

Rehabilitation and Replacement Capital Plan 2023-2032

# TABLE OF CONTENTS

10 Dealeround
Table 1 Installation Daried for Astive Datable Water Maine
2.0 Demons
2.0 Purpose
3.0 Financial
4.0 Relative Risk Rating Process for Water and Sewer Mains
Water Mains Rating Process
Likelihood of Failure and Baseline Pipe Rating
Failure Weight
Consequence of Failure – Size
Water Projects Preliminary Budget Estimates
Table 2 – Water Projects with Score, Priority and Cost Estimate
Figure 1 – Overall Water Projects Map
5.0 Relative Risk Rating Process for Sewer Mains
Description of PACP Based Risk Management
Likelihood of Failure – LOF
Consequence of Failure – COF
Rating Methodology for COF
Consequence of Failure based on Size (COF-S)
Consequence of Failure based on Material (COF-M)
Consequence of Failure based on Age (COF-A)
Sewer Projects Preliminary Budget Estimates
Table 3 – Sewer Projects with Score, Priority and Cost Estimate
Figure 2 – Overall Sewer Projects Map
6.0 Discussion of Rehab Capital Plan Elements
7.0 Capital Rehabilitation Budget
Appendix A – Water Project Maps

Appendix B – Sewer Project Maps

Page

#### CASTLE ROCK WATER <u>REHABILITATION AND REPLACEMENT CAPITAL PLAN</u> 2023-2032

# 1.0 BACKGROUND

The town of Castle Rock was incorporated in 1874 when Jeremiah Gould donated 120 acres of land that became central Castle Rock. The history of the Castle Rock Water infrastructure dates back at least to the 1880's when the system was under the purview of the Street and Water Commissioner G. W. Bardeley (Castle Rock Journal, May 2, 1888). During a major capital rehabilitation project in the original Craig and Gould neighborhood in 2005, cast iron water pipe that was foundry stamped with the date "1916" was uncovered. Even more historic are segments of old wooden water pipe that have been discovered over the years in the south Castle Rock area; samples are on display at the Castle Rock Water offices. Maps of the original sewer system date back to 1930, and indeed some of that original clay sewer pipe is still in service in the central downtown area. Since the formation of Castle Rock Water, over 454 miles of potable water mains and over 314 miles of sanitary sewer mains have been installed by Castle Rock Water and private developers. Castle Rock Water has responsibility for operation, maintenance, rehabilitation, and replacement of all water distribution facilities, wastewater collection infrastructure, and storm water management infrastructure installed by and/or conveyed to Castle Rock Water. Estimates are that the total value of those assets are in excess of \$852 million; as such, a comprehensive plan for the timely and cost effective rehabilitation or replacement is required to ensure sufficient revenue is received from rates to adequately budget for future projects that maintain and extend the life of CRW assets. To support the planning effort, the Castle Rock Water has utilized its geographic information system (GIS) and Cartegraph OMS asset management programs and other tools to develop a 10-year comprehensive rehab and replacement plan for potable water and sewer mains.

Present day valuation costs for all assets owned and maintained by Castle Rock Water totals over \$852 million. Although much (65%) of Castle Rock Water's water pipe infrastructure has been installed since 2001 and is within its expected useful life, electrolysis caused corrosion, damage, and normal aging and deterioration of facilities have highlighted the need for asset rehabilitation or replacement with particular emphasis on older assets. The Rehab Capital Plan provides a systematic process for identifying, prioritizing and budgeting for necessary system improvements in a timely and cost-effective manner.

As of the end of 2022, the Castle Rock Water and Wastewater system consisted of: Active Water Mains: 485.65 miles; potable 439 miles; almost 70 miles raw/reuse: (51/19) Active Hydrants: 4,720 Active Water Valves: 14,800 Active Gravity Sewer Mains: 314 miles Active Wastewater Manholes: 10,300

For Active water mains, the breakdown by period of install in shown in Table 1:

Year	LF	Miles	% of Total
Pre-1976	44666	8.46	1.93%
1976-1980	42115	7.98	1.82%
1981-1985	104764	19.84	4.52%
1986-1990	208023	39.40	8.97%
1991-1995	47873	9.07	2.06%
1996-2000	359308	68.05	15.49%
2001-2005	678630	128.53	29.26%
2006-2010	219220	41.52	9.45%
2011-2015	129077	24.45	5.57%
2016-2020	415313	78.66	17.91%
2021-2022	70038	13.26	3.02%
Total	2319027	439.21	100%

<u>Table 1</u> <u>Installation Period for Active Potable Water Mains</u>

Selection and prioritization of capital projects is updated each year as part of the budget process. Every five years, the Water and Wastewater Master Plans are revised. To support both these processes, a detailed, objective evaluation process has been developed by which water system potable mains and sewer mains with install dates prior to 1976 have been analyzed and rated. Potable water mains are evaluated based on age, material, size and history of main breaks. Sanitary sewer assets are likewise evaluated based on age, pipe material and structural condition as determined by Castle Rock Water's comprehensive video inspection program. The evaluation process and criteria used are described in the following sections.

Long term, Castle Rock Water's replacement goals are to budget annually for approximately 2% of asset valuation towards rehabilitation and replacement in accordance with generally recognized benchmark replacement rates for utilities. In the nearer term, a lesser renewal rate may be more reasonable since the CRW system is a fairly young system (over 65% of potable mains have been installed since 2001). It was essential from a long-term financial management perspective to start planning for major infrastructure replacement so that the impacts to rates and fees could be adequately captured in the annual budget and the rates and fees processes. For the planning years of 2023-2032, the water rehab budget is \$13,392,451 and the wastewater rehab budget is \$26,050,000.

#### 2.0 PURPOSE

The purpose of the Rehabilitation and Replacement Capital Plan (RRCP) is to begin to identify, prioritize and schedule water and wastewater infrastructure rehabilitation and replacement projects for a 10-year planning period for the budget years 2023 through 2032. Ideally, the plan will be revisited every five years or so to ensure continuity of planning and budgeting for the follow-on years.

The RRCP complements the accuracy and effectiveness of budgeting and cash flow analysis and enables Castle Rock Water to schedule expenditures and determine appropriate levels of capital funding. It provides for long range planning of rates and fee revenues and thus minimizes the potential for large fluctuations in rates. The program further allows for planning and scheduling system replacements and rehabilitations on a consistent and level basis to match proposed revenues, and to plan for rehabilitation and replacement with due consideration and coordinated efforts given to planned street and road improvement projects. The RRCP adds transparency to the planning process so that the process can be more readily understood, and adds structure to the process so future personnel can ensure the program legacy.

The capital expenditure plan allows Castle Rock Water to be proactive rather than reactive when dealing with asset replacement and rehabilitation needs. System modifications are prioritized so the infrastructure most in need of repair are replaced or rehabilitated in a timely manner. This allows for minimizing operation and repair expenses by avoiding costly unscheduled repair, replacement, and rehabilitation of deteriorating infrastructure. Most importantly, an aggressive capital rehabilitation and replacement program helps avoid system deterioration and disruption and potential safety, health and property damage impacts.

In summary, the Rehabilitation and Replacement Capital Plan has been prepared to increase the accuracy and reliability of budgetary and long-range financial analysis, to improve short- and long-term infrastructure and maintenance planning, and to be protective of the health and safety of the Castle Rock community.

# 3.0 FINANCIAL

The 2023-2032 Rehab Capital Plan proposes expenditure of \$13,392,451 in water, and \$26,050,000 in wastewater during the ten-year period. The 2023-2032 capital plan's projected expenditures in water replacement are reduced until 2029 due to the need to fund the SCADA Master Plan projects; after 2029 annual expenditures for waterline rehab and replacement are slated to increase to \$2,000,000 per year. Water infrastructure replacement projects account for 33 percent of the total proposed expenditures for the ten-year period while wastewater rehabilitation expenses account for roughly 67 percent. The wastewater fund was less affected by the SCADA master plan costs, so the target budget for wastewater rehab is almost \$2.4 million per year.

#### <u>4.0 RELATIVE RISK RATING PROCESS FOR WATER AND SEWER MAIN</u> <u>REHABILITATION AND REPLACEMENT PROJECTS</u>

# Water Mains Rating Process

For the 2023 – 2032Rehab and Replacement Capital Plan, a relative risk rating process was developed to prioritize the replacement of water and sewer mains over the ten-year planning horizon. This process expanded upon the previously subjective rating process, that typically only looked at the history of breaks and age, to include a more comprehensive assessment of all pre-1976 utility-owned water and sewer mains that incorporates a wider range of factors. While the process used for this evaluation could have been applied to the entire water network, over

485 miles of transmission and distribution piping, the dataset would have been very large. The decision was made to focus on older pipe reaching the projected end of its useful life for this initial plan.

Additionally, this new process provides for a broader evaluation of water mains in that multiple segments of pipe located along the same street are grouped together and evaluated as one project. This new comprehensive evaluation groups several co-located priority segments into projects and recommends replacement on a more aggressive schedule.

# Likelihood of Failure and Baseline Pipe Rating

To begin with, a baseline pipe rating for likelihood of failure (LOF) was calculated for all pre-1976 water pipe (potable and raw) using the known pipe characteristics of age and material, according to the following table. In the GIS data, if the pipe material is unknown, the default is PVC. Much time was spent in reviewing data to adjust default data, particularly if an area or neighborhood was known to be DI or CIP pipe based on age or field knowledge.

Age of pipe	The current year (2023) minus the installation year of the segment, to produce an age accurate to the year
Material of pipe	<ul> <li>Each type of pipe is assigned a number of points related to likelihood of failure with a higher number meaning it is more likely for that pipe material to fail: <ul> <li>cast iron (CIP) – 75 points</li> <li>ductile iron (DI) – 60 points</li> <li>asbestos-cement (ACP) – 100 points (higher total points because we want to eliminate all AC pipe)</li> <li>polyvinyl chloride (PVC) – 50 points</li> <li>steel – 60 points</li> <li>Unknown – 75 (consider same as CIP); this may change if asbuilt data could conclude it should be same type as adjacent pipe</li> </ul> </li> </ul>
Size of Pipe Factor**	• 6 inch diameter or smaller: add 25 points to type of pipe

\*\*Size of Pipe Factor: CRW is trying to eliminate all 6 inch distribution pipe, excluding hydrant laterals, particularly in residential neighborhoods, so a higher priority is placed on replacing that size pipe; if a pipe is 6 inch or smaller, add 25 points to the LOF Baseline Pipe Rating of the pipe.

# The equation for the baseline pipe rating is: Baseline Pipe Rating = ((age of pipe) x 3.0) + (pipe material factor) + (size of pipe factor)

Two additional factors, **Failure Weight and Consequence of Failure-Size**, are then added into the Baseline Pipe Rating equation to determine the Total Pipe Rating for each segment of water main.

Failure Weight: a modifier to the pipe rating if pipe has a history of failure. The GIS group maintains a layer in the mapping data that shows where a pipe failure has occurred. This failure weight requires that each pipe segment be reviewed against the pipe failure layer to determine if Yes or No applies.

History of Breaks?	Failure Weight
No	0
Yes	20

#### Failure Weight

For the development of the Failure Weight, the equation was created to because field experience indicates pipes have a greater risk of incurring multiple failures once the first failure is experienced. Few individual pipe segments in the system have more than two failures, but when water mains are evaluated more broadly it is not that uncommon to see more than three failures on some longer runs of water main (consisting of multiple pipe segments in the same local area).

#### Consequence of Failure-Size (COF-S)

The consequence of failure – size is a rating based on the size of the pipe, that takes into account that smaller pipes can be repaired more quickly, usually with CRW maintenance staff, and that larger pipe may require outside resources, will usually have more significant impact to the utility and/or customers, and have higher potential for significant property damage.

COF-S	Size of Pipe, inches	COF-S
	< 12"	10
	>=12 and < 16	30
	>=16 and < 20	50
	>=20 and < 24	70
	>=24	90

**Example**: 6-inch cast iron pipe, installed 1962, history of 2 breaks

Baseline pipe rating = 3\*(age=60) + Material factor (75) (cast iron) + Size factor (25) (old 6" pipe) = 3\*60 (age)+75 (CIP) + 25 (6 in) = 180+75+25 = 280

Failure Weight = 20 because the pipe has a history of breaks

Consequent of Failure based on Size (COF-S) = 10 (6" pipe, easily repaired)

#### **Total Pipe Rating:**

The equation for the Total Pipe Rating is calculated as:

Total Pipe Rating = (Baseline Pipe Rating) + (Failure Weight) + (CoF Size)

Baseline Pipe Rating =  $60(Age) \times 3.0 + 75 + 25 = 280$ 

Failure Weight = 20 CoF-Size = 10 (again, only 6" pipe)

*Total points* = 280 + 20 + 10 = 310 *points* 

Using the Total Pipe Rating calculations, a score was developed for all active pre-1976 water mains in the distribution system. The scored mains were then grouped into projects based upon their location (i.e. all segments contiguous or in the same street or general location became one project) **and projects ranked according** to the highest average Total Pipe Rating of those pipe segments in a project area. That list became the starting point for the prioritization of the replacement and rehabilitation projects that made sense based on location. Pipes with a lower score but contiguous may be included in a project if logically it makes sense to include. Project size and timing may be subject to annual budget limitations, especially from 2023 to 2028 when Water rehab funding is partially obligated to the SCADA master plan projects. Actual project priority may not strictly follow the pipe rating score and/or project ranking, but the ranking can be a starting point.

Thirteen projects have been identified for the initial 10-year rehab plan. Projects vary in size, so multiple smaller projects may be completed in any one year if the budget allows. The projects should be closely coordinated with the Public Works Department and Development Services in order to consider the potential for Pavement Maintenance Program (PMP) funds to help offset the costs of street rehabilitation, and ensure that PMP projects or developer projects follow, not precede, rehab projects. For example, the Fifth Street Water project (4-inch cast iron pipe) is a high priority, but given its downtown location, should be completed if and when other improvements, particularly pavement rehab, are planned, unless a failure forces an unplanned replacement. Consider also the Fair Street Alley project; which is in an area very likely for redevelopment. Given that the sewer is also a high priority in this alley, the replacement of water and sewer here should precede any major redevelopment projects.

The priority pipes have been grouped into projects primarily based on proximity to each other. Larger areas like Young American have been split into phases to make more manageable project sizes that can be accommodated by an expected annual budget of about \$2.4 Million. In actuality, projects may move up or down on the replacement schedule to obtain budget and/or construction efficiencies.

With the evaluation spreadsheet, pipes can be moved from one project into another and the average score, cost estimate and priority ranking reevaluated. This can be done to increase or decrease a project area, to facilitate construction, or to manage project costs. For example, the large Young American area with a total project cost estimate of \$5.72 Million, was a prime project area to make into three smaller water projects, so that in addition to the Young American Phase 2, there could be a Phase 3.

#### Water Projects Preliminary Budget Estimates

The 2023-2032 Rehab Plan identifies 13 water main replacement projects between 2023 and 2032. Not included in these projects is the Prestwick Way Waterline Replacement Project that is already planned for 2023 construction. These 13 projects total almost 29,000 feet of pipe, and over 23,000 feet of old cast iron pipe. The present-day replacement cost of the projects is almost \$14 Million including engineering and contingencies. Rough project cost estimates are based on \$15 per inch of diameter of replacement pipe (8 inch diameter to replace all current 4, 6, and 8 inch pipe; if existing is greater than 8 inch, then replacement is same size as existing), times the length of pipe, and then times 4 (pipe cost is estimated to be 25% of total project cost). Project cost estimates are rough and should be reevaluated every few years or as projects move towards design. Smaller projects may be candidates to be combined into larger projects to gain economies of scale during bidding. Larger project areas, such as the Young American area, have been evaluated as several smaller projects in order to fit annual budgets without too much impact to rates.

Project Name	Score	Priority	Linear Ft	Cost Est
Castle Rock Heights Water	298	1	2902	\$ 1,392,930
Fifth St Water	296	2	287	\$ 137,760
Wilcox St Water	296	3	365	\$ 175,217
Young Am Water Phase 1	284	4	1534	\$ 736,405
Kinner St Local Water	280	5	2176	\$ 1,044,580
Rock St Water	274	6	2493	\$ 1,196,797
Fair St Alley	270	7	927	\$ 444,836
DC High School	265	8	1877	\$ 900,756
Young American Phase 2	257	9	5414	\$ 2,598,617
Young American Phase 3	253	10	4966	\$ 2,383,747
South St Water	247	11	3577	\$ 1,674,693
Tank 3 Blue	244	12	2351	\$ 1,190,481
Bishop Ct Water	235	13	164	\$ 78,634
		Total	29,033	\$ 13,955,454

<u>Table 2</u> <u>Water Projects with Score, Priority and Cost Estimates</u>

Figure 1 shows the identified water rehab projects for the 10-year planning period. Individual water project maps are found in Appendix A.



# 5.0 RELATIVE RISK RATING PROCESS FOR SEWER MAINS

Sanitary sewer pipelines are rated during routine, preventive television inspections and given a pipe score based on structural defects and a separate score based on operation and maintenance defects identified from CCTV inspection and based on standard NASSCO PACP methodology. NASSCO has developed some guidelines for using PACP software to assist in the asset management process. Castle Rock Water uses NASSCO compatible and certified software, GraniteNet, that can generate pipe scores based on defects identified during CCTV inspections. Pipelines deemed to be at risk of failure or stoppage despite increased preventive maintenance, or identified as a source of infiltration or exfiltration, are scheduled for rehabilitation or replacement. Some pipelines that are damaged yet can continue to provide reliable service with increased preventive maintenance are scheduled for rehabilitation or replacement in later years based on the extent of damage and potential for failure. As with the waterline rehab program, projects are also prioritized if they fall within a major roadway project and warrant point repairs or replacement over insitu rehab methods, such as CIPP lining.

#### Description of PACP Based Risk Management

In response to needs by utilities to develop a methodology to manage assets in a risk based and fact based manner, NASSCO developed a risk based methodology that is compatible with the size and resources of many individual utilities; the methodology uses PACP (Pipeline Assessment Certification Program) data along with general knowledge of the utility to provide a basis for rehab and replacement planning. Castle Rock Water has used NASSCO certified PACP inspection software since 2013. In recent years, emphasis in the annual CCTV effort has been to inspect pipes that had never had a routine scheduled inspection. Additionally, when there are major CIP or PMP projects identified, CRW attempts to video sewer pipes in the affected area in advance of construction in case there are repairs that need to be made. CRW has also partnered with development to cost share in the replacement of water and sewer infrastructure to take advantage of the economies of having a contractor on hand and already working in the project area. An example was the replacement of 15-inch VCP sewer pipe and manholes at the Oakwood Senior Living project in 2021-2022. Replacement and realignment provided for better access for maintenance (the original sewer pipe was only in a 10 foot easement and would be very close to a new building) and replaced old VCP pipe with new PVC pipe.

The basic tenant of an asset management program is to be proactive and not reactive. A utility can wait for a pipe to fail, and deal with the social, environmental and economic costs of a failure, or try to be proactive and rehab or replace before a failure can occur. Unfortunately, utilities have limited human and capital resources, which necessitates having a plan that is based on priorities and funding levels, and managing risk. Risk takes into account an asset's physical condition, as well as the impact that its failure would have on system performance and stakeholders. Mathematically, the risk from an occurrence may be expressed as the product of likelihood of failure and consequence of failure; the challenge for utilities is how to best determine and categorize risk with the data available. Data refinement may be achieved with more intensive efforts focused on data collection, but comes with additional costs and time, and requires dedicated human resources. In the future, there may be additional factors to consider in scoring pipe (depth? environmental factors such as proximity to creeks or under major highways), but currently the depth data is lacking on older water and sewer pipe and developing environmental data is considered too time consuming with little value added for the

current effort.

Pipe Score = Likelihood of Failure (LOF) + Consequence of Failure (COF)

# Likelihood of Failure - LOF

Likelihood of failure refers to a calculated number that denotes the probability of failure based on an asset's physical condition. For sewer pipe, the physical condition is typically determined by non-invasive CCTV inspection. PACP software can generate various pipe scores. The scoring methodology recommended by NASSCO, and incorporated by CRW, **is to use the PACP Quick Rating structural score** since its derivation is based upon the highest rating scores and is not adversely skewed by the presence of multiple low condition grade scores. The O&M (operation and maintenance) score is not used because O&M defects should be addressable by maintenance, and once addressed the defect is corrected. Structural defects can typically only get worse over time unless addressed by rehab or replacement.

Note: a problem with using the structural score is that it relies on CCTV operators due diligence in coding structural defects, coding them fairly accurately, and not just relying on getting a video of the pipe. There are too many sewer pipes to expect that all will be reviewed separately by engineering staff. Major defects that are discovered during CCTV operations need to be elevated for further investigation, immediate correction, or focused follow-up. The pipe scoring system relies on the expertise of the collections staff to identify and actually code defects, and to do so accurately.

There is a standard report in CUES for the quick structural score; the report can be generated for individual sewer pipes, or for each pipe in a CCTV project area. See note above. It may be that pipes of concern, or project areas of interest, are given priority for additional focused CCTV inspection, either with CRW staff or contractors, with the intent of scoring the pipe for more comprehensive evaluation and rating.

As asset's likelihood of failure (LOF) is determined by dividing the four digit structural score of the PACP quick rating by 100. The overall pipe score is generated by adding that number, the LOF, to the sum of the individual COF factors to get an overall pipe score.

# **Consequence of Failure - COF**

The consequence of failure is the combination of direct and indirect impact on the community due to a potential asset failure. Consequence of failure can be viewed, and somewhat rated, in terms of the social, economic and environmental costs of an asset failure. Economic factors include property damage, repair cost and production loss, as examples. Direct consequences of failures include costs for repairs, legal fees and fines. Indirect costs may include costs for environmental restoration and loss of business revenue, and maybe even the credibility of the utility. Social consequences of a failure represent the impact on the community and warrants consideration of the type and number of affected properties, such as hospitals, schools, or critical services. Environmental consequences of a failure should consider the impact to ecological resources, such as rivers and streams that are often sources of water for downstream users. For this initial effort, consequence of failure is based on size, material and age.

# Rating Methodology for COF:

Consequence of failure is determined by considering the material and physical characteristics, location and demographics of an asset. These considerations should be broken into separate scoring parameters using a similar scoring system as was done to compute LOF.

## COF-S based on Size (COF-S)

In general, large diameter pipes are located at the downstream portion of a collection system while small diameter pipes are located upstream. Small diameter pipes often serve small areas, and smaller diameter pipes are more easily repaired. Larger diameter pipe generally cost more to repair, replace or rehabilitate, require significant sewer bypass to repair/replace, may require night work when flows are low, serve more customers, and can have catastrophic environmental impact. The following table shows the scoring system for consequence of failure based on size of pipe.

Diameter	COF-S factor
No Data/ <8*	20*
=8"	10
>8" - < 15"	20
>=15 - < 21"	40
>= 21" - < 30"	60
>=30"	80

\*Note: Sewer pipe that is less than 8 inch in diameter is scored higher because it is more difficult to maintain.

# **Consequence of Failure-Material (COF-M)**

The consequence of failure based on material of pipe is based on the fact that older sewer pipe in the system is most likely VCP (vitreous clay pipe) or maybe even concrete pipe, while new sewer pipe is almost exclusively PVC (polyvinyl chloride). Indirectly, pipe material is also a reflection of the age of the pipe. The following table shows the scoring system for consequence of failure based on the material of the pipe.

Pipe Material	COF-M factor
VCP	30
Concrete	40
DIP	50
PVC	10
CIPP	20
Other/Unknown	30

# Consequence of Failure-Age (COF-A)

The consequence of failure based on pipe age will include a factor to help prioritize the replacement of older sewer pipe. For example, there is old, clay sewer pipe in the downtown area of Castle Rock that is approaching 100 years of service, but also areas with PVC pipe that are approaching 50 years of service. The following table shows the scoring system for consequence of failure for pipe based on the age of the pipe.

Pipe Age	COF-A factor
0-40 years	10
40-50 years	20
50-60 years	30
60-70 years	50
>=70, Unknown	70

Note: If pipe age is unknown, it will be assumed to be greater than 70 years old.

# Sewer Example:

# Calculation of Overall Score -

Overall Score = LOF (Structural Score/100) + COF-S + COF-M + COF-A

Example: Sewer Pipe SS356 (Brisco Fair Street Alley), installed 1932, 8 inch VCP, with a structural score from Granite CCTV of 5243.

LOF - 5243/100 = 52 COF-S = 10 (8 inch pipe) COF-M = 30 (VCP pipe), not lined COF-A = 70 (91 years old) Overall Score = 52+10+30+70=162

# Sewer Projects Preliminary Budget Estimates

Sewer project costs were estimated in the same way as the water projects. Rough project cost estimates are based on \$15 per inch of diameter of replacement pipe (8 inch diameter to replace all current 4, 6, and 8 inch pipe; if existing is greater than 8 inch, then replacement is same size as existing), times the length of pipe, and then times 4 (pipe cost is estimated to be 25% of total project cost). Project cost estimates are rough and should be reevaluated every few years or as projects move towards design. Smaller projects may be candidates to be combined into larger projects to gain economies of scale during bidding. Since water rehab projects may overlap the sewer rehab projects, planning should evaluate water and sewer rehab projects in the same time period, and not strictly follow the ranked project priority. Fourteen projects have been identified, based on proximity, project score and size. Note that the Pre-1936 sewer pipe are mostly in the downtown area and due to traffic constraints, may best be addressed more individually than as a larger overall project; and certainly should be addressed with any redevelopment efforts.

	Project	Project	Linear	Project Est
Project Name	Score	Priority	Feet	Costs
I25 Siphon at Wilcox	141	1	313	\$ 150,240
Front St Sewer under RR	120	2	255	\$ 122,366
Pre 1936 sewer pipe	123	3	9999	\$ 4,799,304
Brisco Fair St Alley	103	4	1339	\$ 642,720
Wolfensberger Rd Local Sewer	80	5	273	\$ 131,040
Bishop Court	76	6	271	\$ 130,214
Rock St Sewer	75	7	1248	\$ 599,208
Kinner St Local Sewer	72	8	2375	\$ 1,140,096
South St Sewer Ph2	70	9	1347	\$ 646,560
South St Sewer Ph1	67	10	1583	\$ 759,754
Young American Ph 2	60	11	4017	\$ 1,927,946
Future Castle Rock Heights	60	12	2934	\$ 1,408,512
Young American Ph 1	55	13	6245	\$ 2,997,720
South St Sewer Ph3	51	14	1406	\$ 675,106

<u>*Table 3</u> Sewer Projects with Score, Priority and Cost Estimate:</u>* 

# <u>TOTAL</u>

<u>33,606 LF \$16,130,786</u>

Figure 2 shows the overall sewer rehab projects that have been identified for the 10-year planning period. Individual sewer project maps are in Appendix B.





CASTLE ROCK WATER

SEWER REHAB PROJECTS

Date: 6/1/2023

# 6.0 Discussion of Rehab Capital Plan Elements

The revised facility rehabilitation and replacement evaluation process has resulted in the addition and rescheduling of several capital projects from the previous ten-year capital plan. These annual fluctuations in project scheduling are likely to be the norm in the future as the timing, type and number of water and sewer main failures, and the criticality of each asset determine the priority for rehabilitation and replacement. Those pipelines that provide critical service and exhibit continuing deterioration will be prioritized while the pipelines that have a lower level of impact on service levels and do not show advanced deterioration will be deprioritized for rehabilitation/replacement.

The Rehab and Replacement Capital Plan has been divided into water infrastructure rehabilitation and replacement and sanitary sewer rehabilitation and replacement. The schedule for water projects is based on the criticality, consequence of failure and current condition of each asset as explained in the criteria for replacement of assets section of this report. No infrastructure in the replacement/rehabilitation schedule require expanded capacity to serve new development. Projects that require expanded capacity are identified separately in the respective (water or sewer) CIP Master Plan.

The proposed 10-year water and sewer rehab budget is shown in the following table. The water budget falls about \$500,000 below project cost estimates, while the sewer budget currently exceeds project cost estimates.

#### **Future Efforts**

In the near term, staff will begin to review raw and reuse water mains in order to develop a rehabilitation plan for those assets. The review will focus only on the mains, not on the wells or the physical well facilities. The rating of the raw and reuse water pipes will be very similar to rating process described earlier for potable water mains.

Future revisions to the rating process could attempt to add a rating for proximity to environmental features (creeks, endangered mouse habitat), criticality for health and emergency response (hospitals, fire stations, critical facilities), and public impact (serves a multi-tenant apartment or senior living facility, major employer, dialysis facility, etc.). Especially for sewer, a rating related to the depth of pipe could be added. For this effort, depth was ignored because of a lack of reliable data for the older sewer pipe.

Preliminary cost estimates should be reviewed and revised, perhaps every 1-2 years as part of the annual CIP budget preparation.

Potential projects should be reviewed with other departments to ensure smart planning, especially with respect to the pavement maintenance program projects and development projects. This is especially important in the downtown Castle Rock where historical sewer mains remain.

#### 7.0 Capital Rehabilitation Budget

The following table shows the proposed capital rehab budget for both water and sewer funds for the years 2023-2032, per the approved 2023 budget and the proposed 2024 Capital Improvement Project (CIP) budget.

# Table 4

# SUMMARY OF PROPOSED CAPITAL REHAB BUDGET FOR THE PERIOD 2023 - 2032

Year	Water	Sewer	Totals
2023	\$1,392,451	\$4,450,000	\$5,842,451
2024	\$1,000,000	\$2,400,000	\$3,400,000
2025	\$1,000,000	\$2,400,000	\$3,400,000
2026	\$2,000,000	\$2,400,000	\$4,400,000
2027		\$2,400,000	\$2,400,000
2028		\$2,400,000	\$2,400,000
2029	\$2,000,000	\$2,400,000	\$4,400,000
2030	\$2,000,000	\$2,400,000	\$4,400,000
2031	\$2,000,000	\$2,400,000	\$4,400,000
2032	\$2,000,000	\$2,400,000	\$4,400,000
	#12 202 4 <b>5</b> 1		
TOTALS	\$13,392,451	\$26,050,000	\$39,442,551

Appendix A – Water Projects Maps



























Appendix B – Water Projects Scoring Spreadsheet

									COF-S			Replace		History	Ave pipe	Project	total linear	Gros	ss Cost Est =	Proj	ect Cost Est
		Material	Install	Age	Age	As_Built_L			Size	Failure Wt		ment		of	score for	score	feet for	\$2	15*( 8 in-	(pipe	cost is 25%
FacilityID	Material	Score	Year	years	score	ength	Diameter	<mark>&lt;6in? +25</mark>	Score	Score	Pipe Score	Size	Project name	Breaks	project	ranking	project	d	lia)*LF*4	of	total est)
WPM2613	PVC	50	1972	50	150	163.82	4	25	10	0	235	8	Bishop Ct Water		235	13	164	\$	78,634	\$	78,634
WPM4966	CIP	75	1960	62	186	598.16	4	25	10	0	296	8	Castle Rock Heights		298	1	2902	\$	287,117	\$	1,392,930
WPM6203	CIP	75	1960	62	186	319.64	6	25	10	0	296	8	Castle Rock Heights					\$	153,426		
WPM770	CIP	75	1960	62	186	224.04	4	25	10	0	296	8	Castle Rock Heights					\$	107,540		
WPM110	CIP	75	1960	62	186	151.75	6	25	10	0	296	8	Castle Rock Heights					\$	72,839		
WPM5993	CIP	75	1960	62	186	24.17	6	25	10	0	296	8	Castle Rock Heights					\$	11,603		
WPM6370	CIP	75	1960	62	186	785.13	6	25	10	0	296	8	Castle Rock Heights					\$	376,864		
WPM6204	CIP	75	1960	62	186	264.2	6	25	10	0	296	8	Castle Rock Heights					\$	126,817		
WPM3434	CIP	75	1960	62	186	230.84	6	25	10	0	296	8	Castle Rock Heights					Ş	110,802		
WPM3714	CIP	75	1960	62	186	304.01	6	25	10	20	316	8	Castle Rock Heights	yes				Ş	145,923		
WPM5899	DI	60	1960	62	186	25.53	6	25	10	0	281	8	DC High School		265	8	1877	Ş	12,256	Ş	900,756
WPM5992	DI	60	1960	62	186	252.84	6	25	10	0	281	8	DC High School					Ş	121,364		
WPM452	DI	60	1960	62	186	341.73	6	25	10	0	281	8	DC High School					\$	164,031		
WPM5890	DI	60	1960	62	186	357	8	0	10	0	256	8	DC High School					\$	171,231		
WPM2520	DI	60	1960	62	186	845.78	8	0	10	0	256	8	DC High School					\$	405,973		
WPM450	PVC	50	1960	62	186	34.56	8	0	10	0	246	8	DC High School					\$	16,588		
WPM5892	DI	60	1960	62	186	19.4	8	0	10	0	256	8	DC High School					\$	9,313	-	
WPM5889	CIP	75	1965	57	171	633.73	6	25	10	20	301	8	Fair St Alley	yes	270	7	927	Ş	303,658	Ş	444,836
WPM789	CIP	/5	1989	33	99	139	6	25	10	0	209	8	Fair St Alley					Ş	66,720		
WPM/90	CIP	/5	1965	57	1/1	151.56	6	25	10	20	301	8	Fair St Alley	yes	200	2	207	Ş	/4,458	ć	407 700
	CIP	75	1960	62	180	287	4	25	10	0	296	8	Fifth St Water		296	2	287	Ş	137,760	ې د	137,760
W/DM6122		75	1909	52	159	500.25	6	25	10		209		Kinner St Local Water		200		2170	ې د	28 048	Ş	1,044,560
WPM6128		75	1969	53	150	03.45	6	25	10		205	8	Kinner St Local Water					ې د	20,040 //5 096		
WPM6125		75	1960	62	186	58	6	25	10		205	8	Kinner St Local Water					4	27 8/10		
WPM2888	CIP	75	1960	62	186	145	6	25	10	0	296	8	Kinner St Local Water					s S	69 600		
WPM2884	CIP	75	1960	62	186	275	6	25	10	0	296	8	Kinner St Local Water					Ś	132 000		
WPM2885	CIP	75	1969	53	159	389.49	6	25	10	0	269	8	Kinner St Local Water					Ś	186 953		
WPM337	CIP	75	1969	53	159	301 56	6	25	10	0	269	8	Kinner St Local Water					Ś	131 590		
WPM6124	CIP	75	1960	62	186	33.48	6	25	10	0	296	8	Kinner St Local Water					Ś	16.071		
WPM2873	PVC	50	1960	62	186	460.46	6	25	10	0	271	8	Kinner St Local Water					Ś	221.021		
WPM414	PVC	50	1960	62	186	93.55	6	25	10	0	271	8	Rock St Water		274	6	2493	\$	44,906	\$	1,196,797
WPM418	PVC	50	1960	62	186	44.47	6	25	10	0	271	8	Rock St Water					\$	21,347		
WPM4587	CIP	75	1969	53	159	410.23	6	25	10	0	269	8	Rock St Water					\$	196,910		
WPM412	CIP	75	1969	53	159	140.26	6	25	10	0	269	8	Rock St Water					\$	67,325		
WPM413	CIP	75	1969	53	159	152.36	6	25	10	0	269	8	Rock St Water					\$	73,133		
WPM416	CIP	75	1966	56	168	140	6	25	10	0	278	8	Rock St Water					\$	67,200		
WPM417	CIP	75	1966	56	168	215	6	25	10	0	278	8	Rock St Water					\$	103,200		
WPM1544	CIP	75	1966	56	168	604	6	25	10	0	278	8	Rock St Water					\$	289,920		
WPM2464	CIP	75	1966	56	168	264.39	6	25	10	20	298	8	Rock St Water	yes				\$	126,907		
WPM2949	CIP	75	1966	56	168	25	6	25	10	0	278	8	Rock St Water					\$	12,000		
WPM2951	CIP	75	1969	53	159	86.98	6	25	10	0	269	8	Rock St Water					\$	41,750		
WPM2952	CIP	75	1969	53	159	96.08	6	25	10	0	269	8	Rock St Water					\$	46,118		
WPM2953	CIP	75	1969	53	159	186.46	6	25	10	20	289	8	Rock St Water	yes				\$	89,501		

									COF-S			Replace	lace		History Ave pipe		total linear Gross Cost Est =		Project Cost Est	
		Material	Install	Age	Age	As_Built_L			Size	Failure Wt		ment		of	score for	score	feet for	\$1	15*( 8 in-	(pipe cost is 25%
FacilityID	Material	Score	Year	years	score	ength	Diameter	<6in? +25	Score	Score	Pipe Score	Size	Project name	Breaks	project	ranking	project	d	ia)*LF*4	of total est)
WPM2465	CIP	75	1966	56	168	22.54	6	25	10	0	278	8	Rock St Water					\$	10,819	
WPM2466	CIP	75	1966	56	168	12	8	0	10	0	253	8	Rock St Water					\$	5,760	
WPM5352	CIP	75	1975	47	141	150.92	6	25	10	20	271	8	South St Water	yes	247	11	3577	\$	72,443	\$ 1,674,693
WPM5642	CIP	75	1975	47	141	359.65	6	25	10	0	251	8	South St Water					\$	172,630	
WPM6176	CIP	75	1975	47	141	370.8	6	25	10	0	251	8	South St Water					\$	177,985	
WPM2118	DI	60	1987	35	105	62	6	25	10	0	200	8	South St Water					\$	29,760	
WPM2119	DI	60	1987	35	105	105	6	25	10	0	200	8	South St Water					\$	50,400	
WPM5640	CIP	75	1975	47	141	313.93	6	25	10	0	251	8	South St Water					\$	150,687	
WPM5643	CIP	75	1975	47	141	69.3	6	25	10	0	251	8	South St Water					\$	33,266	
WPM6202	CIP	75	1975	47	141	391.61	6	25	10	0	251	8	South St Water					\$	187,973	
WPM6208	CIP	75	1975	47	141	664.8	6	25	10	20	271	8	South St Water	yes				\$	319,105	
WPM127	CIP	75	1975	47	141	614.62	6	25	10	0	251	8	South St Water					\$	295,642	
WPM4951	CIP	75	1976	46	138	385	6	25	10	20	268	8	South St Water	yes				\$	184,800	
WPM1549	Di	60	1969	53	159	96.86	6	25	10	0	254	8	Tank 3 Blue		244	12	2351	\$	46,491	\$ 1,190,481
WPM1560	DI	60	1969	53	159	820.72	6	25	10	0	254	8	Tank 3 Blue					\$	393,945	
WPM1487	PVC	50	1969	53	159	366.0	6	25	10	0	244	8	Tank 3 Blue					\$	175,694	
WPM1548	DI	60	1969	53	159	68.2	6	25	10	0	254	8	Tank 3 Blue					\$	32,748	
WPM1549	DI	60	1969	53	159	96.9	6	25	10	0	254	8	Tank 3 Blue					\$	46,491	
WPM1550	DI	60	1969	53	159	178.3	10	0	10	0	229	10	Tank 3 Blue					\$	106,959	
WPM1551	DI	60	1969	53	159	16.7	10	0	10	0	229	10	Tank 3 Blue					\$	10,020	
WPM1552	DI	60	1969	53	159	21.3	8	0	10	0	229	8	Tank 3 Blue					\$	10,210	
WPM1553	DI	60	1969	53	159	17.4	8	0	10	0	229	8	Tank 3 Blue					\$	8,361	
WPM1555	DI	60	1969	53	159	7.7	6	25	10	0	254	8	Tank 3 Blue					\$	3,707	
WPM1562	DI	60	1969	53	159	41.5	8	0	10	0	229	8	Tank 3 Blue					\$	19,908	
WPM1563	DI	60	1969	53	159	30.2	6	25	10	0	254	8	Tank 3 Blue					\$	14,498	
WPM1565	DI	60	1969	53	159	77.4	6	25	10	0	254	8	Tank 3 Blue					\$	37,137	
WPM4038	DI	60	1969	53	159	24.5	6	25	10	0	254	8	Tank 3 Blue					\$	11,772	
WPM4895	DI	60	1969	53	159	166.2	6	25	10	0	254	8	Tank 3 Blue					\$	79,767	
WPM5212	DI	60	1969	53	159	143.0	10	0	10	0	229	10	Tank 3 Blue					\$	85,815	
WPM1550	PVC	50	1960	62	186	177.79	10	0	10	0	246	10	Tank 3 Blue					\$	106,959	
WPM4592	CIP	75	1960	62	186	365.04	4	25	10	0	296	8	Wilcox St Water		296	3	365	Ş	175,217	\$ 175,217
WPM5201	CIP	75	1971	51	153	184	6	25	10	0	263	8	Young Am Water Phase 1		284	4	1534	Ş	88,320	\$ 736,405
WPM5202	CIP	/5	19/1	51	153	//.92/65	4	25	10	0	263	8	Young Am Water Phase 1					Ş	37,405	
WPM8/9/	CIP	/5	19/1	51	153	122.8681	4	25	10	0	263	8	Young Am Water Phase 1					Ş	58,977	
WPM423	CIP	75	1971	51	153	182.11	6	25	10	0	263	8	Young Am Water Phase 1					Ş	87,411	
WPM5354	CIP	75	1960	62	186	75.03	4	25	10	0	296	8	Young Am Water Phase 1					Ş	36,016	
WPM5353	CIP	75	1960	62	186	355.39	6	25	10	0	296	8	Young Am Water Phase 1					Ş	170,585	
WPM124	CIP	75	1960	62	186	397.67	6	25	10	20	316	8	Young Am Water Phase 1	yes				Ş	190,881	
WPM422	CIP	75	1960	62	186	92.27	6	25	10	0	296	8	Young Am Water Phase 1					Ş	44,290	
WPM424	CIP	/5	1960	62	186	46.92	6	25	10	0	296	8	Young Am Water Phase 1		257		<b>F</b> ( 1 )	Ş	22,521	é <u> </u>
WPM5351	CIP	/5	1975	47	141	805.91	6	25	10	0	251	8	Young American Phase 2		257	9	5414	Ş	386,838	\$ 2,598,617
WPIM5638	CIP	/5	1975	4/	141	613.59	6	25	10	20	2/1	8	Young American Phase 2	yes				Ş	294,523	
WPM6207	CIP	/5	1975	47	141	190.11	6	25	10	0	251	8	Young American Phase 2					Ş	91,254	
WPM5637	CIP	/5	1975	47	141	236.58	6	25	10	0	251	8	Young American Phase 2					Ş	113,560	

									COF-S		Replace			History	Ave pipe	Project	total linear	Gross Cost Est	= Project Cost Est
		Material	Install	Age	Age	As_Built_L			Size	Failure Wt		ment		of	score for	score	feet for	\$15*( 8 in-	(pipe cost is 25%
FacilityID	Material	Score	Year	years	score	ength	Diameter	<6in? +25	Score	Score	Pipe Score	Size	Project name	Breaks	project	ranking	project	dia)*LF*4	of total est)
WPM3890	CIP	75	1975	47	141	129.58	4	25	10	0	251	8	Young American Phase 2					\$ 62,19	9
WPM6328	CIP	75	1975	47	141	227.03	6	25	10	20	271	8	Young American Phase 2	yes				\$ 108,97	3
WPM94	CIP	75	1975	47	141	439.99	6	25	10	0	251	8	Young American Phase 2					\$ 211,19	5
WPM303	CIP	75	1975	47	141	257.08	6	25	10	0	251	8	Young American Phase 2					\$ 123,39	Ð
WPM6206	CIP	75	1975	47	141	354.49	4	25	10	20	271	8	Young American Phase 2	yes				\$ 170,15	1
WPM6212	CIP	75	1975	47	141	289.43	6	25	10	0	251	8	Young American Phase 2					\$ 138,92	5
WPM6443	CIP	75	1975	47	141	406.51	6	25	10	20	271	8	Young American Phase 2	yes				\$ 195,12	5
WPM123	CIP	75	1975	47	141	368.89	6	25	10	20	271	8	Young American Phase 2	yes				\$ 177,06	Ð
WPM6399	CIP	75	1975	47	141	89.46	6	25	10	0	251	8	Young American Phase 2					\$ 42,94	3
WPM251	CIP	75	1975	47	141	634.56	6	25	10	0	251	8	Young American Phase 2					\$ 304,58	7
WPM763	CIP	75	1975	47	141	271.07	6	25	10	0	251	8	Young American Phase 2					\$ 130,11	1
WPM132	CIP	75	1975	47	141	99.5	6	25	10	0	251	8	Young American Phase 2					\$ 47,75	3
WPM5636	CIP	75	1975	47	141	7.49	6	25	10	0	251	8	Young American Phase 3		253	10	4966	\$ 3,59	5 \$ 2,383,747
WPM5639	CIP	75	1975	47	141	18.76	6	25	10	0	251	8	Young American Phase 3					\$ 9,00	2
WPM5641	CIP	75	1975	47	141	9.61	6	25	10	0	251	8	Young American Phase 3					\$ 4,61	1
WPM5664	CIP	75	1975	47	141	484.63	6	25	10	0	251	8	Young American Phase 3					\$ 232,62	3
WPM5665	CIP	75	1975	47	141	276.18	6	25	10	0	251	8	Young American Phase 3					\$ 132,56	3
WPM5666	CIP	75	1975	47	141	243.3	6	25	10	0	251	8	Young American Phase 3					\$ 116,78	5
WPM5673	CIP	75	1975	47	141	423.06	6	25	10	0	251	8	Young American Phase 3					\$ 203,06	7
WPM5674	CIP	75	1975	47	141	159.42	6	25	10	0	251	8	Young American Phase 3					\$ 76,52	1
WPM5675	CIP	75	1975	47	141	160.55	6	25	10	0	251	8	Young American Phase 3					\$ 77,06	5
WPM6201	CIP	75	1975	47	141	516.16	6	25	10	0	251	8	Young American Phase 3					\$ 247,75	1
WPM5663	CIP	75	1975	47	141	717.78	6	25	10	20	271	8	Young American Phase 3	yes				\$ 344,53	5
WPM321	CIP	75	1975	47	141	126.88	4	25	10	0	251	8	Young American Phase 3					\$ 60,90	1
WPM264	CIP	75	1975	47	141	318.28	6	25	10	0	251	8	Young American Phase 3					\$ 152,77	5
WPM431	CIP	75	1975	47	141	386	6	25	10	20	271	8	Young American Phase 3	yes				\$ 185,28	1
WPM5661	CIP	75	1975	47	141	223.25	6	25	10	0	251	8	Young American Phase 3					\$ 107,16	)
WPM93	CIP	75	1975	47	141	136.3	4	25	10	0	251	8	Young American Phase 3					\$ 65,42	1
WPM432	CIP	75	1975	47	141	451.6	6	25	10	0	251	8	Young American Phase 3					\$ 216,76	5
WPM91	CIP	75	1975	47	141	74.18	4	25	10	0	251	8	Young American Phase 3					\$ 35,60	5
WPM134	CIP	75	1975	47	141	118.74	4	25	10	0	251	8	Young American Phase 3					\$ 56,99	7
WPM5662	CIP	75	1975	47	141	113.98	6	25	10	0	251	8	Young American Phase 3					\$ 54,70	9
						23811.48													\$ 13,955,454

Appendix C – Sewer Projects Maps











CASTLE ROCK WATER

SEWER REHAB PROJECTS NORTH DOWNTOWN AREA

Date: 6/1/2023







Appendix D – Sewer Projects Scoring Spreadsheet

	CUES															
	Structural						As_Built_					Prj Ave		Priority of	Project	Project Cost
FacilityID	Score	LOF	Material	COF-M	Diameter	COF-S	Length	InstallYear	AGE, yrs	COF-A	Score	Score	Project Name	Project	length	Estimate
SS3588	#N/A	#N/A	PVC	10	8	10	41.34	1973	50	30	50	76	Bishop Court	6	271.28	\$ 130,214
SS4883	3122	31	VCP	30	8	10	229.94	1973	50	30	101		Bishop Court			
SS356	5243	52	VCP	30	8	10	365	1932	91	70	162	103	Brisco Fair St Alley	4	1339	\$ 642,720
SS2535	0000	0	VCP	30	8	10	20	1932	91	70	110		Brisco Fair St Alley			
SS2534	3400	34	VCP	30	8	10	90	1965	58	30	104		Brisco Fair St Alley			
SS2530	3227	32	VCP	30	8	10	357	1965	58	30	102		Brisco Fair St Alley			
SS2533	0000	0	VCP	30	8	10	195	1965	58	30	70		Brisco Fair St Alley			
SS7224	#N/A	#N/A	VCP	30	8	10	312	1965	58	30	70		Brisco Fair St Alley			
SS1713	#N/A	#N/A	VCP	30	10	20	254.93	1932	91	70	120	120	Front St Sewer under RR	2	254.93	\$ 122,366
SS2995	3100	31	CIPP	20	10	20	313	1932	91	70	141	141	I25 Siphon at Wilcox	1	313	\$ 150,240
SS2992	#N/A	#N/A	VCP	30	8	10	314	1969	54	30	70	72	Kinner St Local Sewer	8	2375.2	\$ 1,140,096
SS7471	#N/A	#N/A	VCP	30	6	20	325	1969	54	30	80		Kinner St Local Sewer			
SS7472	0000	0	VCP	30	6	20	325	1969	54	30	80		Kinner St Local Sewer			
SS7478	#N/A	#N/A	VCP	30	8	10	250	1969	54	30	70		Kinner St Local Sewer			
SS7479	#N/A	#N/A	VCP	30	8	10	250	1969	54	30	70		Kinner St Local Sewer			
SS3048	#N/A	#N/A	VCP	30	8	10	100	1969	54	30	70		Kinner St Local Sewer			
SS3049		0	VCP	30	8	10	246	1969	54	30	70		Kinner St Local Sewer			
SS7476	#N/A	#N/A	VCP	30	8	10	115.5	1969	54	30	70		Kinner St Local Sewer			
SS7477	#N/A	#N/A	VCP	30	8	10	204	1969	54	30	70		Kinner St Local Sewer			
SS6929	#N/A	#N/A	VCP	30	8	10	245.7	1969	54	30	70		Kinner St Local Sewer			
SS1581	5142	51	VCP	30	10	20	426.03	1932	91	70	171	123	Pre 1936 sewer pipe	3	9998.55	\$ 4,799,304
SS1579	5141	51	VCP	30	10	20	423.71	1932	91	70	171		Pre 1936 sewer pipe			
SS595	5123	51	VCP	30	10	20	188.14	1932	91	70	171		Pre 1936 sewer pipe			
SS597	3321	33	VCP	30	10	20	379.3	1932	91	70	153		Pre 1936 sewer pipe			
SS1580	3200	32	VCP	30	10	20	448.25	1932	91	70	152		Pre 1936 sewer pipe			
SS1677	3121	31	VCP	30	10	20	410.26	1932	91	70	151		Pre 1936 sewer pipe			
SS1679	3522	35	VCP	30	8	10	379.36	1932	91	70	145		Pre 1936 sewer pipe			
SS2898	3522	35	VCP	30	8	10	385.52	1932	91	70	145		Pre 1936 sewer pipe			
SS604	3200	32	VCP	30	8	10	211.14	1932	91	70	142		Pre 1936 sewer pipe			
SS596	0000	0	VCP	30	10	20	196.44	1932	91	70	120		Pre 1936 sewer pipe			
SS1573	0000	0	VCP	30	10	20	204.3	1932	91	70	120		Pre 1936 sewer pipe			
SS1582	#N/A	#N/A	VCP	30	10	20	439.86	1932	91	70	120		Pre 1936 sewer pipe			
SS1583	#N/A	#N/A	VCP	30	10	20	24.32	1932	91	70	120		Pre 1936 sewer pipe			
SS1584	0000	0	VCP	30	12	20	465.25	1932	91	70	120		Pre 1936 sewer pipe			
SS1675	#N/A	#N/A	VCP	30	10	20	369.17	1932	91	70	120		Pre 1936 sewer pipe			
SS1577	#N/A	#N/A	VCP	30	10	20	176.86	1932	91	70	120		Pre 1936 sewer pipe			
SS1578	#N/A	#N/A	VCP	30	10	20	48.33	1932	91	70	120		Pre 1936 sewer pipe			
SS592	#N/A	#N/A	VCP	30	8	10	211.23	1932	91	70	110		Pre 1936 sewer pipe			
SS593	0000	0	VCP	30	8	10	393.09	1932	91	70	110		Pre 1936 sewer pipe			
SS594	0000	0	VCP	30	8	10	394.79	1932	91	70	110		Pre 1936 sewer pipe			
SS601	#N/A	#N/A	VCP	30	8	10	333.61	1932	91	70	110		Pre 1936 sewer pipe			
SS602	#N/A	#N/A	VCP	30	8	10	179.37	1932	91	70	110		Pre 1936 sewer pipe			
SS1210	0000	0	VCP	30	8	10	161.33	1932	91	70	110		Pre 1936 sewer pipe			
SS1211	#N/A	#N/A	VCP	30	8	10	171.43	1932	91	70	110		Pre 1936 sewer pipe			

	CUES													Γ
	Structural						As_Built_					Prj Ave		
FacilityID	Score	LOF	Material	COF-M	Diameter	COF-S	Length	InstallYear	AGE, yrs	COF-A	Score	Score	Project Name	
SS1574	#N/A	#N/A	VCP	30	8	10	379.23	1932	91	70	110		Pre 1936 sewer pipe	
SS1712	#N/A	#N/A	VCP	30	8	10	232.72	1932	91	70	110		Pre 1936 sewer pipe	
SS2628	#N/A	#N/A	VCP	30	8	10	104.16	1932	91	70	110		Pre 1936 sewer pipe	
SS2902	#N/A	#N/A	VCP	30	8	10	120	1932	91	70	110		Pre 1936 sewer pipe	
SS603	0000	0	VCP	30	8	10	129.03	1932	91	70	110		Pre 1936 sewer pipe	
SS1575	#N/A	#N/A	CIPP	20	10	20	177.36	1932	91	70	110		Pre 1936 sewer pipe	
SS1576	#N/A	#N/A	CIPP	20	10	20	209.14	1932	91	70	110		Pre 1936 sewer pipe	
SS6911	#N/A	#N/A	CIPP	20	6	20	76	1932	91	70	110		Pre 1936 sewer pipe	
SS1571	0000	0	CIPP	20	8	10	415.74	1932	91	70	100		Pre 1936 sewer pipe	
SS1676	0000	0	CIPP	20	8	10	377.53	1932	91	70	100		Pre 1936 sewer pipe	
SS1678	#N/A	#N/A	CIPP	20	8	10	381.35	1932	91	70	100		Pre 1936 sewer pipe	
SS1572	0000	0	CIPP	20	8	10	375.2	1932	91	70	100		Pre 1936 sewer pipe	
SS5527	0000	0	VCP	30	8	10	344	1966	57	30	70	75	Rock St Sewer	
SS5523	#N/A	#N/A	VCP	30	6	20	133.98	1966	57	30	80		Rock St Sewer	
SS5528	#N/A	#N/A	VCP	30	6	20	213.37	1966	57	30	80		Rock St Sewer	
SS5534	0000	0	VCP	30	8	10	111	1966	57	30	70		Rock St Sewer	
SS5539	0000	0	VCP	30	8	10	206	1966	57	30	70		Rock St Sewer	
SS5538	#N/A	#N/A	VCP	30	6	20	240	1966	57	30	80		Rock St Sewer	
SS2982	0000	0	VCP	30	8	10	315	1965	58	30	70	67	South St Sewer Ph1	
ss2983	#N/A	#N/A	VCP	30	8	10	306	1965	58	30	70		South St Sewer Ph1	
ss2274	#N/A	#N/A	VCP	30	8	10	314	1965	58	30	70		South St Sewer Ph1	
SS2275	#N/A	#N/A	VCP	30	8	10	313.79	1965	58	30	70		South St Sewer Ph1	
SS2950		0	VCP	30	8	10	208	1965	58	30	70		South St Sewer Ph1	
SS2276	#N/A	#N/A	PVC	10	8	10	126.03	1965	58	30	50		South St Sewer Ph1	
SS2942	0000	0	VCP	30	8	10	250	1972	51	30	70	70	South St Sewer Ph2	
SS2947	#N/A	#N/A	VCP	30	8	10	195	1972	51	30	70		South St Sewer Ph2	
SS2943	#N/A	#N/A	VCP	30	8	10	215	1972	51	30	70		South St Sewer Ph2	
SS7223	0000	0	VCP	30	8	10	160	1972	51	30	70		South St Sewer Ph2	
SS1704	0000	0	VCP	30	8	10	300	1972	51	30	70		South St Sewer Ph2	
SS2949	#N/A	#N/A	VCP	30	8	10	227	1972	51	30	70		South St Sewer Ph2	L
SS1790	0000	0	VCP	30	8	10	300	1975	48	20	60	51	South St Sewer Ph3	
SS2765	#N/A	#N/A	VCP	30	8	10	75.46	1975	48	20	60		South St Sewer Ph3	
SS2766	#N/A	#N/A	VCP	30	8	10	1/0.01	1975	48	20	60		South St Sewer Ph3	
SS2899	#N/A	#N/A	VCP	30	8	10	243	1975	48	20	60		South St Sewer Ph3	
SS2900	#N/A	#N/A	PVC	10	8	10	200	1975	48	20	40		South St Sewer Ph3	
SS2940	#N/A	#N/A	PVC	10	8	10	208	1975	48	20	40		South St Sewer Ph3	
<u>SS2941</u>	#N/A	#N/A	PVC	10	8	10	210	1975	48	20	40	00	South St Sewer Ph3	╞
552993	#N/A	#N/A		30	10	20		1969	54	30	80	80	Wolfensberger Rd Local Sewer	
552994	#IN/A #NL/A	#N/A		30	12	20	50	1969	54	30	80		Wolfensberger Rd Local Sewer	
SS7043	#N/A #N/A	#N/A #N/A		30	12	20	70	1969	54	30	80		Wolfensberger Bd Local Sewer	
SS1608	#N/A	#N/A		20	22	10	170	1909	54 //2	20	50	55	Voung American Phase 1	$\vdash$
SS1690	0000	0		20	8	10	240.76	1975	40	20	50	55	Young American Phase 1	
SS1705	0000	0		20	8	10	96.84	1975	40	20	50		Young American Phase 1	
331703	0000	0		20	0	10	0.04	1575	-0	20	50			

Priority of Project	Project length	Pro	oject Cost Estimate
7	1248.35	\$	599,208
10	1582.82	\$	759,754
9	1347	\$	646,560
14	1406.47	\$	675,106
5	273	\$	131,040
13	6245.25	\$	2,997,720

	CUES													
	Structural						As_Built_					Prj Ave		P
FacilityID	Score	LOF	Material	COF-M	Diameter	COF-S	Length	InstallYear	AGE, yrs	COF-A	Score	Score	Project Name	
SS1706	0000	0	CIPP	20	8	10	236.04	1975	48	20	50		Young American Phase 1	
SS1707	0000	0	CIPP	20	8	10	173.53	1975	48	20	50		Young American Phase 1	
SS1708	0000	0	CIPP	20	8	10	240.17	1975	48	20	50		Young American Phase 1	
SS2979	0000	0	CIPP	20	8	10	179.63	1975	48	20	50		Young American Phase 1	
SS2980	0000	0	CIPP	20	8	10	158.99	1975	48	20	50		Young American Phase 1	
SS2981	#N/A	#N/A	PVC	10	8	10	166.9	1975	48	20	40		Young American Phase 1	
SS2987	0000	0	CIPP	20	8	10	133.27	1975	48	20	50		Young American Phase 1	
SS2988	0000	0	CIPP	20	8	10	313.32	1975	48	20	50		Young American Phase 1	
SS2989	0000	0	CIPP	20	8	10	75.84		NA	70	100		Young American Phase 1	
SS348	0000	0	CIPP	20	8	10	293.32	1975	48	20	50		Young American Phase 1	
SS349	0000	0	CIPP	20	8	10	256.15	1965	58	30	60		Young American Phase 1	
SS350	0000	0	CIPP	20	8	10	180	1965	58	30	60		Young American Phase 1	
SS351	#N/A	#N/A	CIPP	20	8	10	200.2	1965	58	30	60		Young American Phase 1	
SS366	0000	0	CIPP	20	8	10	140	1975	48	20	50		Young American Phase 1	
SS367	0000	0	CIPP	20	8	10	295	1975	48	20	50		Young American Phase 1	
SS4873	0000	0	CIPP	20	8	10	90.81	1975	48	20	50		Young American Phase 1	
SS4876	0000	0	CIPP	20	8	10	188.05	1975	48	20	50		Young American Phase 1	
SS4884	#N/A	#N/A	CIPP	20	8	10	92.61		NA	70	100		Young American Phase 1	
SS7053	#N/A	#N/A	CIPP	20	8	10	170	1965	58	30	60		Young American Phase 1	
SS7056	0000	0	CIPP	20	8	10	245.13	1975	48	20	50		Young American Phase 1	
SS7062	0000	0	CIPP	20	8	10	91.78	1975	48	20	50		Young American Phase 1	
SS7099	0000	0	CIPP	20	8	10	129.4	1975	48	20	50		Young American Phase 1	
SS7101	#N/A	#N/A	CIPP	20	8	10	142.34	1975	48	20	50		Young American Phase 1	
SS7102	#N/A	#N/A	CIPP	20	8	10	191.6	1975	48	20	50		Young American Phase 1	
SS7103	0000	0	CIPP	20	8	10	133.1	1975	48	20	50		Young American Phase 1	
SS7104	#N/A	#N/A	CIPP	20	8	10	87.36	1975	48	20	50		Young American Phase 1	
SS7122	#N/A	#N/A	VCP	30	6	20	158.8	1975	48	20	70		Young American Phase 1	
SS7228	#N/A	#N/A	CIPP	20	8	10	146.98	1975	48	20	50		Young American Phase 1	
SS7229	#N/A	#N/A	CIPP	20	8	10	138.99	1975	48	20	50		Young American Phase 1	
SS7230	#N/A	#N/A	PVC	10	8	10	154.2	1975	48	20	40		Young American Phase 1	
SS7231	#N/A	#N/A	PVC	10	8	10	75.44	1975	48	20	40		Young American Phase 1	
SS7875	#N/A	#N/A	VCP	30	4	20	458.7	1971	52	30	80		Young American Phase 1	
SS1700	0000	0	CIPP	20	8	10	163	1972	51	30	60	60	Young American Phase 2	
SS1701	0000	0	CIPP	20	8	10	128	1972	51	30	60		Young American Phase 2	
SS1702	0000	0	CIPP	20	8	10	220	1972	51	30	60		Young American Phase 2	
SS1703	#N/A	#N/A	CIPP	20	8	10	170	1972	51	30	60		Young American Phase 2	
SS2951	#N/A	#N/A	CIPP	20	8	10	227	1972	51	30	60		Young American Phase 2	
SS2952	0000	0	CIPP	20	8	10	287	1972	51	30	60		Young American Phase 2	
SS2953	#N/A	#N/A	CIPP	20	8	10	122	1972	51	30	60		Young American Phase 2	
SS2954	#N/A	#N/A	CIPP	20	8	10	188	1972	51	30	60		Young American Phase 2	
SS2955	0000	0	CIPP	20	8	10	110.35	1975	48	20	50		Young American Phase 2	
SS2956	0000	0	CIPP	20	8	10	281.81	1972	51	30	60		Young American Phase 2	
SS2984	0000	0	CIPP	20	6	20	140.33	1975	48	20	60		Young American Phase 2	
SS2985	0000	0	CIPP	20	6	20	276.41	1975	48	20	60		Young American Phase 2	

Priority of Project	Project length	Project Cost Estimate
		1
11	4016.55431	\$ 1,927,946

	CUES															
	Structural						As_Built_					Prj Ave		Priority of	Project	Project Cost
FacilityID	Score	LOF	Material	COF-M	Diameter	COF-S	Length	InstallYear	AGE, yrs	COF-A	Score	Score	Project Name	Project	length	Estimate
SS2986	#N/A	#N/A	CIPP	20	6	20	169.21	1975	48	20	60		Young American Phase 2			
SS3802	0000	0	CIPP	20	8	10	199.18	1975	48	20	50		Young American Phase 2			
SS3803	2200	22	CIPP	20	8	10	145.62	1975	48	20	72		Young American Phase 2			
SS4872	#N/A	#N/A	CIPP	20	8	10	164.87	1975	48	20	50		Young American Phase 2			
SS4874	0000	0	CIPP	20	6	20	117.02	1975	48	20	60		Young American Phase 2			
SS4875	#N/A	#N/A	CIPP	20	8	10	103.26	1975	48	20	50		Young American Phase 2			
SS4879	0000	0	CIPP	20	6	20	109.61	1975	48	20	60		Young American Phase 2			
SS4880	2100	21	CIPP	20	6	20	121.23	1975	48	20	81		Young American Phase 2			
SS7220	#N/A	#N/A	CIPP	20	8	10	115	1972	51	30	60		Young American Phase 2			
SS7221	#N/A	#N/A	CIPP	20	8	10	274.6	1972	51	30	60		Young American Phase 2			
SS7222	#N/A	#N/A	CIPP	20	8	10	23.4	1972	51	30	60		Young American Phase 2			
SS7223	0000	0	VCP	30	6	20	159.7	1975	48	20	70		Young American Phase 2			
SS1695	0000	0	CIPP	20	8	10	186.36	1966	57	30	60	60	Future Castle Rock Heights	12	2934.4	\$ 1,408,512
SS1696	0000	0	CIPP	20	8	10	300	1966	57	30	60		Future Castle Rock Heights			
SS1697	0000	0	CIPP	20	8	10	206	1966	57	30	60		Future Castle Rock Heights			
SS354	0000	0	CIPP	20	8	10	216.09	1966	57	30	60		Future Castle Rock Heights			
SS4877	0000	0	CIPP	20	8	10	58.93	1966	57	30	60		Future Castle Rock Heights			
SS4878	0000	0	CIPP	20	8	10	78.43	1966	57	30	60		Future Castle Rock Heights			
SS4882	0000	0	CIPP	20	8	10	136.35	1966	57	30	60		Future Castle Rock Heights			
SS7064	0000	0	CIPP	20	8	10	178.17	1966	57	30	60		Future Castle Rock Heights			
SS7249	0000	0	CIPP	20	8	10	154.85	1966	57	30	60		Future Castle Rock Heights			
SS353	0000	0	CIPP	20	8	10	250	1966	57	30	60		Future Castle Rock Heights			
SS362	0000	0	CIPP	20	8	10	440	1966	57	30	60		Future Castle Rock Heights			
SS352	0000	0	CIPP	20	8	10	220	1966	57	30	60		Future Castle Rock Heights			
SS6846	0000	0	CIPP	20	8	10	115	1966	57	30	60		Future Castle Rock Heights			
SS6845	0000	0	CIPP	20	8	10	112	1966	57	30	60		Future Castle Rock Heights			
SS7024	0000	0	CIPP	20	8	10	115	1966	57	30	60		Future Castle Rock Heights			
SS7615	0000	0	CIPP	20	8	10	167.22	1966	57	30	60		Future Castle Rock Heights			
															33606	\$ 16,130,786