AECOM

SAULT STE. MARIE

CITY OF SAULT STE. MARIE

ROADS AND BRIDGES ASSET MANAGEMENT PLAN

FINAL | 60735219 | June 2025

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AECOM: 2015-04-13

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
Draft V0	June 30th, 2022	Draft Report – Roads and Bridges AMP		Chris Lombard	Project Manager
Final	August 4th, 2022	Final Report – Roads and Bridges AMP		Chris Lombard	Project Manager
Draft V0	May 28th, 2025	Draft Report – Roads and Bridges AMP		Chris Lombard	Project Manager
Final	June 12th, 2025	Final Report – Roads and Bridges AMP		Chris Lombard	Project Manager

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List of Abbreviations

Abbreviation	Description
AADT	Average Annual Daily Traffic
AM	Asset Management
AMP	Asset Management Plan
BCI	Bridge Condition Index
BFF	Building Faster Fund
CCBF	Canada Community-Building Fund
CHBDC	Canadian Highway Bridge Design Code
CL	Connecting Link
CIBI	Canadian Infrastructure Benchmarking Initiative
CMMS	Computerized Maintenance Management System
DFO	Department of Fisheries and Oceans Canada
DSS	Decision Support System
Ea.	Each
ESL	Estimated Service Life
FIPPA	Freedom of Information and Protection of Privacy Act
GIS	Geographic Information System
ID	Identity
km^2	Square Kilometre
LoS	Level of Service
m^2	Square Metre
MFIPPA	Municipal Freedom of Information and Protection of Privacy Act
MTO	Ministry of Transportation Ontario
N/A	Not applicable
NRBCPI	Non-Residential Building Construction Price Index
NORDS	Northern Ontario Resource Development Stream
O&M	Operations and Maintenance
O. Reg.	Ontario Regulation
OCIF	Ontario Community Infrastructure Funding
OSIM	Ontario Structure Inspection Manual
PCI	Pavement Condition Index
PCR	Pavement Condition Rating
RCR	Ride Comfort Rating
RMS	Road Management System
RSL	Remaining Service Life

1. Introduction

AECOM Canada ULC (AECOM) was retained by The City of Sault Ste. Marie (the "City") to update the asset management plan developed in 2022 to comply with the third phase (Phase III) of the Ontario Regulation 588/17 (O. Reg. 588/17) requirements in respect to its core municipal infrastructure assets. The scope of work is outlined in AECOM's proposal dated September 20, 2024, and subsequent project correspondence.

1.1 Background

Sault Ste. Marie is a City located on the St. Mary's River, North of the United States of America, bordering on two of the Great Lakes with an estimated population of 72,051 (2021). The City provides a wide range of public services to their constituents with the expectation from the public that these services are expected to function efficiently at a certain level of service. The provision of these services requires the management of the physical assets to meet desired service levels, manage risks, and to provide long term financial sustainability. These assets include, but aren't limited to roads, bridges, sidewalks, wastewater assets, stormwater management assets, landfill, fleets, buildings, and parks.

In accordance with the terms of reference for this assignment, it is understood that the City is proceeding with an asset management plan to comply with the third phase of the regulatory requirements in respect to its core municipal infrastructure assets, in accordance with O. Reg. 588/17 by July 1, 2025. The core assets to be included in the scope, as defined by the regulation, include the City's wastewater assets, stormwater management assets, roads, and bridges and culverts.

1.2 Scope and Objectives

In 2015, the City's first Asset Management Plan (AMP) was published. In 2019, by City Council approval, the Strategic Asset Management (AM) Policy came into effect. In 2022, the City published its core asset AMPs. Following that, the City developed the AMPs for its non-core assets in 2024.

Organizations that implement good AM practices will benefit from improved business and financial performance, effective investment decisions, and better risk management. Stakeholders can expect lower total asset lifecycle costs, higher asset performance, and confidence in sustained future performance.

The AMP is to capture the City's infrastructure assets and deliver a financial and technical roadmap for the management of the City's assets. The intent of this plan is to provide the means for the City to maximize value from its roads, bridges and culverts assets, at the lowest overall expense while, at the same time, enhance service levels for its residents.

The objective of this Phase III endeavours is to update all the core and non-core AMPs to comply with the July 1st, 2025, deadline set by O. Reg. 588/17. Phase III will update the AMP by incorporating the latest asset information, with a focus on:

- Updating the current AMPs to integrate proposed Levels of Service (LoS).
- Defining the lifecycle activities and associated costs required to achieve those LoS.
- Identify the available funding and any funding shortfalls.
- Document the risk(s) of failing to meet the proposed LoS for all asset classes over a 10-year period.

This 2025 AMP is an update of the 2022 AMP for the City's Roads, Bridges, and Culverts, as shown in **Table 1-1**. Other core and non-core AMPs are presented under separate reports.

Table 1-1: In-Scope Roads, Bridges and Culverts

Asset Category	Sub-Assets
Roads	Arterial, Collector, Local, and Rural Roads.
Bridges and Culverts (span > 3 m)	Vehicular Bridges, and Pedestrian Bridges.

The following elements are included within the scope of this AMP:

- Asset hierarchy, a summary of the asset inventory, including the replacement cost of the assets, the average age of the assets, pavement field condition assessment, and data gaps analysis (**Sections 2**).
- The City's LoS objectives, stakeholder identification, current LoS have been determined in accordance with the qualitative descriptions and technical metrics outlined in O. Reg. 588/17, proposed service levels, LoS forecast, and future demand drivers (**Section 3**).
- Asset lifecycle management strategies, lifecycle activities and funding needs to achieve proposed LoS, risk of not meeting proposed LoS, available funding and funding gap, and alternative (non-financial) strategies to manage funding shortfall (**Section 4** and **Section 4.3.2**).

1.3 Asset Management Provincial Requirements

O. Reg. 588/17 came into effect in 2018 and stipulates specific AM requirements to be in place within Ontario municipalities by certain key dates (**Table 1-2**). The development of this AMP is one of the steps to guide the City towards meeting the July 1st, 2025 deadline.

Table 1-2: O. Reg. 588/17: AM Planning for Municipal Infrastructure

Deadline Date	Regulatory Requirement
July 1st, 2019	All municipalities are required to prepare their first Strategic AM Policy.
July 1st, 2022	All municipalities are required to have an AM Plan for its entire core municipal infrastructure (i.e., water, wastewater, stormwater, roads, and bridges & culverts).
July 1st, 2024	All municipalities are required to have an AM Plan for infrastructure assets not included under their core assets.
July 1st, 2025	All AM Plans must include information about the LoS that the municipality proposes to provide, the lifecycle activities and associated costs needed to achieve those LoS, available funding, any funding shortfalls, and the risk of failing to meet the proposed LoS.

1.4 Relationship to Other Corporate Documents

This AMP is a tactical plan which links "top-down" strategic objectives with "bottom-up" operational activities. **Figure 1-1** demonstrates the line-of-sight between AM strategic objectives and tactical and operational AM elements, including the relationship this AMP has to the other plans in the City's hierarchy of documents.

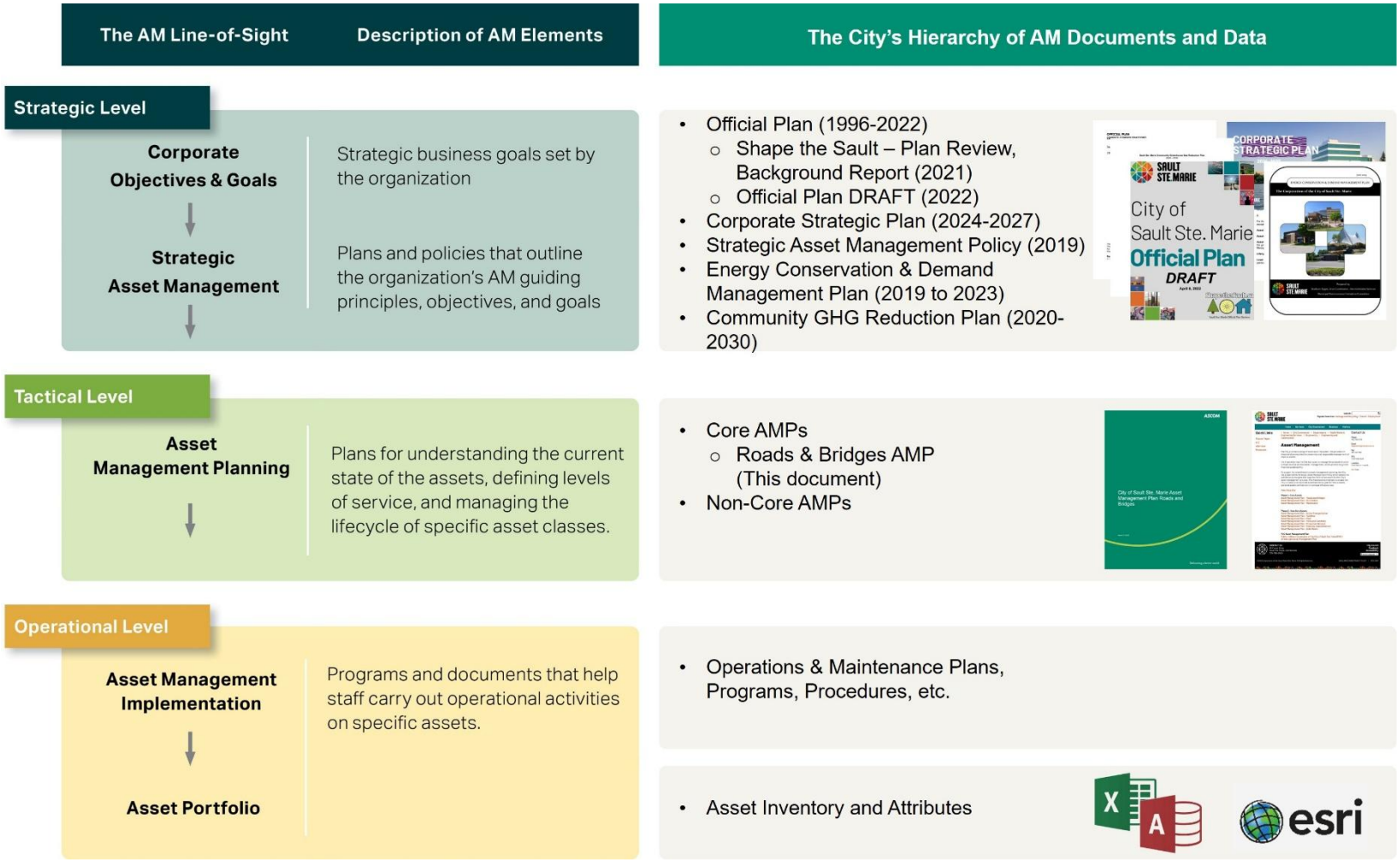


Figure 1-1: The City's Asset Management Line of Sight

2. State of Infrastructure

Understanding the basic physical state of the complex systems that support an owner's network are key to proper asset management, safe use of said infrastructure and effective delivery of service to the public. If the current condition is not known, it poses a serious problem in determining how to maintain an effective service life. As part of AECOM's mandate, a review of available roads, bridges and culverts was completed. The following sections present the results of the assessment and the current state of these assets.

2.1 Asset Hierarchy

Roads are categorized by functional class including arterial roads, collector roads, local roads, and rural roads. Bridges and culverts are divided by vehicular bridges and pedestrian bridges. The in-scope culverts are structural culverts that have a span of 3 metres or more as defined in the Ontario Structure Inspection Manual (OSIM).

Approximately 36% (25 centreline kilometres) of the arterial roads are designated as Ministry of Transportation Provincial Connecting Link roads, which move provincial traffic through the City. There also exists a connection to the United States Interstate System at the International Bridge to Michigan in the downtown core. The City continues to apply for annual funding to assist with the cost of moving provincial traffic within the municipal boundaries. The usual Ministry of Transportation Ontario (MTO) Connecting Link grant is the lesser of 90% of the project cost or $3 million, if the annual application is successful. **Figure 2-1** below presents the asset hierarchy for roads and bridges.

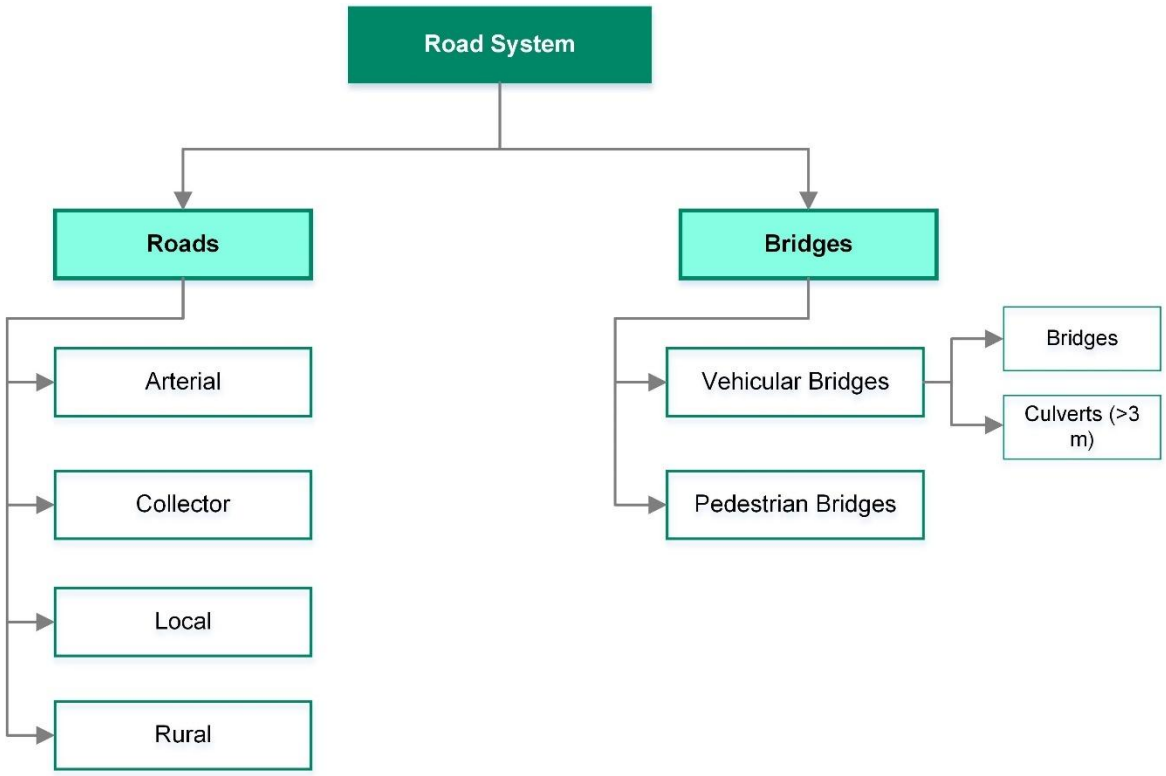


Figure 2-1: City of Sault Ste. Marie Roads, and Bridges and Culverts Asset Hierarchy

2.2 Current State of the Assets

2.2.1 Asset Inventory

The roads quantity is summarized by "*centreline kilometre"* and *"lane kilometre"*. Centreline kilometre refers to the linear distance of the road section measured at the center of the road from its starting point to its end point, while lane kilometre is used to measure the total length and lane count of a given road.

The City currently owns and maintains 531 centreline kilometres of roads, totalling 1,185 lane kilometres. Local roads account for approximately half of the road network. **Table 2-1** present the summary for the road inventory.

Table 2-1: Roads Asset Inventory

Asset Class	Asset Type (Road Class)	Centreline km	Lane-km
Roads	Arterial Roads	73	244
	Collector Roads	73	166
	Local Roads	267	537
	Rural Roads	119	238
	Total	**531**	**1,185**

Please refer to **Appendix A** for the complete roads inventory.

Figure 2-2 summarizes the pavement surface types within the City limits. Approximately 98% of the road network is predominantly constructed as high class and low-class bituminous pavement (flexible / surface treatment) with 1% constructed as a gravel roadway, and the remaining 1.5% as rigid or composite pavement.

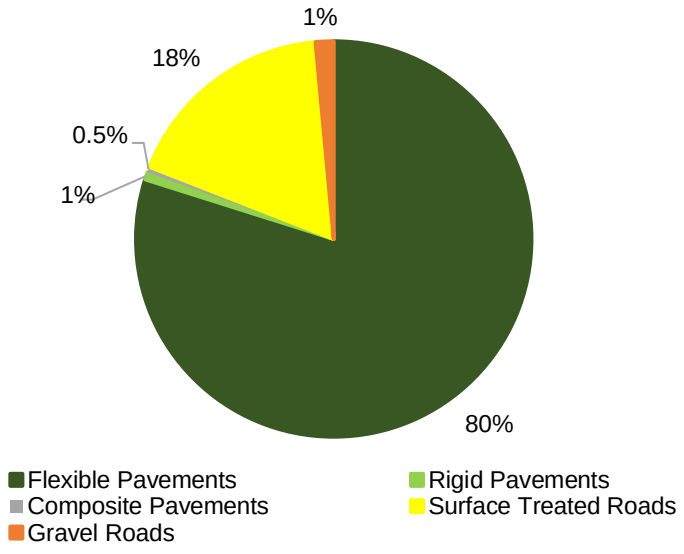


Figure 2-2: City's Pavement Surface Type by Lane km

Table 2-2 summarizes the bridges and culverts inventory. The City has a total of forty-nine bridges and structural culverts including thirty-six vehicular bridges and thirteen pedestrian bridges. Pedestrian Bridges are structures supporting pedestrian movement. Refer to **Appendix B** for complete bridges and culverts inventory including a structural level inventory and an element level inventory.

Table 2-2: Bridges and Culverts Asset Inventory

Asset Class	Asset Category	Asset Type	Quantity	Unit
Bridges and Culverts	Vehicular Bridges	Bridges	24	Ea.
		Culverts (> 3m)	12	Ea.
	Pedestrian Bridges		13	Ea.
		Total	**49**	Ea.

2.2.2 Traffic Volume Impact

Average Annual Daily Traffic (AADT) is generally the representation of the average traffic loads experienced by a roadway daily, over the course of a year. This information is very important in assessing the current structural support capabilities of a roadway, asking the question if the subject road can support current traffic but also will a road be able to support future traffic growth.

Available traffic information was provided to AECOM by the City. This traffic data was used as one of the metrics to determine the current service level of the roadway asset, pavement lifecycle strategy, as traffic loads have a significant impact on the deterioration rate and service life of the pavements. **Figure 2-3** present the traffic distribution for each road functional class.

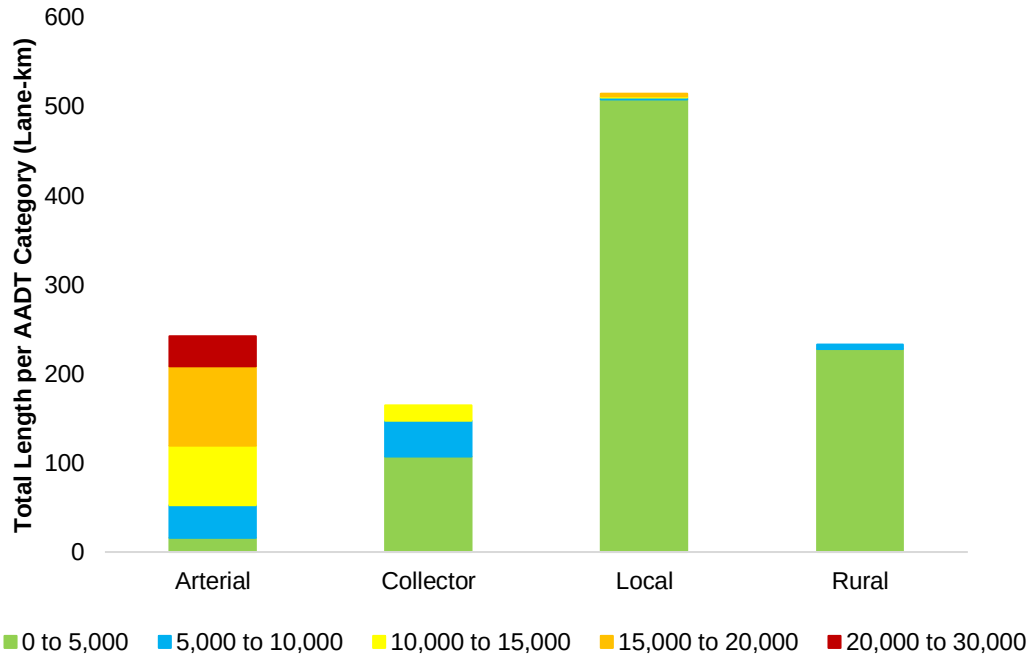


Figure 2-3: Current Traffic Volume Distribution by Functional Class

2.2.3 Current Replacement Value

The replacement value for roads in 2025 was estimated based on inflating 2022 road construction costs that includes pavement removal and reinstatement. The estimate includes a contingency cost to address specific road related ancillary items such as curbs. The total cost does not include replacement costs for underground pipes, adjacent sidewalks, and other peripheral items.

The replacement value for bridges and culverts in 2025 was estimated based on inflating unit cost per deck areas from 2016 MTO Parametric Estimating Guide, with a project markup of 45% applied to account for the cost to remove existing structure, engineering costs, contingencies, and mobility.

The total estimated replacement value of the City's roads, and bridges and culverts is $867 million. **Table 2-3** summarizes replacement values for roads and bridges. The total estimated replacement value of the City's roads is approximately $769 million. Local roads account for the majority value of the network value. The current replacement value for the City's bridges and culverts is estimated at $99 million.

Table 2-3: Roads and Bridges Current Replacement Value Summary

Asset Group	Asset Category	Unit Replacement Cost (2025)	Total Replacement Value (2025)
Roads	Arterial Roads	$1,496,000 - $3,381,000 / Centreline-km	$170,421,000
	Collector Roads	$576,000 - $3,381,000 / Centreline-km	$119,981,000
	Local Roads	$521,000 - $2,810,000 / Centreline-km	$354,334,000
	Rural Roads	$521,000 - $1,496,000 / Centreline-km	$123,476,000
Bridges & Culverts	Vehicular Bridges	$8,000- $ 12,000 / m^2	$81,231,000
	Pedestrian Bridges	$10,000 / m^2	$17,080,000
		Roads Sub-Total	**$768,211,000**
		Bridges & Culverts Sub-Total	**$98,310,000**
		Total	**$866,521,000**

2.2.4 Asset Age and Remaining Service Life

In practice, various assets will deteriorate at different rates and not necessarily linearly over time. However, it is pivotal to keep in mind the level of effort required to predict failure compared with the asset value. More sophisticated deterioration modelling may be warranted for very high value assets, whilst the cost of deterioration modeling for low-value assets may very well exceed the replacement cost of the asset. The actual service life can vary significantly from the estimated service life (ESL). The latter is defined as the period over which an asset is available for use and able to provide the required LoS at an acceptable risk and serviceability (i.e., without unforeseen costs of disruption for maintenance and repair). In some instances, a variation in expected vs. actual service life is evident due to the following factors:

- **Operating conditions and demands:** Some assets are operated intermittently or even infrequently or are being operated at a lower demand than its designed capacity. Thus, the actual operating "age" of the asset is reduced.
- **Environment:** Some assets are exposed to very aggressive environmental conditions (e.g., corrosive chemicals), while other assets are in relatively benign conditions; thus, the deterioration of assets is affected differently.
- **Maintenance:** Assets are maintained through refurbishment or replacement of components, which prolongs the service life of the asset.
- **Technological Obsolescence:** Some assets can theoretically be maintained indefinitely, although considerations such as cost to maintain the asset, its energy efficiency, and the cost to upgrade to an updated technology that would result in cost savings are likely to render this approach uneconomical.

As built construction information is currently not available for analyzing the age and remaining service life (RSL) for roads. Collecting construction date / rehabilitation date information will better represent the state of road assets and help inform future pavement AM decisions.

For bridges & culverts, **Figure 2-4** shows the average age, remaining service life, and ESL weighted by replacement value. Currently, the City's vehicular bridges are at approximately 78% through the asset's expected service life, while pedestrian bridges are about 38% through the asset's expected service life.

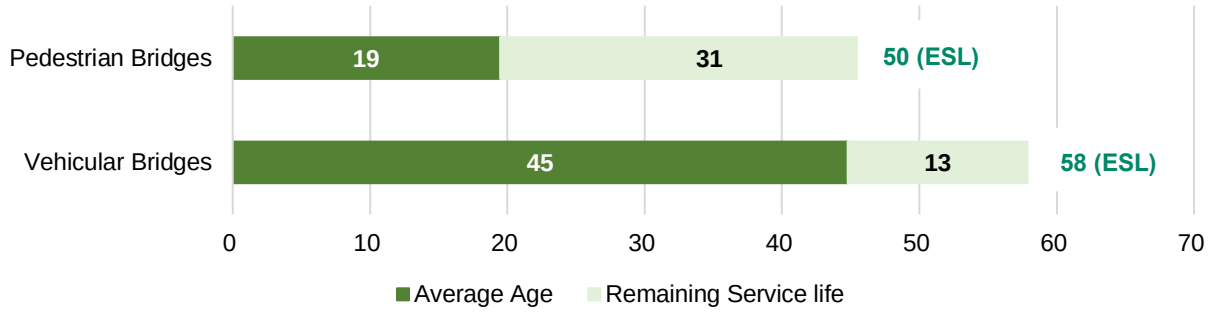


Figure 2-4: Weighted Average Age and Remaining Service Life

2.2.5 Road Condition Summary

A visual field condition survey of the City's road network was performed in Summer 2021. The condition survey was completed in accordance with the MTO guidelines including the "Manual for Condition Rating of Flexible Pavements (SP-024)", "Manual for the Condition Rating of Surface-Treated Pavements (SP-021)", and "Manual for Condition Rating of Gravel Surface Roads (SP-025)".

High resolution videos were collected for the full length of each road section in both directions of travel by driving a vehicle with two mounted cameras. The pavement condition index (PCI) was calculated by integrating Ride Comfort Rating (RCR) and Pavement Condition Rating (PCR) following the MTO guidelines and MTO Pavement Design and Rehabilitation Manual.

The PCI score (0 - worst to 100 - best) was used as an indicator for the pavement's condition. The PCI thresholds for different surface types for the condition states were adopted from the condition rating approach from MTO condition rating guidelines. **Table 2-4** shows the condition grading scale for different pavement surface types.

Table 2-4: Condition Grading Scale

Pavement Condition Rating	Flexible and Rigid Pavements		Surface Treated and Gravel Pavements	
	PCI Minimum	PCI Maximum	PCI Minimum	PCI Maximum
Very Poor	0	19	0	19
Poor	20	39	20	39
Fair	40	64	40	59
Good	65	89	60	79
Very Good	90	100	80	100

Results of AECOM's assessment indicate that in general, the City's road network is overall in Fair condition. **Figure 2-5** presents the summary of current road network condition summary weighted by replacement cost. 39% of the road network is currently in Good to Very Good Condition, 28% in Fair condition, and 33% in Poor and Very Poor Condition.

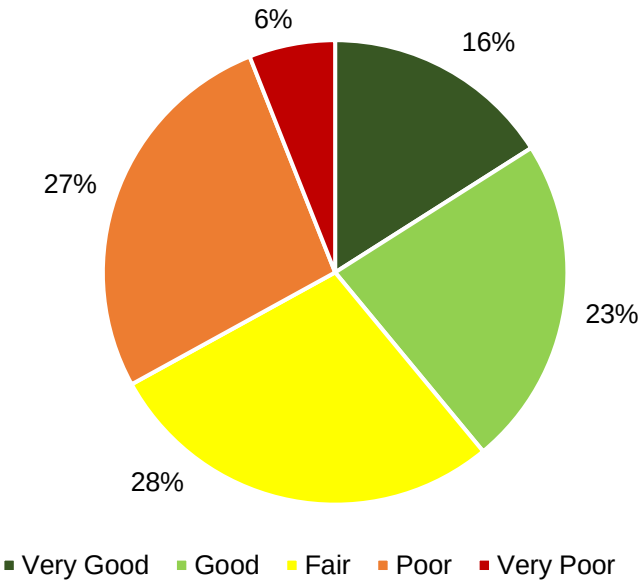


Figure 2-5: Roads Condition Summary Weighted by Replacement Cost

Figure 2-6 and **Figure 2-7** show the road condition distribution for each road class in lane kilometre and replacement value respectively. Arterial roads are primarily in Very Good to Good condition with no sections in Very Poor condition. The City made great efforts in keeping this functional class at a relatively high level of condition among all the functional classes. Collector roads are overall in Fair and better condition. Local roads and rural roads have higher proportions in Fair or Poor conditions.

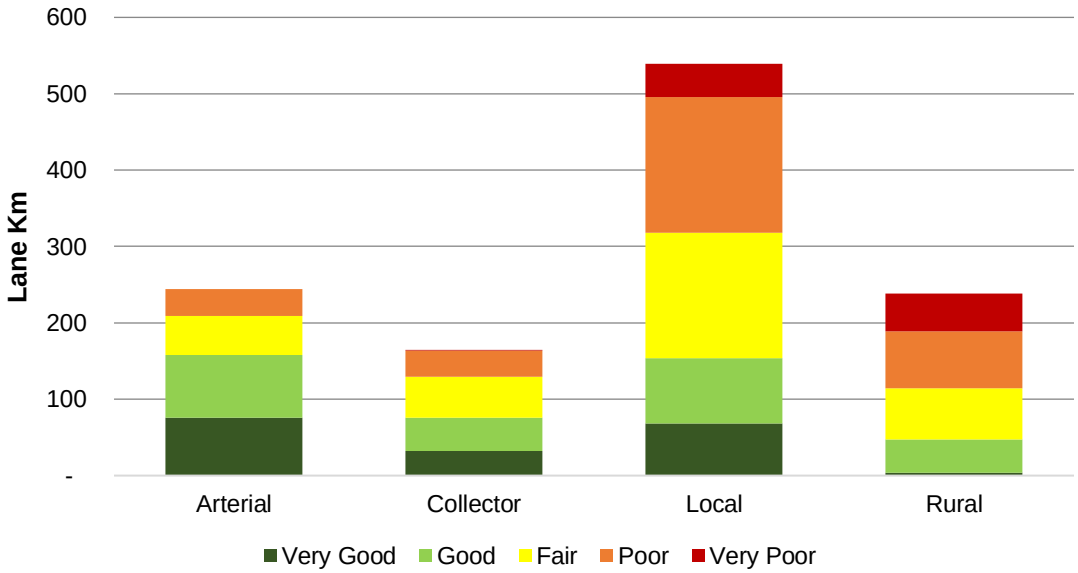


Figure 2-6: Roads Condition Distribution in Lane Kilometres

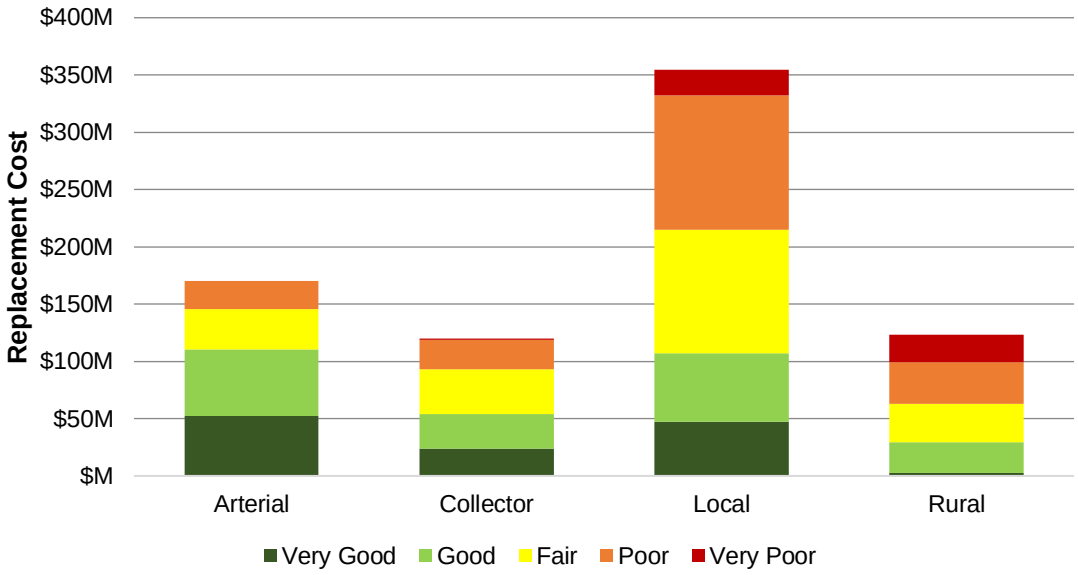


Figure 2-7: Roads Condition Distribution in Replacement Cost

2.2.6 Bridges and Culverts Condition Summary

It is understood that the City retains a consultant every two years to perform a network level inspection of the bridges and culverts within the City limits. The objective of this inspection is to identify structural issues and concerns following OSIM which is in compliance with O. Reg. 104/97. Inspection results are documented and prioritized 10-year capital needs are identified in the consultant report. The most recent inspections were completed in 2024, which provides an overall condition of each bridge and culverts (>3m in diameter), through the bridge condition index (BCI). BCI ranges from 0 to 100 where 100 represents a new structure with no deficiency. To have a consistent condition rating system across the City's asset groups, the bridge conditions are divided into five classes by BCI ranges: Very Good (80-100), Good (60-80), Fair (40-60), Poor (20-40), and Very Poor (0-20).

Figure 2-8 shows a summary of the City's bridges and culverts. Approximately, 81% of the bridges and culverts are in Good to Very Good condition. 17% in Fair condition, while the remaining 2% are in Poor condition. Currently, there are no bridges or culverts in Very Poor condition.

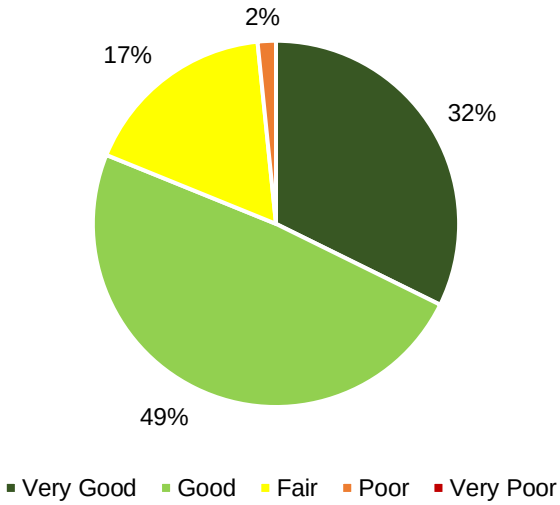


Figure 2-8: Bridges & Culverts Condition Summary Weighted by Replacement Cost

The condition distributions for vehicular bridges and pedestrian bridges are shown in **Figure 2-9**. Both Vehicular Bridges and Pedestrian Bridges are predominantly in a Good or Very Good condition.

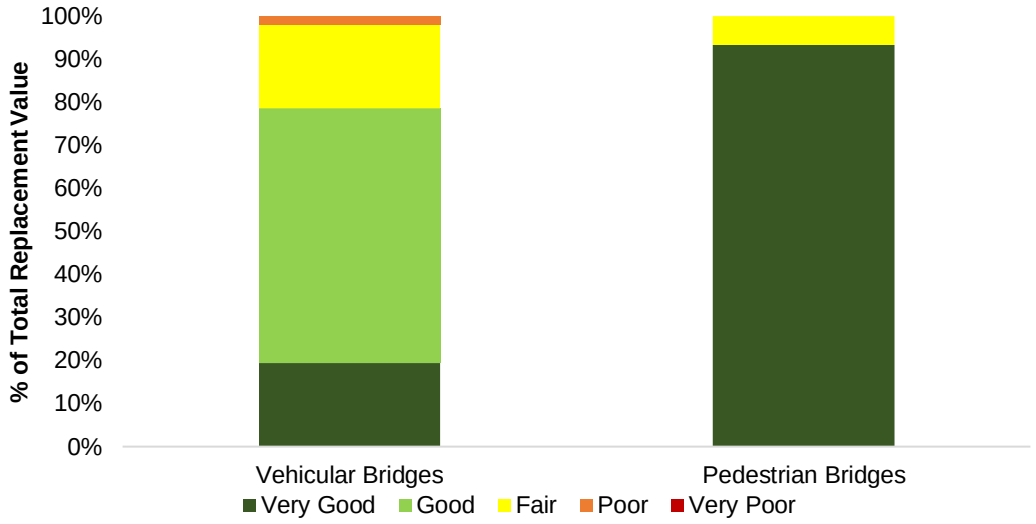


Figure 2-9: Bridges and Culverts Condition Distribution Details

2.3 Asset Data Gap Analysis

This section summarizes the current state of the City's asset data by assessing the quality of the asset inventory. AECOM facilitated a virtual State of Infrastructure and Data Gap Analysis Workshop with key staff across the in-scope assets to determine the overall confidence in the current asset data, identify existing data gaps, as well as to gather insight into the City's data management practices. An online Data Management Gap Assessment Survey was also distributed to the AM Working Group to elicit further insights on the City's current and desired future state, as well as key challenges, regarding the City's overall data management.

2.3.1 Data Gap Observations

Table 2-5 provides a summary of observed data gaps in the compiled roads, and bridges and culverts inventory across key data attributes that help to make informed decisions over the asset lifecycle for this AM plan.

Table 2-5: Observations on Asset Data Completeness

Asset Group	Inventory Completeness (%)						
	Asset ID	Street Name / Location	Install Date	Inspection Date	Condition	Expected Service Life	Replacement Cost
Roads	100%	100%	0%	100%	100%	100%	100%
Bridges & Culverts	100%	100%	100%	100%	100%	100%	100%

2.3.2 Data Confidence

The quality of asset data is critical for effective AM, accurate financial forecasts, and informed decision-making. For this reason, it is important to know what the reliability of the information is for the State of Infrastructure analysis of the roads and bridges. **Table 2-6** provides a description for the data confidence grades used to classify the reliability of the asset data used in this data gap analysis.

Table 2-6: Data Confidence Grading Scale

Confidence Grades	Description
A - Highly reliable	Data is based on sound records, procedures, investigations and analysis, documented properly and agreed as the best method of assessment. Dataset is complete and estimated to be accurate ± 2%
B - Reliable	Data is based on sound records, procedures, investigations and analysis, documented properly but has minor shortcomings, for example some of the data is old, some documentation is missing and/or reliance is placed on unconfirmed reports or some extrapolation. Dataset is complete and estimated to be accurate ± 10%
C - Uncertain	Data is based on sound records, procedures, investigations and analysis which is incomplete or unsupported, or extrapolated from a limited sample for which grade A or B data are available. Dataset is substantially complete but up to 50% is extrapolated data and accuracy estimated ± 25%
D - Very Uncertain	Data is based on unconfirmed verbal reports and/or cursory inspections and analysis. Dataset may not be fully complete, and most data is estimated or extrapolated. Accuracy ± 40%
E - Unknown	None or very little data held.

Through consultation with City staff during the Data Gap and State of Infrastructure Workshop, the asset attribute data for the roads, and bridges and culverts were assigned the grades outlined in **Table 2-7**.

Table 2-7: High-Level Asset Data Confidence Grades

Asset Category	Data Confidence Average Grade		
	Inventory	Age	Condition
Roads	A	--	A
Bridges and Culverts	A	A	A

2.3.3 Data Management Practice

The asset data lifecycle is a sequence of stages that data goes through from its initial creation (i.e., data capture and entry) to its eventual archival and/or deletion at the end of its useful life[1]. A clear definition and understanding of the organization's process for acquiring, storing, utilizing, assessing, improving, archiving, and deleting data (see **Figure 2-10**) will ensure good data management practices and help to sustain levels of data quality required to support AM activities.

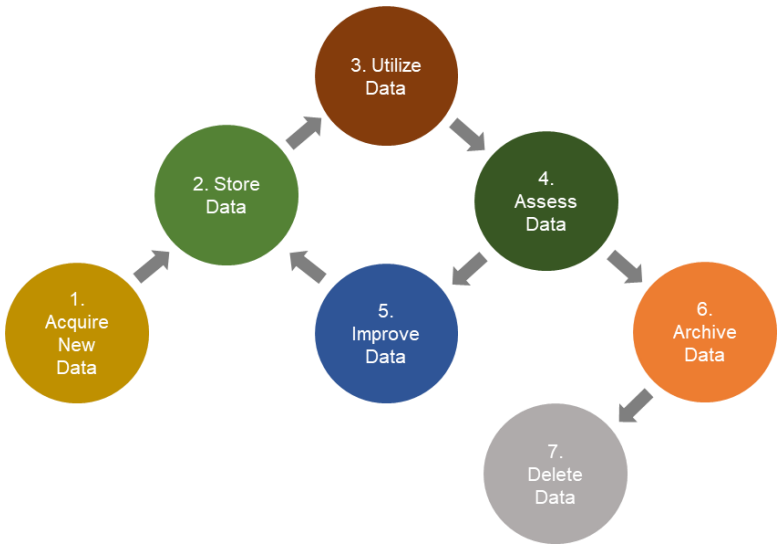


Figure 2-10: Asset Information Lifecycle

[1] TechTarget Network, Definition: Data Life Cycle, 2020.

The seven key stages of the asset data lifecycle are described in more detail below:

- **Acquiring New Data**: The majority of new asset data arises from asset creation, refurbishment and overhaul activities. New data may also come by way of inheritance or transfers from other business units, organizations, or third parties. As such, it is important to have clearly defined processes in place not only to add or update asset data, but to migrate and merge data from other sources.
- **Storing Data**: The way asset data is stored is an important consideration for overall data quality. Having a planned approach to data storage will inevitably reduce the likelihood of duplication and inconsistencies across datasets within the organization. Depending on the needs of the organization, this stage may involve procuring a new software to adequately house the data, along with a data backup and recovery plan to ensure that the necessary data protection and privacy standards are met.
- **Utilizing / Analysing Data**: This aspect of the asset information lifecycle is where users encounter the data to support data-driven activities within the organization. Data can be viewed, processed, edited, and published to allow users to access the data outside the organization. Critical data that has been modified should be fully traceable to maintain the integrity of the data. As such, it is important to communicate to the users why asset data is so important, and how it is used to inform decisions within the organization.
- **Assessing Data**: Assessing the data quality helps to determine the level of confidence in the information and ensures that decision-makers are making informed decisions based on the quality of data available to them. Moreover, it is important to fully understand the availability and quality of the asset data before issuing information publicly. Some of the results of data degradation, due to improper or lack of assessment, may include:
    - Poor asset performance due to lack of information and understanding of asset behaviour.
    - Non-compliance with statutory regulations or safety requirements.
    - Safety incidents due to risks not being identified or reported.
    - Asset failure due to gaps in maintenance planning.
- **Improving Data**: Improving data quality involves establishing clear targets which are intended to be communicated widely across the organization. It is imperative that the organization understand the costs, benefits, and risks associated with any data improvements since the cost of the improvement may outweigh the overall benefit. It is also important to note that *more* data does not necessarily mean *better* data. It is very possible to collect data that does not add value to the organization. As such, it is critical that the organization aligns its data improvement targets with its AM objectives and considers the data-driven decisions staff need to make at the operational and strategic level, to ensure that the *right* data is being improved upon.
- **Archiving Data**: Archiving data is the process of storing data that is no longer active or required but is able to be retrieved in case it is needed again. Data that is archived is stored in a location where no usage or maintenance occurs. It is recommended that a data archive strategy exists within an organization in order to lay out the data archival requirements, which considers the following:
    - What data should be archived and why?
    - Are there any legal obligations for retaining data records?
    - How long should data records be retained?
    - What is the risk associated with not being able to retrieve data records?
    - Who should be able to access archived data records?
    - What is the expected timeframe to retrieve archived data records?

    Clearly communicating these requirements across the organization is key to ensuring staff are educated on why records are being archived, how they can access archived data records, and for how long archived data records can still be accessed.
- **Deleting Data:** The deletion of data is the final component of the asset information lifecycle. Typically, within organizations there is a resistance to permanently delete data, otherwise known as data “squirrelling”, due to

the overall capacity of storing data increasing and the cost decreasing. However, within the organization's data archive strategy, a retention period should be specified to indicate when data should be deleted, along with any processes to follow, such as obtaining prior authorization.

2.3.3.1 Current Data Management State

The City's roads, bridges, and culverts asset data is currently stored in a Geographical Information System (GIS), Road Management System (RMS), Excel spreadsheets, reports, and as-built drawings. The City's roads and bridges data is more robust compared to other core service areas.

Currently, the City utilizes an RMS to store field assessment results for roads. The system was greatly enhanced by GIS integration and maintained by the GIS/Asset Management Technician in the Engineering Department. The RMS data can be linked to GIS with unique road segment IDs.

The bridges and culverts condition data is biennially updated based on OSIM inspection findings. The consolidated inventory for bridges & culverts includes a structural level and element level inventories along with a recommended 10-year capital plan.

The City is following the mandate in records retention procedures for municipalities as per the Freedom of Information and Protection of Privacy Act ("FIPPA") and the Municipal Freedom of Information and Protection of Privacy Act ("MFIPPA").

2.3.3.2 Future Data Management State

The City will develop and implement a software strategy that helps streamline data management following this AMP. Eventually, the City anticipates having a clear and efficient data management process and comprehensive asset inventory to support their asset management decision-making. The implementation plan for data improvement is presented in **Section 6**.

3. Level of Service

3.1 Purpose

Level of Service (LoS) supports every aspect of the overall AM System. The objective of establishing clearly defined service levels is to help the City meet stakeholder values, achieve its strategic goals, make informed decisions, and implement effective asset lifecycle activities.

Documenting LoS is a proven practice that will enable the City to:

- Link corporate strategic objectives to customer expectations and technical operations.
- Balance customer needs and expectations while evaluating the effectiveness of operations and whether the right LoS is being provided at the right cost.
- Transition from an “Asset Stewardship” approach that focuses on making decisions based on maintaining assets in an acceptable condition to a “Serviceability” approach that is geared towards making decisions based on balancing the costs, risks, and goals for the LoS being provided by the City’s assets.
- Communicate the physical nature of infrastructure that the City owns and is financially responsible for while promoting the use of LoS to enable effective consultation with stakeholders regarding alternative funding options according to desired LoS outcomes.
- Make recommendations on strategies that the City can take now to minimize future renewal costs while ensuring that adequate LoS can be delivered without burdening future generations.
- Assess internal (e.g., program changes) and external (e.g., climate change) factors that have the potential to impact the City’s ability to deliver services and how these factors may impact the LoS being provided.
- Implement a corporate continuous improvement program to further optimize AM across all service areas.

O. Reg. 588/17 mandates that Ontario municipalities must report their current LoS by July 1, 2024. Additionally, the proposed LoS for all municipal assets including core and non-core assets should be reported by July 1, 2025 (see **Section 1.3**).

3.2 Objectives

Defining LoS objectives is important for drawing a line of sight between the City’s corporate objectives and the tangible asset performance outcomes. To do so, the LoS objectives must take into consideration stakeholder interests to develop asset performance measures that aim to meet the needs and expectations of the community. By doing this, the City will ensure that their assets are striving towards optimal performance, not only operationally, but economically, socially, and sustainably as well.

Every stakeholder has certain interests in the service being provided and in general. The City’s corporate objective is to lift up the community and build pride, and attract people (visitors, employers and employees). The City’s Comprehensive Background Report[2] for the New Official Plan outlined the overarching themes that reflect the City’s value, as shown in **Table 3-1**. Each overarching theme is also assigned a corporate service objective.

The development of level of service targets should be aligned with these corporate objectives which will be addressed in the next iteration of the AMP.

[2] City of Sault Ste Marie. 2021. Comprehensive Background Report.

Table 3-1: The City's Overarching Themes and Objectives

Overarching Themes	Corporate Objective
Healthy Community	Supports healthy living, active transportation, access to passive and active recreation, social interaction and the creation of spaces that are comfortable, safe and accessible for all ages and abilities (the "8 to 80 Cities" concept).
Environmental Sustainability	Supports energy conservation and efficiency, improved air quality, reduced greenhouse gas emissions and climate change adaptation.
Integrated Mobility	Supports accessibility and choice of a diversity of transportation modes.
Sense of Place	Fosters a welcoming place for all that establishes connection and provides a memorable experience to visitors.
Sustainable Growth	Stimulates reinvigoration of neighbourhoods to provide a complete range of housing, services, employment and recreation.
Economic Resiliency	Supports the growth and diversification of the city's economy.
Social Equity	Contributes to creating a welcoming and inclusive community, focusing on the removal of systemic barriers so that everyone has access to an acceptable standard of living and can fully participate in all aspects of community life.
Cultural Vitality	Celebrates the Sault's history, diverse communities and natural and cultural heritage, with the Downtown as the Sault's core destination for arts and culture.

3.3 Stakeholder Identification

A stakeholder is any person or organization that can affect, be affected by, or perceive themselves to be affected by a decision or an activity. Stakeholder analysis is the process of understanding stakeholder needs, expectations, and perceptions relative to the stakeholder's level-of-interest and level-of-influence over the organization. The organization typically engages with their stakeholders to:

- Establish which activities or services matter most to them.
- Understand their risk appetite and risk threshold.
- Understand their willingness to pay for services.

Stakeholders can take many forms and may be internal (i.e., staff, Council) or external (i.e., the public, regulatory agencies, suppliers, neighbouring municipalities, etc.) to the organization. The following groups were identified as key stakeholders for roads, bridges and culverts at the LoS workshops. This is not intended to be an exhaustive list; however, the following groups provide a good starting point for the City to move forward to the next stage.

- Council.
- Residents.
- Regulatory Agencies (i.e., MTO and Department of Fisheries and Oceans Canada (DFO)).
- Neighbouring Municipalities or Downstream Municipalities (i.e., First Nations, the international bridge connected to the US).
- Environmental groups.
- Developers.
- Contractors and suppliers.
- Other city departments (i.e., fire & police service, planning department, and stormwater)

3.4 O. Reg. 588/17 Levels of Service Metrics

Based on currently understanding, O. Reg. 588/17 requires legislated community LoS. Community LoS use qualitative descriptions to describe the scope or quality of service delivered by an asset category. O. Reg. 588/17 also requires legislated technical LoS. Technical LoS use metrics to measure the scope or quality of service being delivered by an asset category.

Table 3-2 and **Table 3-3** present summaries of the City's roads, and bridges and culverts service level for O. Reg. 588/17 Metrics. References are provided to show where O. Reg. 588/17 requirement has been attained.

Table 3-2: O. Reg. 588/17 Levels of Service Metrics (Roads)

O. Reg 588/17 LoS Performance Measure	Unit	Community or Technical LoS	Current LoS Performance (2025)
Description, which may include maps, of the road network in the municipality and its level of connectivity.	Map	Community	• Road network connectivity map as shown in **Figure 3-1**.
Description or images that illustrate the different levels of road class pavement condition.	Text / Image	Technical	• Refer to **Figure 3-2**.
Number of lane kilometres of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality.	#	Community	• Arterial: 0.63 Lane-km / km^2 • Collector: 0.64 Lane-km / km^2 • Local: 2.32 Lane-km / km^2 • Rural: 1.04 Lane-km / km^2
For paved roads in the municipality, the average pavement condition index value.	#	Technical	• Average PCI for Paved Roads is 53 − Average PCI for Arterial: 64 − Average PCI for Collector: 58 − Average PCI for Local: 50 − Average PCI for Rural: 42 These average PCI is weighted by replacement value.
For unpaved roads in the municipality, the average surface condition (e.g., excellent, good, fair or poor).	Text	Technical	• Fair condition.

Table 3-3: O. Reg. 588/17 Levels of Service Metrics (Bridges and Culverts)

O. Reg. 588/17 LoS Performance Measure	Unit	Community or Technical LoS	Current LoS Performance (2025)
Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	Text	Community	• The City's bridges and culverts have been designed in accordance with the standard and requirements of the Canadian Highway Bridge Design Code (CHBDC) at the time of construction. The bridges have been designed to carry heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, and cyclists.
% of bridges in the municipality with loading or dimensional restrictions.	%	Technical	• Two of the 49 bridges (i.e., 4% of bridges at the City) have loading or dimensional restrictions, as follows: ○ 19 - Town Line Road, 0.5km south of Base Line, over Big Carp River, 10t load limit; and ○ P10 - Fort Creek Hub Trail, approximately 900 m south of Third Line, 1000 lb (Point Load)
Description or images of the condition of bridges and how this would affect use of the bridges.	Text / Image	Community	• The City undertakes rehabilitation / replacement works according to OSIM recommended priorities. • Refer to **Figure 3-3** for images of the condition of bridges.
Description or images of the condition of culverts and how this would affect use of the culverts.	Text / Image	Community	• The City undertakes rehabilitation / replacement works according to OSIM recommended priorities. • Refer to **Figure 3-3** for images of the condition of several culverts.
For bridges in the municipality, the average bridge condition index value.	#	Technical	• Average BCI for bridges is 68 The average BCI is weighted by replacement value
For structural culverts in the municipality, the average bridge condition index value.	#	Technical	• Average BCI for culverts is 74 The average BCI is weighted by replacement value

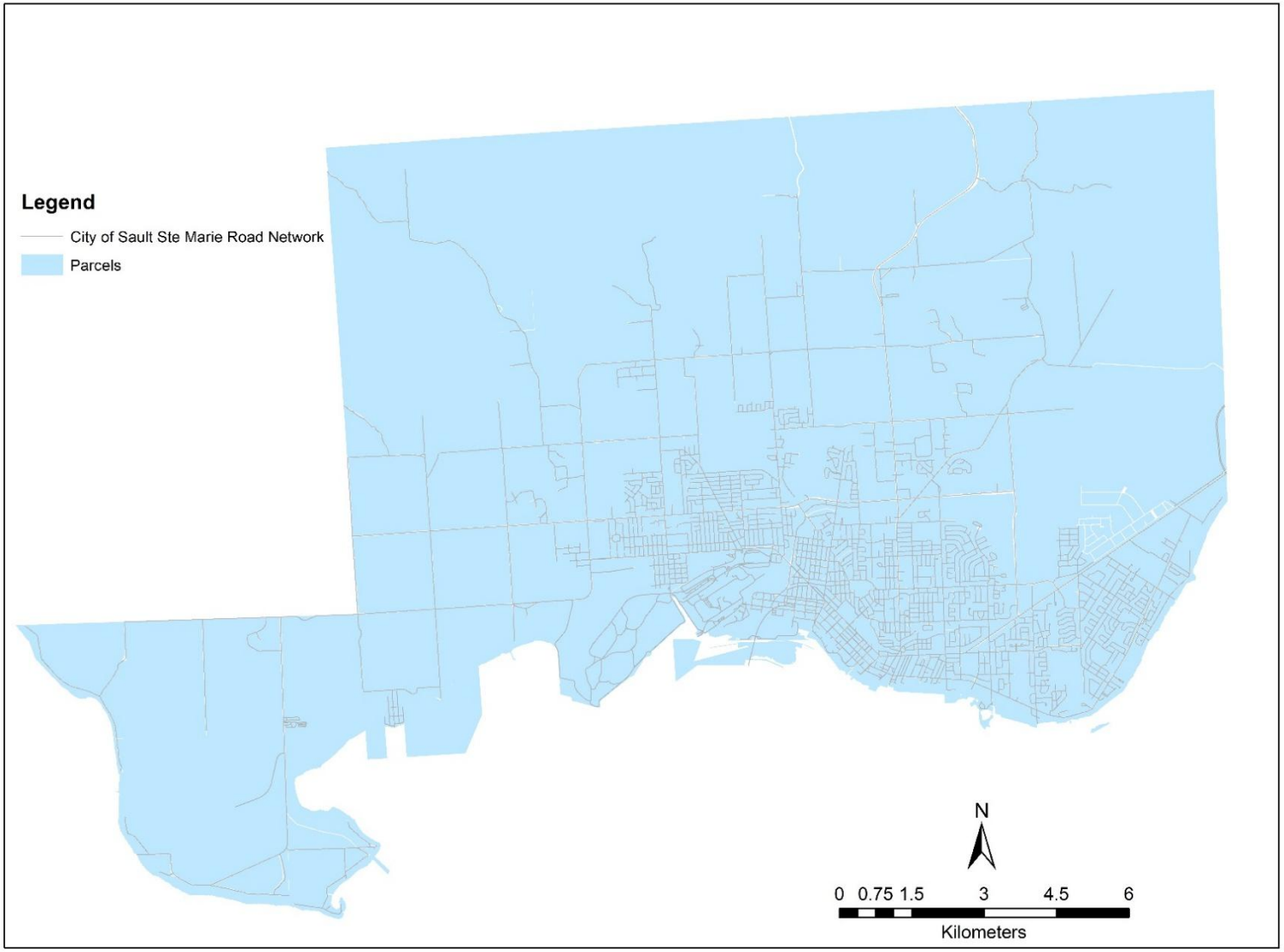


Figure 3-1: City of Sault Ste Marie Road Network

Figure 3-2 and **Figure 3-3** present different levels of condition images as required by O. Reg. 588/17.

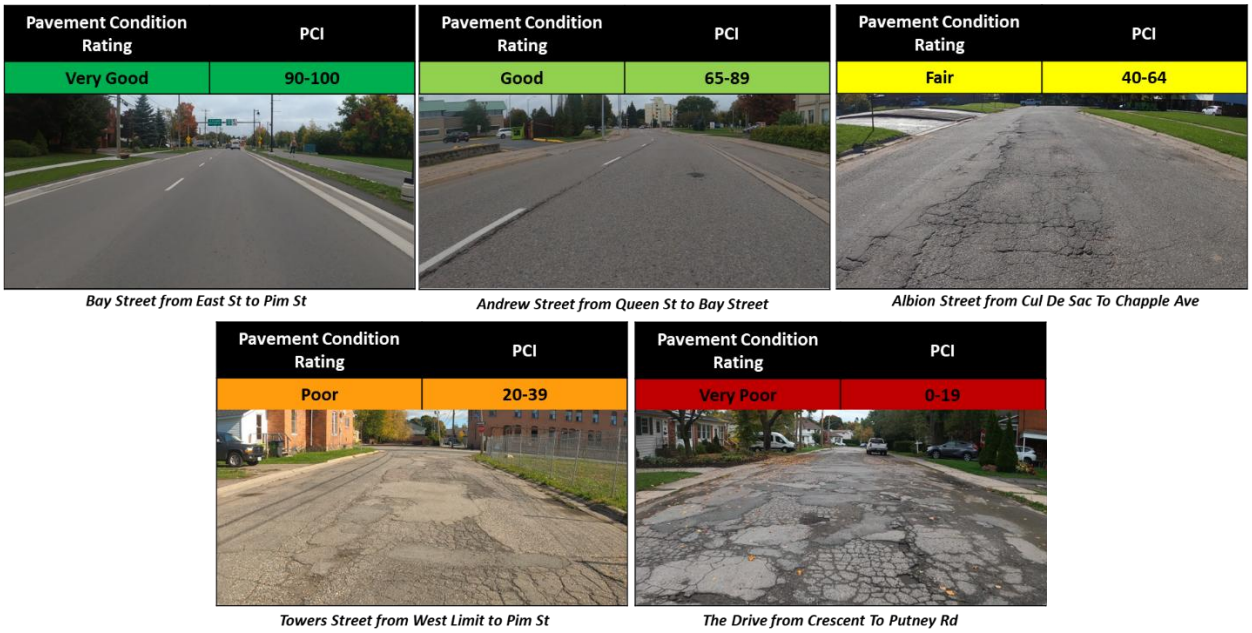


Figure 3-2: City of Sault Ste. Marie Roads Condition Images

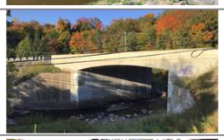
	Bridges	Culverts
Condition Ratings Bridge Condition Index (BCI)	**Images of the condition of bridges and how this would affect use of the bridges.**	**Images of the condition of culverts and how this would affect use of the culverts.**
Very Good BCI Range 80-100	Bridge No. 14 BCI - 96 	Bridge No. 10 BCI - 88 
Good BCI Range 60-79	Bridge No. 1 BCI - 72 	Bridge No. 22 BCI - 66 
Fair BCI Range 40-59	Bridge No. 3 BCI - 52 	Bridge No. 41 BCI - 50 
Poor BCI Range 20-39	N/A	N/A
Very Poor BCI Range 0-19	N/A	N/A

Figure 3-3: Bridges and Culverts Condition Images

3.5 Proposed Levels of Service

Establishing LoS targets is an important part of continual improvement and performance management. Without performance targets, it is difficult to ascertain whether goals are being met, or the extent of the gap if they are not. Incorporating targets into the City's LoS Framework helps to ensure that targets are reasonable, aligned with customer expectations, and evaluated on an objective basis by considering cost-benefit trade-offs.

One of the key challenges in setting infrastructure performance targets in a municipal environment is that they can often become biased and/or politically motivated. Therefore, it is important to review LoS targets with internal and external stakeholders, especially the customers who will be impacted the most by changes in service delivery. An important aspect of evaluating LoS targets is determining how the user is willing to pay for the service. Regulatory requirements are an exception; however, they only provide the minimum service standard. Cost is still an important parameter to consider when assessing the merits of service improvements. To deal with the financial realities, it is necessary to:

- Calculate how much the service costs based on current LoS.
- Determine the lifecycle activities and cost associated with varying the LoS.
- Assess the customers' willingness to pay.

It is important that any targets set be realistic and achievable. O. Reg. 588/17 requires AMPs to include proposed levels of service by July 1, 2025.

The LoS trend legends are described in **Table 3-4**. With this, a summary of the City's Roads and Bridges service level metrics is presented in **Table 3-5**. Each metric was indicated with its current trend and proposed trend for the next 10 years, represented by legends, taking into account the nature of the measure, data availability, analysis feasibility, and whether the trend impacts positively or negatively on the proposed LoS.

Table 3-4: LoS Trend Legend

Symbol	Name	Description
	Positively Increasing	KPI is improving steadily over time, showing progress toward goals.
	Positively Stable	KPI is at a strong, desirable level and consistently maintained.
	Positively Decreasing	KPI is improving as lower values indicate better performance.
	Negatively Increasing	KPI is worsening over time, signaling a need for corrective action.
	Negatively Stable	KPI remains poor with no improvement or further decline.
	Negatively Decreasing	KPI is declining in a way that reflects worsening performance.

Table 3-5: Roads and Bridges Current and Proposed Levels of Service

Asset Category	#	LoS Measure	Unit of Measure	LoS Category	Current Performance	Current Trend	Proposed Trend (Next 10 years)	Lifecycle Activities to meet Proposed LoS	Budget Impact to Meet Proposed LoS	Risk of Not Meeting Proposed LoS
Roads	1	Description, which may include maps, of the road network in the municipality and its level of connectivity.	Map	Customer	See **Figure 3-1**				N/A	
Roads	2	Description or images that illustrate the different levels of road class pavement condition.	Text / Image	Customer	See **Figure 3-2**				N/A	
Roads	3	# of lane-kilometers of each of arterial roads, collector roads and local roads as a proportion of square kilometers of land area of the municipality.	#	Technical	In Lane-km / km2: • Arterial: 0.63 • Collector: 0.64 • Local: 2.32 • Rural: 1.04			• Maintain the existing and future new roads.	Low	• Increased congestion and delays. • Declining road conditions and safety.
Roads	4	For paved roads in the municipality, the average pavement condition index value.	#	Technical	In PCI: • Paved Roads: 53 • Arterial: 64 • Collector: 58 • Local: 50 • Rural: 42			• Regular condition assessments. • Annual resurfacing program with spring surface treatments, budget-dependent. • Annual crack sealing program. • Local road improvements aligned with sanitary sewer and watermain needs. • Engineering-led crack sealing operations. • Public Works conducts routine patching and pothole repairs.	Moderate	• Accelerated pavement deterioration and structural failures • Increased repair and rehabilitation costs over time • More frequent and severe potholes and surface defects • Higher risk of vehicle damage and safety incidents • Decreased public satisfaction and increased complaints • Reduced accessibility and mobility across the network • Negative impact on local economy and goods movement • Potential legal claims due to poor road conditions • Reduced effectiveness of routine maintenance activities • Increased greenhouse gas emissions from slower traffic flow
Roads	5	For unpaved roads in the municipality, the average surface condition.	Text	Technical	Fair			• Routine gravel road grading. • Adding gravel as required. • Drainage maintenance.	Low to Moderate if maintaining current conditions;	• Increased damage claims. • Higher dissatisfaction from high-tax properties (large, waterfront).

Asset Category	#	LoS Measure	Unit of Measure	LoS Category	Current Performance	Current Trend	Proposed Trend (Next 10 years)	Lifecycle Activities to meet Proposed LoS	Budget Impact to Meet Proposed LoS	Risk of Not Meeting Proposed LoS
								• Additional tasks as identified in council reports.	High if upgrading to asphalt road	• Negative public perception of service quality.
Roads	6	Percentage of Roads assets in Fair and Better Condition	%	Technical	67%	→	→	• Same as #4 and #5	Moderate to High	• Same as #4 and #5
Bridges	1	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	Text	Customer	See Table 3-3				N/A	
Bridges	2	% of bridges in the municipality with loading or dimensional restrictions.	%	Technical	4% (two bridges): • 19-Town Line Road, 0.5km south of Base Line, over Big Carp River • P10-Fort Creek Hub Trail, Approximately 900 m south of Third Line	→	→	• OSIM inspections every two years. • Preventive maintenance (cleaning, sealing, minor repairs). • Regular load capacity assessments. • Dedicated bridge maintenance funding.	Low to Moderate	• Increased bridge deterioration and safety risks. • Higher frequency of load or dimensional restrictions. • Reduced network reliability and efficiency. • Elevated repair and replacement costs. • Potential liability and increased damage claims. • Negative public perception and reduced trust.
Bridges	3	Description or images of the condition of bridges and how this would affect use of the bridges.	Text / Image	Customer	See **Figure 3-3**				N/A	
Bridges	4	Description or images of the condition of culverts and how this would affect use of the culverts	Text / Image	Customer	See **Figure 3-3**				N/A	
Bridges	5	For bridges in the municipality, the average bridge condition index value.	#	Technical	68	→	→	• OSIM inspections every two years • Routine maintenance (cleaning, debris removal, joint flushing) • Concrete patching and crack sealing • Expansion joint and bearing replacement • Waterproofing and deck resurfacing • Structural steel painting • Load capacity evaluations	Low to Moderate	• Increased safety hazards and risk of structural failures • More frequent weight or dimensional restrictions • Higher long-term rehabilitation and replacement costs • Disruptions to transportation and emergency access • Negative impact on economic activity and goods movement

Asset Category	#	LoS Measure	Unit of Measure	LoS Category	Current Performance	Current Trend	Proposed Trend (Next 10 years)	Lifecycle Activities to meet Proposed LoS	Budget Impact to Meet Proposed LoS	Risk of Not Meeting Proposed LoS
								• Full bridge replacements (as last resort) • Bridge management system updates • Dedicated capital and O&M funding • Integration with asset management planning		• Increased public dissatisfaction and liability claims • Reduced network reliability and resilience • Greater environmental impact due to inefficient detours
Bridges	6	For structural culverts in the municipality, the average bridge condition index value.	#	Technical	74	↑	→	• Biennial OSIM inspections • Routine cleaning and debris removal • Vegetation control near inlets/outlets • Crack sealing and joint repairs • Minor patching and surface repairs • Structural relining (e.g., CIPP lining) • End treatment repairs or replacements • Roadway embankment stabilization • Hydraulic performance assessments • Full culvert replacements when needed • Erosion and sediment control work • Dedicated funding for critical culvert work • Integration with asset management plans	Low to Moderate	• Increased risk of structural collapse or washouts • Road closures and costly emergency repairs • Disrupted drainage causing flooding and road damage • Safety hazards for motorists and pedestrians • Higher long-term replacement and rehabilitation costs • Environmental damage from uncontrolled water flow • Impaired access for emergency and service vehicles • Public complaints and potential liability claims • Reduced lifespan of adjacent road infrastructure
Bridges	7	Percentage of Bridges & Culverts assets in Fair and Better Condition	%	Technical	92%	→	→	Same as #5 and #6	Moderate	Same as #5 and #6

Performance Trend Legend:

↑ Positively Increasing	→ Positively Stable	↓ Positively Decreasing	↑ Negatively Increasing	→ Negatively Stable	↓ Negatively Decreasing

3.6 2025-2034 10-Year Levels of Service Forecast

Considering the City's characteristics, growth projections, and strategic objectives, the proposed performance trend for each LoS metric for the next 10 years is projected and outlined in **Table 3-6**. This table indicates whether each measure is expected to trend upward, downward, or remain stable, taking into account the nature of the measure, data availability, analysis feasibility, and whether the projected trend impacts positively or negatively on the proposed level of service.

Table 3-6: 2025-2034 10-Year LoS Forecast

Asset Category	#	LoS Measure	Unit of Measure	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	Proposed Trend	Basis for Forecast
Roads	1	Description, which may include maps, of the road network in the municipality and its level of connectivity.	Map								N/A				
Roads	2	Description or images that illustrate the different levels of road class pavement condition.	Text / Image								N/A				
Roads	3	# of lane-kilometers of each of arterial roads, collector roads and local roads as a proportion of square kilometers of land area of the municipality.	#				Arterial: 0.63 Lane-km / km^2 Collector: 0.64 Lane-km / km^2 Local: 2.32 Lane-km / km^2 Rural: 1.04 Lane-km / km^2							→	No substantial development planned within 10 years
Roads	4	For paved roads in the municipality, the average pavement condition index value.	#	53	54	54	54	54	53	53	53	53	52	→	Based on lifecycle modeling for current budget scenario, See **Section 5**
Roads	5	For unpaved roads in the municipality, the average surface condition.	Text					Fair						→	City subject matter expert opinion
Roads	6	Percentage of Roads assets in Fair and Better Condition	%	67%	67%	67%	64%	65%	63%	63%	64%	63%	63%	→	Based on lifecycle modeling for current budget scenario, See **Section 5**
Bridges	1	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	Text								N/A				
Bridges	2	% of bridges in the municipality with loading or dimensional restrictions.	%	4% (two bridges: 19-Town Line Road, 0.5km south of Base Line, over Big Carp River and P10-Fort Creek Hub Trail, Approximately 900 m south of Third Line)										→	City subject matter expert opinion
Bridges	3	Description or images of the condition of bridges and how this would affect use of the bridges.	Text / Image								N/A				
Bridges	4	Description or images of the condition of culverts and how this would affect use of the culverts	Text / Image								N/A				
Bridges	5	For bridges in the municipality, the average bridge condition index value.	#	68	67	68	68	67	68	68	68	68	68	→	Based on lifecycle modeling for current budget scenario, See **Section 5**
Bridges	6	For structural culverts in the municipality, the average bridge condition index value.	#	74	72	71	70	69	68	68	66	68	67	→	Based on lifecycle modeling for current budget scenario, See **Section 5**
Bridges	7	Percentage of Bridges & Culverts assets in Fair and Better Condition	%	98%	98%	100%	100%	100%	100%	100%	100%	100%	100%	→	Based on lifecycle modeling for current budget scenario, See **Section 5**

Performance Trend Legend:

↑ Positively Increasing	→ Positively Maintain	↓ Positively Decreasing	↑ Negatively Increasing	→ Negatively Maintain	↓ Negatively Decreasing

3.7 Future Demand Drivers

Demand management is a critical component of managing the desired LoS in a sustainable manner, now and into the future. Understanding demand drivers enables the City to proactively develop effective, long-term strategies that are suitable for the City's unique political, environmental, social and technological landscape.

A summary of factors identified from the LoS workshop that would impact roads, and bridges and culverts service levels include, but are not limited to, the following:

- Staff availability.
- Funding level.
- Contractor availability.
- Succession Management.
- Supply Chains.
- Climate Change.

On November 2, 2021, the City of Sault Ste. Marie's Planning Division released the Comprehensive Background Report for updating the Official Plan[3]. The City's Official Plan guides the local decision-making on land use, development and public infrastructure over the next 20 years. The City's population is expected to roughly reach to 80,000 (by 2031), and 83,300 people by 2036. Employment is projected to grow by about 6,000 jobs, from approximately 31,000 jobs in 2016 to 36,900 jobs in 2036.

In 2015, the City updated the Transportation Master Plan for advancing the implementation of the various transportation improvements while considering the current and future conditions of the community. The City estimates that residential, industrial / commercial and retail development will occur in various areas of the City within the next 20 years. This new development will be spurred by the increase in population and by shifts and reallocation of the existing City residents. The master plan also includes traffic forecasts for the City's road network. AECOM recommends the City obtains a digital format of the future travel demand AADT information from the master plan and include the traffic data in the roads inventory to help better inform the roads asset management plan.

When additional assets to accommodate this population and employment growth are introduced to the City's portfolio, additional human resources, training and funding are required to maintain and operate and renew or replace those assets. O. Reg. 588/17 requires municipalities by July 1, 2025, to estimate capital expenditures and significant operating costs to achieve the proposed LoS and accommodate projected increases in demand caused by population and employment growth. This includes the estimated capital expenditures and significant operating costs related to new construction and / or to upgrade existing municipal infrastructure assets. This has been mentioned in **Section 5.3**.

[3] City of Sault Ste Marie. 1996. Official Plan

4. Asset Management Strategies

4.1 Asset Lifecycle Management Introduction

Asset lifecycle management focuses on the specific activities that should be undertaken during all phases of the asset lifecycle. Considering entire asset lifecycles can ensure that the City makes sound decisions that consider present and future service delivery needs.

The overarching goal of lifecycle management is to maximize the long-term benefits and services that our assets deliver while minimizing the associated costs and risks in the long run. Every asset has a lifecycle cost, which is the total cost of all the activities undertaken throughout its service life. Part of the purpose of the asset management planning process is to fully understand and predict the long-range financial requirements for the City's infrastructure to facilitate planning and resource management in the most cost-effective manner possible. **Figure 4-1** illustrates how costs typically accumulate over an asset's life. It is worth noting that the accumulation of the ongoing operations and maintenance, renewal & replacement and disposal costs is many multiples of the initial acquisition costs. As such, it is important to fully understand the entire lifecycle costs before proceeding with asset acquisition.

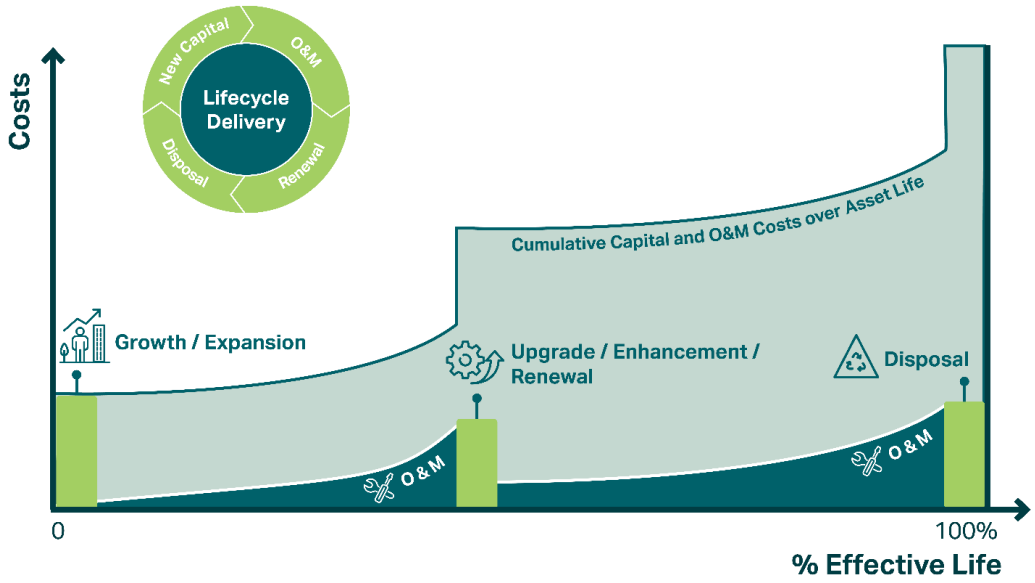


Figure 4-1: Lifecycle Cost Accumulation Over Asset Life

Asset lifecycle management strategies are typically organized into the following categories.

- **Asset Acquisition / Procurement / Construction**: Acquisition includes expansion activities and upgrading activities to extend services to previously unserved areas or expand services to meet growth demands and to meet functional requirements. When acquiring new assets, the City should evaluate credible alternative design solutions that consider how the asset is to be managed at each of its lifecycle stages. Asset management and full lifecycle considerations for the acquisition of new assets include, but are not limited to the following:

  - The asset's operability and maintainability.
  - Availability and management of detours.
  - Staff skill and availability to manage the asset.
  - The manner of the asset's eventual disposal.

- **Asset Operations and Maintenance (O&M)**: As new infrastructure is commissioned, the City accepts the responsibility of operating and maintaining the infrastructure according to O&M standards to ensure that the infrastructure is safe and reliable. Operations staff provide the day-to-day support required to operate the roads, bridges and culverts. Maintenance expenses include periodic preventive maintenance to ensure that the infrastructure can provide reliable service throughout the life of the asset and corrective maintenance that is required to repair defective assets as and when needed. Inadequate funding for O&M will have an adverse impact on the lifespan of assets. The number of O&M resources required in any period is a function of the current inventory of infrastructure and total O&M needs required for each asset. As the inventory of infrastructure grows, total O&M requirements will also grow.

- **Renewal and Replacement:** The third portion of full lifecycle costing relates to the renewal and replacement of roads, and bridges and culverts that have deteriorated to the point where they no longer provide the required service. Renewal or rehabilitation cost is sometimes incurred during the life of an asset where an investment is made to improve the condition and / or functionality of the asset e.g., resurfacing of a road section. Reconstruction activities are expected to occur once an asset has reached the end of its useful life and rehabilitation is no longer an option.

- **Decommissioning and Disposal:** There will inevitably come a point in time when an asset must be removed from service and, depending on the type of asset, there may be significant costs associated with its decommissioning and disposal. Factors that may influence the decision to remove an asset from service include changes to legislation that cause the asset to be in non-compliance, the inability of the asset to cope with increased service levels, technology advances that render the asset obsolete, the cost of retaining the asset is greater than the benefit gained, the current risk associated with the asset's failure is not tolerable, assets that have a negative impact on service delivery, the environment (e.g., roads which have persistent erosion problems, often located in areas of extremely erodible soils), or assets which can no longer be used for the purpose originally intended (e.g., roads and bridges constructed for temporary access such as designated temporary roads).

  Normally, major costs that may be incurred during disposal and decommissioning derive from the environmental impact of the disposal and, if required, the rehabilitation and decontamination of land. However, some cost savings may be achieved through the residual value of the asset or by exploring alternative uses for the asset. In all cases, it is important to consider disposal and decommissioning as the strategy employed has the potential to attract significant stakeholder attention. For that reason, the costs and risks associated with disposal and decommissioning should be equally considered in the City's capital investment decision-making process.

4.2 Current Asset Management Strategies

The asset management strategies that are currently employed by the City to manage the roads, and bridges and culverts throughout their lifecycle is summarized in **Table 4-1**.

Table 4-1: Lifecycle Management Strategies for Roads and Bridges

Asset Group	Lifecycle Activity	Description of Activities Practiced by the City	Benefit or Risk Associated with the Activities
Roads and Bridges	**Acquisition**	**Roads and Bridges** • Assumption of subdivisions, commercial and industrial extensions, local improvements, etc. • Council approved specific initiatives. • New roads through transportation planning.	• Extend services to previously unserved areas or expand services to accommodate asset enhancements. • Adequate planning and implementation of infrastructure projects help to manage existing and potential growth pressures and address other demand factors.
	Operations and Maintenance	**Roads O&M** • Road patrols. • Timely debris removal. • Annual retro-reflectivity assessment of signs and corrective action. • Bike lane summer maintenance. • Pavement paint markings. • Potholes repairs. • Pavement cracks. • Road illumination and visibility. • Street sweeping. • Curb and edge repairs. • Vegetation control. • Dust control. • Drainage improvement. • Traffic control signal systems.	• Ensure assets are operated and maintained in compliance with O. Reg. 239/02 – Minimum Maintenance Standards, which provides municipalities with a defense against liability from actions arising with regard to levels of care on roads and bridges. These standards set a minimum level of care for how roads are operated and maintained.
		Winter Control • Winter control standby. • Ice and snow removal. • Bike lane winter maintenance. • Sand and salt purchase and application. • Snow plowing. • Snow fencing. • Winter equipment fueling.	
		Bridges and Culverts O&M • Bridge cleaning. • Animal/pest control.	• Ensure assets are operated and maintained in compliance with O. Reg. 239/02 – Minimum Maintenance Standards and O. Reg. 104/97: Standards for Bridges and amendments: O. Reg. 160/02, O. Reg. 278/06, and O. Reg. 472/10 – OSIM

Asset Group	Lifecycle Activity	Description of Activities Practiced by the City	Benefit or Risk Associated with the Activities
		• Asphalt surface repair. • Vegetation and debris removal. • Concrete sealing. • Painting steel structures. • Works for drainage system.	
	Renewal and Replacement	**Roads** • Reconstruction and resurfacing of roads to address critical needs. – Preventive Maintenance: strategies like crack sealing and surface treatments to extend the road service life at an early stage – Minor rehabilitation: Non-structural repairs like overlay and mill and overlay to extend pavement life. – Major rehabilitation: Structural repairs such as thick overlays or milling to restore pavement strength. – Reconstruction: Full replacement of the pavement and base layers, often including utility upgrades. • Coordination of road reconstruction work with utility replacement.	• Renewal and reconstruction of roads with critical needs in a timely manner reduce the safety risk, avoid premature asset failure, and achieve cost effectiveness. • Coordination of road reconstruction with sewer works optimally manages a range of assets within a road right-of-way leading to reduced cost and limited disruption to businesses and residents.
		Bridges and Culverts • Reconstruction and rehabilitation of bridges and culverts is determined based on the biennial OSIM inspection results.	• The prioritized capital plans from the biennial OSIM inspections aim to address structural deficiencies and ensure safe service.
	Disposal	**Roads, Bridges and Culverts** • Stop-up and close the road and bridges.	• Ensure assets are disposed of in compliance with waste regulations in Ontario if applicable.
	Non-Infrastructure	**Roads and Bridges** • Regular road condition assessment. • Biennial bridge condition assessment program. • Road Management System (RMS). • Transportation Master Plans and Official Plan.	• Condition assessment programs help to identify and record asset conditions for a prioritized capital programs. • RMS is used to report the condition of roads and inform the coordination of the roads' capital work with adjacent utilities. • Transportation Master Plans and Official Plan include strategic planning / budgeting and project prioritization to inform long-term decision making.

4.3 Road Lifecycle Management Model

Condition assessment information for pavement is one of the important indicators that helps determine the reliability and serviceability of assets in their lifecycle. **Figure 4-2** illustrates the typical deterioration curves for pavements with and without rehabilitation interventions, and the near optimum pavement intervention strategies for the various condition states. For example, the design life for most asphalt pavements is 15 - 20 years and its expected operational life can be extended significantly even to 50 – 60 years if treated with proper approach at the proper time window.

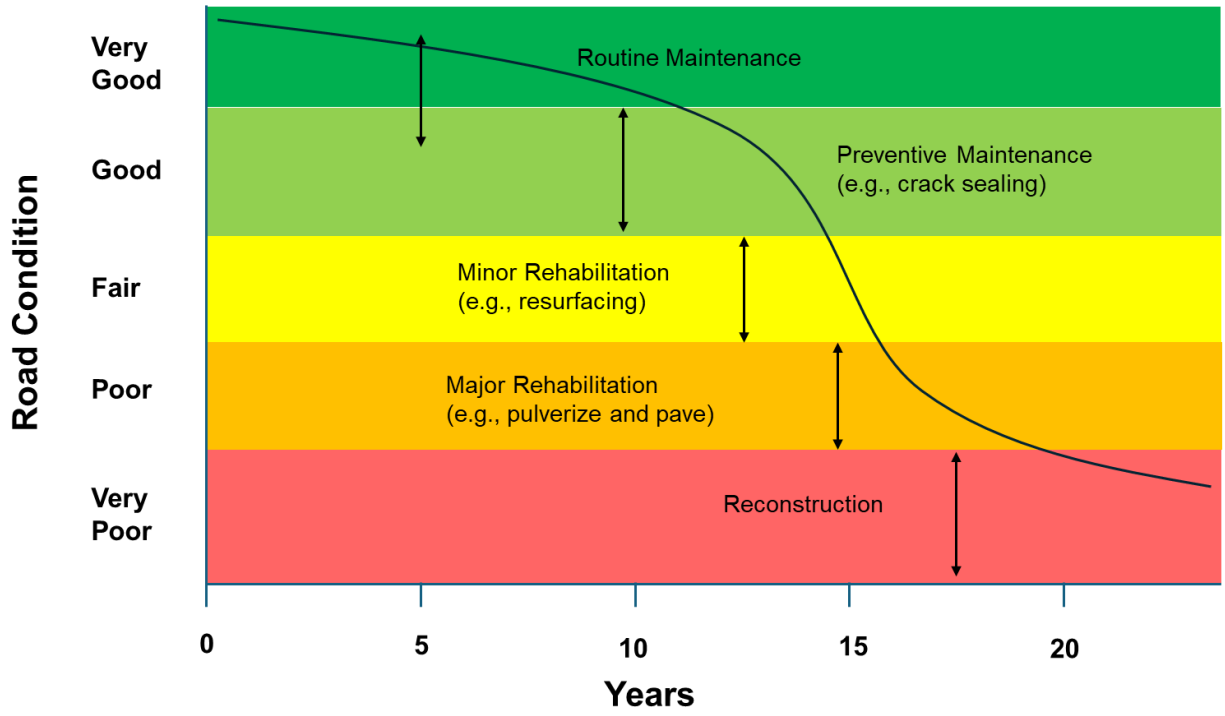


Figure 4-2: Sample Pavement Deterioration Curve and Intervention Approaches

In general, when pavement is in Very Good to Good condition, the intervention approach could be routine or preventive maintenance. If a pavement is in Fair condition, the recommended intervention is typically rehabilitation such as resurfacing. As pavements approach the Poor and Very Poor condition, structural enhancement and reconstruction is most likely warranted.

The proposed lifecycle management strategy for this AMP includes a pavement lifecycle interventions decision tree and a work prioritization model, which will be described in details in **Section 4.3.1** and **Section 4.3.2**, respectively.

4.3.1 Road Pavement Lifecycle Intervention Strategy

Intervention strategies for each road segment within the City's network were determined based on its condition state, which is one of the important indicators for the roads service level. Based on the current condition state, work categories are assigned to each road segment. Each work category / intervention approach includes several options of pavement treatment techniques, which the City could choose from when it comes to actual implementation. **Table 4-2** presents the pavement lifecycle intervention options and criteria.

Table 4-2: Pavement Lifecyle Intervention Strategy and Criteria

Treatment Category	Description	General Criteria in Terms of Road Condition Rating Category
Routine Maintenance	Routine maintenance that typically consists of relatively inexpensive treatment to immediately address specific problems such as localized potholes that may affect rideability. Refer to **Table 4-1** for the City's roads O&M activities.	Very Good
Preventive Maintenance	Pavement preservations are proactive activities, consisting of regularly scheduled treatments to preserve or hold the pavement condition. Conducting pavement preservation mitigates the need for invasive corrective action leading to reduced lifecycle costs, and extended service life. The City has a dedicated budget for annual crack sealing activities.	Good
Minor Rehabilitation	Minor rehabilitation interventions refer to road resurfacing such as overlay, or mill and overlay. It involves actions to partially remove asphalt layer and restore pavement surface condition.	Fair
Major Rehabilitation	Major Rehabilitation (e.g., pulverize and pave) involves structural and rideability enhancements that renew the service life and improve both operational condition and functional condition (load carrying capacity) of pavement structures.	Poor
Reconstruction	Reconstruction is the activity applied when the roadway has reached the end of expected service life and the above categories will not effectively restore the structural and rideability levels to provide sufficient functionality.	Very Poor

Figure 4-3 presents the detailed pavement lifecycle decision tree and the potential treatment options. The financial analysis (**Section 5**) in this AMP uses high level estimates of unit treatment cost per km assigned to these treatments.

The intervention approaches for road sections that are determined to be in the treatment category of maintenance and preservation should be reviewed and updated if needed every two years based on the next condition assessment results. It is recommended that all roads should be re-prioritized when updated condition observations, updated traffic demand, and treatment costs are available.

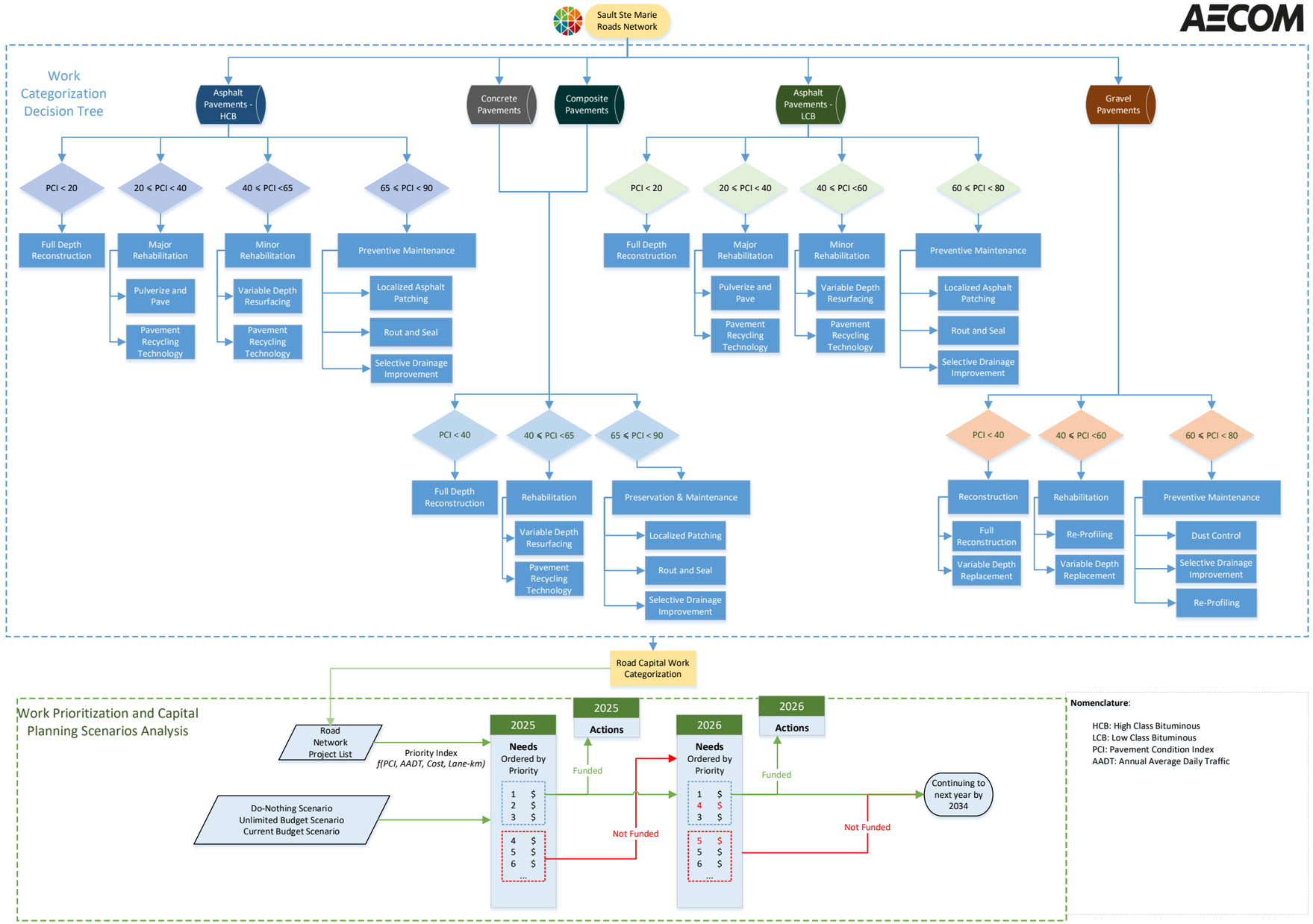


Figure 4-3: Road Lifecycle Management Decision Tree

4.3.2 Capital Work Prioritization Strategy

The work prioritization and capital planning scenarios (highlighted by green dashed box) in **Figure 4-3** which illustrates the logic to prioritize capital reinvestment work with defined funding level. The road capital reinvestment needs determined by the intervention decision tree (upper section in the figure highlighted by blue dashed line) for each pavement segment is an input for the work prioritization model.

All actions for the first year of the analysis are ranked according to Priority Index, which is a function of PCI, AADT, treatment cost, and lane-km, as shown below. The numerator is essentially the Priority Rating from the MTO Inventory Manual for Municipal Roads. Priority Index reflects the overall cost effectiveness of a road section implementing a certain treatment type.

$$Priority\ Index = \frac{0.2 \times (100 - PCI) \times (AADT + 40)^{1/4}}{Treatment\ Cost\ per\ Lane\ Km}$$

Needs are funded in this order until the budget constraint is reached for that year. Funded needs become actions for that year, but all unfunded needs are rolled over into the needs for the next year. This approach can be used to prioritize work considering various budget levels.

AECOM developed a Python-Power BI Road Lifecycle Model to implement the scenario analysis for any desired funding levels and visualize year-over-year required reinvestment activities & spending for each road segment for a 10-year period. Due to limited historical road condition data, the model assumes a deterioration rate of 2 PCI points per year. The LoS section in the financial dashboard of Power BI compares LoS metrics among various scenarios across the City's road classes. Refer to **Section 5.2** for roads scenario analysis results.

4.4 Bridge Lifecycle Management Model

The City undertakes bridge rehabilitation and replacement projects based on capital priorities recommended through OSIM. In line with the road model, the bridge asset management model is designed to prioritize rehabilitation and reconstruction primarily based on condition, measured using the Bridge Condition Index (BCI). When multiple candidate projects share similar condition ratings, prioritization is further refined using asset replacement values to ensure funding is directed toward higher-value infrastructure. To simulate future condition, the model assumes a linear deterioration rate of 1 BCI point per year for vehicular bridges, and 1.2 BCI points per year for culverts and pedestrian bridges.

5. Funding Need Analysis

5.1 Capital and Operating Budget

5.1.1 Capital Budget – Future Forecast

The City's average annual capital budget for roads from 2025 to 2029 is approximately $13.5 million. This includes $2.0 million allocated for engineering (15%), with the remaining $11.5 million used as the 2025 base budget for the financial analysis presented in a later section. The annual capital budget for bridges is estimated at $750,000 starting in 2025. From 2025 onward, a 2% annual inflation rate is applied to calculate the 10-year average capital budgets for both roads and bridges, as shown in **Table 5-1**.

Table 5-1: Capital Reinvestment Budget Forecast for Roads and Bridges

Asset Class	2025 Capital Budget	2025-2034 10-Year Average Annual Capital Budget (Inflation Considered)
Roads	$13,500,000, including a 15% engineering cost* ($2,025,000), with the remaining amount $11,475,000 containing a $75,000 budget for crack sealing as preventive maintenance	$14,782,000
Bridges	$750,000	$821,000
Total	**$14,250,000**	**$15,603,000**

* The engineering cost covers but is not limited to planning, design, and project management services.

In addition, the roads capital reinvestment costs do not include underground utility replacement costs, which are already covered in the wastewater AM plan and stormwater AM plan. Project cost and rehabilitation or reconstruction design should be further refined in advance of the actual implementation by conducting geotechnical investigations.

5.1.2 Operating Budget – Future Forecast

The City's 2025 Final Operating Budget Summary[4] outlines two operating budgets related to roads: Roadways and Winter Control – Roadways. As noted earlier, the City adheres to O. Reg. 239/02 – Minimum Maintenance Standards, with typical O&M activities including road patrol, pothole repairs, street sweeping, drainage improvements, road illumination, and visibility enhancements, among others.

As shown in **Table 5-2**, for bridges, approximately $10,000 is allocated in the 2025 operating budget. While additional funding may be sourced from other programs, it is not guaranteed and therefore excluded from this estimate. Similar to roads, a 2% annual inflation rate is applied to the 2025 bridge operating budget to calculate the 10-year average of $12.9 million.

Table 5-2: Operating Budget Forecast for Roads and Bridges

Asset Class	Budget Category	2025 Operating Budget	2025-2034 10-Year Average Annual Operating Budget (Inflation Considered)
Roads	Roadways	$4,206,000	$4,605,000
	Winter Control Roadways	$7,580,000	$8,300,000
Bridges		$10,000	$11,000
	Total	**$11,796,000**	**$12,916,000**

[4] 2025 Final Operating Budget Summary. *https://saultstemarie.ca/Cityweb/media/Finance/Budget/2025-Final-Operating-Budget-Summary-for-Website.pdf*

5.2 Capital Reinvestment Scenario Analysis

This section outlines the capital funding scenarios analyse approach, assumptions, and presents service level trends regarding asset condition under three budget scenarios:

- **S1 - Do-Nothing Scenario:** Assumes no intervention over the next 10 years. Serves as a reference to illustrate road network deterioration and emphasize the value of early intervention compared to other scenarios.
- **S2 - Unlimited Budget Scenario:** Implements all triggered work and represents the ideal scenario with the highest service level. Useful for identifying funding needs to achieve optimal performance.
- **S3 - Current Budget Scenario**: Reflects the City's current 10-year capital budget mentioned in **Section 5.1.1**.

5.2.1 Analysis Approach and Assumptions

The roads lifecycle analysis was implemented within a Python-Power BI Lifecycle Model. The first part of the analysis was performed in Python to optimize lifecycle interventions, including preventive maintenance, rehabilitation, and reconstruction. It began by utilizing the detailed road inventory and the most recent condition assessment results from 2024. This data was input into deterioration models to predict future pavement performance under various scenarios. Based on the conditions defined for each scenario, appropriate interventions were identified using established decision trees and ranked according to the Priority Index, as explained in **Section 4.3.2**. Finally, the selected projects are programmed for implementation. The second part of the analysis involved a financial dashboard developed in Power BI to present the lifecycle modeling results from Python. This Power BI dashboard offers several advantages, including enhanced data visualization, interactive filtering, and the ability to easily compare scenarios and key performance indicators.

The bridges & culverts lifecycle analysis was performed in a similar Python-Power BI Lifecycle Model. The prioritization of intervention projects were ranked based on assets condition and replacement cost.

The Road and Bridge models also use the following assumptions on inflations:

- The base year used is 2025. Any historic asset replacement values have been inflated using the experienced inflation rate from Non-Residential Building Construction Price Index (NRBCPI).
- Inflation rate: the inflation rates adopted for the financial model are presented in **Table 5-3**. The inflation for 2025 and later is determined based on the City's input.

Table 5-3: Inflation Rate[5]

Year	Inflation Rate
2022	7%
2023	7.1%
2024	6%
2025	2%
2026	2%
2027	2%
2028	2%
2029	2%
2030 - 2034	2%

[5] Past inflation data obtained from NRBCPI using the non-residential; yearly result taken from an average of quarterly results. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810027601

5.2.2 Road Assets Budget Scenarios & 10-Year Service Level Forecast

This section presents the budget scenario analysis and the 10-year service level forecast for roads.

5.2.2.1 Road Assets Funding Need

Based on the Unlimited Budget Scenario, the average annual reinvestment required for the City's road assets is estimated at approximately $33 million over the next 10 years, in inflated dollar values. This amounts to a total of roughly $331 million over the same period, as illustrated in **Table 5-4**.

Table 5-4: Road Assets 10-Year Total and Annual Average Capital Reinvestment Need

Road Class	Annual Average Need	10-Year Total
Arterial	$3,454,000	$34,538,000
Collector	$4,328,000	$43,281,000
Local	$17,787,000	$177,867,000
Rural	$7,559,000	$75,595,000
Total	**$33,128,000**	**$331,281,000**

It is important to note that there are substantial reinvestment backlogs, particularly for local and rural roads, many of which have exceeded their expected service lives or are currently rated below Fair condition. **Figure 5-1** highlights the reinvestment need spike in 2025, totaling approximately $253 million, primarily driven by these backlogs. Following this peak, the annual reinvestment needs drop significantly, ranging from $3.3 million in 2026 to $17 million by 2034, with the 10-year average $33 million represented by the green dashed line. This trend reflects a transition from addressing overdue needs to sustaining ongoing asset performance through regular reinvestment under the Unlimited Budget Scenario.

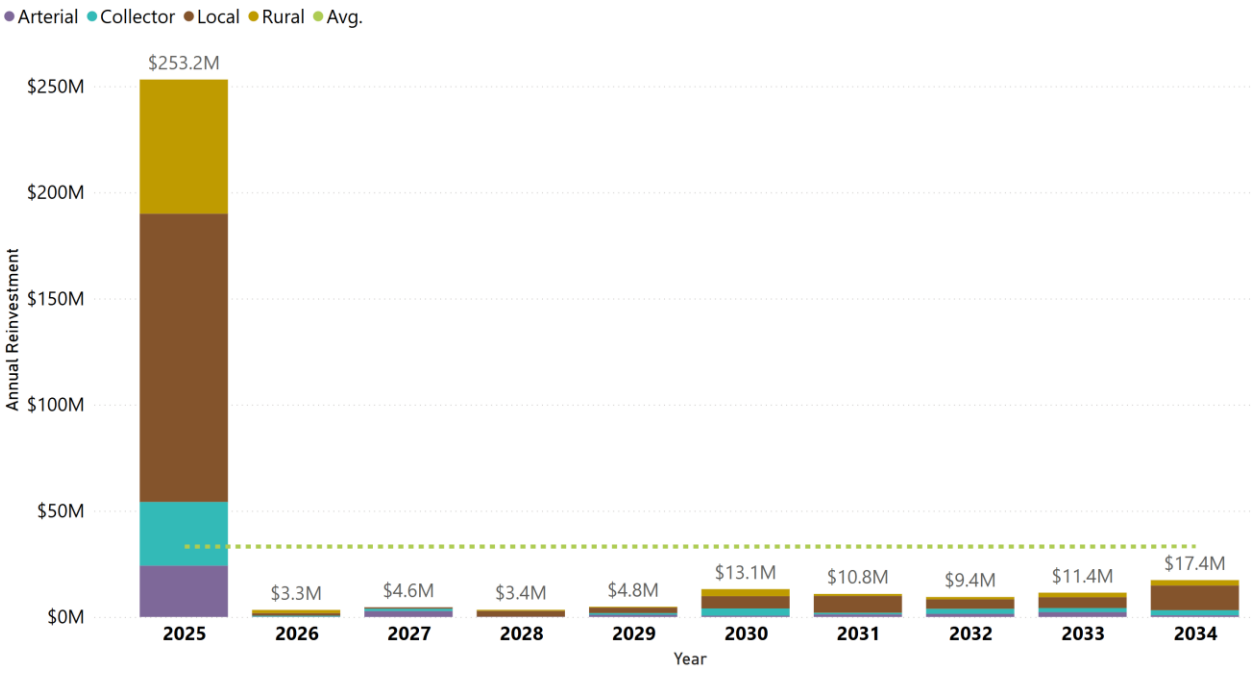


Figure 5-1: 10-Year Funding Need for Road Assets – Unlimited Budget Scenario

5.2.2.2 Road Assets 10-Year Service Level Trend Forecast

Figure 5-2 illustrates the projected Network Pavement Condition Index (PCI) from 2025 to 2034 under three funding scenarios. Without any reinvestment (Scenario 1), the PCI steadily declines from 53 to 36, reflecting significant deterioration. Under the current annual budget of $11.5 million (Scenario 3), the network condition remains relatively stable, with the PCI decreasing slightly from 53 to 52.

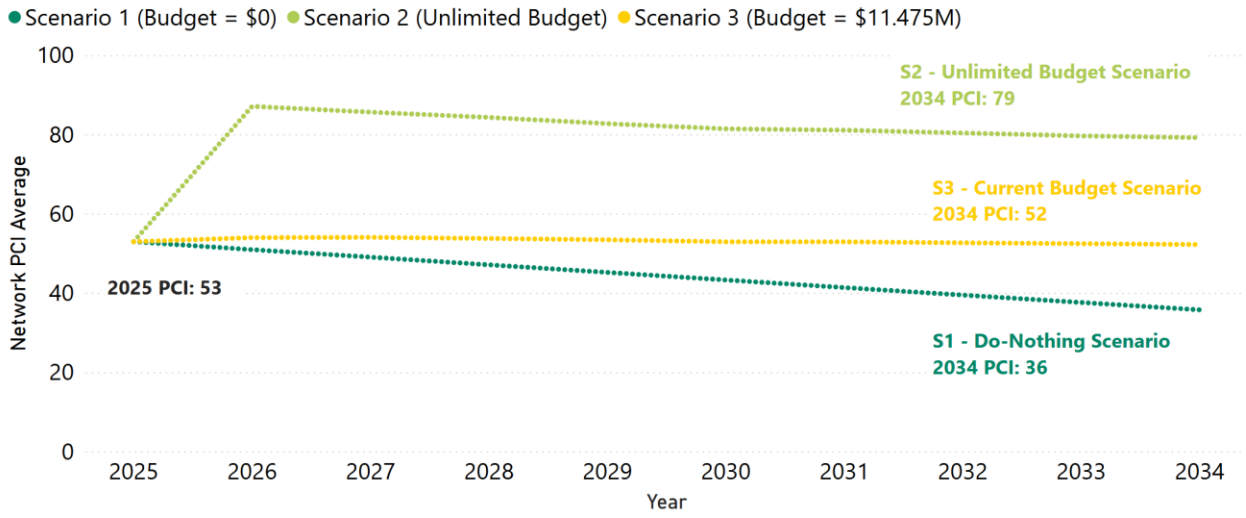


Figure 5-2: Assets Network PCI Trend in the Next 10-Year for All Budget Scenarios

Figure 5-3 presents the projected roads in Fair or better condition over a 10-year period under three funding scenarios. Currently, 67% of the road network is in Fair or better condition. Under Scenario 1 (Do Nothing), this percentage steadily declines to 41% by 2034, highlighting the deterioration that occurs without reinvestment. Scenario 3, which reflects the City's current funding level of $11.5 million annually, results in a slight decline, reaching a level of 63% of roads in Fair or better condition by 2034. In contrast, Scenario 2, which assumes an unlimited annual budget of approximately $33 million, leads to a significant improvement, achieving 100% of assets in fair or better condition by 2026, and maintaining that level through 2034.

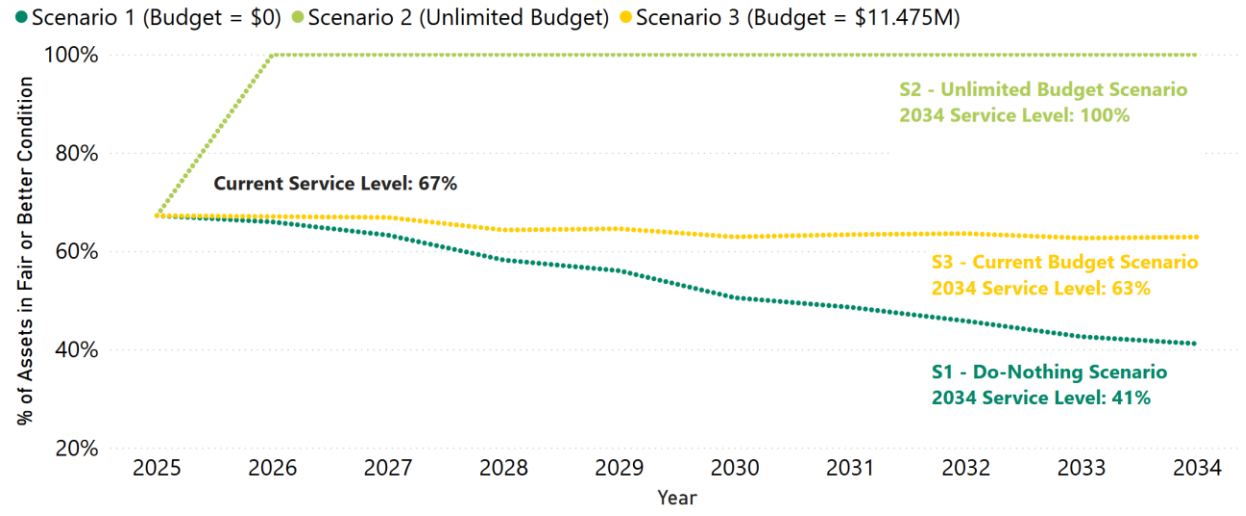


Figure 5-3: Road Assets Levels of Service Trend in the Next 10-Year for All Budget Scenarios

Moreover, Figure 5-4 illustrates the projected distribution of road asset conditions from 2025 to 2034, assuming the City maintains its current annual investment level of $11.5 million. As mentioned previously, the proportion of the network in Fair or better condition is expected to decline slightly by 4% over the 10-year period. However, a more significant concern is the increase in roads classified as Very Poor, which is projected to reach 23% by 2034, highlighting that the current budget level is insufficient to address all deteriorating assets.

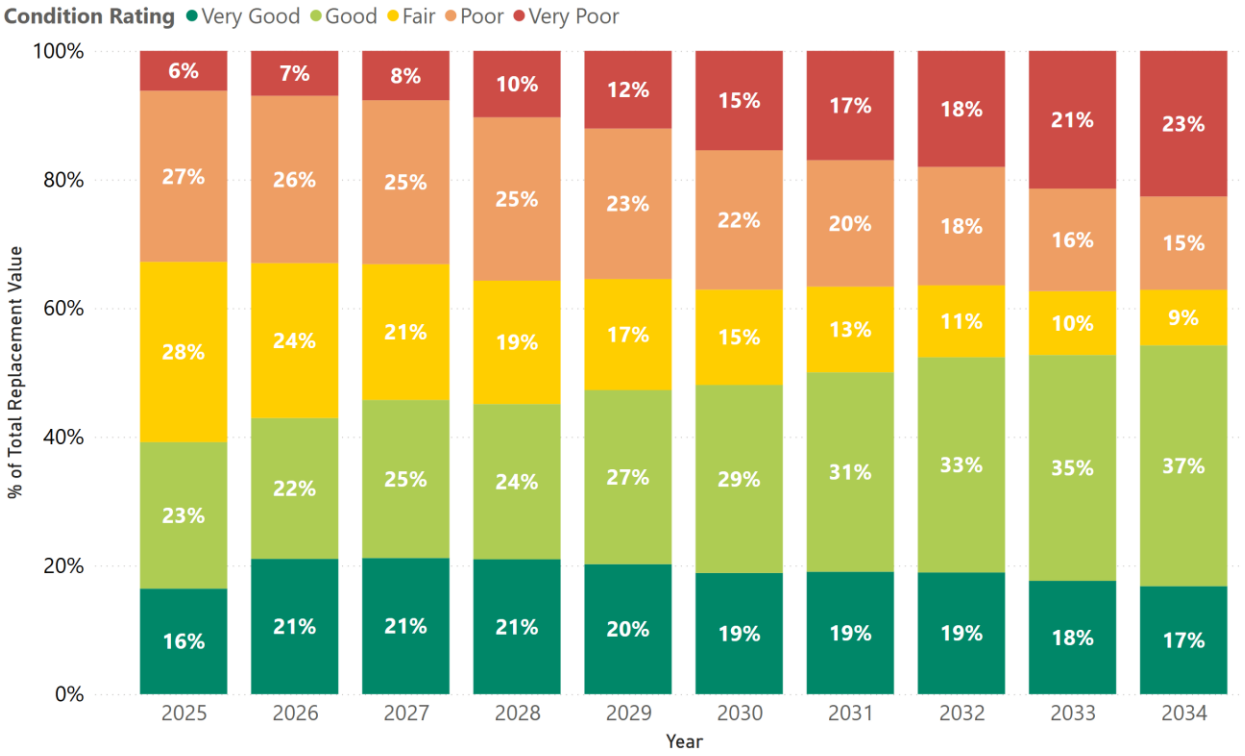


Figure 5-4: Road Assets Condition Projection Under Scenario 3 - City's Current Budget

Effective pavement management emphasizes preserving roads in Fair or better condition before significant deterioration occurs. Intervening early in the pavement distress cycle extends service life and helps avoid the substantially higher costs associated with major rehabilitation or full reconstruction. This proactive approach enables the City to stretch limited maintenance funds further, delivering quicker and more widespread improvements across the network.

While the City acknowledges the need to fully reconstruct roads in Poor or Very Poor condition, current funding levels make it impossible to address all such needs in the near term. As a result, investment decisions must take a broader, network-level view—balancing available budgets, rising construction costs, and potential coordination with underground utility works. Priority is given to treatments that deliver the greatest long-term value for the entire road system.

5.2.3 Bridge & Culvert Assets Budget Scenarios & 10-Year Service Level Forecast

This section presents the budget scenario analysis and the 10-year service level forecast for bridges & culverts.

5.2.3.1 Bridge & Culvert Assets Funding Need

Table 5-5 summarize the projected annual reinvestment needs under the Unlimited Budget Scenario for the City's bridge assets, including vehicular bridges, culverts, and pedestrian bridges, over a 10-year period. The total estimated reinvestment need across all asset types is approximately $10.7 million, with an annual average of $1.07 million. Bridges represent the largest share of this need, requiring $853,000 annually, followed by culverts at $188,000, and pedestrian bridges at $28,000.

Table 5-5: Bridge & Culvert Assets 10-Year Total and Annual Average Capital Reinvestment Need

Asset Category	Asset Type	Annual Average Need	10-Year Total
Vehicular Bridges	Bridges	$853,000	$8,528,000
	Culverts	$188,000	$1,882,000
Pedestrian Bridges	Pedestrian Bridges	$28,000	$285,000
Total		**$1,069,000**	**$10,695,000**

Furthermore, **Figure 5-5** shows annual reinvestment needs for bridges and culverts, with a $5.3 million peak in 2025 due to near-term rehabilitation and replacement needs to address existing backlog.

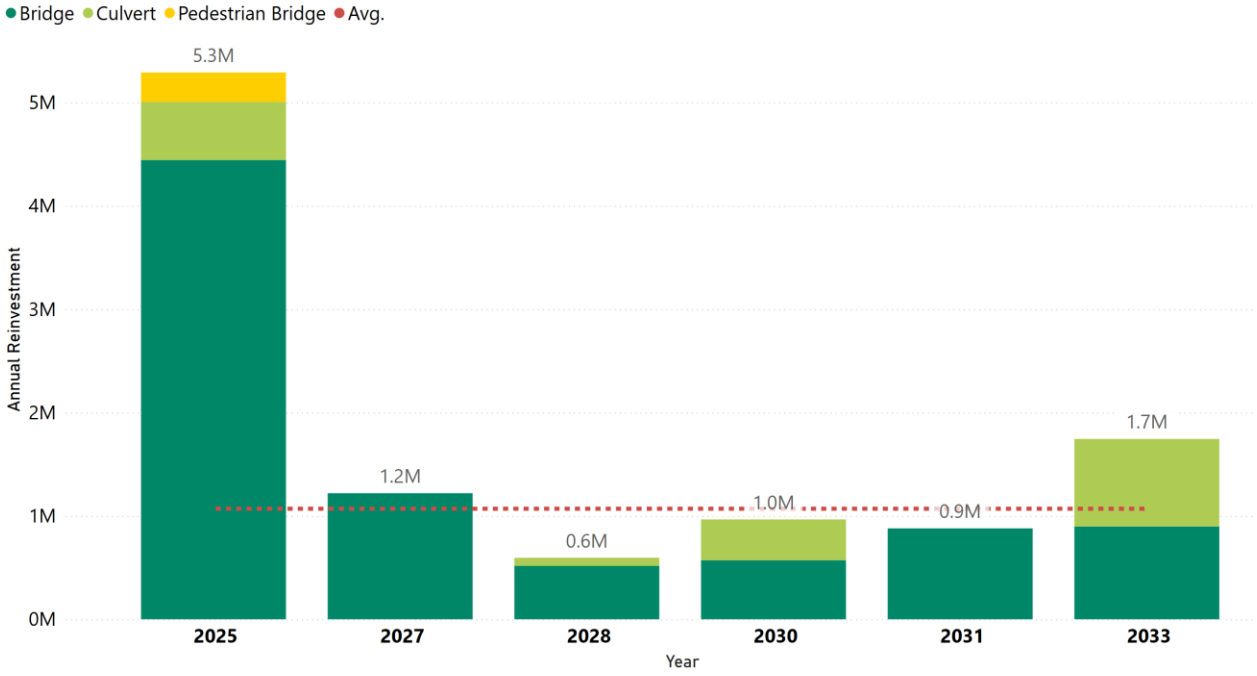


Figure 5-5: 10-Year Funding Need for Bridge Assets – Unlimited Budget Scenario

5.2.3.2 Bridge & Culvert Assets 10-Year Service Level Trend Forecast

Figure 5-6 illustrates the projected percentage of bridge & culvert assets in Fair or better condition over a 10-year period under three funding scenarios. The current service level is 94%, meaning the vast majority of bridges & culverts are in fair or better condition as of 2025.

Under Scenario 1 (Do-Nothing, Budget = $0), the service level remains relatively stable, declining to 94% by 2034, indicating that most assets will retain acceptable condition over the short to medium term. In contrast, Scenario 2 (Unlimited Budget) and Scenario 3 (Current Budget = $750,000 annually) both improve the network's condition to 100% of assets in Fair or better condition by 2027 and maintain that level through 2034. This shows that the current budget is sufficient to gradually bring the lower-condition assets into good condition and sustain a high service level over the planning horizon.

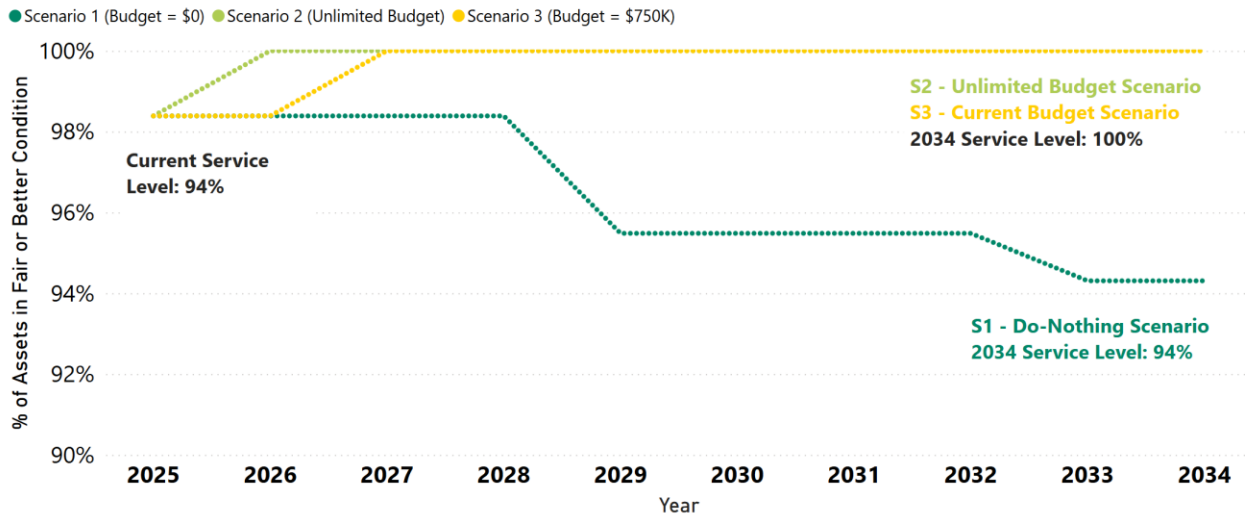


Figure 5-6: Bridge & Culvert Assets Levels of Service Trend in the Next 10-Year for All Budget Scenarios

Figure 5-7 presents the projected condition distribution of bridges & culverts over a 10-year period, assuming the City continues with its current annual investment level of $750,000.

In 2025, approximately 32% of the total replacement value of assets is rated Very Good, 49% is Good, 17% is Fair, and 2% is Poor. No bridge or culvert is in Very Poor. Over time, the condition distribution shifts toward better performance, with the percentage of assets rated Good increasing from 49% in 2025 to 63% by 2034. Meanwhile, Very Good condition assets gradually decline to 22% by 2034, reflecting the natural aging of assets despite reinvestment. Most notably, the portion of assets in Poor condition is effectively eliminated after 2026 and remains at 0% through 2034, while the Fair category also decreases from 17% to 15%, indicating a net improvement across the network.

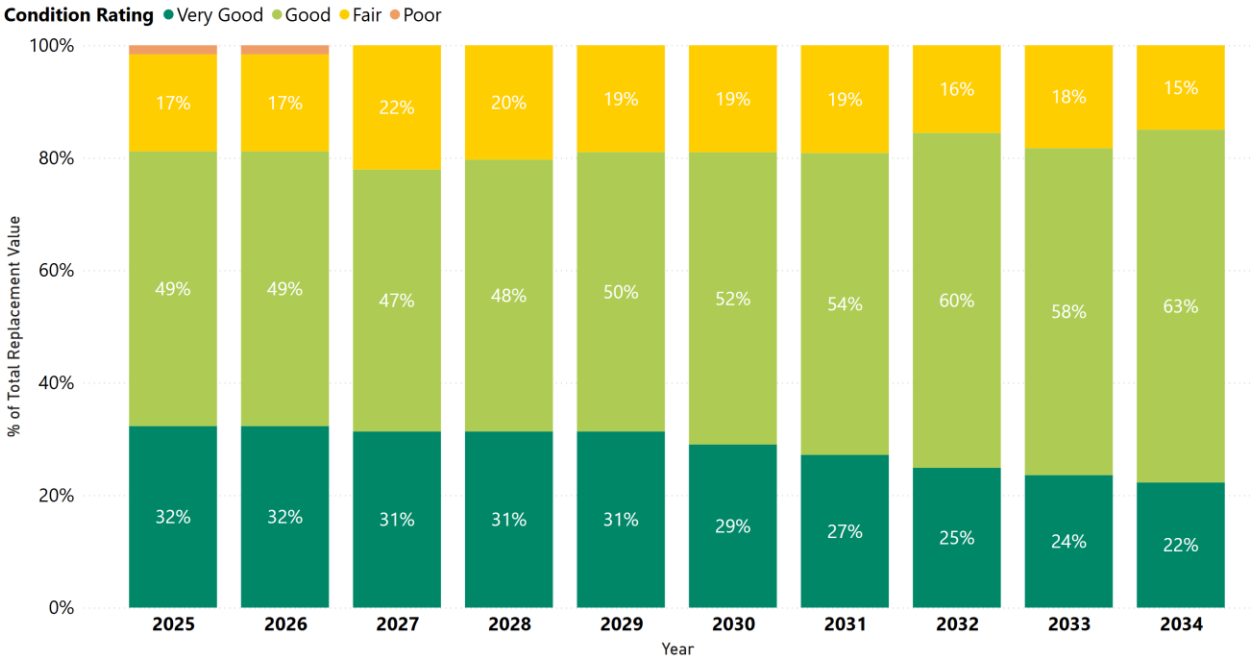


Figure 5-7: Bridge Assets Condition Projection under Scenario 3 - City's Current Budget

5.3 Growth Related Capital Funding Need

The growth-related capital funding identified for road services includes the Sackville Road Extension project, valued at $7.4 million, which covers both roadway and utility construction and is planned for implementation in 2026. As of now, no growth-related capital funding for bridges has been identified through 2029. Given the limited expansion of the road and bridge networks, it is assumed that no significant increase in the O&M budget will be required over the next 10-year period from 2025 to 2034.

5.4 Full Funding Profile

This section shows a full funding profile in inflated dollar value (growth related lifecycle cost not included) for the City's roads and bridges under the Current Budget Scenario for the next 10 years.

Figure 5-8 illustrates the roads full funding profile including reinvestment (including engineering, preventive maintenance, minor and major rehabilitation, and reconstruction) and O&M. The average annual roads full funding level is approximately $28 million (dotted orange line). The largest portion of funding is consistently allocated to O&M activities, followed by minor and major rehabilitation. Reconstruction and engineering portions are relatively smaller but remain critical components of long-term roads planning.

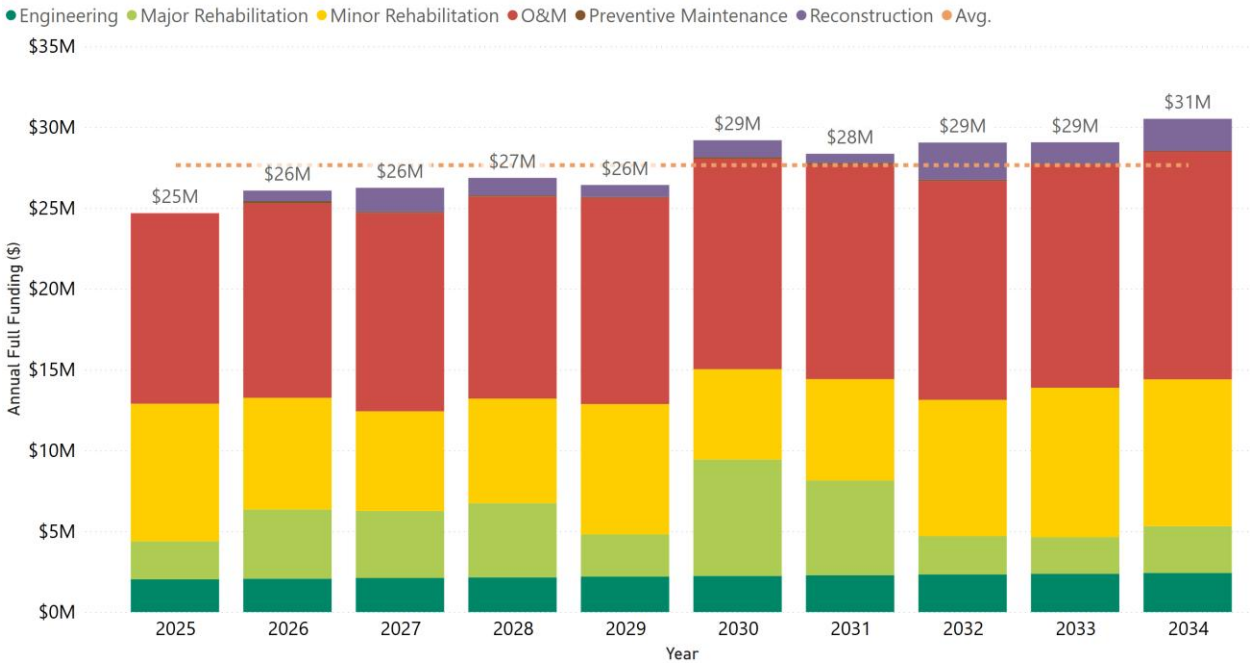


Figure 5-8: Roads Full Funding Profile Based on City's Current Capital Reinvestment Budget Scenario

Figure 5-9 shows the full funding profile for bridges & culverts, including O&M, rehabilitation, and reconstruction. The average annual full funding level is approximately $826,000. Rehabilitation makes up the vast majority of full funding, while O&M costs remain minimal.

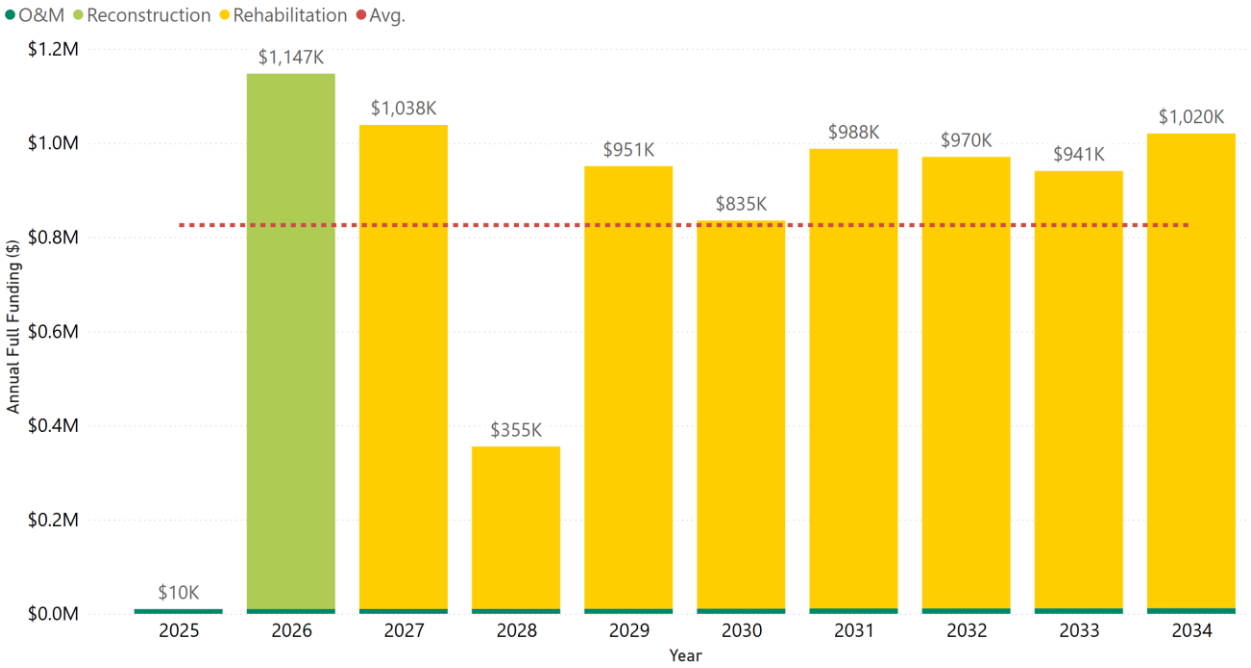


Figure 5-9: Bridges & Culverts Full Funding Profile Based on City's Current Capital Reinvestment Budget Scenario

5.5 Funding Gaps & Risks

The City intends to continue to invest in the growth and renewal of the road and bridge assets over the next 10 years. Table 5-6 compares the City current capital reinvestment budget against the capital reinvestment funding needs under the Unlimited Scenario. The difference between these two values is referred to as the "funding gap".

Table 5-6: Funding Gap – Capital Reinvestment Funding Needs vs. Budget Forecast

Asset Class	10-Year Need Total (Unlimited Scenario)	10-Year City Budget Total (Current Budget Scenario)	10-Year Gap Total
Roads	$331,281,000	$125,200,000	$206,081,000
Bridges & Culverts	$10,695,000	$8,146,000	$2,549,000
Total	**$341,976,000**	**$133,346,000**	**$208,630,000**

Table 5-7 provides a high-level overview of the key risks associated with delayed intervention due to funding gaps.

Table 5-7: Risk of Delayed Intervention for Roads, Bridge, and Culverts

Key Risk	Asset	Potential Consequences/Impacts
Inconsistent Service Level Expectations	Roads	Delayed intervention might lead to unclear service level expectations. **Impacts include:** • Inconsistent maintenance and investment decisions • Misalignment between public expectations and actual service • Inefficient use of limited budgets • Difficulty in prioritizing projects across the network • Reduced transparency and accountability in planning • Increased public dissatisfaction and complaints • Difficulty justifying funding requests or capital plans • Fragmented coordination with utility and development partners

Key Risk	Asset	Potential Consequences/Impacts
Inconsistent Service Level Expectations	Bridges & culverts	Delayed intervention might lead to unclear service level expectations. **Impacts include:** • Inconsistent inspection and maintenance cycles • Delayed interventions leading to accelerated deterioration • Increased safety risks and potential structural failures • Increased legal liability and higher insurance premiums • Increase environmental and regulatory non-compliance (e.g., erosion, sedimentation, and habitat damage by blocked culverts) • Unplanned load or access restrictions • Inefficient allocation of capital and maintenance funds • Difficulty prioritizing repairs and replacements • Limited ability to justify funding needs • Public dissatisfaction and potential liability claims
Deterioration Beyond Optimal Intervention Stage	Road, Bridges, and Culverts	Delayed or inadequate lifecycle interventions lead to asset deterioration beyond optimal intervention windows. **Impacts include:** • Accelerated deterioration of roads, bridges, and culverts • Significantly higher future rehabilitation or reconstruction costs • Shortened asset lifespan and reduced return on investment • Inability to meet performance targets and service level commitments
Insufficient Funding for O&M	Road, Bridges, and Culverts	Delayed capital reinvestment could result in higher funding needs for O&M. **Impacts include:** • More frequent repairs to address recurring issues (e.g., potholes, erosion) • Increased need for monitoring and inspections • Higher risk of emergency interventions and reactive maintenance • Reduced operational efficiency and increased reactive maintenance costs • Escalating future rehabilitation and capital costs • Decreased user safety, satisfaction, and mobility
Higher Vulnerability of Assets to Emergencies or Extreme Weather Events	Road, Bridges, and Culverts	Infrastructure may lack resilience to withstand climate-related or unforeseen events. **Impacts include:** • Increased frequency and severity of service disruptions during storm or flood events • Higher safety risks to the public and maintenance crews • Emergency repairs diverting funds from planned programs • Infrastructure failure causing damage to adjacent properties and the environment

5.6 Funding Sources & Alternative Strategies

The Funding Gap represents the shortfall between optimal and forecasted funding levels. Addressing this gap requires careful strategic consideration. Options may include increasing revenues (e.g., user rates, taxes), issuing debt, adjusting the LoS, or accepting elevated asset-related risks. Each of these choices involves trade-offs that must be weighed in light of financial sustainability, regulatory obligations, and community expectations.

The City's current internal funding and external funding source include, but not limited to:

- Carryover from the previous year.
- Ontario Community Infrastructure Funding (OCIF).
- Canada Community-Building Fund (CCBF), formerly known as the federal Gas Tax Fund.
- Connecting Link (CL) for roads.

- Northern Ontario Resource Development Stream (NORDS).
- Building Faster Fund (BFF).

Looking ahead, the City recognizes the need to explore both financial and non-financial strategies to support the long-term delivery of road and bridge services. On the financial front, the City will continue to pursue external grant opportunities and seek Council approval for project-specific co-funding when appropriate. There have also been internal discussions about the potential to fund road renewal components through sanitary infrastructure, which is sometimes the primary cost driver of a project.

Beyond financial tools, non-financial strategies offer valuable levers to manage service expectations within existing fiscal constraints. These include:

- **Prioritize high-use corridors and critical infrastructure**.
- **Strengthening asset management practices** to improve forecasting, risk-based prioritization, and evidence-based decision-making. Risk is considered by the City in the asset management decisions, but establishing a structured and consistent risk assessment process will enhance the transparency and repeatability of decision-making.
- **Leveraging inter-municipal partnerships** for shared procurement, joint infrastructure studies, or coordinated submissions for regional grant applications.
- **Engaging the public and Council early** to align expectations on affordable service levels and prioritize transparency in decision-making.
- **Integrating climate resilience and accessibility goals** into infrastructure planning, which can enhance eligibility for both provincial and federal funding programs.

One particularly impactful strategy is assigning **dedicated staff resources** to support infrastructure grant applications. This role provides focused attention on identifying and securing external funding, ensuring a deep understanding of eligibility requirements, submission processes, and deadlines—thereby reducing the risk of missed opportunities. Furthermore, a dedicated resource can build strong relationships with funding agencies, monitor emerging programs, and tailor applications for greater competitiveness.

6. Implementation Plan and Continuous Improvement

Continuous improvement to management of owner assets is an important component of any AM program and is achieved through the implementation of recommended improvement initiatives which support sustainable service delivery.

Based on the results of AECOM's analysis, a suite of improvement initiatives has been identified for the next phase of AM planning for the City's road and bridge assets, as outlined below:

- **Recommendation 1: Develop a Data Management Plan to provide a holistic and consistent approach to the City's data management practices for roads, bridges, and culverts**.

  A Data Management Plan outlines how data is collected, stored, maintained, shared, and used to support informed decision-making. Key components include data governance, data collection, data quality control, centralized databased, lifecycle tracking, interdepartmental coordination, security and access control, and data sharing protocols.

  As part of the plan, a Data Governance Framework includes developing an asset information and data standards strategy to clearly define what asset data exists, who is accountable for managing it, methods of data collection, and safeguarding data quality. The successful deployment of a Data Governance Framework aims to achieve the following benefits:

  - Enhanced data integrity to support reliable analysis.
  - Improved data management workflows and processes.
  - Improved AM reporting.
  - Clearly defined data management roles & responsibilities.

- **Recommendation 2: Refine asset data and fill data gaps to make more informed and defensible decisions.**

  Continue to collect data and fill gaps in the GIS inventory as identified in **Section 2.3** to have a more accurate representation of the current state of the roads and bridges. It is recommended that the City continues to merge asset data from various drawings, spreadsheets, and other databases through the process of digitizing, transforming, or georeferencing assets to capture the whole inventory.

  - Continue to update dynamic inventory attributes including condition rating, traffic counts, maintenance and rehabilitation activities, road classification from minimum maintenance standards, etc. by using the unique road asset ID.
  - Collect construction and rehabilitation date information to assist in projecting future pavement deterioration, which is one of the important components for informing pavement AM planning.
  - Updating road inventory after rehabilitation and reconstruction to reset service life and intervention history and reflect current pavement attributes and condition, supporting accurate lifecycle planning and improving budgeting and performance tracking.

- **Recommendation 3: Refine the Levels of Service Framework.**

  This AMP represents the City's Levels of Service in alignment with the requirements of O. Reg. 588/17 July 1, 2025, deadline. The City will continue its efforts to:

  – Regularly record LoS performance measures to monitor changes over time and identify emerging trends.

  – Review and update performance measures as needed to ensure they remain relevant and effective.

  - Periodically assess proposed LoS to confirm alignment with shifting community expectations, regulatory changes, City priorities, available resources, and observed performance trends—supporting adaptive and responsive service delivery.
  - Continuously enhance demand management by routinely evaluating future demand drivers that influence service delivery and asset use, integrating these insights into long-term capital planning to ensure LoS remains responsive to changing needs.

- **Recommendation 4: Develop a Risk Assessment Framework and use risk scores to drive financial needs forecasting.**

  The use of a risk-based approach to inform financial needs provides a clear direction in maintenance, rehabilitation, and replacement work in terms of balancing priorities. It also provides transparency to the public and other stakeholders to demonstrate that decisions are made in an impartial and consistent manner, without unreasonable bias, and in accordance with agreed upon policy and priorities.

- **Recommendations 5: Balance the funding needs with asset performance**

  For roads, at current funding levels, the overall road network LoS will decline only slightly—from an average PCI of 53 to 52, and from 67% to 64% of roads rated in Fair or better condition. However, the proportion of local and rural roads in Very Poor condition is expected to continue rising. To address all roads requiring preventive maintenance, rehabilitation, and reconstruction, the Unlimited Scenario estimates a total 10-year funding need of approximately **$332 million**—significantly higher than the current 10-year budget of $126 million, considering inflation. For bridges and culverts, the Unlimited Scenario estimates a total 10-year funding need of approximately **$11 million**, compared to the current 10-year budget of $8 million (inflation-adjusted). While there is a funding gap for bridges and culverts, it is not as significant as that for roads. The analysis indicates that the current funding level is sufficient to maintain all bridges and culverts in Fair or better condition by 2034.

  This budget shortfall, particularly in roads, underscores the urgent need for long-term financial planning and increased funding commitments to address the growing backlog, particularly on local and rural roads. Given the limited annual budget, the City is encouraged to assess funding needs based on different service levels, establish realistic short- and long-term LoS targets, and adopt both financial and non-financial strategies to gradually close the funding gap and maintain assets in a state of good repair.

- **Recommendation 6: Evaluate the use of a Computerized Maintenance Management System (CMMS) and Decision Support System (DSS) for Coordinated Capital Planning and O&M Management**

  The implementation of a CMMS and DSS would enable the City to optimize capital planning and consistently manage and track asset operations and maintenance activities across all asset classes. These systems support data-driven decision-making, improve coordination between departments, and enhance the ability to prioritize investments based on condition, risk, and service levels. It is recommended that the City conduct an AM Software Assessment to identify future system requirements that may include enhancing existing software, adding-on, or replacing.

- **Recommendation 7: Refine the lifecycle model and update the model periodically as new information becomes available.**

  The roads lifecycle model is based on a wide range of data inputs, currently available information, and a number of assumptions, and is therefore at best a high-level estimate of future needs.

  - Review and update lifecycle model parameters, such as priority index, replacement values, unit treatment cost, treatment trigger conditions (decision trees) and reset values, and deterioration models.
  - Rerun the model with latest information as it becomes available.
  - When there is a new iteration of pavement asset condition information, it is recommended the City to use the updated pavement condition in the model and refresh the capital reinvestment forecast to better inform asset reinvestment needs.

- **Recommendation 8: Continue to find ways to improve AM initiatives across the City by maintaining a high level of AM awareness through training, AM buy-in, communication, and knowledge sharing.**

ISO 55010[6] identifies that the financial and non-financial functions of AM within organizations are generally inadequately aligned. The lack of alignment between financial and non-financial functions can be attributed to silos in an organization, including reporting structures, functional / operational business processes, and related technical data. Financial and non-financial alignment needs to work both “vertically” and “horizontally”, as follows:

- Vertical Alignment: financial and non-financial asset-related directives by management are informed by accurate upward information flows, effectively implemented across the appropriate levels of the organization.
- Horizontal alignment: financial and non-financial information that flows between departments conducting functions such as operations, engineering, maintenance, financial accounting, and management, etc. should use the same terminology and refer to the assets identified in the same way.

- **Recommendation 9: Develop a Knowledge Retention Strategy to document staff AM knowledge and experience for succession planning purposes.**

  Communicate AM improvement initiatives and enhance AM awareness through internal communication.

- **Recommendation 10: Develop a Change Management & Communications Plan.**

  AM buy-in and support are needed from all levels of the City to ensure that AM standards, practices, and tools are properly adopted and incorporated into day-to-day work activities. A successful Change Management & Communications Plan will depend on the following factors:

  – AM buy-in from Council, senior management, staff, and departments.
  – AM objectives are realistic and achievable.
  – AM improvement initiatives are appropriately resourced.
  – A network of AM champions is developed and empowered across the City.

- **Recommendation 11: Establish a Public and Council Engagement Framework**

  Establish a structured approach to public and Council engagement to ensure the AMP aligns with community expectations, supports informed decision-making, and enhances transparency, the City is committed to establishing a structured approach to public and Council engagement. While several engagement activities have already been undertaken, these efforts lay the foundation for a more consistent and strategic approach moving forward.

  For Council engagement, the City has held presentations and conducted media events to share key project updates. It is recommended the development of Councillor Tool Kits could equip elected officials with clear and consistent messaging, including project overviews and frequently asked questions, to help them confidently respond to inquiries from residents. Suggested content for the tool kits includes:

  – Overview of the City’s Infrastructure Network
  – Unique Conditions and Localized Challenges
  – Investment in Infrastructure: Past, Present, and Future
  – How the City Plans and Delivers Maintenance
  – Why Continued Investment in Infrastructure Is Critical
  – Asset Types and How They Guide Investment Priorities
  – Introduction to Asset Management Principles
  – Service Levels: What Residents Can Expect
  – How Climate Change Impacts Infrastructure and their Maintenance

[6] International Organization for Standardization (2019): ISO 55010 - Asset management — Guidance on the alignment of financial and non-financial functions in asset management

- Leveraging Technology to Improve Infrastructure Management
- Funding Sources and Budget Allocation
- How Infrastructure Are Prioritized and Selected for Maintenance

On the public engagement side, the City has shared information through existing channels, and this could be enhanced through a dedicated project webpage. This webpage would serve as a central hub for infrastructure planning updates, offering frequently asked questions, downloadable resources, project timelines, contact information, and an interactive feature to encourage two-way communication. A targeted social media strategy is also recommended to further broaden outreach—leveraging platforms such as Facebook and Instagram, including the use of sponsored posts to promote project milestones and public input opportunities.

The recommended engagement strategies would help foster public trust, define customer-focused performance targets, and ensure that the AMP reflects the evolving priorities of both Council and the broader community.

APPENDIX A

Roads MS Excel Inventory

Appendix A - Roads MS Excel Inventory

The City's roads inventory is presented as a separate MS Excel file.

APPENDIX B

Bridges and Culverts MS Excel Inventory

B

Appendix B - Bridges and Culverts MS Excel Inventory

The City's bridges and culverts inventory is presented as a separate MS Excel file.

About AECOM

AECOM is the world's trusted infrastructure consulting firm, delivering professional services throughout the project lifecycle — from planning, design and engineering to program and construction management. On projects spanning transportation, buildings, water, new energy and the environment, our public- and private-sector clients trust us to solve their most complex challenges. Our teams are driven by a common purpose to deliver a better world through our unrivaled technical expertise and innovation, a culture of equity, diversity and inclusion, and a commitment to environmental, social and governance priorities. AECOM is a *Fortune 500* firm and its Professional Services business had revenue of $13.2 billion in fiscal year 2020. See how we are delivering sustainable legacies for generations to come at aecom.com and @AECOM.