the most practical options available to South Weber, but is certainly not a comprehensive list of possible options.

#1 Springs and Wells

These sources require that the City hold a "Water Right" to use the water. The Division of Water Rights is the state agency that regulates the appropriation and distribution of water in the state of Utah. Springs often times need to be treated in order to be used as culinary water. A lot of times wells do not require treatment because the raw water often meets the drinking water standards. South Weber has Water Rights to one culinary water well located across the street from the City Office. The cost associated with these sources depends upon the infrastructure, operation and maintenance required to pull the water out of the ground and

treat it if necessary. It is important to note that The State Engineer has closed this area to any new appropriations of ground water. Therefore, adding new groundwater sources is not possible unless the City were able to buy someone else's water rights or well. This means that the opportunity to acquire addition water from a well source for South Weber is most likely limited to improving the City's existing well and trying to increase its production.

#2 Wholesale Water from Weber Basin Water Conservancy District
(Traditional Take of Pay Contracts)

This source of culinary water does not require any "Water Rights" to be held by the City. This water is simply delivered by Weber Basin and purchased by the City. These Contracts are "use it or lose it" type contracts. WBWCD contracts to deliver the amount of water contracted for and the City pays for it whether they actually use it or not. This type of water source makes up the majority of the water currently supplied to the City. The cost of this water depends on the cost when it was contracted. The cost for the water is split up into two parts: 1) the Capital Improvements portion and the 2) Operation and Maintenance portion. When the City contracts for this water, the cost associated with the Capital Improvements potion is locked in and will never change. The O&M portion does increase in accordance with the costs associated in operating and maintaining the infrastructure connected with the development of that water.

The City is currently contracted for 700 AF of water under these Take of Pay Contracts. For informational purposes, according to Weber Basin, the City has used 447 AF of water so far this year (as of 8-31-14), and is projected to use approximately 650 AF by the end of the year.

#3 Wholesale Water from Weber Basin Water Conservancy District
(Tri-Lateral Agreement)

This is an agreement between the City, the secondary water purveyors and WBWCD that is specifically set up to handle the additional water needed for new development. This arrangement would require the developer to bring sufficient secondary water shares in order to equal 3 acre-feet of water per acre. Two-thirds of this water is then allocated to the Secondary Water Service District for irrigation and One-third is allocated to culinary water. The culinary water portion of the shares is then turned over to WBWCD and WBWCD agrees to provide the City with the equivalent amount in culinary water. The cost for this water is based upon the terms of the agreement but is much less than the Take or Pay Contracts because the Capital Improvements portion of the water is significantly reduced. Actual Water Rights could also be brought by a developer as a part of this agreement, but this would be a very unlikely scenario.

South Weber does not currently have any such agreement with WBWCD, but it could be arranged. The main caveat to this type of arrangement is that the City would become responsible for checking and verifying that sufficient shares were being provided by the developer and coordinating approval with WBWCD.

#4 Wholesale Water from Weber Basin Water Conservancy District
(Impact Fee Pass Through)

WBWCD has created an Impact Fee Facilities Plan (IFFP) and performed the associated Impact Fee Analysis (IFA), so that they can legally charge an Impact Fee. However, the charging of this fee has to be implemented by the City. This arrangement would allow the City to collect the Impact Fee on behalf of WBWCD. This Impact Fee essentially covers the Capital Improvements portion of water plus a small amount to cover the first year's worth of O&M. Based on the number of Impact Fees collected and sent to WBWCD on a quarterly basis, the City would then be under contract for the equivalent amount of culinary water (i.e.1 ERC = 0.448 AF). The City would only pay the O&M portion of this water from then on, which would be payable on January 1st of each year, for the year following the actual use of the water.

The current impact fee for District II water is $2,903/ERC. The on-going annual cost that the City is then contracted for is $110/AF. Contrast this to the $361.59/AF cost for the current District II Take of Pay Contracts. When District II water is no longer available, then the District III costs will go into effect. The impact fee for District III water is $4,363/ERC. The on-going annual cost that the City is then contracted would still be approximately $110/AF. Contrast this to the $546/AF cost for the District III Take of Pay Contracts.

South Weber does not currently have any such arrangement with WBWCD. The main caveat to this approach is that the City would need to include WBWCD's IFFP and IFA in the City's IFFP and IFA for culinary water. The City Council just authorized that we begin the process of updating the culinary water Capital Facilities Plan, IFFP and IFA. So, this approach could be added into the study.

Recommendation:

The City is currently 200 AF deficit in having sufficient source for the existing residents plus the lots that have been approved but are not yet built on. Given the information in this memo, our recommendation to the City Council was to purchase between 250 - 300 AF of District II water. The reason for this recommendation was to cover the current deficit and purchase an additional 50 – 100 AF more than is needed to give some buffer to cover anticipated developments in the next year or so, plus allow time for the new IFFP and IFA to be adopted, which would include the necessary provisions to be able to charge the WBWCD Impact Fee and receive the discounted water rate contract (as shown in Option #4). The City Council made a motion at the September 23, 2014 meeting (last night) to purchase 110 AF of District II water and direct Staff to pursue efforts to get the 10% reduction of source requirement from the State.

Our recommendation, at this point, is to proceed with efforts to put Option #4 in place. This option ensures that the City would always maintain the correct amount of source per ERC, and would be fairly simple to administer. This also requires that the new residences pay for the capital portion of the new water; essentially allowing the City to have new development "pay their way" without dramatically impacting the overall cost of the water to the existing residents.

APPENDIX B

TABLE B105.1 MINIMUM REQUIRED FIRE-FLOW AND FLOW DURATION FOR BUILDINGS[a]

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[c]	FLOW DURATION (hours)
Type IA and IB[b]	Type IIA and IIIA[b]	Type IV and V-A[b]	Type IIB and IIIB[b]	Type V-B[b]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-	166,501-	106,501-	77,001-	47,401-	6,000	

Greater	Greater	115,800	83,700	51,500		
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. The minimum required fire flow shall be allowed to be reduced by 25 percent for Group R.

b. Types of construction are based on the *International Building Code*.

c. Measured at 20 psi.

APPENDIX C

Existing System with 1750 gpm fire flow				
Output from FireFlow 2.12 by OptiWater				
Check Node	Maximal Flow (gpm)	Violating Node	Minimal Pressure (psi)	Location
J1	Maximal flow was reached			
J2	Maximal flow was reached			
J3	Maximal flow was reached			
J4	Maximal flow was reached			
J5	1180	J6	19.79954	Lincoln Lane
J6	740	J6	19.52606	Lincoln Lane
J7	Maximal flow was reached			
J8	Maximal flow was reached			
J9	Maximal flow was reached			
J10	Maximal flow was reached			
J11	Maximal flow was reached			
J12	Maximal flow was reached			
J13	1020	J13	19.55583	2750 East
J14	Maximal flow was reached			
J15	Maximal flow was reached			
J16	Maximal flow was reached			
J17	Maximal flow was reached			
J18	Maximal flow was reached			
J19	Maximal flow was reached			
J20	Maximal flow was reached			
J21	Maximal flow was reached			
J22	Maximal flow was reached			
J23	Maximal flow was reached			
J24	Maximal flow was reached			
J25	Maximal flow was reached			
J26	Maximal flow was reached			
J27	Maximal flow was reached			
J28	Maximal flow was reached			
J29	Maximal flow was reached			
J30	Maximal flow was reached			
J31	Maximal flow was reached			
J32	Maximal flow was reached			
J33	Maximal flow was reached			
J34	Maximal flow was reached			
J35	1470	J35	19.26315	2575 East
J36	Maximal flow was reached			

J37	Maximal flow was reached			
J38	1650	J38	18.98	2350 East, south of Deer Run I
J39	Maximal flow was reached			
J40	Maximal flow was reached			
J41	Maximal flow was reached			
J42	Maximal flow was reached			
J43	Maximal flow was reached			
J44	Maximal flow was reached			
J45	Maximal flow was reached			
J46	Maximal flow was reached			
J47	Maximal flow was reached			
J48	Maximal flow was reached			
J49	Maximal flow was reached			
J50	Maximal flow was reached			
J51	Maximal flow was reached			
J52	Maximal flow was reached			
J53	Maximal flow was reached			
J54	Maximal flow was reached			
J55	Maximal flow was reached			
J56	Maximal flow was reached			
J57	Maximal flow was reached			
J58	1390	J58	19.59811	7875 South
J59	1340	J59	19.56701	7925 South
J60	Maximal flow was reached			
J61	Maximal flow was reached			
J62	Maximal flow was reached			
J63	1430	J63	19.61848	2300 East
J64	Maximal flow was reached			
J65	1670	J65	19.88811	City Park
J66	Maximal flow was reached			
J67	Maximal flow was reached			
J68	1140	J68	19.68914	2175 East
J69	Maximal flow was reached			
J70	Maximal flow was reached			
J71	Maximal flow was reached			
J72	Maximal flow was reached			
J73	Maximal flow was reached			
J74	Maximal flow was reached			
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J81	Maximal flow was reached			
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J88	Maximal flow was reached			
J89	Maximal flow was reached			
J90	Maximal flow was reached			
J91	Maximal flow was reached			
J92	Maximal flow was reached			
J93	1730	J93	19.94456	1800 East
J94	Maximal flow was reached			
J95	Maximal flow was reached			
J96	1630	J96	19.51543	1750 East
J97	Maximal flow was reached			
J98	Maximal flow was reached			
J99	Maximal flow was reached			
J100	Maximal flow was reached			
J101	Maximal flow was reached			
J102	Maximal flow was reached			
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J118	Maximal flow was reached			
J119	Maximal flow was reached			
J120	Maximal flow was reached			
J121	Maximal flow was reached			
J122	Maximal flow was reached			
J123	1450	J123	19.96541	925 East
J124	Maximal flow was reached			

J125	Maximal flow was reached			
J126	Maximal flow was reached			
J127	Maximal flow was reached			
J128	Maximal flow was reached			
J129	Maximal flow was reached			
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J136	Maximal flow was reached			
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J140	Maximal flow was reached			
J141	Maximal flow was reached			
J142	Maximal flow was reached			
J143	Maximal flow was reached			
J144	Maximal flow was reached			
J145	Maximal flow was reached			
J146	Maximal flow was reached			
J147	Maximal flow was reached			
J148	Maximal flow was reached			
J149	Maximal flow was reached			
J150	Maximal flow was reached			
J151	Maximal flow was reached			
J152	Maximal flow was reached			
J153	1330	J153	19.5778	end of South Weber Drive
J154	1220	J154	18.64459	end of South Weber Drive
J155	Maximal flow was reached			
J156	Maximal flow was reached			
J157	Maximal flow was reached			
J158	Maximal flow was reached			
J159	1640	J159	19.26956	Jensen Circle
J160	Maximal flow was reached			
J161	Maximal flow was reached			
J162	Maximal flow was reached			
J163	Maximal flow was reached			
J164	Maximal flow was reached			
J165	Maximal flow was reached			
J166	Maximal flow was reached			
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J168	Maximal flow was reached			

J169	Maximal flow was reached			
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J177	Maximal flow was reached			
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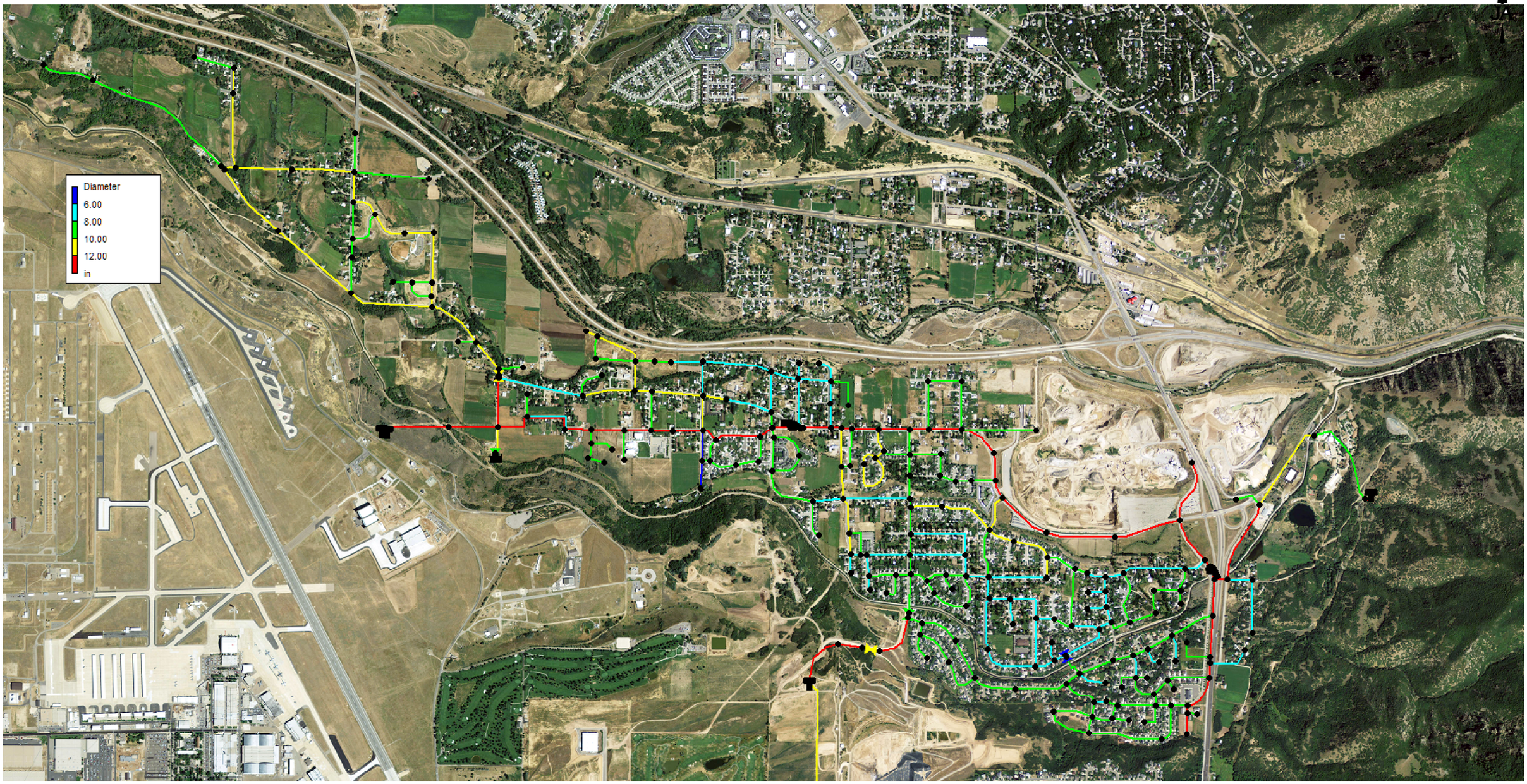
J182	Maximal flow was reached			
J183	Maximal flow was reached			
J184	Maximal flow was reached			
J185	Maximal flow was reached			
J186	Maximal flow was reached			
J187	Maximal flow was reached			
J188	Maximal flow was reached			
J189	Maximal flow was reached			
J190	Maximal flow was reached			
J191	Maximal flow was reached			
J192	Maximal flow was reached			
J193	Maximal flow was reached			
J194	1400	J194	19.0838	925 East
J195	Maximal flow was reached			
J196	Maximal flow was reached			
3	Maximal flow was reached			
6	Maximal flow was reached			
7	Maximal flow was reached			
8	Maximal flow was reached			
10	Maximal flow was reached			
12	Maximal flow was reached			
13	Maximal flow was reached			
14	Maximal flow was reached			
15	Maximal flow was reached			
16	Maximal flow was reached			
9	Maximal flow was reached			
17	Maximal flow was reached			
2	Maximal flow was reached			
11	Maximal flow was reached			
18	Maximal flow was reached			
19	Maximal flow was reached			

1	Maximal flow was reached			
J208	Maximal flow was reached			
J207	Maximal flow was reached			
J199	Maximal flow was reached			
J205	Maximal flow was reached			
J206	Maximal flow was reached			
J201	Maximal flow was reached			
J202	Maximal flow was reached			
J204	Maximal flow was reached			
J203	Maximal flow was reached			
J209	Maximal flow was reached			
J197	Maximal flow was reached			
J198	Maximal flow was reached			
J200	Maximal flow was reached			
J210	Maximal flow was reached			
J212	Maximal flow was reached			
J211	Maximal flow was reached			
J216	Maximal flow was reached			
J217	630	J217	19.92859	1375 East



SOUTH WEBER city

NOTES:

SCALE: N.T.S.

MM/DD/YYYY 05/19/2016

DESIGNED BEB
DRAWN BEB
CHECKED BKJ

JA JONES & ASSOCIATES CONSULTING ENGINEERS
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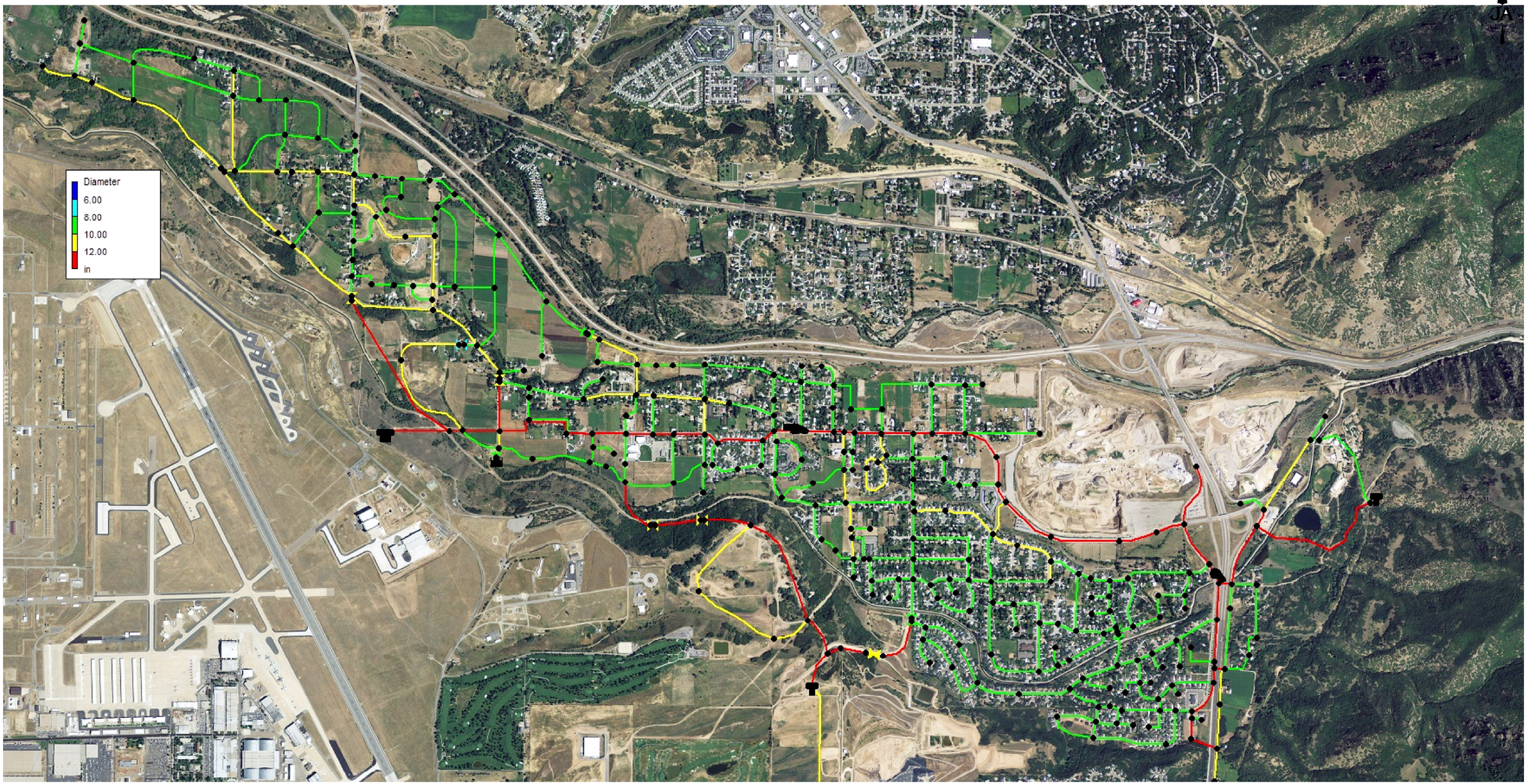
South Ogden, Utah 84403 (801) 476-9767

SOUTH WEBER CITY CORPORATION
WATER CAPITAL FACILITIES PLAN

EXISTING SYSTEM WATER MODEL

SHEET: C OF SHEETS 0

APPENDIX D



SOUTH WEBER city

NOTES:

SCALE: N.T.S.

MM/DD/YYYY 05/19/2016

DESIGNED BEB
DRAWN BEB
CHECKED BKJ

JA JONES & ASSOCIATES CONSULTING ENGINEERS
1716 East 5600 South
South Ogden, Utah 84403 (801) 476-9767

SOUTH WEBER CITY CORPORATION
WATER CAPITAL FACILITIES PLAN

FUTURE SYSTEM WATER MODEL

SHEET: D OF SHEETS 0

APPENDIX E

Project No.: 1

Description: Enter into contract with WBWCD for Impact Fee Pass-Through method of purchasing water

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Engineering and Attorney fees for analysis and review of contract with WBWCD for Impact Fee Pass-Through approach of purchasing water	1 ls	$ 12,000	$ 12,000	$ -	$ 12,000	$ -
			Subtotal	$ 12,000	$ -	$ 12,000	$ -
			10% Contingency	1,200	-	1,200	-
			TOTAL	**$ 13,200**	**$ -**	**$ 13,200**	**$ -**

Notes:

Project No.: 2

Description: Upsize to 8" pipe: 1375 East, south of Lester; 7600 South, west of 1375 East; 1800 East, south of 7775 South; 1750 East, south of 7775 South; Jensen Circle; 1250 East, between South Weber Dr. and Lester Dr.; replace lead joint pipe on Canyon Dr. between 1375 E and 1300 E

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Construct 8" water line	4,140 lf	$ 60	$ 248,400	$ 248,400	$ -	$ -
2	Install 8" gate valve	19 ea	3,000	57,000	57,000	-	-
3	Connect to existing water line	14 ea	4,000	56,000	56,000	-	-
4	Install fire hydrant	8 ea	6,000	48,000	48,000	-	-
5	Install water service	35 ea	1,800	63,000	63,000	-	-
6	Patch asphalt road	2,815 lf	20	56,300	56,300	-	-
7	Patch gravel road	1,325 lf	12	15,900	15,900	-	-
8	Mobilization	1 ls	55,000	55,000	55,000	-	-
			Subtotal	$ 599,600	$ 599,600	$ -	$ -
			15% Engineering & Construction Management	89,940	89,940	-	-
			10% Contingency	59,960	59,960	-	-
			TOTAL	**$ 749,500**	**$ 749,500**	**$ -**	**$ -**

Notes:

Project No.: 3
Description: Install new generator at Church Street pump station

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Provide 125 kW diesel generator	1 ls	$ 55,000	$ 55,000	$ 55,000	$ -	$ -
2	Modify electrical to accommodate new generator	1 ls	3,500	3,500	3,500	-	-
3	Modify site to accommodate generator	1 ls	12,000	12,000	12,000	-	-
8	Mobilization	1 ls	8,000	8,000	8,000	-	-
			Subtotal	$ 78,500	$ 78,500	$ -	$ -
			15% Engineering & Construction Management	11,775	11,775	-	-
			10% Contingency	7,850	7,850	-	-
			TOTAL	**$ 98,125**	**$ 98,125**	**$ -**	**$ -**

Notes:
Assumes site contains area large enough to accommodate generator and pad.

Project No.: 4

Description: Construct new supply line from West Bench reservoir(s) to South Weber Dr. at 475 E. for secondary feed to zone 1, including PRV; connect 925 East to S. Weber Drive

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Construct 12" water line	3,250 lf	80	260,000	260,000	-	-
2	Install 12" butterfly valve	4 ea	5,000	20,000	20,000	-	-
3	Install 10" PRV	1 ea	75,000	75,000	75,000	-	-
4	Connect to existing water line	4 ea	5,000	20,000	20,000	-	-
5	Patch asphalt road	285 lf	20	5,700	5,700	-	-
6	Mobilization	1 ls	39,000	39,000	39,000	-	-
			Subtotal	$ 419,700	$ 419,700	$ -	$ -
			15% Engineering & Construction Management	62,955	62,955	-	-
			10% Contingency	41,970	41,970	-	-
			TOTAL	**$ 524,625**	**$ 524,625**	**$ -**	**$ -**

Notes:

Project No.: 5
Description: Relocate transmission line to East Bench Reservoir #3

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Construct 12" transmission line	1,300 lf	$ 80	$ 104,000	$ 104,000	$ -	$ -
2	Install 12" butterfly valve	4 ea	5,000	20,000	20,000	-	-
3	Connect to existing water line	2 ea	5,000	10,000	10,000	-	-
4	Bore and case under canal	100 lf	250	25,000	25,000	-	-
6	Patch asphalt road	20 lf	20	400	400	-	-
7	Patch gravel road	50 lf	12	600	600	-	-
8	Mobilization	1 ls	16,000	16,000	16,000	-	-
			Subtotal	$ 176,000	$ 176,000	$ -	$ -
			15% Engineering & Construction Management	26,400	26,400	-	-
			10% Contingency	17,600	17,600	-	-
			TOTAL	**$ 220,000**	**$ 220,000**	**$ -**	**$ -**

Notes:
Does not include any additional property or easement acquisition/purchase

Project No.: 6

Description: Replace West Bench Reservoirs (#1 and #2) with new 1.5 MG West End Bench Reservoir

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Demolish existing 100,000 gallon and 1 MG water storage reservoirs	1 ls	$ 150,000	$ 150,000	$ 150,000	$ -	$ -
2	Construct new 1.5 MG concrete water storage reservoir	1 ls	2,000,000	2,000,000	840,000	1,160,000	-
3	Install 16" water line	300 lf	100	30,000	30,000	-	-
4	Install 16" butterfly valve	1 ea	7,000	7,000	7,000	-	-
5	Connect to existing water line	1 ea	5,000	5,000	5,000	-	-
6	Patch gravel road	300 lf	12	3,600	3,600	-	-
7	Construct new road crossing across the canal	1 ls	100,000	100,000	100,000	-	-
8	Mobilization	1 ls	230,000	230,000	230,000	-	-
			Subtotal	$ 2,525,600	$ 1,365,600	$ 1,160,000	$ -
			15% Engineering & Construction Management	378,840	204,840	-	-
			10% Contingency	252,560	136,560	116,000	-
			TOTAL	**$ 3,157,000**	**$ 1,707,000**	**$ 1,276,000**	**$ -**

Notes:

Future development contributes to approximately 58% of the size of the tank.

Remaining items included regardless of size of tank.

Does not include any additional property or easement acquisition/purchase

Project No.: 7

Description: Connect Lincoln Lane and 2750 East; upsize to 8" 8075 South, 2575 East, and 2350 East (south of Deer Run Dr.); upsize US 89 crossing at 8075 South to 12”; abandon existing 4" PSV and replace with new 8" PRV and line on Peachwood Dr.

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Construct 8" water line	2,330 lf	$ 60	$ 139,800	$ 139,800	$ -	$ -
2	Construct 12" water line	100 lf	80	8,000	6,000	2,000	-
3	Install 8" gate valve	7 ea	3,000	21,000	21,000	-	-
4	Install 12" butterfly valve	2 ea	5,000	10,000	6,000	4,000	-
5	Bore and case	275 lf	250	68,750	44,688	24,063	-
6	Connect to existing water line	7 ea	5,000	35,000	35,000	-	-
7	Install 8" PRV	1 ea	60,000	60,000	60,000	-	-
8	Abandon and remove existing PSV	1 ls	12,000	12,000	12,000	-	-
9	Install fire hydrant	2 ea	6,000	12,000	12,000	-	-
10	Install water service	12 ea	1,800	21,600	21,600	-	-
11	Patch asphalt road	1,305 lf	20	26,100	26,100	-	-
12	Mobilization	1 ls	42,000	42,000	42,000	-	-
			Subtotal	$ 456,250	$ 426,188	$ 30,063	$ -
			15% Engineering & Construction Management	68,438	63,928	4,509	-
			10% Contingency	45,625	42,619	3,006	-
			TOTAL	**$ 570,313**	**$ 532,734**	**$ 37,578**	**$ -**

Notes:

Upsize US 89 crossing from 8" to 12" water line for future development.

Does not include any additional property or easement acquisition/purchase.

Project No.: 8

Description: Automate Weber Basin well feed to Reservoirs #1 and #2 to match supply to system demand

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Add SCADA and water level monitors at West Bench Reservoir(s)	1 ls	$ 20,000	$ 20,000	$ 20,000	$ -	$ -
2	Add SCADA and actuated valve in vault at Weber Basin Well connection point	1 ls	35,000	35,000	35,000	-	-
3	Mobilization	1 ls	6,000	6,000	6,000	-	-
			Subtotal	$ 61,000	$ 61,000	$ -	$ -
			15% Engineering & Construction Management	9,150	9,150	-	-
			10% Contingency	6,100	6,100	-	-
			TOTAL	**$ 76,250**	**$ 76,250**	**$ -**	**$ -**

Notes:

Cost for item 1 may be reduced if incorporated into 1.5 MG Reservior Replacement Project.

Project No.: 9
Description: Rehabilitate Well #1; add new generator; modify controls

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Rehabilitate existing well, including video log, removal and reinstallation of pump, pump efficiency evaluation, scrubbing, brushing & bailing material, cleaning, repairing casing/perforations, etc.	500 vf	200	$ 100,000	$ 100,000	$ -	$ -
2	New pump motor	1 ls	50,000	50,000	50,000	-	-
3	Provide 125 kW Diesel Generator	1 ls	55,000	55,000	55,000	-	-
4	Modify electrical to accom-modate new generator	1 ls	12,000	12,000	12,000	-	-
5	Mobilization	1 ls	22,000	22,000	22,000	-	-
			Subtotal	$ 239,000	$ 239,000	$ -	$ -
			15% Engineering & Construction Management	35,850	35,850	-	-
			10% Contingency	23,900	23,900	-	-
			TOTAL	**$ 298,750**	**$ 298,750**	**$ -**	**$ -**

Notes:
If the initial assement reveals that rehabilitation of the well will not provide the intended purpose, a new well may need to be drilled.
This cost estimate does not include the cost of drilling a new well.

Project No.: 10
Description: Upsize Cottonwood Dr. to 8" line

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Construct 8" water line	3,100 lf	$ 60	$ 186,000	$ 186,000	$ -	$ -
2	Install 8" gate valve	5 ea	3,000	15,000	15,000	-	-
3	Connect to existing water line	2 ea	4,000	8,000	8,000	-	-
4	Install fire hydrant	5 ea	6,000	30,000	30,000	-	-
5	Install water service	8 ea	1,800	14,400	14,400	-	-
6	Patch asphalt road	3,000 lf	20	60,000	60,000	-	-
7	Mobilization	1 ls	32,000	32,000	32,000	-	-
			Subtotal	$ 345,400	$ 345,400	$ -	$ -
			15% Engineering & Construction Management	51,810	51,810	-	-
			10% Contingency	34,540	34,540	-	-
			TOTAL	**$ 431,750**	**$ 431,750**	**$ -**	**$ -**

Notes:
Current conditions require that this line be upsized in order to meet fire flow demands at the end of the line. However, this project is not needed if a new line (north of South Weber Drive) is looped into this line.

Project No.: 11

Description: Upsize to 8": 7875 South; 7925 South; Peachwood Dr. between 7925 South and Peachwood Way; 8100 South between Peachwood Drive and 2300 East; 2300 East; 2175 East; 7875 South between 2100 and 2175 East; 2100 East between 7800 South and City Park

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Construct 8" water line	5,375 lf	$ 60	$ 322,500	$ 322,500	$ -	$ -
2	Install 8" gate valve	18 ea	3,000	54,000	54,000	-	-
3	Connect to existing water line	16 ea	4,000	64,000	64,000	-	-
4	Install fire hydrant	11 ea	6,000	66,000	66,000	-	-
5	Install water service	89 ea	1,800	160,200	160,200	-	-
6	Patch asphalt road	5,375 lf	20	107,500	107,500	-	-
7	Mobilization	1 ls	78,000	78,000	78,000	-	-
			Subtotal	$ 852,200	$ 852,200	$ -	$ -
	15% Engineering & Construction Management			127,830	127,830	-	-
			10% Contingency	85,220	85,220	-	-
			TOTAL	**$ 1,065,250**	**$ 1,065,250**	**$ -**	**$ -**

Notes:

Project No.: 12
Description: Upsize remaining 4" and 6" lines to 8" (30,000 lf), as funds allow

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Construct 8" water line	30,000 lf	$ 60	$ 1,800,000	$ 1,800,000	$ -	$ -
2	Install 8" gate valve	50 ea	3,000	150,000	150,000	-	-
3	Connect to existing water line	50 ea	4,000	200,000	200,000	-	-
4	Install fire hydrant	60 ea	6,000	360,000	360,000	-	-
5	Install water service	400 ea	1,800	720,000	720,000	-	-
6	Patch asphalt road	30,000 lf	20	600,000	600,000	-	-
7	Mobilization	1 ls	383,000	383,000	383,000	-	-
			Subtotal	$ 4,213,000	$ 4,213,000	$ -	$ -
			15% Engineering & Construction Management	631,950	631,950	-	-
			10% Contingency	421,300	421,300	-	-
			TOTAL	**$ 5,266,250**	**$ 5,266,250**	**$ -**	**$ -**

Notes:
Assumes one (1) valve and connection every 600 ft; one (1) fire hydrant every 500 ft; one (1) service every 75 ft.

Project No.: 13

Description: Construct Connection #4 to WBWCD's transmission line with pump station to pump to Zone 4

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Construct 12" water line	4,200 lf	80	$ 336,000	$ -	$ 336,000	$ -
2	Install 12" butterfly valve	5 ea	5,000	25,000	-	25,000	-
3	Construct pump station	1 ls	175,000	175,000	-	175,000	-
4	Install generator	1 ls	50,000	50,000	-	50,000	-
5	Connect to existing water line	2 ea	5,000	10,000	-	10,000	-
6	Mobilization	1 ls	60,000	60,000	-	60,000	-
			Subtotal	$ 656,000	$ -	$ 656,000	$ -
			15% Engineering & Construction Management	98,400	-	9,000	-
			10% Contingency	65,600	-	65,600	-
			TOTAL	**$ 820,000**	**$ -**	**$ 730,600**	**$ -**

Notes:

Project No.: 14
Description: Upsize developer-installed loop from 7150 S to about 7400 South

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Construct 10" water line	3,300 lf	$ 70	$ 231,000	$ -	$ -	$ 231,000
2	Install 10" gate valve	5 ea	4,000	20,000	-	-	20,000
3	Connect to existing water line	2 ea	4,000	8,000	-	-	8,000
4	Install fire hydrant	6 ea	6,000	36,000	-	-	36,000
5	Mobilization	1 ls	30,000	30,000	-	-	30,000
			Subtotal	$ 325,000	$ -	$ -	$ 325,000
			10% Contingency	32,500	-	-	32,500
			TOTAL	**$ 357,500**	**$ -**	**$ -**	**$ 357,500**

Notes:
This cost is not included as an Existing Definciency or Impact Fee eligible project. It is only included for reference and to show that this line would need to be upsized by the developer.

Project No.: 15
Description: Upsize South Weber Drive (6650 South to end) to 10" line

Item	Description	Units	Unit Price	Total Amount	Cost Breakdown		
					Replacement/ Deficiency	Impact Fee Eligible	Developer Cost
1	Construct 10" water line	4,250 lf	$ 70	$ 297,500	$ 297,500	$ -	$ -
2	Install 10" gate valve	3 ea	4,000	12,000	12,000	-	-
3	Connect to existing water line	2 ea	4,000	8,000	8,000	-	-
4	Install fire hydrant	2 ea	6,000	12,000	12,000	-	-
5	Install water service	7 ea	1,800	12,600	12,600	-	-
6	Patch asphalt road	400 lf	20	8,000	8,000	-	-
7	Mobilization	1 ls	36,000	36,000	36,000	-	-
			Subtotal	$ 386,100	$ 386,100	$ -	$ -
			15% Engineering & Construction Management	57,915	57,915	-	-
			10% Contingency	38,610	38,610	-	-
			TOTAL	**$ 482,625**	**$ 482,625**	**$ -**	**$ -**

Notes:
Current conditions require that this line be upsized in order to meet fire flow demands at the end of the line. However, this project is not needed if a new line (north of South Weber Drive) is looped into this line.