Capital Facilities Plan

Culinary Water, Sanitary Sewer
&
Storm Water Systems

January 2009

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SECTION 1 - INTRODUCTION

Section 1 - Introduction

1.1 Purpose and Scope

The ultimate purpose of this report is to assist Riverdale City in providing efficient, safe and adequate life sustaining culinary water, sanitary sewer and storm water utilities, for the City residents.

As necessary, develop a City-wide Plan for the construction and/or replacement of any inadequate or non-existing facilities; prepare cost estimates, construction time table schedules and possible funding sources for the implementation, upgrade/replace of the culinary water, sanitary sewer and storm water utilities.

This Capital Facilities Plan will serve as a base plan for long range capital improvement projects and may serve as a base plan for the development of Impact Fees due to growth.

1.2 Additional Sources of Information and Data

Population projections for the City were developed using information provided by the U. S. Bureau of the Census, the State of Utah – Governor's Office of Planning and Budget and Riverdale City.

The Riverdale City culinary water computer-model was developed in January through March 2007 and was used in determining the culinary water system hydraulic conditions and limitations under existing and growth scenarios. Information obtained in the review of the culinary water computer-model and planning review meetings with the Public Works Staff have assisted greatly in the preparation of this report.

Field reports, video surveys and information obtained from the Public Works Staff in regards to the culinary water, sanitary sewer and storm drainage systems have also assisted greatly in the preparation of this report.

1.3 Riverdale City Background*

Riverdale City is located in southern Weber County and is bordered by Hill Air Force Base on the south, Roy City on the west, Ogden City, South Ogden City and Washington Terrace City on the north and east. Riverdale is situated in south central Weber County. It was once called "Stringtown" due to the early homes being strung along a single road and the Weber River. It was

also known as "Jack Thompson's Settlement" and "Union" before the name of Riverdale was given to the town

The first settlers in the community were James Graham, his sons George and Robert, and other members of the family. They farmed in the area as early as 1850. Elisha Lane located nearby, as did William Farley, and Rufus Allen. Other early settlers of Riverdale included Adam Fife, Alexander Patterson, Warren C. Child, Thomas Slater, Richard Woolsey, John Child, John C. Thompson, William Stimpson, Myron Barber Child, and George Ritter

In 1853, Daniel Burch built a grist mill on the east side of the Weber River. Later he added a saw mill to rip logs and saw lumber for homes. The river bottoms were covered with cottonwood timber which supplied the lumber. In 1858, Apostle John Taylor of The Church of Jesus Christ of Latter-day Saints purchased the mill and made improvements, including the establishment of a carding machine. Richard Dye and Edward Stratton took charge of the grist mill and carding machine.

Other early industries included a blacksmith shop built in about 1860. Matches were manufactured by Hugh Findlay. He packaged them in pasteboard boxes of 200 and sold them for 25 cents a box. Milk was hauled in from the Morgan area and was processed at the Creamery. Settlers also enjoyed the convenience of a canning factory.

The Population of Riverdale in 1878 was 211.

The pioneer settlers dug a canal taking water out of the Weber River near the eastern bend for the purpose of irrigating the bottom land. They raised hay, potatoes, vegetables, fruits, and sugar beets.

John Child was the first postmaster. Mail came once a week. Hugh Findlay was the first teacher in the log school house in 1858. The school house was located at about what is presently 1000 West 4400 South. In 1862, a larger log building was constructed, and then replaced by a rock school house in 1865. It served until 1900.

The Town of Riverdale was incorporated March 4, 1946 with Mondell Bennett serving as the first President of the Town Board. Alexander Carlsen and Frank Warner subsequently served as President also. Riverdale became a third class City on July 7, 1956. Edwin G. Anderson, the presiding President, became the first man to officially have the title of Mayor. He was also the first elected Mayor. Other mayors have included Gail Sanders, Keith N. Oram, L. Leon Poulsen, Ben A. Jones and J. Bruce Burrows.

During the 2000 US. Census, the population in Riverdale City was measured and accepted as 7,656 people. In January 2009, the population of Riverdale City was estimated at approximately 8,462 people.

*See: Riverdale City web site "About Our City -History"

SECTION 2 - DEMOGRAPHICS

Section 2 - Demographics

2.1 Riverdale City Overview

The Public Works Department manages the culinary water, sanitary sewer and storm water utility service for a population of ~ 8,462.

The Riverdale City Government consists of a Mayor, five-member City Council, and a seven member Planning and Zoning Commission and a Board of Adjustments.

The administration staff includes: City Administrator, City Attorney, Business Administrator, Community Development Director, Chief of Police, Fire Chief, Public Works Director, Recorder and support staff.

The Culinary water, sanitary sewer and storm water utilities are operated and maintained by the Public Works Department. The monthly service connection user fees are collected and administered through the Riverdale City Finance Department.

2.2 Riverdale City Utility Service Connections

The following table summarizes the approximate culinary water and sanitary sewer connections within the City boundaries for the year 2008:

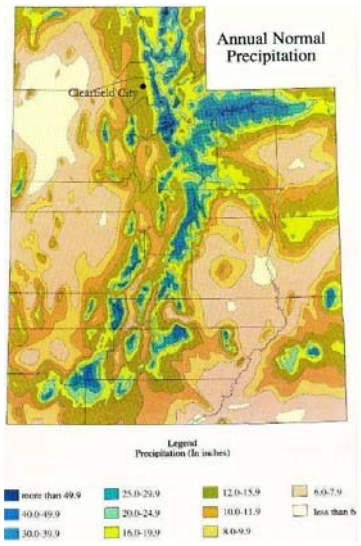
Culinary Water and Sanitary Sewer - User Connections:

Residential	1937
Commercial	201
Industrial	4
Public Buildings and Facilities	9
Parks	15
Churches	8
Schools	3
Mobile Home Parks	9
Multi-Residential Unit	122

Table 2.1

2.3 Geographic Setting

The Climate of the Riverdale is semi-arid with an annual average precipitation of approximately 20.75 inches per year. The average high temperature occurs in July at 89.90° F and the average low temperature occurs in January at 18.60° F.



2.4 Environment

The City is moderately vegetated with residential lawns and gardens and a variety of deciduous and evergreen trees.

The Utah History Encyclopedia states that the native plant species for the Northern portions of the State of Utah include: greasewood, shadscale or salt brush with some saltgrass, sagebrush, seepweed, and rabbitbrush.

The elevation change through Riverdale City is approximately 350 feet from the lowest elevation of 4320 to the highest elevation of 4670 mean sea level (MSL).

2.5 Population

The City of Riverdale grew the most dramatically during the 1950's with a growth of about 112%.

Riverdale saw its second largest growth period in the 1960's with a growth of about 100%. Growth slowed somewhat during the 1970's to about 62%.

The slowest growth period in recent history was during the 1980's at about 6%. The 1990's brought a growth rate of about 19% and since then the growth has been about 9%.

The population was 7,656 at the 2000 census and was estimated at 8,462 in January 2009.

With the subdivisions presently approved by the city, and now being built, the expected population growth rate of about 1.6% over the next two years is forecasted.

The Governors Office of Planning and Budget estimates the growth rate at about 0.9%. Riverdale City is nearing build-out; therefore a 0.9% growth rate appears to be a fairly accurate growth projection.

2.6 Land Use

2.6.1 Current Land Use Designations

The current General Land Use Plan is shown on Map 2.1. Shown on Map 2.2 are the various types of zones utilized and permitted within the Riverdale City boundaries.

The primary land use types in Riverdale City are as follows:

Agricultural Use (A-1 zone), Residential Uses - integrated residential uses, planned residential unit development - PRUD, mobile homes, mixed use (MU zone) Commercial Uses – regional retail and office, general commercial (C-zones), and Manufacturing zones.

2.6.2 Future Land Use

The Riverdale City General Plan was prepared, and after a public hearing was held, the recommendations for adoption by the Riverdale City Planning Commission were sent to the Riverdale City Council. The Riverdale City General Plan was last revised on April 25, 2001.

This Master Zoning Plan depicts the projected growth patterns based upon the planning goals adopted by the City Council, Planning Commission, and City Staff and with local citizen input.

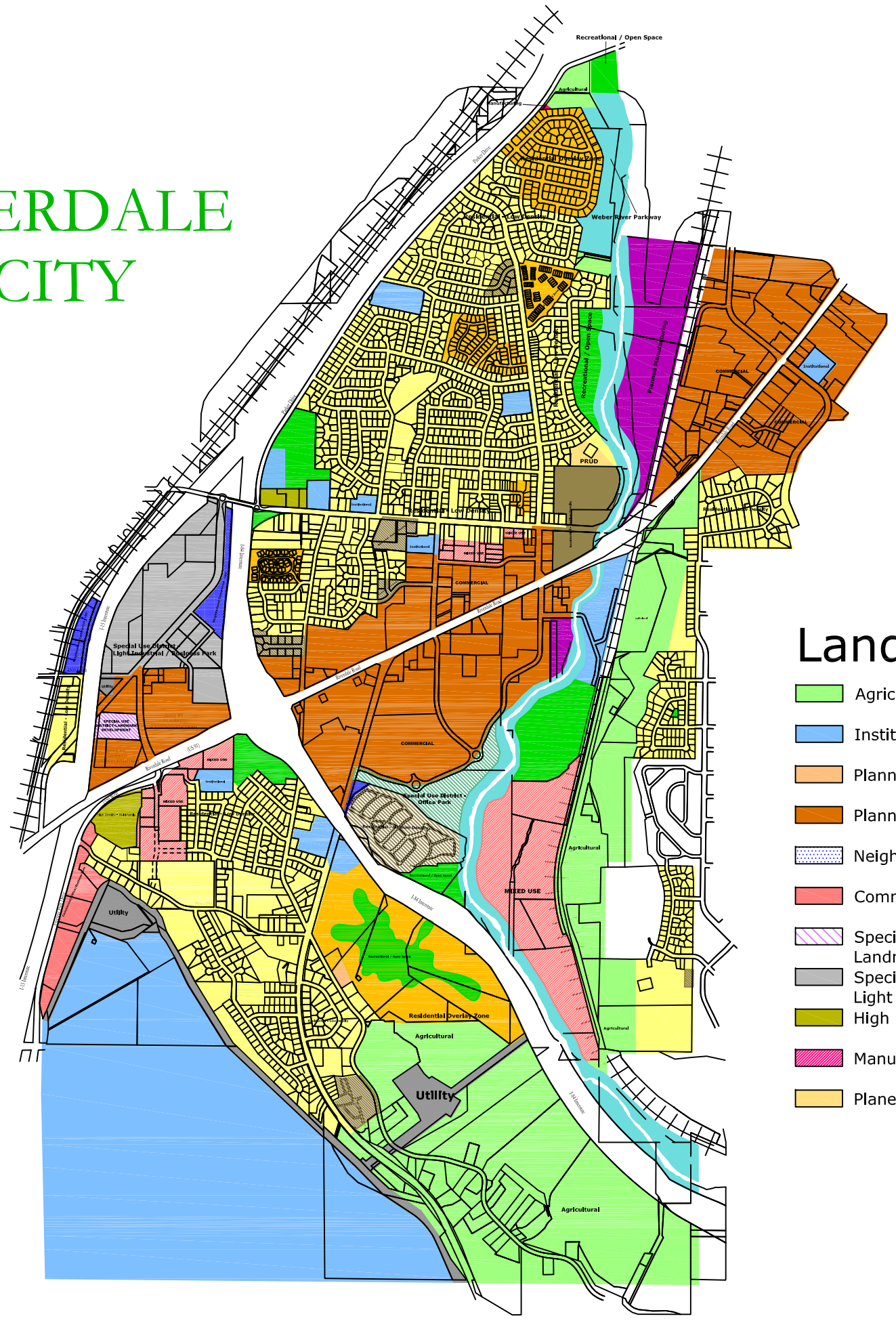
The population projections and distribution of zones have been used herein to project future areas of growth and to assist in the planning for culinary water, storm drain and sanitary sewer utility changes and future new service connections.

2.7 Planning and Evaluation

2.7.1 Equivalent Residential Connections

In the development and evaluation of the Culinary Water, Sanitary Sewer, and Storm Water utility systems, the use of the Equivalent Residential Connection (ERC) is the planning element commonly used in the facilities development.

RIVERDALE CITY



Land Use General Plan

- Agricultural
- Institutional
- Planned Commercial / Prof. Office
- Planned Commercial - High
- Neighborhood Commercial - Low
- Commercial/Office/Business Park
- Special Use District - Landmark Development
- Special Use District - Light Industrial / Business Park
- High Density - Multi Family
- Manufacturing
- Planed Residential Unit Development
- Residential Overlay Zone
- Residential - Low Density
- Residential - Medium Density
- Recreational / Open Space
- Planned Manufacturing
- Special Use District - Office Park
- Light Industrial / Business Park / Hotel Node
- Utility
- Mixed Use
- Weber River Parkway

N

NOT TO SCALE

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REVISIONS

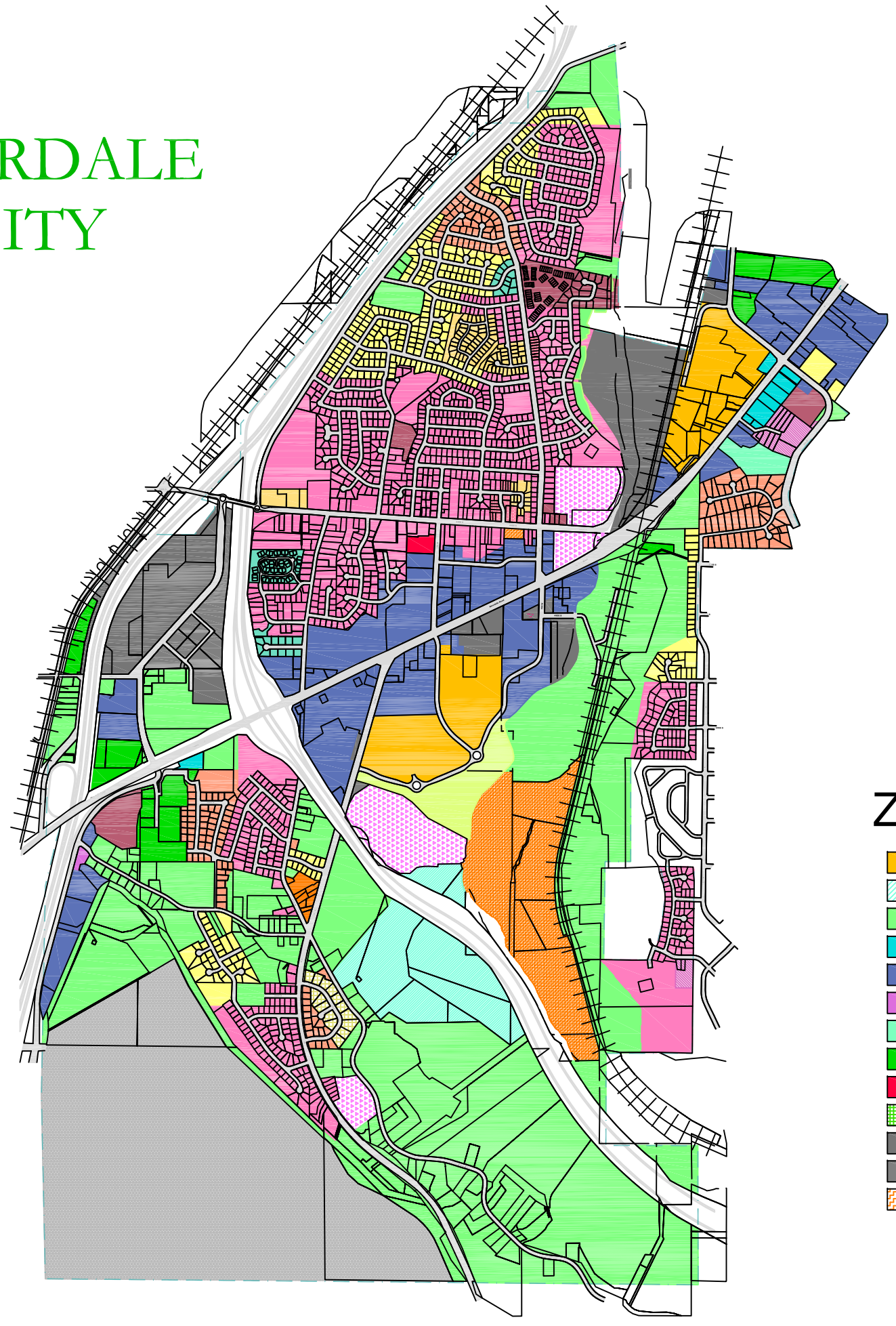
NO.	DATE	BY

DATE: FEBRUARY 2009
DRAWN: JLN
DESIGNED: NSN

PROJECT / LOCATION: CAPITAL FACILITIES PLAN RIVERDALE CITY MAP
TITLE: GENERAL LAND USE MAP

CLIENT: RIVERDALE CITY
PROJECT NUMBER: rc07006
FILE: rc07006-riv.dwg
SHEET: Map 2.1

RIVERDALE CITY



Zoning Legend

RCP	OP
O-1	PRUD
A-1	R-1-10
C-2	R-1-4.5
C-3	R-1-6
CP-1	R-1-8
CP-2	R-2
CP-3	R-3
LIT	R-4
LM	R-5
M-1	RE-20
MP-1	RMH-1
MU	H.A.F.B.

N

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NO.	DATE	BY	REVISIONS

DATE: FEBRUARY 2009

DRAWN: JLN

DESIGNED: NSN

PROJECT / LOCATION: CAPITAL FACILITIES PLAN
RIVERDALE CITY MAP

TITLE: GENERAL ZONING MAP

CLIENT: RIVERDALE CITY

PROJECT NUMBER: rc07006

FILE: rc07006-riv.dwg

SHEET: Map 2.2

Riverdale City utilizes the term Equivalent Service Unit (ESU) for the Storm Water Utility and the planning and billing of that utility.

One Equivalent Residential Connection (ERC) represents a single (1) family dwelling and the consumption of culinary water this single residential connection will typically consume daily.

This is the base volume unit used in sizing and evaluating the Culinary Water and Sanitary Sewer systems. The conversion from one (1) service connection to one (1) Equivalent Residential Connection (ERC) is calculated using approved engineering methods as outline in the State of Utah Administrative Code R309-510 and as shown in the Table 2.5 at the end of this section.

The total Equivalent Residential Connections (ERC) for Riverdale City in the year 2008 is **3,770.13**

Following the calculations of the Equivalent Residential Connection (ERC) for one residential consumer the calculations are expanded to develop Equivalent Residential Connection (ERC) for commercial, manufacturing, industrial, churches, schools, parks and other culinary water users.

In the development and refinement for the correct Equivalent Residential Connection (ERC) for Riverdale City, the actual Culinary Water consumption records have been evaluated. See the appendix for this report for the monthly/annual consumption records.

The total Equivalent Residential Connections (ERC) for Riverdale City at the present time – year 2008, is 3,770.13. On the following Table 2.2 is a summary of the Equivalent Residential Connections (ERC) for all the culinary water utility users in Riverdale City.

Service Connection User - type	Total Service Connections	Units	ERC/Unit	ERC
Commercial	201	201	4.4	884.40
Industrial	4	4	1.8	7.20
Residential	1937	1937	1.0	1937.00
Multi-Family Units	122	577	0.37	213.49
Mobile Home Units	9	488	1.08	527.04
Schools	3	3	10.7	32.10
Parks	15	15	7.6	114.00
Churches	8	6	4.8	28.80
Public Buildings and Facilities	9	9	2.9	26.10
Totals	**2,308**	**3,240**	**-**	**3,770.13**

Table 2.2 Equivalent Residential Connections (ERC) in Riverdale City.

2.7.2 Planning for Growth In Riverdale City

The future expansion and growth of Culinary Water, Sanitary Sewer and Storm Water facilities must be considered early in the development of infrastructure utility systems. The better the growth projections are, the less system expansion/re-construction funds are required, due to initial inadequate facility sizing.

To properly Master Plan for future population growth; infrastructure analysis and facility sizing, it is necessary to project growth patterns and population projections to total boundary build-out. As all cities grow and land is annexed or boundaries re-adjusted, the master facility utility planning process is a very dynamic complicated process.

The largest problem with the culinary water, sanitary sewer and storm water infrastructure facilities in Riverdale City is age and obsolesces.

Based upon planning information obtained from growth projection review meetings, guidance from the Public Works Department Staff and discussions with the City Planning Staff, Riverdale City should reach total build-out by 2017.

In considering 10-year growth projections with 1.6% growth for the next *2 years*, and projecting 0.9% growth for the next *8 years* the population of Riverdale City could reach approximately 9,332 persons by 2017.

Projected population for year 2011 = 8735 persons (1.6% growth projected)
Projected population for year 2020 = 9,384 persons (0.9% growth projected)

Table 2.3 Population Projection - for the years 2010 and 2020

2.7.3 Population and the Equivalent Residential Connections (ERC)

To calculate future Equivalent Residential Connections (ERC) due to population growth, the generally accepted value of 3.5 persons per household is used with population projections.

Due to the varying number of residential and multi-family dwelling units in Riverdale City the Equivalent Residential Connections (ERC) values have been determined from the projected growth percentages

shown in table 2.3 "Population Projections", rather than using the value of 3.5 persons per household in the calculations.

The future Equivalent Residential Connection (ERC) values used to determine effects from growth, for all the Riverdale City Land Use Types, has been calculated and summarized in table 2.4 shown below:

Service Connection User - type	Current – ERC Year 2008	Future – ERC Year 2011	Future – ERC Year 2020
Residential	2677.53	2788.77	3022.97
Commercial	884.40	921.14	998.50
Industrial & misc.	7.20	7.50	8.13
City Buildings and Facilities	26.10	27.18	29.47
Parks	114.00	118.74	128.71
Churches	28.80	30.00	32.52
Schools	32.10	33.43	36.24
Totals	**3770.13**	**3937.76**	**4268.45**

Table 2.4 – Future Equivalent Residential Connections (ERC) due to Population Growth – Riverdale City

Table 2.5
2005 to 2008 Equivalent Residential Connections

RIVERDALE CITY

	Commercial	Industrial	Residential	Multi Unit Residential	Mobile Home Parks	Schools	Parks	Churches	Public Buildings	Total Monthly Usage	Other Information		
Number of Connections	201	4	1937	125	4	3	15	8	9				
Number of units			1937	577	488			6			Yearly Water Volume Consumed (acre feet)	Yearly Water Volume Master Meters (acre feet)	Yearly Water Volume Loss (percent - loss)
YEAR 2008													
Water Usage (gallons)													
January 2008	4,734,000	-	5,000	2,759,000	8,972,000	106,000	-	17,000	85,000	16,678,000			
February 2008	5,434,000	140,000	64,629,000	1,534,000	6,252,000	132,000	-	50,000	101,000	78,272,000			
March 2008	8,212,000	102,000	15,911,000	2,309,000	7,973,000	125,000	68,000	145,000	120,000	34,965,000			
April 2008	6,159,000	56,000	-	2,026,000	5,376,000	113,000	-	52,000	112,000	13,894,000			
May 2008	11,559,000	81,000	27,418,000	1,935,000	6,529,000	314,000	1,726,000	385,000	432,000	50,379,000			
June 2008	34,074,000	114,000	52,360,000	6,474,000	17,275,000	1,308,000	3,357,000	2,347,000	1,215,000	118,524,000			
July 2008	44,278,000	298,000	83,611,000	7,245,000	17,490,000	1,279,000	4,774,000	2,453,000	1,551,000	162,979,000			
August 2008	36,488,000	174,000	76,516,000	5,943,000	14,877,000	1,170,000	5,437,000	1,950,000	1,145,000	143,700,000			
September 2008	24,448,000	95,000	59,049,000	4,393,000	7,598,000	657,000	5,001,000	1,409,000	753,000	103,403,000			
October 2008	19,676,000	132,000	24,962,000	3,330,000	9,547,000	453,000	1,094,000	1,448,000	435,000	61,077,000			
November 2008	5,679,000	101,000	-	2,304,000	7,825,000	118,000	-	106,000	99,000	16,232,000			
December 2008	4,978,000	86,000	-	2,124,000	4,705,000	88,000	-	33,000	63,000	12,077,000			
MONTHLY AVERAGE - 2008	17,143,250	114,917	33,705,083	3,531,333	9,534,917	488,583	1,788,083	866,250	509,250	812,180,000	2,492	2543	1.99
YEAR 2007													
Water Usage (gallons)													
January 2007	5,811,000	163,000	26,000	2,162,000	8,794,000	99,000	-	47,000	84,000	17,186,000			
February 2007	3,694,000	119,000	-	1,207,000	6,476,000	86,000	-	15,000	53,000	11,650,000			
March 2007	6,839,000	149,000	55,656,000	2,236,000	8,043,000	117,000	-	102,000	136,000	73,278,000			
April 2007	5,635,000	63,000	12,404,000	1,602,000	5,780,000	106,000	-	56,000	100,000	25,746,000			
May 2007	23,134,000	75,000	38,193,000	3,257,000	7,085,000	491,000	5,453,000	1,190,000	727,000	79,605,000			
June 2007	31,588,000	134,000	55,607,000	5,399,000	16,320,000	1,281,000	4,024,000	1,390,000	1,305,000	117,048,000			
July 2007	60,934,000	201,000	72,769,000	7,634,000	20,680,000	1,584,000	7,640,000	1,960,000	1,692,000	175,094,000			
August 2007	36,986,000	164,000	76,505,000	5,692,000	7,394,000	1,351,000	3,127,000	1,655,000	1,466,000	134,340,000			
September 2007	28,263,000	140,000	50,776,000	5,416,000	10,689,000	1,229,000	3,871,000	1,340,000	774,000	102,498,000			
October 2007	13,763,000	77,000	22,842,000	1,865,000	7,236,000	473,000	1,639,000	945,000	106,000	48,946,000			
November 2007	5,251,000	65,000	-	2,862,000	6,502,000	110,000	-	164,000	76,000	15,030,000			
December 2007	6,437,000	72,000	-	2,463,000	7,643,000	147,000	-	263,000	90,000	17,115,000			
MONTHLY AVERAGE - 2007	19,027,917	118,500	32,064,833	3,482,917	9,386,833	589,500	2,146,167	760,583	550,750	817,536,000	2,509	2679	6.35
YEAR 2006													
Water Usage (gallons)													
January 2006	3,876,800	85,000	13,355,000	1,936,000	7,106,000	59,000	-	93,200	36,000	26,547,000			
February 2006	3,567,800	91,000	13,355,000	1,806,000	6,187,000	111,000	-	93,200	36,000	25,247,000			
March 2006	7,506,800	102,000	13,355,000	2,537,000	7,157,000	98,000	-	93,200	36,000	30,885,000			
April 2006	4,001,000	116,000	25,855,000	2,068,000	5,743,000	85,000	97,000	32,000	33,000	38,030,000			
May 2006	17,933,000	186,000	29,717,000	5,075,000	10,872,000	752,000	3,529,000	726,000	627,000	69,417,000			
June 2006	21,094,000	186,000	64,061,000	6,345,000	9,810,000	641,000	5,443,000	1,237,000	764,000	109,581,000			
July 2006	29,616,000	212,000	74,502,000	9,864,000	17,266,000	2,072,000	6,108,000	1,441,000	780,000	141,861,000			
August 2006	27,020,000	186,000	83,100,000	6,649,000	12,483,000	1,620,000	5,956,000	2,019,000	1,345,000	140,378,000			
September 2006	19,048,000	169,000	53,627,000	5,279,000	8,601,000	749,000	4,779,000	830,000	455,000	93,537,000			
October 2006	8,763,000	129,000	20,338,000	2,828,000	6,124,000	124,000	862,000	328,000	102,000	39,598,000			
November 2006	4,372,800	157,000	13,355,000	2,405,000	6,912,000	90,000	-	93,200	36,000	27,421,000			
December 2006	3,429,800	90,000	13,355,000	1,523,000	4,773,000	78,000	-	93,200	36,000	23,378,000			
MONTHLY AVERAGE - 2006	12,519,083	142,417	34,831,250	4,026,250	8,586,167	539,917	2,231,167	589,917	357,167	765,880,000	2,350	2472	4.92
YEAR 2005													
Water Usage (gallons)													
January 2005	3,915,200	50,000	12,348,400	2,367,000	7,889,000	121,000	-	31,000	40,800	26,762,400			
February 2005	3,443,200	43,000	12,348,400	1,869,000	5,981,000	94,000	-	31,000	40,800	23,850,400			
March 2005	6,385,200	50,000	12,348,400	2,080,000	5,244,000	147,000	-	31,000	40,800	26,326,400			
April 2005	3,999,000	42,000	14,165,000	2,013,000	6,315,000	128,000	1,000	14,000	23,000	26,700,000			
May 2005	5,026,000	116,000	14,648,000	2,920,000	7,426,000	145,000	17,000	75,000	133,000	30,506,000			
June 2005	15,710,000	123,000	35,854,000	4,211,000	9,759,000	532,000	1,748,000	724,000	290,000	68,951,000			
July 2005	25,080,000	101,000	62,111,000	7,145,000	12,483,000	1,732,000	4,862,000	1,035,000	1,246,000	115,795,000			
August 2005	23,193,000	82,000	67,596,000	6,222,000	10,359,000	1,488,000	4,614,000	1,025,000	938,000	115,517,000			
September 2005	23,417,000	294,000	67,583,000	6,137,000	9,680,000	1,314,000	4,384,000	711,000	662,000	114,182,000			
October 2005	16,068,000	98,000	35,661,000	3,084,000	7,940,000	639,000	2,193,000	462,000	421,000	66,566,000			
November 2005	4,479,800	54,000	13,355,000	1,865,000	5,580,000	112,000	-	93,200	36,000	25,575,000			
December 2005	3,860,800	141,000	13,355,000	1,877,000	6,133,000	86,000	-	93,200	36,000	25,582,000			
MONTHLY AVERAGE - 2005	11,214,767	99,500	30,114,433	3,482,500	7,899,083	544,833	1,484,917	360,450	325,617	666,313,200	2,045	2233	8.43
4 YEAR AVERAGE	14,976,254	118,833	32,678,900	3,630,750	8,851,750	540,708	1,912,583	644,300	435,696	765,477,300			
Gallons per connection per day	2,484	990	562	968	73,765	6,008	4,250	2,685	1,614				
Gallons per unit per day			562	210	605			3,277					
Equivalent Residential Connections	**4.4**	**1.8**	**1**	**0.37**	**1.08**	**10.7**	**7.6**	**4.8**	**2.9**				

Summary: 1 Equivalent Connection = 562 Gallons per unit per day

Note:
Public Buildings includes: Civic Center, Community Center, Fire Station, Police Station, & Public Works
Multi Unit Residential includes Senior Center.
"Reidential","Churches" & "Public Buildings" meters are not read in the winter, the winter usage is averaged over the winter months

SECTION 3 – CULINARY WATER

Section 3 – Culinary Water

3.1 Riverdale City Culinary Water System Overview

The Riverdale City culinary water system has been developed through the years following a very wise culinary water master plan. The culinary water system does not rely solely upon one source of culinary water supply. Some cities develop only one source of water supply and when that source has trouble the entire system reacts negatively.

The Riverdale City culinary water system has numerous supply sources of water.

There are four (4) separate metered connections to the Weber Basin Water Conservancy District supply pipelines. The City also has three (3) underground culinary water wells, which are very valuable sources of culinary water.

Listed below in Table 3.1 are the three (3) underground wells and their respective location within Riverdale City.

Culinary Water Wells – Locations	
Well #1	Located on 1050 West - near the Christian Heritage School
Well #2	Located near the Roy Water Conservancy District
Well #3	Located on the Riverside Golf Course

Table 3.1 Culinary Water Wells – Locations

At the present time the City utilizes only one (1) of the underground wells. Well #2 is currently off-line and is being evaluated for the high concentrations of Iron and Manganese. Well #3 has been disconnected from the culinary water system due to the large amount of sand and clay the Well generates when being pumped and the low volume of water the Well produces.

The following Table 3.2 lists all the Riverdale City culinary water connections with Weber Basin Water Conservancy District along with the connection diameter and their respective connection locations in Riverdale City.

Culinary Water Connections to Weber Basin Water Conservancy District – Meter Locations – Connection size		
Meter #1	6" Diameter Connection	500 West 4800 South
Meter #2	6" Diameter Connection	4800 South Weber River Drive
Meter #3	4" Diameter Connection	4800 South 1500 West
Meter #4	6 " Diameter Connection	4800 South 1500 West

Table 3.2 Culinary Water Connections to Weber Basin Water Conservancy District – meter, diameter and locations

The culinary water system includes three (3) storage reservoirs (tanks) which are below ground and above ground culinary water storage reservoirs, which range in age from 19 years to 46 years old.

One (1) of the storage reservoirs is a reinforced concrete under ground storage tank, the other two (2) reservoirs are above ground welded steel storage tanks.

The following Table 3.3 lists the three (3) Storage Reservoirs (tanks) and their storage capacities and respective location.

Culinary Water Reservoirs (Tanks) – Capacities and Locations		
Reservoir #1	2 Million Gallon tank	Located near 5400 South / 500 West (North of 5400 South)
Reservoir #2	1 Million Gallon tank	Located near the Roy Water Conservancy District - 5200 South / 1500 West (South of Ritter Drive)
Reservoir #3	2 Million Gallon tank	Located near the Roy Water Conservancy District - 5200 South / 1500 West (South of Ritter Drive)

Table 3.3 Culinary Water Reservoir – Capacity / Locations

. . . 37.4miles of distribution pipelines ranging from 2" in diameter to 16" in diameter.

There are at present approximately 37.4 miles of culinary water distribution pipelines ranging from 2" in diameter to 16" in diameter. The distribution culinary water pipelines range in age from 1 year to 61 years old. The distribution water pipelines range in materials from asbestos concrete, cast iron, ductile iron, and polyvinyl chloride (pvc).

Riverdale City's culinary water system currently has one (1) pressure reducing valve station (prv). The pressure reducing valve station (prv - station) is very important in the culinary water system. The culinary water pressure is reduced through the pressure reducing valve station for the downstream users. The pressure reducing valve station (prv) is located at well # 1 with a manifold of pipes, valves, tees, angles and fittings.

Other important culinary water facilities within the Riverdale City system include: Gate valves, fire hydrants, blow-off valves and check valves.

3.1.1 Water Rights and Sources

Riverdale City has 3,243.44 approved municipal water shares of underground water. These water shares are also referred to as water rights. The underground water rights have been filled, approved and proofed through the office of the Utah State Engineers Office – Division of Water Rights.

1 acre foot of water is equal to 325,850 gallons of water.

Each underground water share is equal in volume to 1 acre-foot of water.

The combined total pumping rate of the underground City wells is approximately 4,700 gallons per minute as shown in Table 3.4.

Culinary Water Wells – Pumping Rate		
Well #1	2,000	Gallons per minute
Well #2	2,200	Gallons per minute
Well #3	500	Gallons per minute

Table 3.4 Culinary Water Wells – Pumping Rate

Additionally, Riverdale City has approved contracts with Weber Basin Water Conservancy District to purchase / consume 1,165

shares of water annually, at 1 acre-foot per share, from the four (4) connections shown in Table 3.2 above.

The City can vary the production of water throughout the year by turning on or off its underground wells as consumption demands vary. But the City is required to purchase and pay Weber Basin Water Conservancy District for the availability and/or use of the entire 1,165 shares annually, whether or not the City utilized the contracted water.

3.1.2 Culinary Water Storage

As noted in Section 3.1 there are three (3) culinary water storage reservoirs in use by Riverdale City. Culinary water storage in the reservoirs is an important part of the culinary water system. Culinary water must be stored for daily consumption, fire protection, recreation and outdoor irrigation needs for the residential, light and heavy commercial businesses.

Culinary water consumption and uses vary hourly, daily and seasonally. Typical daily winter water consumption and use is about 40 percent of the annual daily average consumption, while summer consumption and use is 107 percent greater than the daily average consumption.

Listed below on table 3.5, are the various City Storage Reservoirs (tanks) with their respective capacity, direct supply source, diameter and depth.

Reservoir (tank)	Tank Diameter - Dimension	Tank Depth (feet)	Primary Supply Source(s)	Capacity (Million gallons)
Tank #1	135	20	Well #1 & Weber Basin	2.0
Tank #2	74	32	Any Well & Weber Basin	1.0
Tank #3	104	32	Any Well & Weber Basin	2.0

Table 3.5 Culinary Water Reservoirs – Size and Capacity

The Riverdale City storage reservoirs vary from below ground storage to above ground culinary water storage. The storage reservoirs range in age from 20 years to 47 years old.

The two steel reservoirs (tanks) – Reservoir #2 and #3 are in need of interior re-painting, lining or replacement. The reinforced concrete reservoir which is know as Reservoir #1, was in good condition the last time it was inspected in detail, during the 1997 inspection.

On the following table - Table 3.6 is provided additional information in regards to the City's storage reservoirs and summaries the location, usage and water level information of the existing three (3) storage reservoirs (tanks).

Reservoir (name)	Location, Usage and Water Surface Elevation
Reservoir #1	This reservoir is located within Washington Terrace City limits on 5400 South Street. The reservoir provides fire suppression support to the Tibbetts and South Crest Subdivisions and general support to the lowest pressure zone of Riverdale City. The reservoir has a maximum water surface of 4671 feet in elevation (msl).
Reservoir #2 and #3	These two reservoirs are located above or South of Ritter Drive on the westerly side of the City and provide support to the lowest pressure zone of Riverdale City. These reservoirs have maximum water surface of 4625 feet in elevation (msl). The two reservoirs work in parallel with each other.

Table 3.6 Reservoir – Location, Usage and Water Surface Elevation

3.1.3 Culinary Water Distribution System

Distribution system consideration and infrastructure planning must always be a dynamic process to evaluate and resolve the effect of the new developments and changes with existing consumers, to the culinary water system. The culinary water computer-model is a valuable tool in the distribution system evaluation.

The future layout of the culinary water distribution system should remain much the same as the present layout due to the fact that the vast majority of the City is developed. As additional growth occurs

the developers of those new areas will be required to install the necessary culinary pipelines to serve the new development areas and interconnect with the City's current water system.

3.1.4 Water Quality

The water quality of the Riverdale City culinary water system has been shown in the past to exceed drinking water standards. The City Public Works Department tests the culinary water supply on a regular schedule.

Riverdale City . . . exceeds drinking water standards

Nine bacteriologic tests are taken each month. Nitrate tests are taken annually. Lead and copper testing is done every three years. Pesticides testing is twice every three years. Radionuclide and Volatile organic chemicals' testing is every six years. Inorganics & metals and asbestos testing are every nine years.

In addition, testing and quality control is also performed by Weber Basin Water Conservancy District for all culinary water provided by them prior to the deliverance of culinary water to Riverdale City:

3.1.5 Water Consumption and Records

The monthly water consumption records are available from the Riverdale City Public Works Department. The consumption records for the period of January 2005 to the present were used in the development of this report.

The consumption records used in this report are in table 2.5.

Riverdale City has considered various options to decrease culinary water consumption. Most of the City does not have a secondary water (irrigation) system exclusive for the irrigation of outdoor landscaping and vegetation. Within Riverdale City are three secondary water systems. These secondary water systems supply an irrigation source of water for about 10% of the entire irrigation water demands of the City's culinary water system.

The City evaluated the implementation costs and the potential cost savings, if a secondary water systems was to be implemented and installed within the city limits. It was concluded that the installation of a secondary source of water (irrigation water) was not an economically feasible plan.
The option of individual, residential, businesses and manufacturing conservation of culinary water is the best method to decrease culinary water consumption within the City. This conservation method to

decrease consumption will continue to be encouraged within Riverdale City.

Listed on the following table – table 3.7 is a tabulation of the recent years – 2004 to 2008 annual culinary water consumption in Riverdale City.

Annual Use		Maximum Monthly Use		Minimum Monthly Use	
Fiscal Year	Total Acre Feet	Month	Total Acre Feet	Month	Total Acre Feet
2004	2297	July	375	December	97
2005	2233	July	428	February	84
2006	2472	July	467	February	86
2007	2679	July	490	February	93
2008	2543	July	485	February	94

Table 3.4 Annual Water Consumption – approximate quantities

In general, the Riverdale City culinary water system may experience maximum daily consumption demands as high as to be 180 percent of the average daily consumption; with values ranging from 120 to more than 400 percent. Maximum hourly consumption can range from 1.5 to more than 10 times the average flow in extreme cases; a mean (average) for the maximum hourly rate is 300 percent in residential culinary water consumption for domestic and public uses only.

Using the City records for consumption amounts for the years 2003 through 2006 the following typical consumption parameters were calculated.

CONSUMPTION PARAMETERS

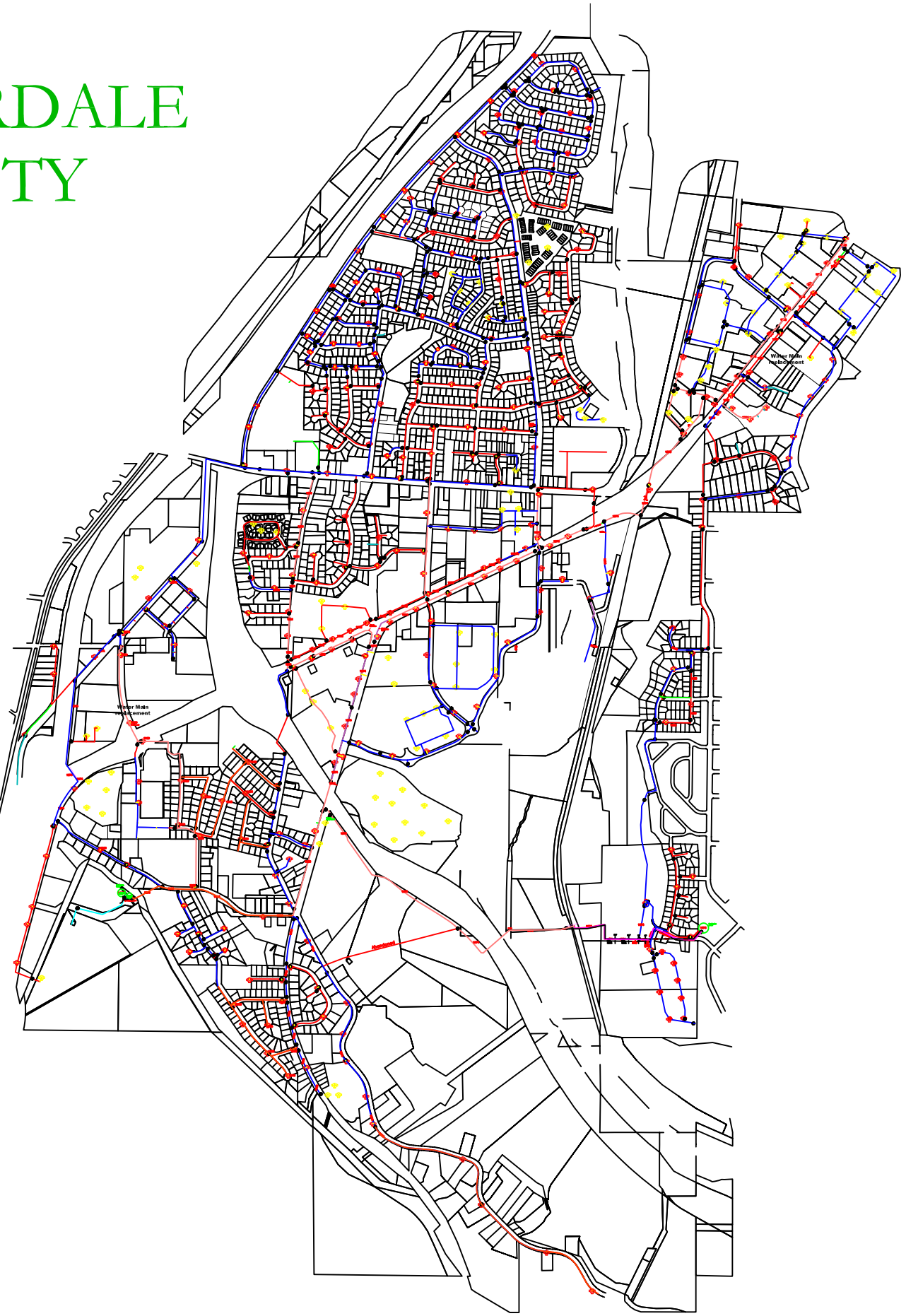
- Unit Average Daily Flow 562 gpd/ERC
- Peak Flow Peaking factor 1.8
- Peak Instantaneous Flow Peaking Factor 3.0
- Unit Peak Day Flow 1,012 gpd/ERC
- Unit Peak Instantaneous Flow 1,686 gpd/ERC

Table 3.5 Consumption Parameters

3.2 Current Facilities Mapping

The current Culinary Water Base Map for Riverdale City is shown as Map 3.1 on the following page.

RIVERDALE CITY



WATERLINE PIPE SIZES

- 2"
- 4"
- 6"
- 8"
- 10"
- 12"
- 14"
- 16"

N

NOT TO SCALE

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NO.	DATE	BY	REVISIONS

DATE: JANUARY 2008

DRAWN: JLN

DESIGNED:

PROJECT / LOCATION: CAPITAL FACILITIES PLAN
RIVERDALE CITY MAP

TITLE: CURENT CULINARY WATER MAP

CLIENT: RIVERDALE CITY

PROJECT NUMBER: rc07006

FILE: rc07006-riv.dwg

SHEET: Map 3.1

3.3 Culinary Water System Evaluation Parameters

The parameters used to analyze the capacity of the City's culinary water supply and distribution system for the present year of 2009 and the forecasted build-out year of 2020 are illustrated below.

Note that the source and storage parameters are based upon 100% of the residential customers using culinary water for outdoor irrigation.

For a metered culinary water system the following parameters need to be considered and also modeled in the culinary water computer-model.

A minimum culinary water pressure of 20 psi . . .

A. The culinary water sources will need to provide the peak day use of 1012 gallons per day / equivalent residential connections (ERC) or 0.703 gallons per minute / equivalent residential connections (ERC).

during peak instantaneous flows.

B. Storage facilities should be capable of storing the annual average use of 562 gallons per day / equivalent residential connections (ERC). Available storage must also include a fire flow, which is 2,000 gallons per minute for a two-hour duration or 240,000 gallons.

C. Distribution systems should be designed and constructed to maintain a minimum culinary water pressure of 20 pounds per square inch (psi) at all points in the water system during the peak instantaneous flow condition and also during the peak day flow with fire flow. Required fire flows range from 1,000 gpm to 3,000 gpm for the residential zones and 2,000 gpm to 12,000 gpm for commercial zones, namely the Riverdale Road Commercial Center.

3.4 Present Source and Storage Demands

Table 3.5 summarizes the present culinary water sources and the storage demands based upon the current equivalent residential connections (ERC) of **4863**

Water Storage Source	Water Storage Unit	Present Demand	Total Capacity	Surplus	Surplus ERC
Wells	Gpm	2,650	2,000	-650	-958
Weber Basin Connection	Gpm	None additional	682	682	1,086
Tanks	Gallons	2,118,813	4,760,000	2,641,187	4700

Table 3.5 Present Culinary Water System Capacity – Riverdale City

A surplus of 258 ERC is available when using the City Wells and the Weber Basin supply sources.

The fire storage requirement of 240,000 gallons was subtracted from the present storage amount of 5,000,000 gallons of total storage. The yield balance of culinary water storage available is 4,760,000 gallons.

In table 3.5 above, the total sources of water must include the wells and the Weber Basin Water Conservancy District supply of culinary water on a "Peak Day Flow". Combining the culinary water sources we show a present surplus of 128 ERC or approximately 43 gallons per minute for "Peak day flow" for the year 2008.

3.5 Culinary Water System Evaluations – Computer Model

When evaluating the possible necessary future sources, storage capacity, distribution, infrastructure and facilities required for the year 2020 (build-out) the population projection and the growth distributions from Section 2 – Demographic needs to be considered.

Additional population growth due to development in Riverdale City and changes in the Commercial Center and future Industrial users will affect the current culinary water system.

. . .
Continuous fine-tuning and calibration of the culinary water computer-model must continue.

Additional effects on the current culinary water system, is deterioration due to age, growth changes and present inadequate facility sizing.

With the development of the culinary water computer-model the current (existing) culinary water system and facilities may be reviewed in regards to all current existing elements and facilities of the culinary water system. Existing culinary water maps must be updated to reflect the current infrastructure.

In order to identify any deficiencies in the City's present culinary water system the model must reflect the actual existing culinary water system. The computer model will require continuous fine-tuning and calibration in order to reflect the existing City's culinary water system. The closer the model is to the existing culinary water system the more accurate the modeling results will be.

It has been determined during preliminary evaluations that there are many deficiencies in the current culinary water system and they vary with each computer-modeling scenario evaluated.

Hundreds of possible, real life scenarios can be evaluated with the culinary water computer- model, relatively easy and very quickly. The culinary water computer-model is a dynamic modeling tool and must be kept current with system changes. All new improvement projects as they are constructed and

completed, must be permanently entered into the computer-model for accuracy when performing additional modeling.

3.6 Recommended Culinary Water Improvement Projects

Upon review of the proposed growth, the recommendations of the Public Works Staff, and the results from several preliminary culinary water computer-modeling scenario's, it is recommended that transmission pipelines, valves, reservoirs and pressure reducing valve stations be modified and/or installed as outline in table 3.6 below.

The recommended culinary water projects have been outlined based upon the required parameters for the City's culinary water system and for the culinary water computer-model, as outlined in Section 3.3 of this report.

Some of the proposed projects are recommended due to changes to the pressure zones, additional storage volume needs, aging of the distribution pipes and needed facility upgrades. Many of the replacement/upgrade projects will need to be constructed within the existing developed subdivisions, within existing streets and areas of Riverdale City.

The recommended list of culinary water projects needed to be constructed within Riverdale City, are shown on Table 3.6 below.

The culinary water projects which are recommended should be constructed during a 10-year construction period, or sooner, if possible. The proposed 10-year construction period has been divided into two (2) 5-year periods, to better allow for City budgeting requirements.

Project period	Project Number: Project Name:	Estimated cost of Project	Estimated Design life (years)
0 – 5 years	**Project #1** Culinary Water Reservoir – Tank Replacement	$1,848,000	60 years
0 – 5 years	**Project #2** Riverdale Road Water Line - Replacement	$850,000	60 years
Total – Projects 0 – 5 years		**$2,698,000**	

Table 3.6 Summary of recommended Culinary Water Projects – 0 to 5 Year Construction Period (continued next page)

Project period	Project Number: Project Name:	Estimated cost of Project	Estimated Design life (years)
5 – 10 years	**Project #3** 5400 South – 16" Transmission Pipeline Improvements	$306,100	60 years
5 – 10 years	**Project #4** 1700 West Street – Pipeline Upgrade Improvements	$70,100	60 years
5 – 10 years	**Project #5** Waterline Connection with Weber Basin	$84,800	60 years
5 – 10 years	**Project #6** 500 West Street – Pipeline Upgrade and Improvements	$348,600	60 years
Total – Projects 5 - 10 years		**$809,600**	

Table 3.6 Summary of recommended Culinary Water Projects – 5 to 10 Year Construction Period

On the following table – table 3.7 the above listed project costs shown in table 3.6 are summarized and shown on a five-year basis for a 10-year construction period.

Summary of Project Costs – 10 Year Construction Period	
Projects 0 to 5 years	$2,698,000
Projects 5 to 10 years	$809,600
Total	**$3,507,600**

Table 3.7 Summary of Project Costs – 10 Year Construction Period

SECTION 4 - SANITARY SEWER

Section 4 – The Sanitary Sewer System

4.1 Riverdale City Sanitary Sewer System Overview

The Riverdale City Sanitary Sewer System consists of pipes ranging from 4-inch diameter to 18-inch diameter. Most of the original sewer system pipes installed in 1958 are still in use.

The City has not conducted any infiltration and inflow studies to determine the volume of groundwater that is collected daily via leaking pipeline joints. It is the general opinion of the Public Works department that the some of the older pipelines are allowing infiltration into the system due to initial installation practices and deterioration due to age. As the older deteriorated sanitary sewer pipelines are replaced, this infiltration problem will decrease in severity and any lost capacity will return.

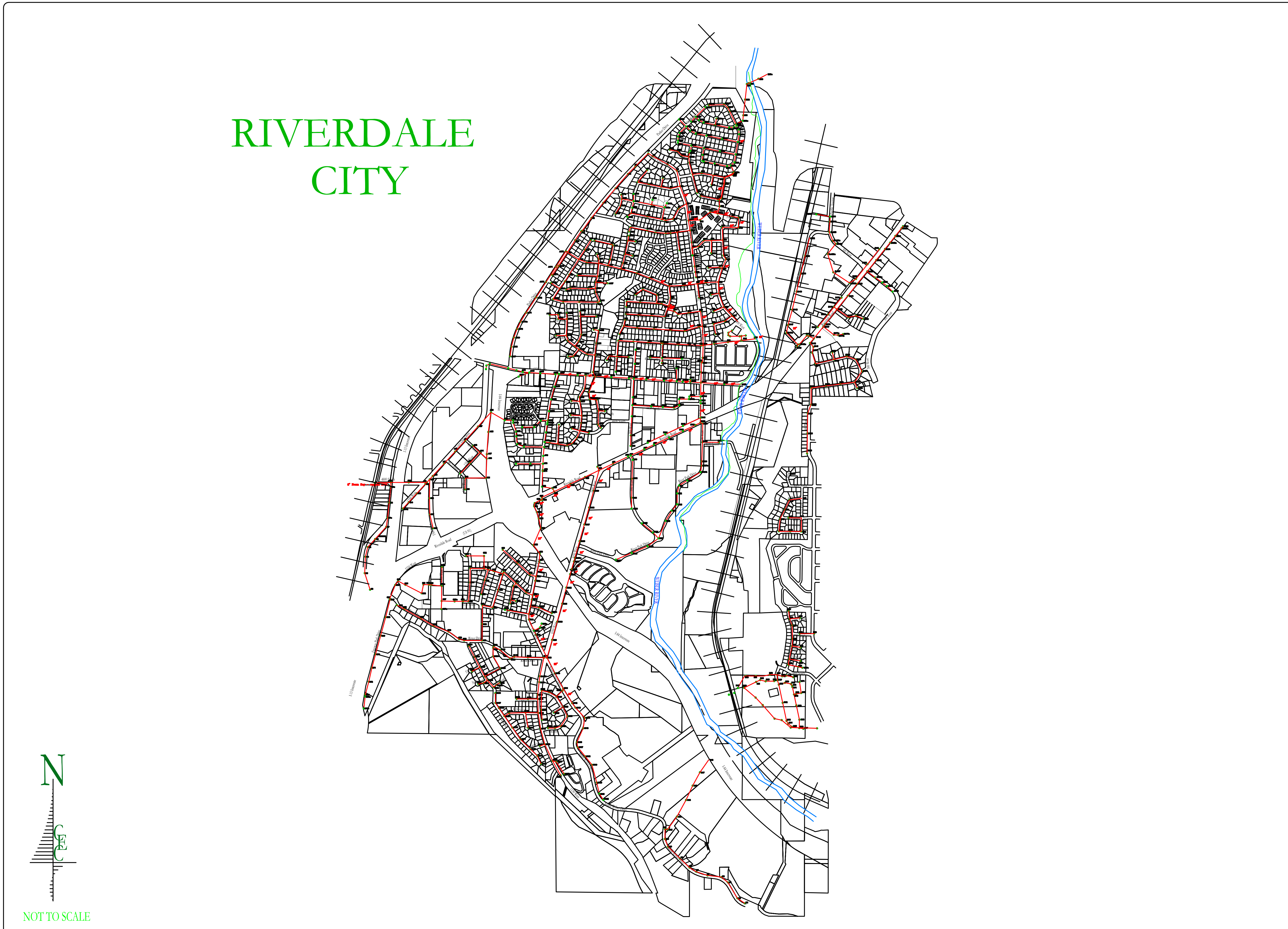
Riverdale City sanitary sewer pipelines range in size from 4" in diameter to 18" in diameter

The City sanitary sewer system is comprised of the following important components:

- Lateral pipelines
- Branch or sub-main pipelines
- Main pipelines
- Trunk pipelines
- Out-fall pipelines
- Clean-out facilities
- Siphon
- Manholes

4.2 Current Facility Mapping

The current sanitary sewer collection system for Riverdale City is shown on Map 4.1 on the following page.



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NO.	DATE	BY	REVISIONS

DATE: JANUARY 2008
DRAWN: JLN
DESIGNED: NSN

PROJECT / LOCATION:
CAPITAL FACILITIES PLAN
RIVERDALE CITY MAP

TITLE:
CURENT SANITARY SEWER MAP

CLIENT: RIVERDALE CITY
PROJECT NUMBER: rc07006
FILE: rc07006-riv.dwg
SHEET: Map 4.1

4.3 Sanitary Sewer Treatment

Central Weber Sewer Improvement District provides the treatment for Riverdale City sewage.

The City does not operate or perform any treatment of the sanitary sewer waste generated within the City limits. All wastewater is conveyed from the various sewage generation sources (residential, commercial & industrial) via the lateral pipelines which flow into the branches or sub-main pipelines then into mainlines which connect to the trunk lines and finally into the City out-fall pipelines. The City out-fall pipelines tie into the main trunk line for Central Weber Sewer Improvement District.

Riverdale City has contracted with the Central Weber Sewer Improvement District to manage maintain, transport and treat the sanitary sewage. The sewage is piped via the main trunk line through Riverdale City to their treatment facility at 2618 West Pioneer Road, Marriott-Slaterville where the sanitary sewage is processed, treated and released into the lower Weber River.

4.3.1 Connections with Central Weber Sewer Improvement District

Riverdale City has 6 separate out-fall sewer connections with Central Weber Sewer Improvement District.

The City has six-(6) connections with the Central Weber Sewer Improvement District. These sanitary sewer connections range in size from 8" diameter pipe connections to an 18" diameter pipe connection.

On the following table – Table 4.1, is the listed location addresses of the sanitary sewer connections with the Central Weber Sewer Improvement District.

Connection	Pipeline Connection Diameter	Connection Location
#1	8" diameter pipe	5838 South Weber Drive Maxwell Property, near I-15
#2	18" diameter pipe	4400 South Weber Drive
#3	12" diameter pipe	Approximately 4350 South on City owned property.
#4	10" diameter pipe	Approximately 4000 South Pacific Avenue
#5	8" diameter pipe	3953 South Pacific Ave.
#6	18" diameter pipe	Approximately 3480 South Parker Drive

Table 4.1 Out-fall Connections Locations – with Central Weber Sewer Improvement District

4.3.2 Connections with other Cities and/or Political Subdivisions

Riverdale City has two - (2) connections where other Political Subdivisions connect with Riverdale City sanitary sewer pipelines to transport their collected sewage, through the Riverdale City pipelines into the outfall pipelines of the Central Weber Sewer Improvement District.

These two sanitary sewer connections are with South Weber City and Hill Air Force Base.

Additionally Riverdale City has two connections which are with Washington Terrace City. These connections are important to Riverdale City; in that the collected sanitary sewage within Riverdale City limits, needs to be transported through Washington Terrace City, to the outfall pipelines of the Central Weber Sewer District.

On the following table – Table 4.2, is the listed location addresses of the sanitary sewer connections with Washington Terrace City.

Connection	Pipeline Connection Diameter	Connections to Washington Terrace City pipelines
#1	8" diameter pipe	500 West 5275 South
#2	8" diameter pipe	Combe Farms Subdivision

Table 4.2 Riverdale City - Pipeline Connection locations with Washington Terrace City.

Shown for reference, on the attached map – Map 4.2, are the various referenced pipeline connections and their respective locations as shown on the Riverdale City, city-wide map.

4.4 Capacity Evaluations

The current Riverdale City sanitary sewer piping collection system (pipeline and piping facilities) should remain much the same as the present piping layout, as shown on Map 4.1.

As growth occurs, those new growth areas will be required to install their sanitary sewer piping collection system, which will meet the needs of those

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As growth occurs, those new growth areas will be required to install their sanitary sewer piping collection system, which will meet the needs of those new developments. These new local sanitary sewer collection systems should be easily connected to the existing City or Central Weber Sewer Improvement District sanitary sewer facilities without major pipeline upsizing.

Upon review with the Public Works staff of the existing sanitary sewer collection system and forecasting the future residential growth areas, it is the combined opinion that only minor upgrade pipe sizing will be required in residential areas of the City.

In summary, there should not be any major sanitary sewer pipeline upsizing required down stream of the un-developed areas of Riverdale City.

4.4.1 Capacity Evaluations at the Out-fall Connection

The capacity at the various out-fall connection as shown in table 4.3 below has been calculated and summarized as related to the potential number of homes which may be served sanitary sewer collection services.

3,262 homes with 2.86 persons per home …

equals a population of 9,332 persons at build-out.

Connection	Pipeline Connection Diameter	Pipeline Discharge Capacity (estimated capacity)
#1	8" diameter out-fall pipe	350 gpm or 550 homes
#2	18" diameter out-fall pipe	2,100 gpm
#3	12" diameter out-fall pipe	765 gpm or 950 homes
#4	10" diameter out-fall pipe	550 gpm or 750 homes
#5	8" diameter out-fall pipe	350 gpm or 550 homes
#6	18" diameter out-fall pipe	2,100 gpm
Summary:	Sanitary sewer capacity is available for approximately 4,000 homes and 1,000 gpm for the Business Center.	

Table 4.3 Out-fall Connections – Pipeline Capacities

The two (2) sanitary sewer out-fall connections with Washington Terrace City are very minor in nature and will not be further considered in this report.

In summary, the capacity of the Riverdale City sanitary sewer system is limited by the volume of the various out-fall connections shown in

Table 4.3 above. These connections should not hamper full build-out.

4.4.2 Commercial Business Center

The Riverdale Road Commercial Business Center is somewhat unique and the volume of sanitary sewer generated from the commercial users varies greatly.

. . . as the commercial business and products change

The sanitary sewer discharge volumes from the different commercial users in the Riverdale Road Commercial Center fluctuate more than the residential users of the City.

. . . periodical reviews are recommended.

As the existing commercial businesses grow, and as business and products change, the sanitary sewer volumes generated are subject to minor and possible major volume changes.

Due to these possible changes the Sanitary Sewer Master Plan for the Commercial Business Center should be periodically reviewed and the pipeline capacities checked and or re-sized, along with a review of the available pipeline capacity of the northeasterly connection (see table 4.3 - connection #'s) with the Central Weber Sewer District.

4.5 Riverdale City in year 2017 – Sanitary Sewer Collection System

The Sanitary Sewer Master Plan for the year 2017 for the City will have minor changes as residential and commercial growth continues toward build-out. During the next 10-years many of the undeveloped pockets within the City limits will be developed with pipelines constructed and connection made with little or no effect to the existing sanitary sewer system.

As funds are available the deteriorated and aged sanitary sewer system facilities within the City limits will need to be replaced. Prior to any replacement and or update of the deteriorated and/or aged sanitary sewer facilities, the capacity of replacement pipeline should be checked. Minor up-sizing may be warranted.

4.6 Recommended Sanitary Sewer Improvement Projects

The following list of sanitary sewer projects shown below on Table 4.4 are recommended to be constructed during the periods shown. The list of projects was developed in conjunction with the Public Works Department Staff recommendations.

Project period	Project Number: Project Name:	Estimated cost of Project	Estimated Design life (years)
0 – 5 years	**Project #1** Riverdale Road – Rumbi Grill	$242,300	65 years
0 – 5 years	**Project #2** Riverdale Road – Ruby River to PC Laptops	$864,200	65 years
0 – 5 years	**Project #3** Rumbi Grill to 500 West Riverdale Road Intersection	$59,000	65 years
0 – 5 years	**Project #4** Del Taco to Olive Garden Building	$307,200	65 years
0 – 5 years	**Project #5** 4400 South Street – Colonial Gardens to 700 West Street	$582,100	65 years
0 – 5 years	**Project #6** South Weber Drive	$139,900	65 years
0 – 5 years	**Project #7** Riverdale Road – Check City to Wasatch Front Building	$76,000	65 years
0 – 5 years	**Project #8** 4375 South 800 West Street	$9,700	65 years
0 – 5 years	**Project #9** South Weber Drive	$138,400	65 years
0 – 5 years	**Project #10** 575 West to end of Cul-de-sac on 5350 South Street	$23,900	65 years
0 – 5 years	**Project #11** 564 West 575 West on 5400 South Street	$20,400	65 years
0 – 5 years	**Project #12** 575 West to end of Cul-de-sac on 5300 South Street	$19,200	65 years
0 – 5 years	**Project #13** 561 West 5275 South Street	$28,600	65 years

Table 4.4 Summary of recommended Sanitary Sewer Projects – 0 to 5 Year Construction Period (continued next page)

Project period	Project Number: Project Name:	Estimated cost of Project	Estimated Design life (years)
0 – 5 years	**Project #14** 575 West to end of Cul-de-sac on 5225 South Street	$22,200	65 years
0 – 5 years	**Project #15** 5175 South to 5375 South on 575 West Street	$107,400	65 years
Total – Projects 0 – 5 years		**$2,640,500**	

Table 4.4 Summary of recommended Sanitary Sewer Projects – 0 to 5 Year Construction Period

Project period	Project Number: Project Name:	Estimated cost of Project	Estimated Design life (years)
5 – 10 years	**Project #16** 4865 South 600 West Street	$27,100	65 years
5 – 10 years	**Project #17** 720 West to 700 West South Street	$42,000	65 years
5 – 10 years	**Project #18** 720 West to 751 West on 4350 South Street	$23,600	65 years
5 – 10 years	**Project #19** 3860 South 700 West Street	$6,700	65 years
5 – 10 years	**Project #20** 4350 South 700 West Street	$5,800	65 years
5 – 10 years	**Project #21** 783 West 4300 South Street	$5,800	65 years
5 – 10 years	**Project #22** Interstate I-84	$41,500	65 years
5 – 10 years	**Project #23** 775 West 4375 South Street	$14,400	65 years
5 – 10 years	**Project #24** 1241 West 4575 South Street	$5,800	65 years

Table 4.5 Summary of recommended Sanitary Sewer Projects – 5 to 10 Year Construction Period (continued next page)

Project period	Project Number: Project Name:	Estimated cost of Project	Estimated Design life (years)
5 – 10 years	**Project #25** 5109 South to 5100 on 1200 West Street	$25,300	65 years
5 – 10 years	**Project #26** 1219 West 5050 South Street to 1150 West Intersection	$85,900	65 years
5 – 10 years	**Project #27** 1200 West 5100 South Street to 5116 South 1100 West Street	$77,300	65 years
5 – 10 years	**Project #28** 5175 South 1200 West Intersection	$25,100	65 years
5 – 10 years	**Project #29** 950 West to 739 West on 4300 South Street	$27,000	65 years
5 – 10 years	**Project #30** 739 West to 783 West on 4300 South Street	$33,600	65 years
5 – 10 years	**Project #31** 827 West 4300 South Street	$5,800	65 years
5 – 10 years	**Project #32** 739 West 4300 South Street	$33,100	65 years
5 – 10 years	**Project #33** 4399 South to 4375 South on 950 West Street	$29,600	65 years
5 – 10 years	**Project #34** 4375 South to 4377 South on 950 West Street	$22,800	65 years
5 – 10 years	**Project #35** 4375 South to 4350 South on 950 West Street	$31,300	65 years
5 – 10 years	**Project #36** 4362 South to 4382 South on 900 West Street	$28,600	65 years
5 – 10 years	**Project #37** 4382 South 900 West Street	$5,800	65 years

Table 4.5 Summary of recommended Sanitary Sewer Projects – 5 to 10 Year Construction Period (continued next page)

Project period	Project Number: Project Name:	Estimated cost of Project	Estimated Design life (years)
5 – 10 years	**Project #38** 4396 South 800 West Street	$9,600	65 years
5 – 10 years	**Project #39** 1190 West 5175 South Street	$5,800	65 years
5 – 10 years	**Project #40** 5175 South 1200 West Street	$5,800	65 years
5 – 10 years	**Project #41** 1571 West Ritter Drive	$5,800	65 years
5 – 10 years	**Project #42** 5250 South 1250 West Street	$6,100	65 years
5 – 10 years	**Project #43** South Weber Drive	$6,400	65 years
Total – Projects 5-10 years		**$643,400**	

Table 4.5 Summary of recommended Sanitary Sewer Projects – 10 Year Construction Period.

On the following table – table 4.6 the above listed project costs shown in tables 4.4 and 4.5 are summarized and shown on a five-year basis for a 10-year construction period.

Summary of Project Costs – 10 Year Construction Period	
Projects 0 – 5 years	$2,640,500
Projects 5 - 10 years	$643,400
Total	**$3,283,900**

Table 4.6 Summary of Project Costs – 10 Year Construction Period

SECTION 5 – STORM WATER

Section 5 – The Storm Water System

5.1 Riverdale City Storm Water System Overview

Historically, the need to manage storm water drainage evolved from private property owners, discharging from their properties, the excess storm water they could not manage or control.

The local Cities and/or local political jurisdictions have by default assumed responsibility for handling and regulating storm water. The storm water draining from private property, from the city streets and from public buildings and other facilities must be regulated and controlled.

The present day situation now requires the local political jurisdiction to manage and regulate all storm water discharged from private and public properties.

The Riverdale City Storm Water Management Plan has been developed and regulates storm water collection, storage and discharge similar to the vast majority of neighboring political jurisdictions along the Wasatch Front Mountains and Valleys.

In general, the Riverdale City Storm Water Management Plan allows up to 0.20 cubic feet per acre of storm water received via rain/snow, to be discharged in a controlled method, from private property into City constructed storm water facilities. The volume of additional storm water received on-site, over the 0.20 cubic feet per acre, generally must be stored and managed safely on-site, in an approved storm water detention and retention facility.

Riverdale City storm water pipelines range in size from 8" in diameter to 60" in diameter

As the City of Riverdale has grown, storm water pipes have been installed. Many of the older pipelines installed, were sufficient for the needs at the time, but can no longer meet the needs of the City. It is the general opinion of the Public Works Department that the some of the older pipelines should be replaced due to improper sizing and deterioration due to time.

The Riverdale City Storm Water System consists of buried pipes ranging from 8-inch diameter to 60-inch diameter.

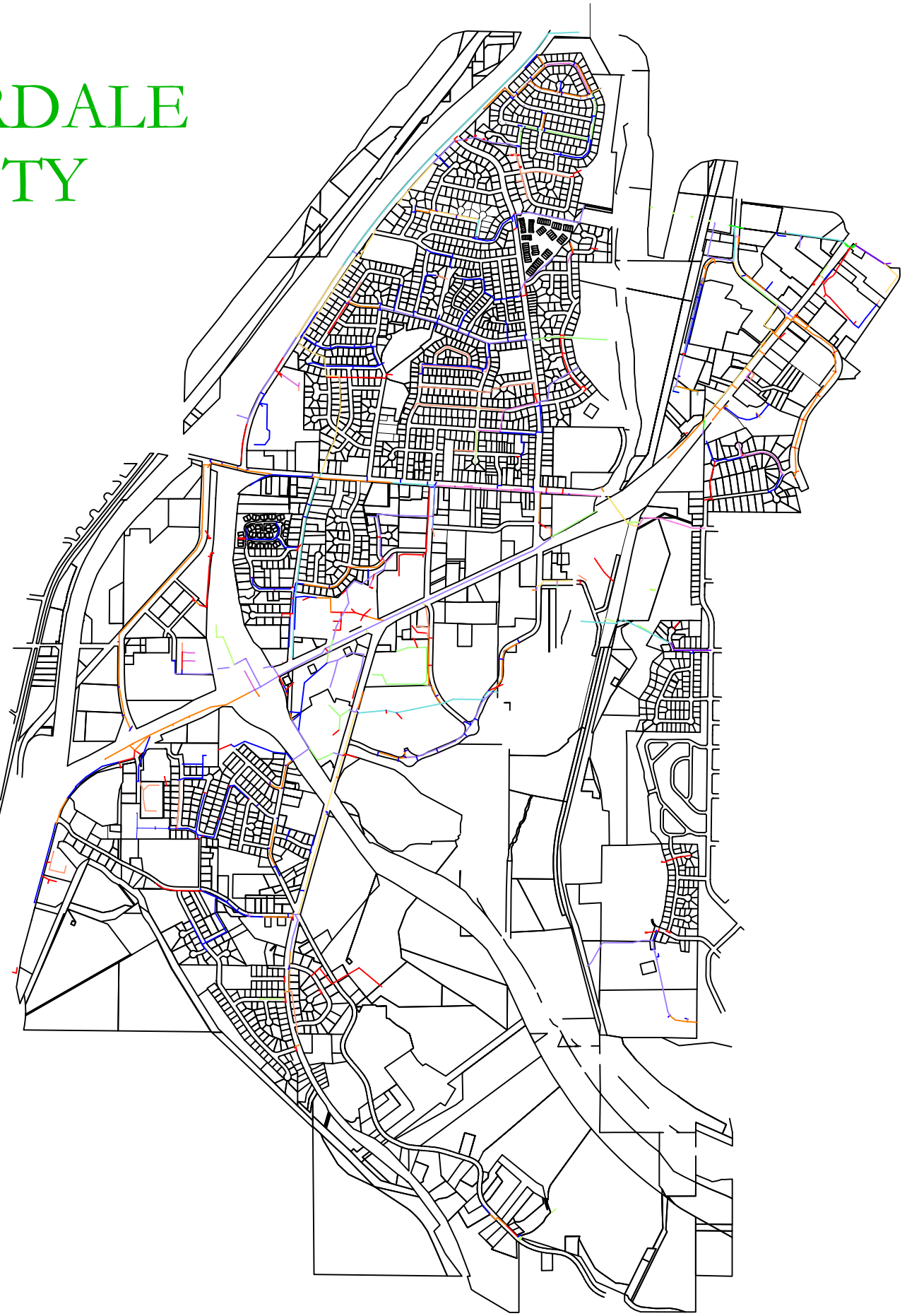
The City Storm Water System is comprised of the following important components:

- Inlet catch basins
- Branch or sub-main pipelines
- Main pipelines
- Trunk pipelines
- Out-fall pipelines
- Clean-out facilities
- Manholes
- Detention Basins, Wetland areas

5.2 Current Storm Water Facility Mapping

The current Storm Water piping and collection system for Riverdale City is shown on Map 5.1 on the following page.

RIVERDALE CITY



Pipe Sizes

- 4”
- 6”
- 8”
- 10”
- 12”
- 15”
- 18”
- 21”
- 24”
- 27”
- 30”
- 36”
- 42”
- 48”
- 54”
- 60”

N

NOT TO SCALE

CIVIL ENGINEERING CONSULTANTS, PLLC.
5141 SOUTH 1500 WEST
RIVERDALE, UT 84405
801.866.0550

REVISIONS

NO.	DATE	BY

DATE: JANUARY 2008

DRAWN: JLN

DESIGNED:

PROJECT / LOCATION: CAPITAL FACILITIES PLAN
RIVERDALE CITY MAP

TITLE: CURRENT STORM WATER SYSTEM

CLIENT: RIVERDALE CITY

PROJECT NUMBER: rc07006

FILE: rc07006-riv.dwg

SHEET: Map 5.1

5.3 Storm Water Treatment and Pollution Prevention

The Riverdale City Storm Water Management Plan does not presently require treatment of collected storm water.

The Federal Government via the Environmental Protection Agency (EPA) has recently required all political jurisdictions, adopt and pattern storm water pollution prevention, per federal guidelines and sample documents.

The Riverdale City Storm Water Management Plan requires the implementation of the Federal Government – EPA's "Best Management Practices". All proposed Construction sites must develop and implement a "Storm Water Pollution and Prevention Plan". Developers must utilizing the Federal Governments (EPA) - Best Management Practices; and to try to prevent and minimize all contaminates from entering into the local storm water systems, Streams and Rivers during all Construction phases.

5.4 Storm Water Piping Network – Discharge Piping into Weber River

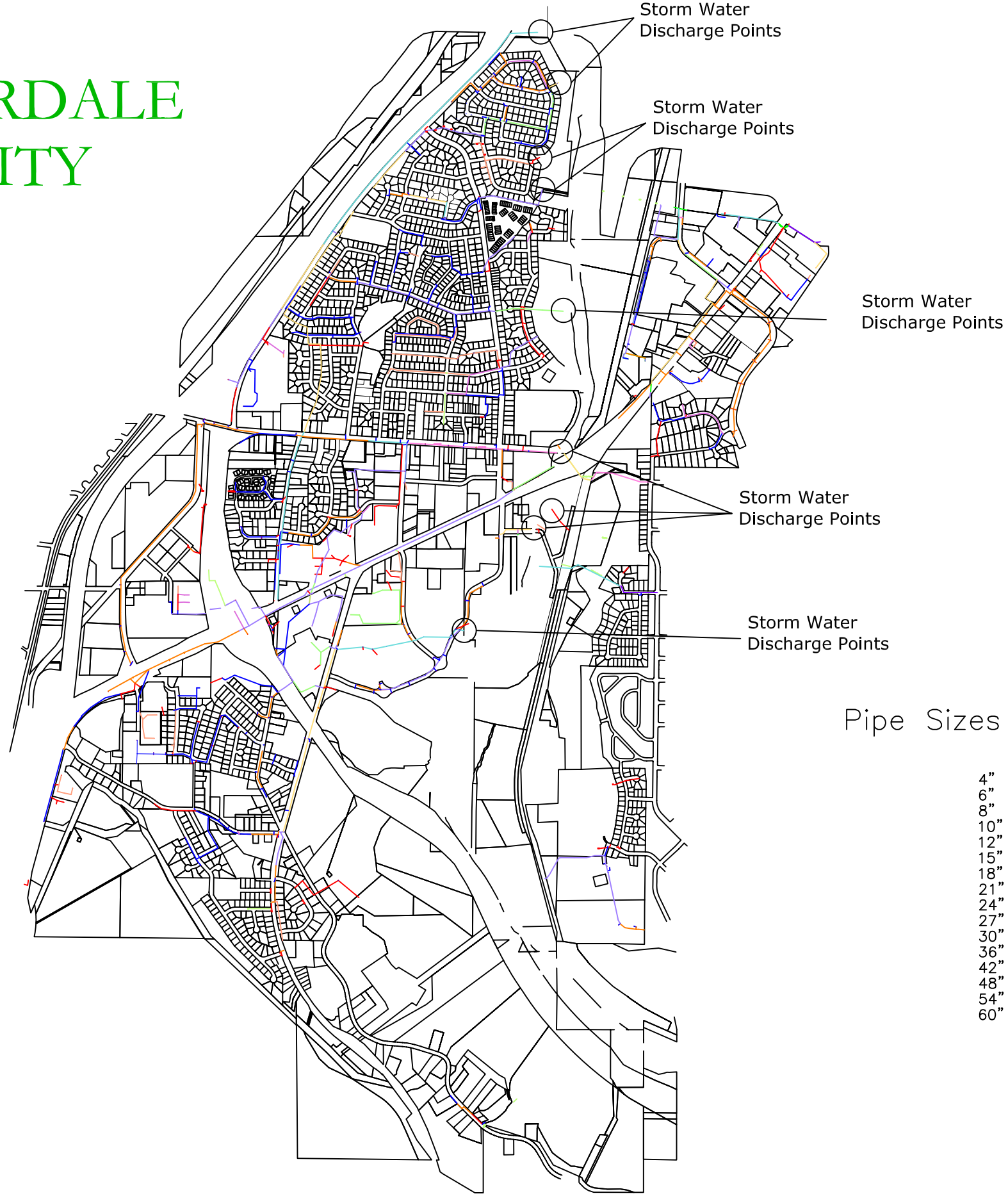
On the following table – Table 5.1, is the listed location addresses of the storm water piping connection into to the Weber River or other water bodies.

Connection	Pipeline Connection Diameter	Discharge Location
#1	42 diameter pipe	Approximately 4900 South River Park Drive
#2	36" diameter pipe	4600 South Weber River Drive
#3	12" diameter pipe	Approximately 4580 South on City owned property
#4	48" diameter pipe	4400 South Weber River Drive
#5	30" diameter pipe	4200 South on City owned property
#6	24" diameter pipe	Approximately 4050 South to Hunter Spring drainage
#7	24" diameter pipe	Approximately 3900 South to Hunter Spring Drainage
#8	36" diameter pipe	Approximately 3550 South 575 West
#9	24" diameter pipe	Approximately 3480 South Parker Drive

Table 5.1 Pipe Locations – Connection with the Weber River or other water bodies

Shown on the following map – Map 5.2 are the various piping locations shown on the City - wide map.

RIVERDALE CITY



N

NOT TO SCALE

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REVISIONS

NO.	DATE	BY

DATE: JANUARY 2009

DRAWN: JLN

DESIGNED:

PROJECT / LOCATION: CAPITAL FACILITIES PLAN
STORM WATER MAP

TITLE: DISCHARGE LOCATIONS

CLIENT: RIVERDALE CITY

PROJECT NUMBER: rc07006

FILE: rc07006-riv.dwg

SHEET: Map 5.2

5.5 Capacity Evaluations

The current Riverdale City storm water piping collection system (pipelines and piping facilities) should remain much the same as the present piping layout, as shown on Map 5.1.

As growth occurs, those new growth areas will be required to install their respective storm water piping collection system, which will meet the needs of those new developments. These new local storm water collection systems should be easily connected to the existing City storm water facilities without major pipeline upsizing.

Upon review with the Public Works staff of the existing storm water collection system and forecasting the future residential growth areas, it is the combined opinion that only minor upgrade pipe sizing will be required in residential areas of the City.

In summary, there should not be any major storm water pipeline upsizing required down stream of the yet to be developed areas.

5.6 Riverdale City in year 2017 – Storm Water Collection System

The Storm Water Master Plan for the year 2017 for the City of Riverdale will have minor changes as residential and commercial growth continues toward build-out. During the next 10-years many of the undeveloped pockets within the City limits will be developed with pipelines constructed and connection made with little or no effect to the existing storm water system.

As funds are available the deteriorated and aged storm water system facilities within the City limits will need to be replaced. Prior to any replacement and or update of the deteriorated and/or aged storm water facilities, the capacity of replacement pipeline should be checked. Minor up-sizing may be warranted.

5.7 Recommended Storm Water Improvement Projects

The following list of storm water projects shown below on Table 5.2 are recommended to be constructed during the periods shown.

The list of construction projects was developed in conjunction with the Public Works Department Staff recommendations.

Project period	Project Number: Project Name:	Estimated cost of Project	Estimated Design life (years)
0 – 5 years	**Project #1** 4400 South Street – 700 West to 1191 West	$1,036,100	65 years
Total – Projects 0 – 5 years		**$1,036,100**	

Table 5.2 Summary of recommended Storm Water Projects – 0 to 5 Year Construction Period

Project period	Project Number: Project Name:	Estimated cost of Project	Estimated Design life (years)
5 – 10 years	**Project #2** 4400 South Street – 700 West to Weber River	$196,400	65 years
5 – 10 years	**Project #3** Cherry Drive	$163,700	65 years
5 – 10 years	**Project #4** 1150 West – 5500 South Intersection & 1106 West 5475 South Street	$49,300	65 years
5 – 10 years	**Project #5** 5175 South – 1200 West Intersection	$86,400	65 years
5 – 10 years	**Project #6** 4800 South – 1700 West Intersection	$21,100	65 years
5 – 10 years	**Project #7** Parker Drive – (3675 South)	$46,200	65 years
5 – 10 years	**Project #8** 4300 South 700 West - Intersection	$22,300	65 years
5 – 10 years	**Project #9** 4350 South Street	$84,500	65 years
Total – Projects 5 - 10 years		**$669,900**	

Table 5.3 Summary of recommended Storm Water Projects – 5 to 10 Year Construction Period.

On the following table – table 5.4 the above listed project costs shown in tables 5.2 and 5.3 are summarized and shown on a five-year basis for a 10-year construction period.

Summary of Project Costs – 10 Year Construction Period	
Projects 0 – 5 years	$1,036,100
Projects 5 - 10 years	$669,900
Total	**$1,706,000**

Table 5.4 Summary of Project Costs – 10 Year Construction Period

SECTION 6 - FUNDING

Section 6 – Funding

6.1 Funding

The main purpose of this report is to assist Riverdale City in providing efficient, safe and adequate life sustaining culinary water, sanitary sewer and storm water utilities, for the City residents.

Funding all the recommended projects will place a heavy burden on the Mayor, Council and residents of Riverdale City. Listed below are typical sources of funding.

6.1.1 Bonds

- Non-voted General Obligation Bonds
- Voted General Obligated Bonds
- System Revenue Bonds
- Sales and Gasoline Tax Revenue Bonds
- Certificates of Participation
- General Improvement Districts
- Redevelopment Area Bonds

6.1.2 Governmental Agency Loans

- US Department of Agriculture Rural Utilities Service (USDA)
- Utah Water Quality Project Assistance Program (WQPAP)
- Revolving Construction Fund (RCF)
- Cities Water Loan Fund (CWLF)
- Conservation and Development Fund (CDF)

6.1.3 Governmental Agency Grants

- Community Development Block Grant Program (culinary water, sanitary sewer, streets, public buildings)
- US Army Corps of Engineers Section 595 Program (water and sewer)
- USDA Matching Grants (water and sewer)

SECTION 7 - REFERENCES

Section 7 – References

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