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REPORT

City of Camrose

25 Year Infrastructure Replacement Plan

FEBRUARY 2024

EXECUTIVE SUMMARY

In 2022, the City of Camrose (City) retained Associated Engineering (AE) to develop the 25-Year City-wide Infrastructure Replacement Plan (CIRP) for underground assets, including water, sanitary, and stormwater infrastructure. The CIRP was an expansion to the Downtown Infrastructure Renewal Plan (DIRP) that was ongoing at the time of undertaking the assignment. The objective of the CIRP was to develop a comprehensive 25-Year Infrastructure Replacement Plan that identifies rehabilitation projects across the City, excluding the Downtown area. The CIRP provides information to support the City's long-range asset management and rehabilitation and aids in the coordination of renewal projects for underground and roadways infrastructure.

This report presents the results of the assessment and recommendations for the **2023-2047 Infrastructure Replacement Plan**.

The infrastructure renewal candidates presented in this report were identified following a desktop condition assessment, in consideration of the following:

- The City's Underground Infrastructure Asset Inventory and GIS records.
- Condition Assessments of Roadways based on a Pavement Condition Index established in the Pavement Condition Assessment Report, Tetra Tech, 2019.
- Storm and Sanitary sewers CCTV survey results identified in ISL's 2020 Storm and Sanitary CCTV Inspections and Condition Assessments.
- Infrastructure upgrades identified in the various utility Master Plans.

A risk-based evaluation criteria, developed in consultation with the City, was used to identify and prioritize rehabilitation candidates for inclusion in the CIRP. The rehabilitation projects were identified and prioritized based on a calculated risk score. Meetings with the City confirmed program development methods and categorization of the upgrade priority of the identified infrastructure rehabilitation projects. The City's comments were adopted into the CIRP.

In this report, Risk is defined as the product of the probability/likelihood of failure and impact/consequence of failure (Probability x Impact). The risk-based evaluation criteria was developed for underground infrastructure and was used to prioritize rehabilitation and renewal projects included in the CIRP. Probability of failure scores for utilities were assigned based on asset age and material, while impact of failure scores were assigned based on asset diameter. Where information was available, the CCTV inspection results and Master Plan recommended upgrades were considered in the prioritization criteria.

The comprehensive infrastructure assessment, cost projections, and the recommended high priority assets were organized into the 25-year renewal plan. The proposed program is summarized in **Table ES-1**, with a breakdown of the 25-year program based on a budget of approximately $3 million per year, shown in **Table ES-2**.

Table ES-1 Summary of Proposed CIRP

	Quantities and Opinion of Probable Cost
Number of Blocks	175
Length of Watermains	32,300 m
Length of Sanitary Sewers	27,780 m
Length of Storm Sewers	23,225 m
Low-Cost Scenario [1]	$73,212,000
High-Cost Scenario [1]	$146,423,000

[1] Costs include a 12% Engineering Fee, 5% Emerging Issues Fund, and 20% Contingency Fund, based on 2023 dollars.

Table ES-2 25-Year CIRP and Opinion of Probable Cost Based on $3M per Year Budget

Renewal Years	Number of Blocks	Length of Watermain (m)	Length of Sanitary Sewer (m)	Length of Storm Sewer (m)	Low-Cost Scenario[1]	High-Cost Scenario[1]
2023-2025	11	1,286	1,341	1,361	$4,289,000	$8,577,000
2026-2028	19	2,637	2,353	1,516	$4,111,000	$8,222,000
2029-2031	8	1,119	1,631	1,314	$4,611,000	$9,221,000
2032-2034	12	1,933	2,242	1,242	$4,346,000	$8,692,000
2035-2037	6	1,063	1,907	1,303	$4,261,000	$8,521,000
2038-2040	8	404	1404	1760	$4,828,000	$9,656,000
2041-2043	12	1,846	2,335	1,540	$4,605,000	$9,210,000
2044-2046	15	2,300	1,853	1,256	$4,249,000	$8,498,000
2047-2048	9	981	1233	1055	$2,795,000	$5,589,000
Total [1]	**100**	**13,569**	**16,299**	**12,347**	**$38,095,000**	**$76,186,000**

[1] Costs include a 12% Engineering Fee, 5% Emerging Issues Fund, and 20% Contingency Fund, based on 2023 dollars.

The following recommendations are made, based on the assessment completed:

1. Implementation of the 25-Year CIRP at a total budget ranging from a **minimum of $73,212,000 (Low-cost scenario) to a maximum of $146,423,000 (High-cost scenario).**
2. Allocation of a portion of the annual budget for engineering fees for the preparation of the **design and tender packages** for the subsequent year's projects. These costs should cover any additional data collection, pre-design, and detailed design required for a rehabilitation project. An allowance equivalent to 12% of the anticipated construction costs is recommended.
3. Allocation of a portion of the annual budget to address emerging issues. This will cover potential scope creep that typically arises during implementation of a renewal program. An allowance equivalent to 5% of the anticipated construction costs is recommended.

4. The City should retain a portion of each year's uncommitted budget for a contingency fund to cover fluctuation in the construction market, and potential costs unforeseen during pre-design stages. A sum equal to 20% of the anticipated construction costs should be considered.
5. The City should implement a CCTV Inspection Program to verify the condition of underground assets at a total cost of **$3,060,000**. This program can be implemented on a 10-year timeline.
6. The City review the 25-Year CIRP on 3-to-5-year cycles, based on condition assessment data, and re-prioritizing infrastructure needs.

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1 INTRODUCTION

The City of Camrose (City) has historically budgeted and implemented infrastructure renewal projects. The City recognizes the need for proactive infrastructure renewal and coordination of underground utility rehabilitation with surface work. In 2022, the City engaged Associated Engineering (AE) to assist in the development of the 25-Year City-wide Infrastructure Renewal Plan (CIRP). The CIRP study area excludes the Downtown core.

The objective of the project was to undertake a desktop condition assessment of the underground infrastructure (water, sanitary and stormwater) to identify and prioritize rehabilitation needs and develop a 25-year renewal plan. The scope of work included a review of the City's available GIS data for watermains, sanitary sewers, storm sewers, previous utility infrastructure assessments, and Master Plan documents. Additionally, risk-based evaluation of the infrastructure candidates was used to prioritize the projects. Opinion of probable costs were also developed as part of this study.

1.1 Coordination with Downtown Infrastructure Renewal Plan

In 2020, the City engaged Associated Engineering to prepare the Downtown Infrastructure Renewal Plan (DIRP), which focussed on the Downtown core. The scope of DIRP project included a review of the condition of the existing underground utilities, roadways, and sidewalks in the central Downtown area. The goal of the project was to develop a long-range rehabilitation plan, including construction schedules and cost estimates for infrastructure renewal.

2 METHODOLOGY

Our methodology for developing the 25-Year CIRP followed the generalized tasks below:

Background Data Collection:
This included collection and review of background data, such as the utility GIS data, the City's underground asset inventory, various Master Plan documents, existing CCTV inspection records, and Roadway Rehabilitation Report.

Establishment of Asset Condition Grades: The condition of the assets were assigned a grade based on age/remaining service life, material, and condition assessment information. A minimal break history and limited maintenance records were available for this project. No field condition assessments were undertaken.

Risk Assessment: A risk-based assessment was used based on the anticipated likelihood and consequence of failure and assigned scores for each of the infrastructure assets. This was used for prioritization of infrastructure candidates for renewal.

Development of 25 Year Infrastructure Replacement Program: Renewal projects were then selected. Opinion of probable costs and suggested implementation timelines were developed using the Risk Assessment developed.

The following sections of the report present a detailed description of the work completed.

2.1 Background Data Collection and Desktop Review

2.1.1 Utilities

2.1.1.1 Geographic Information System (GIS) Data

The City's GIS utilities data that included watermains, sanitary, and storm sewer infrastructure assets formed the basis of the analysis. The first steps in formatting and preparing usable information from the database was the removal of extraneous assets that were identified as having been abandoned, privately owned, services, or located within the Downtown area. Assets were mapped using ArcGIS tools, followed by further visual clean up of the dataset completed in coordination with the City.

2.1.1.2 Asset Properties

Key asset properties, such as material, diameter, length, and age were reviewed. Some asset material types were found to be missing, unknown, or labeled to be uncommon types. There was a need to establish a consistent naming convention for pipe materials within the database to allow for a standardized evaluation process. To address this, a list of standard pipe material types was proposed, and assets identified with uncommon types are re-assigned to a material on the list. **Table 2-1** below presents the list of standard pipe materials. **Table 2-2** summarizes the list of the materials in the dataset that were re-assigned.

Where asset properties, such as material type, age, and diameter were unknown, known attributes from the closest connected pipe were re-assigned. There were a number of instances where a series of connected pipes did not have diameters assigned to them. These were tagged as pipes with unknown diameters.

Once asset properties were assigned, identification of the estimated and remaining service lives was completed, as discussed in **Section 2.2**.

Table 2-1 List of Standard Pipe Material Types

Material Name	Material Name
Polyvinyl Chloride	PVC
High Density Polyethylene	HDPE
Steel	STEEL
Ductile Iron	DI
Cast Iron	CI
Corrugated Steel Pipe	CSP
Concrete	CONCRETE
Asbestos Cement	AC
Vitrified Clay Tile	VCT

Table 2-2 Assumed Standard Material

Water Materials from Database	Assumed Standard Material	Sanitary Materials from Database	Assumed Standard Material	Storm Materials from Database	Assumed Standard Material
AC	AC	PVC	PVC	ABANDONED	-
C-900 DR18	PVC	AC	AC	AC	AC
CI	CI	ACCMP	CSP	BIG O	HDPE
CONCRETE	Concrete	CLAY	VCT	BOSS2000	HDPE
CSP	CSP	CLAY TILE	VCT	BOX CULV	Concrete
Copper (CU)	CI	CLPECSTEEL	Steel	CMP	CSP
DI	DI	CONC	Concrete	CONC	Concrete
HDPE	HDPE	DUCT IRON	DI	CULVERT	CSP
HPDE	HDPE	FORCE MAIN (not a material type but assets were labeled like this in database)	HDPE	F-36A	Concrete
Polyethylene (PE)	HDPE	HDP	HDPE	K-7	Concrete
PLASTIC	PVC	HDPE	HDPE	NF-80	Concrete
POLY	PVC	LOG	-	PERF PVC	PVC
PVC	PVC		-	PERFORATED	PVC
PVC (THIN)	PVC	PE	HDPE	PVC	PVC

Water Materials from Database	Assumed Standard Material	Sanitary Materials from Database	Assumed Standard Material	Storm Materials from Database	Assumed Standard Material
STEEL	Steel	PVC	PVC	PVC UR	PVC
		SDR35	PVC	PVCULTRRIB	PVC
		STEEL	Steel	PVC UR	PVC
		TILE	VCT	RCP	Concrete
		ULTRA-RIB	PVC	SDR35	PVC
				STEEL	Steel
				ULTRA-RIB	PVC
				ULTRA-RIB	PVC
				ULTRA-RIB	PVC
				VCT	VCT

2.1.2 Water

2.1.2.1 Water Breaks

The City's GIS water distribution network break history was reviewed and found to include 35 watermain breaks across the City dating from 2009 to 2022. This data was statistically insignificant for use in condition and risk assessments. In addition, the City provided a water breakage dataset that dated back to 1970. However, the dataset did not capture the locations for the breaks. As such, break history was not used in this analysis as no deterioration trends could be drawn from the dataset. Clean up of the dataset, including assignment of specific locations to the water breaks, is recommended for future condition assessment.

2.1.2.2 Water Master Plan

The 2006 Water Master Plan Update (Associated Engineering) recommended minimum watermain sizes to accommodate the projected Peak Hour Demand of the ultimate distribution network and fire flow requirements as the minimum pipe sizes are summarized below:

- 300 mm – Commercial Business District
- 250 mm – Commercial & Industrial
- 200 mm – Residential

The Master Plan also recommended additional watermains to improve network connectivity and looping. In discussion with the City, there are no specific assets where the master plan upgrades address ongoing water demand issues and supersede condition-based replacements. As such, master plan upgrades are not considered as part of condition and risk assessment.

2.1.3 Sanitary and Storm Sewers

2.1.3.1 Sanitary Master Plan

The 2007 Sanitary Master Plan Update (Associated Engineering) modelled the trunk sewers within the City and identified a number of capacity related upgrades to reduce surcharge. Per discussions held with the City, there are no identified areas where capacity issues are presently an issue. As such, master plan upgrades are not considered as part of condition and risk assessment.

2.1.3.2 Stormwater Master Plan

The 2008 Stormwater Master Plan Update (Associated Engineering) identified flow loading and surcharge levels for various storm events and recommended upgrades to address current and future stormwater issues. Multiple locations within the City were projected to experience surcharging during a 1:5-year storm event or greater. The master plan did not specify whether capacity deficiencies were projected within the minor or major system and no recommendations could be made to address the surcharging issues. As such, the CIRP, does not include specific recommendations for stormwater upgrades.

2.1.3.3 Sanitary and Storm CCTV Review

The most recent CCTV inspection reports of sanitary and storm sewers were reviewed in the 2020 Storm and Sanitary CCTV Inspection and Condition Assessment Report (ISL). The report was prepared following the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) rating system. The report provided CCTV inspection results for infrastructure assets that were selected by the City based on the following criteria:

- Sewer locations coinciding with locations where road work was planned in the next 3-5 years.
- The oldest infrastructure.
- Sewers that were known to have condition, operational, and maintenance issues.

As part of the CCTV Inspection reporting, sewers were assigned priority scores, based on the evaluated condition grade, as described in **Table 2-3**.

Table 2-3 2020 Sewer CCTV Inspection Rating

Priority	Implication	Condition Grade	Number of Identified Assets
1	Repair or Service Immediately	5 and sometimes 4	5
2	Repair or Service within the next 5 years	3 and 4	20
3	Re-inspect in 5 to 10 years	1 and 2	9

34 sanitary and storm sewer sections were inspected across the City. Of the 34, five were identified as Priority 1 and 20 were Priority 2. The recommended rehabilitation measures for the Priority 1 and Priority 2 assets were relatively minor, with a single sewer section being recommended for full replacement. Priority 3 assets were in relatively good condition and were recommended to be re-inspected in 5 to 10 years. **Table 2-4** below presents a summary of the recommended rehabilitation measures.

Table 2-4 2020 CCTV Inspection Rehabilitation Recommendations

Priority 1 Rehabilitations	Priority 2 Rehabilitations	Priority 3 Rehabilitations
2x Flush, Clean, Re-inspect	6x Flush, Clean, Re-inspect	2x Flush, Clean, Re-inspect
1x Spot Repair CIPP Liner	5x Spot Repair CIPP Liner	7x No work required
1x Spot Repair Excavation	3x Full Length CIPP Liner	
1x Spot Repair Excavation + Spot Repair CIPP Liner	1x Full Length Excavation and Replacement	
	5x Further Internal Visual Inspection	

The sample size from the 2020 CCTV Inspection was not significant enough to be incorporated into the overall risk assessment criteria for this assignment. Therefore, the CCTV inspection results do not affect the prioritization criteria used in this assignment.

2.1.4 Roadways

In 2019 the City retained Tetra Tech Inc. to conduct condition assessment of paved roadways. The results of the assessment were used to assign Pavement Condition Indices (PCI) to express the condition of the pavement surface as a function of the severity and extent of visible distresses. The 2019 Condition Assessment report provided a 20-year rehabilitation plan for each road segment, based on an annual budget of $2 Million.

It is our understanding that the City has implemented a separate roadways rehabilitation plan. As such, it was agreed with the City that roadway surface rehabilitation recommendations would not be integrated into the CIRP. The City will continuously review recommendations made in CIRP and coordinate underground and roadway surface rehabilitation work.

2.1.5 Sidewalk Infrastructure

Sidewalk infrastructure was not evaluated as part of the CIRP. Sidewalk renewal will be included as part of the roadway surface rehabilitation work, as discussed with the City.

2.2 Establishment of Asset Condition Grades

2.2.1 Expected Service Life

Table 2-5 presents the typical expected service lives for various pipe materials. These were derived from service lives reported by other regional municipal infrastructure owners on previous studies completed by Associated Engineering.

Table 2-5 Expected Service Life (ESL)

Material Type	Material Abbreviation	Expected Service Life (ESL)
Asbestos Cement	AC	50
Cast Iron	CI	50
Concrete	CONCRETE	60
Corrugated Steel Pipe	CSP	60
Copper	CU	40
Ductile Iron	DI	50
High Density Polyethylene	HDPE	75
Polyvinyl Chloride	PVC	60
Steel	STEEL	75
Vitrified Clay Tile	VCT	50

2.2.2 Remaining Service Life

The Remaining Service Live (RSL) of each underground asset was calculated as a percentage of the ESLs presented in Table 2-6 using the formula presented below:

$$\boldsymbol{RSL}\ (\%) = \boldsymbol{100} * (\boldsymbol{ESL} - \boldsymbol{AGE})/\boldsymbol{ESL}$$

2.2.3 Condition Grade

In the absence of historic failure data and CCTV survey results, condition grades were assigned based on remaining service life to reflect the expected deterioration. Table 2-7 below outlines the range of condition grades.

Table 2-6 Condition Grade Scores Based on % Remaining Service Life

Remaining Service Life	Condition Grade (Score)	Condition Grade (Description)	Expected Deterioration, Based on RSL	
<10%	5	Terminal	1	Defects that may need to be addressed immediately.
10% - 30%	4	Poor	2	Severe defect.
31% - 60%	3	Fair	3	Defect deterioration commenced.
61% - 90%	2	Good	4	A moderate defect with continuous deterioration.
91% - 100%	1	Very Good	5	Minor defects.

2.3 Risk-Based Evaluation

A risk-based evaluation criteria was proposed and used for prioritization. The evaluation criteria used assigned likelihood and consequence of failure scores for the infrastructure assets. In the absence of information on historic failure, data from typical deterioration curves was used to assign the likelihood of failure for each asset, based on RSL and material.

2.3.1 Annual Probability of Failure

Table 2-7 presents the annual probability of failure, which was determined based on the condition score and the standard deterioration curves derived from other municipal jurisdictions.

Table 2-7 Annual Probability of Failure Based on Condition Grade Score

Condition Grade (Score)	Very Good (1)	Good (2)	Fair (3)	Poor (4)	Terminal (5)
Pipe Material	91% - 100% (RSL)	61% - 90% (RSL)	31% - 60% (RSL)	10% - 30% (RSL)	<10% (RSL)
	Annual Probability of Failure				
PVC	1%	2%	7.5%	20%	45%
HDPE	1%	2%	7.5%	20%	45%
Steel	1%	3%	10%	30%	50%
DI	1%	3%	10%	30%	50%
CI	1%	3%	10%	30%	50%
CSP	1%	3%	10%	30%	50%
Concrete	1%	3%	5%	15%	40%
AC	1%	3%	10%	40%	60%
VCT	1%	3%	10%	40%	60%

2.3.2 Likelihood of Failure

The annual probability of failure data was used to assign likelihood of failure scores on a scale of 1 to 5. **Figure 2-1** below presents a graphical summary of the criteria used to assign likelihood of failure scores. This was developed by Associated Engineering specifically for this assignment. **Table 2-8** shows how the likelihood of failure score scales with annual probability of failure.

Figure 2-1 Criteria for Assigning Likelihood of Failure Scores

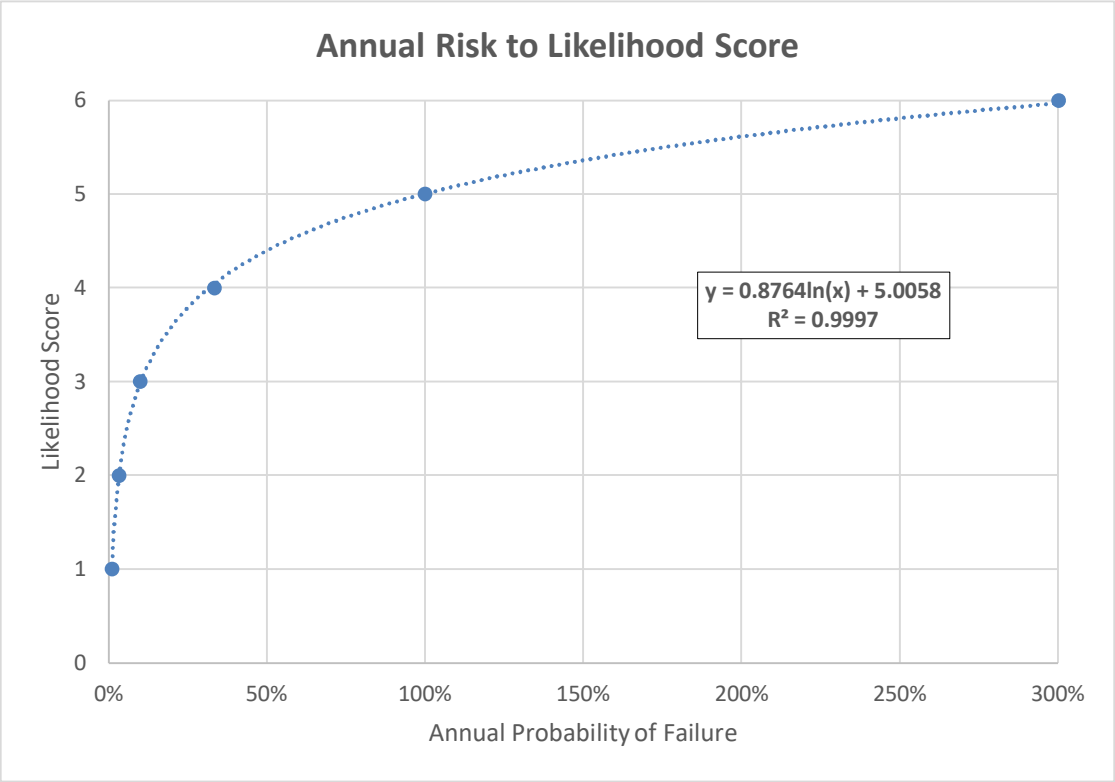


Table 2-8 presents a sample of the Likelihood of Failure Scores derived from the Annual Probability of Failure.

Table 2-8 Likelihood of Failure Scores Derived from the Annual Probability of Failure

Annual Probability of Failure	Assigned Likelihood of Failure Score
0.5%	0.36
1%	0.97
3%	1.93
4%	2.18
7.5%	2.74
10%	2.99
15%	3.34
32%	4.01
35%	4.09
60%	4.56
100%	5.0

2.3.3 Consequence of Failure

Consequence of Failure (CoF) refers to the direct and indirect impacts that would result from an asset's failure. CoF can include, utility service interruptions, traffic disruption, environmental impacts, damage to property, safety risks, social, and economic costs. For this assignment, CoF scores were assigned based on the severity of the impact represented by asset diameter. The larger the asset diameter, the greater the CoF. **Table 2-11** and **Table 2-12** present the criteria that was used to assign CoF scores.

Table 2-9 Criteria for Consequence of Failure Scores

Consequence of Failure Assigned Score	Description
1	Negligible impact: population is unaffected; no injuries or illness; minor investment required; no loss of reputation.
2	Minimal to negligible impact; population is unaffected; no injuries or illness; minor investment required; no loss of reputation.
3	Moderate impact. Minor environmental impact; low impact to the population; minor injuries or illness; unplanned investment would be required to repair/replace. For **water** assets, diameters smaller than 200 mm are considered to have higher impact as they do not meet minimum service requirements. Smaller diameters provide inadequate fire protection, which has a relatively higher impact.
4	Moderately high impact.
5	Significant/irreversible or not easily reversible damage to environment; large population; Severe injury or death or health hazards; significant unplanned investment required to repair or replace; significant loss of reputation.

Table 2-10 Consequence of Failure Assigned Scores

Water		Sanitary		Storm	
Diameter (mm)	Consequence of Failure	Diameter (mm)	Consequence of Failure	Diameter (mm)	Consequence of Failure
<200	**3**	**<200**	**3**	**<200**	**3**
201 - 350	2	201 - 350	2	201 – 450	1
351 - 500	3	351 - 500	3	451 - 700	2
501 - 650	4	501 - 650	4	701 - 950	3
> 650	5	> 650	5	951 - 1200	4
Unknown	3	Unknown	3	> 1200	5
				Unknown	3

2.3.4 CoF for Critical Assets Identified by the City

Further to the risk evaluation criteria described above, the City identified critical locations and infrastructure that needed to be prioritized. **Figure A-1** in **Appendix A** shows the critical locations and infrastructure that were identified by the City.

The following provides a summary of the critical locations and infrastructure identified by the City:

1. **Major Thoroughfares (Arterial and Major Collectors)**
    - 48 Avenue
    - Camrose Drive
    - 53 Street
    - Marler Drive
2. **Critical Utility Locations**

    Unplanned disruptions on these utilities would have severe impacts to the City's service delivery. These utilities include:
    - Sanitary trunk sewers
    - Water transmission lines between the City's water treatment plant, reservoirs, and pump stations
    - Larger diameter water distribution downstream of the reservoirs
3. **Major Facilities and Institutions**
    - These include:
        - Hospital
        - Schools
        - Fire Hall
        - Senior's Care facilities

As part of the evaluation, additional weighting was applied to the CoF scores for all infrastructure assets that fell within the priority categories listed above. A consequence of this approach is that some blocks may appear as higher priority and at greater risk despite that utilities within such blocks may have been recent repairs or replaced.

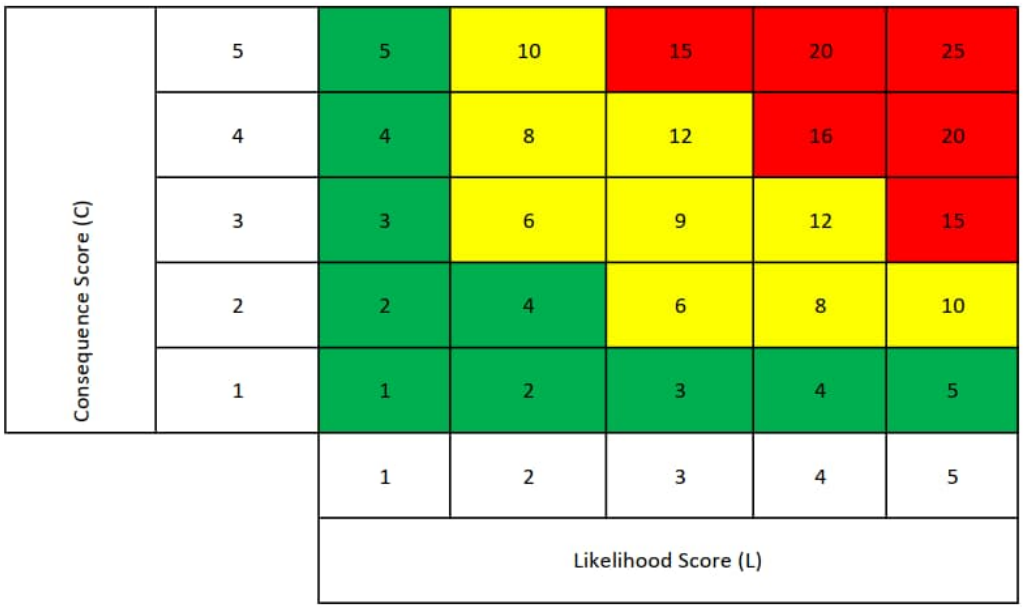
2.3.5 Risk-Based Evaluation

A risk-based evaluation criteria utilizing likelihood of failure and consequence of failure scores was used for prioritization. In this report, risk is defined as the product of likelihood of failure and consequence of failure.

$$\boldsymbol{Risk\ Score = Likelihood\ of\ Failure\ (LoF) * Consequence\ of\ Failure\ (CoF)}$$

Figure 2-2 presents a risk matrix for the assets that were assessed. This risk matrix is specific to the CIRP analysis.

Figure 2-2 Risk Matrix



2.4 Infrastructure Overlap and Consolidation

Though underground infrastructure assets were reviewed, analyzed, and rated independently, there was a need to link them together to develop a location-based rehabilitation program. In the GIS data provided by the City, there were no pre-defined block limits or labels that could be used to link the assets to one another. Consequently, a custom block delineation was completed using ArcGIS software. Due to the scale of the dataset, blocks were created and numbered through an automated polygon generation process. The delineation process and resulting data were based on the following rules:

- Block delineation was based on approximate road segments. Where utilities existed beyond roadways, blocks were defined around the utility segments.
- The automated process showed blocks visually terminating at intersections or utility junctions. Assets within intersections were assigned to the blocks.
- Assets that fell within the limits of a block were assigned to that block.
- Assets that crossed between two blocks were assigned to one of the two blocks.
- Assets located in intersections that appeared between multiple blocks were assigned to one of the adjacent blocks.
- Assets that fell outside of defined block limits were assigned to the closest adjacent block.

All infrastructure assets were consolidated into over-arching street blocks.

This approach aimed to:

- Minimize rework in neighborhoods, resulting in less impact to residents.
- Lower capital costs by taking advantage of economies of scale.
- Increase the City's return on investment on rehabilitation projects.

3 DEVELOPMENT OF 25 YEAR INFRASTRUCTURE REPLACEMENT PROGRAM

3.1 Total Risk

Total risk in the CIRP is defined as the sum of the risk scores for the individual underground assets within a block. This approach allowed the infrastructure to be evaluated equally and efficiently. Consolidation of the risk scores was a key step in the prioritization of assets for rehabilitation. Where multiple assets of the same utility category existed within the same block, the highest scoring asset was used to define the risk score of that utility.

3.2 Rehabilitation Recommendations

The limited information on asset condition within the CIRP means that some rehabilitation recommendations may be overly conservative or aggressive. Furthermore, the 25-year duration of the CIRP makes it impractical to propose detailed rehabilitation methods and improvements for each asset. The CIRP approaches the rehabilitation method as complete removal and replacement of the underground infrastructure. The roadway surface reconstruction is excluded as the City budgets for roadway rehabilitation separately.

To provide a balanced assessment, high-cost and low-cost scenarios were developed for all blocks within the DRA. The **high-cost scenario** assumes a “worst-case” situation, where all underground assets within a block will require full removal and replacement. This scenario assumes full replacement of all underground assets and remediation of the roadway, only up to the granular surface. This approach provides a degree of proactive mitigation to prevent further deterioration of infrastructure, as every asset will eventually be replaced.

The **low-cost scenario** assumes an “ideal” situation where some underground assets will require full removal and replacement, while others may not, or may only require rehabilitation or partial replacement. For this assignment, the low-cost scenario was set at 50% of the estimated cost of the high-cost scenario. This was based on trends observed through the DIRP study, where the block analysis, master plan upgrades, and CCTV results determined that an average of 50% of blocks were found to be in conditions that required renewal or replacement.

3.3 Opinion of Probable Construction Cost for the Proposed Program

The Opinion Of Probable Construction Cost was based on rates for removal and replacement of underground infrastructure derived from similar work recently completed in the Camrose area. The rates were compared to project cost estimates prepared by the City in September 2022 for the Marler Drive rehabilitation project. The rates assume the full removal and replacement of the underground infrastructure, including road backfill up to the granular surface. Asphalt replacement, curb, gutter, and sidewalk replacement work were excluded from the rates.

Table 3-2 summarizes the opinion of probable costs and prioritization categories.

Table 3-1 Summary of Opinion of Probable Construction Cost and Prioritization

Prioritization	Total Risk Scores	Number of Blocks	Length of Water Mains (m)	Length of Sanitary Sewers (m)	Length of Storm Sewers(m)	Total Length for each Prioritization Category (m)	Total Construction Cost (2023 Dollars)
High	27 - 56	175	32,300	27,775	23,225	83,300	**$106,878,000**
Medium	15 - 26	435	65,135	53,050	28,700	146,885	**$149,846,000**
Low	<15	633	33,115	42,550	32,550	108,215	**$130,419,000**
Total		**1,243**	**130,550**	**123,375**	**84,320**	**338,400**	**$387,006,000**

Figure 3-1 presents an outline of the total risk scores across the CIRP area. Additionally, **Appendix B**, presents a detailed breakdown of the scope and cost of the high priority assets recommended for replacement as part of the 25-Year CIRP.

IF NOT 25 mm ADJUST SCALES 25 mm

SCALE (S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE

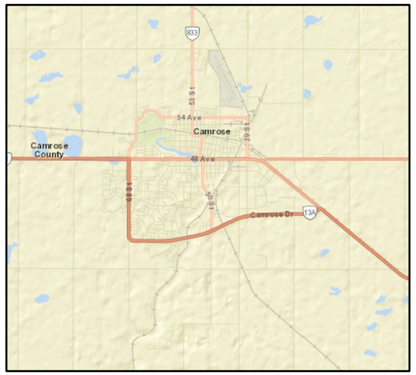
DATA SOURCE: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community, Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Associated Engineering

BEST MANAGED COMPANIES Platinum member

Legend:

- Low
- Medium
- High



CITY OF Camrose

FIGURE 3-1

CITY OF CAMROSE 25-YEAR INFASTRUCTURE REHABILITATION PLAN

BLOCK RISK SCORE DISTRIBUTION

AE PROJECT No.	2022-3374
SCALE	1:3,500
APPROVED	D.FRIESEN
DATE	2024JAN30

3.4 Proposed Program

The **25-Year Replacement Program** for the **high priority infrastructure** includes a total of 83.3 km of water, sanitary, and storm infrastructure at a total construction cost of **$106,878,000**. This amounts to an annual budget of **$4,275,120**.

3.5 Annual CCTV Inspection Program

It is recommended that the City establishes an annual CCTV Inspection Program to verify the condition of underground assets, to support and refine the scope of rehabilitation and replacement and to facilitate the implementation of the CIRP.

The 2020 CCTV inspection programs provided asset condition records for less than 1% of the sanitary and storm sewer across the City. Implementing an annual inspection program will allow for proactive project planning and provide the following benefits:

- Assessment of specific critical assets to confirm rehabilitation requirements.
- Verification that critical assets are in functional condition, which allows reallocation of budget to other projects.
- Identification of the remediation needs for critical assets to facilitate project design and planning.
- Facilitates prioritization of utility rehabilitation.

There is approximately 51,000 m of high priority sanitary and stormwater sewers across the City (excluding the Downtown area) where no records of CCTV inspection exist. As such, a 10-year Condition Assessment Program is proposed for the underground assets **within the high priority category**. This will allow all high priority sanitary and storm assets to be inspected over a 10-year period. **Table 3-3** below provides a summary of the proposed CCTV Inspection Program.

Table 3-3 Proposed 10-Year Condition Assessment Program

Scope for Sewer Inspection	Estimated Quantity/Cost (2023 Dollars)
Total Length of High Priority Sanitary Sewers to be Inspected	27,775 m
Total Length of High Priority Stormwater Sewers to be Inspected	23,225 m
Total - High Priority Sewers	**51,000 m**
Total Cost of Inspection Program (Based on $60/m)	**$3,060,000**
Length of Sewers to be Inspected per Year (Based on 10 – Year Program)	5,100 m
Annual Inspection Budget	**$306,000**

4 PROGRAM COST SUMMARY

The Opinion of Probable Construction Cost for the proposed 25 Year CIRP is **$106,878,000**. This includes the removal and replacement of the identified underground assets. Only the reconstruction of roadways up to the granular surface is included in this cost, and a separate budget will be required for pavement or surface restoration. **Figure 4-1** presents the blocks included in the proposed 25 Year CIRP. The actual costs and extent of rehabilitation required must be determined through physical confirmation of the condition and detailed engineering design.

Engineering fees are allocated for each year, projected to be 12% of the construction costs. These costs should cover any additional data collection, pre-design, and detailed design required for a rehabilitation project.

An Emerging Issues Fund of 5% of the construction costs is allocated for each program year to accommodate potential scope creep that typically arises during implementation of a renewal program.

A contingency fund of 20% of the construction costs is allocated for each program year to accommodate fluctuation in the construction market, and potential costs unforeseen during pre-design stages.

The estimated total cost for the **CIRP** and the **CCTV Inspection Program** is **$146,423,000 and $3,060,000** respectively. To address all high priority infrastructure assets under the 25-year renewal plan, an **annual expenditure** of approximately **$5,857,000** is required. **Table 4-1** summarizes the opinion of probable cost for the **2023-2047 CIRP** including construction costs, engineering fees, emerging issues fund, and contingency fund.

Table 4-1 CIRP Opinion of Probable Cost Summary

Description	CIRP Annual Low-Cost[2]	CIRP Total Low-Cost (25 Year Total)	CIRP Annual High-Cost	CIRP Total High-Cost (25 Year Total)
Construction Cost	$2,138,000	$53,439,000	$4,275,000	$106,878,000
Engineering (12%)	$257,000	$6,413,000	$513,000	$12,825,000
Emerging Issues Fund (5%)	$107,000	$2,672,000	$214,000	$5,344,000
Contingency (20%)	$428,000	$10,688,000	$855,000	$21,376,000
Cost Total	**$2,930,000**	**$73,212,000**	**$5,857,000**	**$146,423,000**
Annual Inspection Program[1]	**$306,000**	**$3,060,000**	**$306,000**	**$3,060,000**

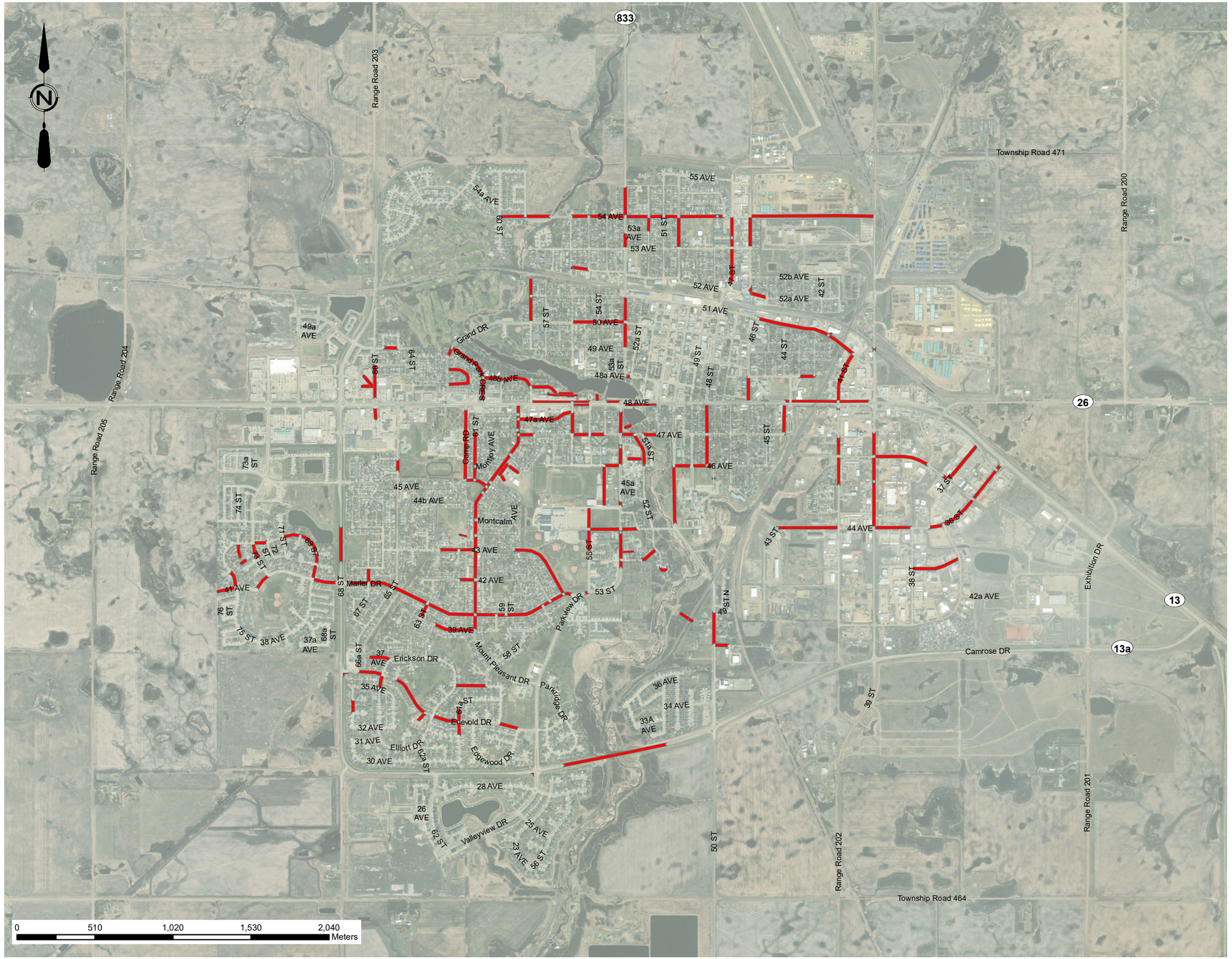
[1] The Annual Inspection Program is based on a 10-year inspection cycle.

[2] All costs shown are 2023 dollars.

IF NOT 25 mm ADJUST SCALES 25 mm

SCALE (S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE

DATA SOURCE: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

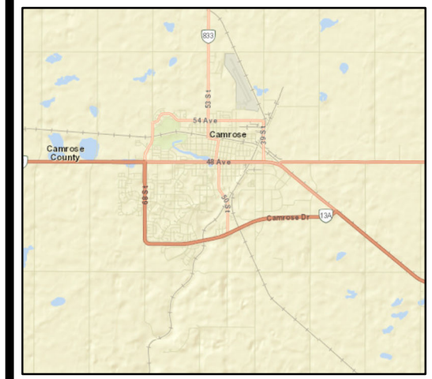


Associated Engineering

BEST MANAGED COMPANIES
Platinum member

Legend:

- High Priority



CITY OF Camrose

FIGURE 4-1

CITY OF CAMROSE 25-YEAR INFASTRUCTURE REHABILITATION PLAN

BLOCKS IDENTIFIED FOR INCLUSION IN THE 25-YEAR CIRP

AE PROJECT No.	2022-3374
SCALE	1:3,500
APPROVED	D.FRIESEN
DATE	2024JAN30

4.1 Downtown Infrastructure Renewal Plan and Comparison

Prior to the preparation of the CIRP, the City initiated a 25-year Downtown Infrastructure Renewal Plan (DIRP). The DIRP covered the Downtown area, spanning from 48 Ave to 51 Ave, between 46 Street and 53 Street.

Table 4-2 and Table 4-3 below summarize the budget estimates for the **High-Cost and Low-Cost Scenarios** for the CIRP and DIRP, respectively. The tables also show the annual average budgets, based on 25-year programs. The opinion of probable total cost for the combined High-Cost and Low-Cost Scenarios for the CIRP and DIRP is **$177,648,000** and **$88,988,000**, respectively. The baseline Annual Average Budget (based on 25 years) for the High-Cost and Low-Cost scenario is **$7,106,000** and **$3,561,000**, respectively.

The costs presented include engineering fees estimated at 12% of the construction costs, which covers data collection, pre-design, and detailed design requirements for the preparation of subsequent year's projects. The opinion of probable cost also includes a nominal budget equivalent to 5% of the construction cost for emerging issues to cover potential scope creep that typically arises during implementation of a renewal program. A 20% contingency allowance was estimated to cover fluctuation in the construction market, and potential costs unforeseen during pre-design stages.

Table 4-2 High-Cost Scenario – Summary of Opinion of Probable Cost For 25-Year CIRP and DIRP

	Description	Baseline Annual Average Budget (Based on 25 Years)	Total Over 25 Years (2023 Dollars)
City-wide Infrastructure Replacement Plan	Construction Cost	$4,275,000	$106,878,000
	Engineering, Investigations, Program Re-evaluation/Update (12%)	$513,000	$12,825,000
	Emerging Issues Fund (5%)	$214,000	$5,344,000
	Contingency (20%)	$855,000	$21,376,000
	Total – CIRP	**$5,857,000**	**$146,423,000**
Downtown Infrastructure Renewal Plan (DIRP)	Construction Cost	$912,000	$22,790,000
	Engineering, Investigations, Program Re-evaluation/Update (12%)	$109,000	$2,736,000
	Emerging Issues Fund (5%)	$46,000	$1,141,000
	Contingency (20%)	$182,000	$4,558,000
	Total – DIRP	**$1,249,000**	**$31,225,000**
	Grand Total High-Cost Scenario – CIRP and DIRP	**$7,106,000**	**$177,648,000**

Table 4-3 Low-Cost Scenario – Summary of Opinion of Probable Cost For 25-Year CIRP and DIRP

	Description	Baseline Annual Average Budget (Based on 25 Years)	Total Over 25 Years (2023 Dollars)
City-wide Infrastructure Replacement Plan	Construction Cost	$2,138,000	$53,439,000
	Engineering, Investigations, Program Re-evaluation/Update (12%)	$257,000	$6,413,000
	Emerging Issues Fund (5%)	$107,000	$2,672,000
	Contingency (20%)	$428,000	$10,688,000
	Total - CIRP	**$2,930,000**	**$73,212,000**
Downtown Infrastructure Renewal Plan (DIRP)	Construction Cost	$461,000	$11,515,000
	Engineering, Investigations, Program Re-evaluation/Update (12%)	$55,000	$1,382,000
	Emerging Issues Fund (5%)	$23,000	$576,000
	Contingency (20%)	$92,000	$2,303,000
	Total - DIRP	**$631,000**	**$15,776,000**
	Grand Total High-Cost Scenario - CIRP and DIRP	**$3,561,000**	**$88,988,000**

4.2 Condition Assessment Program

It is recommended that the City establishes an annual Condition Assessment Program to verify the condition of underground assets, in support of rehabilitation and replacement planning. The proposed program will run in conjunction with both the CIRP and DIRP. Table 4-4 summarizes the sewer inspection programs for the DIRP and CIRP.

Table 4-4 Summary of Opinion of Probable Cost For Proposed Condition Assessment Program

Scope for Sewer Inspection	CIRP Estimated Quantity/Cost	DIRP Estimated Quantity/Cost (2023 Dollars)
Total Length of Sanitary Sewers to be Inspected	27,775 m	2,900 m
Total Length of Stormwater Sewers to be Inspected	23,225 m	4,000 m
Total - Sewers	**51,000 m**	**6,900 m**
Total Cost of Inspection Program (Based on $60/m)	**$3,060,000**	**$414,000**
Length of Sewers to be Inspected per Year (Based on 10 – Year Program)	5,100 m	690 m
Annual Inspection Budget	**$306,000**	**$41,400**

4.3 Annual Budget Allocation Options

An analysis of annual budget allocation options was undertaken to facilitate decision making based on the corresponding durations to complete both the CIRP and the DIRP. **Figure 4-2** and **Figure 4-3** below present the budget allocation options for the High-Cost and Low-Cost Scenarios, respectively. The options presented assume that the total annual budget allocation will be split between the CIRP and DIRP on the removal and replacement (R&R) of underground assets. This will allow the CIRP and DIRP to be executed simultaneously.

Figure 4-2 Budget Allocation Options for High-Cost Scenario

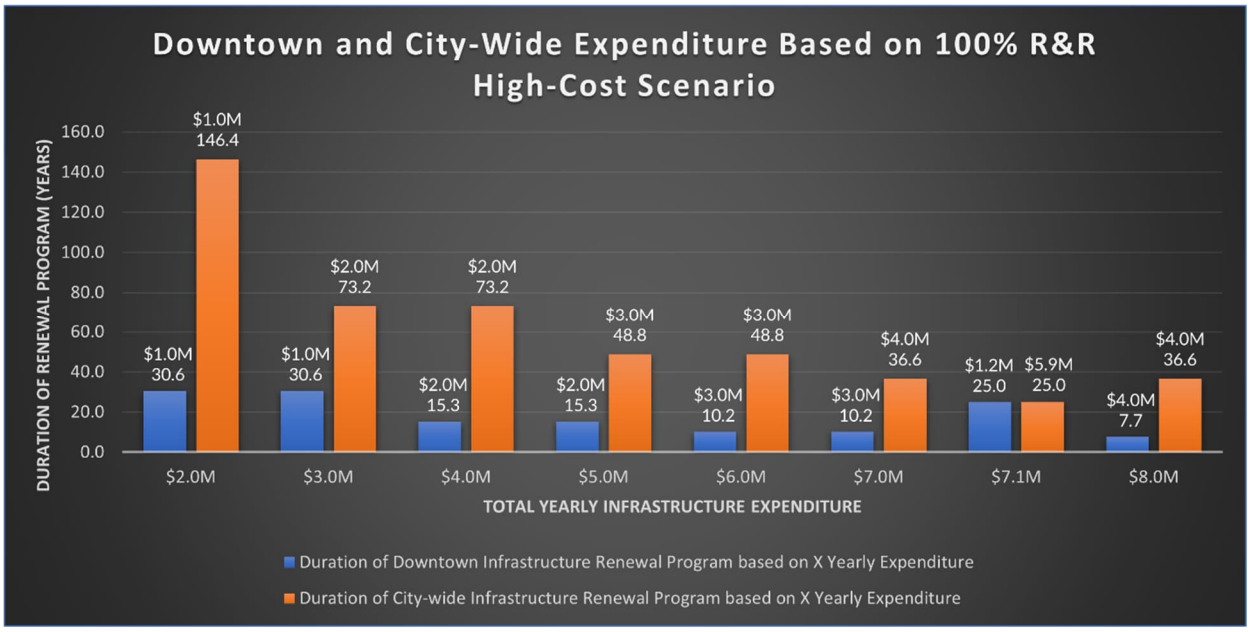
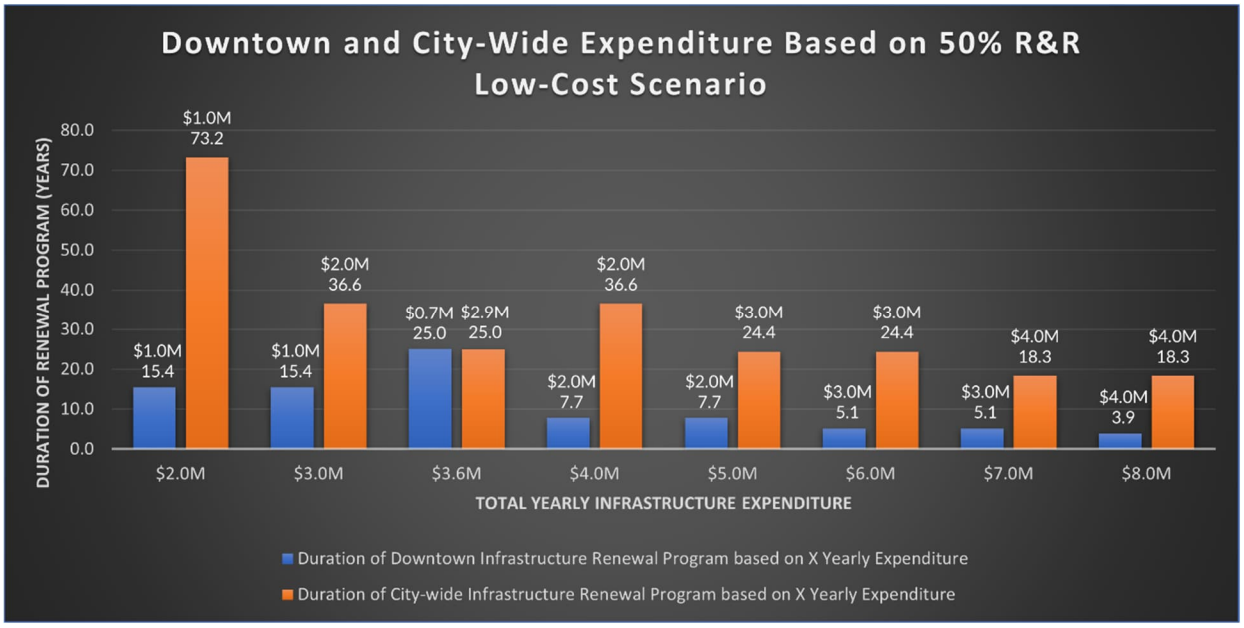


Figure 4-3 Budget Allocation Options for Low-Cost Scenario



Based on the analysis summarized in **Figure 4-2** and **Figure 4-3**, the following should be considered in deciding the preferred budget allocation:

1. The smaller the budget, the longer it will take to complete the replacement programs. This will lead to further deterioration of infrastructure condition and increased risk of failure.
2. A larger budget allocation will allow replacement of more infrastructure assets. The replacement program can be completed in relatively shorter time, which will address deterioration and minimize the risk of failure.

Based on the above analysis, a baseline Annual Average Budget based on a 25-year implementation period is recommended. The total annual budget allocation for both City-wide and Downtown work should range from **a minimum of $3,561,000 (Low-Cost Scenario) to a maximum of $7,106,000 (High-Cost Scenario)**.

4.4 25-Year CIRP

A potential approach to the implementation of the 25-Year City-wide rehabilitation plan, based on the **low-cost scenario** annual budget of approximately **$3,000,000**, is identified in **Table 4-5**. The 25-year plan is separated into nine multi-year phased work packages to provide the City with construction sequencing and budgeting flexibility. This is consistent with the accepted approach to phasing that is presented in the Downtown Infrastructure Renewal Plan.

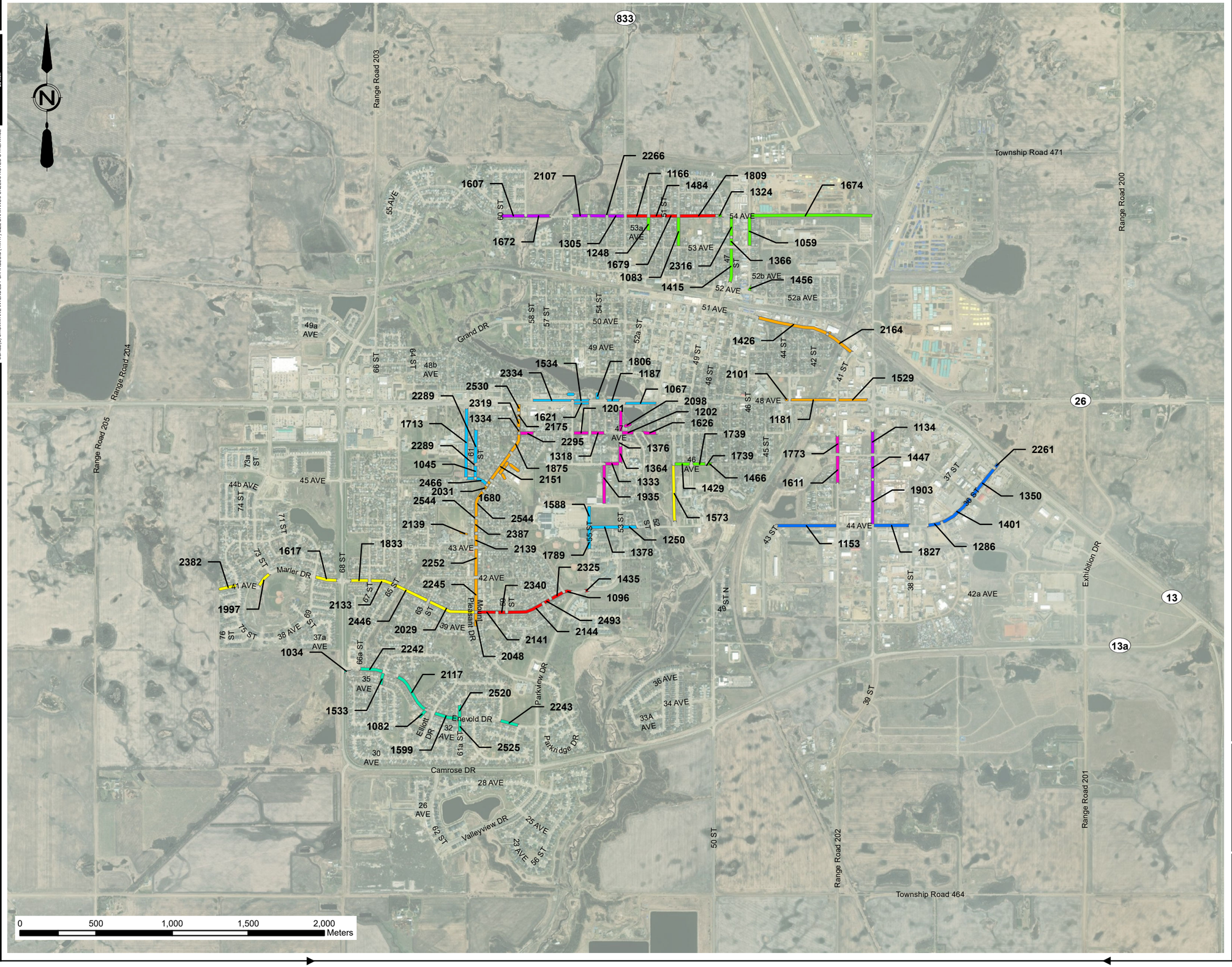
An annual expenditure of $3,000,000 is insufficient to address all high priority blocks, consequently, the prioritization of the identified blocks was based on the total risk scores, in consideration of cost, location, and proximity to adjacent projects for sequential improvements where possible. Furthermore, this plan assumes a full replacement of each asset within each block. **Figure 4-4** presents a map of the potential 25-Year CIRP Plan. **Figure 4-5** presents a map of the high priority blocks that would not be addressed following this 25-year sequencing approach.

For the purposes of this report, the 25-year sequencing plan only identifies high priority blocks. Medium or low priority block that exist between two high priority blocks were not included and are not shown in the tables and figures. However, rehabilitation or replacement of contiguous sections of infrastructure should be considered during the design phase.

IF NOT 25 mm ADJUST SCALES 25 mm

SCALE (S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE

DATA SOURCE: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community; Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



0 500 1,000 1,500 2,000 Meters

Associated Engineering

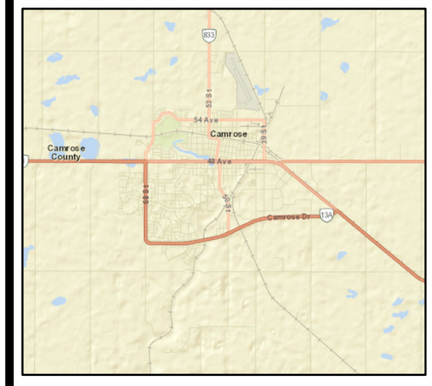
CANADA'S BEST MANAGED COMPANIES Platinum member

Legend:

- 2023-2025
- 2026-2028
- 2029-2031
- 2032-2034
- 2035-2037
- 2038-2040
- 2041-2043
- 2044-2046
- 2047-2048

Approximate Total Utility Lengths

Water Main:	13,569 m
Sanitary Sewer:	16,299 m
Storm Sewer:	12,345 m



CITY OF Camrose

FIGURE 4-4

CITY OF CAMROSE 25-YEAR INFASTRUCTURE REHABILITATION PLAN

25-YEAR CIRP

AE PROJECT No.	2022-3374
SCALE	1:3,500
APPROVED	D.FRIESEN
DATE	2024JAN30

Table 4-5 CIRP 25-Year Sequencing Plan (Based On Low-Cost Scenario Budget)

Rehabilitation Year	Street	Block ID	Block Score	Total Cost[1]	Watermain Length	Sanitary Sewer Length	Storm Sewer Length
2023-2025	Marler Drive	1096	32.5	$589,000	0	122	88
	Marler Drive	2325	46.5	$677,000	93	99	95
	Marler Drive	2493	52.5	$498,000	63	109	62
	Marler Drive	2144	52.5	$1,948,000	251	240	289
	Marler Drive	2340	30	$139,000	63	63	0
	Marler Drive	2141	52.5	$992,000	134	44	167
	Marler Drive	1435	27	$440,000	72	43	78
	54 Ave	1166	52.5	$876,000	155	155	155
	54 Ave	1484	49.5	$890,000	98	100	197
	54 Ave	1679	31.5	$208,000	99	99	0
	54 Ave	1809	55.5	$1,320,000	258	267	230
2023-2025 Total				**$8,577,000**	**1,286**	**1,341**	**1,361**
2026-2028	Mt. Pleasant Drive	2530	27	$236,000	0	67	66
	Mt. Pleasant Drive	2175	49.5	$306,000	39	28	100
	Mt. Pleasant Drive	2319	37.5	$136,000	62	73	0
	Mt. Pleasant Drive	1334	49.5	$128,000	29	29	29
	Mt. Pleasant Drive	1875	55.5	$812,000	145	148	150
	Mt. Pleasant Drive	2151	55.5	$1,494,000	225	409	213
	Mt. Pleasant Drive	2508	55.5	$223,000	31	37	43
	Mt. Pleasant Drive	2031	49.5	$215,000	57	51	42
	Mt. Pleasant Drive	2544	37.5	$328,000	196	122	0

Rehabilitation Year	Street	Block ID	Block Score	Total Cost[1]	Watermain Length	Sanitary Sewer Length	Storm Sewer Length
	Mt.Pleasant Drive	2387	37.5	$199,000	94	94	0
	Mt.Pleasant Drive	2139	37.5	$238,000	146	97	0
	Mt.Pleasant Drive	2252	46.5	$752,000	194	97	194
	Mt.Pleasant Drive	2245	37.5	$452,000	222	227	0
	Mt.Pleasant Drive	2048	30	$212,000	101	101	0
	48 Ave	1181	49.5	$178,000	38	97	55
	48 Ave	1529	37.5	$472,000	234	235	0
	48 Ave	2101	40.5	$192,000	50	0	73
	51 Ave	1426	46.5	$945,000	571	414	351
	51 Ave	2164	43.5	$704,000	203	27	200
2026-2028 Total				**$8,222,000**	**2,637**	**2,353**	**1,516**
2029-2031	Marler Drive	2029	37.5	$2,059,000	0	326	431
	Marler Drive	2446	43.5	$1,920,000	266	243	259
	Marler Drive	2133	36	$884,000	0	167	164
	Marler Drive	1833	51	$976,000	204	122	150
	Marler Drive	1617	37.5	$945,000	398	270	0
	Marler Drive	1997	43.5	$672,000	133	140	139
	50 Street	1573	36	$1,127,000	0	318	42
	51 Street	2382	29	$638,000	118	45	128
2029-2031 Total				**$9,221,000**	**1,119**	**1,631**	**1,314**
2032-2034	46 Ave	1739	46.5	$572,000	100	99	105
	46 Ave	1429	27	$604,000	0	202	147
	46 Ave	1466	28.5	$100,000	47	48	0
	47 Street	2316	34.5	$253,000	0	66	64
	47 Street	1366	37.5	$297,000	195	95	0

Rehabilitation Year	Street	Block ID	Block Score	Total Cost[1]	Watermain Length	Sanitary Sewer Length	Storm Sewer Length
	47 Street	1415	27	$779,000	0	217	223
	54 Ave	1674	49.5	$2,431,000	748	830	191
	54 Ave	1324	45	$444,000	54	50	101
	46 Street	1059	37	$1,719,000	192	203	300
	46 Street	1456	33	$871,000	300	105	112
	52 Street	1248	32.5	$201,000	101	99	0
	50 Street	1083	37.5	$421,000	197	226	0
2032-2034 Total				**$8,692,000**	**1,933**	**2,242**	**1,242**
2035-2037	44 Ave	1153	39	$3,784,000	53	675	576
	44 Ave	1827	30	$1,693,000	683	590	0
	44 Ave	1286	28.5	$440,000	206	30	121
	36 Street	1401	33	$717,000	23	208	210
	36 Street	1350	30	$1,586,000	57	360	319
	36 Street	2261	33	$301,000	40	44	77
2035-2037 Total				**$8,521,000**	**1,063**	**1,907**	**1,303**
2038-2040	54 Ave	1607	30	$930,000	288	233	166
	54 Ave	1672	30	$954,000	0	284	160
	54 Ave	2107	30	$530,000	0	118	117
	54 Ave	2266	30	$556,000	0	118	122
	54 Ave	1305	39	$631,000	115	118	108
	39 Street	1903	37.5	$862,000	0	122	153
	39 Street	1447	37.5	$4,054,000	0	244	669
	39 Street	1134	28.5	$1,139,000	0	169	264
2038-2040 Total				**$9,656,000**	**404**	**1,404**	**1,760**
2041-2043	41 Street	1611	35	$1,671,000	290	244	360
	41 Street	1773	33	$1,071,000	249	243	133
	47 Ave	1626	39	$902,000	169	225	114
	47 Ave	1202	33	$472,000	99	232	0

Rehabilitation Year	Street	Block ID	Block Score	Total Cost[1]	Watermain Length	Sanitary Sewer Length	Storm Sewer Length
	47 Ave	1318	30	$571,000	99	257	97
	47 Ave	1201	31.5	$281,000	29	0	126
	47 Ave	2295	37	$997,000	109	203	197
	54 Street	1935	39	$1,091,000	353	326	93
	46 Ave	1333	33	$433,000	106	101	101
	53 Street	1364	31.5	$543,000	212	102	99
	53 Street	1376	27	$453,000	131	102	77
	53 Street	2098	27	$725,000	0	301	143
2041-2043 Total				**$9,210,000**	**1,846**	**2,335**	**1,540**
2044-2046	48 Ave	2334	34.5	$142,000	119	0	29
	48 Ave	1534	37	$613,000	29	64	169
	48 Ave	1621	37.5	$188,000	59	119	0
	48 Ave	1187	37.5	$574,000	145	106	0
	48 Ave	1067	34.5	$712,000	0	189	127
	48 Ave	1806	33	$403,000	71	152	0
	Comp Road	1713	36	$1,365,000	341	301	264
	45 Ave	1680	28	$415,000	103	122	53
	45 Ave	2466	37	$458,000	91	51	89
	61 Street	2289	29	$501,000	226	226	40
	61 Street	1045	37	$282,000	103	28	142
	55 Street	1588	31.5	$1,109,000	228	100	341
	55 Street	1789	30	$1,002,000	344	113	0
	44 Ave	1378	33	$465,000	283	168	0
	44 Ave	1250	30	$269,000	156	113	0
2044-2046 Total				**$8,498,000**	**2,300**	**1,853**	**1,256**
2047-2048	Enevold Drive	1034	27	$265,000	0	139	41
	Enevold Drive	2242	36	$731,000	0	115	292
	Enevold Drive	2117	31.5	$894,000	0	219	207

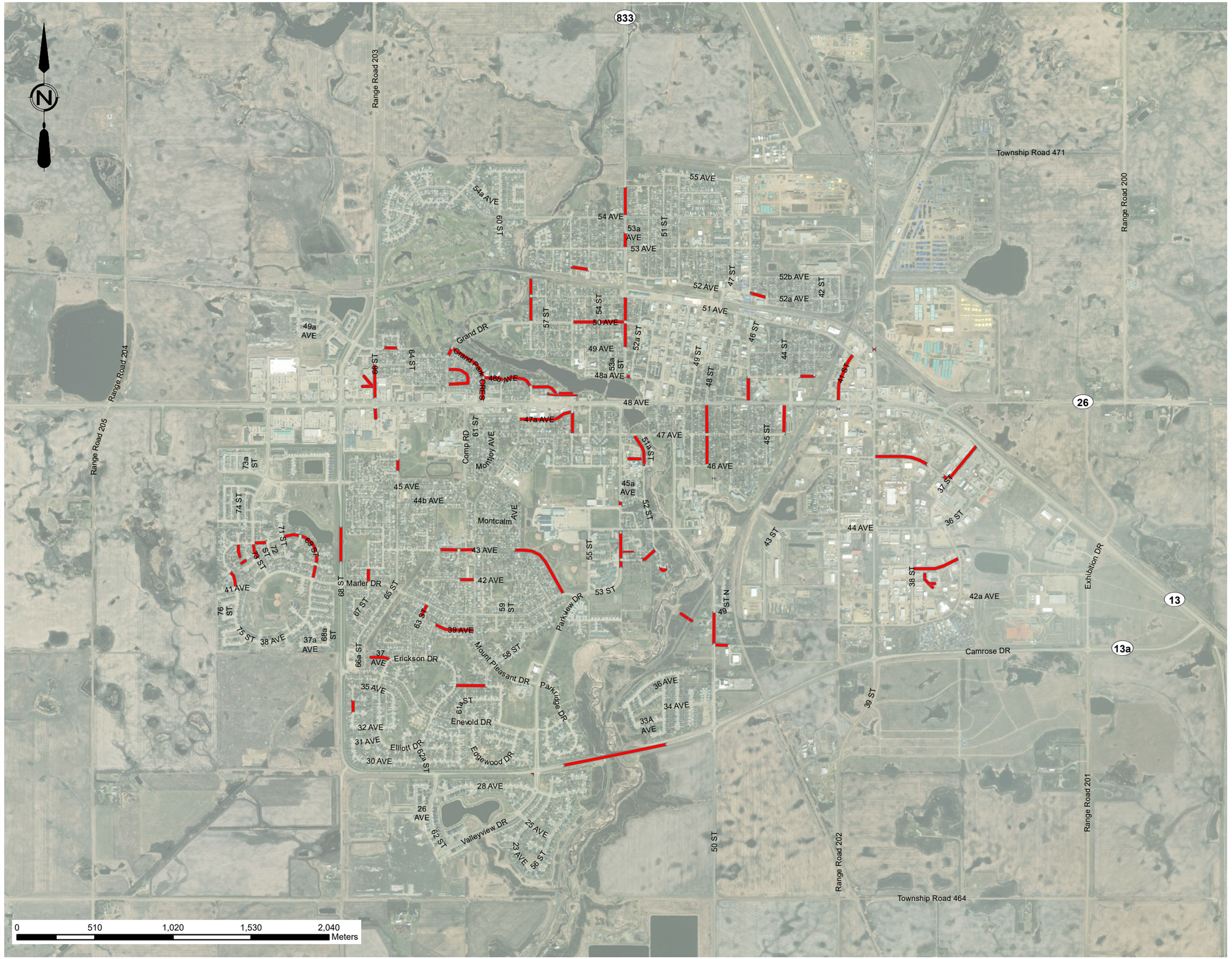
Rehabilitation Year	Street	Block ID	Block Score	Total Cost[1]	Watermain Length	Sanitary Sewer Length	Storm Sewer Length
	Enevold Drive	1599	28.5	$898,000	182	0	175
	Enevold Drive	2243	31.5	$789,000	133	133	208
	Erickson Drive	1533	32.5	$348,000	96	202	0
	62a Street	1082	37.5	$782,000	397	215	0
	61a Street	2525	46.5	$750,000	70	180	132
	61a Street	2520	30	$132,000	102	29	0
2047-2048 Total				**$5,589,000**	**981**	**1,233**	**1,055**
25-Year Plan Total				**$76,186,000**	**13,569**	**16,299**	**12,345**

[1] Total Costs include a 12% Engineering Fee, 5% Emerging Issues Fund, and 20% Contingency Fund, based on 2023 dollars.

IF NOT 25 mm ADJUST SCALES
25 mm

SCALE (S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE

DATA SOURCE: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

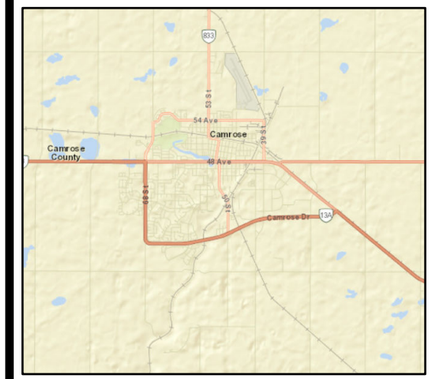


Associated Engineering

BEST MANAGED COMPANIES
Platinum member

Legend:

High Priority



CITY OF Camrose

FIGURE 4-5

CITY OF CAMROSE 25-YEAR
INFASTRUCTURE REHABILITATION PLAN

HIGH PRIORITY BLOCKS REMAINING
AFTER 25-YEAR $3M/YEAR EXPENSE

AE PROJECT No.	2022-3374
SCALE	1:3,500
APPROVED	D.FRIESEN
DATE	2024JAN30

5 ANALYSIS SUMMARY

1. The rehabilitation candidates identified for the 2023-2047 CIRP were prioritized using a risk-based criteria.
2. The CIRP methodology prioritizes utilities and assets in specific critical geographic areas.
3. The CIRP includes 32.3 km of water mains, 27.8 km of sanitary mains, and 23.2 km of stormwater mains to be replaced.
4. The overall high-cost budget for the CIRP is **$146,423,000.**
5. The overall low-cost budget for the CIRP is **$73,212,000.**
6. The annual CCTV Inspection Program budget is **$306,000** on a 10-year cycle.
7. To rehabilitate all high priority assets across the City over the 25-year plan, an annual budget of approximately **$5,857,000** will be required.
8. A potential approach to the 25-year renewal based on a budget of approximately **$3,000,000** per year could address up to 13.6 km of water mains, 16.3 km of sanitary mains and 12.3 km of sewer mains.

For budgetary purposes, this assessment applied high-level rehabilitation strategies. Engineering design and analysis will be required to determine suitable rehabilitation strategies as projects are implemented. Further analysis and field confirmation of the existing condition of the utility will yield alternative and innovated rehabilitation strategies to reduce the length of utility that must be replaced. For example, trenchless methods of relining or replacing existing pipe may be feasible and would reduce costs while reducing impact to the adjacent properties. There are utilities that do not meet the City's current development standards, but this alone should not warrant rehabilitation. Functionality and sustainability must be considered in the determination of the rehabilitation.

General redevelopment across the City may ultimately impact the priority of rehabilitation. The redevelopment is linked to the infrastructure capacity and may drive infrastructure upgrades. As such, the City will need to consider the CIRP in any future redevelopment plans and adjust priorities accordingly.

6 RECOMMENDATIONS

The following recommendations are made:

1. Implementation of 25-Year **CIRP and DIRP** at a total budget allocation ranging from a minimum total budget of **$88,988,000** (Low-cost scenario) to a maximum of **$177,648,000** (High-cost scenario).
2. Total **annual** budget allocation for the **CIRP and DIRP** ranging from a minimum of **$3,561,000** (Low-cost scenario) to a maximum of **$7,106,000** (High-cost scenario).
3. Implementation of a CCTV Inspection Program to verify the condition of underground assets at a total cost of **$3,060,000** for the CIRP and **$414,000** for the **DIRP**. This program can be implemented on a 10-year timeline.
4. Allocation of a portion of the annual budget for engineering fees for the preparation of the **design and tender packages** for the subsequent year's projects. These costs should cover any additional data collection, pre-design, and detailed design required for a rehabilitation project. An allowance equivalent to 12% of the anticipated construction costs is recommended.
5. Allocation of a portion of the annual budget to address emerging issues. This will cover potential scope creep that typically arises during implementation of a renewal program. An allowance equivalent to 5% of the anticipated construction costs is recommended.
6. The City should retain a portion of each year's uncommitted budget for a contingency fund to cover fluctuation in the construction market, and potential costs unforeseen during pre-design stages. A sum equal to 20% of the anticipated construction costs should be considered.
7. The City should review the 25-Year CIRP on 3-to-5-year cycles, based on condition assessment data, and re-prioritizing infrastructure needs.
8. The City should consider additional identification labels for their GIS system to group underground assets by geographic location and roadway. Presently, there is no intuitive way of connecting underground assets with their location aside from visually in GIS maps. This could provide an improved means of tracking surface and underground project overlaps.
9. Concurrently with the preparation of this report, the City continued with their utility upgrade and replacement planning across the City. Consequently, at the time of report writing, construction has been completed on the utility replacements on Marler Drive between Mount Pleasant Drive and Parkview Drive, and further replacement work had been planned for Marler Drive between Mount Pleasant Drive and 68th Street for 2024. This report identified these areas as very high priority replacements. The City should reference these newly completed projects when reviewing the report recommendations and adjust their replacement priorities with consideration for the work already completed.

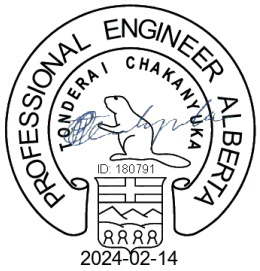
CLOSURE

This report was prepared for the City of Camrose to provide program development information and data for the 2023-2047 Camrose Infrastructure Replacement Plan.

The services provided by Associated Engineering Alberta Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No other warranty expressed or implied is made.

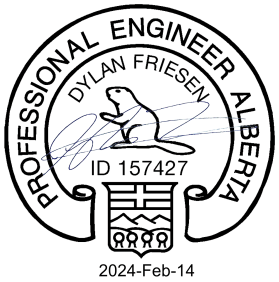
Respectfully submitted,

Associated Engineering Alberta Ltd.



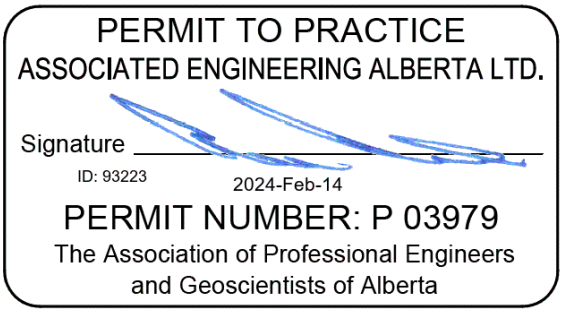
2024-02-14

Tonderai Chakanyuka, MBA, P.Eng., PMP, C.Eng. M.I.C.E
Project Manager



2024-Feb-14

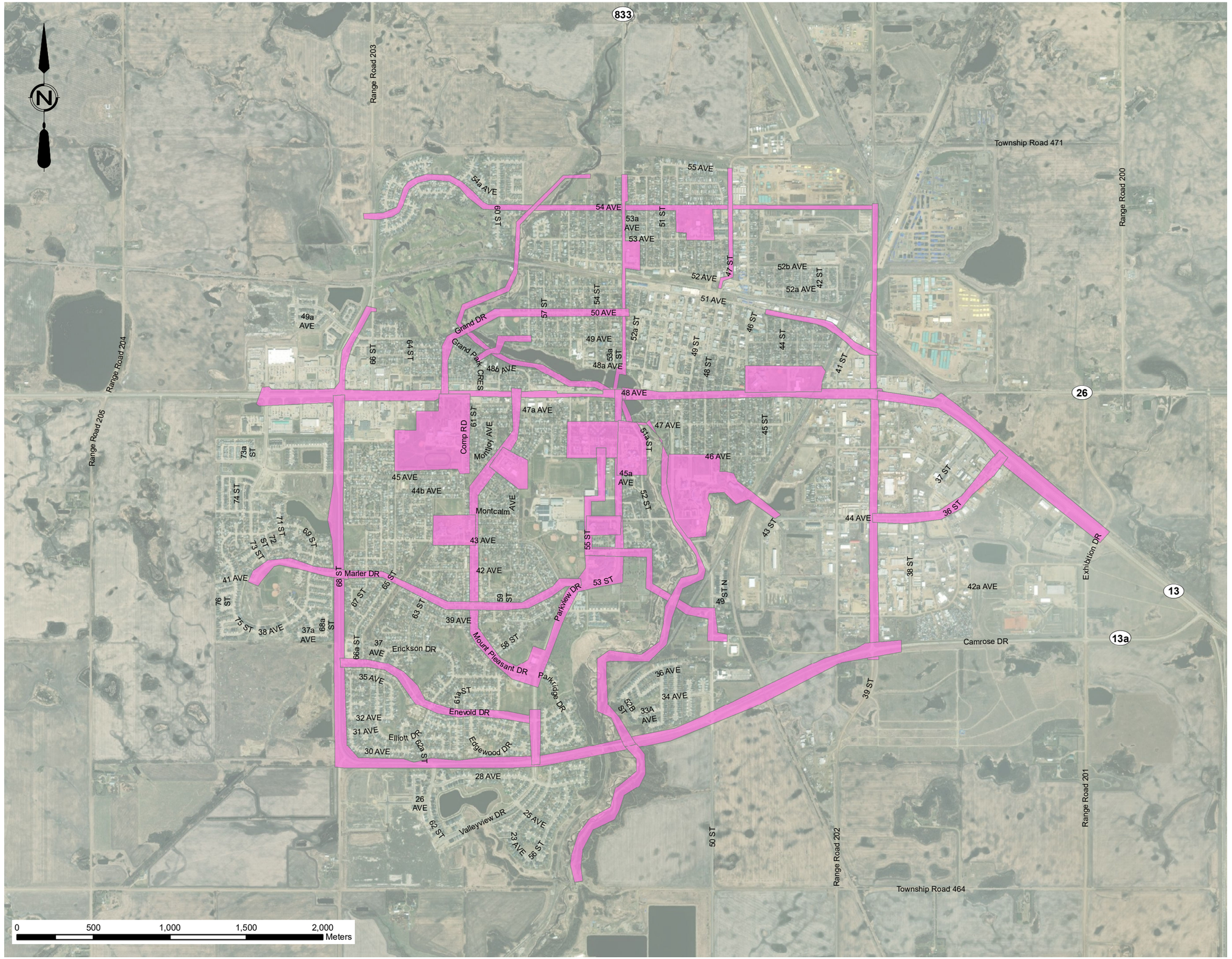
Dylan Friesen, P.Eng.
Project Engineer



APPENDIX A - FIGURES

IF NOT 25 mm ADJUST SCALES
25 mm

SCALE (S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- Areas and assets prioritized by the City of Camrose

Associated Engineering

BEST MANAGED COMPANIES
Platinum member

CITY OF Camrose

FIGURE A-1

CITY OF CAMROSE -25 YEAR INFASTRUCTURE REHABILITATION PLAN

INFRASTRUCTURE ASSETS AND AREAS PRIORITIZED BY THE CITY OF CAMROSE

AE PROJECT No.	2022-3374
SCALE	1:24,000
APPROVED	
DATE	2023JUL14
REV	
DESCRIPTION	ISSUED FOR DRAFT

SAVE DATE: 7/7/2023 10:48:48 AM SAVED BY:
DRAWING PATH: C:\2022-3374_25YRCamroseInfastructurePlan\RiskAssessment\RiskAssessmentPriority2.mxd
DATA SOURCE: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

APPENDIX B - SUMMARY TABLES

Table B-1 - High Priority Assets

Block ID	Water Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Water Asset Score	Sanitary Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Sanitary Asset Score	Storm Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Storm Asset Score
1008						1162	600	63	$ 111,000	8	1330	600	37	$ 65,000	6
1008											1439	1200	52	$ 172,000	18
1008											1801	1220	42	$ 139,000	22.5
1008											1926	900	78	$ 218,000	13.5
1008											2212	600	85	$ 149,000	9
1008											2391	900	74	$ 207,000	13.5
1020	497	150	106	$ 74,000	15	926	200	93	$ 72,000	10	1434	910	91	$ 254,000	9
1027	426	200	52	$ 40,000	10	138	200	127	$ 98,000	10	959	0	25	$ 18,000	13.5
1027	1037	200	415	$ 320,000	10	877	200	91	$ 70,000	10					
1027	1186	200	156	$ 120,000	6	883	200	79	$ 61,000	10					
1027						1305	200	59	$ 46,000	10					
1027						1492	200	124	$ 96,000	10					
1027						1775	600	150	$ 262,000	8					
1032	1240	200	354	$ 273,000	15	69	300	71	$ 65,000	15	740	600	31	$ 54,000	9
1034						1692	380	103	$ 116,000	22.5	2042	300	41	$ 37,000	4.5
1034						1824	380	36	$ 40,000	22.5					
1036	367	150	2	$ 1,000	9	841	450	120	$ 151,000	9					
1036	417	200	12	$ 9,000	6										
1036	557	200	21	$ 16,000	6										
1036	558	450	15	$ 24,000	9										
1036	1223	200	44	$ 34,000	9										
1045	656	150	103	$ 72,000	15	1379	200	28	$ 21,000	10	852	0	55	$ 38,000	12
1045											1207	250	90	$ 74,000	4
1059	559	150	192	$ 135,000	15	748	200	101	$ 78,000	10	907	1050	109	$ 326,000	12
1059						1298	200	101	$ 78,000	10	2339	1200	196	$ 638,000	8
1067						81	380	35	$ 39,000	22.5	1081	910	130	$ 354,000	12
1067						410	300	52	$ 48,000	10					
1067						1552	200	102	$ 79,000	15					
1069	138	200	83	$ 64,000	15	1362	200	88	$ 68,000	15					
1082	341	250	291	$ 265,000	15	190	380	85	$ 95,000	22.5					
1082	503	250	49	$ 44,000	12	1044	200	56	$ 43,000	6					
1082	752	150	57	$ 40,000	9	1250	380	75	$ 84,000	22.5					
1083	1207	150	197	$ 138,000	15	933	200	155	$ 120,000	15					
1083						1944	150	71	$ 50,000	22.5					
1096						996	300	87	$ 79,000	10	2137	1350	88	$ 307,000	22.5
1096						1948	450	35	$ 44,000	9					
1101	654	200	86	$ 66,000	10	145	380	86	$ 96,000	15	2104	900	102	$ 276,000	9
1101						162	250	55	$ 46,000	10					
1101						670	200	48	$ 37,000	15					
1101						1726	380	38	$ 43,000	22.5					
1125	501	150	140	$ 98,000	6	1598	200	53	$ 41,000	10	2434	200	33	$ 25,000	2
1125	726	150	51	$ 36,000	15	1737	200	36	$ 27,000	4					
1129	779	250	233	$ 212,000	10	379	200	89	$ 69,000	10	918	680	42	$ 84,000	6
1129						445	200	119	$ 91,000	4	2085	1050	73	$ 223,000	12
1129						1075	250	38	$ 32,000	10	2127	1050	73	$ 222,000	12
1129						1549	250	54	$ 45,000	10					
1130	987	200	134	$ 103,000	15	51	200	74	$ 57,000	15					
1130						694	200	54	$ 41,000	15					
1130						1462	600	120	$ 210,000	12					
1130						1463	600	117	$ 204,000	8					
1134						443	200	85	$ 65,000	15	741	760	75	$ 183,000	13.5
1134						1190	200	85	$ 65,000	15	1319	910	56	$ 159,000	13.5
1134											1965	910	76	$ 211,000	13.5
1134											2201	760	61	$ 153,000	13.5
1137	88	150	9	$ 6,000	6	1393	0	100	$ 70,000	9	818	300	38	$ 34,000	2
1137	97	200	59	$ 45,000	4						1314	400	41	$ 48,000	2
1137	164	150	44	$ 31,000	6						1477	450	85	$ 107,000	2
1137	682	200	127	$ 98,000	10						2357	610	142	$ 245,000	4
1137	689	200	19	$ 15,000	4										
1137	1189	150	73	$ 51,000	6										
1153	161	250	26	$ 24,000	6	38	200	39	$ 30,000	4	247	1500	60	$ 223,000	10
1153	2735	0	27	$ 17,000	9	197	680	34	$ 71,000	10	312	1200	79	$ 259,000	8
1153						384	450	102	$ 128,000	18	754	1200	73	$ 236,000	8
1153						417	530	71	$ 104,000	8	857	900	40	$ 109,000	9
1153						941	680	114	$ 240,000	10	1735	450	29	$ 36,000	3
1153						964	600	70	$ 122,000	8	1795	1200	124	$ 397,000	8
1153						1128	200	90	$ 69,000	6	2242	450	83	$ 103,000	2
1153						1150	600	36	$ 63,000	8	2449	1200	102	$ 328,000	12
1153						1331	600	120	$ 210,000	8				$ -	
1166	534	150	15	$ 10,000	13.5	176	300	155	$ 141,000	12	2361	840	155	$ 390,000	18
1166	868	150	140	$ 98,000	22.5										
1181	1034	150	19	$ 14,000	22.5	696	100	43	$ 27,000	13.5	822	150	55	$ 38,000	9
1181	1050	150	16	$ 12,000	22.5	859	0	54	$ 38,000	18					
1181	1241	150	3	$ 3,000	22.5										
1187	4	450	142	$ 229,000	13.5	519	600	106	$ 186,000	24					
1187	360	350	3	$ 4,000	9										
1194	1038	300	217	$ 228,000	9	690	380	36	$ 40,000	13.5					
1194						954	380	92	$ 103,000	13.5					
1194						1467	380	85	$ 95,000	13.5					
1202	113	200	87	$ 67,000	9	238	200	89	$ 68,000	15					
1202	1358	200	12	$ 9,000	9	450	600	82	$ 144,000	24					
1202						1181	300	61	$ 56,000	15					
1241	69	150	107	$ 76,000	9	186	250	47	$ 39,000	10	727	600	40	$ 70,000	4
1241	291	150	6	$ 5,000	13.5	484	200	99	$ 76,000	10	1178	600	42	$ 73,000	4
1241	745	150	25	$ 19,000	9	652	300	117	$ 106,000	6	1610	600	137	$ 239,000	4
1241	1156	150	198	$ 139,000	15	986	250	59	$ 50,000	10	1612	600	125	$ 219,000	4
1241	1375	250	169	$ 155,000	6	1183	250	98	$ 82,000	10					
1248	129	150	94	$ 66,000	15	613	200	99	$ 76,000	10					
1248	979	150	6	$ 4,000	22.5										
1253	966	150	127	$ 89,000	13.5	1503	200	144	$ 111,000	15					
1269	35	200	1	$ -	6	1289	200	183	$ 141,000	10	1395	840	196	$ 493,000	12
1269	200	200	1	$ -	6										
1269	1415	150	183	$ 128,000	9										
1283	208	300	6	$ 6,000	9	401	200	121	$ 94,000	15	3	300	71	$ 65,000	6
1283	209	300	103	$ 108,000	9	1410	200	82	$ 63,000	15	1780	300	57	$ 52,000	6
1286	1119	200	206	$ 158,000	12	204	600	30	$ 52,000	12	415	310	121	$ 110,000	4.5
1305	126	300	2	$ 2,000	9	1341	250	118	$ 99,000	12	1013	840	108	$ 273,000	18
1305	1414	200	113	$ 87,000	9										
1318	906	200	99	$ 76,000	6	966	200	107	$ 83,000	10	864	530	97	$ 143,000	9
1318						1148	200	99	$ 77,000	15					
1318						1284	200	50	$ 38,000	15					

Block ID	Water Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Water Asset Score	Sanitary Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Sanitary Asset Score	Storm Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Storm Asset Score
1324	570	0	54	$ 34,000	13.5	415	0	50	$ 35,000	13.5	125	760	58	$ 140,000	18
1324											548	760	47	$ 115,000	18
1331	595	150	206	$ 145,000	15	285	200	96	$ 74,000	8	265	750	107	$ 268,000	6
1331						294	150	84	$ 59,000	9	345	900	105	$ 286,000	6
1331						1734	200	81	$ 62,000	8	1078	750	102	$ 246,000	6
1333	874	350	14	$ 16,000	9	626	200	101	$ 78,000	15	543	300	102	$ 92,000	4.5
1333	1418	400	92	$ 129,000	13.5										
1334	1014	150	29	$ 20,000	22.5	862	200	29	$ 22,000	15	2181	610	29	$ 51,000	12
1346	1487	600	572	$ 1,282,000	12	511	900	122	$ 342,000	15	2852	450	29	$ 35,000	3
1350	614	200	29	$ 22,000	6	634	600	119	$ 209,000	12	148	680	53	$ 113,000	4
1350	1438	100	28	$ 18,000	9	1059	600	121	$ 211,000	12	317	250	28	$ 24,000	2
1350						1451	600	120	$ 210,000	12	355	680	118	$ 249,000	6
1350				$ -					$ -		1796	300	92	$ 85,000	3
1350				$ -					$ -		2883	0	28	$ 21,000	9
1364	119	200	18	$ 15,000	9	574	200	71	$ 54,000	15	374	450	99	$ 125,000	3
1364	539	100	7	$ 6,000	13.5	1207	200	31	$ 24,000	15					
1364	791	350	73	$ 88,000	9										
1364	1123	200	11	$ 9,000	9										
1364	1131	200	9	$ 8,000	9										
1364	1179	200	94	$ 73,000	9										
1366	1216	150	195	$ 136,000	22.5	1169	250	95	$ 80,000	15					
1367	181	300	50	$ 53,000	4	1312	250	115	$ 96,000	9	720	600	27	$ 48,000	6
1367	528	600	126	$ 282,000	18						2261	600	88	$ 154,000	6
1367	1135	300	167	$ 176,000	9										
1375	44	150	15	$ 11,000	22.5	312	200	101	$ 77,000	10					
1375	1165	200	85	$ 66,000	10										
1378	923	200	210	$ 162,000	15	94	200	100	$ 77,000	9					
1378	1297	150	73	$ 51,000	13.5	1139	200	30	$ 23,000	15					
1378						1999	0	38	$ 27,000	18					
1401	498	200	23	$ 17,000	12	202	600	67	$ 117,000	12	765	300	62	$ 57,000	3
1401						726	600	90	$ 158,000	12	1065	300	58	$ 53,000	3
1401						1155	300	22	$ 20,000	6	1649	300	89	$ 81,000	3
1401						2007	0	30	$ 21,000	18					
1410	593	150	160	$ 112,000	13.5						1015	680	80	$ 167,000	6
1410											1620	600	83	$ 146,000	6
1414	141	150	76	$ 54,000	15	492	250	28	$ 24,000	10	113	310	109	$ 100,000	2
1414	415	150	145	$ 102,000	9	602	250	67	$ 56,000	10					
1414						1593	250	134	$ 112,000	6					
1414						1611	250	118	$ 100,000	10					
1415						648	250	95	$ 80,000	15	1523	690	158	$ 332,000	12
1415						1080	250	122	$ 103,000	15	2109	250	64	$ 54,000	4
1426	806	150	142	$ 100,000	22.5	329	200	104	$ 80,000	15	2468	0	71	$ 50,000	9
1426	2817	200	25	$ 19,000	2	383	200	103	$ 79,000	15	3420	0	120	$ 84,000	4.5
1426						596	250	101	$ 85,000	15	3422	0	79	$ 55,000	4.5
1426						1200	200	107	$ 82,000	15	3424	0	81	$ 56,000	4.5
1427						256	250	72	$ 60,000	6	751	1500	36	$ 136,000	22.5
1429						132	250	44	$ 37,000	8	192	450	40	$ 51,000	4.5
1429						467	250	104	$ 87,000	15	1536	690	107	$ 224,000	12
1429						1201	200	55	$ 42,000	6					
1432	1002	200	15	$ 12,000	6						947	0	26	$ 18,000	13.5
1432	1178	200	120	$ 92,000	9										
1435	757	300	72	$ 76,000	6	1271	750	43	$ 109,000	15	1968	600	78	$ 136,000	6
1447						874	200	122	$ 94,000	15	84	1370	128	$ 447,000	22.5
1447						1387	200	122	$ 94,000	15	1182	2130	248	$ 1,078,000	15
1447						2492					1544	1650	125	$ 516,000	10
1447											1903	2130	168	$ 731,000	15
1466	1285	150	47	$ 33,000	13.5	1195	250	48	$ 40,000	15					
1482	222	150	20	$ 14,000	13.5	631	200	38	$ 30,000	6	1797	200	93	$ 73,000	2
1482	875	150	136	$ 95,000	9						2087	450	97	$ 123,000	2
1482	951	150	144	$ 101,000	6						2138	200	97	$ 75,000	2
1482											2263	450	42	$ 54,000	3
1484	942	150	98	$ 69,000	22.5	1476	250	100	$ 84,000	9	476	840	197	$ 498,000	18
1504	547	200	297	$ 229,000	9	303	1200	58	$ 192,000	10	2809	300	25	$ 23,000	2
1504	884	200	438	$ 338,000	10	1030	1050	144	$ 445,000	10					
1504	1484	300	386	$ 405,000	4	1828	0	43	$ 30,000	6					
1504	1515	300	5	$ 6,000	6	1829	0	54	$ 38,000	6					
1504	1652	150	9	$ 6,000	9	1830	0	93	$ 65,000	3					
1529	457	150	14	$ 10,000	13.5	16	200	85	$ 66,000	15					
1529	1096	150	220	$ 154,000	22.5	566	200	85	$ 65,000	15					
1529						1082	200	65	$ 50,000	12					
1531	545	150	49	$ 34,000	22.5	292	250	99	$ 83,000	15					
1531	548	150	5	$ 3,000	13.5	1420	250	106	$ 89,000	15					
1531	572	150	8	$ 5,000	13.5										
1531	665	150	149	$ 104,000	13.5										
1531	728	150	15	$ 11,000	13.5										
1531	881	150	134	$ 94,000	22.5										
1533	436	200	96	$ 74,000	10	54	200	51	$ 39,000	10					
1533						1224	380	36	$ 40,000	22.5					
1533						1233	200	27	$ 21,000	10					
1533						1621	300	88	$ 80,000	15					
1534	910	150	29	$ 21,000	9	1570	300	64	$ 59,000	10	553	900	64	$ 178,000	12
1534											813	530	79	$ 117,000	6
1534											2272	910	26	$ 74,000	18
1537	420	200	67	$ 51,000	15	1703	200	58	$ 45,000	15					
1567	270	200	129	$ 99,000	10	1145	380	108	$ 121,000	15	2070	1200	120	$ 394,000	12
1569	770	200	77	$ 59,000	10	33	380	72	$ 80,000	15	1677	900	37	$ 105,000	9
1569											2397	900	39	$ 108,000	9
1573						116	200	48	$ 37,000	6	2417	690	42	$ 89,000	12
1573						286	600	57	$ 100,000	24					
1573						617	1200	145	$ 477,000	15					
1573						1339	600	69	$ 120,000	24					
1573						1473									
1577	10	100	73	$ 46,000	18	1268	200	67	$ 51,000	15	1644	300	28	$ 26,000	6
1577	85	200	162	$ 125,000	15	1626	200	109	$ 84,000	15					
1577	1120	200	20	$ 16,000	9										

Block ID	Water Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Water Asset Score	Sanitary Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Sanitary Asset Score	Storm Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Storm Asset Score
1585	133	300	144	$ 152,000	4	691	380	68	$ 76,000	9	793	300	29	$ 26,000	3
1585	531	350	68	$ 81,000	6						1629	900	117	$ 328,000	9
1585	988	300	120	$ 126,000	4						1781	300	29	$ 26,000	3
1585	1436	350	55	$ 65,000	4						2197	900	40	$ 113,000	9
1585				$ -					$ -					$ -	
1588	319	200	96	$ 74,000	4	252	200	23	$ 18,000	6	135	600	68	$ 120,000	4
1588	1017	400	133	$ 186,000	13.5	828	200	77	$ 59,000	9	272	600	54	$ 95,000	6
1588											1907	0	26	$ 19,000	9
1588											2219	600	78	$ 138,000	6
1588											2395	300	115	$ 105,000	3
1595	974	200	156	$ 120,000	15	1746	200	68	$ 52,000	15	436	450	91	$ 114,000	4.5
1595											533	450	107	$ 135,000	4.5
1599	81	250	182	$ 166,000	15						1104	910	91	$ 254,000	13.5
1599											1538	910	84	$ 236,000	13.5
1607	769	300	10	$ 10,000	9	495	250	112	$ 94,000	9	343	530	116	$ 171,000	6
1607	1204	200	279	$ 215,000	12	911	250	120	$ 101,000	12	2603	600	50	$ 88,000	6
1617	31	200	148	$ 114,000	15	249	380	54	$ 60,000	22.5					
1617	391	200	3	$ 2,000	15	612	380	54	$ 60,000	22.5					
1617	1177	350	247	$ 294,000	4	803	100	48	$ 30,000	18					
1617						908	380	115	$ 129,000	22.5					
1621	184	150	3	$ 2,000	22.5	135	200	87	$ 67,000	15					
1621	985	150	56	$ 39,000	22.5	962	300	32	$ 29,000	15					
1626	1858	200	80	$ 62,000	4	234	600	72	$ 125,000	12	500	300	77	$ 70,000	4
1626	1859	200	32	$ 25,000	4	864	380	28	$ 31,000	15	631	910	37	$ 103,000	9
1626	1860	150	57	$ 40,000	6	975	600	91	$ 160,000	24					
1626						1290	450	34	$ 43,000	13.5					
1629	37	200	108	$ 83,000	6	1105	200	172	$ 133,000	10	836	680	86	$ 181,000	4
1629	127	150	22	$ 15,000	6	1568	150	24	$ 17,000	6	1312	380	88	$ 98,000	2
1629	166	200	7	$ 5,000	6						2182	530	40	$ 58,000	4
1629	297	150	1	$ 1,000	9										
1629	396	200	57	$ 44,000	6										
1629	721	150	12	$ 8,000	6										
1629	1046	150	1	$ 1,000	9										
1629	1137	200	1	$ 1,000	6										
1646						785	300	122	$ 111,000	12	2295	690	55	$ 115,000	9
1646											2805	1370	46	$ 161,000	22.5
1654	390	150	43	$ 30,000	15	518	200	95	$ 73,000	10	2314	0	36	$ 26,000	6
1654	642	150	132	$ 93,000	15	712	200	40	$ 31,000	10					
1668	418	150	6	$ 4,000	13.5						1481	600	80	$ 141,000	6
1668	449	250	248	$ 226,000	4						1527	600	93	$ 164,000	6
1668	566	150	132	$ 92,000	13.5						2024	600	33	$ 59,000	6
1668	583	150	3	$ 2,000	13.5						2176	750	64	$ 162,000	9
1668	660	150	20	$ 14,000	13.5						2846	300	63	$ 58,000	2
1668	837	250	61	$ 55,000	6										
1668	1031	250	87	$ 79,000	6										
1668	1245	150	6	$ 4,000	13.5										
1668	1393	200	19	$ 14,000	9										
1672						804	530	136	$ 201,000	24	1391	600	51	$ 89,000	6
1672						805	530	147	$ 217,000	24	1977	600	109	$ 190,000	6
1674	103	150	11	$ 7,000	22.5	183	250	76	$ 64,000	15	1051	760	71	$ 178,000	9
1674	518	200	101	$ 78,000	9	257	100	40	$ 25,000	9	2381	380	27	$ 30,000	3
1674	729	150	185	$ 129,000	22.5	381	200	113	$ 87,000	6	2384	760	94	$ 236,000	12
1674	1106	150	102	$ 72,000	22.5	421	250	34	$ 29,000	15					
1674	1220	150	350	$ 245,000	22.5	795	250	58	$ 49,000	15					
1674						808	200	132	$ 102,000	9					
1674						871	250	57	$ 48,000	15					
1674						1020	250	59	$ 49,000	15					
1674						1297	250	77	$ 64,000	15					
1674						1336	250	58	$ 48,000	15					
1674						1391	250	99	$ 83,000	15					
1674						1485	250	81	$ 68,000	15					
1674						1486	250	42	$ 35,000	15					
1674						1624	250	58	$ 49,000	15					
1680	810	200	103	$ 79,000	10	640	300	48	$ 43,000	10	951	690	53	$ 112,000	8
1680						836	300	75	$ 68,000	10					
1712	364	200	178	$ 137,000	10	1471	380	75	$ 84,000	15	264	1520	62	$ 236,000	15
1712											1010	1200	38	$ 127,000	12
1712											1531	1200	40	$ 132,000	12
1712											2276	900	78	$ 220,000	9
1713	131	200	23	$ 18,000	15	110	0	82	$ 57,000	18	38	380	29	$ 34,000	3
1713	397	200	89	$ 69,000	15	287	200	93	$ 71,000	12	849	380	103	$ 116,000	3
1713	760	200	11	$ 8,000	15	735	0	83	$ 58,000	18	865	300	80	$ 74,000	0
1713	803	200	94	$ 72,000	15	919	200	43	$ 33,000	15	1758	380	69	$ 78,000	3
1713	1236	150	66	$ 46,000	15						1925	300	41	$ 38,000	0
1713	1242	200	57	$ 44,000	15						2122	380	100	$ 113,000	0
1713											2398	380	63	$ 72,000	3
1717	789	250	115	$ 104,000	9	905	200	85	$ 65,000	15					
1719	941	150	150	$ 105,000	15	896	380	45	$ 50,000	15	851	300	94	$ 85,000	4
1719						1526	380	63	$ 70,000	15					
1720	579	350	167	$ 198,000	9	412	200	86	$ 66,000	15	584	460	143	$ 181,000	6
1720						1337	200	87	$ 67,000	15	1106	380	36	$ 40,000	3
1736	70	200	150	$ 116,000	9	181	200	84	$ 65,000	15	1521	380	28	$ 31,000	4.5
1736	674	150	8	$ 5,000	13.5	569	200	88	$ 68,000	15					
1736	913	200	14	$ 11,000	9										
1739	115	150	76	$ 53,000	13.5	763	250	99	$ 83,000	15	503	840	105	$ 264,000	18
1739	183	150	25	$ 17,000	13.5										
1749	825	200	103	$ 80,000	10	345	250	101	$ 84,000	10	1741	100	57	$ 36,000	12
1766	1198	150	111	$ 78,000	9	674	250	112	$ 94,000	6	453	0	34	$ 24,000	9
1773	928	150	249	$ 174,000	15	246	380	123	$ 138,000	12	1415	750	133	$ 334,000	6
1773						295	380	120	$ 135,000	12					
1782	527	150	86	$ 60,000	9	372	380	68	$ 76,000	9	1766	530	63	$ 92,000	4
1782						486	380	78	$ 87,000	9	2467	530	64	$ 95,000	4
1789	90	400	76	$ 107,000	13.5	149	600	30	$ 53,000	12					
1789	243	400	27	$ 38,000	9	568	200	83	$ 64,000	9					
1789	508	400	83	$ 117,000	13.5										
1789	927	600	129	$ 289,000	18										
1789	1184	600	29	$ 64,000	12										
1806	1200	150	4	$ 3,000	9	1000	600	74	$ 130,000	24					
1806	1437	150	67	$ 47,000	9	1220	600	57	$ 100,000	24					
1806						1319	150	21	$ 15,000	13.5					
1809	187	150	258	$ 181,000	22.5	861	150	34	$ 24,000	12	224	840	137	$ 346,000	18
1809						1349	200	114	$ 88,000	15	404	840	40	$ 100,000	18
1809						1758	200	119	$ 92,000	15	1019	840	53	$ 133,000	18

Block ID	Water Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Water Asset Score	Sanitary Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Sanitary Asset Score	Storm Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Storm Asset Score
1833	429	200	204	$ 157,000	15	664	380	122	$ 137,000	22.5	2457	910	150	$ 419,000	13.5
1839	121	350	101	$ 121,000	4	302	600	101	$ 176,000	8	1193	1050	70	$ 216,000	8
1839	356	150	23	$ 17,000	6	930	600	99	$ 174,000	8	1371	530	98	$ 145,000	4
1839	630	350	98	$ 118,000	4	1440	600	98	$ 172,000	8	1407	1050	29	$ 90,000	8
1839	717	150	12	$ 9,000	6						1627	1050	32	$ 98,000	8
1839	718	150	12	$ 9,000	6						1949	1050	66	$ 202,000	8
1839	840	350	93	$ 112,000	4						2418	1050	76	$ 234,000	8
1839	968	150	12	$ 9,000	6										
1856	776	150	5	$ 4,000	12	1307	250	107	$ 90,000	8	324	610	131	$ 229,000	6
1856	1369	150	265	$ 185,000	12						609	530	131	$ 193,000	6
1875	241	150	145	$ 102,000	22.5	233	200	62	$ 48,000	15	420	840	60	$ 152,000	18
1875						556	200	85	$ 66,000	15	618	840	89	$ 225,000	18
1886	158	150	75	$ 52,000	15	1166	200	93	$ 72,000	10	368	0	52	$ 36,000	12
1897	80	150	3	$ 2,000	13.5	174	300	22	$ 20,000	12	2644	0	60	$ 42,000	6
1897	156	150	19	$ 13,000	13.5										
1897	1430	150	8	$ 5,000	13.5										
1903						253	200	122	$ 94,000	15	239	1370	153	$ 535,000	22.5
1935	317	150	7	$ 6,000	9	27	200	35	$ 27,000	15	1264	380	33	$ 37,000	3
1935	638	400	257	$ 361,000	13.5	350	200	63	$ 49,000	15	2426	380	60	$ 67,000	3
1935	973	400	20	$ 29,000	13.5	514	200	59	$ 46,000	2					
1935	1421	150	13	$ 10,000	9	667	200	115	$ 88,000	15					
1935	2746	200	55	$ 43,000	2	1097	150	54	$ 38,000	22.5					
1943	1078	150	129	$ 90,000	15	822	200	37	$ 28,000	10	1075	380	37	$ 41,000	3
1943						1351	200	41	$ 31,000	10					
1943						1652	200	70	$ 54,000	10					
1956	562	150	9	$ 6,000	13.5	175	200	129	$ 100,000	8					
1956	943	150	14	$ 10,000	13.5	1550	200	115	$ 88,000	10					
1962						55	900	85	$ 239,000	15	161	900	145	$ 406,000	9
1962						539	900	203	$ 568,000	22.5	328	900	52	$ 144,000	9
1962						866	200	34	$ 27,000	4	393	600	64	$ 112,000	4
1962						1193	900	138	$ 387,000	15	707	900	85	$ 238,000	9
1962						1490	900	109	$ 306,000	15	878	0	110	$ 77,000	9
1962						1733	900	30	$ 85,000	15	1597	900	90	$ 253,000	9
1962											1624	900	26	$ 73,000	9
1962											1759	900	29	$ 80,000	9
1962											1866	600	33	$ 58,000	6
1962											2041	900	37	$ 103,000	9
1962											2340	900	27	$ 76,000	9
1967	1208	350	297	$ 353,000	4	2001	0	26	$ 19,000	6	137	900	135	$ 377,000	6
1967	1892	0	92	$ 58,000	6						1450	380	48	$ 54,000	2
1967											1699	1800	29	$ 124,000	10
1967											2857	0	56	$ 39,000	6
1984	984	200	123	$ 95,000	6	513	250	67	$ 56,000	15					
1984						1037	250	49	$ 42,000	15					
1997	716	250	133	$ 121,000	15	552	200	48	$ 37,000	4	507	680	31	$ 65,000	9
1997						1042	250	93	$ 78,000	15	1105	0	27	$ 19,000	13.5
1997											1425	680	82	$ 171,000	9
2029						24	250	60	$ 50,000	15	799	600	102	$ 178,000	6
2029						669	250	24	$ 20,000	15	1311	1220	110	$ 361,000	22.5
2029						819	250	81	$ 68,000	15	1389	1220	65	$ 214,000	22.5
2029						1247	250	83	$ 70,000	15	1742	1070	155	$ 476,000	18
2029						1750	250	80	$ 67,000	15					
2031	657	150	57	$ 40,000	22.5	1460	250	51	$ 43,000	15	2401	610	42	$ 74,000	12
2048	54	200	101	$ 77,000	15	1186	200	101	$ 77,000	15					
2058	53	200	100	$ 77,000	10	951	200	50	$ 39,000	10	346	900	71	$ 199,000	9
2058						1773	200	96	$ 74,000	10	1828	910	66	$ 186,000	9
2079	744	250	74	$ 67,000	9	888	380	77	$ 87,000	13.5					
2082	1172	150	388	$ 272,000	6	423	200	70	$ 54,000	4	15	1220	64	$ 210,000	10
2082	1429	150	147	$ 103,000	15	672	200	122	$ 94,000	8	1468	1200	89	$ 294,000	8
2082	1941	150	78	$ 54,000	6	1769	200	73	$ 56,000	4	1858	1220	150	$ 493,000	15
2098						1178	600	89	$ 155,000	24	1239	450	143	$ 181,000	3
2098						1474	300	86	$ 78,000	10					
2098						1762	300	127	$ 115,000	10					
2101	82	150	50	$ 35,000	22.5						1005	0	34	$ 24,000	18
2101											1911	680	39	$ 81,000	6
2107						289	200	118	$ 91,000	12	1242	840	117	$ 296,000	18
2115	1469	300	245	$ 258,000	4	1816	200	87	$ 67,000	4	2544	1200	112	$ 369,000	8
2115	1471	300	322	$ 339,000	4						2554	1200	84	$ 277,000	8
2115	1475	200	14	$ 12,000	4										
2115	1476	200	20	$ 16,000	4										
2115	1479	600	4	$ 9,000	12										
2115	1480	450	689	$ 1,111,000	9										
2117						520	380	98	$ 109,000	22.5	1100	610	81	$ 141,000	9
2117						909	380	122	$ 136,000	22.5	1984	690	126	$ 265,000	9
2133						1635	380	98	$ 110,000	22.5	590	910	98	$ 274,000	13.5
2133						1695	380	69	$ 77,000	22.5	676	910	66	$ 185,000	13.5
2136	229	150	29	$ 20,000	9	483	300	101	$ 92,000	6	446	600	98	$ 171,000	6
2137	178	150	4	$ 3,000	15	8	200	116	$ 89,000	10	1409	610	113	$ 198,000	8
2137	1109	200	104	$ 80,000	10										
2139	509	150	103	$ 72,000	22.5	1123	200	97	$ 75,000	15					
2139	817	100	43	$ 27,000	18										
2141	610	200	134	$ 104,000	15	936	250	44	$ 37,000	15	1666	1350	167	$ 584,000	22.5
2142	447	150	125	$ 89,000	9	156	250	28	$ 24,000	10	605	300	77	$ 70,000	3
2142	554	150	188	$ 133,000	15	378	250	89	$ 74,000	10					
2142	713	150	1	$ 2,000	9	1113	250	26	$ 22,000	10					
2142	888	150	10	$ 8,000	9	1114	250	51	$ 42,000	10					
2142	930	150	64	$ 46,000	9	1601	200	58	$ 45,000	8					
2142	959	150	2	$ 3,000	15										
2144	122	200	251	$ 193,000	15	375	300	53	$ 48,000	15	1140	1350	167	$ 583,000	22.5
2144						586	300	65	$ 59,000	15	1570	1350	122	$ 427,000	22.5
2144						902	300	122	$ 111,000	15					
2151	87	150	225	$ 158,000	22.5	23	300	76	$ 69,000	15	526	840	41	$ 102,000	18
2151						668	200	91	$ 70,000	10	1186	840	107	$ 269,000	18
2151						671	300	136	$ 123,000	15	2148	840	66	$ 165,000	18
2151						840	450	107	$ 134,000	9					
2157	32	300	679	$ 713,000	9	1251	250	132	$ 111,000	9	95	600	133	$ 233,000	6
2157	36	600	678	$ 1,520,000	18						721	600	32	$ 56,000	6
2157	800	300	164	$ 174,000	9						850	600	85	$ 149,000	6
2157	1061	600	164	$ 369,000	18						2349	600	51	$ 90,000	6
2157	1485	200	8	$ 7,000	4										
2157	1486	600	46	$ 104,000	8										

Block ID	Water Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Water Asset Score	Sanitary Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Sanitary Asset Score	Storm Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Storm Asset Score
2164	653	150	5	$ 3,000	22.5	1439	250	27	$ 23,000	15	559	600	119	$ 208,000	6
2164	1213	150	198	$ 139,000	15						2179	600	81	$ 141,000	6
2175	425	150	39	$ 27,000	22.5	5	200	28	$ 22,000	15	1316	610	100	$ 174,000	12
2189	885	300	130	$ 137,000	9	309	200	52	$ 40,000	15					
2189	1231	150	204	$ 143,000	15	1143	200	103	$ 80,000	10					
2189	1908	150	58	$ 40,000	3										
2192	456	100	185	$ 116,000	22.5	235	300	121	$ 110,000	15	1238	300	69	$ 63,000	6
2192	953	150	39	$ 27,000	13.5	756	200	56	$ 43,000	15	1689	380	77	$ 86,000	3
2192	1122	200	2	$ 1,000	9	1203	300	96	$ 87,000	15	2120	300	25	$ 23,000	3
2218	1181	150	131	$ 92,000	15	3	200	59	$ 45,000	10	102	530	97	$ 142,000	6
2218	1420	150	62	$ 43,000	15	854	200	50	$ 38,000	10	1447	900	55	$ 153,000	12
2218											1882	900	64	$ 179,000	12
2218											2168	530	47	$ 68,000	6
2218											2825	0	34	$ 24,000	9
2242						168	380	115	$ 128,000	22.5	54	380	58	$ 65,000	3
2242											465	0	25	$ 18,000	13.5
2242											557	610	122	$ 213,000	9
2242											1808	460	87	$ 109,000	6
2243	796	250	133	$ 121,000	9	600	380	133	$ 149,000	13.5	1638	500	90	$ 133,000	9
2243											2084	500	117	$ 173,000	6
2252	751	150	194	$ 136,000	22.5	396	200	97	$ 75,000	15	430	600	101	$ 176,000	9
2252											545	600	93	$ 163,000	9
2261	576	150	40	$ 28,000	9	1831	0	44	$ 31,000	18	939	680	77	$ 161,000	6
2264	197	150	65	$ 46,000	9	79	200	67	$ 52,000	15	2206	300	56	$ 51,000	3
2264	1180	250	224	$ 204,000	6	1548	200	51	$ 39,000	12					
2264	1298	200	68	$ 52,000	15	1640	200	80	$ 62,000	6					
2264						1761	250	115	$ 97,000	8					
2266						1240	250	118	$ 99,000	12	1328	840	122	$ 307,000	18
2289	50	150	226	$ 158,000	15	987	200	118	$ 91,000	10	1068	280	40	$ 34,000	4
2289						1173	200	108	$ 83,000	10					
2295	506	150	109	$ 76,000	15	971	200	93	$ 72,000	10	558	840	93	$ 236,000	12
2295						1477	200	109	$ 84,000	10	2777	840	103	$ 260,000	12
2302	64	400	272	$ 382,000	12	1116	250	126	$ 106,000	6	1456	600	104	$ 182,000	4
2302	515	250	236	$ 215,000	4	1216	0	143	$ 100,000	9	2080	450	56	$ 70,000	2
2302	1101	250	91	$ 84,000	4										
2310	153	200	43	$ 34,000	15	325	600	23	$ 41,000	12					
2310	615	200	66	$ 52,000	15	595	200	26	$ 20,000	15					
2310	719	200	4	$ 4,000	15	1367	600	60	$ 105,000	12					
2310	854	100	95	$ 61,000	18	1731	200	82	$ 63,000	15					
2316						1234	0	40	$ 28,000	22.5	1819	690	64	$ 135,000	12
2316						1938	250	26	$ 22,000	15					
2325	852	200	93	$ 72,000	15	580	300	99	$ 91,000	9	1108	1350	95	$ 332,000	22.5
2326	1029	350	172	$ 205,000	9	300	200	91	$ 70,000	12	1151	450	96	$ 120,000	3
2326						1208	200	82	$ 63,000	15	1480	450	72	$ 91,000	3
2331	284	150	187	$ 131,000	9	868	200	125	$ 96,000	10	1241	840	134	$ 323,000	12
2331						1693	200	79	$ 60,000	10	1525	840	79	$ 200,000	12
2334	117	150	46	$ 32,000	15						1592	0	29	$ 20,000	12
2334	428	150	18	$ 13,000	22.5										
2334	500	150	55	$ 38,000	22.5										
2340	1139	200	63	$ 49,000	15	692	250	63	$ 53,000	15					
2363	2	150	31	$ 23,000	15	493	200	57	$ 44,000	10	1290	380	65	$ 72,000	3
2363	616	150	30	$ 22,000	15	793	200	61	$ 47,000	10					
2363	735	150	56	$ 40,000	6										
2363	1190	150	4	$ 3,000	15										
2382	801	250	118	$ 108,000	10	641	200	45	$ 35,000	10	935	760	45	$ 115,000	9
2382											1394	760	83	$ 208,000	9
2382															
2382															
2382															
2382															
2387	322	150	94	$ 66,000	22.5	245	250	94	$ 79,000	15					
2392	47	100	15	$ 9,000	6	548	200	60	$ 46,000	4	10	1370	110	$ 378,000	15
2392	400	100	53	$ 33,000	6						277	450	84	$ 107,000	2
2392											2348	250	45	$ 39,000	2
2392											2499	250	33	$ 29,000	2
2423	1081	150	8	$ 6,000	13.5	144	200	172	$ 133,000	15	259	530	125	$ 184,000	4
2423											1520	600	88	$ 151,000	6
2446	313	200	266	$ 205,000	15	182	200	53	$ 41,000	10	614	910	102	$ 285,000	13.5
2446						326	300	161	$ 147,000	4	839	910	76	$ 214,000	13.5
2446						406	250	122	$ 102,000	15	887	910	85	$ 229,000	13.5
2446						553	200	96	$ 74,000	10					
2446						1038	250	45	$ 38,000	15					
2446						1539	310	76	$ 69,000	15					
2464	596	150	15	$ 10,000	15	335	200	60	$ 46,000	10	240	900	51	$ 144,000	12
2464						654	200	76	$ 58,000	10	990	300	40	$ 36,000	3
2464						1280	200	75	$ 58,000	10	1148	900	71	$ 188,000	12
2464											2323	840	87	$ 218,000	12
2466	899	150	91	$ 64,000	15	952	300	51	$ 47,000	10	174	760	90	$ 224,000	12
2493	446	200	63	$ 49,000	15	882	300	52	$ 47,000	15	2143	1350	65	$ 216,000	22.5
2493						1110	300	57	$ 52,000	9					
2503	1	150	150	$ 105,000	15	218	100	41	$ 26,000	9	285	1370	100	$ 352,000	15
2503	893	150	13	$ 9,000	6	1679	200	91	$ 70,000	10	594	1370	146	$ 511,000	15
2503	1154	150	133	$ 93,000	15	1702	200	122	$ 94,000	10	1787	250	85	$ 69,000	3
2503											2075	0	75	$ 36,000	9
2503											2333	0	65	$ 34,000	9
2503											2358	450	70	$ 84,000	3
2503											2359	300	87	$ 80,000	3
2508	507	150	31	$ 22,000	22.5	1196	250	37	$ 31,000	15	2152	840	43	$ 109,000	18
2513	338	150	20	$ 14,000	12	464	300	119	$ 109,000	8	1640	600	75	$ 131,000	4
2513	412	400	225	$ 315,000	12	768	250	119	$ 100,000	8					
2513	792	150	241	$ 169,000	12										
2523	633	100	96	$ 60,000	12	584	200	45	$ 35,000	10	1072	300	40	$ 36,000	3
2523						1270	200	62	$ 47,000	10	1692	1050	30	$ 89,000	12
2525	594	200	21	$ 16,000	15	72	380	96	$ 108,000	22.5	2129	910	105	$ 292,000	9
2525	1427	250	49	$ 44,000	15	1465	200	83	$ 64,000	6	2282	250	30	$ 23,000	4.5
2530						1281	250	67	$ 56,000	15	248	600	70	$ 116,000	12

Block ID	Water Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Water Asset Score	Sanitary Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Sanitary Asset Score	Storm Asset ID	Diameter (mm)	Length (m)	Replacement Cost	Storm Asset Score
2547	59	150	14	$ 12,000	6	108	200	97	$ 75,000	10					
2547	211	200	151	$ 118,000	4										
2547	381	150	6	$ 6,000	13.5										
2547	1067	200	40	$ 32,000	4										
3334	1158	450	6	$ 10,000	9						2847	0	86	$ 60,000	6
3339	645	150	91	$ 65,000	22.5						1199	0	35	$ 23,000	9
3339											2234	0	40	$ 27,000	9
3354	1201	200	77	$ 59,000	4						2569	1500	35	$ 133,000	10
3354	1217	200	118	$ 91,000	9										
3354	1219	150	72	$ 51,000	22.5										
3354														$ -	
3394	957	200	12	$ 9,000	9						1501	1050	75	$ 230,000	12
3395	1113	150	118	$ 82,000	12										
3404	162	150	37	$ 27,000	6						2337	900	125	$ 340,000	6
3404	315	200	154	$ 120,000	4						2393	900	53	$ 142,000	6
3404	586	150	88	$ 63,000	9										
3404	799	150	61	$ 43,000	6										
3404	826	150	296	$ 208,000	12										
3404	869	150	108	$ 77,000	9										
3404	1013	150	84	$ 60,000	22.5										
3404	1237	150	154	$ 109,000	13.5										
3404	1238	200	176	$ 136,000	10										
3404	1410	300	45	$ 48,000	6										
3423	494	150	7	$ 5,000	6						1594	460	67	$ 77,000	9
3423	1385	150	74	$ 52,000	13.5						2380	460	50	$ 57,000	9
3454	251	250	16	$ 14,000	6						1921	300	95	$ 84,000	4.5
3454	962	150	205	$ 143,000	9										
3454	1224	450	4	$ 6,000	9										
		Water Sub-Total:	32,296	**$ 29,730,000**			**Sanitary Sub-Total:**	27,776	**$ 28,201,000**			**Storm Sub-Total:**	23,225	**$ 48,947,000**	