WATER ASSET MANAGEMENT REPORT

CITY OF CARSON CITY
MONTCALM COUNTY, MICHIGAN

Prepared By:

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Project I.D. Number 125269SG2017

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INTRODUCTION

Background

The City of Carson City is located in southeast Montcalm County along M-57, approximately 15 miles southwest of Alma and 20 miles northwest of St. Johns. The population in the 2010 Census was 1,093 people. The City is approximately 1.07 square miles in area, with M-57 running east-west through the middle of downtown. Carson City is largely residential, with a prominent commercial corridor along Main St. (M-57) and the Carson City Correctional Facility located along Boyer Road just southwest of the city. Sparrow Carson Hospital is also within Carson City and facilitates several other Sparrow medical facilities throughout the city limits.

The purpose of this Water Asset Management Report is to provide a summary of how the City is currently engaging in asset management and the next steps the City plans to take in developing the Water Asset Management Program promulgated under the Michigan Safe Drinking Water Act. Ultimately, the City will use this to manage their assets, plan for capital improvements and financial soundness for their water distribution system, and to ensure continued excellence in providing good quality water service throughout the community.

Below is an excerpt from *Part 16 – General Plans; Administrative Rules to the Michigan Safe Drinking Water Act*, PA399 of 1976 that shows what the City's asset management program must contain:

> ***R 325.11606 Community water supplies; additional general plan requirements; asset management program; capital improvements plan.***
>
> *Rule 1606. (1) A community water supply that serves more than 1,000 people shall implement an asset management program as defined in R 325.10102 beginning January 1, 2018, unless otherwise required in this subrule. Supplies may use the reference guide for asset management tools, May 2014, prepared by the U.S. Environmental Protection Agency and listed in R 325.10113 when developing an asset management program. Supplies shall include in the general plan each of the following:*
>
> *(a) A summary detailing the system used to maintain an inventory of assets. Priority shall be given to an inventory of source, treatment, pumping, and distribution system assets.*
>
> *(b) A summary describing the method used to assess the criticality of assets considering the likelihood and consequence of failure.*
>
> *(c) A statement of level of service goals.*
>
> *(d) A capital improvements plan that identifies waterworks system needs for 5-year and 20-year planning periods. A publicly owned or operated supply shall comply beginning January 1, 2016. A privately owned supply shall comply beginning January 1, 2018.*
>
> *(e) A summary detailing the funding structure and rate methodology that provides sufficient resources to implement the asset management program.*

Summary

The City's water distribution system has been inventoried, including 101,580 feet of water main ranging in size from 4-inch to 12-inch, a 500,000-gallon water tower located near the Carson City Hospital / E. Maple Street, and two (2) water supply wells along Condensery Road. The distribution system is primarily composed of 6-inch, 8-inch, and 12-inch ductile iron and cast-iron water main installed from 1938-2010.

The City of Carson City was awarded a SAW grant in 2014 to perform wastewater and storm water system asset management plans. As a part of these studies, a geographical information system (GIS) was developed to track the inventories, condition assessments, criticalities, and other attributes of the wastewater and storm water systems. Since the 2014 SAW Grant, the City has been building upon its asset inventory by developing the water distribution system and its components in GIS for the purposes of implementing a comprehensive water system asset management plan. At this time the skeleton of the water system GIS has been developed, and the City will be populating key asset data in the future, to make full use of the GIS capabilities.

This Water Asset Management Report reflects the data that has been collected to date, as well as a comprehensive condition and risk assessment of that data. To have a complete water asset management plan, the City has developed a capital improvement plan (CIP) including short range and long range projects, strategized annual operations and maintenance (O&M) procedures, and performed a water system financial sustainability analysis to ensure that capital funds are available to perform the work once the time comes.

Mission Statement

Carson City is committed to improving and maintaining the public health protection and performance of our water system, while minimizing the long-term cost of operating those assets. We strive to make the most cost-effective renewal and replacement investments and provide the highest-quality customer service possible to ensure that residents and the public can continue to "Live, Work, Play, and Learn" in Carson City.

Asset Management Team

City of Carson City - Owner
Bruce Tasker - Mayor
Jean Southward - City Administrator
Dan Curtis – DPW Director

Spicer Group, Inc.
John Bradley, Project Engineer
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PART 1 – ASSET INVENTORY AND CONDITION ASSESSMENT

INTRODUCTION AND APPROACH

The City of Carson City is located in southeast Montcalm County along M-57, approximately 15 miles southwest of Alma and 20 miles northwest of St. Johns. The population in the 2010 Census was 1,093 people. The City is approximately 1.07 square miles in area, with M-57 running east-west through the middle of downtown. Carson City is largely residential, with a prominent commercial corridor along Main St. (M-57) and the Carson City Correctional Facility located along Boyer Road just southwest of the city.

The City's water distribution system has been inventoried, including 19 miles of watermain ranging in size from 4-inch to 12-inch, a 500,000-gallon water tower located just east the Carson City DPW Building on Garfield Street, and two (2) water supply wells located along Condensery Road. The distribution system is primarily composed of 6-inch, 8-inch, and 12-inch ductile iron and cast-iron watermain installed from 1938-2010.

The City of Carson City was awarded a SAW grant in 2014 to perform wastewater and storm water system asset management plans. As a part of these studies, a geographical information system (GIS) was developed to track the inventories, condition assessments, criticalities, and other attributes of the wastewater and storm water systems. Since the 2014 SAW Grant, the City has been building upon its asset inventory by developing the water distribution system and its components in GIS for the purposes of implementing a comprehensive water system asset management plan. At this time the skeleton of the water system GIS has been developed, and the City will be populating key asset data in the future, to make full use of the GIS capabilities

WATERMAIN PIPE INVENTORY AND CONDITION ASSESSMENT

City of Carson City has approximately 101,580 feet of watermain pipe. The pipe assets were cataloged using existing data from City as-built plan information and then compiled into the City's GIS. The City has populated the GIS with data such as diameter, year installed, and material. Appendix A contains several figures for the water distribution system. The figures depict size, material, and age of the water distribution system. Additional asset management plan attributes such as break history and hydraulic modeling results (flow, pressure, etc) will be added to the GIS system in the future as the City continues to populate those data sets.

Table 1-1 below, shows the system is a combination of pipes less than 4-inches in diameter to 12-inch diameter pipes.

Table 1-1 Watermain Pipe Size

Watermain Inventory		
DIAMETER (in)	**LENGTH (ft)**	**Percent of Total**
<4	3,023	3.0%
4	2,524	2.5%
6	27,656	27.2%
8	12,337	12.1%
12	56,039	55.2%
TOTAL	**101,579**	**100.0%**

The pipes in the City of Carson City are comprised of 3 main materials; ductile iron, cast-iron, and polyvinyl chloride pipe (PVC). The percentage of each pipe is displayed in Table 1-2. The majority of the watermain piping (90%) in the system is cast-iron and ductile-iron pipes.

Table 1-2: Watermain Pipe Material

Mains by Material		
Cast Iron	26,509	26.1%
Ductile Iron	47,760	47.0%
PVC	17,543	17.3%
HDPE	2,719	2.7%
Copper	1,691	1.7%
Unknown	5,356	5.3%
TOTAL	**101,579**	**100.0%**

The age and material type of the watermains have been researched and input into the GIS. There are several watermain locations within the City that do not have asbuilt information available. These areas will require additional investigations to determine the data. Generally, those watermains installed in before 1950 are cast iron. Cast Iron pipes seem to generally be the 1950's to 1970's, and since the 1980's, ductile iron and PVC watermains have been installed.

WATER SERVICES

The City currently has 682 customers, of which 13 are metered separately for irrigation. The City has performed several large watermain projects in the past 30 years which have replaced existing services to the curb box. These services are believed to be a 50/50 split between copper and galvanized. The City is unaware of lead services or lead goose necks on the watermain side. The City has embarked on system wide replacement of the existing water meters. This project commenced was completed in 2013. The City used its own forces to replace the meters. The City noted that no lead was found between the watermain and the newly installed water meter.

NON-PIPE ASSET INVENTORY AND CONDITION ASSESMENT

HYDRANTS

The City has approximately 141 hydrants in the water system. All of the hydrants except for 46 are self-draining. Hydrants are inspected biannually, flushed annually, and painted as needed. Any hydrants in disrepair are repaired and put back into service in a timely manner. The City's fire department staff have been conducting inventories on the hydrants for several years. Data collected to date include age, manufacturer, barrel size, inspection date, etc. The existing data has been incorporated into the City's GIS system. Future data to collect may include repair history and hydrant flow testing results.

VALVES

The City has approximately 253 main line valves and 230 hydrant valves in the water system. The City operates the 61 of the primary valves on an annual basis during flushing operations or general maintenance. These valves are considered the "critical" valves in the system. The City is in the process of developing a comprehensive valve exercising program. In the future, the City will be collecting asset information including age, manufacturer, condition, turn direction, and number of turns vital to each valve, and then populating their GIS system.

STORAGE

Carson City has one elevated water storage tank in the system. The tank was constructed in 2006 and provides a capacity of 500,000 gallons. The tank has sufficient storage to meet the City's 2035 water demands and fire flows. It can provide 6,000 gpm for approximately 1.5 hours.

WELLS

The City has two active wells (Well #5 & Well #6) located along Condensery Road that supply all of the City's water users with water. Both wells use the same chemical feed point for disinfection and treatment purposes. The combined pumping capacity was rated at 1,900 gpm as of the 2015/2016 Water System Reliability Study and General Plan submission. Recent pump performance testing in 2018 by Peerless indicate that the combined pumping capacity has increased and is rated at 2,100 gpm. The firm capacity of the well supply system is estimated by assuming one of the pumps is out of service. This leaves the firm capacity of the system to be around 900 gpm.

The City has a permanent natural gas generator in place that provides power to both Well #5 and Well #6 in the event of an electrical disruption.

Well#5

Well #5 was constructed in 1995 and has a 125 HP vertical turbine pump. The well was last pulled for inspection in 2012. The current capacity of Well #5 is 1,200 gpm. The 2018 pump performance tests showed Well #5 is in good condition since the 2012 overhaul, according to the 2018 MDEQ Sanitary Survey.

Well #6

Well #6 was constructed in 2000 in the same well field as Well #5 and has a 75 HP vertical turbine pump. The well was last pulled for inspection in 2009. The current capacity of Well #6 is 900 gpm. The 2018 pump performance tests showed Well #6 is in good condition since its last overhaul in 2009, according to the 2018 MDEQ Sanitary Survey.

REMAINING USEFUL LIFE

Table 1-3 below shows the Life Expectancies used in this study for determining remaining useful life of the City's assets.

Table 1-3: Typical Life Expectancies

Typical Life Expectancies	
Component	Engineers Expected Service Life (Years)
Wells and Springs	40
Intake Structures	55
Pumping Equipment	20
Disinfection Equipment	15
Paint on Tank	20
Concrete and metal Storage tanks	75
PVC/HDPE Pipe	100
AC Pipe	50
Ductile Iron Pipe	65
Cast Iron Pipe	50
Valves (Distribution System)	50
Hydrants	40
Computer Equipment/Software	10
Meters	10
Service Lines	75

In general, as of 2018:

- The cast-iron pipes constructed in the 1940's and 1950's in the residential areas of the City have exceeded their life expectancy.
- The cast iron pipes constructed in the 1950's to 1970's in the residential areas of the City are nearing or have exceeded their life expectancy.
- The ductile iron and PVC watermains generally have 50% to 75% of their life remaining.
- The 500,000 gallon elevated tank was constructed in 2006 and has approximately 60 years of useful life remaining.
- Well #5 was constructed in 1995 and approximately 17 years of useful life remaining. Scheduled pump performance testing and inspection will continue in the future.
- Well #6 was constructed in 2000 and has approximately 22 years of useful life remaining. Scheduled pump performance testing and inspection will continue in the future.
- City staff have collected age, material, and installation date of the distribution system.
- The City will continue to collect data for each asset (valves, hydrants, watermain, storage, wells) and populate the GIS system when the data becomes available.

PART 2 - CRITICAL ASSETS AND RISK MANAGEMENT

INTRODUCTION

For the criticality of a given asset, an evaluation of the likelihood of failure of the assets must be completed in conjunction with the associated consequences of that asset's failure. The likelihood of failure generally relates to the probability of a negative consequence or impact to the Owner's system and its users. The consequence of failure of the Owner's assets must carefully consider a set of parameters to evaluate the economic and social ramifications of failure.

Understanding and assessing risk is key to implementing an asset management plan. Risk management is defined as the forecasting and evaluating economical, social, and environmental factors together with identifying the necessary procedures to avoid or mitigate their impact. The risk management process can be broken down into two simple steps; first determining what risks exist in the current system and infrastructure, then plan for those risks in a way best-suited for future goals and objectives.

To define the critical assets in the system, risk needs to be established for every asset. Risk is defined as the product of the Likelihood of Failure (LoF) multiplied by the Consequence of Failure (CoF) for each asset. Therefore, if the LoF was calculated to be *"Immediate"* at the highest level possible 5 and the CoF was determined to be *"Major Disruption"* (score 5), then the overall highest risk possible would be *5x5=25*. Risk can then be prioritized on a high, medium and low scale. The highest risk calculation possible is 25, therefore assets that have a risk factor of 12.5 to 25 have a high risk factor, 7.5 to 12.49 is a medium risk factor, and 7.49 or less is a low risk factor.

The following sections define the parameters which have been established to evaluate and address risk, along with determining which assets are critical in the system. *Appendix B - Pipe Summary Index* contains the individual scoring breakdown by pipe segment for the entire water distribution system.

LIKELIHOOD OF FAILURE (LOF)

Likelihood of Failure (LoF) for water distribution main assets is primarily based on the physical condition of the asset. This rating is an indicator of the probability of the particular asset to fail. This physical condition score for the City of Carson City was calculated by a matrix of both material and age. The overall LoF was calculated using the Matrix in Table 2-2, LoF Rating Matrix. The pipe age rating was added to the pipe material rating and divided by two for an overall LoF rating. The LoF matrix rating scores were developed from engineering experience and the City's knowledge of their system. Previous engineering experience from the surrounding area of the City allowed average ages of remaining useful life to be estimated. The LoF values were tailored to fit both the engineer's and City's opinion. This report reflects the data that has been collected to date.

Table 2-1 below demonstrates the one (1) to five (5) LoF scale and elaborates on the extents of each level.

Table 2-1: Likelihood of Failure Scale Definitions

Likelihood of Failure (LoF)		
Description	Grade	Failure of Asset
Immediate	4.5-5	Pipe has failed or will likely fail within 5 years
Poor	3.5-4.4	Pipe will probably fail in 5-10 years
Fair	2.5-3.4	Pipe may fail in 10-20 years
Good	1.0-2.4	Pipe unlikely to fail for at least 20 years

Table 2-2: LoF Rating Matrix

LoF Rating Matrix				
Install Date	Age Rating		Material	Material Rating
1940's, Unknown	5		UNKNOWN	5
1950-1959	4		CAST IRON	4
1960-1979	3		DUCTILE IRON, COPPER	2
1980 - 1989	2		PVC, HDPE	1
1990 - Present	1			
LoF Score= (Pipe Age Rating+Pipe Material Rating)/2				

Table 2-3 below shows the LoF breakdown for the entire distribution system as a percentage and overall footage. Once populated, this table is a good snapshot of the overall "health" of a system. The highest LoF values are typically cast iron and ductile iron water mains installed in the 1950's and prior. Scores ranging from 2.5 to 3.5 will be associated with the slightly newer asbestos-cement and ductile iron mains, which make up roughly 70% of the system (Water System Reliability Study and General Plan, Dec. 2015). New PVC and HDPE mains have low LoF values given their extensive life expectancy and, generally, newer install date. The Lof for each watermain segment has been generated and populated in GIS. Supporting LoF figures are in Appendix B.

Table 2-3: Water Distribution by Likelihood of Failure

Overall System LoF		
Risk Score	Length (Feet)	Percent of System
1.0-2.4	68,321	67%
2.5-3.4	1,065	1%
3.5-4.4	6,971	7%
4.5-5.0	25,222	25%
Total	**101,579**	**100%**

CONSEQUENCE OF FAILURE (COF)

The Consequence of Failure (CoF) is aggregating the empirical value associated with failure of an asset as it directly and indirectly pertains to social, cost implications, complaints, and service interruptions to customers. The overall CoF score is calculated on a 1-5 scale where one (1) has the least CoF implications, and five (5) has the highest implication. Table 2-4 Consequence of Failure below, demonstrates the one (1) to five (5) CoF grade ranges and elaborates on the extents of each range in accordance with MDEQ guidance documents.

Table 2-4: Consequence of Failure Scale Definitions

Consequence of Failure (CoF)		
Description	Grade	Failure of Asset
Major Disruption	4.5-5	Major effect - major capacity loss, health effects, high replacement costs, LOS compromised
Moderate to Major Disruption	3.5-4	Major effect - moderate to major loss of system capacity, health effects, and costs, LOS may be compromised
Moderate Disruption	2.5-3	Moderate effect - moderate loss of system capacity, health effects, and costs, LOS still achieved
Minor Disruption	1.5-2	Minor effect - minor capacity loss, health effects, and costs
Insignificant Disruption	1	Slight effect - slight loss of system capacity, minor health effects, minor costs

For the water distribution system, the pipe diameter and location are used to indicate the CoF.

Factors:

Pipe Diameter

a. When a break occurs on a large diameter water main the repair is much more costly due to water loss, parts, and labor/time to repair than smaller mains.
b. Typically, larger diameter mains act as transmission mains to smaller distribution mains. Therefore, interruptions to these mains affect more customers than a break on a smaller main.

Location Code

a. Access to repair or replace a water main when a break occurs is critical. Mains under heavily traveled roads and highways, or inaccessible areas such as wooded lots, have a higher consequence of failure as response time, traffic control, human health, and safety risks increase.
b. Water mains located in easily accessible areas such as outlawns, where minimal disruption to traffic and safety occur, have a lower consequence of failure.

Table 2-5 Consequence of Failure Rating Matrix below, shows the CoF rating assigned to each diameter of pipe and location within the City's water distribution system. One (1) has the least CoF implications, where five (5) has the highest. Overall CoF value is calculated by taking the appropriate size rating and adding it to the appropriate location code and dividing the rating by 2.

Table 2-5: Consequence of Failure Rating Matrix

CoF Rating Matrix				
Size (Inch)	Rating		Location	Rating
2, 4	1		Main Highway - Urban	5
6, Unknown	2		Building	5
8, 10	3		Creek	5
12	4		Railway	5
16	5		Woods	5
			Airport	5
			Main Highway - Suburban/Rural	4
			Local Streets	3
			Sidewalk	2
			Parking Lot	2
			Alley	2
			Ditch	2
			Yard	1
			Easement/Right of Way	1
			Other	1
COF Score= (Size Rating+Location Rating)/2				

Table 2-6 below, summarizes the overall water distribution system by CoF. Overall CoF scores were calculated based on the parameters above and populated in GIS. Supporting CoF figures are in Appendix B.

Table 2-6: Water Distribution by Consequence of Failure

Overall System CoF		
CoF Score	Length (Feet)	Percent of System
1.0-2.4	11,448	11%
2.5-3.4	75,327	74%
3.5-4.4	14,804	15%
4.5-5.0	-	0%
Total	**101,579**	**100%**

WATER MAIN PIPE CRITICAL ASSETS AND RISK MANAGEMENT

To determine which watermains were deemed to be "critical assets", first, the LoF was determined based on the physical condition matrix. Second, the CoF was determined based on the diameter. Overall, multiplying the LoF times the CoF calculates the risk for water main by pipe segment. Table 2-7 below shows the risk scores associated with low, medium, and high categories.

Table 2-7: Risk Levels

Low Risk	1-7.49
Medium Risk	7.5-12.49
High Risk	12.5-25

Table 2-8 Water Distribution System Risk below, shows the overall system risk associated by total footage and percent of entire system. Risk scores were determined based on LoF and CoF scores. The risk values were then populated in GIS. Supporting Risk figures are in Appendix B.

Table 2-8: Water Distribution by Risk

Overall System Risk		
Risk Score	Length (Feet)	Percent of System
1-7.49	67,873	67%
7.5-12.49	21,301	21%
12.5-25	12,405	12%
Total	**101,579**	**100%**

ELEVATED WATER STORAGE TANK

Based on the age, condition, and routine maintenance inspection of the elevated storage tank, LoF values are extremely low. Given the importance of the elevated tank, the CoF remains very high.

WELL FIELD AND PUMPS

Based on the age, condition, and routine maintenance inspection of the well fields, LoF values are extremely low. CoF valves will remain high but have not been determined to date.

HYDRANTS

Will be evaluated in a similar manner as the watermain distribution system. This work has not been completed to date and will be incorporated in later revisions of the water asset management plan.

VALVES

Will be evaluated in a similar manner as the watermain distribution system. This work has not been completed to date and will be incorporated in later revisions of the water asset management plan.

PART 3 – LEVEL OF SERVICE

MISSION STATEMENT

Carson City is committed to improving and maintaining the public health protection and performance of our water system, while minimizing the long-term cost of operating those assets. We strive to make the most cost-effective renewal and replacement investments and provide the highest-quality customer service possible to ensure that residents and the public can continue to "Live, Work, Play, and Learn" in Carson City.

METHODOLOGY

For the Level of Service, the City prioritized projects in their capital improvement plan and rate structure based on the level of service that they feel is affordable. The levels of service have been ranked as minimum, medium and high, defined as:

- Minimum LOS, operating the system in a manner needed to conform with applicable regulations and provide reliable water service, and performing reactive repair and replacement work.
- Medium LOS, operating the system in a manner needed to conform with applicable regulations and provide reliable water service, and performing projects to include work that is not critical for regulations but that makes sense for a long term sustainable result, and performing proactive replacement projects based on predicted high level risk assets.
- High LOS, operating the system in a manner needed to conform with applicable regulations and provide reliable water service, and performing projects to include work that is not critical for regulations but that makes sense for a long term sustainable result, and performing proactive replacement projects based on predicted high and medium level risk assets.

GOALS

The City's Level of Service goals are:

- Meet all federal and state drinking water standards.
- Maintain annual hydrant flushing program.
- Develop and implement a State approved valve exercising program
- Maintain a minimum of 35 psi pressure in all areas of the system.
- Responded to customer complaints within 24 hours, 7 days a week.
- Update and maintain the Water Asset Management Plan (WAMP) annually
- Revise CIP plan, and Rate Structure based on WAMP as needed
- Track WAMP goals annually and adjust as needed.
- Incorporate current lead and copper rules / regulations into the WAMP, specifically identifying water service materials and their locations within the City's system.
- Continue Well Head Protection Program (WHPP) to ensure the quality of the City's water and safety to the Public.

PART 4 – CAPITAL IMPROVEMENT PLAN

INTRODUCTION

The City currently has an approved 10-Year CIP. The CIP was approved in 2015 after the City completed and extensive water system financial sustainability analysis. The 2015 Water System Financial Sustainability Analysis Report, performed by Burton & Associates, is discussed in Part 5 – Revenue Structure.

CAPITAL IMPROVEMENT PROJECTS

A listing of the 10-Year CIP projects is shown below and can be found in the 2015 Water Financial Sustainability Analysis Report in Appendix C.

10-YEAR CAPITAL IMPROVEMENT PROJECTS

Table 4-1: 10-Year Capital Improvement Plan

Water System Financial Sustainability Analysis

Schedule 4 – Capital Improvement Program — APPENDIX

Project Description	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Well 5 Rehab	$ -	$ -	$ 45,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well 6 Rehab	$ -	$ -	$ -	$ -	$ 2,500	$ -	$ -	$ -	$ -	$ -	$ -
Well House Chlorine Tanks	$ -	$ -	$ -	$ -	$ 2,500	$ -	$ -	$ -	$ -	$ -	$ -
Well House Chlorine Pumps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Phosphate Tank	$ -	$ -	$ -	$ -	$ 2,500	$ -	$ -	$ -	$ -	$ -	$ -
Phosphate Pump	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Flouride Tanks	$ -	$ -	$ -	$ -	$ 2,500	$ -	$ -	$ -	$ -	$ -	$ -
Flouride Pumps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cummins Generator	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Water Tower Inspection	$ -	$ -	$ -	$ -	$ 2,500	$ -	$ -	$ -	$ -	$ -	$ -
Water Tower Painting Int	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 100,000	$ -
Water Tower Painting Ext	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 100,000
Equipment	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
Meters	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
Capital Reserve Fund	$ -	$ 38,013	$ 77,547	$ 118,646	$ 161,359	$ 205,732	$ 251,817	$ 256,853	$ 261,990	$ 267,230	$ 264,397
Total CIP Budget (in current dollars)	**$ 20,000**	**$ 58,013**	**$ 142,547**	**$ 138,646**	**$ 193,859**	**$ 225,732**	**$ 271,817**	**$ 276,853**	**$ 281,990**	**$ 387,230**	**$ 384,397**
Cumulative Projected Cost Escalation	0.0%	0.0%	2.0%	4.0%	6.1%	8.2%	10.4%	12.6%	14.9%	17.2%	19.5%
Resulting CIP Funding Level	**$ 20,000**	**$ 58,013**	**145,397**	**144,192**	**205,684**	**244,243**	**300,085**	**311,736**	**324,006**	**453,833**	**459,355**
Annual CIP Execution Percentage	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Final CIP Funding Level	**$ 20,000**	**$ 58,013**	**$ 145,397**	**$ 144,192**	**$ 205,684**	**$ 244,243**	**$ 300,085**	**$ 311,736**	**$ 324,006**	**$ 453,833**	**$ 459,355**

FUTURE CAPITAL IMPROVEMENT PLAN PROJECTS

This section evaluates the recommendations provided in the 2016 Water System Reliability (WRS) Study and General Plan (Appendix C), as well as the 2018 WSSS evaluations provided by the State (Appendix C). The projects listed below have not be prioritized and several of the projects require additional construction cost estimating to be performed. Once these projects have been reviewed by the City, financial planning can be determined, and scheduling of the projects will be included in a subsequent CIP after FY 2025, unless it is determined that there is a need to perform the project(s) prior to then.

2015 WRS and General Plan Project Considerations:

1. Loop Dead End Watermains

2. Conduct Public Protection Summary Report by Insurance Services Office (ISO) Inc.
    - The last report was performed in 2007.

3. Evaluate proposed developments and street projects to include water distribution system improvements that will increase system fire flow.

4. Update WRS and General Plan.
    - Next submission 2020

5. Replace existing 4-inch distribution watermains with 8-inch watermains
    - See Appendix F of the report for construction opinion
    - W. Sherman St.: West St. to Williams St. $50,000
    - S. Abbott St.: Maple St. to Sherman St. $150,000
    - 3rd St.: Elm St. to Sherman St. $60,000

6. Cleaning and inspection of well pumps
    - Well #5 was last inspected in 2012
    - Well #6 was last inspected in 2009

7. Perform Performance / Efficiency Testing of Well pumps
    - Annually

8. Storage Tank
    - Perform internal and external inspection. Last inspection was 2017.
    - Consider Improvements by Dixon for fall protection and cathodic protection

2018 Water System Sanitary Survey Project Considerations:

1. Provide Revised Emergency Response Plan (ERP)
    - City provided revised ERP to MDEQ. Copy to be included in future Water Asset Management Plan revisions.

2. Provide Cross Connection Program to get back into compliance with MDEQ.
    - City entered in agreement with Hydro Corp in May 2018.
    - Hydro Corp has performed inspections on approximately 10% of the low hazard areas. There are 52 in total for low hazard. There are zero (0) high hazard. See Appendix C for Hydro Corp Agreement.

3. Provide Water Asset Management Plan
    - This document is the water asset management plan report submittal

4. Provide capping of observation wells in proximity of productions wells if no intention of utilizing these wells.

5. Provide additional sampling sites for chlorine residual.

    - Currently there is only one sample location. Three (3) or four (4) are recommended.

6. Revise City Water AMP and GIS system to include Well Head Protection Program revisions (WHPP).
    - The City has participated in the WHPP since 2008
    - The latest revisions were reviewed and approved by the MDEQ in 2017 (see copy in Appendix C)
    - Updates are required every six (6) years. Next update will be 2023

ANNUAL OPERATIONS AND MAINTENANCE

1. Continue annual hydrant flushing program
2. Implement valve exercising program
3. Calculate lost water within the system
4. Create and implement a tracking system for customer complaints, maintenance issues, repairs
5. Continue safety programs and professional development

PART 5 – REVENUE STRUCTURE

INTRODUCTION AND APPROACH

The City of Carson City entered into an agreement with Burton & Associates in 2015 to complete a compressive water system financial sustainability analysis. This partnership occurred during the City's 2013 SAW Grant award with Burton & Associates was also contracted to perform the wastewater financial sustainability analysis. A copy of the water system financial sustainability analysis report is located in Appendix D.

This report presents the results of a Financial Sustainability Analysis (Study) conducted for Carson City's Water Enterprise Fund (Utility) by Burton & Associates. The purpose of the Study was to develop a multi-year financial management plan and identify the level of any needed rate increases to ensure sufficient revenue to meet the Utility's current and projected requirements, inclusive of operating costs, debt repayments, capital appropriations, and maintenance of adequate operating and capital reserves.

BACKGROUND

The City's last independent financial evaluation was conducted by the Michigan Rural Water Association (MRWA) in 2012 (hereafter referred to as the 2012 Study). This study resulted in the City adopting an 11% increase in FY 2013 and a 10% increase in FY 2014. Moreover, the 2012 Study called for a 9% increase in FY 2016, and 8% increase in FY 2017, and a 4% increase in FY 2018 to meet the projected requirements of the Utility.

The intent of this Study was to measure the adequacy of the revenue provided by the City's current water rates to meet the projected operating, debt, capital, and reserve requirements of the Utility, and ultimately identify a multi-year plan of rate adjustments necessary to ensure its long-term financial sustainability.

RESULTS

The CIP Projects identified in Part 4 – Capital Improvement Plan, along with key factors to develop the financial model (debt service, minimum operating reserve budget, current and forecasted revenue) were are incorporated to determine the sustainability of the water fund balance.

Based upon the source data and assumptions presented in the report, the Utility's current rates did provide sufficient revenue to meet its ongoing debt service, capital, and operating cost requirements over a multi-year projection period. As such, the Study developed a financial management plan and corresponding plan of rate revenue increases that will meet the Utility's current and projected cost requirements. A five-year rate revenue adjustment plan was presented and adopted. Table 5-1 indicates the recommended plan of water rate revenue increases.

Table 5-1: 5-Year Recommended Rate Adjustment Plan

	FY 16	FY 17	FY 18	FY 19	FY 20
Effective Date	7/1/15	7/1/16	7/1/17	7/1/18	7/1/19
Water Rate Revenue Increases	5.50%	5.50%	5.50%	5.50%	5.50%
Recommended Water Rates					
Carson City Customers	$2.57	$2.71	$2.86	$3.02	$3.19
Township Customers	$5.14	$5.42	$5.72	$6.04	$6.38
Prison	$5.14	$5.42	$5.72	$6.04	$6.38

The current approved CIP plan and rate structure will be evaluated in 2020 to determine if the current structure will sustain the remaining 10-year plan as well as any additions to the CIP plan based on the current WRS and WSSS evaluation, as well as financial impacts to improved O&M practices.