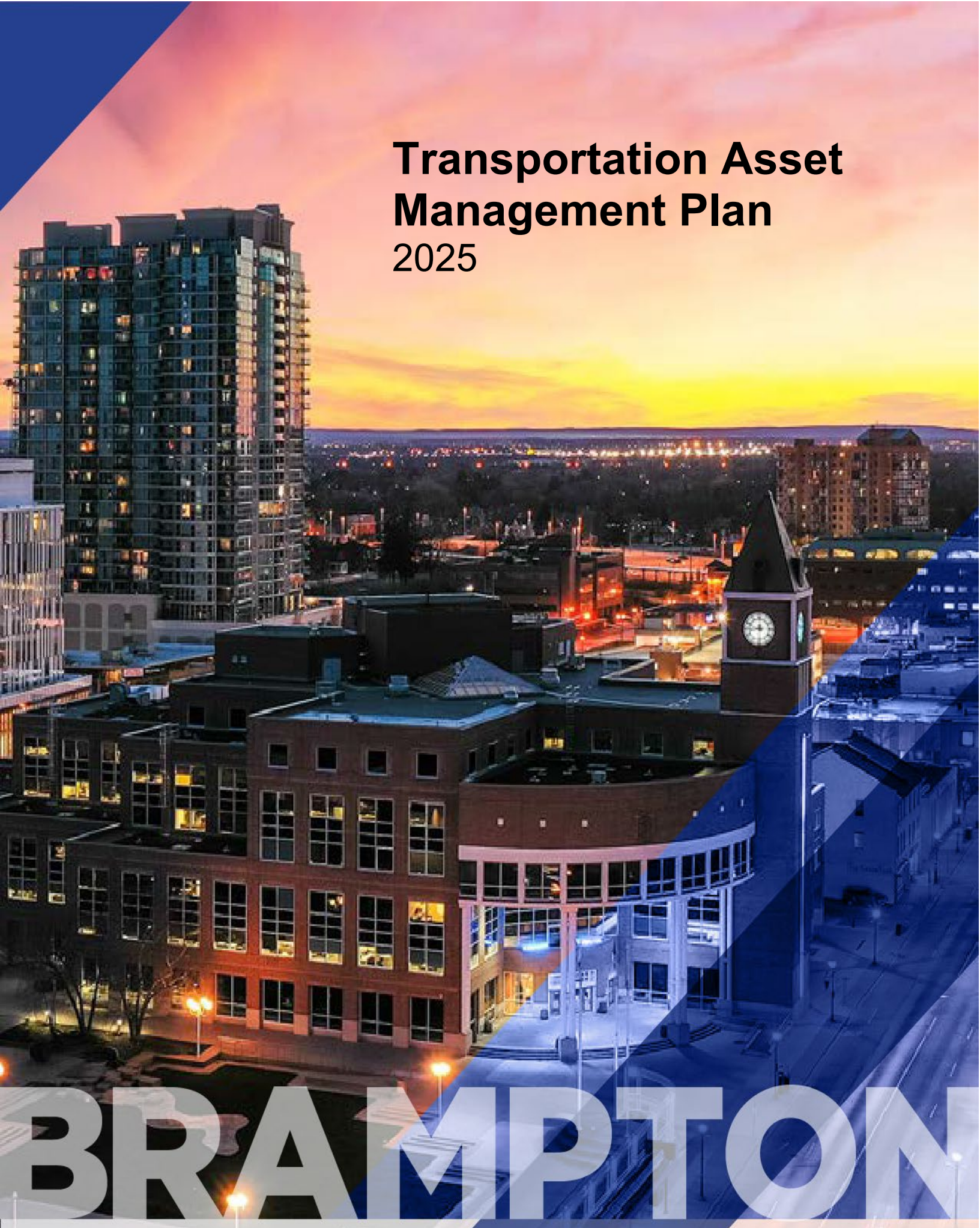
Transportation Asset Management Plan

2025



BRAMPTON

Land Acknowledgement

The City of Brampton is located on the traditional territories of the Mississaugas of the Credit, Haudenosaunee, and Wendat Nations who have called this land home since time immemorial. We acknowledge the agreements made in Treaty 19—the Ajetance Purchase of 1818—and are committed to our ongoing role in reconciliation through meaningful action rooted in truth, justice, and respect. We are grateful to the original caretakers of this land who have ensured we are able to work, play, and live in Brampton now and in the future.

The City of Brampton has formally adopted the Truth and Reconciliation Commission's Calls to Action; the United Nations Declaration on the Rights of Indigenous Peoples; the National Inquiry into Missing and Murdered Indigenous Women and Girls, and 2SLGBTQIA+ Peoples' Calls to Justice. Through a nation-to-nation approach with our host Nations and urban Indigenous community, the City will utilize the recommendations for municipalities within these reports and frameworks to guide its work of increasing awareness, building capacity, and collaborating on solutions.

The City's relationships with the Indigenous community contribute to the continuing creation of processes for reconciliation that drive economic recovery, social development, and cultural inclusion of the Indigenous community. The City honours the uniqueness of Indigenous knowledge, histories, and traditions, and recognizes their importance in building and supporting an inclusive, successful, innovative, and brighter future for Brampton.

Staff Acknowledgement

The development of the Transportation Asset Management Plan was a significant undertaking with contributions from staff across the organization. The Transportation AMP was prepared collaboratively with the Transportation service areas and its input was collected over a series of workshops and meetings, which required extensive time and effort. The Corporate Asset Management Office would like to acknowledge the efforts of the City of Brampton staff and sincerely thank everyone including the Steering Committee, Working Group, Subject Matter Experts from the City's Transportation service area, and City Council, for their continued support and guidance throughout the development of this Plan.

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Executive Summary

The City of Brampton is Canada's ninth-largest municipality, with an estimated population of 790,000 in 2024. It continues to be one of the largest employment centres in the Greater Toronto Area. As a result of rapid growth in recent years, the City has significantly expanded its already extensive asset inventory to meet increasing service demands.

This Transportation Asset Management Plan (AM Plan) has been developed to further advance the City's asset management practices. Its primary objective is to ensure that Brampton's transportation infrastructure is managed in a financially sustainable manner while consistently delivering the expected levels of service to the community. The Plan aligns with the requirements set out in Ontario Regulation 588/17 (O.Reg. 588/17) and incorporates leading industry practices.

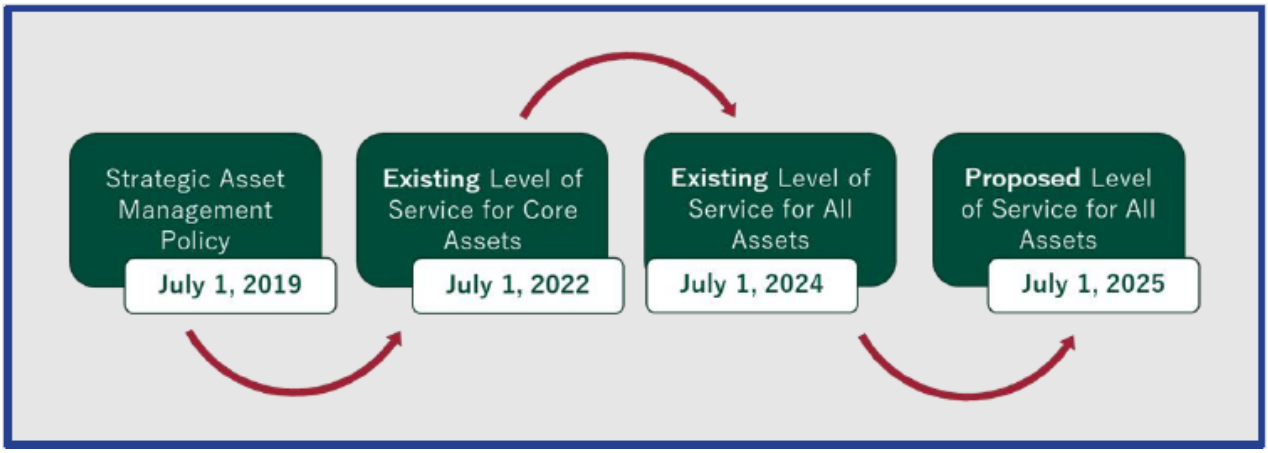
In May 2023, the Province of Ontario introduced Bill 112, the Hazel McCallion Act, which established a Transition Board with the intention of dissolving the Region of Peel and transitioning Brampton, Caledon, and Mississauga into single-tier municipalities.

However, in January 2024, the Province revised the Transition Board's mandate, shifting its focus from dissolution to a broader objective of modernizing and reorganizing the Region into a more efficient and responsive municipal structure that better serves residents and taxpayers. The Transition Board recommended that select services currently managed by the Region of Peel—specifically waste collection and regional road maintenance—be transferred to the local municipalities to enhance efficiency and accountability.As such, future iterations of this AM Plan will include any assets acquired from the Region of Peel.

A summary timeline outlining the regulatory requirements is presented in Figure E-1. This AM Plan fulfills—and in several areas exceeds—the requirements set forth in the Ontario Building Together Guide for Municipal Asset Management Plans. It is also aligned with international best practices, drawing from both the ISO 55000 Global Asset Management Standard and the International Infrastructure Management Manual (IIMM).

Additionally, this Plan includes the proposed levels of service components required to meet the 2025 regulatory deadline for all transportation asset classes addressed within this document.

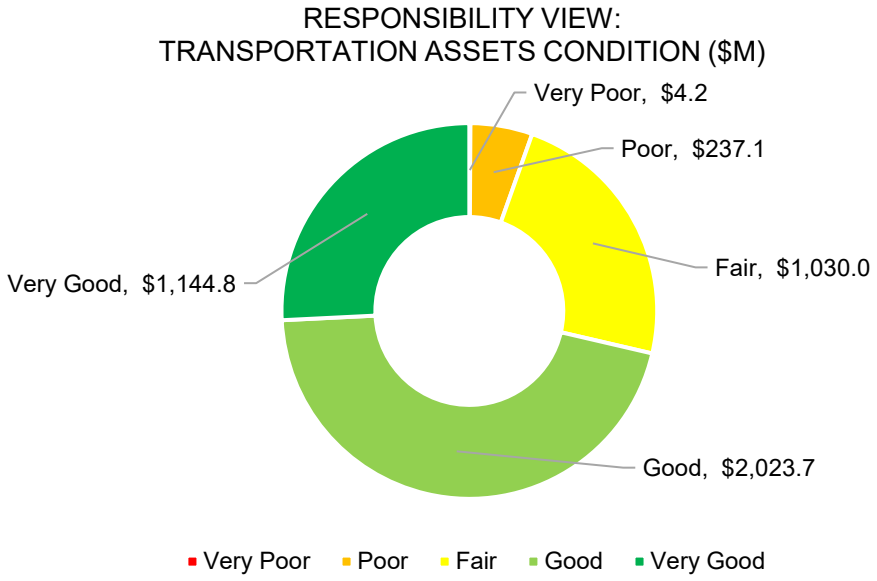
Figure E-1: Regulatory O.Reg 588/17 Requirements



State of the Local Infrastructure

The City's portfolio of transportation assets has a total replacement value estimated at $4.4 billion. The assets included in this AM Plan predominantly consist of the roadway network, bridges and culverts, other structures, walkways and pathways and traffic assets. The valuation is estimated based on an inventory of capital assets as of year-end 2023.

Figure E-2: Asset Condition Grade Profile by Replacement Value



Note: Replacement values are based on the SOLI 2023 report which is in 2024 dollars.

The above figure shows that 95% of the City's assets are in fair or better condition based on replacement value, while 5% or $237 million are in poor condition and 0.1% or $4 million are in very poor condition. O.Assets identified very poor are physically unsound and/or not performing as originally intended. In most cases, very poor assets are either being renewed or will be addressed through the upcoming budget. The report affirms that the assets deemed unsafe will never be put into service under any circumstances, thereby prioritizing public safety.

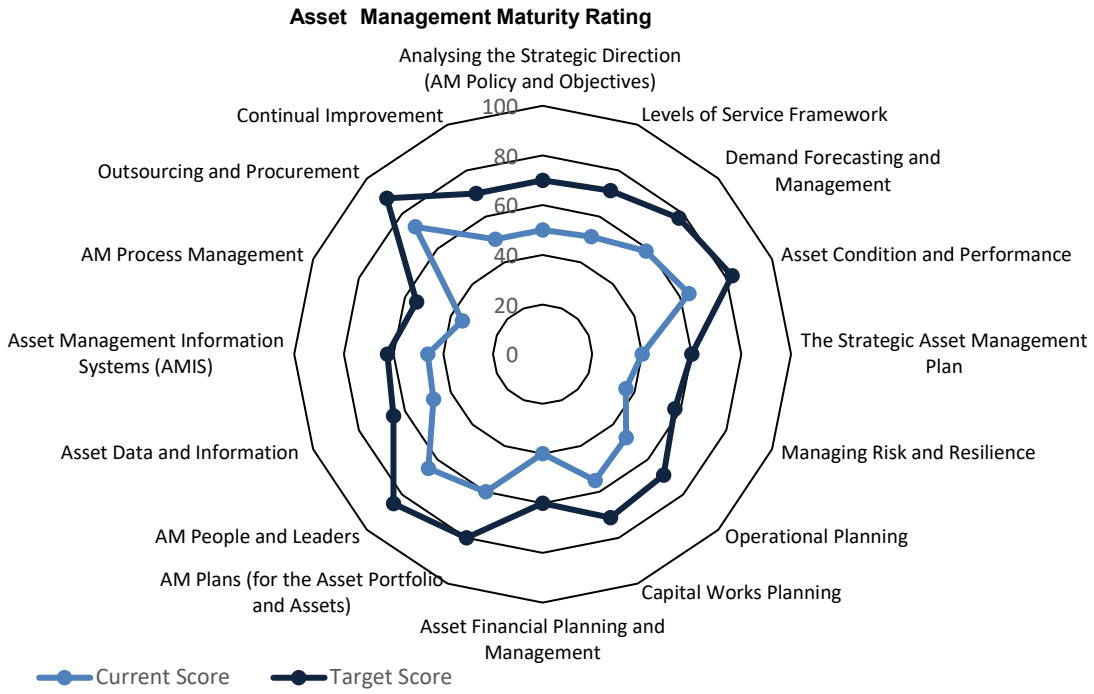
Maturity Assessment

As part of this Transportation Asset Management Plan, individual asset management maturity assessments were conducted for each transportation asset class. These assessments were informed through dedicated workshops, which facilitated the collection of data related to asset information, current practices, and management approaches within each service area.

Radar graphs illustrating the current and target maturity levels for each asset class are provided in the appendix. These visuals also outline the key activities required to progress toward the desired maturity.

Based on the results of these assessments, the City's overall current maturity score across all transportation asset classes is 51, which corresponds to a "Core" maturity level. The City has established a strategic objective to advance to an "Intermediate" maturity level, on average, over the next five years.

Figure E-3 – Asset Management Maturity Radar Graph by Element (Across all Asset Classes)



Levels of Service

The City of Brampton is committed to delivering high-quality services to its residents and businesses while maintaining affordability and long-term financial sustainability. As the City's asset management program has matured, it has become increasingly evident that a more advanced understanding of the scope and performance of services is required to effectively evaluate both their effectiveness and cost-efficiency.

In support of this objective, this Asset Management Plan includes detailed Levels of Service (LOS) table for transportation assets , presented in Section 3.4 of this report. The table establish a clear link between the current levels of service and the proposed or targeted levels, and identify the associated costs required to achieve those targets. This approach provides a foundation for more informed decision-making and supports the City's commitment to balancing service excellence with fiscal responsibility.

Demand Management

Demand management within this Asset Management Plan refers to the City's approach to anticipating and responding to future changes that may influence the demand for municipal services. The objective is to proactively identify key factors that will affect service needs, outline strategies to effectively manage these changes, and estimate the associated costs of doing so.

This section of the report provides an overview of:

- Demand Drivers and Forecast;
- Impact on Level of Services; and
- Demand Management through Lifecycle Activities.

As Brampton continues to grow and evolve, the demand for City services will be shaped by shifting community priorities, technological advancements, and enhancements to existing service offerings. A forward-looking demand management approach ensures that the City remains adaptable and prepared to maintain service quality in the face of these changes.

Risk Management

In total, approximately $4.4 billion ($2024) in transportation assets have been assessed as part of this Asset Management Plan. Of this amount, around $2.20 billion (51%) have been classified as presenting *low to insignificant* levels of risk. An additional $2.06 billion (46%) are categorized as *moderate risk*, while the remaining $124 million (3%) have been identified as *high-risk* assets. Importantly, no assets have been assessed in the *extreme risk* category.

The City actively monitors high-risk assets through ongoing inspections and incorporates risk mitigation strategies within the capital and operating budget processes to ensure that these risks are addressed before they negatively impact service delivery or the community. Importantly, the assets deemed unsafe will never be put into service under any circumstances, thereby prioritizing public safety.

While the cumulative risk profile indicates that nearly all assets (approximately 97%) fall within the moderate risk range or lower, the City continues to face ongoing risk-related challenges. Insights from the risk assessment process and consultations with service area staff indicate that the most significant risk drivers remain:

- **Capacity constraints**, particularly during peak service periods; and
- **Asset condition**, with heightened attention required for assets rated in *Very Poor* condition.

As demand for service increases and infrastructure continues to age, it will be critical for the City to closely monitor these high-risk assets to ensure timely interventions and sustained service performance.

Figure E-4: Summary of Risk Assessment by Replacement Value (Transportation Services)

PoF	Replacement Value (2024$M) by Risk Exposure (PoF x CoF)				
5	$0.0	$1.6	$3.3	$1.0	$0.0
4	$0.0	$9.1	$79.3	$119.8	$0.0
3	$0.0	$38.6	$644.6	$484.3	$0.0
2	$0.0	$292.5	$1,583.1	$846.5	$0.0
1	$0.2	$41.5	$294.0	$0.0	$0.0
	1	2	3	4	5

Consequence of Failure (CoF)

Current ($2024M) Risk Ratings	
Extreme	$0
High	$124
Medium	$2,065
Low	$2,208
Insignificant	$42

Note: Replacement values are based on the SOLI 2023 report which is in 2024 dollars.

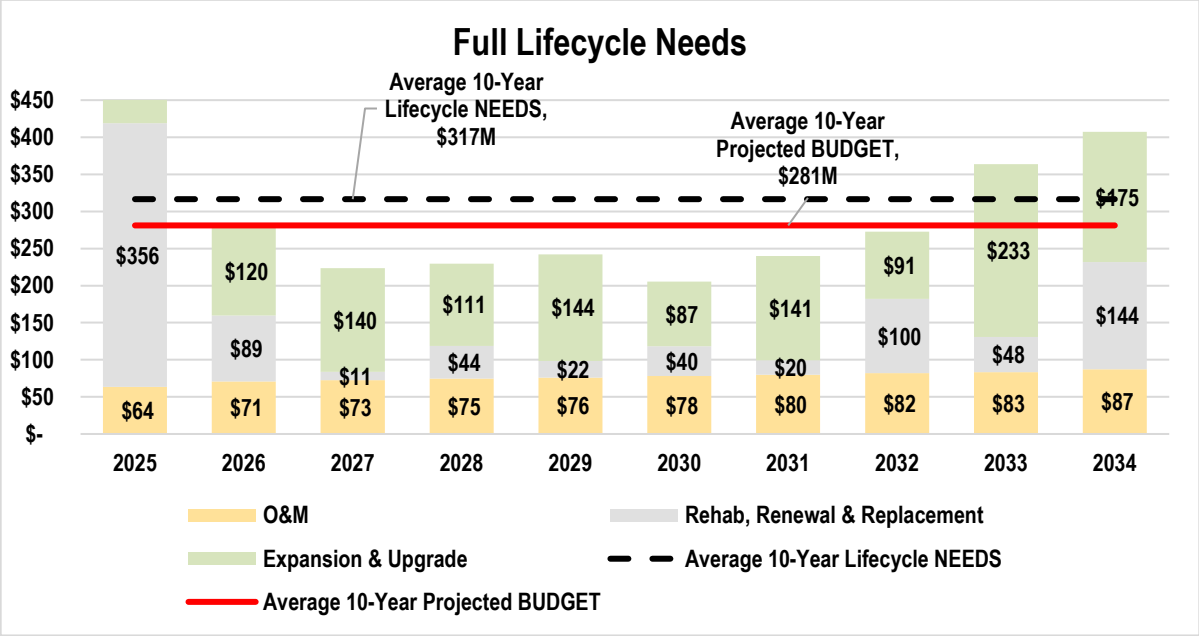
Lifecycle Management

The City of Brampton manages assets across various service areas using distinct lifecycle strategies, which are currently a mix of formal and informal procedures. Consistent with the recommendations of the City's Service Area Asset Management Plan (Service Area AMP) and regulatory requirements, the City's asset-related work has been categorized into six lifecycle action categories. These categories represent the actions undertaken throughout the lifecycle of assets to ensure they provide desired levels of service:

- Non-Infrastructure Solutions
- Operations & Maintenance (O&M)
- Renewal & Rehabilitation
- Replacement
- Disposal/Removal
- Expansion/Upgrade.

Figure E-5 below summarizes the lifecycle costs by category to maintain current levels of service for the City's transportation assets.

Figure E-5: Full Lifecycle Needs (Transportation Services) – In Millions



Key findings from the lifecycle strategy analysis include:

- The City's total expansion and upgrade investment requires total $152.0 million/year. Planning for these future assets is essential to ensuring that the City's infrastructure can accommodate anticipated increases in population, development, and service demands effectively.

- Operational needs are expected to increase from $63.6 million/year in 2025 to $87.3 million/year in 2034. The estimate of operations and maintenance cost increases can be refined by conducting more detailed analysis of operating costs by asset sub-types or by maintenance activity. For the period 2025-2034, the annual operating and maintenance costs are expected to be an average of $76.8 million/year.

- For rehabilitation, renewal and replacement – the average annual need to maintain the current LOS over the next ten years is $87.0 million. This analysis looked at activities needed to be undertaken such that the current levels of service are maintained over the next 10 years. The City is committed to the long-term viability and maintenance of its core infrastructure, including its roads, bridges and culverts, as a critical component of its public services. For assets with relatively shorter useful life the end-of-life replacements are considered.

- The estimated annual funding requirement to effectively implement non-infrastructure strategies is approximately $0.5 million/year. These initiatives complement physical infrastructure investments by improving service delivery, enhancing safety, and managing demand without the need for costly capital construction.

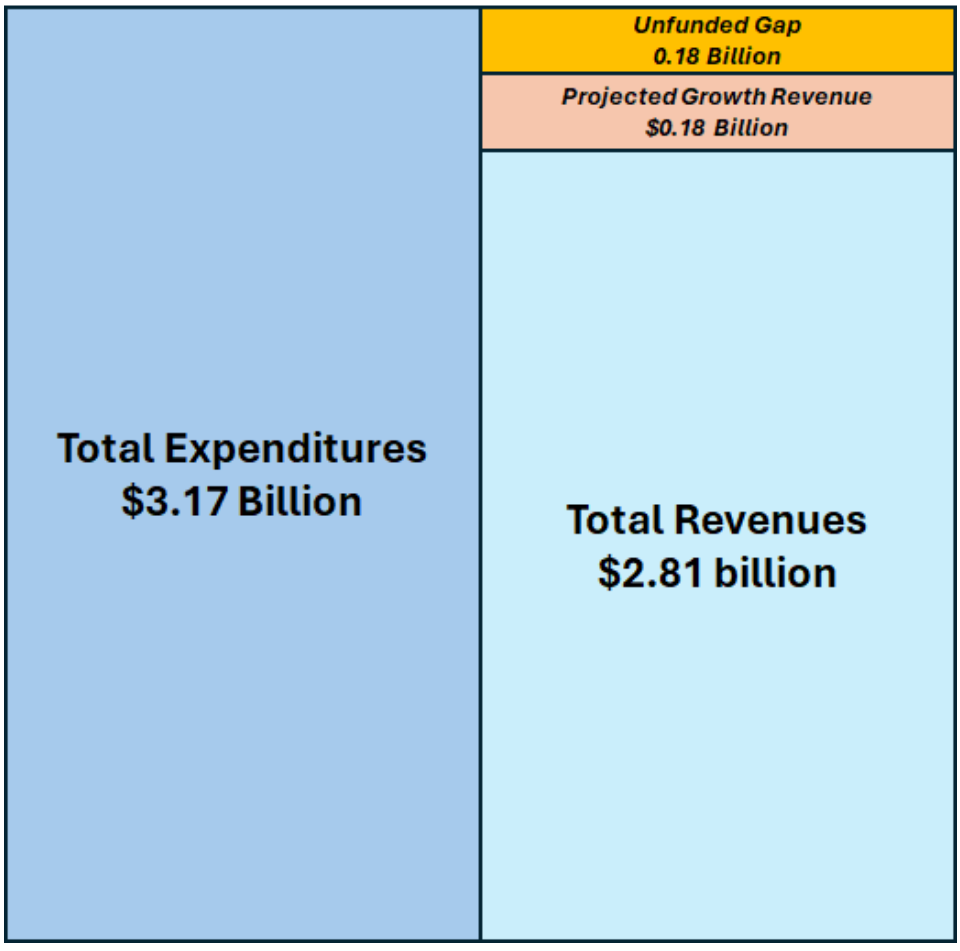
In total, the City's transportation network requires an estimated $317 million annually to meet the proposed service levels. This figure represents the combined lifecycle investment needs across all categories, including expansion and upgrade, operations and maintenance, renewal, rehabilitation and replacement, as well as non-infrastructure solutions.

Financing Strategy

The financing strategy outlined in this report evaluates the infrastructure funding gap associated with maintaining current levels of service for existing transportation assets. The infrastructure gap is defined as the difference between the total full lifecycle costs and the projected available revenues over a 10-year planning horizon.

Based on this analysis, and as illustrated in Figure E-6, the infrastructure gap is estimated at approximately $180 million when factoring in additional revenues from new growth. This calculation accounts for additional revenues anticipated from new growth, which are assumed—within this analysis—to be prioritized toward the renewal and rehabilitation of existing assets. However, the specific allocation of these revenues will ultimately be determined through future municipal budget processes as growth materializes.

Figure E-6: Projected Infrastructure Gap to Maintain Current Levels of Service (10-Year Total)



Monitoring & Improvement Plan

Continuous improvement is a fundamental aspect of municipal asset management, reflecting the City's ongoing commitment to optimize the performance, efficiency and sustainability of infrastructure assets over time. This plan builds upon prior efforts that the City has taken to improve the availability, completeness and accuracy of asset data. These improvements have increased the confidence ratings of the data used to develop this plan and facilitate the work required to update asset management reporting in the future.

Asset specific improvements are outlined in the appendix and are categorized into the following improvement areas:

- Data Enhancement & Governance;
- Process Optimization; and
- Technology & Tools.

Concluding Remarks

In summary, this Transportation AM Plan represents a significant milestone in the City of Brampton's ongoing commitment to responsible infrastructure stewardship and regulatory compliance.

The Plan meets the requirements of O.Reg. 588/17, aligning with industry best practices and international standards, while also laying the foundation for ongoing improvements in asset performance, risk management, and financial sustainability.

The projected infrastructure gap is estimated at approximately $180 million when factoring in additional revenues from new growth. The AM Plan emphasizes the importance of strategic financing, lifecycle optimization, and continuous monitoring. It also prepares the City to adapt to future developments, including growth-related asset additions and the potential organizational changes stemming from the Transition Board's work on regional governance.

Looking ahead, the City will continue to refine and update this AM Plan to ensure it remains responsive to emerging risks, regulatory changes, community expectations, and operational realities. Through disciplined implementation, transparent reporting, and alignment with strategic objectives, Brampton is well-positioned to deliver a safe, reliable, and efficient transportation system for its residents and businesses—today and into the future.

Key Acronyms & Abbreviations

AM – Asset Management
AMP – Asset Management Plan
BMP – Brampton Mobility Plan
CAM – Corporate Asset Management
CAPEX – Capital Expenditures
CLOS – Current Levels of Service
DC – Development Charges
GIS – Geographic Information System
IIMM – International Infrastructure Management Manual
ITS – Intelligent Transportation Systems
KPI – Key Performance Indicator
LC – Lifecycle
LID – Low Impact Development
LOS – Levels of Service
O&M – Operations and Maintenance
OPEX – Operating Expenditures
ODM – Optimized Decision-Making
PLOS – Proposed Levels of Service
PM – Preventive Maintenance
PoF – Probability of Failure
PSAB – Public Sector Accounting Board
QA – Quality Assurance
QC – Quality Control
SA – Service Area
SLA – Service Level Agreement
SOLI – State of Local Infrastructure
SOP – Standard Operating Procedure
TCA – Tangible Capital Asset
TLOS – Technical Levels of Service

Glossary

Asset Management

The combination of management, financial, economic, engineering, and other practices applied to physical assets with the objective of providing the required level of service in the most cost-effective manner.

Asset Management Plans (AMPs)

An Asset Management Plan (AMP) is a formal document that outlines the strategies and processes for managing an organization's assets to deliver an agreed standard level of service.

Benchmarking

A process of comparing the business processes and performance metrics including cost, cycle time, productivity, or quality to another that is widely considered to be an industry standard benchmark or best practice.

Capital Expenditure (CAPEX)

Expenditure used to create new assets or to increase the capacity of existing assets beyond their original design capacity or service potential. CAPEX increases the value of the asset stock.

Condition-Based Preventive Maintenance

Preventive maintenance initiated as a result of knowledge of an items condition from routine or continuous monitoring**.**

Condition Monitoring

Inspection, assessment, measurement, and interpretation of the resultant data, to indicate the condition of a specific asset or component and determine the need for some preventive or remedial action.

Consequence of Failure

The effects of a failure mode, including impacts on health & safety, reputation, environment, service provided and economy.

Current Assets

Those assets which are expected to be realized in cash or sold or consumed within one year of an organization’s balance date.

Critical Assets

Those assets that are likely to result in a more significant financial, environmental and social cost in terms of impact on organizational objectives.

Deferred Maintenance

The shortfall in maintenance work required to maintain the service potential of an asset.

Demand Management

Actions taken to influence demand for services and assets, often undertaken as part of sustainability initiatives and/or to avoid or defer required asset investment. Demand management may be ‘SUPPLY-SIDE’ demand Management (for example minimizing wastage through pipe leak detection or customer DEMAND-SIDE management, to reduce demand for over-utilized assets or vice versa (for example through pricing, regulation, education and incentives).

Deterioration Rate

The rate at which an asset approaches failure (end of life).

Failure

The condition in which an asset fails to perform its function. Failures can be total (e.g., a pump fails to pump any water) or partial (e.g., a pump can pump only a portion of the required pumping volume).

Failure Mode
A single event that causes a failure. A single asset may have multiple failure modes.

Gap Analysis
A method of assessing the difference between a business's current (asset management) practices and the future desirable (asset management) practices. Also called “needs analysis”.

Geographic Information System (GIS)
Software that provides a means of spatially viewing, searching, manipulating, and analyzing an electronic database.

Infrastructure Assets
Stationary systems forming a network and serving whole communities, where the system as a whole is intended to be maintained indefinitely at a particular level of service by the continual maintenance, replacement, and refurbishment of its components.

Key Performance Indicator (KPI)
A qualitative or quantitative measure of a service or activity used to compare actual performance against a standard or other target. Performance indicators commonly relate to safety, responsiveness, cost, asset performance, reliability, efficiency, environmental protection, and customer satisfaction.

KPIs are measures of how well a utility is conducting its duties (inward focus), as opposed to the customers’ perspective of the level of service being provided (outward focus).

Level of Service (LOS)
A measure of the effectiveness of a particular activity (e.g., the taste of drinking water as a result of treatment) or service area (e.g., brightness as the result of installed street lighting) as perceived by customers. Service levels usually relate to safety, customer satisfaction, quality, quantity, capacity, reliability, responsiveness, environmental acceptability, cost and availability.

Lifecycle Management
The cycle of activities that an asset or facility goes through while it retains an identity as a particular asset, from planning and design to operations, maintenance, decommissioning and disposal. Investment decisions should be based on understanding the total lifecycle costs and benefits.

Maintenance
All actions necessary for retaining an asset as near as practicable to its original condition and to prevent unplanned downtime, excluding rehabilitation or renewal.

Master Plans
Long range plans developed for major asset classes which consider business drivers, demand and supply projections, conservation, and rehabilitation and replacement of existing assets.

Operation
The active process of utilizing an asset which will consume resources such as labour, energy, chemicals and materials.

Operational Expenditure (OPEX)
Ongoing annual cost expenditures for running day-to-day business operations including costs of workers and facility expenses such as supplies, rent and utilities.

Operations Management

The active process of using an asset that consumes resources such as manpower, energy, chemicals, and materials. Operation costs are part of the lifecycle costs of an asset.

Performance Measure

See Key Performance Indicator (KPI).

Performance Monitoring

Continuous or periodic quantitative and qualitative assessments of the actual performance compared with specific objectives, targets or standards.

Planned Maintenance

Planned maintenance activities fall into two categories:

1. Planned Predictive - condition monitoring activities used to predict failure.
2. Planned Preventive - maintenance that can be initiated without routine or continuous checking (e.g., using information contained in maintenance manuals or manufacturers' recommendations) and isn't condition-based.

Predictive Maintenance (PdM)

Monitoring an asset's condition to predict when it will fail or when maintenance should be performed. This approach offers cost savings over routine or time-based preventive maintenance, because tasks are performed only when warranted.

Preventive Maintenance (PM)

Planned maintenance activities performed at scheduled intervals to prevent equipment failure or deterioration.

Probability of Failure

The likelihood or frequency that an asset will fail to perform its function, typically expressed in terms of failures per year.

Rehabilitation

Work to rebuild or replace parts or components of an asset, to restore it to a required functional condition and extend its life, which may incorporate some modification. Generally involves repairing the asset to deliver its original level of service (e.g., slip-lining of sewer mains) without resorting to significant upgrading or renewal, using available techniques and standards.

Renewal

Work to upgrade, refurbish, or replace existing assets or facilities with assets or facilities of equivalent capacity or performance capability.

Replacement

The complete replacement of an asset that has reached the end of its life to provide a similar, or agreed alternative, level of service.

Risk

The probability of an event occurring multiplied by the impact(s) of that event.

Risk Management

The application of a formal process to assess organizational risks to determine the resultant ranges of outcomes, their probability of occurrence, and what actions may be cost-effectively taken to reduce the organization's overall risk exposure.

Strategic Plan

A plan containing the long-term goals and strategies of an organization. Strategic plans have a strong external focus, cover major portions of the organization and identify major targets, actions and resource allocations relating to the long-term sustainability, value, and growth of the organization.

Unplanned Maintenance

Corrective work required in the short-term to restore an asset to working condition so it can continue to deliver the required service or to maintain its level of security and integrity.

Useful Life

Useful life can be categorized into the following:

1. Design or Engineered Useful Life: Expected lifespan based on design and engineering specifications.
2. Manufacturer Suggested Useful Life: Duration recommended by the manufacturer for optimal performance
3. Actual Useful Life: Real-world lifespan influenced by usage, maintenance and environmental factors.

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3. Asset Hierarchy
4. 2023 SOLI Report Card
5. LOS Summary Graphics
6. Brampton Complete Streets Guide
7. FAO Climate Change Study Scenarios
8. Asset Interdependencies Evaluation
9. Financing Strategy Assumptions

1.

Introduction

1. Introduction

1.1 Asset Management Plan (AMP) Background

The City of Brampton (City), located within the Greater Toronto and Hamilton Area (GTHA), in the Region of Peel is a diverse and rapidly growing City. The City is responsible for delivering an equally diverse range of services to its residents, including the provision of Transportation Services. Responsibility for the management of these assets within the City resides with the Transportation Service Area, which comprises several groups within the Public Works and Engineering Department.

As infrastructure continues to age and demands increase, the challenge of effectively meeting community needs with limited resources will also grow. This Asset Management Plan (AMP) seeks to address that concern by providing a framework for considering, prioritizing, and optimizing asset management efforts, and providing direction for the effective management of the City's Transportation assets.

This plan is focused on achieving several key goals and objectives:

- **Ensuring Long-Term Sustainability** – management of the City's assets is a long-term commitment that must be sustainable to ensure effective service delivery for future generations.
- **Lowest Cost of Ownership** – long-term sustainability is only possible by ensuring costs are minimized through efficient management of assets by developing service area specific plans and objectives.
- **Minimizing Risk** – risk is minimized through the assessment, management and long-term planning of assets at more focused levels and through consultations with individual service areas.
- **Enhancing Service Delivery** – the City strives for continual improvement as outlined in the Corporate Strategic Plan and therefore service area specific plans are a key objective to ensure enhanced delivery of services at a more detailed level.
- **Supporting Informed Decision-Making** – development of a set of asset management tools that help evidence-based decision-making. As the Transportation AMP continues to be implemented, it will support the essential strategic planning process, including the City's Long Term Financial Master Plan and budgeting processes, well into the future.

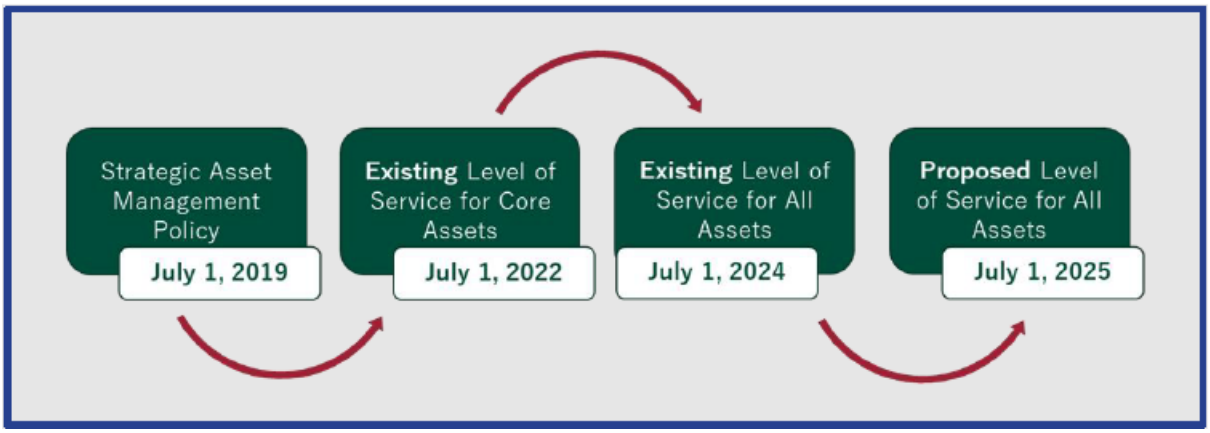
By following the key objectives above, the Transportation AMP establishes a "clear line of sight" from senior management to the customer and from planners to frontline decision makers. Any investment requirements included in the Transportation AMP are clearly linked to a well-defined need. These needs are based on either maintaining or enhancing customer-focused levels of service as well as alignment with strategic

objectives through capital and operating decisions. This will improve transparency and stakeholder confidence that the right decisions are being made on the right assets at the right time.

1.2 Alignment with Regulatory Requirements

The “Building Together Guide” was published in 2012 to encourage and support municipalities in Ontario to develop Asset Management Plans (AMPs) in a consistent manner. O. Reg. 588/17 was subsequently enacted in 2017 and further expands on the “Building Together Guide” by mandating specific requirements for municipal Asset Management Policies and AMPs in Ontario.

Figure 1-1: Regulatory O.Reg 588/17 Requirements



O. Reg. 588/17 has set three AMP-related deadlines (as seen above in Figure 1-1):

- July 1, 2022 deadline: Every municipality shall prepare an AMP in respect of its core municipal infrastructure assets (water, wastewater, stormwater, roads and bridges) documenting current levels of service.
- July 1, 2024 deadline: Every municipality shall prepare an AMP in respect of all its other municipal infrastructure assets documenting current levels of service.
- July 1, 2025 deadline: Every municipality shall prepare an AMP in respect of all its municipal infrastructure assets documenting proposed levels of service and financial strategies to fund these expenditures for each of the next 10 years.

This AMP is compliant with the July 1, 2025 deadline.

In accordance with the requirements of O.Reg. 588/17, this AM Plan is posted on the City’s website and is emailed to the Ministry of Infrastructure.

1.3 Relationship with Other Municipal Documents

Asset management planning is a medium- to long-term planning activity that relies on input from strategic planning activities and informs shorter-term decision making. The AM Plan provides a framework to validate the City's budgeting processes and assist in prioritizing work activities, including capital projects, based on risk. It also discusses LOS that support goals in the City's Strategic Plan and lifecycle management strategies intended to reduce the overall cost of asset ownership.

Relevant City policies and planning documents to be read with the AM Plan are provided as part of ***the General Appendices.***

1.4 AMP Scope

The Scope of the AMP includes all the assets within the City's Transportation Service Area and the services they deliver. These include:

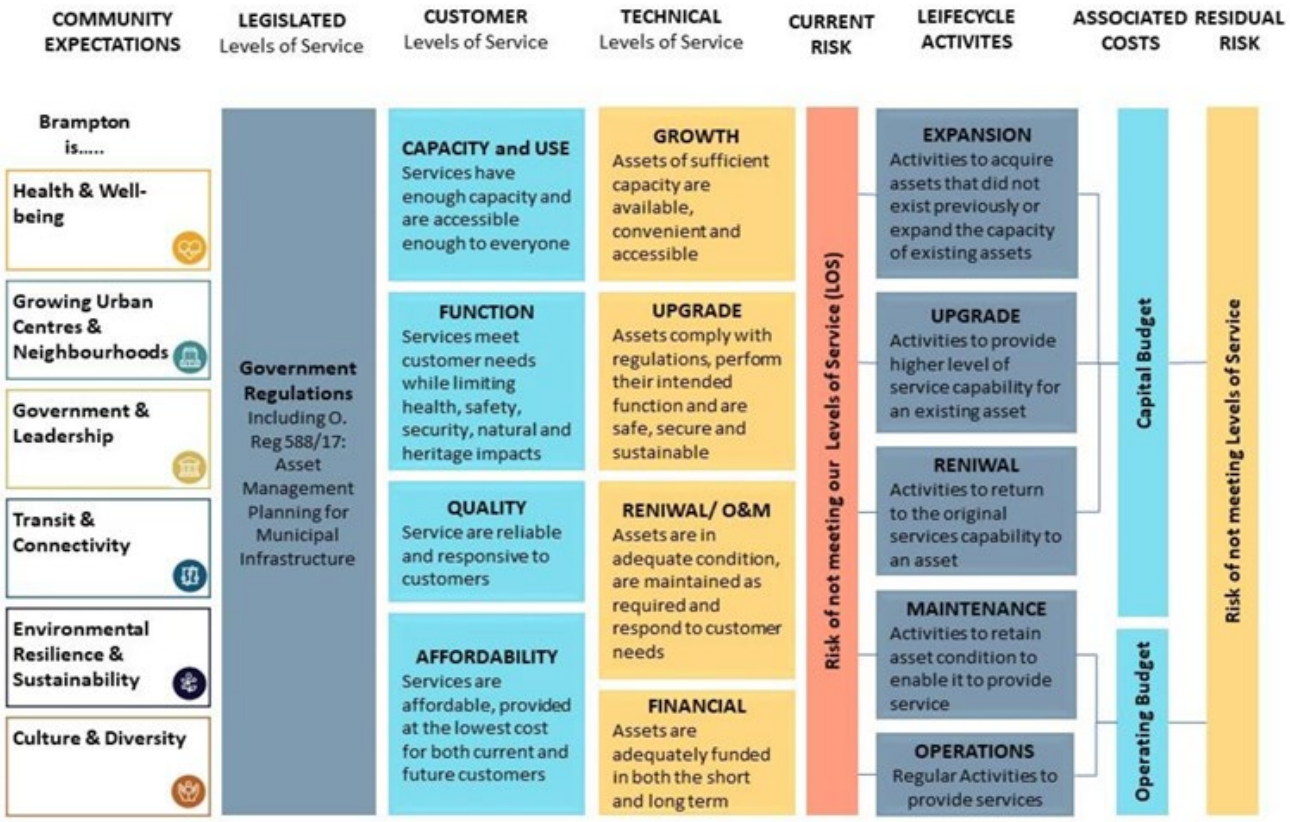
- Roadway Network (including bike lanes)
- Structures (Bridges and Culverts)
- Structures (Other)*
- Walkways, Trails & Paths
- Traffic Services

In addition to the above, the City's Transportation team also relies on supporting assets such as operations facilities, fleet and software. These assets are covered as part of the Service Area AMP 2024 developed for facilities, fleet and IT assets.

Following guidance of the Corporate AMP, the service delivery framework for the City includes a hierarchy of corporate, legislated, customer and technical levels of service, as shown in Figure 1-2. This framework establishes the line of sight between the City's strategic objectives and activities undertaken by service area to deliver customer levels of service. It creates a logical and transparent tool to support and inform the resourcing (financial and other) to deliver the asset lifecycle activities. Asset lifecycle activities are undertaken to close gaps between current performance and target service standards throughout the hierarchy of technical, customer, legislated and corporate levels of service.

* Other structures include gateway features, noise walls, retaining walls, guiderails, handrails and steps.

Figure 1-2: Asset Management Line of Sight



1.5 AM Maturity

Asset management data quality and maturity of AM practice varies across the major asset classes within the Transportation Division. As part of this AMP, an AM maturity assessment was undertaken for the major asset classes of the Transportation Division. Several workshops were conducted to gather information on the current state of asset data and overall asset management planning practices for the assets included in this AMP.

The purpose of the asset management maturity assessment was to identify the current AM maturity of the Transportation Division, along with a target maturity level with associated improvement initiatives that can be reasonably achieved over a five (5) year planning horizon.

Using the International Infrastructure Management Manual (IIMM) maturity assessment tool, information on asset maturity was collected under three categories:

1. Understanding and Defining the Requirements
2. Development of Asset Management Lifecycle Strategies
3. Asset Management Enablers

The three AM maturity categories are broken down into 16 elements that are assessed in the individual Asset Maturity Radar Graphs (which can be found within the *Asset Class Summary Reports* in the **Appendix A to D**). Most of the elements are considered on an asset class level basis; however, a number apply on a corporate-wide level and are scored as such. The elements reviewed for each major asset class (roadways, walkways, structures and traffic) are outlined in Table 1-1.

Table 1-1 – AM Maturity Assessment Elements

Category	AM Element
Understanding and Defining the Requirements	Analyzing the Strategic Initiatives (AM Policy and Objectives)
	Levels of Service Framework
	Demand Forecasting and Management
	Asset Condition and Performance
	The Strategic Asset Management Plan
Developing Asset Management Lifecycle Strategies	Managing Risk and Resilience
	Operational Planning
	Capital Works Planning
	Asset Financial Planning and Management
	AM Plans (for the Asset Portfolio Assets)
Asset Management Enablers	AM People and Leaders
	Asset Data and Information
	Asset Information Management Systems (AIMS)
	AM Process Management
	Outsourcing and Procurement
	Continual Improvement

The following scale, provided in Table 1-2 below, was used to determine a maturity level or score between 0 and 100 for each element. The full maturity assessment framework, tailored to each of the elements above, is provided within ***the General Appendices.***

Table 1-2 – AM Maturity Assessment Scoring Scale

Maturity Level	Score	Definition
Aware	0-20	The organization demonstrates initial recognition of the importance of asset management principles but has limited understanding or application. Processes are ad hoc or informal, and leadership commitment is minimal.
Basic	21-40	Asset management practices are beginning to form, with some foundational processes in place. Understanding and application are still inconsistent and typically reactive rather than proactive.
Core	41-60	The organization has established fundamental asset management practices, including defined objectives and processes. These are applied consistently but may not yet be optimized or integrated into all areas.
Intermediate	61-80	Asset management practices are more robust and integrated across the organization. The organization proactively manages assets based on a combination of historical data, stakeholder needs, and risk assessments.
Advanced	81-100	The organization demonstrates leadership in asset management, with optimized, innovative, and fully integrated practices. Asset management strategies are predictive, dynamic, and aligned with long-term goals.

Two separate scores have been assigned for each element:

- **Current Score** - Through workshops with city staff, an assessment of current AM maturity was determined based on the outlined criteria. This score does not capture advancements made as part of the Transportation AMP.
- **Target Score –** Target scores are generally set at one or two maturity levels above the current score to be achieved in the next 5 years as a result of the City's AM processes and data improvement.

Looking at the results in aggregate across all asset classes, the overall current maturity score is 51, or at a "Core" maturity level, as shown in Figure 1-2 and 1-3 below. The target score across the service area is to achieve an "Intermediate" maturity level on average in the next 5 years. It is recognized that the organization will seldom have perfect processes and data with which to manage the asset portfolio. The underlying concept of continuous improvement and reliability is key, and the basis in setting out target scores to strive for in the short to medium term.

Figure 1-2 – Overall Asset Management Maturity Score by Category (Across all Asset Classes)

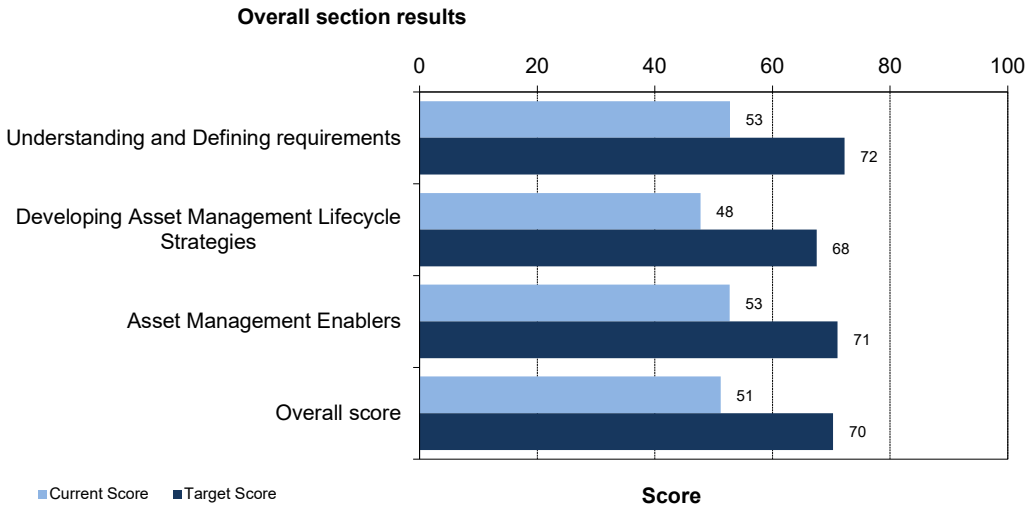
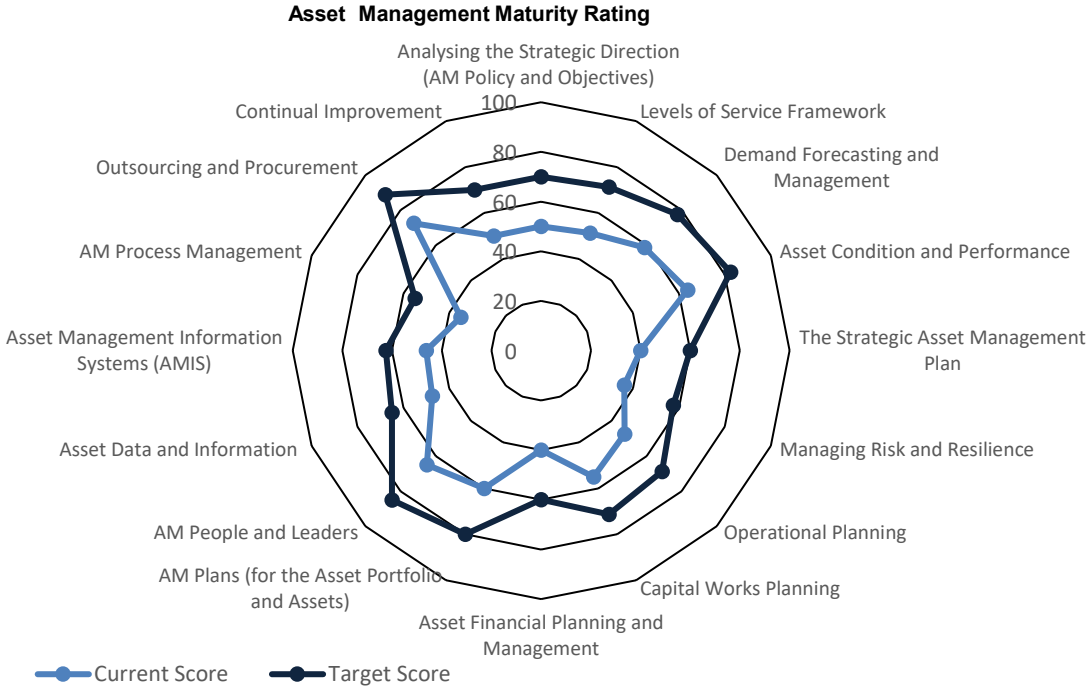


Figure 1-3 – Asset Management Maturity Radar Graph by Element (Across all Asset Classes)



The following improvement initiatives are recommended in Table 1-3 for the City to meet its target maturity level. The initiatives listed are common across all asset classes assessed and detailed, asset specific, improvement actions are provided in the *"Asset Class Summary Reports"* as part of the appendices **.**

Table 1-3 Summary of Improvement Actions

Category	Improvement Actions
Asset Management Enablers	• Develop and implement condition assessment frameworks, procedures, and lifecycle activities to address deficiencies for each asset type, including sub-asset categories where relevant. • Adopt industry-standard methods for forecasting future asset conditions and performance (e.g., deterioration modeling) to enhance lifecycle planning efforts. • Integrate the corporate risk management framework to establish and maintain asset risk profiles, aiding in lifecycle intervention prioritization. • Identify and bridge data gaps while improving the quality of data for critical assets across the organization. • Create and maintain a standardized data dictionary to ensure consistency and reliability of asset data and attribute fields organization wide. • Formalize data governance processes at the departmental level to effectively manage asset management data, technology enablers, and business intelligence (e.g., dashboards). • Document and regularly update key asset management processes, reflecting changes in responsibilities, technology, and data workflows.
Developing Asset Management Lifecycle Strategies	• Monitor and report on service levels and associated key performance indicators (KPIs) to track effectiveness and inform decision-making. • Conduct formal risk assessments to evaluate the ability to meet service levels and the costs of lifecycle management activities, documenting the relationship between service levels, risk, and costs. • Align levels of service (LOS) with active transportation and mobility plans to reflect the City's evolving infrastructure priorities. • Enhance forecasting methodologies for infrastructure needs to establish future funding requirements for operations, maintenance, and other lifecycle activities. • Integrate outcomes from asset management plans into budgeting processes and long-term financial planning, ensuring compliance with regulatory requirements (e.g., O.Reg.588/17). • Implement formalized planning and scheduling mechanisms to improve work planning, inventory management, and operational efficiency (e.g., optimizing "wrench time").
Understanding and Defining Requirements	• Conduct periodic environmental scans to identify strategic changes impacting the asset management system and inform necessary updates. • Promote and audit compliance with asset management policies at the departmental level to reinforce policy directives. • Continue master planning initiatives every 5–10 years, incorporating demand management scenarios (low, medium, high) to prepare for varying growth trajectories.

Category	Improvement Actions
	• Establish a formal process for post-project audits to assess whether capital projects achieved their intended objectives and outcomes. • Review and refine the asset management governance model, ensuring alignment with evolving strategies and roadmaps. • Develop a skills and competency framework to assess current and required expertise in asset management, informing training needs and succession planning.

1.6 Plan Structure

The contents of this AM Plan follow the recommended elements of a detailed AM Plan.

- **1.0 Introduction:** An overview of the Transportation Asset Management Plan.
- **2.0 State of Local Infrastructure:** Summary of the Local Infrastructure's overall state for all service areas (based on the City's 2023 SOLI). This section meets regulatory requirements for reporting on the current asset base as outlined in O. Reg 588/17.
- **3.0 Levels of Service:** Documentation of standard Levels of Service (LOS), detailing links between Technical LOS and Customer LOS, meeting reporting requirements on current and future service levels in accordance with O. Reg 588/17.
- **4.0 Asset Management Strategy:** Details a comprehensive Asset Management Strategy at a granular level for each asset class. This includes various functional components and addresses requirements for developing strategies that cover asset management, risk, climate change integration, and lifecycle management, as mandated by O. Reg 588/17. There are various important subchapters within this section:
    - 4.1 Demand Management: Identification of factors influencing demand and levels of service for the City's asset portfolio.
    - 4.2 Risk Management: Development of a Risk Assessment aligned with the Risk Management Strategy (RMS).
    - 4.3 Climate Change: Framework for integrating climate change considerations into asset management.
    - 4.4 Governance: Review of asset management governance and its structure at the service area level.
    - 4.5 Asset Information: Strategy for managing the City's asset data and related processes.

- 4.6 Communication: Processes and strategies for effective communication of asset management objectives, supporting collaboration across service areas.
- 4.7 Lifecycle Management: Strategy for defining activities required to meet established levels of service expectations.

- **5.0 Financing Strategy:** Evaluation of asset-based needs, coupled with revenue projections, to support the infrastructure gap analysis. This section fulfills requirements for developing a financial plan to achieve proposed service levels as per O. Reg 588/17.
- **6.0 Monitoring and Improvement Plan:** Outline of approaches for monitoring progress and implementing improvements in asset management, underscoring the city's commitment to continuous enhancement as outlined in the City's Strategic Asset Management Plan.

State of the Local Infrastructure

2. State of Local Infrastructure

This section of the AM Plan describes the City's Transportation asset inventory, and provides an overview of the valuation, age, and condition of its assets. Recommendations for the regular frequency of data collection and reporting are provided in the AM Plan Improvement and Monitoring section.

2.1 Asset Hierarchy and Inventory

Understanding the assets owned by the City that are used to support each major service area is important to enable their effective and efficient management. In this AM Plan, the City's asset inventory has been organized around the major service groups and program areas shown in Table 2-1 in the following sub-section.

Most infrastructure assets owned by the City are included and organized into the functional classifications of roadway networks, , structures, walkways and paths, and traffic services. Land is generally not included in the current replacement costs of the asset inventory.

The asset inventory used to develop this AM Plan is from the City's 2023 State of Local Infrastructure (SOLI) report which was presented to and approved by Council in November 2024. The detailed asset hierarchy for Transportation Services can be found as part of the ***General Appendices*.**

2.2 Asset Valuation

Financial accounting valuation uses historical costs and depreciation assumptions to determine the net book value of capital assets in accordance with the Public Sector Accounting Board (PSAB). Policies and procedures relating to the development of net book values for accounting purposes have been developed by the City to comply with PSAB 3150 Tangible Capital Assets (TCA) reporting.

While financial accounting valuations are based on historical costs, managerial accounting valuations are based on replacement costs. For the most part, replacement values are benchmark values calculated from current and previous year construction contracts. The replacement cost valuation represents the estimated cost to replace assets today and is presented in 2024 dollars. The replacement cost does not account for future technological improvements.

The estimated current replacement value of City's transportation assets is $4.4 billion presented in 2024 dollars, as outlined in the following table.

Table 2-1: Asset Inventory and Evaluation Summary

Asset Category	Quantity		Replacement Value
Roadway Network (including bike lanes)	3,859	Lane KMs	$2,440,374,066
Structures (Bridges And Culverts)	5,320	Metres	$968,916,688
Structures (Others)	119,226	Metres	$100,540,638
Walkways & Paths	2,145,009	Metres	$455,431,979
Traffic Services	105,006	Each	$474,565,676
Total	**2,378,421**		**$4,439,829,048**

Detailed transportation asset class total values are shown in Table 2-2 below. The most valuable asset class is the Roadway Network followed by Structures. The valuations are based on known or calculated replacement values, with data compiled from Transportation Service Area information sources.

Table 2-2: Asset Inventory and Evaluation by Asset Classification

Asset Category	Quantity	Unit	Replacement Value (2024$M)
Transportation (TOTAL)			**$4,439,829,048**
Roadway Network			**$2,440,374,066**
Roads	3520	Lane KMs	$2,428,157,096
Vertical Traffic Calming Devices	179	Each	$1,601,400
Bike Lanes	339	Lane KMs	$10,615,570
Structures			**$968,916,688**
Bridges	4,056	Metres	$461,120,965
Culverts	1,264	Metres	$507,795,723
Other Structures			**$100,540,638**
Gateway Features	2,857	Metres	$16,677,561
Noise Walls	14,799	Metres	$22,388,127
Retaining Walls	9,134	Metres	$24,191,716
Fences	56,619	Metres	$13,328,033
Guiderails	32,328	Metres	$21,391,402
Handrails	3,405	Metres	$1,257,466
Steps	85	Metres	$1,306,333
Walkways & Paths			**$455,431,979**
Sidewalks	1,995,092	Metres	$422,146,733
Walkways	13,850	Metres	$7,457,049
Multi-Use Paths	136,067	Metres	$25,828,197
Traffic Services			**$474,565,676**
Street Lighting	51,553	Each	$353,917,682
Traffic Signals	818	Each	$119,177,181
Traffic Signs	52,635	Each	$1,470,812

2.3 Asset Condition

In this AM Plan, the term “condition” refers to the degree of physical deterioration of an asset. “Performance” is a more general term that typically describes an asset’s ability to achieve levels of service through measures such as capacity, function and operational quality.

Condition assessment programs evaluate current physical condition, determine rate of deterioration over time, enable forecasts of future condition, and inform the most beneficial type and timing of treatment. Condition assessment methods and rating systems have become relatively standard for some assets but vary depending on the type of asset. The City conducts inspections more frequently on more critical assets such as roads, bridges, structural culverts and other critical transportation infrastructure.

For those assets with no condition data, age-based condition is estimated as the percentage of age to useful life. Using age data as a surrogate for condition data is common in municipal organizations, but it can be misleading as age does not always directly reflect condition or remaining life.

To enable comparison of condition and condition trends over time between different asset types, a generic condition grading scale is often used to translate detailed engineering data about assets into information that can be compared across asset groups. For this purpose, the City uses a five-point condition grading system, summarized in the table below, which is consistent with the general condition grading system included in the International Infrastructure Management Manual (IIMM).

Table 2-3: Five-Point Condition Grading System

	Rating	Condition Criteria
State of Good Repair	Very Good	Asset is physically sound and is performing its function as originally intended. Required maintenance costs are well within standards and norms. Typically, asset is new or recently rehabilitated.
	Good	Asset is physically sound and is performing its function as originally intended. Required maintenance costs are within acceptable standards and norms but are increasing. Typically, asset has been used for some time but is still within early to mid-stage of its expected life.
	Fair	Asset is showing signs of deterioration and is performing at a lower level than originally intended. Some components of the asset are becoming physically deficient, and component replacement may be necessary. Maintenance requirements and costs are continuing to increase. Typically, asset has been used for a long time and is within the mid- to later stage of its expected life.
End of Life	Poor	Asset is showing significant signs of deterioration and is performing to a much lower level than originally intended. A major portion of the asset is physically deficient. Required maintenance costs exceed acceptable standards and norms. Typically, asset is approaching the end of its expected life.
	Very Poor	Asset is physically unsound and/or not performing as originally intended. Asset has higher probability of failure or failure is imminent. Maintenance costs are unacceptable, and rehabilitation is not cost effective. Replacement / major refurbishment is required.

Details relating to the condition of each asset are currently maintained in various databases and spreadsheets. The City converts industry standard condition rating systems and age-based assets to the above condition grading system as provided in the table below.

Table 2-4: Conversion of Industry Condition to Five-Point Condition Grade

Grade (Rating: 1 to 5)	Pavement Quality Index (PQI)	Bridge Condition Index (BCI)	Estimated Remaining Useful Life	Age (Traffic Signs only)
Very Good (1)	>=8	90 to <100	>80%	<= 1 year
Good (2)	<8	70 to <90	>60 to 80%	>1 to 2 years
Fair (3)	<7	60 to <70	>40 to 60%	>2 to 24 years
Poor (4)	<6	50 to <60	>20 to 40%	
Very Poor (5)	<5	0 to <50	<20%	>= 24 years

Figure 2-1 depicts, by colour, the value of assets that fall within each of the condition grades (very good, good, fair, poor, very poor). The total replacement value of assets within each service area is shown on the condition grade bars.

Where condition has been assessed using age as opposed to a formal inspection or assessment have been delineated with a hashed shading as the condition reported for these assets is less accurate.

Figure 2-1: Asset Condition Grade Profile by Replacement Value

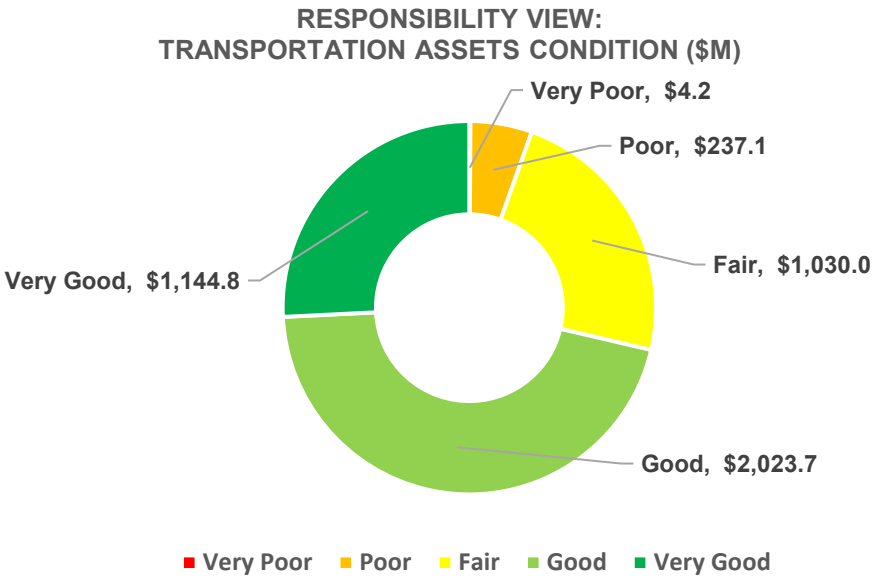
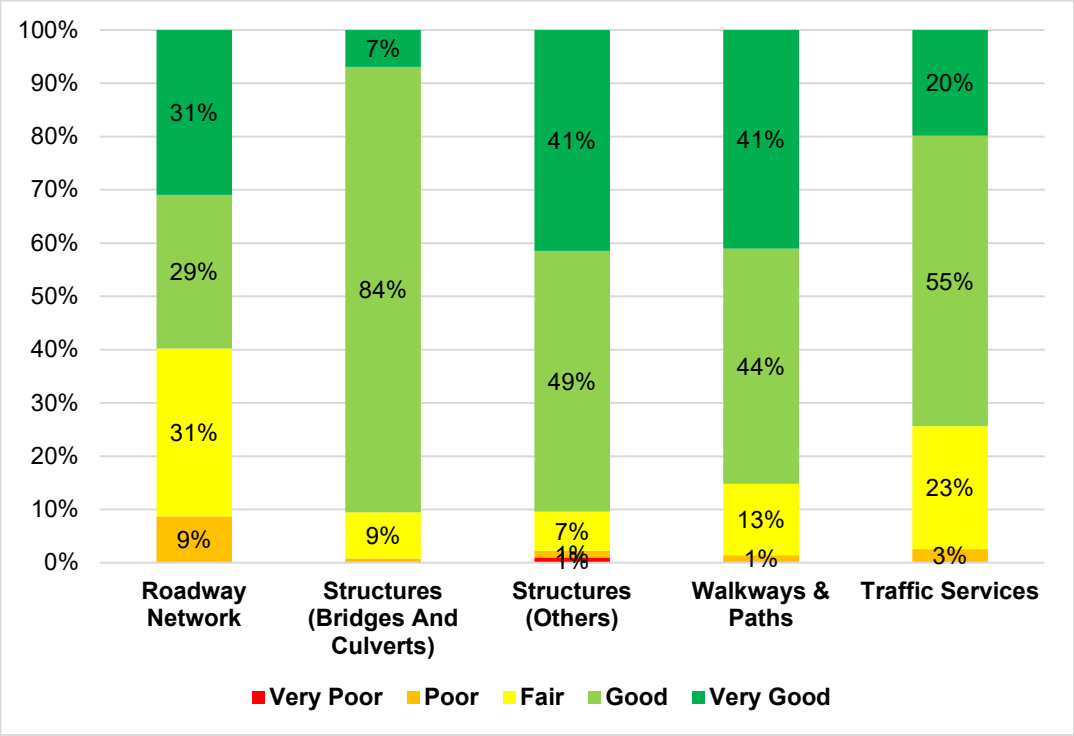


Figure 2-2 depicts, by colour, the percentage of assets that fall within each of the condition grades, organized by asset category. Detailed outputs for each asset class are provided within the *"Asset Class Summary Reports"* within the appendices.

Figure 2-2: Asset Condition Grade Profile by Percentage (by Asset Category)[*]



To adequately meet service levels and manage risk while minimizing lifecycle costs, most assets should generally be preserved in fair or better condition. The above figures show that 95% of the City's assets are in fair or better condition based on replacement value.

Subsequently, 5% or $237 million are in poor condition and 0.1% or $4 million are in very poor condition . Assets in poor or very poor condition require increased attention and renewal investment (funding and staff resources) to avoid increased maintenance costs and/or unexpected failure. The assets that are currently in poor or very poor condition are typically those that are included in 10-year capital renewal programs and budget forecasts, especially if deemed critical by the City.

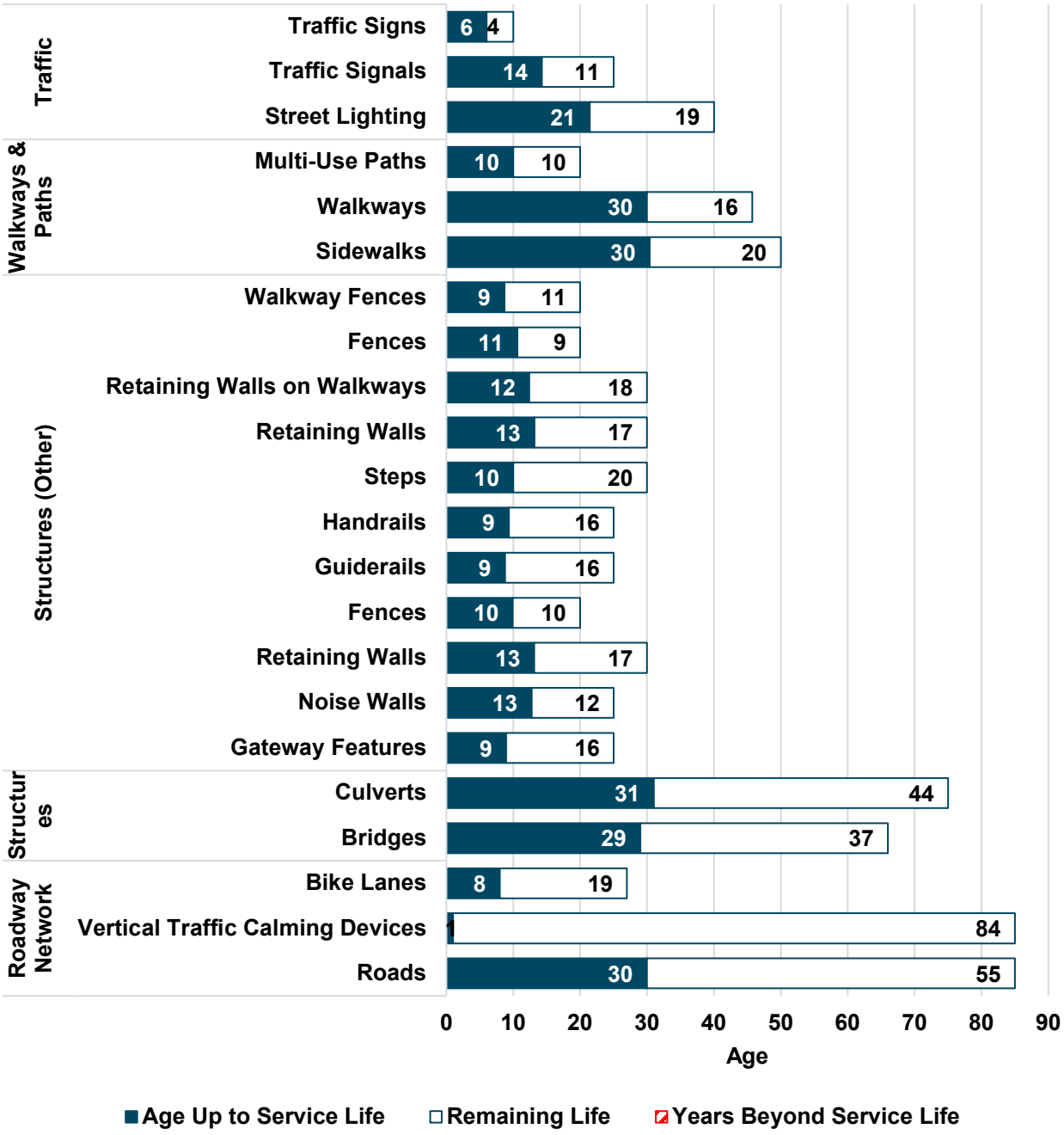
2.4 Asset Age

The following figure summarizes the average age of the City's transportation assets, weighted by replacement value, along with their estimated average service life. Overall, the City's transportation assets are currently just under halfway through their expected service lives. It is important to note that

[*] Unlike the 2023 SOLI, bike lanes are not presented as a separate asset category in the condition graph; instead, they have been incorporated into the broader roadway network classification.

some historical data gaps exist pertaining to the installation year of some assets, resulting in them not being included in the age analysis. The City is proactively looking to fill these data gaps to improve the maturity of future iterations of the AM Plan.

Figure 2-3: Asset Age Summary‡



‡ Based on the latest published 2023 SOLI Report.

2.5 Approach to Informed Decision Making

To achieve the objectives of asset management planning, the City utilizes various types of assessments to optimize resource allocation, reduce risks and ensure the efficient and effective management of its diverse portfolio of assets. The data confidence scale outlined in Table 2-5 defines the measures used to qualify the accuracy and reliability of the information used to develop this AMP. The assessment of condition is a key component in determining the projection of investment needs for asset repair and replacement.

The choice of condition assessment depends on the type of asset. The 2023 SOLI report implemented the following condition assessment methodologies:

- Roads – Pavement Condition Index
- Bridges – Bridge Condition Index
- All other assets – Age and Inspection Based Assessment.

The following provide a description of the different approaches used:

1. Age-Based Assessment: Relies on the assumption that asset conditions deteriorate with time, and their remaining lifespan estimated based on their age. Application: Organizations often use age-based assessments as an initial step to establish a baseline understanding of asset conditions. This approach is particularly relevant for assets with well-documented deterioration patterns, allowing organizations to forecast future maintenance and replacement needs where inspection costs outweigh the benefit of actual condition data.

2. Inspection-Based Assessment: Involves regular inspections and data collection to assess an asset's current condition, identify maintenance requirements and guide asset management decisions. Application: Provide up-to-date data on asset conditions that are crucial in targeting and performing lifecycle activities at the right time. Organizations employ this approach to manage assets with variable deterioration rates and to monitor asset health continuously.

3. Risk-Based Assessment: Focus on identifying and managing assets that pose the highest risk assets to an organization, considering factors such as criticality, operational impact, safety and financial implications. Application: Used to prioritize resources and efforts toward assets with the greatest potential impact on safety, service delivery and financial sustainability. This approach ensures the application of resources where needed most.

Table 2-5: Data Confidence Rating Scale

Scale	Confidence Rating	Assessment Approach	Data Quality Description
	**High Confidence**	Risk-based assessment based on comprehensive data including inspection-based condition where feasible and risk assessment	Robust data, extensive analysis, and rigorous validation. There is a high degree of certainty in the results, and they are considered highly reliable.
	Medium Confidence	Inspection-based assessments	Reasonably strong data and analysis but may have some limitations or uncertainties. The results are credible but not without some degree of risk or uncertainty.
	Low Confidence	Age-based assessment not accounting for variations in asset performance	The assessment has significant limitations or uncertainties, and there may be gaps in data or methodology. The results are less reliable and should be interpreted with caution.
	Very Low Confidence	Age-based assessment without sufficient records and requiring validation	The assessment is highly unreliable, lacks sufficient data or analysis, or is subject to significant flaws or biases. The results should be viewed skeptically and may not be suitable for decision-making.

The current data confidence to use the information presented in this report (which is consistent with the 2023 SOLI) for investment related decision-making is assessed as Medium (Condition Based), as indicated on the scale in Table 2-5. For Transportation Services, almost all assets have utilized inspection-based assessments.

Over the long-term, the City will move towards the use of risk-based assessments to prioritize resources and efforts toward assets with the greatest potential impact on safety, service delivery and financial sustainability.

The City is actively advancing its Decision Support System (DSS) initiative to enhance data-driven decision-making for infrastructure management. A key component of this initiative is the development of risk-based assessment frameworks, ensuring that asset investment and maintenance strategies align with service levels, risk exposure, and long-term sustainability.

Currently, the City utilizes dTIMS for Roads and Bridges, enabling risk-based analysis to support lifecycle management and financial planning. As it matures it will lead into risk-based scenarios and play a crucial role in the Risk and Financing Strategy, providing insights into funding priorities and asset resilience.

Looking ahead, the City intends to expand the scope of risk-based assessments to include other transportation assets—such as sidewalks, cycling infrastructure, and transit facilities—until a fully integrated DSS system is in place. This phased approach ensures a structured transition toward a comprehensive, risk-informed asset management framework.

A summary of the City's existing condition framework is provided in Table 2-6 below:

Table 2-6: City Current Condition Assessment

Asset Class	Age	Inspection	Risk
Roadway Network		✓	
Vertical Traffic Calming Devices	✓		
Roadway Bridges & Pedestrian Bridges		✓	
Roadway Culverts		✓	
Gateway Features		✓	
Noise Walls		✓	
Retaining Walls on Walkways		✓	
Fences		✓	
Guiderails		✓	
Handrails		✓	
Steps		✓	
Sidewalks		✓	
Walkways		✓	
Multi-Use Paths		✓	
Street Lighting	✓	✓	
Traffic Signals	✓		
Traffic Signs		✓	

Levels of Service

3. Levels of Service

In the State of Infrastructure section, the value, age, and condition of the City's transportation infrastructure assets were examined. Building on this, the Levels of Service (LOS) chapter defines the performance standards that these transportation assets are expected to deliver throughout their service lives.

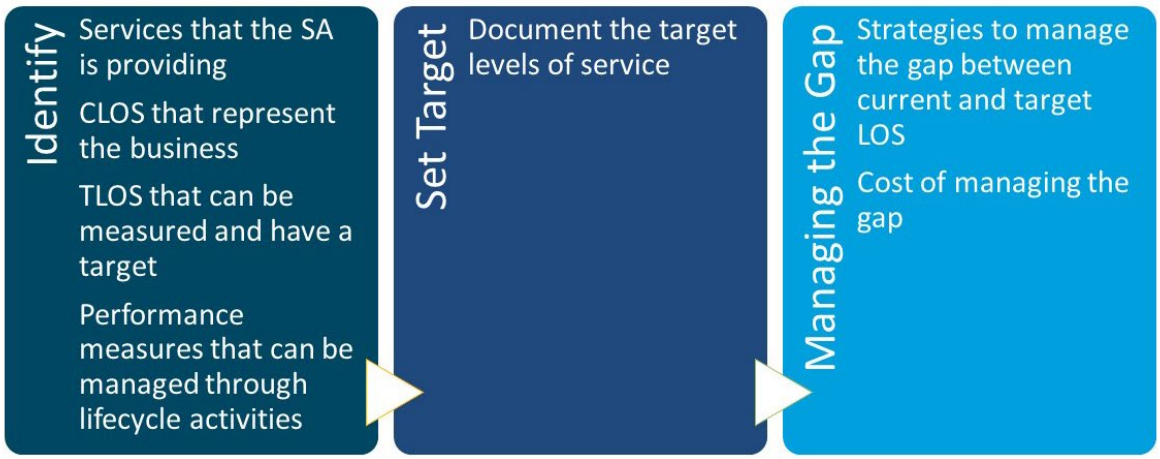
The City of Brampton is committed to delivering high-quality services to its residents and businesses while maintaining affordability, ensuring Brampton remains an attractive place to live and work.

As the City's asset management program has matured, it has become increasingly evident that a more advanced understanding of service delivery is needed to effectively assess both performance and affordability. The legislative framework—particularly Ontario Regulation 588/17—requires municipalities to develop and document levels of service (LOS).

The City has developed several key LOS measures for its transportation services. These metrics will enable the City to monitor and evaluate performance over time, supporting evidence-based decision-making. Further, by systematically defining, monitoring, and integrating levels of service into financial and operational planning, the City can enhance service delivery resilience, optimize resource allocation, and ensure long-term sustainability.

Consultations with staff have resulted in a Levels of Service Table, which outlines current and target LOS, the costs associated with achieving these targets, and recommendations for both infrastructure and non-infrastructure solutions. To develop these LOS measures, the City employed a structured approach based on three key steps, illustrated in Figure 3-1 below.

Figure 3-1: Steps to Developing Levels of Service

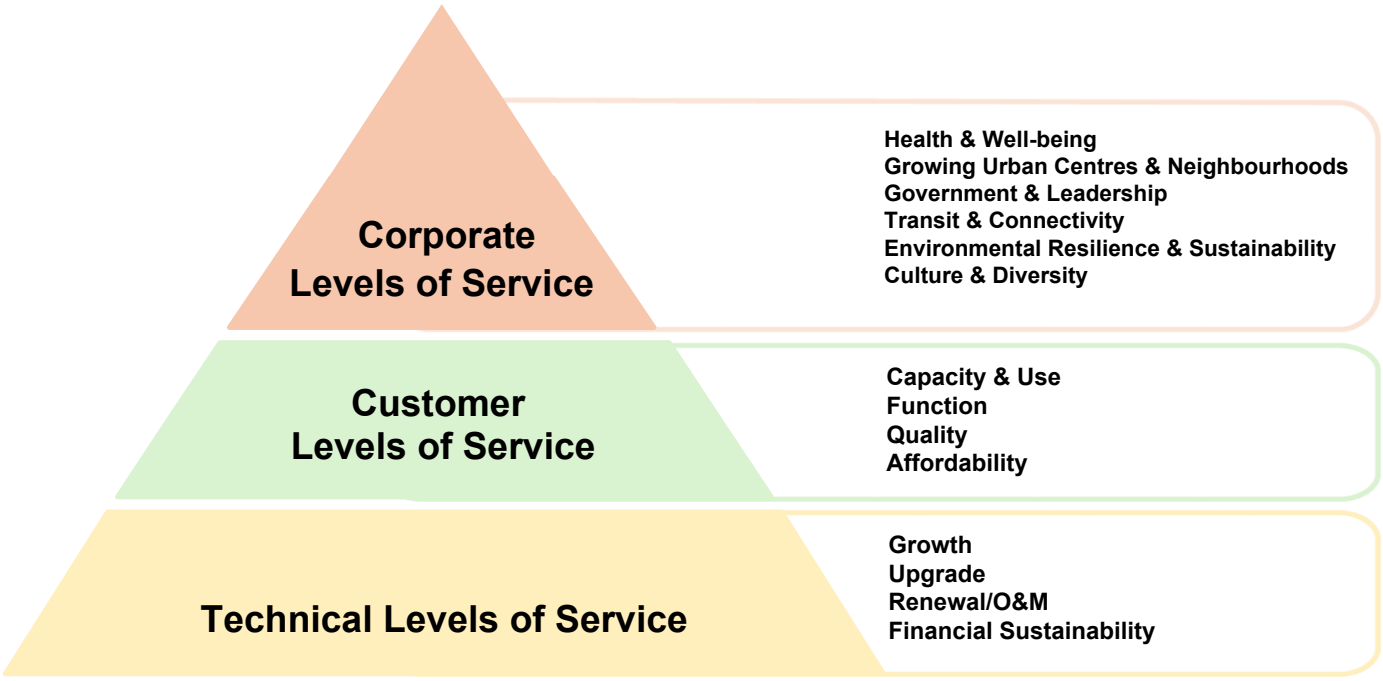


3.1 Levels of Service Framework

The City's approach to developing LOS involved three main steps. Firstly, the staff identified the services provided and set Corporate Levels of Service (CLOS) aligned with business objectives, alongside measurable Technical Levels of Service (TLOS). Then, they set clear targets based on these TLOS. Lastly, they developed strategies to bridge any gaps between current performance and target LOS, considering associated costs. This approach ensures alignment with organizational goals, stakeholder expectations, and prudent resource management.

Figure 3-2 summarizes the City's Level of Service framework which is being used as the basis for measuring performance.

Figure 3-2: Levels of Service Framework



The framework includes several key elements:

Corporate Levels of Service – Considered to be the overarching principles to ensure that levels of service are in alignment with the City's strategic themes and resulting customer and technical levels of service.

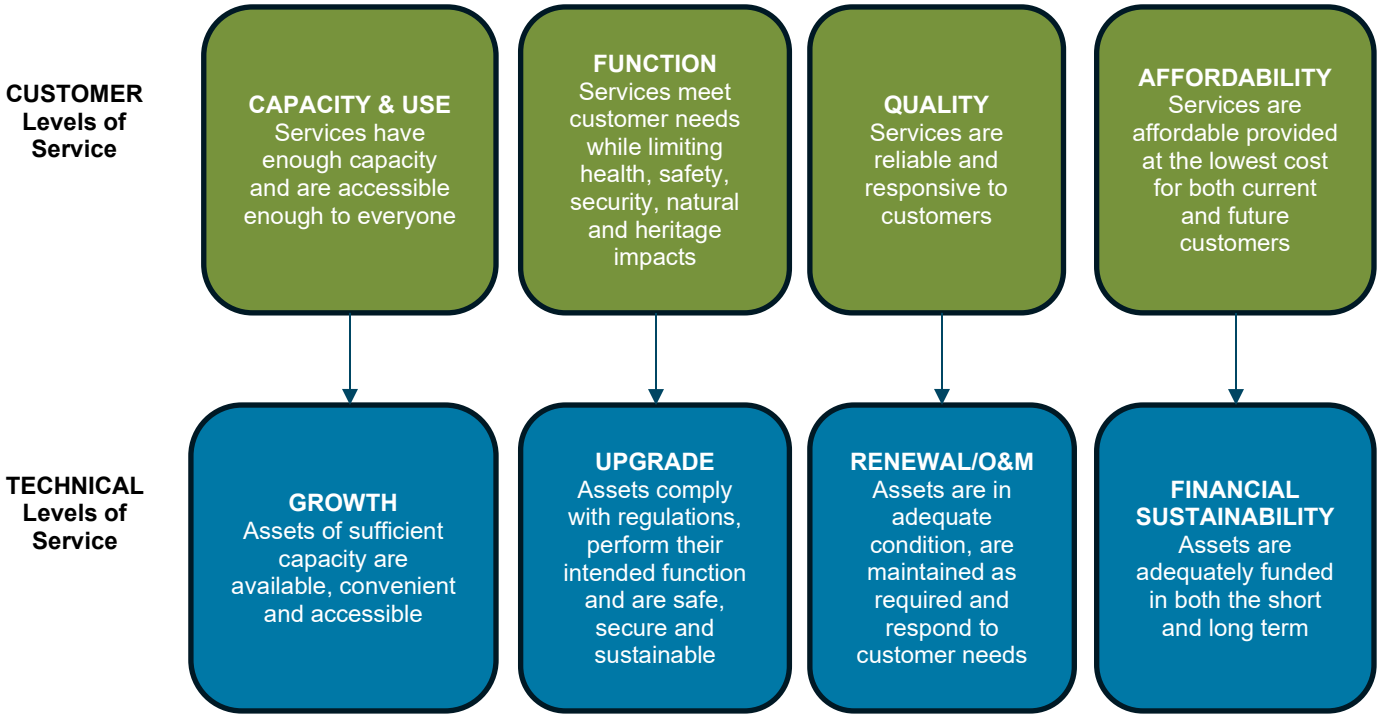
Customer Levels of Service – Definitions and statements describing the stakeholder's expectations of the services provided by the City in order to align the organization's value delivery with the community's needs.

Technical Levels of Service – Measures the allocation of resources to service activities that the organization undertakes to best achieve the desired community outcomes and demonstrate effective organizational performance.

As shown in Figure 3-3, Customer LOS (that inform Technical LOS) can be categorized into the following categories:

- **Capacity and Use:** Services have enough capacity and are accessible to the customers. Capacity and Use LOS informs Growth needs.
- **Function:** Services meet customer needs while limiting health, safety, security, natural and heritage impacts. Function LOS informs Upgrade needs.
- **Quality and Reliability:** Services are reliable and responsive to customers. Quality and Reliability LOS informs Renewal, Operations and Maintenance needs.
- **Affordability:** Services are affordable and provided at the lowest cost for both current and future customers. Financial Sustainability LOS informs Funding needs.

Figure 3-3: Customer and Technical Levels of Service



3.2 Corporate Strategic Goals

The Corporate, or Strategic LOS establish service levels that describe the main vision or objective of service delivery at the City. The Corporate Strategic Plan charts the City's path forward, focuses efforts, communicates progress, and measures the City's success. This critical document provides structure to prioritize and deliver what is most important to the community. It is a live document that sets the context for the City's budgets, master plans, projects, services, and resources. Council and staff curated a Corporate

Strategic Plan that includes community feedback and is grounded by six (6) focus areas with concentrated themes and outcomes (Figure 3-3). The City is committed to the completion of all strategic priorities within these focus areas and this AM Plan is developed in alignment with the objectives and focus areas of the Corporate Strategic Plan.

Figure 3-4, sets a framework for the objectives and actions to be pursued to maintain and grow City as a safe, prosperous, and healthy community, and to ensure decisions set a course for the desired future.

Figure 3-4: Corporate Strategic Plan Focus Areas

Some of the key policies related to transportation infrastructure from the Brampton Plan (which is in line with the Corporate Strategic Plan and Vision 2040 Plan) include:

- The City will investigate alternative design options to six-lane road widenings to increase the person-throughput of a street, rather than focusing on vehicle capacity, such as dedicated transit lanes or transit priority measures, enhanced active transportation facilities, and exploring ways to increase the efficiency of signals with intelligent transportations systems (ITS)

- Promoting active transportation, and incorporating Low Impact Development (LID) standards, green infrastructure including green roofs and other nature-based solutions to assist in stormwater quantity and quality control. A “climate change lens” will be implemented as the approval authority for all Council decisions and planning and development applications (which includes the promotion of active transportation within new development).

- The Active Transportation Network will be barrier-free for people of all ages and abilities, consistent with standards established by the Accessibility for Ontarians with Disabilities Act.

- Increasing access throughout Brampton by taking advantage of the combined travel benefits afforded by improved mobility, shared mobility, and increased proximity to amenities, which is accomplished by designing complete streets where land use and transportation planning are effectively integrated.

- New public streets or private streets internal to a block will be designed to connect to and integrate into the broader public street network. All new public streets will provide sidewalks on both sides of the street, landscaping, and street furniture.

- The City will establish a hierarchy to prioritize pedestrians, cyclists, transit and accommodate private automobiles and goods movement in decision making and investments.

3.3 Legislated Levels of Service

Ontario Regulation 588/17, under the Infrastructure for Jobs and Prosperity Act, 2015, sets out the requirements for municipalities to develop and maintain asset management plans for core infrastructure assets, including roads, bridges, and culverts. The regulation establishes mandatory LOS to ensure municipalities provide safe, reliable, and cost-effective infrastructure for the public. The above-referenced tables are as follows:

Table 3-1: Roads Mandatory LOS

Service attribute	Customer levels of service (Qualitative descriptions)	Technical levels of service (Technical metrics)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity.	Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality.
Quality	Description or images that illustrate the different levels of road class pavement condition.	1. For paved roads in the municipality, the average pavement condition index value. 2. For unpaved roads in the municipality, the average surface condition (e.g., excellent, good, fair or poor).

Table 3-2: Bridges and Culverts Mandatory LOS

Service attribute	Customer levels of service (Qualitative descriptions)	Technical levels of service (Technical metrics)
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	Percentage of bridges in the municipality with loading or dimensional restrictions.
Quality	1. Description or images of the condition of bridges and how this would affect use of the bridges. 2. Description or images of the condition of culverts and how this would affect use of the culverts.	1. For bridges in the municipality, the average bridge condition index value. 2. For structural culverts in the municipality, the average bridge condition index value.

In addition to the Mandatory LOS requirements associated with regulation of O. Reg 588/17 the Transportation Service Area is also required to comply with the requirements of O. Reg. 239/02: Minimum Maintenance Standards for Municipal Highways. This sets out the minimum standards of repair for highways under the municipal jurisdiction and describe a desired outcome. Although the Transportation Service Area is very familiar with this standard and the requirements the City has issued additional standards of service, which align or exceed the levels of service prescribed in the standard.

3.4 Current and Proposed Levels of Service

The City has developed performance measures for its infrastructure assets in accordance with O. Reg. 588/17, ensuring compliance with both qualitative descriptions and technical metrics. This process included aligning measures with the City's strategic objectives and incorporating input from stakeholders through consultation sessions with service area representatives. These efforts have helped ensure that the current levels of service accurately reflect the performance and condition of the City's infrastructure assets.

The development of the levels of service was guided by several key principles:

- LOS measures are relevant and meaningful;
- LOS are feasible to track, with required data either currently available or planned to be collected in future updates to the Asset Management Plan (AMP); and
- LOS serve as an important component of public engagement, with future iterations to be informed by public input and community consultations. This will help ensure service delivery decisions reflect community priorities.

Performance measures are essential for tracking LOS, as they provide quantifiable metrics to assess the effectiveness and efficiency of service delivery. Through systematic monitoring, the City can determine whether service standards are being met, identify areas for improvement, and allocate resources strategically. An iterative consultation process also contributed to the development of an internal tracking tool, which captures necessary data to monitor current LOS and identify future trends.

In compliance with O. Reg. 588/17, municipalities are required to define proposed levels of service (PLOS) by July 1, 2025. These PLOS will establish measurable future targets for service delivery.

The current LOS—originally developed in the 2022 Transportation AMP and updated in this Plan—serve as a baseline for these proposed targets.

Currently, the city has assessed that most services are already meeting or exceeding established performance targets and community expectations. Maintaining these levels ensures efficient use of resources while continuing to provide consistent, reliable service across infrastructure and transportation systems. The Brampton Mobility Plan provides a strategic roadmap to address increased performance targets related to capacity and function by guiding future investments, policy updates, and infrastructure improvements to continue to meet these levels of services over the long term.

Appropriateness Assessment

The appropriateness assessment is conducted by the service area staff through internal assessment processes. This ensures that the levels of service are carefully evaluated based on the following criteria:

1. Options & Associated Risks:

Service area staff evaluate multiple LOS options and assess the risks associated with each, particularly in terms of long-term sustainability. This includes consideration of service quality, operational efficiency, and financial impacts.

2. Differences from Current Levels of Service:

A comparison of current and proposed LOS highlights where changes may be necessary to respond to evolving stakeholder needs, regulatory requirements, or technological advancements. While many proposed measures may align with current LOS, refinements may be required to meet strategic objectives.

3. Achievability:

The service area assessed the feasibility of achieving the levels of service, considering factors such as available resources, technological capabilities, and operational constraints. Efforts have been made to ensure that the targets are realistic and attainable within the municipality's operational capacity. Notwithstanding the City's intended ability to achieve the targets, it is expected that the levels of service continue to be reviewed and monitored and further adjustments may be warranted moving forward.

4. Affordability:

The affordability assessment for the levels of service is conducted in conjunction with the budget process, ensuring alignment with the financial resources and constraints of the municipality. This process inherently involves approval by Council and the organization, with affordability considerations integrated into budgetary decisions.

Tables 3-3 below presents the current and proposed levels of service for the City of Brampton's transportation assets.

The mandated O.Reg. LOS descriptions, images and graphs are included as part of the ***General Appendices.***

Table 3-3: Current and Proposed Levels of Service – Transportation Services

Customer LOS		Technical LOS			Current LOS	Proposed LOS
CLOS Category	**Customer Level of Service Measure**	**Technical LOS Category**	**Technical LOS Measure**	**Asset Class**	**Current Performance (2024)**	**Desired Target Performance (2034)**
Capacity and Use	Transportation network provides convenient access to properties	Growth	Number 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*	Roads	Arterial: 2.9 Collector: 1.9 Local: 7.3	N/A†
Capacity and Use	Bridges and culverts are accessible for designated users and modes of transport	Growth	Percentage of bridges in the municipality with loading or dimension restrictions*	Structures	1%	<2%
Capacity and Use	Bridges and culverts are accessible for designated users and modes of transport	Growth	% roadway bridges and structural culverts with dimensional restriction - vertical clearance	Structures	<1%	<1%
Capacity and Use	Increased connectivity for road users	Growth	Length of cycling facilities in network‡	Roads	593.6 km	749.0 km
			Lane KMs assumed by the City		3830 km	4580 km, 1.8% growth per year
			Lane KMs of roadway maintained (winter maintenance)		4128 km	4935 km, 1.8% growth per year
Capacity and Use	Transportation network provides convenient access to alternative transport modes	Growth	Modal share of cars (driver + passenger) during the AM peak period (2016)	Traffic	81%	64% by 2051
			Modal share of transit trips during the AM peak period (2016)		10%	25% by 2051
			Modal share of walking and cycling during the AM peak period (2016)		9%	11% by 2051

* Legislated for reporting by O.Reg. 588/17.
† No target currently exists for this measure; it has been reported as part of O.Reg. 588/17 legislative reporting.
‡ kms are considering centerline of the facilities.

Customer LOS		Technical LOS			Current LOS	Proposed LOS
CLOS Category	**Customer Level of Service Measure**	**Technical LOS Category**	**Technical LOS Measure**	**Asset Class**	**Current Performance (2024)**	**Desired Target Performance (2034)**
Function	Transportation services comply with regulations	Upgrade	Rated performance related to compliance with legislation or Brampton standards	ALL	VG	VG
Function	Roadway bridges are designed to reduce incidents	Upgrade	Rated performance of safety measured as availability of protective barriers to avoid vehicle collision with piers on roadway bridge	Structures	G	G
			% of roadway bridges & culverts that have sidewalks and railings		95%	95%
			% of roadway bridges that have parapet walls with end protection		71%	>75%
			% of pedestrian bridges with railings		95%	>95%
			% of pedestrian bridges or underpasses including rails lit at night		100%	>95%
Function	Transportation services are green and environmentally sustainable	Upgrade	Active Transportation Infrastructure (includes only cycling infrastructure)	Walkways & Paths	593.6 km	TBD§
			Length of cycling facilities in high equity need / high access need areas	Roads	228.3 km	TBD*
Function	Transportation services improve access to opportunities and community amenities	Upgrade	Roads planned/designed with a Complete Streets approach.	Roads	Not Available	TBD†
Function	Transportation services are green and environmentally sustainable	Upgrade	% of City streetlights retrofitted with LED lights	Traffic	75%	>95%
Function	Transportation service	Upgrade	Total Motor Vehicle Collisions per	Traffic	2800	2800

* Proposed performance to be finalized as part of the Active Transportation Master Plan update.
† All roads planned and designed using a "Complete Streets" approach in accordance to the Brampton Mobility Plan.

Customer LOS		Technical LOS			Current LOS	Proposed LOS
CLOS Category	**Customer Level of Service Measure**	**Technical LOS Category**	**Technical LOS Measure**	**Asset Class**	**Current Performance (2024)**	**Desired Target Performance (2034)**
	network is safe and limits vehicle collisions		100,000 residents			
			Fatal Motor Vehicle Collisions per 100,000 residents		2.2	0
Quality	Description/images that illustrate the different levels of road class pavement condition*†	Renewal/O&M	For paved roads in the municipality, the average pavement condition index value†	Roads	7.56	7.5
Quality	Description/images of the condition of bridges/culverts and how this would affect use of bridges†	Renewal/O&M	For bridges in the municipality, the average bridge condition index value†	Structures	74.3	> 74
			For structural culverts in the municipality, the average bridge condition index value†		74.3	>75
Quality	Assets are maintained in a state of good repair.	Renewal/O&M	% of roadway and pedestrian bridges and structural culverts with a BCI of 60 or greater	Structures	99%	99%
			% retaining walls in fair or better condition	Structures	96%	>90%
			% noise walls in fair or better condition	Structures	99%	>90%
			% fences in fair or better condition	Structures	97%	>90%
			% guiderails in fair or better condition	Structures	98%	>90%
			% sidewalks in fair or better condition	Walkways & Paths	99%	>90%
			% walkways in fair or better condition	Walkways & Paths	94%	>90%
Quality	Operations and	Renewal/O&M	Lane KMs of roads resurfaced	Roads	26.10	60.0

* No unpaved roads currently exist within the City's Road network, therefore this LOS measure has not been recorded.
† Legislated for reporting by O.Reg. 588/17. Details related to O.Reg 588/17 measures such as images, maps, descriptions etc. can be found within the General Appendices

Customer LOS		Technical LOS			Current LOS	Proposed LOS
CLOS Category	**Customer Level of Service Measure**	**Technical LOS Category**	**Technical LOS Measure**	**Asset Class**	**Current Performance (2024)**	**Desired Target Performance (2034)**
	Maintenance work done when required		Rated performance based on outstanding maintenance work orders	ALL	G	G
			Rated performance based on outstanding operations work orders	ALL	G	G
			Service Requests Received	ALL	10,092	10,000
			Service Requests Resolved	ALL	98%	98%
Quality	Traffic network assets are kept in a good state of repair	Renewal/O&M	% traffic signals in fair or better condition	Traffic	100%	>90%
			% traffic lighting in fair or better condition		97%	>90%
			% traffic signage in fair or better condition		100%	>90%
Quality	Operations and Maintenance work done when required	Renewal/O&M	Streetlight outage response time (days)	Traffic	3.0	3.0

The above table outlines key performance indicators to assess how the City's infrastructure is currently performing against established benchmarks and future targets. The levels of service are designed to enhance infrastructure resilience, improve safety and efficiency, and align with regulatory requirements under O.Reg. 588/17. By identifying gaps between existing and desired service levels, this table provides a foundation for strategic planning, resource allocation, and long-term sustainability of Brampton’s transportation network. The associated costs and the City’s ability to afford the proposed service levels are detailed within the ‘Financing Strategy’ section of this report.

Asset Management Strategy

Demand Management

4. Demand Management

Demand management within this AMP involves responding to future changes in the City that may impact on the demand for municipal transportation services. This section of the report is intended to identify the factors that may influence the demand, outline strategies for managing it and estimated associated costs. The demand placed on City services would evolve as the priorities of the community change, technologies emerge, and existing services are improved. This section of the report is informed by analysis and surveys completed by each service area, as well as relevant master planning documents which approach demand management with a narrower scope than the contents of this plan. This section further builds on the framework developed during the Service Area AMP by outlining the framework for consideration and provides an overview of:

- Demand Drivers & Forecast;
- Impact on Levels of Service; and
- Demand Management through Lifecycle Activities.

Moving forward, the City is expected to grow over the long-term. This level of growth will continue to require additional services, such as improved access to all modes of transportation, to ensure that quality of life is maintained for the existing and new residents while also ensuring new facilities, parks and other services are expanded to keep pace with the increased demand.

4.1 Demand Drivers and Forecast

The City of Brampton is in the process of updating its 2015 Transportation Master Plan to develop a comprehensive Brampton Mobility Plan. This initiative aims to guide future investments in transportation infrastructure, aligning with Brampton's 2040 Vision of creating a "mosaic of safe, integrated transportation choices and new modes, contributing to civic sustainability, and emphasizing walking, cycling, and transit".

Guiding Principles of the Brampton Mobility Plan include:

1. Enhance Mobility and Travel Options for People and Goods: Develop a sustainable, seamless, and

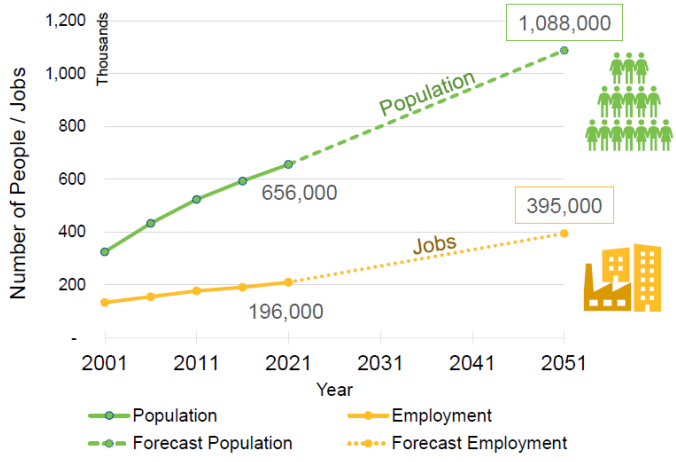
integrated mobility network connecting people to places and facilitating the movement of goods.

2. Improve Environmental Sustainability: Manage travel demand to reduce car travel and increase sustainable transportation trips.
3. Integrate Transportation and Land-Use Planning: Support compact, high-density, mixed land use in strategic centers connected by transit and active transportation networks.
4. Advance Multi-Modal Transportation Equity: Prioritize infrastructure decisions that balance the needs of all road users, including pedestrians, cyclists, and transit riders of all ages and abilities.
5. Protect Public Health & Safety: Embrace Vision Zero objectives to eliminate collision fatalities and serious injuries, enhancing community well-being.
6. Leverage Technology: Plan for the future of mobility by considering the impacts of new travel technologies.
7. Emphasize Community Engagement & Collaboration: Engage citizens in addressing mobility issues to support the 2040 Vision.

The City of Brampton's Mobility Plan is strategically developedto address several key demand drivers to create a more sustainable, efficient, and inclusive transportation network. Below is an overview of these core drivers:

- **Population Growth:** Brampton has experienced significant population growth, leading to increased transportation demands. Between 1996 and 2015, transportation trips nearly doubled from 480,000 to 880,000. This rapid growth necessitates a comprehensive mobility strategy to accommodate current and future residents.

Figure 4-1: Future Growth in Brampton



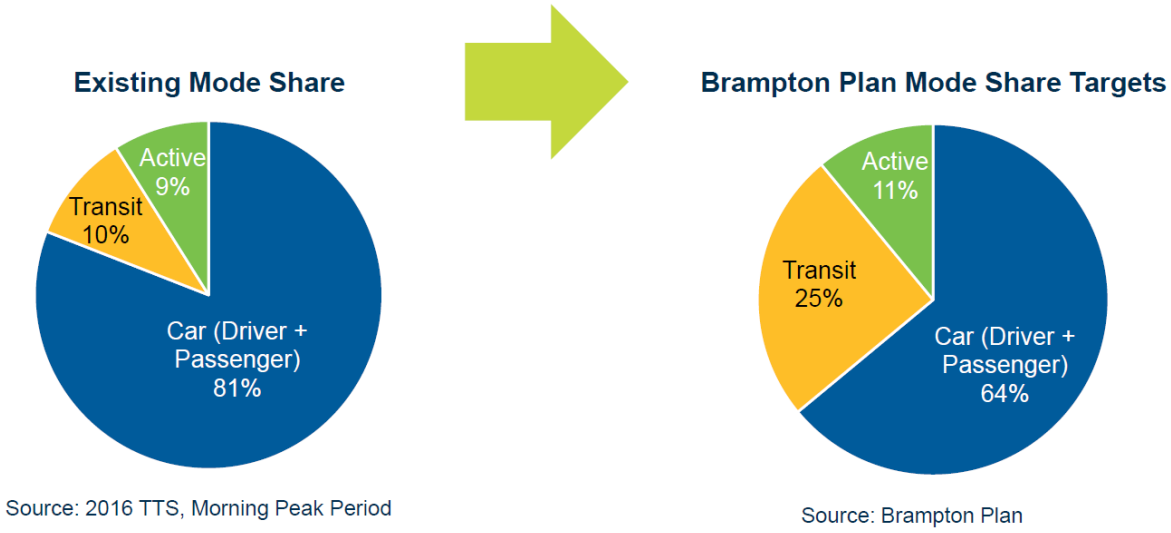
By 2051, Brampton is expected to grow* by 430,000 people (**+66%**) and 200,000 jobs (**+88%**).

As a result of this growth, future travel demand is expected to grow by 185,000 trips (**+62%**) by all modes in the morning peak period.

*Growth measured from 2021 for population, employment and trips.

- **Multi-Modal Travel:** Promoting a variety of transportation modes—such as public transit, cycling, walking, and emerging options like e-scooters—reduces reliance on personal vehicles. Brampton's Active Transportation Master Plan emphasizes creating a connected network that integrates these modes, enhancing accessibility and convenience.

Figure 4-2: Modal Share Targets in Brampton



Source: 2016 TTS, Morning Peak Period

Source: Brampton Plan

- **Active Transportation:** Encouraging walking and cycling not only alleviates traffic congestion but also promotes public health and environmental sustainability. Brampton is investing in infrastructure like bike lanes and pedestrian pathways to support these active modes of travel.
- **Transportation Equity:** Ensuring equitable access to transportation means providing affordable and accessible options for all residents, regardless of income or ability. This includes prioritizing infrastructure that serves diverse communities and addressing barriers that may prevent certain groups from accessing various transportation modes.
- **Complete Streets:** The 'Complete Streets' approach involves designing roadways that safely accommodate all users—pedestrians, cyclists, transit riders, and motorists. This design philosophy enhances safety, promotes active transportation, and improves the overall livability of urban spaces. A visual showing more information related to complete streets as specified within the City of Brampton's Complete Streets Guide is provided within the ***General Appendices*.**
- **Travel Technology:** Embracing advancements in transportation technology, such as real-time transit information, e-scooter programs, and future innovations, can improve the efficiency and appeal of the transportation system. Brampton's e-scooter pilot program, for instance, offers residents a convenient and sustainable travel option.

By addressing these demand drivers, the Brampton Mobility Plan aims to create a transportation network that is safe, efficient, and inclusive, aligning with the City's 2040 Vision.

4.2 Demand Management Strategy

Demand changes for services within the City (positive or negative) will necessarily require an adjustment to the way services are delivered. Table 4-1 below provides an overview of the services impact, demand direction, treatments to manage demand based on the demand drivers listed in Section 4.1.

The preliminary preferred solution outlined in the Brampton Mobility Plan proposes a balanced approach to addressing the city's anticipated future growth. It includes a combination of strategically limited road widenings and a greater focus on complete street reconstruction projects in accordance to the Brampton Plan and the 2040 Vision. This is designed to improve safety and accessibility for all users. Additionally, it includes the introduction of higher-order transit infrastructure to enhance regional connectivity and support sustainable transportation options. Cost estimates associated with the Brampton Mobility Plan are currently under development and have not yet been finalized. As such, detailed financial information for demand treatments are not available at this time.

Table 4-1: Demand Management Strategy

Demand Driver	Current Position	Projection	Services Impacted	Demand Direction (Up, Down, Neutral)	Treatment of Assets to Manage Demand
Population Growth	As of the 2021 Census, the City's population stands at approximately 656,000 residents.	The population is projected to exceed 1,000,000 by 2051, leading to an estimated increase of 185,000 additional trips in the morning peak period by 2051.	The transportation network, including roads and related infrastructure, will require expansion and/or upgrades to accommodate the anticipated growth across both urban and suburban areas.	**Up**	In alignment with the Brampton Mobility Plan's direction to "Build a Future-Ready Network," Brampton will undertake infrastructure expansion initiatives such as road widenings and the addition of new lane kilometers. These expansions will specifically target high-growth areas to accommodate projected increases in vehicle volume and support economic development objectives. Emphasis will be placed on optimizing arterial road capacity and improving connectivity to regional transportation corridors.
Environmental and Sustainability Goals	Presently, 81% of all trips are made using private automobiles.	By 2051, the city aims to reduce car trips by 70,000 in the morning peak period, achieving a modal shift whereby only 64% of trips rely on private vehicles.	Enhanced integration of multi-modal transportation options, including cycling, public transit, and active transportation, will be required.	**Up**	The Brampton Mobility Plan focuses on moving people rather than cars, emphasizing mode shift through investment in infrastructure that supports active transportation and public transit. Upgrades will include the expansion of protected cycling lanes,

Demand Driver	Current Position	Projection	Services Impacted	Demand Direction (Up, Down, Neutral)	Treatment of Assets to Manage Demand
					implementation of transit signal priority, and the development of complete streets.
Transportation Equity	The City is currently reviewing measures to enhance accessibility and safety across its transportation infrastructure.	A commitment has been made to implement safer walking, cycling, and rolling solutions for vulnerable road users, including individuals with disabilities, seniors, and children.	Through the adoption of the Complete Streets Guide, the city will design, construct, and maintain streets with improved safety, accessibility, and affordability for all users, including motorists, transit riders, and cyclists.	**Up**	The Brampton Mobility Plan prioritizes infrastructure in areas with existing mobility inequities, particularly neighbourhoods with low access to cycling facilities or where residents rely on active transportation as a primary mode of travel. The BMP incorporates an Equity Index to guide decision-making and ensure fair distribution of mobility investments. Road renewal and new construction projects will embed features such as raised crossings, wider sidewalks, protected bike lanes, and tactile paving to improve safety and accessibility for vulnerable users.

Demand Driver	Current Position	Projection	Services Impacted	Demand Direction (Up, Down, Neutral)	Treatment of Assets to Manage Demand
Technology Advancements	The City is actively exploring and implementing various technology-driven initiatives, such as the "Connected Vehicle Pilot Program."	The role of smart traffic management systems, autonomous vehicles, and curbside management solutions is expected to increase. Expansion of Internet of Things (IoT) infrastructure for real-time traffic data collection is also anticipated.	Advancements in data collection and analysis tools will influence the efficiency of traffic management. Additional investments may be made to extend IoT-enabled intersections beyond the current 10-pilot locations.	**Neutral**	As part of its vision to create a “Smart and Connected Network,” Brampton is preparing its infrastructure to accommodate emerging mobility technologies. Upgrades will include installation of digital infrastructure, such as vehicle-to-infrastructure (V2I) communication systems, and adaptive traffic signal controls. In tandem, the City is developing policy frameworks to support autonomous vehicle (AV) deployment, which includes planning for designated rights-of-way, curb management strategies, and integration with the City’s Vision Zero objectives—aimed at eliminating all traffic-related fatalities and serious injuries through safer infrastructure design.

Risk Management

5. Risk Management

Managing risk is a fundamental component of effective asset management, particularly for critical infrastructure systems such as stormwater networks. Risk management enables the City to proactively identify, assess, and address potential threats to service delivery, public safety, environmental protection, and financial sustainability. This chapter outlines the City's approach to risk management for transportation assets, including the methodology used to evaluate risk across the asset portfolio, the identification of key risk drivers, and the integration of risk into infrastructure decision-making. A comprehensive understanding of asset-related risks ensures that limited resources are prioritized toward the most critical needs, helping to maintain levels of service and support long-term resilience.

5.1 Risk Framework

A fundamental asset management principle for the City is to achieve service level objectives and effectively manage risk while minimizing lifecycle costs. The relative importance of assets in supporting service delivery, referred to as asset criticality, serves as the primary determinant in selecting the most appropriate asset management strategy for each asset. Critical assets are those that significantly contribute to performance, incur high lifecycle costs, and are most susceptible to deterioration or require ongoing maintenance investment.

Risk events, such as failures in asset capacity, function, or reliability, may compromise the City's ability to achieve its strategic priorities. Lifecycle activities are implemented to mitigate the risk of failure by reducing the likelihood of asset failure to acceptable levels. The impact of asset failure on the City's strategic objectives informs the type and timing of lifecycle interventions.

The City of Brampton has historically considered risk as an integral part of its daily operations, using it as a guiding principle to determine appropriate lifecycle interventions that ensure assets continue to meet their defined levels of service. This practical application of risk has long supported decision-making related to maintenance, renewal, and rehabilitation activities across various asset types.

City has developed a Risk Management Strategy (RMS) as a core component of the Service Area AMP. The RMS provides a standardized and systematic framework for assessing and managing asset-related risks across all service areas including transportation, regardless of asset class. It facilitates consistent decision-making, particularly when prioritizing projects within and across departments, by ensuring that risk evaluations are objective, comparable, and aligned with corporate goals.

Key features of Brampton's RMS include:

- Alignment with ISO 31000: The strategy is grounded in internationally recognized risk management principles, offering a benchmark for best practices in identifying, evaluating, and mitigating risk. This alignment enhances credibility, repeatability, and strategic rigor in Brampton's asset management processes.

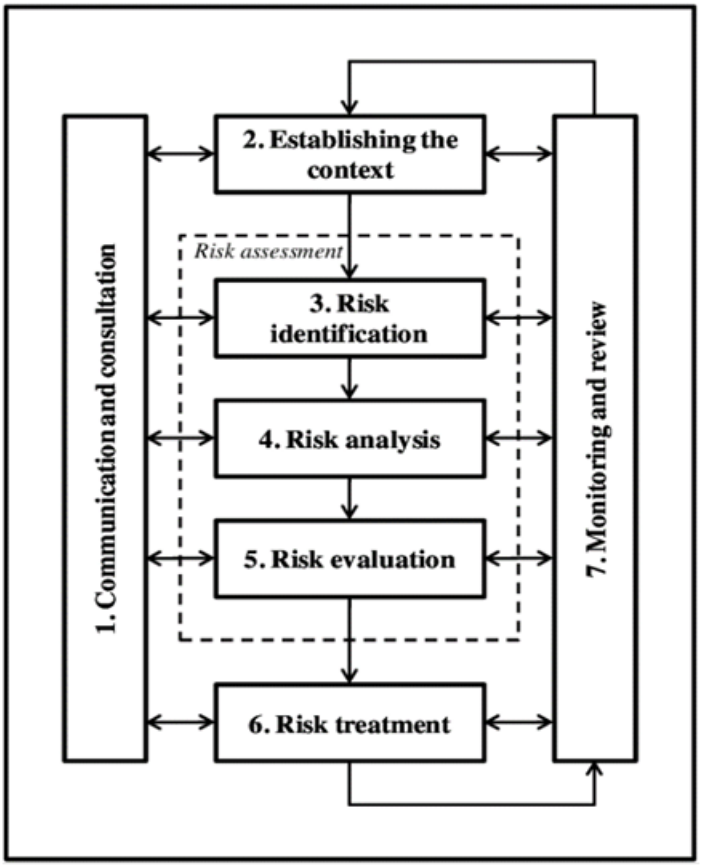
- Consistent Risk Scoring Methodology: The RMS incorporates both probability and consequence factors to evaluate risk. It considers potential impacts on safety, service delivery, financial performance, reputation, and environmental outcomes.

- Integration with Decision-Making Processes: Risk scores generated through the RMS are used to inform project prioritization, capital planning, and lifecycle activity selection. This ensures that limited resources are directed to the most critical needs, improving service reliability and reducing the likelihood of unexpected asset failures.

- Cross-Departmental Adoption: The RMS has been adopted across all asset-owning departments, reinforcing a unified approach to asset risk assessment. Training and guidance have been provided to ensure effective implementation and alignment with the City's broader asset management strategy.

The structure and methodology of the RMS are summarized in **Figure 5-1,** which outlines the key components of the risk framework, including the assessment matrix, risk categories, thresholds, and scoring criteria.

Table 5-1: ISO 31000 Risk Management Process



5.2 Risk Evaluation

Risk information is often used to generate a quantitative assessment based on the following formula:

Probability x Consequence = Risk Rating

where Probability = {1,2,3,4 or 5} and Consequence = {1,2,3,4 or 5}

For example, an asset with probability of 5 multiplied by consequence of 5 would generate a risk score of 25 (P5, C5). This would indicate that the asset is at high risk of failing to provide desired levels of service in the near term, and is of vital importance, therefore would require immediate effort in order to allow the asset to continue to provide service effectively.

The risk management strategy is then expanded to incorporate the customer levels of service for both the probability and consequence of failure. Therefore, a more detailed evaluation of the probability and consequence of failure are clearly defined as resulting from the customer levels of service. This provides a clearer relationship between the services provided and the linkage to the perceived risks.

The more advanced probability and consequence formula is as follows:

max Probability = max (Capacity & Use, Functionality, Quality) and

max Consequence = max (Capacity & Use, Functionality, Quality)

where Capacity & Use = {1,2,3,4 or 5}, Functionality = {1,2,3,4 or 5}, Quality = {1,2,3,4 or 5}

The resulting quantitative risk assessment in this expanded risk framework is therefore determined as follows:

max Probability x max Consequence = Risk Rating

At the heart of the RMS is an evaluation of risk across three key customer-focused LOS categories—each of which is associated with defined probability and consequence factors. This structured approach allows the City to assess risk holistically, beyond traditional failure definitions.

1. Quality

- Quality risks can manifest in deteriorating infrastructure—such as potholes or faded signage — which may not immediately impair function but diminish user experience and service value.

2. Capacity & Use

- In the context of Brampton, this typically relates to whether infrastructure (e.g., roads) can keep pace with a growing population and intensifying land use.
- Risks in this category may arise due to capacity limitations, constrained service hours, or excessive demand peaks.

3. Functionality

This area assesses whether assets:

- Comply with applicable regulations, perform their intended function safely and effectively and support operational sustainability and security

An asset that is outdated, non-compliant with safety codes, or unable to meet evolving user needs may still be structurally sound but be deemed functionally deficient.

The respective analysis and results of the RMS for the City's transportation assets are presented below.

5.3 Consequence of Failure

The consequence of an event affecting the levels of service is determined by the extent to which a risk event impacts service delivery. The consequence of failure is assessed based on the following criteria:

- **Health & Safety:** This criterion evaluates the severity of potential injuries that could result from a specific risk event. It is closely linked to legal and regulatory considerations, as changes in regulations and compliance requirements can influence the overall consequence of failure.

- **Reputation/Social:** This refers to the public's perception of the service provided by an asset. It aligns with the strategic aspect of risk, where factors such as demographic shifts or changes in social consciousness can affect the consequence of failure.

- **Service:** This criterion assesses the extent of disruption caused when an asset fails to deliver the intended level of service. It corresponds to the operational aspect of risk, where any changes in service levels can influence the severity of the consequence.

- **Economic**: This considers the financial and economic impact of an asset's inability to provide the desired level of service. It is associated with the financial aspect of risk, where market conditions, economic fluctuations, and cost implications serve as key drivers of consequence.

- **Environmental:** This criterion evaluates the impact of asset failure on the natural environment, including potential effects on water quality, habitat disruption, and erosion. It also considers the duration and complexity of environmental recovery efforts

The CoF table used to score each of asset categories for this AM Plan is provided in Table 5-1 below.

Table 5-1: Consequence of Failure Rating Table

Consequence Criteria	Consequence of Failure				
	C1 Insignificant	C2 Minor	C3 Moderate	C4 Major	C5 Catastrophic
Health & Safety	Negligible injuries	Minor injuries, medical attention required	Serious injuries, multiple minor injuries	Multiple serious injuries, Loss of life	Multiple loss of life or City-wide health-related disaster
Reputation/ Social	Event only of interest to individuals. No community concern.	Minor community interest. Local media report.	Public Community Discussion. Broad adverse media coverage.	Loss of confidence in Council. National publicity. Public agitation for action.	Public investigation. International coverage. Management changes demanded.
Service	Service not affected or minimal impact	Localized disruption of non-essential service	Localized disruption of essential service	Widespread short-term disruption or localized long-term disruption of essential service	Widespread and long-term disruption of essential service
Economic	Damages, losses or fines <$10,000	Damages, losses or fines $10,000 to $200,000	Damages, losses or fines $200,000 to $2,000,000	Damages, losses or fines $2,000,000 to $10,000,000	Damages, losses or fines >$10,000,000
Environmental	Negligible impact fully reversible within 1 week.	Material damage of local importance. Prosecution possible. Impact fully reversible within 3 months.	Serious damage of local importance. Prosecution probable. Impact fully reversible within 1 year.	Serious damage of national importance. Prosecution expected. Impact fully reversible within 5 years.	Serious damage of national importance. Prosecution. Long term study. Impact not fully reversible.

5.3.1 Probability of Failure

The likelihood of an asset risk event refers to the probability of a risk event occurring. The probability of failure is assessed on an asset-by-asset basis, incorporating input from subject matter experts for the relevant asset class. This assessment is based on a qualitative scale ranging from 1 to 5, where a score of 5 represents the highest probability of failure. Table 5-2 provides a summary of the probability definitions.

Table 5-2: Probability of Failure Rating Table

Level	Name	Description
P1	Rare	Event could occur very infrequently or only in exceptional circumstances; but is not expected.
P2	Unlikely	Event could occur infrequently.
P3	Moderate	Event should occur at some time.
P4	Probable	Event will probably occur regularly or in most circumstances.
P5	Almost Certain	Event is expected to occur very frequently or in most circumstances.

In previous Asset Management Plans, the City established a standardized Risk Evaluation Framework for infrastructure assets. This framework consolidated asset-level risks—specifically related to capacity, functionality, and reliability—into a single composite risk score that provides an overall risk map for all Transportation assets

In this Asset Management Plan, the City has advanced its approach by adopting a more granular methodology. And provides fa separate risk scores at the asset class level for each of the three key risk dimensions: Capacity & Use, Functionality, and Reliability. This refinement enhances the City's ability to target and prioritize interventions more effectively based on the specific nature of risks.

Furthermore, it is recognized that the Probability of Failure PoF for Capacity & Use and Functionality is currently assessed at the asset class level, reflecting the current state of maturity in available data and analytical methods. Opportunities to improve this level of precision have been identified and are addressed in the Improvement Plan chapter of this document.

Understanding the probability of asset failure further enables effective management of assets – the "right" management strategy for every asset should depend on its criticality to achieve the City's objectives and then on the probability of a failure that would trigger the impact. A summary of the probability for each asset category, on each customer LOS attribute is shown in Table 5-3.

Table 5-3: Probability of Failure Ratings

Asset	Asset Category	Capacity and Use	Functionality	Quality
Road Network	Arterial	2	1	Based on Asset Condition
	Collector	2	1	
	Local	2	1	
	Traffic Calming	2	1	
Structures	Bridges	2	1	Based on Asset Condition
	Culverts	2	1	
	Gateway	1	1	
	Noise Walls	1	1	
	Retaining Walls	1	1	
	Fences	1	1	
	Guiderails	1	1	
	Handrails	1	1	
	Steps	1	1	
Sidewalks/Walkways	Sidewalks	2	1	Based on Asset Condition
	Walkways	2	1	
	Multi-use Paths	2		
Traffic	Street Lighting	1	1	Based on Asset Condition
	Signals	1	1	

For this AM Plan, the highest PoF score across the three categories above was assigned as the overall PoF for the asset.

5.3.2 Risk Map

Risk mapping is used by the City to determine the significance of a perceived risk to transportation services. A risk map represents a graphic representation of the magnitude of risk, or combination of risks, expressed in terms of the product of the consequence and probability of the risk. The Risk Map utilized is shown in Table 5-3.

Table 5-3: Risk Map

		Consequence				
		C1	C2	C3	C4	C5
Likelihood	P5	Medium	Medium	High	High	Extreme
	P4	Low	Medium	Medium	High	High
	P3	Low	Low	Medium	Medium	High
	P2	Insignificant	Low	Low	Medium	Medium
	P1	Insignificant	Insignificant	Low	Low	Medium

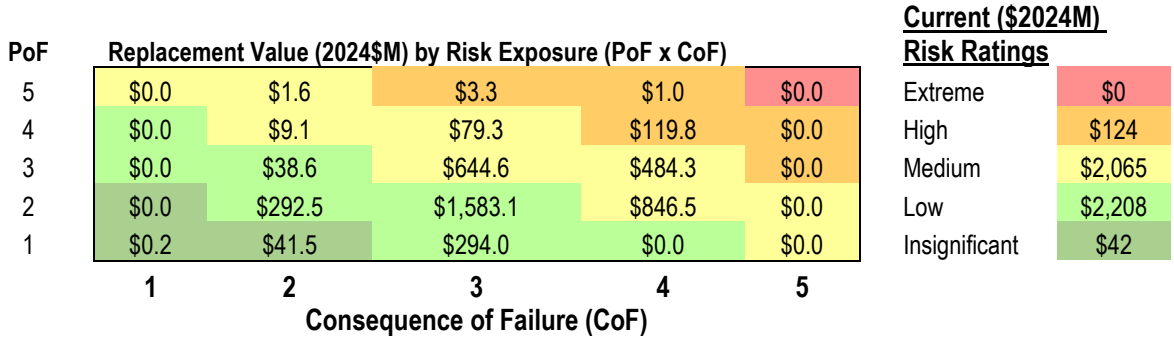
- **Insignificant (Green)** – Accept risk, no risk treatment required.
- **Low (Light Green)** – May be acceptable but monitoring of assets may be required
- **Medium (Yellow)** – Requires some consideration by management with necessary risk management and monitoring adopted as needed.
- **High (Orange)** – Requires consideration by management, risk management and monitoring are required.
- **Extreme (Red)** – Requires extensive management input, risk mitigation to reduce to an acceptable level is essential.

5.3.3 Risk Assessment Results

After estimating the asset criticality and probability of failure (based on the maximum of reliability, capacity and function scores), the results were plotted on a risk map Figure 5-2 to show a visual representation of risk exposure across the City's transportation assets, by major asset groups. Colors on the map denote various levels of risk and help to prioritize the City's resources, time, and effort for renewal activities. Asset class specific risk profiles are provided within the Asset Class Summary Reports in **Appendix A to D**.

The City mitigates its exposure to the risks through the renewal lifecycle strategies discussed in next Section of this report.

Figure 5-2: Risk Map (Transportation Services)



Note: Replacement values are based on the SOLI 2023 report which is in 2024 dollars.

The figure above show that no assets are in the Extreme-risk exposure category. This is due to the City managing their assets in a state of good repair, preventing them from dropping into very poor' condition. It is important that the City monitors the condition of assets in 'High'-risk (orange), as these are likely to yield Very High-risk exposure if not their asset condition is not managed.

The City has established a strong foundation in identifying and managing infrastructure risks. Building on this progress, there is an opportunity to further advance the City's risk management practices by adopting a more integrated and strategic approach. This next phase of maturity would help align risk-based planning with long-term service objectives, improve project prioritization, and ensure the most effective use of available funding.

To support this evolution, the following enhancements are recommended across the three core dimensions of service levels:

- **Capacity-Related Risks:**
  Risks to capacity levels of service are initially identified through the completion of master plans, which define infrastructure needs in response to growth and demand. Following these plans, a structured risk assessment is recommended to prioritize key projects based on urgency and potential service impacts. This will support the development of a more responsive and risk-informed 10-year capital plan.

- **Functional Risks:**
  Functional service risks—such as those arising from climate change, accessibility, and regulatory compliance—are typically identified through targeted studies and plans. To strengthen this process, it is recommended that the City apply a consistent risk assessment lens to these projects to help determine timing and priority within capital planning cycles. This approach would enhance transparency and ensure alignment with broader service delivery objectives.

- **Reliability Risks:**
  Risks related to service reliability are currently assessed through inspections and condition evaluations, which guide maintenance and renewal activities. These efforts are largely funded through operating and capital budgets. Moving forward, the City may consider integrating these findings more systematically to inform risk trends and investment decisions across asset classes.

While current risk identification efforts are valuable, they are often conducted independently across different asset groups. As a forward-looking enhancement, it is recommended that the City begin to consolidate risk insights across capacity, functional, and reliability dimensions. A more holistic risk framework would enable the City to assess service delivery risks comprehensively and prioritize investments based on criticality, risk exposure, and potential impact.

This recommended approach represents a natural progression in the City's asset management maturity. It would support more informed, transparent decision-making; reinforce alignment with strategic goals; and improve the efficiency and effectiveness of infrastructure investment planning.

Below is a summary of key capacity and function risk factors affecting the performance of transportation infrastructure and initial measures in place to address them:

- In terms of vandalism and security, the City has faced ongoing challenges, particularly with theft and intentional damage to infrastructure. In response, a pilot program is currently underway to apply graffiti-resistant coatings to signage, preventing paint or marker ink from adhering to surfaces. Additionally, Automated Speed Enforcement (ASE) cameras, previously mounted at ground level, are now installed on elevated poles to reduce their vulnerability to vandalism.

- Utility installation and repair work, while not currently a significant issue due to strong permitting processes, remains an ongoing area of attention. Utility restoration teams at the City provide oversight to ensure quality and minimize disruption.

- Overloading from heavy vehicles is another contributing factor to asset degradation. Load limits are enforced on certain roads; however, roads constructed with HL3 asphalt, particularly in transitional rural-to-urban areas, have proven insufficient to support increased development-related traffic and will require upgrades.

- The transition to LED lighting represents a strategic investment that aligns with the City's goals for cost efficiency, environmental stewardship, and enhanced public service delivery. The transition to LED lighting has resulted in substantial energy savings and reduced operating costs, while also improving luminosity and overall lighting performance.

5.4 Risk Treatment

In addition to identifying risk exposure, the risk analysis also serves to develop guidelines for appropriate risk treatments—targeted actions or strategies intended to manage or reduce the risks associated with asset failure. A key focus of this process is determining which risk treatments are required to ensure that assets continue to deliver the City's desired LOS.

Since different risk treatments can have varying impacts on LOS, the City staff has identified the optimal treatments tailored to specific asset needs and operational contexts. These high-level risk treatment recommendations are presented within the lifecycle management section of this AM Plan.

As the assets reach nearing the end of their service life, increasing the probability of failure, the City continues to prioritize investment for these in the City's capital planning and lifecycle management activities. These treatments are intended not only to mitigate immediate risks but also to support long-term service sustainability and resilience.

Next Steps: Maturing the Risk-Based Approach

The City of Brampton has laid a solid foundation for managing infrastructure risk through the development and implementation of a structured Risk Management Strategy (RMS). The RMS supports consistent risk evaluation across service areas and informs decision-making related to asset maintenance, rehabilitation, and capital planning. As the City continues to enhance its asset management maturity, there are several key opportunities to strengthen and expand the application of risk-based planning.

The following initiatives are recommended as part of the City's evolution toward a more mature and integrated risk management framework:

1. Deepen Risk-Based Prioritization of Lifecycle Activities

To ensure investments are aligned with service needs and fiscal constraints, the City can enhance the use of risk data to support prioritization of lifecycle activities. This includes:

- Refining asset-level risk evaluations to more accurately reflect deteriorating conditions, criticality, and evolving service demands.
- Incorporating risk-adjusted cost-benefit analyses to assess the timing, scale, and trade-offs of proposed capital and maintenance interventions.
- Using risk exposure as a central input when developing multi-year capital forecasts and allocating funding across competing priorities.

2. Strengthen Linkages Between Risk and Levels of Service (LOS)

The City's current framework evaluates risk across capacity, functionality, and quality service dimensions. Moving forward, it is recommended that the relationship between risk exposure and LOS performance be more explicitly defined:

- Establish thresholds for acceptable risk tolerance aligned with LOS targets.
- Develop indicators that demonstrate how risk events—such as asset failure or performance decline—affect service outcomes.
- Use this information to adjust lifecycle strategies based on service criticality and risk escalation trends.

3. Introduce Residual Risk Assessment

Understanding residual risk—the risk that remains after treatment strategies are applied—will be essential to assessing the effectiveness of current interventions. The City may consider:

- Integrating residual risk analysis into its RMS framework, with tracking mechanisms for assets that remain at elevated risk levels despite investment.
- Documenting trade-offs between fully mitigating risk and accepting residual exposure within budgetary or operational constraints.
- Supporting this approach with training and guidance to promote consistent application across departments.

4. Expand Data Granularity and Analytical Capabilities

A more mature risk assessment process depends on improving the granularity and reliability of supporting data. Recommendations include:

- Enhancing asset condition and performance monitoring practices, including digitization of inspection records and broader use of predictive modeling.
- Where feasible, shifting from asset-class level assessments to asset-specific risk scoring, especially for high-value or high-risk assets.
- Leveraging GIS and business intelligence tools to spatially visualize risk exposure and overlay it with demographic, environmental, and growth factors.

5. Monitor, Review, and Continuously Improve

Establishing a strong risk management culture requires continuous improvement. It is recommended that the City:

- Periodically review the effectiveness of its RMS and update scoring criteria, thresholds, and data sources as needed.
- Develop performance metrics to evaluate the impact of risk-based interventions on asset reliability, service delivery, and financial efficiency.
- Document and communicate lessons learned from risk management efforts across departments.

These enhancements represent a natural progression of the City's risk management maturity and are aligned with best practices established under ISO 31000 and industry-leading asset management frameworks. By continuing to evolve in this direction, the City will be well-positioned to optimize its infrastructure investments, safeguard service delivery, and maintain public trust in a transparent, proactive, and defensible manner.

The specific actions, timelines, and accountabilities associated with these improvements are further outlined in the Monitoring & Improvement Plan section of this Asset Management Plan.

Climate Change Integration

6. Climate Change Integration

Municipal asset management primarily focuses on maintaining existing assets in a state of good repair while planning for their future rehabilitation and replacement across all service areas including transportation. However, the impacts of climate change are already being observed in Canada and globally. It is imperative for municipalities to incorporate climate considerations into their asset management strategies and proactively plan for future climate-related challenges to ensure the continued delivery of essential services, particularly concerning the maintenance of critical municipal infrastructure.

In accordance with Ontario Regulation 588/17, Section 3(5), municipalities are required to integrate climate change considerations into their asset management planning. This includes addressing vulnerabilities related to climate change impacts on operations, levels of service, and lifecycle management. Furthermore, municipalities must evaluate anticipated costs, mitigation and adaptation strategies, and disaster preparedness measures to comply with provincial asset management requirements. This section establishes a foundation for future policies aimed at embedding climate change considerations within the City's asset management framework.

The *Climate Trends and Future Projections in the Region of Peel (2016)* report indicates that the City of Brampton is projected to experience rising air temperatures, increased precipitation, and more frequent extreme weather events. Specific climatic changes in Brampton include hotter, drier summers; warmer winters with heightened precipitation; an increased frequency and intensity of storms; and stronger extreme wind events. These climatic shifts are expected to elevate risks related to flooding, heatwaves, infrastructure

deterioration, public health and safety concerns, and the disruption or loss of natural habitats.

Mitigation and adaptation planning for climate change is a critical step for municipalities in ensuring long-term resilience. Accordingly, the City is actively working to integrate climate change considerations into its asset management planning practices to enhance infrastructure sustainability and service reliability in the face of evolving climate challenges.

6.1 Climate Ready Brampton

Climate Ready Brampton is a forward-looking plan to address the anticipated impacts of climate change on our communities, infrastructure, economy, and natural systems. While reducing greenhouse gases is more important now than ever, simultaneously addressing climate adaptation is a critical priority due to the accelerating impacts of climate change. We are already feeling these effects in Brampton through warmer winters, increased rainfall, and extreme events like flooding and heat waves.

By 2070, Brampton is expected to become warmer, wetter, and wilder. Average temperatures are expected to rise significantly, leading to milder winters, increased temperature variability, and more extreme heat days in the summer (e.g., days where temperatures exceed 30°C). Annual precipitation will increase, and we will experience more intense rainfall events. As temperatures continue to rise, more snow may turn to rain in the winter, heightening flood risks across the city. With a wilder climate, extreme weather events, such as heatwaves, storms, tornadoes, and extreme wind events, are expected to become more frequent. These changes will result in widespread impacts such as property damage, threats to health and safety, loss of natural systems, and impacts to our local economy. By acting now to prepare for future climate impacts, Brampton and its communities will be well-equipped to handle these changes, developing the resilience to bounce back from adverse climate impacts.

To support the Vision and Goals of Climate Ready Brampton, a series of actions were created and designed to reduce risks from future climate hazards. The following actions are relevant to the City's transportation assets and will be completed over the next several years.

- Updating City Design Standards: Update design standards (e.g., engineering standards, Intense-Duration-Frequency Curves, etc.) to account for future climate change risks and ensure development addresses extreme weather events.

- City Department Risk and Vulnerability Assessments: Develop detailed departmental risk and vulnerability assessments to help prioritize City projects and inform budgets.

- Department needs during Extreme Weather: Regularly review and update operational needs of all departments to ensure adequate preparedness for inclement weather and extreme weather conditions.

- Use climate science and evidence-based decision-making: Incorporate up-to-date climate projections into City planning, policies, programs and infrastructure.

- Climate Lens in Asset Management: Integrate climate risk into the development of Asset Management Plans.

6.2 Impacts of Climate Change on Transportation Assets

The Financial Accountability Office of Ontario (FAO) recently prepared a report to analyze the costs that climate change impacts could impose on Ontario's provincial and municipal infrastructure, and how those costs could impact the long-term budget outlook of the province.

It should be noted that any projections from the FAO study were not utilized in the development of the City's Climate Change Adaptation Plan. While still in progress of being developed, the City's plan used locally relevant climate data, municipal infrastructure priorities, and guidance from national and provincial climate adaptation frameworks to ensure alignment with the specific needs and context of the City.

Key climate risks identified for transportation infrastructure within this report, "Costing Climate Impacts to Public Infrastructure" project (CIPI)., include:

Roads

- Extreme rainfall events, particularly acute occurrences such as 100-year storm events, pose the greatest risk to road infrastructure. While roads are generally resilient to lower-intensity rainfall, severe storm events can lead to washouts and flooding, overwhelming drainage systems and damaging pavement surfaces. Additionally, excessive rainfall can infiltrate the base and sub-base layers of roadways, accelerating deterioration and increasing the probability of cracking.

- Extreme heat, characterized by ambient temperatures exceeding 30°C, creates conditions where heat dissipation is less efficient, resulting in the softening of asphalt pavement. This softening increases the road's susceptibility to rutting and cracking, which in turn facilitates water infiltration, weakens the base and sub-base layers, and contributes to surface defects such as potholes.

- Freeze-thaw cycles (FTCs) occur when temperatures fluctuate between freezing and non-freezing conditions, causing water to freeze and expand or melt and contract. Unlike vertical infrastructure (e.g., buildings), where gravity runoff minimizes water accumulation, horizontal infrastructure such as roadways is more susceptible to water penetration into sub-layers. The repeated freezing and thawing of accumulated water can result in significant surface degradation.

Bridges

- Extreme rainfall events, particularly acute occurrences such as 100-year storm events, will impact

bridge infrastructure through increased runoff and flooding. These events can lead to the erosion of embankments and bridge approaches, as well as the scouring and deterioration of bridge substructures and shallow foundations. However, deep bridge foundations are expected to experience negligible impacts.

- Freeze-thaw cycles contribute to the weathering of bridge decks and barriers, leading to concrete cracking. However, projections indicate a decline in the annual frequency of freeze-thaw cycles, which is expected to extend the service life of vertical concrete elements. Other bridge components, including the superstructure, substructure, and the layer beneath the asphalt pavement, are not anticipated to be significantly affected by freeze-thaw cycles.

Structural Culverts

- Extreme rainfall events, particularly acute occurrences such as 100-year storm events, will impact large structural culverts primarily through increased erosion. These events may also compromise channel protection measures, making them susceptible to washout and scour-related damage.

6.3 Cost Implications of Climate Change

The FAO study examined three scenarios as part of the analysis of future infrastructure costs due to climate change:

- The low emissions scenario assumes a major and immediate turnaround in global climate policies.
- The medium emissions scenario assumes that global emissions peak in the 2040s, then decline rapidly thereafter.
- The high emissions scenario assumes global emissions continue to grow at their historical pace for most of the century.

Further details outlining the difference of emissions projections for each scenario are provided within the ***General Appendices*.**

In analyzing the potential impacts of climate change on municipal infrastructure, the high emissions scenario was selected as the basis for assessment. This scenario represents a future with continued high greenhouse gas emissions and limited global climate mitigation efforts. While it may reflect a worst-case trajectory, it serves as a conservative planning benchmark, helping the City to better prepare for more extreme and uncertain climate outcomes.

Given the long service lives and high capital costs associated with municipal assets such as roads, bridges, sidewalks etc., it is critical that infrastructure is designed and managed to withstand more frequent and severe weather events, including increased precipitation, freeze-thaw cycles, flooding, and extreme heat. By planning for higher-impact scenarios, the City reduces the risk of underestimating climate stressors and being unprepared for costly or disruptive service interruptions in the future.

Table 6-1 below presents the projected median impacts of both the medium (lower limit) and high-emissions (upper limit) climate change scenarios on public infrastructure assets in Ontario, specifically focusing on transportation assets such as roads, bridges, and large structural culverts. The impacts are measured in terms of changes in operating and maintenance (O&M) costs, life reductions, and increases in retrofit and renewal costs.

Table 6-1: Climate Change Impacts on O&M Costs (Source: FAO Costing Climate Impacts to Public Infrastructure Study)

Asset	O&M Cost ($)	Service Life (years)	Retrofit Cost ($)	Renewal Cost ($)
Roads	+0.6% to +1.5%	-12.1% to -31.1%	+10.2% to +25.9%	+9.4% to +23.8%
Bridges	+0.5% to +1.3%	-0.6% to -2.6%	+3.1% to +7.5%	+2.8% to +6.7%
Large structural culverts	+1.0% to +2.5%	-13.1% to -31.3%	+24.6% to +58.9%	+10.5% to +25.1%

At this stage, the City has chosen to focus its climate change impact assessment on operating costs rather than extending the analysis to asset service life reductions, retrofit requirements, or renewal costs. This decision reflects the current limitations in available data, models, and local experience linking specific climate variables to long-term asset degradation rates and capital renewal triggers.

Operating costs—such as increased frequency of maintenance, emergency repairs, or additional inspections—are more immediate, observable, and quantifiable in the short to medium term. These impacts are already being experienced and can be tracked through existing asset management and financial systems, making them more practical to assess with greater confidence.

In contrast, impacts on service lives or the cost of retrofits are more complex and require detailed engineering assessments, long-term monitoring, and assumptions about future materials, standards, and design practices, many of which are still evolving in response to climate adaptation research. By initially focusing on operational impacts, the City is taking a pragmatic first step in understanding how climate change affects its infrastructure portfolio, while recognizing the need to expand this analysis in the future as tools, data, and methodologies improve.

Based on the criticality of continuing to provide the Levels of Service the High emissions scenario has been considered for O&M to account for climate change impacts, this AM Plan has adopted the following within the operating needs forecast (found within the lifecycle strategy):

- a 1.5% future increase in O&M costs for roads,
- a 1.3% increase in O&M costs for bridges,
- a 2.5% increase in O&M costs and for large structural culverts.

Overall, the data underscores the substantial financial and operational impacts of climate change on transportation infrastructure. The City will need to implement strategic asset management practices, prioritize investments in climate-resilient infrastructure, and adopt mitigation and adaptation measures to address these challenges effectively.

Governance

7. Governance

For an effective asset management planning process, it is crucial to establish a well-defined governance structure with clear authority, roles, and responsibilities. This ensures that individuals within the organization understand their duties, take accountability, and contribute effectively to achieving asset management objectives.

The purpose of this section is to further elaborate on the roles and responsibilities outlined in the Strategic Asset Management Policy as they pertain to Transportation Assets. The City recognizes the critical role of a robust asset management governance framework in facilitating the successful delivery of services and the achievement of strategic goals. This Asset Management Plan builds upon recent advancements in governance by refining the identification and documentation of asset management roles and responsibilities.

7.1 Organizational Chart

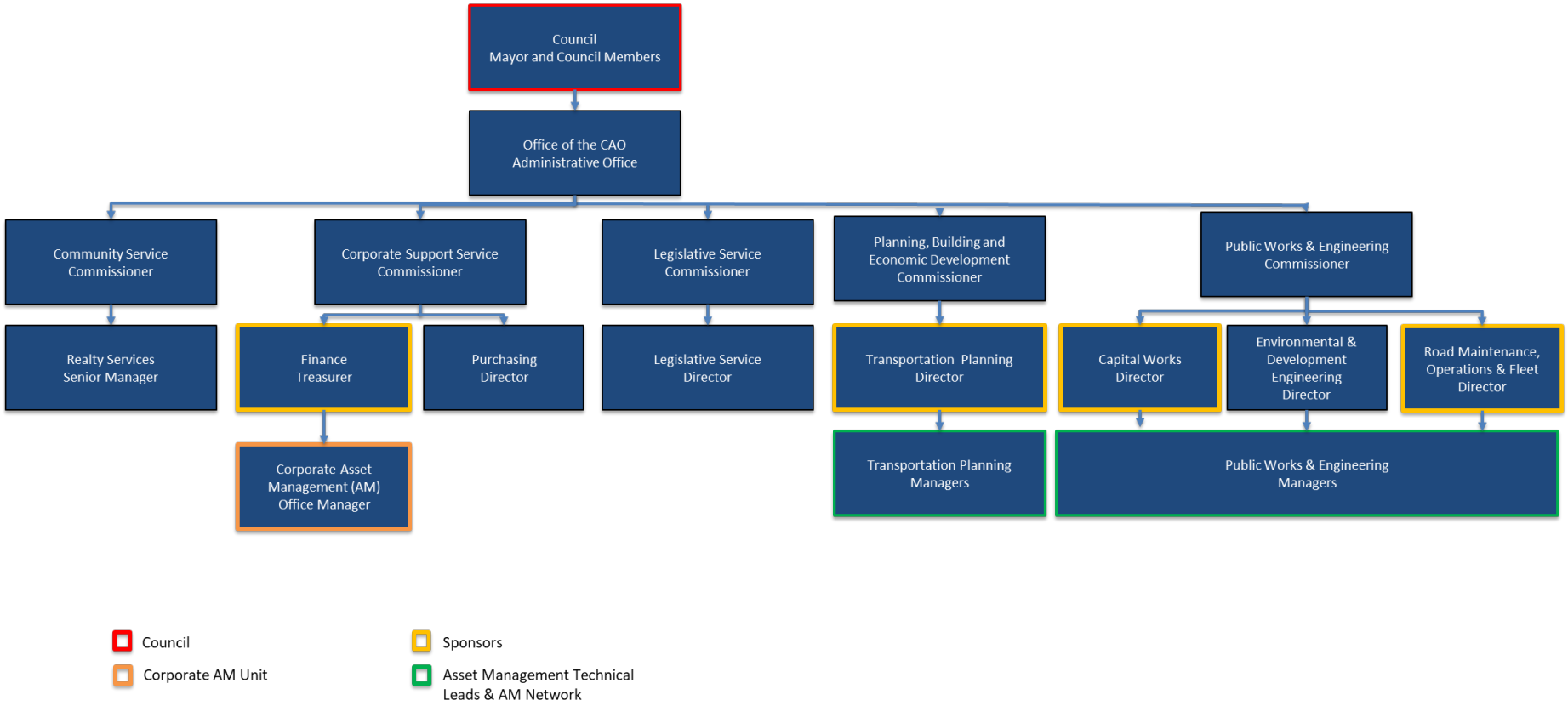
The key positions within the Transportation Service Area, along with the associated reporting and relational hierarchy, are outlined in the organizational chart. This chart identifies individuals and roles within the City's Transportation Service Area. The roles and responsibilities described in the Strategic Asset Management Policy are also reflected in the organizational chart, demonstrating how the corporate AM governance structure is applied within the Transportation Service Area. The AM Policy roles and responsibilities captured in the chart include:

- Council
- Senior Leadership Team (SLT)

- The Treasurer
- Asset Management Steering Committee
- Corporate Asset Management Office
- Asset Management Technical Leads and Asset Management Network

For simplicity, the Senior Leadership Team and the Asset Management Steering Committee have not been shown as the individuals within these groups exist outside the organizational chart shown in Figure 7-1.

Figure 7-1: Transportation Service Area Organizational Chart



7.2 Responsibility Matrix

The Responsibility Assignment Matrix (RACI) outlines the roles and responsibilities of key stakeholders within the City of Brampton who are involved in the asset management of transportation infrastructure. This framework categorizes the level of involvement for each role based on their responsibility, accountability, consultation, and information requirements.

The RACI matrix classifies involvement into four distinct categories:

- **Responsible (R)**: The individual or group directly responsible for project delivery or task completion.
- **Accountable (A):** The individual who holds ultimate responsibility for ensuring the correct and thorough completion of the deliverable, including final approval.
- **Consulted (C):** Individuals or groups whose expertise, input, or coordination is required to support the development of the deliverable. This involves a two-way exchange of knowledge.
- **Informed (I):** Stakeholders who are kept updated on progress as a courtesy but are not required to contribute directly. These individuals are typically notified upon task or deliverable completion.

The RACI matrix provides a structured approach to defining roles within the City's asset management framework for transportation infrastructure. It maps out key asset management activities across the typical lifecycle of transportation assets, ensuring clarity in leadership, engagement, and decision-making responsibilities. A detailed summary of these assignments is provided in Table 7-1.

This structured approach enhances accountability, facilitates effective coordination, and ensures that all relevant stakeholders are appropriately engaged in transportation asset management processes.

Table 7-1: Transportation Service Area RACI Matrix

Sub-Elements Key Activities	Council	Executive Leadership	Divisional AM Manager	Operations and Maintenance Staff	Strategic Planners	Finance Department	Internal Stakeholders (Other Departments)	External Stakeholders
Understanding and Defining Requirements								
Analysing the Strategic Direction (AM Policy and Objectives) -Review and refine AM policy; align with corporate vision and legislative requirements; define objectives and priorities	A	R	C	C/I	C/I	C/I	C/I	I
Levels of Service Framework -Define and document customer and technical levels of service; establish performance metrics and targets	R	A	C	C	R	C	C	I
Demand Forecasting and Management -Analyze population growth, land use, and service trends; identify demand drivers; assess impact on assets	R	A	C/I	C/I	R	C	C	I
Asset Condition and Performance -Establish condition assessment programs; track asset performance; analyze deterioration trends	I	A	R	C	C	C	C	I
The Strategic Asset Management Plan -Develop and update the SAMP; align with AM policy and corporate strategy	R	A	C	C	R	C	C	I

Sub-Elements Key Activities	Council	Executive Leadership	Divisional AM Manager	Operations and Maintenance Staff	Strategic Planners	Finance Department	Internal Stakeholders (Other Departments)	External Stakeholders
Developing Asset Management Lifecycle Strategies								
Managing Risk and Resilience -Identify asset-related risks; evaluate likelihood and consequence; develop risk mitigation strategies	I	A	C/I	R	C	C	C	I
Operational Planning -Develop maintenance strategies; optimize O&M activities; integrate with capital planning	I	A	R	C	C	C	C	I
Capital Works Planning -Identify capital renewal and upgrade needs; prioritize projects based on risk and condition	I	A	R	C/I	C	C/I	C	I
Asset Financial Planning and Management -Align lifecycle costs with budget forecasts; evaluate funding strategies and investment scenarios	I	A	C/I	C	C	R	C	I
AM Plans (for the Asset Portfolio and Assets) -Develop and maintain AMPs for all major asset classes; integrate lifecycle strategies, risks, and service levels	I	R	R	C/I	R	C	C	I
Asset Management Enablers								
AM People and Leaders -Identify AM roles and responsibilities; build	I	A	R	C	C	C	C	I

Sub-Elements Key Activities	Council	Executive Leadership	Divisional AM Manager	Operations and Maintenance Staff	Strategic Planners	Finance Department	Internal Stakeholders (Other Departments)	External Stakeholders
organizational capacity and training programs								
Asset Data and Information -Define data standards; establish collection, validation, and storage protocols; ensure data quality and access	I	A	R	C/I	C/I	C/I	C	I
Asset Management Information Systems (AMIS) -Select, implement, and manage AM systems; ensure integration with other corporate systems	I	A	R	C/I	C/I	C/I	C	I
AM Process Management -Develop and maintain AM processes; ensure consistency, efficiency, and documentation	I	A	R	C/I	C	C	C	I
Outsourcing and Procurement -Manage contracts and procurement related to asset services; ensure alignment with AM objectives	I	A	R	C	C	R	C	I
Continual Improvement -Monitor AM performance; implement improvements based on audits, KPIs, and stakeholder feedback	I	A	R	C	C	C	C	I

Regular review and continuous improvement of the RACI matrix are essential to ensure its effectiveness in supporting the City's asset management processes. As transportation infrastructure evolves and organizational structures change, roles and responsibilities may need to be redefined to reflect shifting priorities, emerging challenges, and advancements in asset management practices.

Periodic assessments should be conducted to evaluate the matrix's alignment with current workflows, decision-making processes, and regulatory requirements. Engaging key stakeholders in this review process helps identify gaps, inefficiencies, or areas where additional clarity is needed. Adjustments should be documented and communicated to all relevant parties to maintain transparency and accountability. By adopting an iterative approach to refining the RACI framework, the City can enhance coordination, improve operational efficiency, and ensure that asset management responsibilities remain clearly defined and effectively executed.

7.3 Asset Interdependencies

Transportation assets do not operate in isolation. Their performance, reliability, and service delivery are often closely tied to the condition and functionality of other municipal infrastructure systems. Interdependencies exist both within the transportation network—such as between roads, sidewalks, bridges, and traffic systems—and with external systems including stormwater infrastructure, utilities, and adjacent land uses.

Understanding these interdependencies is critical to effective asset management planning. Coordinated maintenance, renewal, and capital investment strategies help reduce service disruptions, improve cost efficiency, and extend asset lifecycles. For example, road resurfacing projects are often aligned with underground utility upgrades to avoid future rework, while bridge and culvert assets depend on stormwater systems to maintain structural integrity during high-flow events.

A breakdown of these asset interdependencies, as evaluated through the City’s Service Area Asset Management Plan, is provided in the ***General Appendices***. This includes an assessment of cross-asset impacts and shared service delivery considerations to inform integrated planning and investment decision-making.

Asset Information Management

8. Asset Information Management

Asset information serves as a critical enabler for effective decision-making and is fundamental to strong asset management practices. Just as physical assets require structured management throughout their lifecycle, asset information must also be systematically governed to ensure its accuracy, reliability, and long-term value. Properly managed asset information enhances the City's ability to plan, operate, maintain, and optimize infrastructure investments efficiently.

The management of asset information begins at the conceptualization phase, where data is first generated and recorded. This process continues throughout the asset's entire lifecycle, supporting key activities such as planning, design, construction, operations, maintenance, and renewal. When asset information is no longer required, it must be appropriately archived or deleted in accordance with data governance policies. Maintaining high-quality asset data throughout this lifecycle is essential for ensuring informed decision-making, regulatory compliance, and the overall effectiveness of asset management strategies.

8.1 Asset Information Management Strategy

As the City's asset management programs continue to evolve, the development of an Asset Information Management Strategy (AIMS) has been identified as a critical initiative to enhance asset data management and support long-term planning. AIMS provides a structured framework for identifying asset-specific data needs and establishing a roadmap to achieve asset data objectives through 2025 and beyond. This strategy is essential in meeting the regulatory requirements outlined in Ontario Regulation 588/17.

Initially developed in early 2021, AIMS has since been further refined through the Service Area AMP to ensure alignment with the City's overarching asset management goals.

Designed as a high-level guiding document, AIMS sets the vision for asset data management while also assessing the City's current data and system capabilities. Its primary objective is to enhance the maturity of asset information management processes, thereby strengthening broader asset management practices.

Advancing Asset Management Through Decision Support

The City of Brampton is committed to the continuous improvement and adoption of best practices in Asset Management (AM) planning and investment, with a strong emphasis on transparency, accountability, and reducing the lag between information gathering and decision-making. As the City's asset management framework continues to mature, it is enabling more comprehensive, evidence-based, and principled decision-making regarding lifecycle investment in municipal assets. These advancements directly support the reliable and sustainable delivery of services to Brampton's residents and businesses.

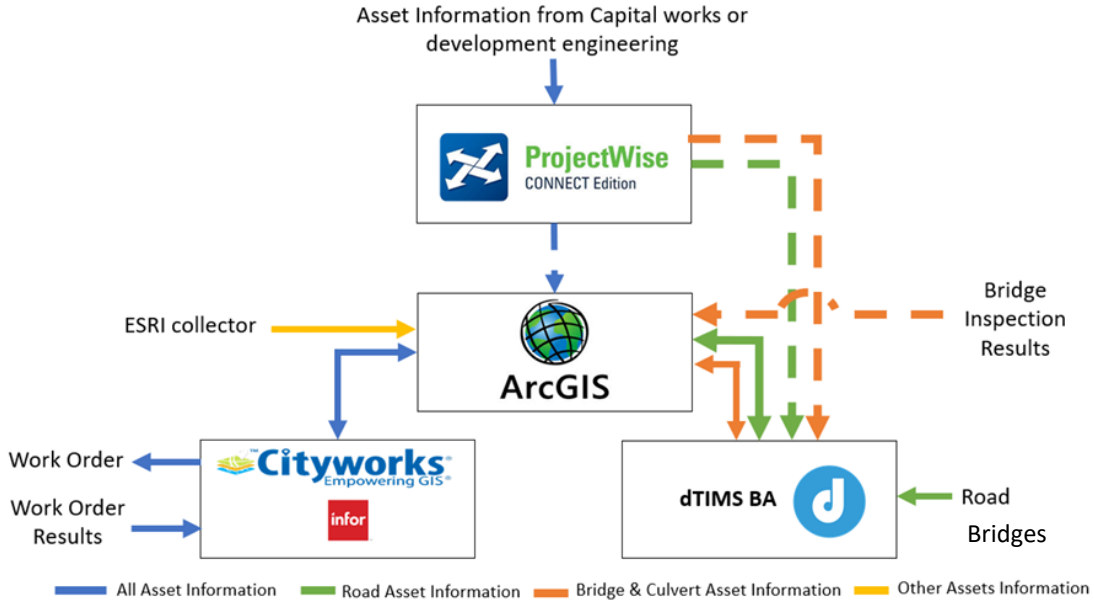
To further strengthen its asset management capabilities, the City is assessing the feasibility and strategic direction for implementing a Decision Support Solution (DSS). The intent is to explore how such a system could enhance asset planning and investment decisions by providing a centralized, systematic, and holistic platform for integrating data, analytics, and decision workflows across departments.

The implementation of a DSS is intended to support evidence-based decision-making for lifecycle asset spending, enabling the City to optimize investments, enhance service delivery, and ensure long-term value for the community.

8.2 Information Management Support Tools

To support the management of the City's Transportation assets, the City uses several databases and software tools. The Asset Information Ecosystem which relates to the Transportation Assets is shown in Figure 8-1.

Figure 8-1: Asset Information Ecosystem



- **ProjectWise:** ProjectWise serves as the central digital repository for original construction documents, including specifications and design/as-built drawings, from which all SOLI asset information is developed. After project completion, data is stored in its native file format and manually transferred to relevant asset management tools, such as GIS, dTIMS BA, or CityWorks. The system is currently limited by licensing restrictions, requiring asset information to be duplicated in SharePoint for broader access, while the migration of Transportation Assets continues.

- **Esri (ArcGIS)**: Esri ArcGIS is the primary Geospatial Information System (GIS) database for the City's Transportation assets, holding detailed information on linear and vertical assets such as roads, structures, walkways, and traffic elements. This system is linked to other asset management tools like dTIMS BA and CityWorks, with additional data (e.g., traffic signal subcomponents) to be added in the future. The ArcGIS Collector app is used for field inspections, though it is currently limited to certain asset types.

- **dTIMS BA:** dTIMS BA is utilized for analyzing road and bridge asset data to optimize rehabilitation programs. It integrates with Esri GIS to manage asset features and work history, facilitating easy transfer of data between the systems. A risk-based life-cycle cost optimization tool is in development to further support decision-making for bridge and pavement assets' lifecycle management strategies.

- **Cityworks:** Cityworks is the primary work management system for most Transportation Assets,

including structures (except bridges and culverts), traffic elements, and walkways. It handles maintenance scheduling, inspections, and service requests, both for in-house and external teams. Cityworks enables digital work order management, which improves efficiency and accuracy, while Esri GIS serves as the central database for asset information.

- **Other:** In addition to the primary systems, asset information is also stored in legacy systems such as Infor, Excel spreadsheets, and SharePoint. Infor is being replaced by Cityworks, while SharePoint continues to be used for document management and cloud storage. Migration from these legacy systems to more integrated asset management tools is ongoing to streamline information management processes.

8.3 Asset Information Management Strategy Framework

The AIMS framework has been developed to support City staff in planning and monitoring action items aimed at enhancing the maturity of asset information and improving confidence in decision-making. To facilitate this process, an internal tracking tool, the AIMS Tracker, has been introduced. This tool monitors the progress of key AIMS objectives across each of the City divisions, including the Transportation Service Area.

The AIMS framework considers specific asset management tools that are essential for informing the City's asset decision-making processes. Its primary goal is to advance the City's asset-related data management practices by promoting the adoption of baseline data standards in the critical areas outlined in Table 8-1 below.

Table 8-1: AIMS Framework (Transportation)

Information Categories	Roadmap Strategy Plans	Status	Next Steps
Holistic Review (HR)	**HR 1.1** Active Holistic Review of Business Requirements.	In Progress	CAMO, IT, and the Transportation have reviewed business needs and arrived at a general understanding of requirements to improve and mature AMIS deployment and other AM tools/processes as outlined in this roadmap.
Data Management (DM)	**DM 1.1** Formalize asset data governance including interdependent assets.	Completed	Extend the established data stewardship practices to encompass all aspects of operations.
	DM 1.2 Mature processes and continue implementing tools for data collection and management, including data migration into City systems upon acquisition or capital construction phase.	In Progress	Develop and implement a comprehensive data management strategy specifically tailored for transportation assets. This includes benchmarking other municipalities, and establishing protocols for data collection, storage, and maintenance. Lack of automation between systems,

Information Categories	Roadmap Strategy Plans	Status	Next Steps
			particularly for GIS and other asset management tools, needs to be addressed through improved data standards and business processes.
State of Local Infrastructure (SOLI)	**SOI 1.1** Improve on inventory data and attributes.	In Progress	Routinely assess whether the useful life extension applied in this AM plan can continue to be used effectively. Gaps which exist in asset information accuracy, such as missing in-service dates and work management activities for some structures and sidewalks, requiring an audit and correction program.
	SOI 1.2 Identify asset classes that require tracking outside of the existing core infrastructure management solutions.	In Progress	Enhance records to capture and analyze lifecycle data, enabling better integration of energy consumption into lifecycle decision-making.
Levels of Service	**LOS 1.1** Review how existing LOS measures are	In Progress	Expand performance metrics and

Information Categories	Roadmap Strategy Plans	Status	Next Steps
(LOS)	tracked and improve tracking by identifying attributes required to quantify and work on collecting the data.		targets considering asset functionality, reliability, and usage patterns.
	LOS 1.2 Collaborate with Corporate Performance group and Transportation Service area on tracking performance for current LOS. Link selected LOS to dashboards. Develop dashboard update for City assets first for regulatory compliance.	Not started	Implement a structured approach for collecting, analyzing, and reporting LOS data for inclusion in the City's dashboard.
	LOS 1.3 Associate current cost to provide major LOS and develop the linkage to lifecycle strategy for selected assets, start including refined information on O&M costs collected through CityWorks solutions as attributed to specific LOS. Timeline to align with the CAMO roadmap for Transportation AMPs.	In Progress	Conduct a comprehensive analysis of direct and indirect costs of maintaining LOS using data captured within City Works.
Lifecycle Strategies (LC)	**LC 1.1** Define lifecycle activities to be tracked in alignment with Corporate Lifecycle activities framework.	In Progress	Analyze lifecycle prediction data to better forecast maintenance and replacement needs, optimize resources, and minimize asset downtime.

Information Categories	Roadmap Strategy Plans	Status	Next Steps
	LC 1.2 Develop and refine systems, tools, and processes to enable all asset lifecycle information to be captured and available for analysis by Transportation SMEs for lifecycle strategy development and refinement.	In Progress	Expand the use of advanced technologies and further enhancements to work management software.
	LC 1.3 Review how to integrate risk factors into lifecycle strategies. .	In Progress	Utilize standardized risk assessment criteria in the asset management plan to evaluate asset criticality and inform risk mitigation strategies. Integrate these assessments into decision-making processes to proactively reduce operational disruptions.
Lifecycle Financing Strategies (FS)	**FS 1.1** Develop procedures and frequency to update asset replacement values and integrate them within the asset inventory management systems including unit cost and reference to the source of the information.	Completed	Routinely update CRV using supplier-provided values through RFQ deliverables.
	FS 1.2 Develop requirements and explore the use of	In Progress	Assess the capability of dTims to link to

Information Categories	Roadmap Strategy Plans	Status	Next Steps
	current systems for decision support.		a broader DSS for informed financial decision-making.
	FS 1.3 Develop a lifecycle cost model to capture all lifecycle activities (non-infrastructure solutions, operation/maintenance, renewal, replacement, disposal, and expansion) leveraging information contained in CityWorks and other systems.	In Progress	Enhance the existing lifecycle cost model developed for this AM Plan to routinely capture and report all relevant lifecycle activities.

It is recommended that the Transportation Service Area formally integrate outputs and recommendations from the DSS initiative into its financial planning and budget development processes. As the DSS provides evidence-based insights into asset condition, risk, lifecycle costs, and level of service performance, its integration will allow for more strategic, transparent, and defensible allocation of capital and operating resources.

Communication

9. Communication

This AM Plan is intended to support stakeholders, including City employees, City Council, and the community, by educating, informing, and engaging them on all facets of the City's transportation asset management program. This AM Plan aims to provide stakeholders with timely, accurate, and comparable information regarding the City's transportation assets to facilitate decision-making on a service area basis.

In alignment with the Corporate AM Plan, a strategically planned communication approach will help support both this plan and the City's overall asset management program by ensuring stakeholders are informed of the necessity and objectives of asset management. It also provides opportunities for stakeholders to actively engage, collaborate, and contribute to the program, ensuring they are equipped with the tools and information necessary to meet asset management requirements.

The Service Area AMP outlines a proposed Communications Strategy (CS), designed to provide an integrated approach to clear, accurate, and timely communication with stakeholders, thus fostering awareness and potential engagement with key asset management messages. This Transportation AM Plan aligns with the communications strategy detailed in the Service Area AMP. The CS serves to ensure that:

- Communication strategies are integrated within the City's asset management program;
- Information is accessible, relevant, timely, and accurate;
- Key public documents, such as SOLI reports and Service Area AMPs, are communicated using the appropriate methods for each target audience;
- Stakeholder contributions are consistently acknowledged;
- Public engagement meets the requirements set out in O Reg 588/17.

9.1 Stakeholder Engagement

City Corporate Asset Management Office (CAMO) Communications and Stakeholder Engagement

Through the development of the 2024 SA AM Plan, the City of Brampton has significantly enhanced its communication channels and engagement strategies to ensure that key stakeholders—both internal and external—are effectively involved and informed throughout the asset management lifecycle. These efforts have supported greater transparency, stronger cross-departmental collaboration, and more inclusive decision-making processes.

To support this, the City established:

- An Advisory Committee (Steering Committee), comprising representatives from the Corporate Asset Management Office (CAMO) and senior leadership. This committee provides oversight to the entire asset management program, ensuring quality, consistency, and alignment with corporate objectives, while maintaining accountability in reporting results to the public.
- A series of Focus Groups (Working Groups), made up of CAMO staff and subject matter experts from individual service areas including Transportation. These groups contribute critical data, knowledge, and operational insights, forming the technical foundation of the asset management plans. To build capacity within these working groups, CAMO also leads training and capacity-building sessions, offering guidance on asset management principles, legislative requirements, and the specific data inputs required from each service area.
- One-on-one meetings with working group participants to facilitate deeper discussions around data quality, review results, and support decision-making throughout the planning process. These targeted sessions foster greater clarity and alignment while promoting a more hands-on and informed approach to asset planning.
- Regular updates and reports to Council and the public. These updates include summaries of asset performance, levels of service analysis, and long-term financial forecasts derived from the AMP process. Additionally, public meetings and workshops are organized to communicate the key concepts of asset management planning, present recent findings, and outline next steps, particularly in support of meeting provincial and legislative requirements.
- A range of online platforms, including the corporate website, social media channels, and media relations, to disseminate information and make asset management content publicly accessible. To further engage the community, surveys and public feedback mechanisms are employed to collect resident input on topics such as asset condition, desired levels of service, and perceived infrastructure priorities.

Table 9-1 is a generalized list of the external and internal groups that have some level of interest and/or influence in the development and outcomes of the asset management program, as well as the applicable key tools for engagement.

Table 9-1: Key Stakeholders

Stakeholder Group	Key Engagement Tools
City Council	• Regular Updates & Reports • Public Meetings & Workshops
Corporate Asset Management Office (CAMO)	• Advisory Committee • Focus Groups • Training Sessions / Capacity Building Sessions • One-on-One Meetings • Regular Updates & Reports • Public Meetings & Workshops
City Staff *(Including Service Area SMEs and CLT)*	• Advisory Committee • Focus Groups • Training Sessions / Capacity Building Sessions • One-on-One Meetings • Regular Updates & Reports • Public Meetings & Workshops
Upper Levels of Government	• Regular Updates & Reports
Taxpayers	• Online Platforms • Surveys & Feedback Mechanisms

Together, these communication tools form a comprehensive engagement framework that supports informed participation, strengthens interdepartmental collaboration, and builds public confidence in the City's approach to asset management planning and investment.

Transportation Service Area Communications and Stakeholder Engagement

The City of Brampton's Transportation team implements comprehensive engagement plans and strategies to ensure effective communication and collaboration with stakeholders, including the public, City Council, and other relevant parties. These strategies are designed to facilitate informed decision-making and foster transparency in transportation planning and management.

- Public Surveys: To gather input and feedback from the community, the City conducts public surveys. These surveys are used to assess public opinion on transportation-related issues, such as road improvements, traffic management, and public transit services. The results help shape policy development, identify community priorities, and ensure that transportation projects meet the needs of the residents.

- Council Communications: Regular communication with City Council is a key component of the engagement strategy. The Transportation team ensures that Council members are informed about ongoing projects, upcoming initiatives, and issues requiring attention. This communication is critical for obtaining Council approval and support for transportation projects and initiatives. The team often provides detailed reports, presentations, and updates to facilitate decision-making by Council.
- Public Consultation/Hearings: Public consultations are held to involve residents in key decisions related to transportation infrastructure, planning, and services. These consultations provide a platform for community members to voice their opinions, ask questions, and offer suggestions about proposed projects, policies, or changes to existing systems. The Transportation team actively seeks public input through these consultations to ensure that the transportation needs and concerns of the community are addressed.

Together, these engagement methods contribute to a well-rounded approach to stakeholder involvement, ensuring that transportation decisions reflect the needs and interests of the broader community while maintaining alignment with the City's goals and regulatory requirements.

Lifecycle Strategy

10. Lifecycle Management

To achieve its program objectives, the City builds new infrastructure assets to meet growth needs and manages existing assets to meet reliability needs – all with limited funds. Asset lifecycle management strategies are planned actions that enable assets to provide the defined levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost. Asset lifecycle management strategies are typically organized into the following categories:

1. **Non-Infrastructure Solutions**
   Non-infrastructure solutions refer to actions or policies that can lower costs or extend asset life but is not directly related to work on the asset itself. The City currently undertakes various types of non-infrastructure solutions on an ongoing basis, which includes initiatives like integrated infrastructure planning and co-ordination with other levels of government, demand management through the growth-planning process or continual improvements to City processes to achieve cost efficiencies.

2. **Operations & Maintenance (O&M)**
   These activities refer to servicing assets on a regular basis in order to fully realize the original service potential of the assets. Operations and maintenance typically will not extend the life of an asset or add to its value, however, not performing regular maintenance may reduce an asset's useful life and/or levels of service. O&M therefore ensures the asset continues to deliver defined levels of services.

   - Operations include day-to-day activities such as system monitoring, inspections, cleaning, and minor adjustments that ensure service delivery.

   - Maintenance involves scheduled (preventative) and unscheduled (corrective) tasks to address

wear and tear, minor repairs, and functional upkeep to prevent premature deterioration and prolong asset life.

3. **Renewal & Rehabilitation**

   Renewal/rehabilitation activities are mostly associated to significant repairs designed to extend the life of an asset. These types of activities are typically undertaken at key points in the lifecycle of an asset to ensure the asset reaches or exceeds its designed useful life.

   - Renewal typically refers to activities that extend the service life of an asset, such as resurfacing a road or conducting repairs on bridges.
   - Rehabilitation may involve more intensive efforts to bring a deteriorated asset back to a functional state, often improving performance but not increasing capacity.

4. **Replacement**

   Replacement involves removing and substituting an asset or major asset component that has reached the end of its useful life or can no longer deliver the required level of service. This activity restores original capacity and functionality and typically involves capital investment. Examples include replacing a streetlight pole, or a culvert.

5. **Disposal/Removal**

   Disposal/removal activities are actions associated with removing and disposing of an asset once it has reached the end of its useful life or is otherwise no longer needed. Typically, most assets will have one-time associated disposal costs.

6. **Expansion/Upgrade**

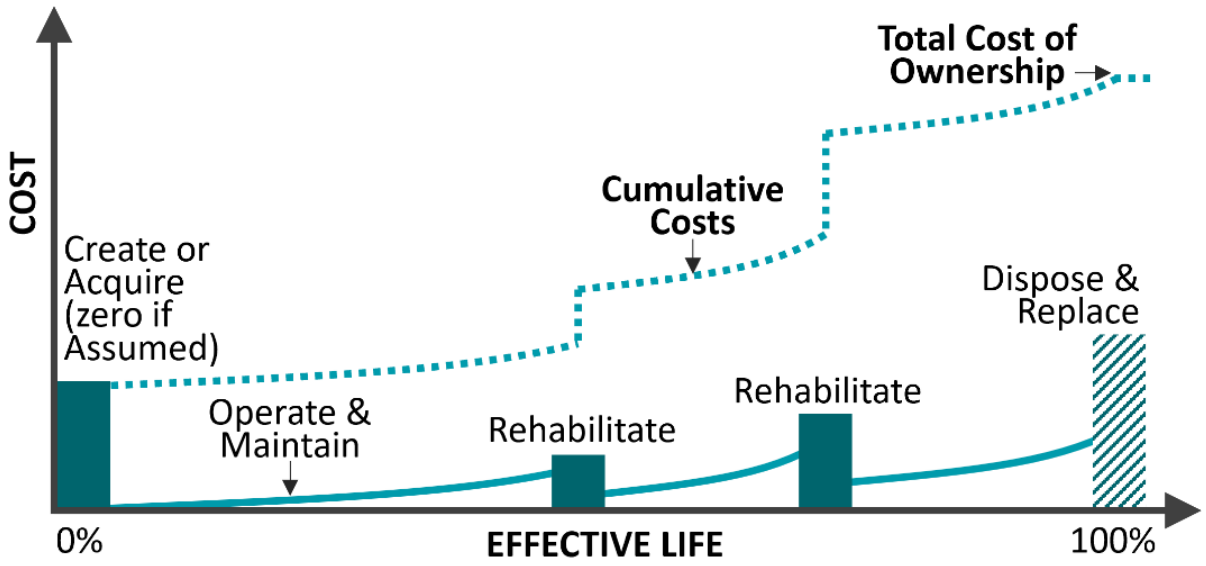
   These are planned activities to extend or expand municipal services to accommodate various demands (growth, legislative, environmental etc.). As development occurs, additional infrastructure is required to service new residents and businesses.

   - Expansion refers to adding new assets or extending infrastructure (e.g., new road lanes).
   - Upgrades enhance existing assets (e.g., converting lighting to LED, improving accessibility features, or increasing load capacity).

The City reviews the costs of potential lifecycle activities to determine the lowest lifecycle cost strategy while still meeting service levels. The total cost of ownership is the sum of lifecycle activity costs to sustain an asset over its lifecycle. (See Figure 10-1 for a conceptual lifecycle cost model). Sufficient investment of the right type of asset intervention, at the right time, minimizes the total cost of ownership for each asset and mitigates other potential risks such as interruption to service delivery or failure that

could cause damage to other nearby infrastructure. Operations, maintenance, and renewal activities are timed to reduce the risk of service failure from deterioration in asset condition, and all contribute to the total cost of ownership.

Figure 10-1: Conceptual Lifecycle Cost Model



10.1 Lifecycle Activity and Cost Approach

10.1.1 Asset Expansion and Upgrade – Needs

The City of Brampton is Canada's 9th largest municipality with an estimated population of 725,000 and over 182,500 occupied households. Based on the data provided in the 2025 Brampton Mobility Plan, the City of Brampton has projected significant growth in both residential dwellings and population over the coming years. The forecast, in line with the 2051 Peel Region Land Needs Study forecast, estimates that the City of Brampton is expected to increase their total population of residents by over 150,000 people and 50,000 dwellings over the next ten years.

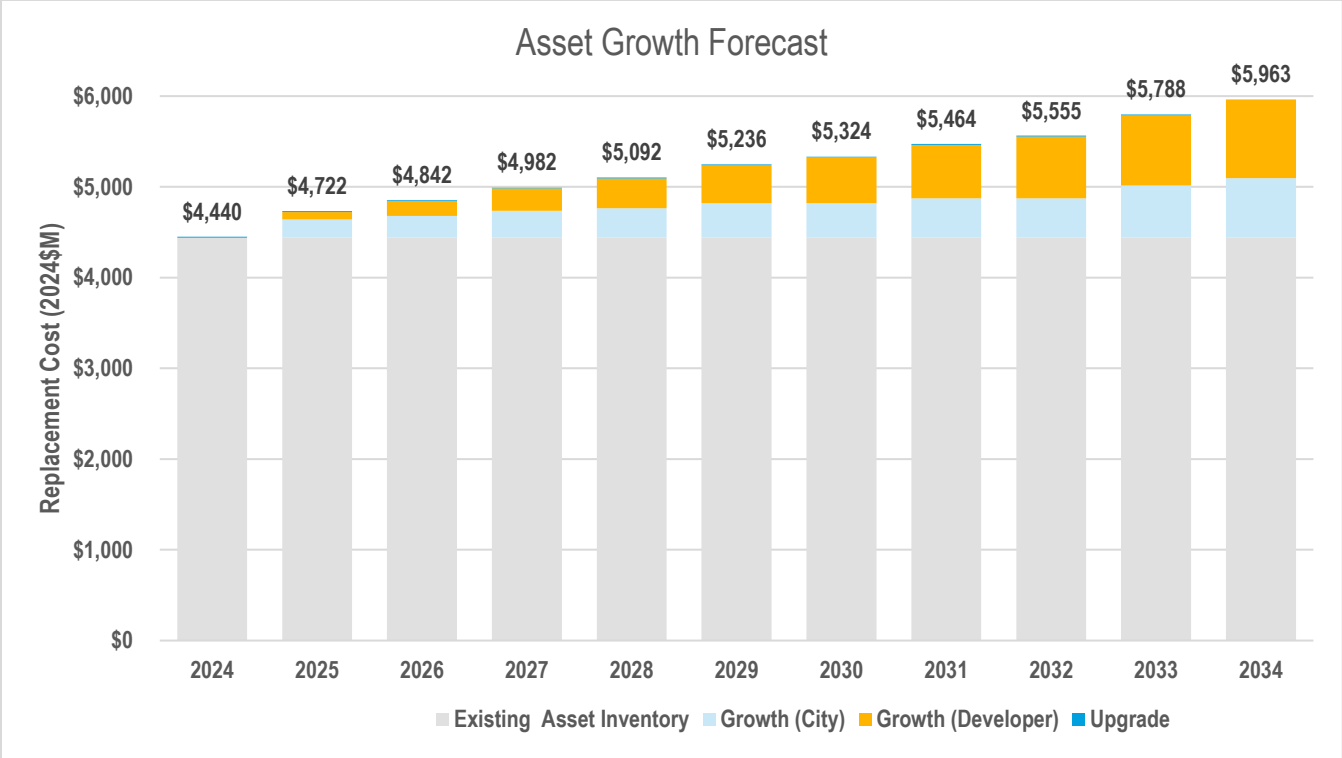
Growth requirements for transportation assets were determined using a multi-faceted approach to ensure alignment with the City's development trajectory and infrastructure needs.

First, ***Growth (Developers)*** was calculated based on an assumed annual growth rate of 1.8% for each asset class, in alignment with projections provided by the City's Finance team. This approach reflects the anticipated increase in demand and service coverage requirements associated with ongoing population and development growth across Brampton.

Second, ***Growth (City)*** was informed by the Brampton Mobility Plan, specifically identifying future transportation assets required to support planned urban expansion. These future infrastructure assets are expected to be funded by developers through development charges or other growth-related funding mechanisms. This ensures that growth-related infrastructure investments are both strategically aligned with City plans and financially sustainable, while also supporting the broader objectives of accommodating population and employment targets outlined in regional growth forecasts.

The growth forecast for the City's transportation assets is presented as the red line in Figure 10-2 below. The City has several projects planned over the next 10 years that benefit both existing customers as well as future development.

Figure 10-2: City Transportation Expansion and Upgrade Forecast



Based on the figure above, the City is anticipating its overall transportation asset portfolio to grow by approximately $152 million dollars per year over the next 10 years. Planning for these future growth assets is essential to ensure that the City's infrastructure can accommodate anticipated increases in population, development, and service demands effectively. It is important to note that under the BMP, projects are scheduled across three planning horizons—2031, 2041, and 2051. Expansion needs were predominantly focused on initiatives identified for the 2031 horizon, with some early progress on projects planned for 2041.

It is important to note that growth-related infrastructure needs are currently fully funded through development charges and other growth-related funding mechanisms, ensuring that capital expansion to support new development is appropriately resourced. However, while the initial capital costs of growth are covered, however the ongoing operations and maintenance (O&M) costs associated with these new assets are not captured within the development charge framework.

As a result, these O&M requirements will contribute to the City's future infrastructure funding gap, particularly as the asset base continues to expand. This underscores the importance of long-term financial planning to ensure that the City can sustainably operate and maintain its growing infrastructure portfolio without compromising service levels or asset performance.

10.2 Operations and Maintenance – Needs

While the City continues to make strategic investments in infrastructure, it is recognized that operating needs are not always prioritized to the same extent as capital investments. To address this gap, operating needs in this Asset Management Plan were projected using a comprehensive approach that considered both current service delivery requirements and anticipated future demands. This ensures that operational capacity—such as staffing, maintenance resources, and service-level expectations—are aligned with the growth and complexity of the City's infrastructure portfolio.

Operating needs were projected using a comprehensive approach that considered both current and future demands. This includes:

- **Delineation of Baseline Operating Budget:** The baseline operating budget (capital works and road maintenance and fleet operations) was analyzed to identify existing transportation expenditure. This step provided a clear understanding of current financial commitments and resource allocation.

- **Incorporation of Growth Factors:** Aligning operating budget forecasts with anticipated growth (as determined by the growth needs) ensures that resources will be available to deliver services and maintain and service an expanding portfolio of assets effectively.

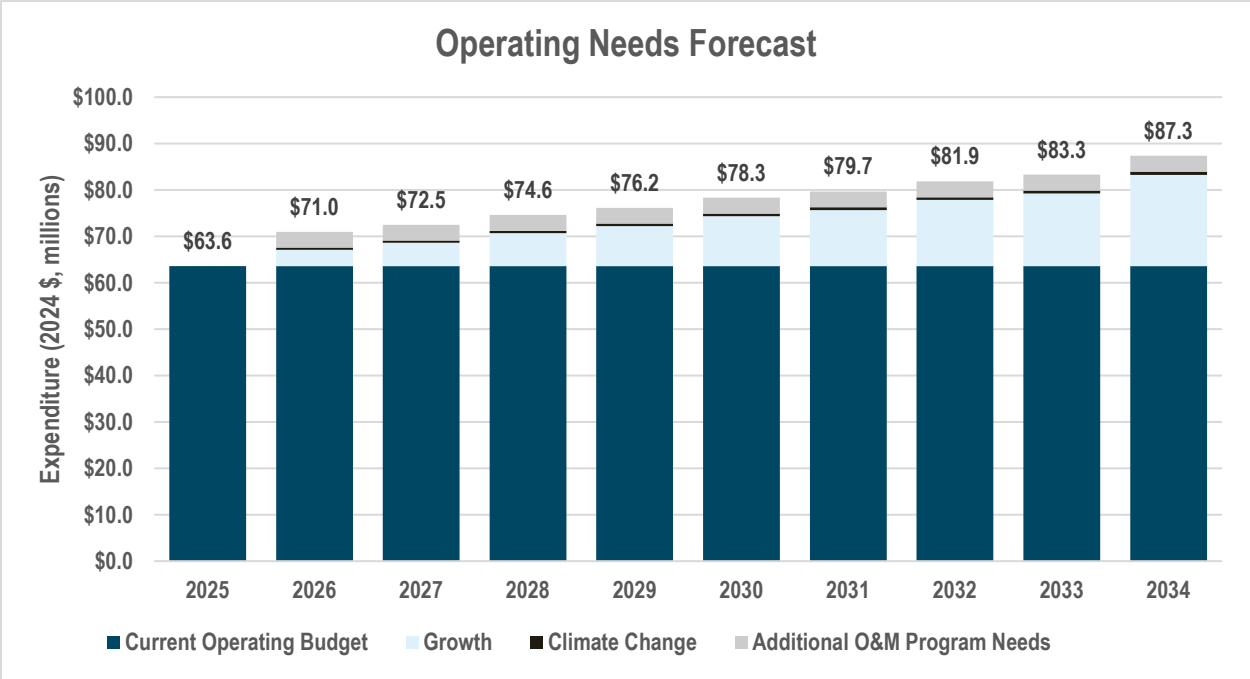
- **Incorporation of Climate Change Factors:** Recognizing the impacts of climate change, additional resources (as determined within the climate change integration section) were allocated to enhance resilience measures.

- **Incorporation of Additional Identified O&M Needs:** The increase in additional operating needs is driven by two key factors. First, the expansion of bike lanes has introduced additional requirements for Winter Control and Street Sweeping, resulting in a 10% increase in associated maintenance efforts. Ensuring these lanes remain safe and accessible year-round necessitates

enhanced operational activities, including snow clearing and debris removal. Second, the expansion of walkways and pathways to a 1.8m width has similarly increased the operating demands by 10%. This broader infrastructure footprint requires additional resources for surface maintenance, cleaning, and general upkeep to maintain accessibility and service levels.

Figure 10-3 shows the forecast operations and maintenance costs for the next 10 years.

Figure 10-3: Operating Needs Forecast



The figure shows that the operational needs are expected to increase from $63.6 million/year in 2025 to $87.3 million/year in 2034. All figure values are shown in 2024$ (including historical operating amounts). The estimate of operations and maintenance cost increases can be refined by conducting more detailed analysis of operating costs by asset sub-types or by maintenance activity.

For the period 2025-2034, the annual operating and maintenance costs are expected to be an average of **$76.8 million/year.**

10.3 Asset Renewal, Rehabilitation and Replacement – Needs

Renewal, rehabilitation and replacement efforts enable the City to meet its quality and reliability service levels. Over time, as the City refines the asset management strategies through tracking of actual condition, costs, and benefits of the strategies, the City will improve its understanding of the deterioration rates and the lowest lifecycle cost for each asset type. Where appropriate, the City considers coordinating multiple activities across asset areas through project bundling to reduce total costs.

Rehabilitation activities extend the life of an asset and reduce its risk of failure. These activities and associated benefits are deemed more cost effective than allowing the asset to reach its end of life.

At a certain point in an asset's lifecycle, it is no longer cost-effective to rehabilitate the asset, and replacement is required. The City has identified estimated service lives for each of its assets. These replacement intervals are developed to minimize lifecycle costs while considering service levels and the associated risk. The renewal forecast considers the asset's current condition or age, the planned rehabilitation and replacement activities.

The City's strategies are summarized in Table 10-1. Over time, as the City refines the asset management strategies through tracking of actual condition and the actual costs and benefits (extension of asset life) of rehabilitations, the City will improve its understanding of the lowest lifecycle cost for each asset type. The affordability of the service levels and associated lifecycle activities are discussed in the Financing Strategy section of this Plan.

Table 10-1: Asset Renewal, Rehabilitation and Replacement Lifecycle Strategies

Asset Category		Estimated Replacement Frequency (Years)	# of rehabs in lifecycle	Rehab Cost (Estimated as % of Replacement Value)	Rehabilitation Activity
Roadway Network (including bike lanes)	Arterial Roads	75*	4	Based on 2023 SOLI Costing†	Road resurfacing
	Collector Roads	80*	3		Road resurfacing
	Local Roads	90*	3		Road resurfacing

* While the City's assigns road, bridge and culverts a nominal replacement life for the purposes of valuation and lifecycle analysis, it is important to note that roads are rarely, if ever, replaced in full at the end of their expected service life. Instead, roads these are managed through a rigorous treatments and interventions that extend their useful life and long-term viability

† 2023 SOLI costing provides detailed cost area based on parameters such as length or area to perform rehabilitation activities broken down in detail by resurfacing, paved shoulder, kill strip costs etc.

Asset Category		Estimated Replacement Frequency (Years)	# of rehabs in lifecycle	Rehab Cost (Estimated as % of Replacement Value)	Rehabilitation Activity
	Traffic Calming	80	4	30%	Road resurfacing
Structures	Roadway Bridge	75*	2	30%	Minor and major refurbishments
	Pedestrian Bridge	50*	1	20%	
	Culvert	25	2	20%	
Structures - Other	Gateway Features	50			
	Noise Walls	25			
	Retaining Walls	30			
	Fences	20			
	Guiderails	25			
	Handrails	25			
	Steps	25	1	30%	Minor refurbishment 15 years
Walkways & Paths	Sidewalks	80			
	Walkways	30			
	Multi-Use Paths	20			
	Street Lighting	37	1	5%	Major refurbishment of brackets at 20 years.
	Traffic Signals	25	1	30%	
Traffic	Traffic Signal Components (PXOs, Flashing Units, Beacons etc.)	25			
	Traffic Signs	-			Adjusts made as part of maintenance

While the City's assigns road, bridge and culverts a nominal replacement life for the purposes of valuation and lifecycle analysis, it is important to note that roads are rarely, if ever, replaced in full at the end of their expected service life. Instead, roads these are managed through rigorous treatments and interventions that extend their useful life and long-term viability.

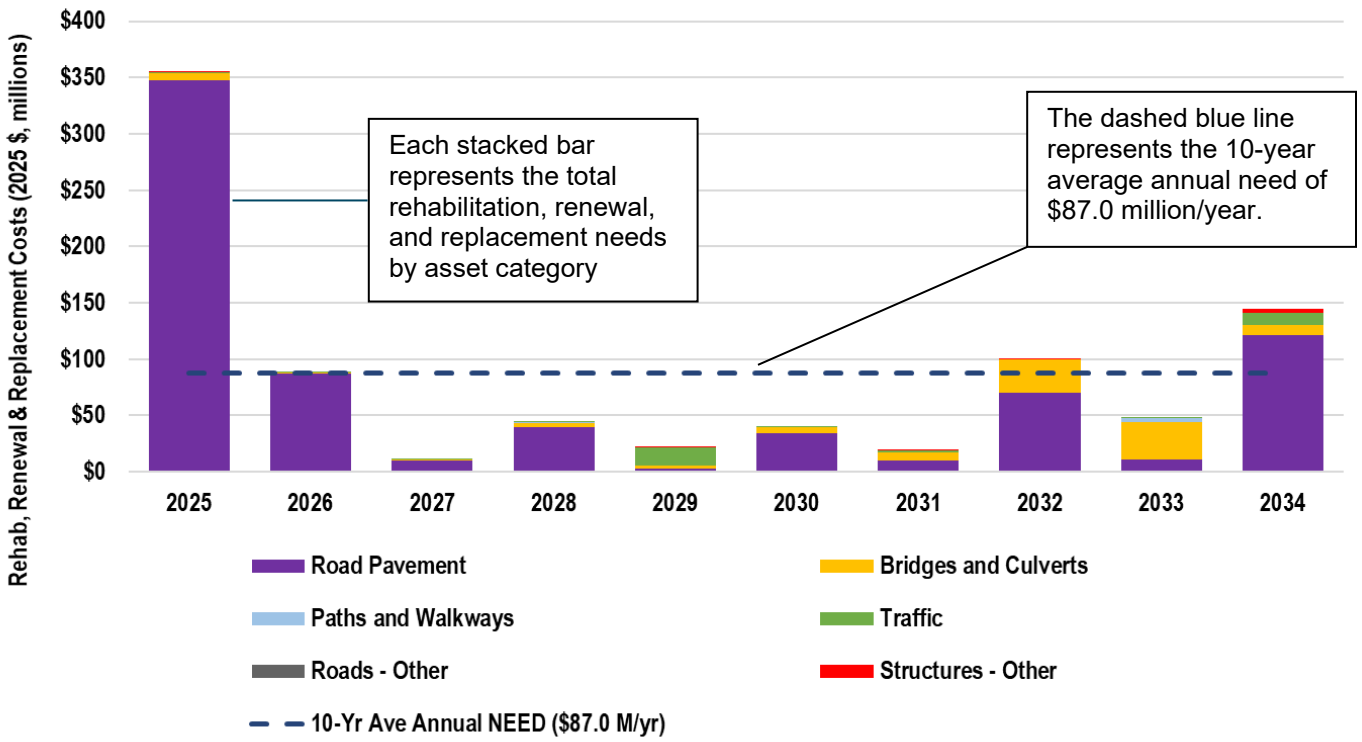
This means that needs were not identified based on a full replacement of the roads, bridges, and culverts at the end of its estimated lifespan. Rather, needs were determined by modeling a series of renewal and rehabilitation treatments that reflect how roads are actually maintained in practice—such as resurfacing, mill-

and-pave, crack sealing, and other preservation strategies. These treatments are strategically timed based on condition assessments, deterioration rates, and risk profiles, ensuring the road and bridge network remains in a state of good repair while minimizing total lifecycle costs.

This approach aligns with best practices in asset management and more accurately reflects how municipalities plan and budget for road infrastructure renewal.

Figure 10-4 shows the rehabilitation, renewal and replacement activities that would be required to maintain the Levels of Service. Needs outlined by asset class are provided within the *"Asset Class Summary Reports"* within the appendices.

Figure 10-4: 10-Year Capital Renewal, Rehabilitation and Replacement Needs Forecast – Maintain LOS

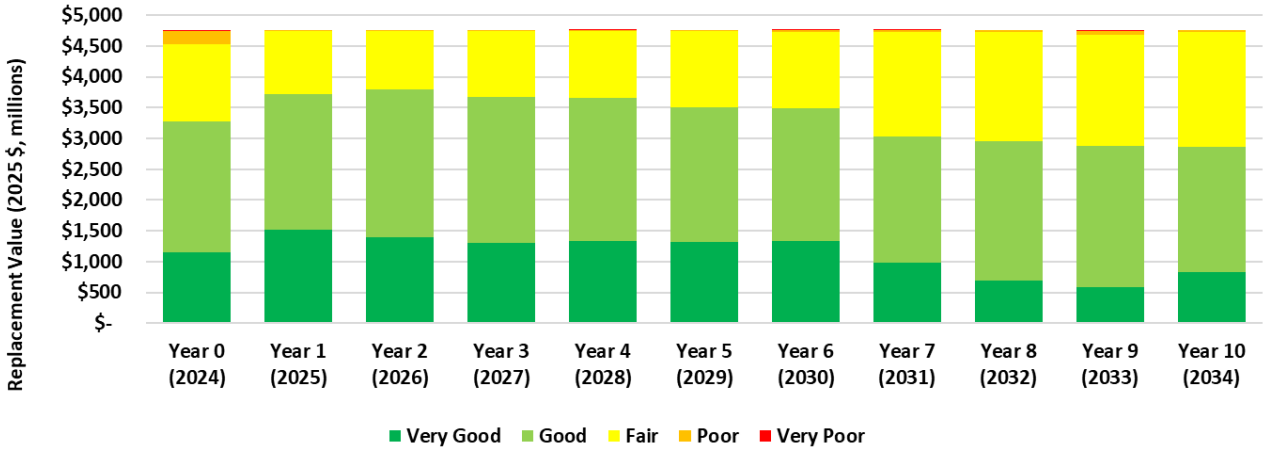


As seen above, the dominant cost driver in almost every year is road pavement needs, especially in 2025 and 2034. *Unlike other assets that may be fully replaced at the end of their service life, road, bridges and culvert assets are rarely reconstructed in full. Instead, they undergo a series of cyclical treatments and interventions—such as resurfacing, mill-and-pave, and localized repairs—that extend their lifespan and preserve serviceability. As such, roads are not assessed for full replacement in lifecycle models.*

There is a notable spike in 2025, where total needs approach $350 million. This spike is largely attributed to deferred renewal activities for road pavement that have accumulated and are modeled to occur in that year based on risk and lifecycle analysis.

Figure 10-5 below shows the forecast condition distribution associated with the spending level in Figure 10-4 (Maintaining Current LOS Scenario). The City is projected to maintain its service level of assets in very poor condition (infrastructure backlog) if the renewal needs are fulfilled.

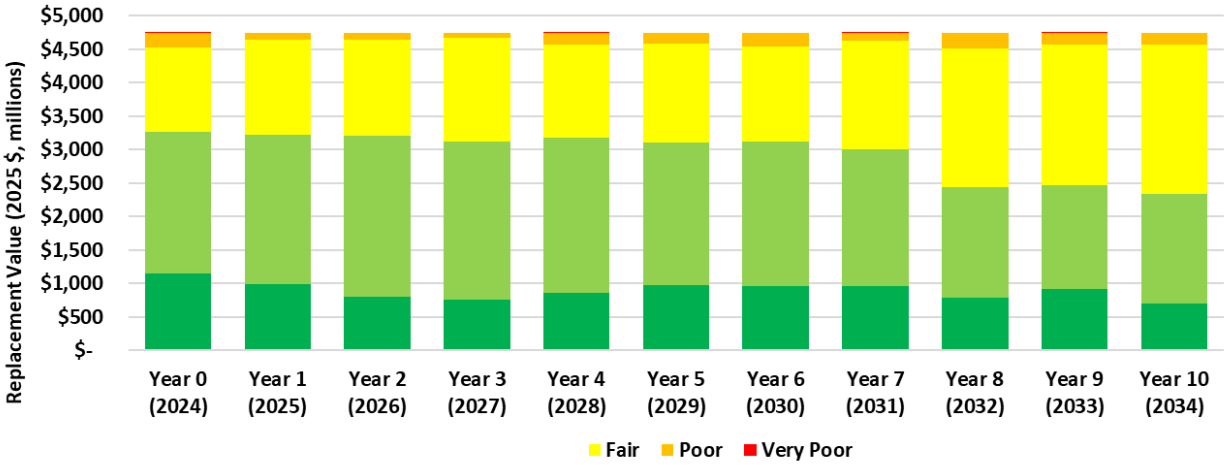
Figure 10-5: Condition Forecast – Maintain LOS



The current **average annual funding to support renewal, rehabilitation and replacement activities is $59.8 million dollars,** which is in line with the projected budget amounts.

Figure 10-7 below shows the forecast condition distribution associated with the current spending level. Depending on the asset type and failure context, an asset failure may result in various negative impacts, such as service disruptions, injuries to employees and the public, or reputational harm to the organization.

Figure 10-7: Condition Forecast – Projected Funding

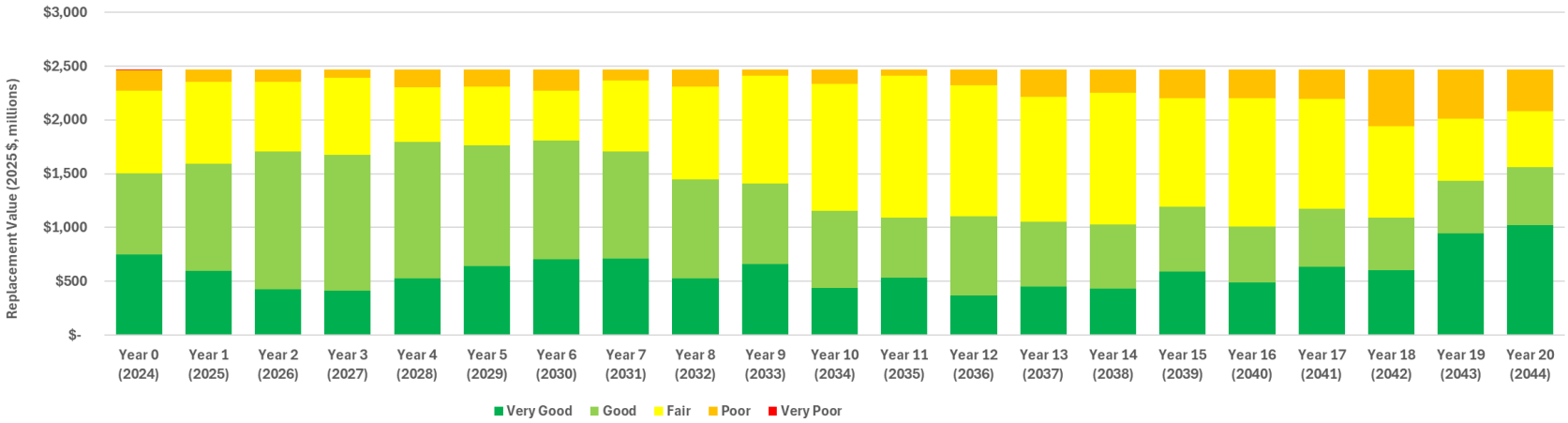


To support long-term decision-making and demonstrate the relationship between investment levels and asset condition, a 20-year forecast of road pavement condition has been developed. This forecast models the expected condition of the road network over time based on current funding levels and assumed deterioration rates.

The 20-year forecast for pavement renewal (as seen in Figure 10-8) presented in this AMP reflects a funding-constrained scenario in which the City is not able to achieve the desired levels of service for roads currently rated in poor and very poor condition. As a result, these assets will remain below target thresholds over the forecast period. Rehabilitation activities for many segments have been deferred to future years, which will lead to further deterioration before a treatment is performed to reset the asset back to very good condition. Furthermore, the forecast does not include renewal needs for growth-related roadways that will be added to the network over the next 20 years. This exclusion may contribute to a compounding infrastructure gap in future plan updates as these new assets approach the end of their useful lives.

The analysis helps reinforce the importance of proactive asset management and lifecycle investment strategies. It provides a visual and data-driven foundation for evaluating funding options, communicating with stakeholders, and guiding the development of fiscally sustainable road maintenance programs.

Figure 10-8: Pavement Condition Forecast – Projected Funding



Based on the appropriateness assessment completed by the service area staff, no enhanced service levels have been defined at this time. The evaluation considered multiple factors including resource availability, regulatory requirements, community expectations, and long-term affordability. It was determined that the current focus should remain on preserving existing service levels rather than expanding or upgrading them. As such, all state of good repair measures outlined in this AMP are intended to at minimum sustain the current levels of service over the planning horizon.

10.4 Non-Infrastructure Solutions

Non-infrastructure solutions are a critical component of Brampton's transportation strategy, enabling the City to manage demand, improve system efficiency, and promote safer, more sustainable travel without expanding physical infrastructure. These solutions help extend the service life of existing roadways, reduce lifecycle costs, and support the City's long-term mobility objectives.

Key non-infrastructure strategies include:

- **Transportation Demand Management (TDM):** TDM initiatives aim to influence travel choices by encouraging shifts from single-occupancy vehicle use to active modes such as walking and cycling. Examples include commuter challenges, school travel planning, and employer-led programs that promote carpooling or flexible work hours.

- **Traffic Operations and Signal Optimization:** Enhancements to signal timing plans, coordinated signal systems, and implementation of adaptive signal control technologies can improve traffic flow and reduce congestion. These low-cost operational strategies help delay or avoid the need for capital-intensive road widenings.

- **Policy and Regulatory Tools:** Through land-use planning, parking management policies, and the application of complete streets principles, the City supports more efficient use of existing road networks while promoting safer and more inclusive mobility for all users.

- **Behavioral Change and Public Education:** Campaigns focused on road safety, active travel encouragement, and driver awareness help shift behavior in ways that improve system outcomes without requiring new infrastructure. These programs are particularly effective when paired with enforcement initiatives.

- **Intelligent Transportation Systems (ITS):** The City is exploring and implementing ITS technologies such as traffic cameras, vehicle detection systems, and dynamic message signs. These tools enable real-time monitoring, incident management, and system optimization to improve reliability and reduce delays.

- **Interdepartmental and Regional Coordination:** The City continues to collaborate with internal departments and regional partners to align operations, share data, and coordinate mobility initiatives. This ensures more cohesive planning across the broader transportation network and reduces inefficiencies.

While these strategies are not tied to physical assets tracked in the asset register, they represent important components of the City's approach to transportation management. Performance is monitored through

indicators such as travel time reliability, safety outcomes, and user satisfaction, supporting continuous improvement across the network.

The City has identified a total of **$0.5 million per year** spent on non-infrastructure solution. It is important to note that some solutions such as policies are difficult to allocate costs towards and are not included in this total number.

10.5 Overall Lifecycle Needs

The investment needs associated with each lifecycle activity have been outlined in the preceding subsections of this chapter. The table below provides a consolidated summary of these investment needs, categorized by expansion and upgrade, operations and maintenance, renewal, rehabilitation and replacement, as well as non-infrastructure solutions.

Table 10-2: Average Annual Investment Requirements from 2025 to 2034 (In Millions)

Lifecycle Activity	Annual Investment Requirement ($M, 2025)
Expansion & Upgrade	$152.0
O&M	$77.0
Renewal, Rehab & Replacement	$87.0
Non-Infrastructure Solutions	$0.5M
Totals	**$317M**

Financing Strategy

11. Financing Strategy

In alignment with asset management best practices, this AM Plan has been developed to directly address the critical need for strategic and sustainable financial planning. Consistent with trends observed across municipalities within the province, the City's analysis highlights a disparity between current financial allocations and the projected capital investment needs required to maintain assets in a state of good repair over the next decade.

This section presents the forecasted funding requirements for the period 2025 to 2034, outlining the anticipated investment needed to support lifecycle activities such as renewal, rehabilitation, and replacement across key asset classes. In doing so, it provides a clear picture of the long-term financial commitments necessary to meet desired levels of service and manage infrastructure risk.

Furthermore, this section identifies key financial and operational strategies the City is pursuing to bridge the funding gap efficiently. These include enhancing asset data quality, improving cost forecasting methodologies, integrating risk-based prioritization into capital planning, and leveraging available funding tools and grant opportunities. Together, these strategies support the City’s commitment to responsible stewardship of public infrastructure and ensure that asset-related decisions are informed, transparent, and fiscally prudent.

The City is considered in a financially sustainable position if it:

- Provides an accepted level of service with willingness and ability to pay;
- Can adjust service levels in response to changes in economic conditions or transfer payments from other levels of government;
- Can adjust its implementation plans in response to changes in the rate of growth; and
- Has sufficient reserves and/or debt capacity to replace infrastructure when it needs to be replaced to keep its infrastructure in a state of good repair.

The key challenges to financial sustainability are:

- A discrepancy between level of service decisions and fiscal capacity;
- The future cost of infrastructure investments; and
- Unforeseen impacts to revenue.

As per O.Reg. 588/17, this section of the AM Plan identifies the annual funding projected to be available to undertake the planned lifecycle activities and discusses strategies to address potential funding shortfalls.

11.1 Lifecycle Activity Funding

11.1.1 Asset Expansion – Funding

In alignment with the City's financial planning principles and growth management strategy, it is assumed that all asset growth-related capital costs will be fully funded through developer contributions, primarily via Development Charges (DCs) and other applicable growth-related funding mechanisms.

This assumption ensures that the infrastructure required to support new growth is not a financial burden on existing taxpayers but rather funded by those directly contributing to growth through new development. This approach reflects the City's commitment to fiscal responsibility, cost recovery, and growth paying for growth, and is consistent with the legislative framework outlined in the *Development Charges Act*.

As a result, all projected costs associated with asset expansion or new assets required to accommodate population and employment growth are allocated to developer-funded sources in the City's asset management and capital planning models.

11.1.2 Asset Renewal, Rehabilitation and Replacement – Funding

Renewal rehabilitation and replacement funding requirements were established through a collaborative process with subject matter experts (SMEs) within the Transportation Service Area. This involved a detailed review of planned and historical capital projects to identify and isolate the renewal components within each project, broken down by asset class.

The City currently produces a 5-year capital plan, however O.Reg 588/17 requires a 10-year outlook of asset lifecycle needs to required funding. For this AM Plan, the 5-year amounts of the Capital Plan were averaged and applied for the remaining years as the estimated funding amounts. These values are provided in Table 11-1 below.

Table 11-1: Renewal, Rehabilitation and Replacement Funding by Asset Class (In Millions)

Asset Class Service Area	Renewal, Rehabilitation & Replacement Program (M$)
	Ave. 5-Yr
Roadways	$46.41
Structures	$10.60
Walkways	$0.51
Traffic Services	$2.25
Totals	**$59.8**

11.1.3 Operations and Maintenance – Funding

The City's 2025 operating budget serves as the baseline for estimating ongoing operational and maintenance costs associated with municipal assets. This budget was delineated by major asset class, using input and guidance from key City stakeholders, including service area leads and financial planning staff, to ensure alignment with operational realities and service delivery needs.

To support long-term forecasting, the operating budget was assumed to increase annually by 1.8%, consistent with the City's financial planning and budgeting projections. This inflationary adjustment reflects anticipated increases in labour, material, and service delivery costs, and supports the City's ability to maintain assets at the required level of service over time.

Based on the 1.8% year over year adjustment, the average 10-year operating budget for the City to support transportation services is approximately **$69.0 million/year**.

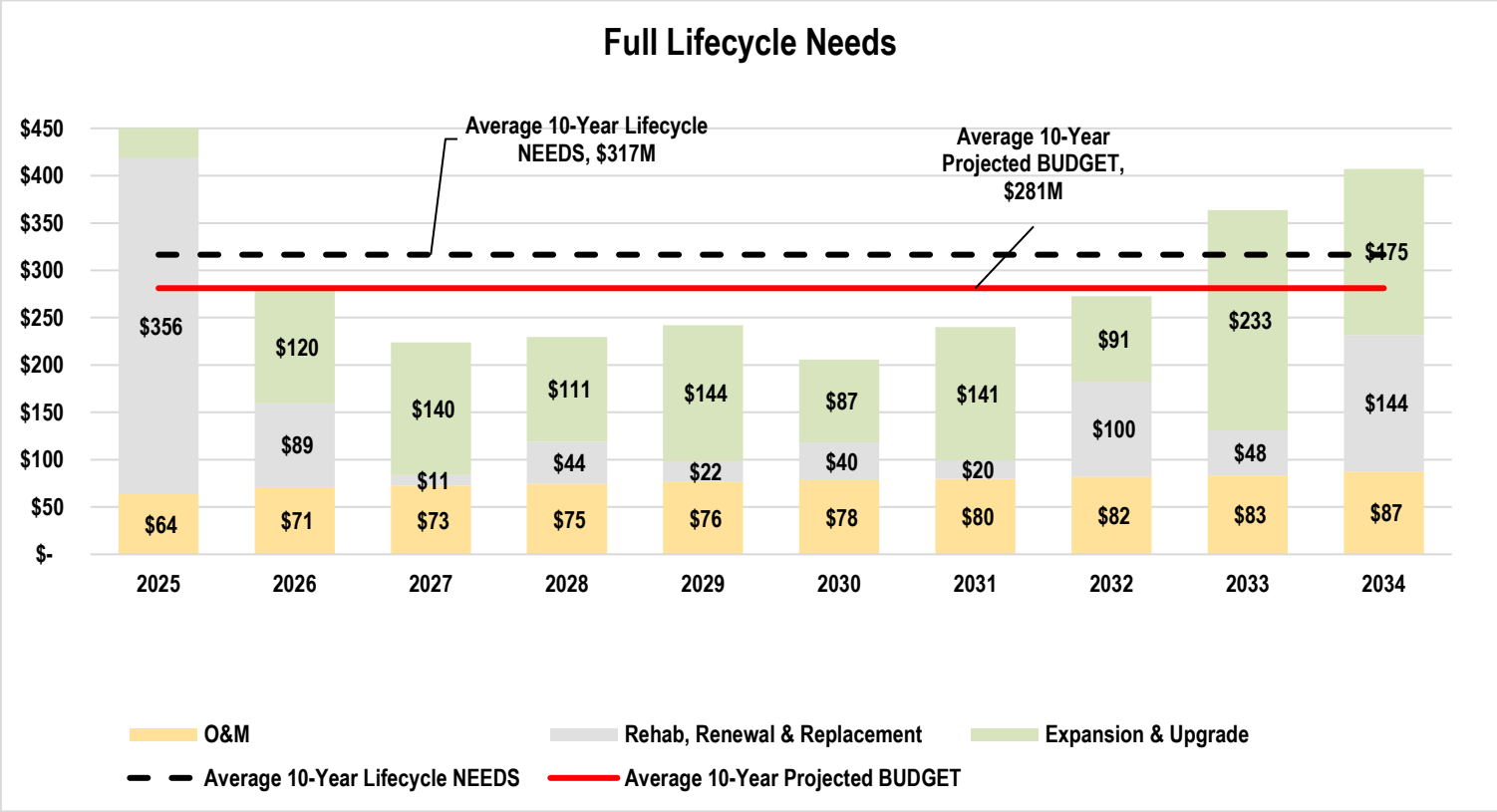
11.2 Overall Lifecycle Needs and Infrastructure Gap

Under the Maintain Current LOS scenario, the City's 10-year full lifecycle investment need is estimated at $317 million per year.

This results in an **annual infrastructure funding gap of approximately $36 million**.

Figures 11-1 illustrates this gap by comparing the yearly full lifecycle needs to the projected average funding level over the 10-year horizon. This funding shortfall highlights the difference between the financial resources required to maintain the selected level of service and the City's current financial capacity. Assumptions related to the financial strategy are provided as part of the ***General Appendices*.**

Figure 11-1: Full Lifecycle Needs and Infrastructure Gap (In Millions)



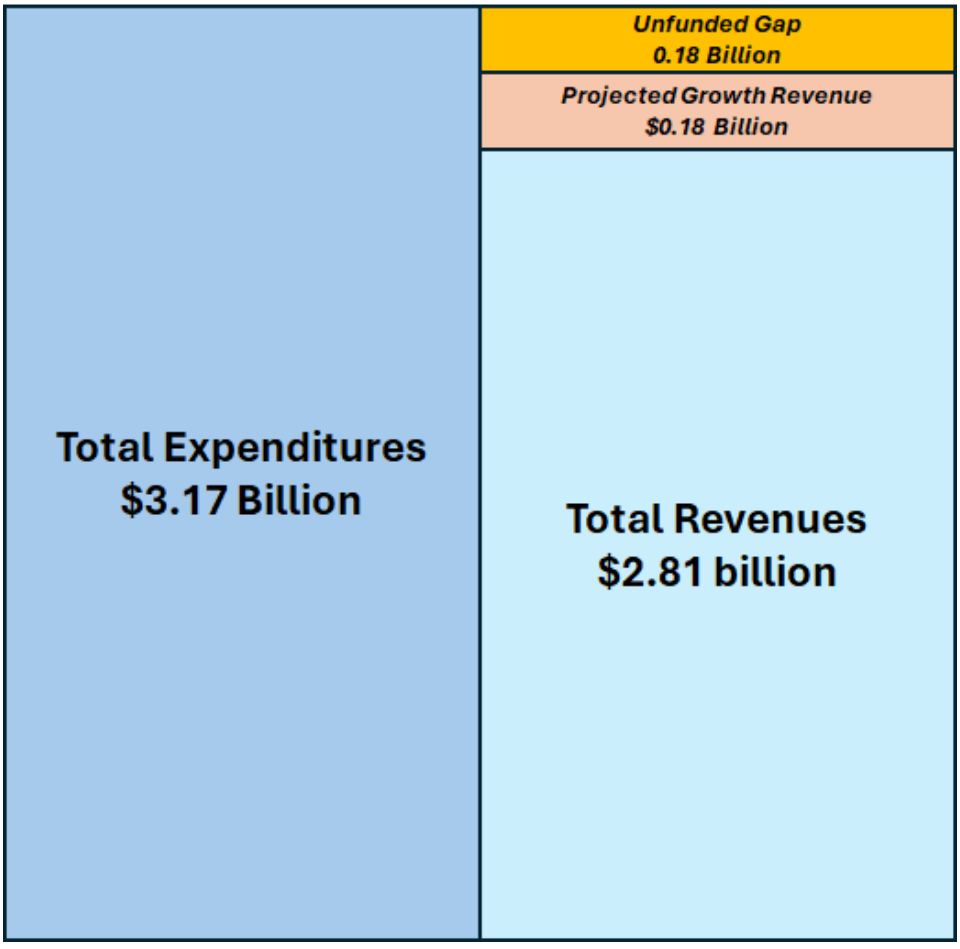
This gaps above represent the shortfall between the resources required to fully fund the selected level of service and the financial capacity currently available. Addressing this gap will require continued optimization of asset management practices, ongoing monitoring of asset performance, and consideration of strategies such as alternative funding sources, improved project prioritization etc.

11.3 Projected Infrastructure Gap

Based on the preceding analysis, the infrastructure gap has been calculated for existing assets to maintain current levels of service. For the purposes of this analysis, the infrastructure gap is defined as the difference between the total full-life cycle costs and the projected revenues over the 10-year period.

After thorough analysis, an infrastructure gap of approximately $180 million over the 10-year period has been identified to maintain current service levels for existing assets, after the additional revenues generated from new growth are considered into the calculation. These additional revenues are assumed to be prioritized for existing assets, although, the specific allocations will be determined though future budgets as growth occurs.

Figure 11-3: Projected Infrastructure Gap to Maintain Current Levels of Service (10-Year Total)



Note: Values have been rounded

The chart above displays the following information:

- **Total Expenditures (Full-Life Cycle Costs):** Represents the total full-lifecycle costs required to maintain the City's existing assets throughout their useful life including the provisions for asset repair and replacement, which could occur beyond the 10-year period.

- **Total Revenues:** Represents the total projected revenues based on existing funding commitments over the 10-year period.

- **Projected Growth Revenues:** Revenues anticipated from new growth, assumed to be used towards existing assets, which is generally consistent with the City's existing budget practice. The additional growth revenues are assumed from assessment growth and increases in Federal Gas Tax Growth revenues are assumed to equal $182 million over the ten-year period. Importantly, despite the City being poised for growth over the next 10 year, the rate of growth will determine the timing of expense incurred and revenues received.

11.4 Risk to Not Meeting Selected LOS

Failure to meet the needs outlined in this AM Plan poses several significant risks that could impact the City's infrastructure, financial sustainability, and overall service delivery. Key risks include:

- **Increased Demand for Maintenance** – Insufficient investment in lifecycle management strategies may lead to a higher demand for reactive maintenance. This can result in increased operational costs, unplanned repairs, and disruptions to transportation services.

- **Growing Renewal Backlog and Higher Long-Term Costs** – Deferred capital investments will contribute to an increasing backlog of infrastructure renewal needs. Over time, the deterioration of assets will require more extensive and costly rehabilitation efforts (e.g., replacement versus rehabilitation), placing a greater financial burden on the City in the future.

- **Safety, Compliance, and Financial Risks** – Aging infrastructure without timely renewal increases safety hazards for the public and workforce. Additionally, non-compliance with regulatory standards may expose the City to legal and reputational risks, while deteriorating conditions could lead to higher insurance liabilities and financial losses.

- **Traffic Congestion and Service Delays** – Inadequate funding for road maintenance and transportation infrastructure improvements may result in increased congestion and extended delays. This can negatively impact mobility, economic productivity, and public satisfaction with transportation services.

- **Future Renewal Needs Due to Growth-Related Assets** – As the City continues to expand, new infrastructure assets will require ongoing maintenance and future renewal. Without a sustainable funding strategy, these assets may not be adequately maintained, exacerbating long-term financial and operational challenges.

Addressing these risks through proactive asset management planning and strategic investment is essential to ensuring a reliable, safe, and efficient transportation network for residents and businesses.

11.5 Available Funding Sources

The 2025 Budget for the Transportation Service Area in the City of Brampton is funded through a combination of municipal, federal, and external sources, consisting of the following:

Table 11-3: 2025 Capital Budget Transportation Funding Sources

Funding Source	Description
Tax-Based Capital Contribution	This represents funding collected from property taxes that is allocated toward infrastructure projects. It is a primary source of municipal capital funding and supports asset renewal and new capital investments
Canada Community-Building Fund	Formerly known as the Federal Gas Tax Fund, this funding source is provided by the federal government to support municipal infrastructure projects such as roads
Development Charges	These are fees collected from developers to help cover the cost of infrastructure needed to support new development
External Recoveries	Funding received from external sources such as other government agencies, utility companies, or cost-sharing agreements related to specific infrastructure projects
Debt – DC Supported	Debt financing that is repaid using Development Charges revenue. This allows municipalities to fund infrastructure projects upfront while recovering costs from future development.
Other Funding	A minimal allocation from other miscellaneous sources, which may include grants, sponsorships, or small-scale contributions
TOTAL	

11.6 Strategies for Closing the Infrastructure Gap

To effectively address the infrastructure gap identified within this AM Plan, a balanced approach that combines revenue enhancement, strategic debt management, and cost-reduction measures is essential. The following strategies outline a comprehensive plan to ensure financial sustainability while maintaining and optimizing infrastructure assets:

1. Increasing Revenues

One of the primary ways to close the infrastructure funding gap is by generating additional revenue sources:

- **Infrastructure Levy:** Incremental increases in the capital levy can provide a dedicated revenue stream for infrastructure renewal and rehabilitation projects, reducing reliance on debt and external funding.
- **Funding Support from Upper Levels of Government:** The City is demonstrating a strong commitment to asset management by developing renewal practices that support the cost-effective delivery of services. However, to balance affordability and sustain these efforts, support from upper levels of government is essential. Stable and predictable funding is critical for effective long-term financial planning and for accurately assessing and addressing the infrastructure gap.
- **Public Private Partnership opportunities (P3):** P3s enable the City to access alternative funding sources, share project risks, and leverage innovative financing models. Involving the private sector can also enhance efficiency, introduce innovation, and strengthen lifecycle management, while supporting knowledge transfer to City staff.

2. Optimizing Debt Capacity and Reserve Management

Strategic use of debt financing and reserves can help balance long-term infrastructure investments:

- **Debt Management/Financing:** Issuing debentures allows the municipality to spread infrastructure costs over the lifecycle of assets, ensuring equitable cost distribution across taxpayers.
- **Reserve Management:** Strengthening and maintaining dedicated reserve funds for capital projects can provide financial stability and ensure funding availability for critical infrastructure needs.

3. Reducing Expenditures and Improving Cost Efficiency

Efficiently managing expenditures is crucial for closing the infrastructure gap without compromising service quality:

- **Deferring Renewals Based on Risk Exposure**: Prioritizing critical infrastructure projects while deferring lower-risk renewals can optimize available resources. To manage the risks associated with aging infrastructure, maintenance strategies should be adapted — for example, through increased inspections and preventive maintenance. Conducting detailed risk analyses, including establishing risk tolerance levels for each asset class, will further support effective prioritization of investment needs and service levels. While not always ideal, accepting a higher level of asset risk in certain cases—such as reducing

inspection frequency for low-criticality assets — may help lower ongoing asset management costs.

- **Adjusting Service Levels as Appropriate:** Tracking LOS measures and recalibrating funding needs based on performance, where feasible, can help align expenditures with available funding while minimizing the impact on residents.
- **Minimizing the Size of the Asset Portfolio:** Rationalizing underutilized assets and optimizing the asset portfolio can reduce long-term operating and renewal costs, ensuring that investments are focused on essential infrastructure.
- **Implementing Non-Infrastructure Solutions:** Management strategies, policies, and operational efficiencies can improve asset performance without significant capital investment. For example, data-driven decision-making and predictive maintenance models can extend asset life and reduce costs.
- **Continued Project Co-ordination with Region of Peel and Utility Companies:** In exploring opportunities with the Region and Utility service providers, overall cost efficiencies may be achieved during linear asset rehabilitation and replacement (e.g. storm sewers, roads, bridges, culverts) by better aligning capital ventures.
- **Exploring Cost-Effective Service Delivery Options:** Identifying opportunities for greater efficiency such as shared services, outsourcing, or process improvements can enhance service delivery while reducing infrastructure costs.
- **Improved Data Quality:** As the City advances its asset management practices, enhancing data quality across the Transportation service areas will enable more accurate assessments of asset condition. Currently, some assets are assessed on an age-based approach that does not necessarily reflect the true condition of the asset. Strengthening lifecycle cost data will support evidence-based decision-making and help achieve the lowest lifecycle cost through prioritization of repair and replacement activities.

Monitoring & Improvement Plan

12. Monitoring and Improvement Plan

Development of AM Plans is an iterative process that includes improving processes, data, and staff skills over time. This section identifies opportunities for improvements to the City's asset management practices, to be considered before completion of the next iteration of this AM Plan.

12.1 Improvement Plan

Improvement initiatives have been identified that will enhance the effectiveness of the City's asset management program. The following table provides recommended improvement initiatives with associated priorities and timelines.

Table 12-1: Improvement Plan

Area of Improvement	Action	Outcome	Timeline	Priority	Comments
State of Local Infrastructure	Regularly update the asset register, asset condition, and state of good repair needs	Improved data for future SOLI reporting	Medium	Medium	To be updated based on inspection and Condition Assessment programs (road needs assessments, OSIM reporting, and annual inspections).
Levels of Service	Align AMP and structure of budgeting process	Easier to determine lifecycle costs specific to TLOS measures	Medium	Medium	Adjusting the budget process following the release of this AMP will require effort from all departments to ensure delineation of different lifecycle activities, resulting in more accurate cost estimations for achieving LOS targets.
	More clearly delineate costs related to achieving PLOS	Support for active decision making rather than reporting of decisions already made	Medium	Medium	Support for active decision making rather than reporting of decisions already made.
Risk Management Strategy	Incorporate risk into investment decision making	Ensuring the right projects are done at the right time based in constrained funding environments.	Medium	Medium	Transition towards risk-based condition assessment and evaluation. The City is recommended to improve their quantification of capacity and function risk by exploring the usage of metrics

Area of Improvement	Action	Outcome	Timeline	Priority	Comments
					which can define these performances such as AADT scores and compliance with complete streets.
Climate Change Integration	Further develop mitigation and adaptation strategies into asset management	Further understanding of climate change risks on City's delivery of services and support informed prioritization of strategies.	Short	High	While the risks have been discussed in the Climate Change chapter, the Transportation Service Area is tasked to conduct more comprehensive vulnerability assessments and climate risk evaluations to understand future mitigation strategies and costs.
Governance	Identify internal resource needs (operational and renewal impacts) to deliver recommended AM Plan capital growth projects	Better insight and coordinated effort at the service area level to sustain future assets	Short	High	This initiative will have to be coordinated with the City's Finance department.
	Further refinement of asset interdependencies	Capitalize on efficiencies across service areas and asset types	Long	High	While some progress has been actualized, a longer timeframe is required to further refine asset interdependencies.
	Improved knowledge transfer through robust asset management processes and systems	Better insight and coordinated effort at the service area level to better inform future iterations of this report	Long	Medium	Longer timeframe is required to be receive larger buy-in from staff.
	Build capacity of staff through hiring practices and training	Staff is more knowledgeable throughout on existing and future asset management practices – will create efficiencies and limit knowledge gap.	Long	Medium	Requires longer timeframe before capacity of staff is significantly expanded.
Asset Information	Continue to improve AIMS, work order management system and other processes	More informed decision making at the departmental level	Medium	Medium	While some progress has been actualized, a longer timeframe is required to completely achieve work order management objectives through Cityworks.

Area of Improvement	Action	Outcome	Timeline	Priority	Comments
	Develop a financial decision support tool to support the entire portfolio of transportation assets	Financial efficiencies achieved across the organization	Medium	Low	Currently DTims supports analytics for roads and bridges only. The City should develop DSS analytic ability for other assets in the transportation portfolio such as sidewalks, , other structures, etc.
Lifecycle Management Strategy	Refine AM Plan growth and upgrade projections based on updated Brampton Mobility Plan and other growth projections.	More accurate needs projects for growth and upgrade.	Short	High	Some information from the Brampton Mobility Plan has been integrated into this AM Plan, however there are other aspects which can be incorporated once the Brampton Mobility Plan is approved by Council. An assumed overall growth rate of 1.8% for assets added by developers was assumed for this AM Plan. The City should refine this projection in future AM Plans.
	Full integration of Lifecycle Management Strategy with the RMS and LOS frameworks	Fully developed LOS and RMS frameworks based on LMS to inform decision making	Medium	Medium	Full integration of LMS with RMS and LOS not yet achieved – target for future AMP iterations.
Financing Strategy	Continue to monitor and benchmark infrastructure gap with other municipalities	Benchmarking of key performance measures such as the average reinvestment rate or backlog of asset renewal are important to inform the current state of the transportation AM program.	Short	Medium	Benchmarking against comparators is not expected to be possible until after the 2025 PLOS deadline for all municipalities.
	Maintain current levies	Continual bridging of funding gap for improved financial sustainability.	Long	High	While current levies have been maintained during annual budget process, and opportunities for government funding have been pursued where possible, this will need to continue
	Seek funding support from upper levels of government		Long	High	

Area of Improvement	Action	Outcome	Timeline	Priority	Comments
					indefinitely in order to achieve continual bridging of funding gap.
	Continue to align with Long-Term Financial Master plan and Budget	Determination of reasonability of current reinvestment rates and allows for new targets to be developed to meet current or planned LOS	Medium	Medium	It is important for the City to show cost of asset lifecycle during budgeting process (planning for future reserves).
	Continue to coordinate with Region of Peel; integration of Region roads into the City's AM Program	Cost efficiencies through asset rehabilitation and replacement	Medium	Medium	The City is expected to onboard and be responsible for a number of Region roads as part of the dissolution. These roads will need to be integrated into the City's existing AM planning frameworks and strategies.

Note, any asset class specific improvements are outlined in the asset class appendix and categorized into the following improvement areas:

- Data Enhancement & Governance;
- Process Optimization; and
- Technology & Tools.

12.2 Monitoring Plan

The AM Plan is to be updated at least every five years, reporting on the City's updated asset portfolio, associated value, age, and condition. The update will also provide the 10-year forecast on service levels, costs of the associated lifecycle strategies and an assessment of any funding shortfalls.

As per O.Reg. 588/17, the City will conduct an annual review of its asset management progress in implementing this AM Plan and will discuss strategies to address any factors impeding its implementation.

The effectiveness of this AM Plan can be measured in the following ways:

- The degree to which the required forecast costs identified in this AM Plan are incorporated into the long-term financial plan;
- The degree to which the City's 1-5 year detailed capital programs, budgets, business plans and corporate structures consider the information provided within the AM Plan;

- The degree to which the existing and projected service levels and service consequences, risks and residual risks are incorporated into the Strategic Planning documents and associated plans; and

- The Asset Renewal Funding Ratio achieving the City's target once determined (this target is often 90% to 100%).

12.3 Closing Remarks

In summary, this Transportation AM Plan represents a significant milestone in the City of Brampton's ongoing commitment to responsible infrastructure stewardship and regulatory compliance.

The Plan meets the requirements of O.Reg. 588/17, aligning with industry best practices and international standards, while also laying the foundation for ongoing improvements in asset performance, risk management, and financial sustainability.

The projected infrastructure gap is estimated at approximately $180 million when factoring in additional revenues from new growth. The AM Plan emphasizes the importance of strategic financing, lifecycle optimization, and continuous monitoring. It also prepares the City to adapt to future developments, including growth-related asset additions and the potential organizational changes stemming from the Transition Board's work on regional governance.

Looking ahead, the City will continue to refine and update this AM Plan to ensure it remains responsive to emerging risks, regulatory changes, community expectations, and operational realities. Through disciplined implementation, transparent reporting, and alignment with strategic objectives, Brampton is well-positioned to deliver a safe, reliable, and efficient transportation system for its residents and businesses—today and into the future.

Appendix A to Appendix D

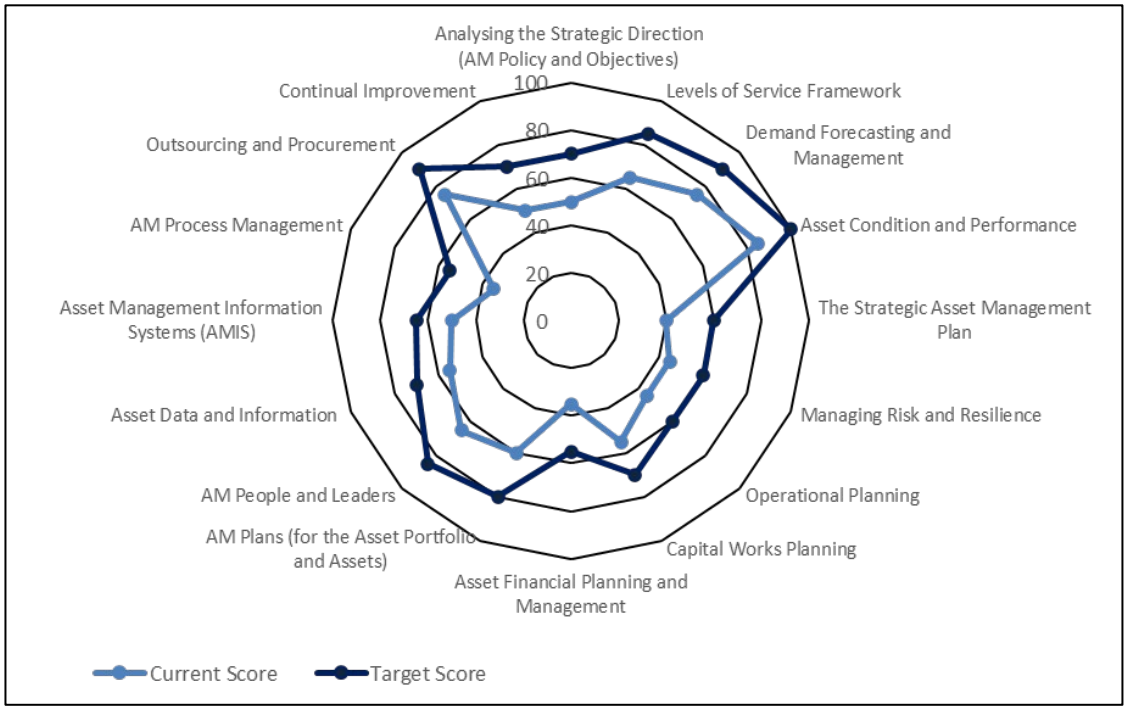
Asset Class Summary Report Cards

A - ROADS

Maturity Assessment

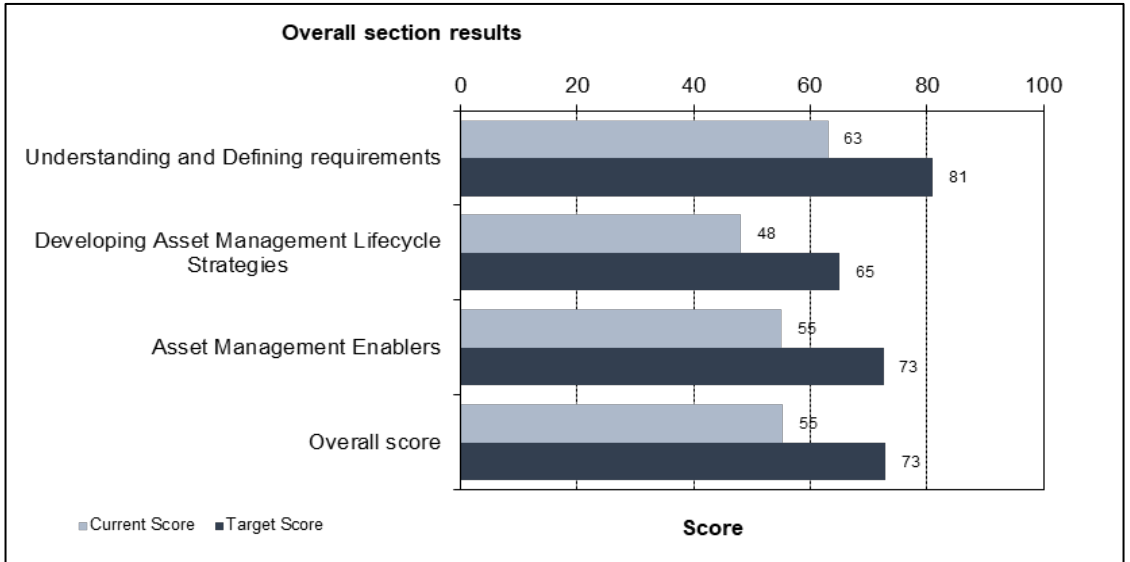
55 Pre-Project Score

73 Target Score



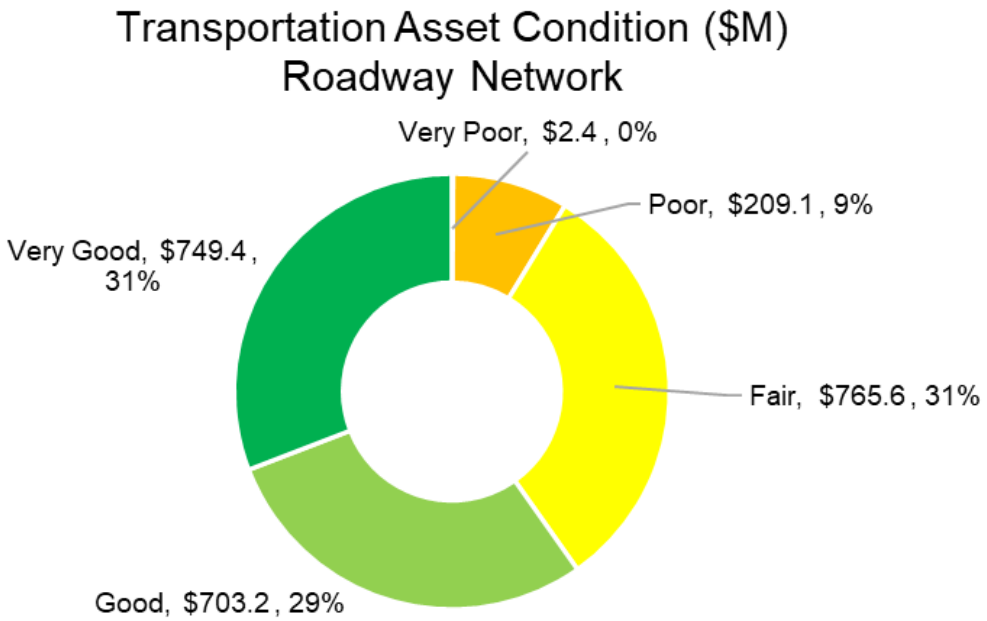
Activities to Achieve Target Score in Future

- Continue to advance integrations between AM Systems (GIS, DTIMs, CityWorks) to allow for advancement of lifecycle analytics to support planning.
- Continue to advance methodologies used for forecasting infrastructure needs based on established LOS, particularly for operations and maintenance, to assist in establishing future funding required to complete the required asset lifecycle activities
- Continue to improve knowledge of asset criticality and risk to support the regularity of data collection and updating.
- Incorporate outcomes/findings from the City's updated Brampton Mobility Plan and Active Transportation Master Plan into the service areas' levels of service framework and needs assessment for approved initiatives.



A - ROADS

State of Local Infrastructure Summary



Assets in Very Poor Condition

- Churchville Rd – from Steeles Avenue to Bridge Culvert north of Steeles
- Hemlark Ct – from Hindquarter Court to end
- Homeland Ct – from Hanover Road to end
- Horseshoe Ct – from Homeland Court to ends
- Huronia Ct – from Hedley Court to end
- Wanless Dr – from Mississauga Road to Heritage Road

A - ROADS

Risk Management Summary

Risk Identification

The methodology is discussed in detail in the Risk Management section of the report is applied consistently across all service areas. The table below provides a summary of a guide that can be used to interpret the results of the risk analysis.

- Insignificant (Green) – Accept risk, no risk treatment required.
- Low (Light Green) – May be acceptable but monitoring of assets may be required.
- Medium (Yellow) – Requires some consideration by management with necessary risk management and monitoring adopted as needed.
- High (Orange) – Requires consideration by management, risk management and monitoring are required.
- Extreme (Red) – Requires extensive management input, risk mitigation to reduce to an acceptable level is essential.

Risk Evaluation

Risk exposure in year 2024 $, millions

Probability of Failure		Insignificant	Minor	Moderate	Major	Catastrophic
5	Certain	$0.0	$0.0	$0.0	$1.0	$0.0
4	Likely	$0.0	$0.0	$96.9	$112.1	$0.0
3	Possible	$0.0	$0.0	$434.8	$330.7	$0.0
2	Unlikely	$0.0	$0.0	$615.0	$80.8	$0.0
1	Rare	$0.0	$0.0	$577.9	$140.8	$0.0

Consequence of Failure

Risk Exposure Ratings	
Very High	$0.0
High	$113.1
Medium	$943.21
Low	$1333.7
Insignificant	$0.0
Total	$2390

Risk Treatment

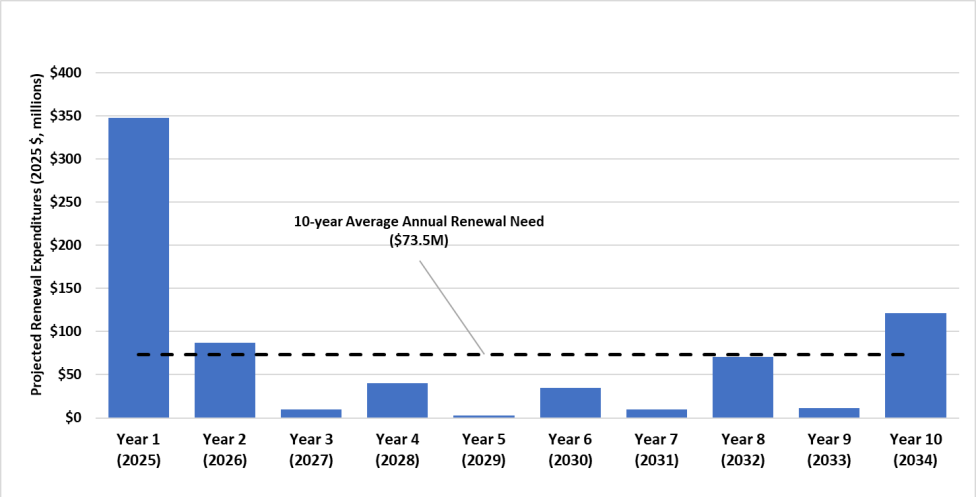
Through detailed analysis of the Risk Assessment, the results show:

- The risk map indicates that there are no assets which fall into the Very High risk category. That said, there is a high proportion of assets which are assessed as High or Moderate risk.
- The analysis indicates that some assets within the High or Moderate risk category possess a high likelihood of failure, despite the consequence of failure being fairly low. The high likelihood of failure is due to assets being in Poor condition.
- If the nature of the service changes and the consequence of failure increases, these assets will begin to create “High” risk to the City. No further strategies are required to manage this risk at this time.

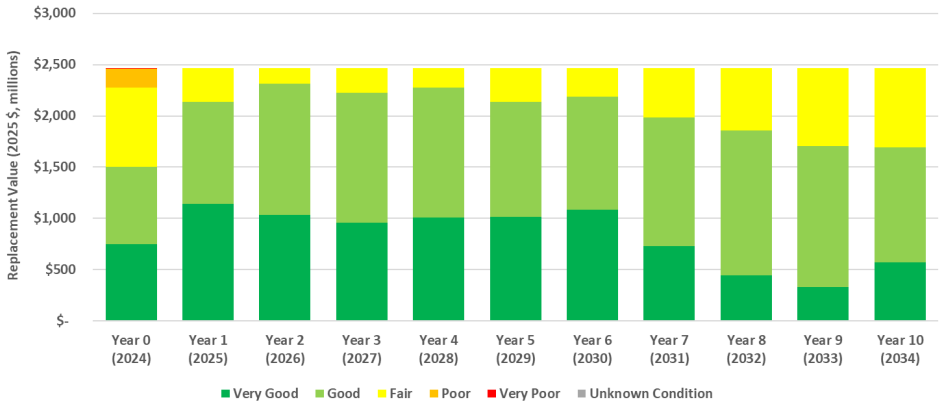
A - ROADS

Lifecycle Management Needs Summary

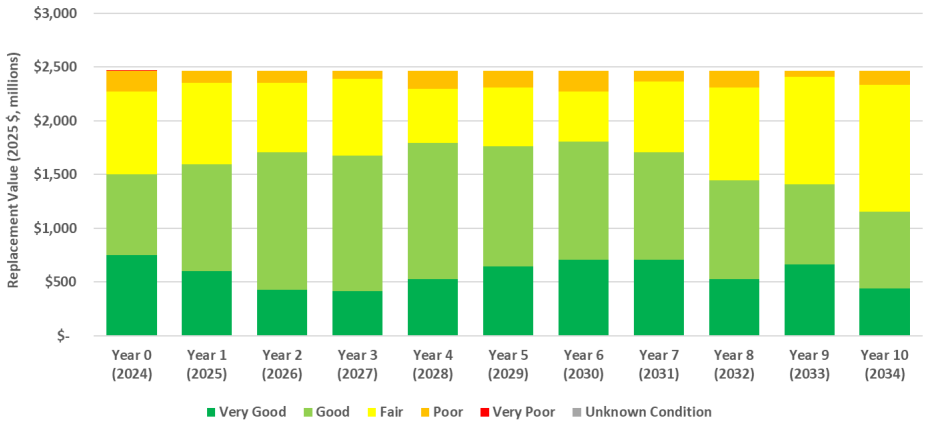
Maintain LOS – Renewal Needs



Maintain LOS – Condition Forecast



Projected Funding – Condition Forecast



A - ROADS

Monitoring and Improvement Plan

1. Data Enhancement & Governance

- Develop a formal data governance framework with assigned roles and responsibilities for updating road-related asset data, including version control and quality assurance protocols.
- Continue coverage of condition assessments, aiming for full network-level Pavement Condition Index (PCI) data updates every 3–5 years.
- Create a data confidence rating system for all road asset data to support transparent decision-making and identify priority areas for validation or improvement.

---

2. Process Optimization

- Implement a standardized lifecycle treatment protocol to guide when roads should receive maintenance, rehabilitation, or replacement based on PCI thresholds and risk factors.
- Develop integrated annual planning workflows to coordinate condition assessments, capital project planning, and maintenance scheduling across departments.
- Establish performance monitoring KPIs (e.g., % of roads in fair or better condition, response time for pothole repairs) and embed them into routine reporting.
- Refine capital prioritization models to incorporate risk, condition, traffic volume, and socio-economic impact when ranking road renewal projects.
- Introduce post-project audits to evaluate whether road interventions meet expected service level and cost objectives.

---

3. Technology & Tools

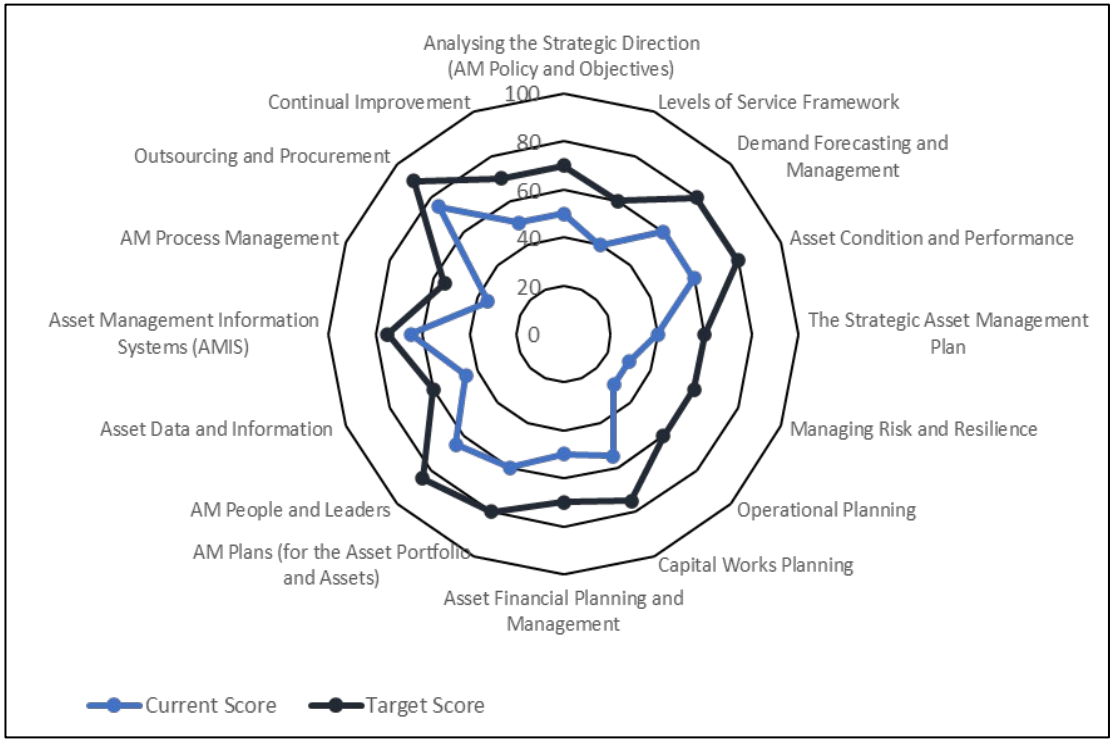
- Expand use of pavement management systems (e.g., dTIMS) to enable data-driven optimization of capital planning scenarios and lifecycle strategies.
- Integrate GIS with road asset databases to spatially visualize asset condition, age, treatments, and project histories for improved decision-making.
- Leverage dashboards and business intelligence tools for real-time reporting on road performance indicators, maintenance activities, and funding gaps.

B - BRIDGES & CULVERTS

Maturity Assessment

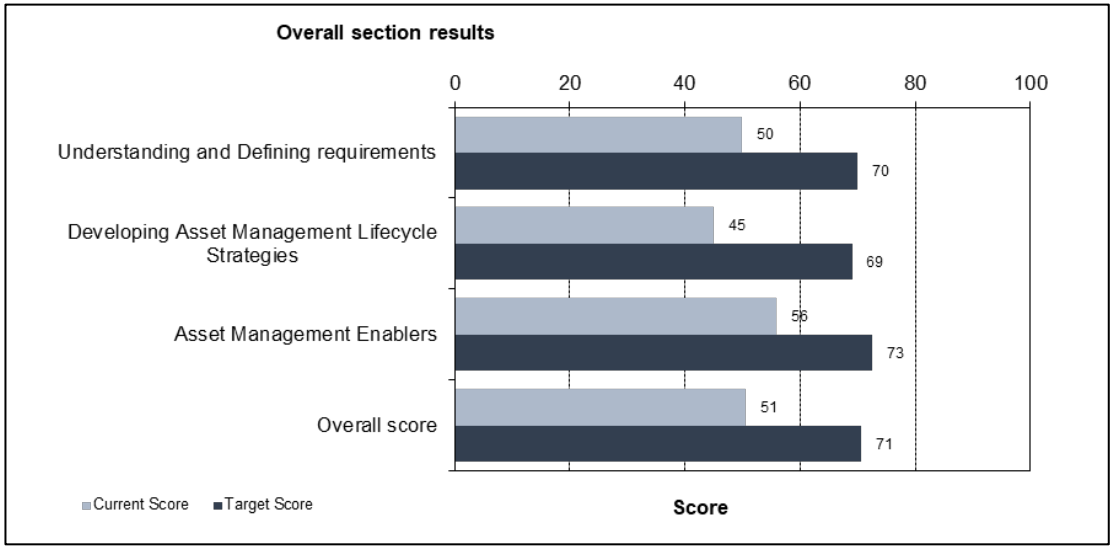
51 **Pre-Project Score**

71 **Target Score**



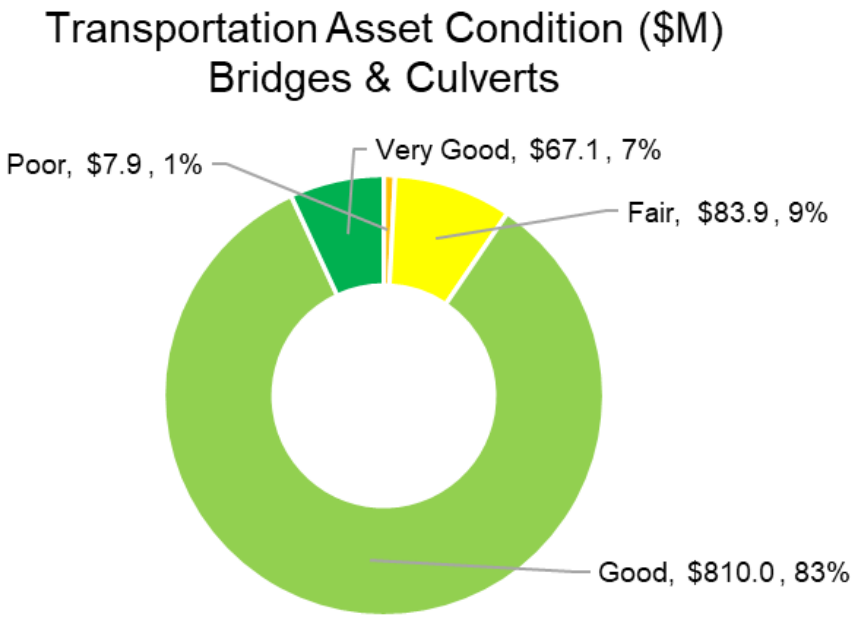
Activities to Achieve Target Score in Future

- Adopt methods for forecasting future asset condition / performance based on industry practices and standards (e.g., how the asset will deteriorate over time) to support future lifecycle planning)
- Continue to advance methodologies used for forecasting infrastructure needs based on established LOS, particularly for operations and maintenance, to assist in establishing future funding required to complete the required asset lifecycle activities.
- Continue to improve knowledge of asset criticality and risk to support the regularity of data collection and updating.



B - BRIDGES & CULVERTS

State of Local Infrastructure Summary



Assets in Very Poor Condition

- No assets are in Very Poor Condition

B - BRIDGES & CULVERTS

Risk Management Summary

Risk Identification

The methodology is discussed in detail in the Risk Management section of the report is applied consistently across all service areas. The table below provides a summary of a guide that can be used to interpret the results of the risk analysis.

- Insignificant (Green) – Accept risk, no risk treatment required.
- Low (Light Green) – May be acceptable but monitoring of assets may be required.
- Medium (Yellow) – Requires some consideration by management with necessary risk management and monitoring adopted as needed.
- High (Orange) – Requires consideration by management, risk management and monitoring are required.
- Extreme (Red) – Requires extensive management input, risk mitigation to reduce to an acceptable level is essential.

Risk Evaluation

Risk exposure in year 2024 $, millions

Probability of Failure		Insignificant	Minor	Moderate	Major	Catastrophic
5	Certain	$0.0	$0.0	$0.0	$0.0	$0.0
4	Likely	$0.0	$5.5	$0.0	$2.5	$0.0
3	Possible	$0.0	$37.2	$0.0	$46.6	$0.0
2	Unlikely	$0.0	$44.6	$0.0	$765.4	$0.0
1	Rare	$0.0	$0.0	$0.0	$67.1	$0.0

Consequence of Failure

Risk Exposure Ratings	
Very High	$0.0
High	$49.1
Medium	$808.1
Low	$111.7
Insignificant	$0.0
Total	$968.9

Risk Treatment

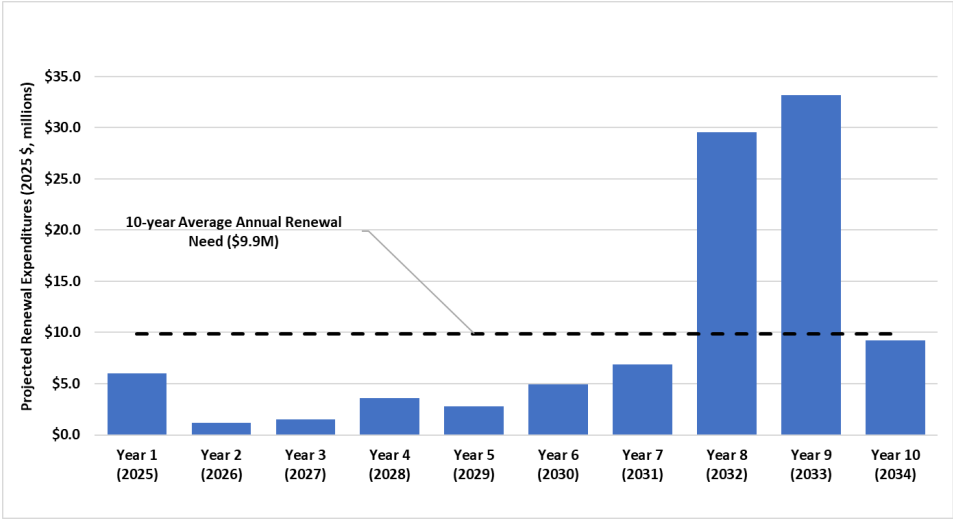
Through detailed analysis of the Risk Assessment, the results show:

- The risk map indicates that there are no assets which fall into the Very High risk category. That said, there is a high proportion of assets which are assessed as High or Moderate risk.
- The analysis indicates that some assets within the High or Moderate risk category possess a high likelihood of failure, despite the consequence of failure being fairly low. The high likelihood of failure is due to assets being in Poor condition.
- If the nature of the service changes and the consequence of failure increases, these assets will begin to create “High” risk to the City. No further strategies are required to manage this risk at this time.

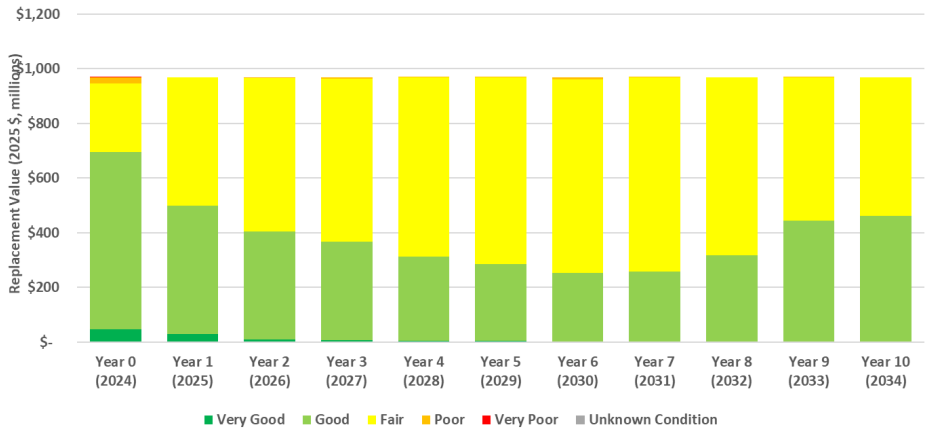
B - BRIDGES & CULVERTS

Lifecycle Management Needs Summary

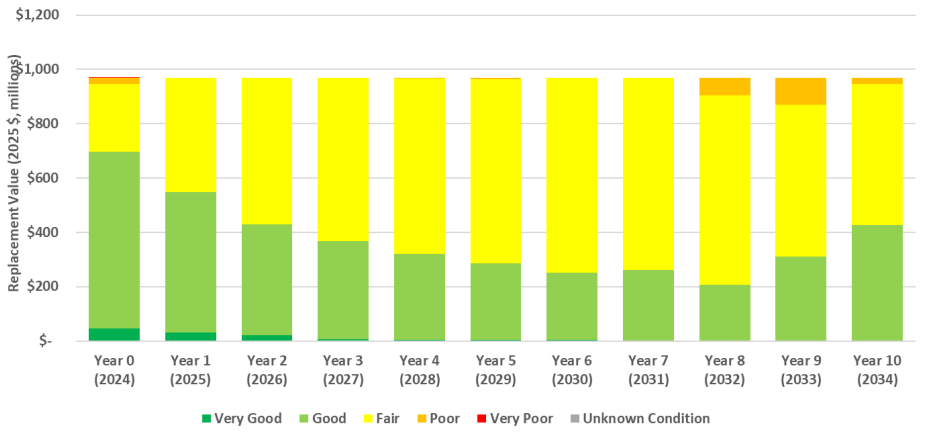
Maintain LOS – Renewal Needs



Maintain LOS – Condition Forecast



Projected Funding – Condition Forecast



B - BRIDGES & CULVERTS

Monitoring and Improvement Plan

1. Data Enhancement & Governance

- Implement a data governance policy that assigns responsibility for routine updates to asset records, inspection results, and maintenance logs.
- Introduce confidence ratings for asset data and inspection results, particularly for older structures with limited records.

---

2. Process Optimization

- Develop a risk-based prioritization framework that incorporates condition (BCI), usage, consequence of failure, and criticality for renewal planning.
- Link inspection findings to capital planning processes to ensure timely rehabilitation and avoid reactive interventions.
- Introduce lifecycle costing models to determine optimal timing for intervention (e.g., major rehab vs. replacement).
- Conduct post-rehabilitation performance reviews to assess effectiveness of interventions and refine future planning assumptions.

---

3. Technology & Tools

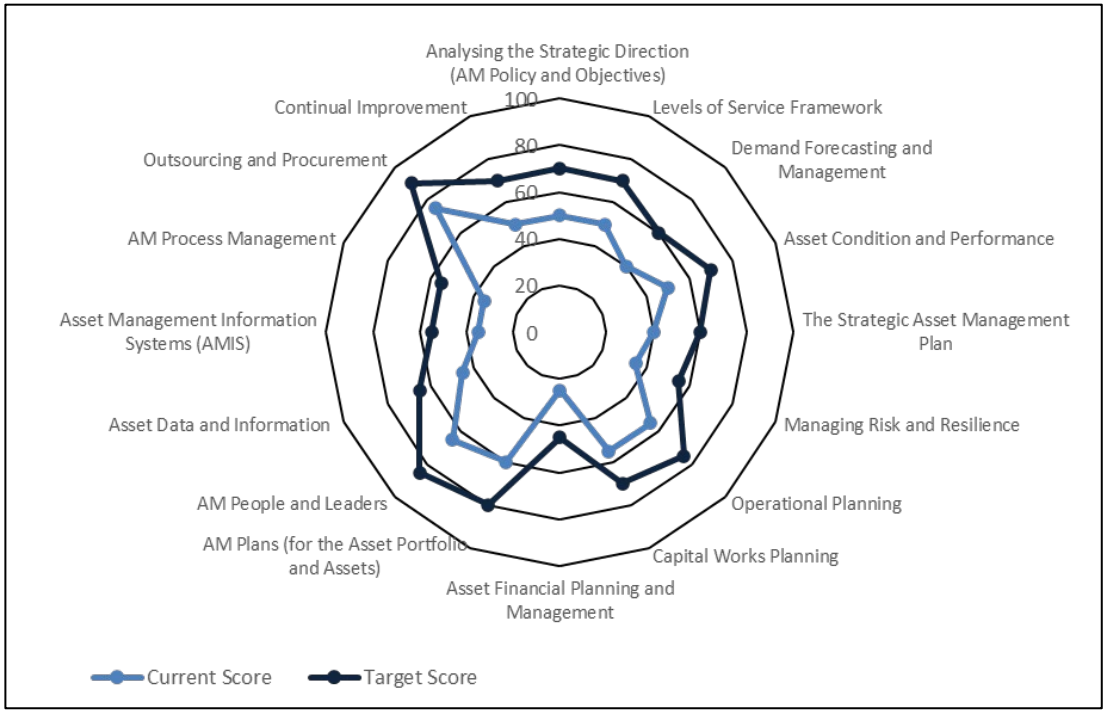
- Implement or enhance a Bridge Management System (DTims) to support condition tracking, inspection scheduling, and renewal forecasting.
- Integrate bridge and culvert data into GIS platforms to enable spatial analysis of condition, access constraints, and environmental exposure.
- Pilot predictive modeling tools to estimate deterioration rates and budget scenarios for long-term asset planning.

C - WALKWAYS & PATHS

Maturity Assessment

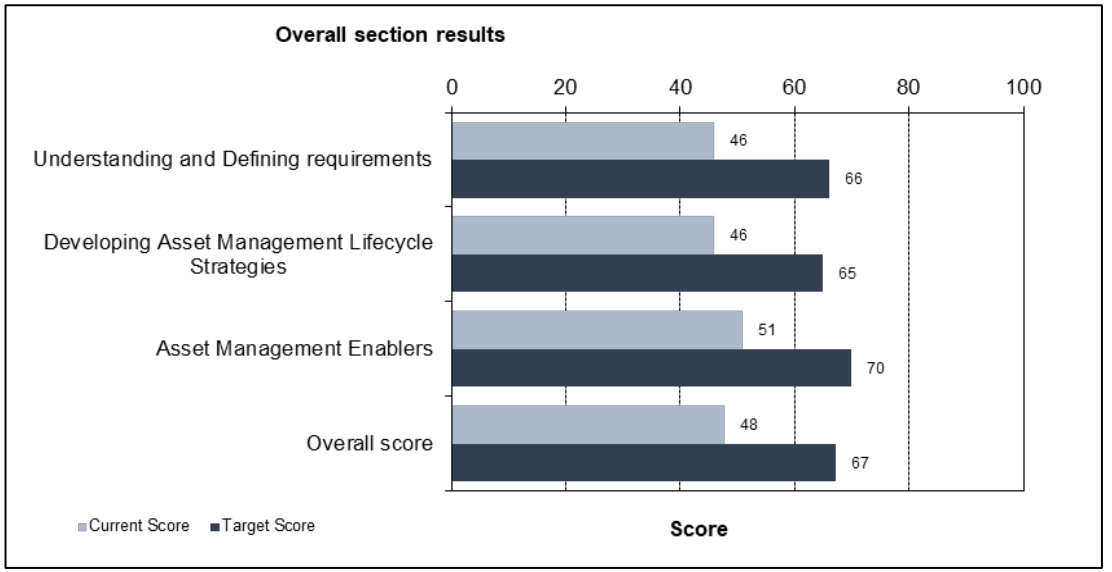
48 **Pre-Project Score**

67 **Target Score**



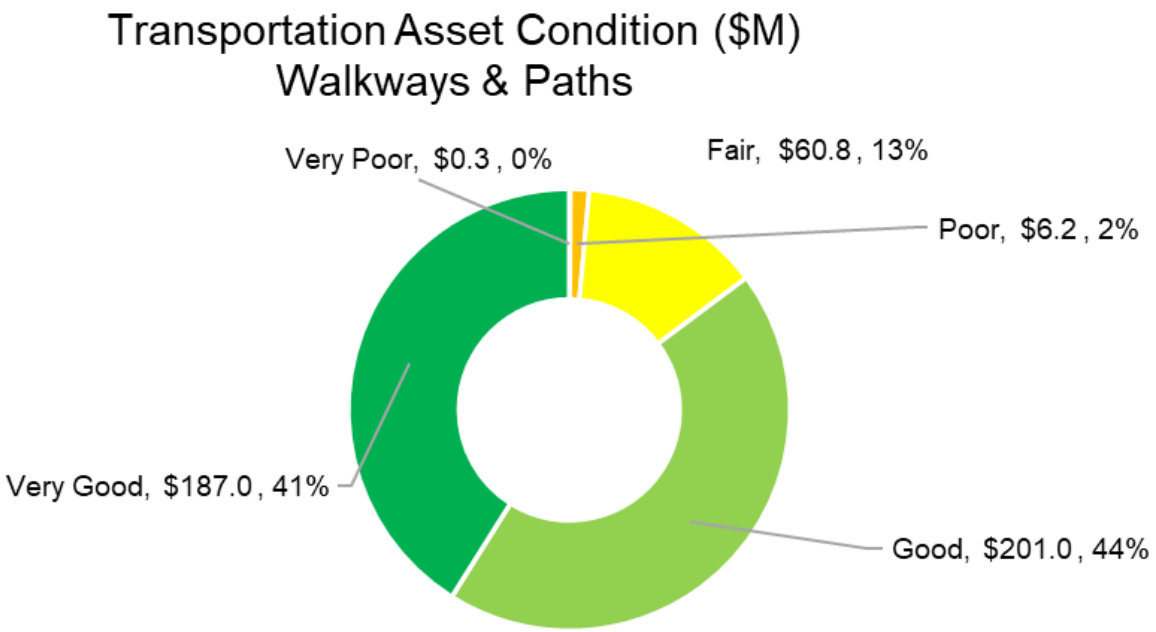
Activities to Achieve Target Score in Future

- Continue to improve and review capital works planning processes and procedures, integrating any updates to risk management and level of service assessment outcomes.
- Continue to undertake master planning every five (5) to ten (10) years and analyze multiple demand management scenarios (low, medium, high) for assets to model and plan for future growth circumstances.
- Review work orders annually to update and optimize the preventative maintenance program (type of maintenance, frequency, etc.)



C - WALKWAYS & PATHS

State of Local Infrastructure Summary



Assets in Very Poor Condition

- Harold St – to Brenda Ave
- Steeles Ave W – to James Potter Rd
- Torbram Rd – to Bramhurst Ave
- Torbram Rd – from Connolly Cres to Torbram Rd

C - WALKWAYS & PATHS

Risk Management Summary

Risk Identification

The methodology is discussed in detail in the Risk Management section of the report is applied consistently across all service areas. The table below provides a summary of a guide that can be used to interpret the results of the risk analysis.

- Insignificant (Green) – Accept risk, no risk treatment required.
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- High (Orange) – Requires consideration by management, risk management and monitoring are required.
- Extreme (Red) – Requires extensive management input, risk mitigation to reduce to an acceptable level is essential.

Risk Evaluation

Risk exposure in year 2024 $, millions

Probability of Failure		Insignificant	Minor	Moderate	Major	Catastrophic
5	Certain	$0.0	$0.0	$0.2	$0.0	$0.0
4	Likely	$0.0	$0.0	$0.3	$0.0	$0.0
3	Possible	$0.0	$0.0	$2.0	$0.0	$0.0
2	Unlikely	$0.0	$0.0	$5.5	$0.0	$0.0
1	Rare	$0.0	$0.0	$9.1	$0.0	$0.0

Consequence of Failure

Risk Exposure Ratings	
Very High	$0.0
High	$0.5
Medium	$7.5
Low	$9.1
Insignificant	$0.0
Total	$17.1

Risk Treatment

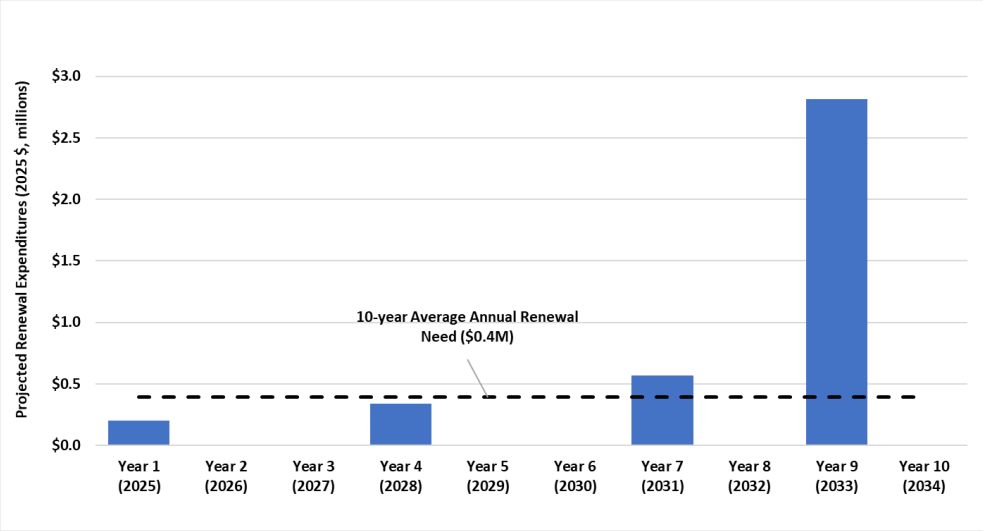
Through detailed analysis of the Risk Assessment, the results show:

- The risk map indicates that there are no assets which fall into the Very High risk category. That said, there is a high proportion of assets which are assessed as High or Moderate risk.
- The analysis indicates that some assets within the High or Moderate risk category possess a high likelihood of failure, despite the consequence of failure being fairly low. The high likelihood of failure is due to assets being in Poor condition.
- If the nature of the service changes and the consequence of failure increases, these assets will begin to create “High” risk to the City. No further strategies are required to manage this risk at this time.

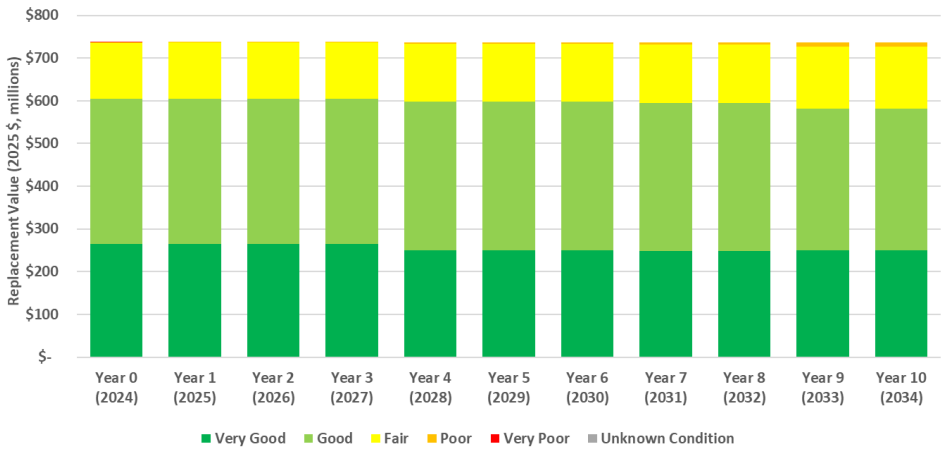
C - WALKWAYS & PATHS

Lifecycle Management Needs Summary

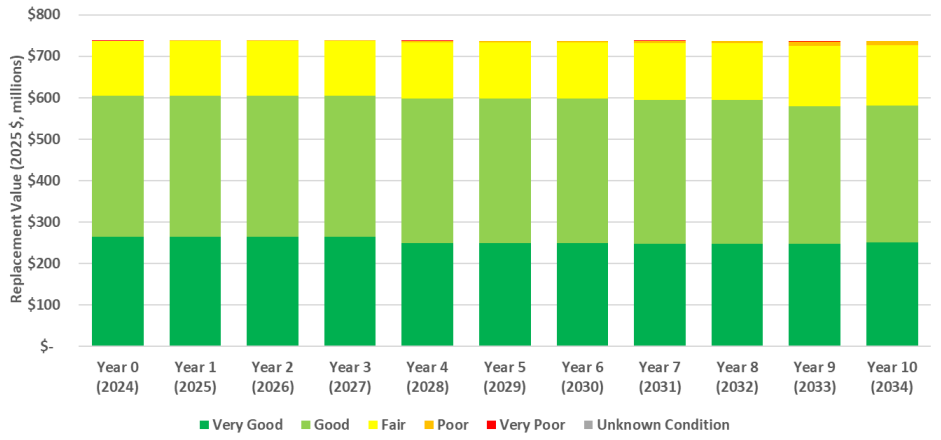
Maintain LOS – Renewal Needs



Maintain LOS – Condition Forecast



Projected Funding – Condition Forecast



C - WALKWAYS & PATHS

Monitoring and Improvement Plan

1. Data Enhancement & Governance

- Standardize data attributes (e.g., material type, accessibility features, connectivity) to enable consistent evaluation and lifecycle analysis.
- Incorporate condition and accessibility data (e.g., trip hazards, curb cuts, tactile strips) to support inclusive service delivery.
- Implement a governance structure with defined roles for maintaining, updating, and auditing asset records, including integration with capital project records.
- Introduce a data confidence rating system to track the reliability and source of walkway and path asset information.

---

2. Process Optimization

- Develop a proactive inspection program using risk-based intervals (e.g., higher frequency in school zones or high-use areas).
- Formalize service standards for surface condition, snow clearing, and trip hazard response times in line with accessibility and safety goals.
- Establish renewal prioritization criteria that incorporate condition, connectivity, usage, and proximity to vulnerable populations.
- Align walkway planning and upgrades with broader city-wide mobility, active transportation, and accessibility plans.
- Implement a process for capturing citizen-reported issues (e.g., cracks, obstructions) and linking them directly to maintenance workflows.

C - WALKWAYS & PATHS

Monitoring and Improvement Plan

3. Technology & Tools

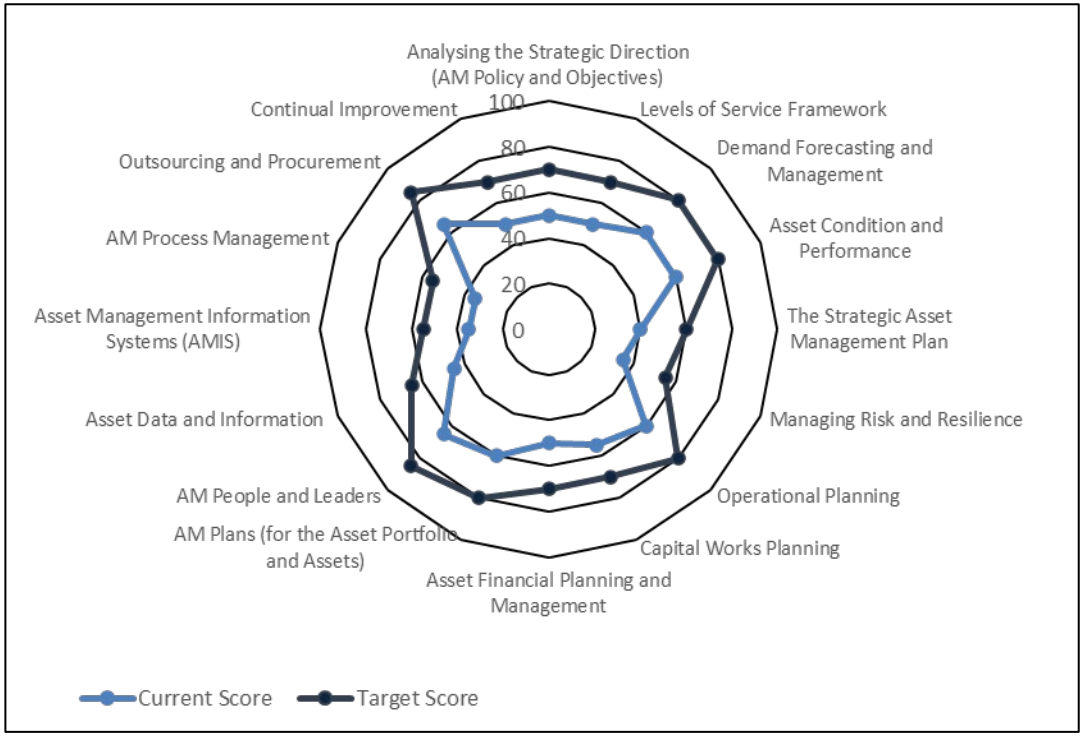
- Integrate walkway and path assets into the City’s GIS system for spatial analysis of condition, gaps in network coverage, and renewal needs.
- Develop interactive dashboards to monitor asset condition trends, maintenance backlog, and response time KPIs for public and internal use.

D - TRAFFIC

Maturity Assessment

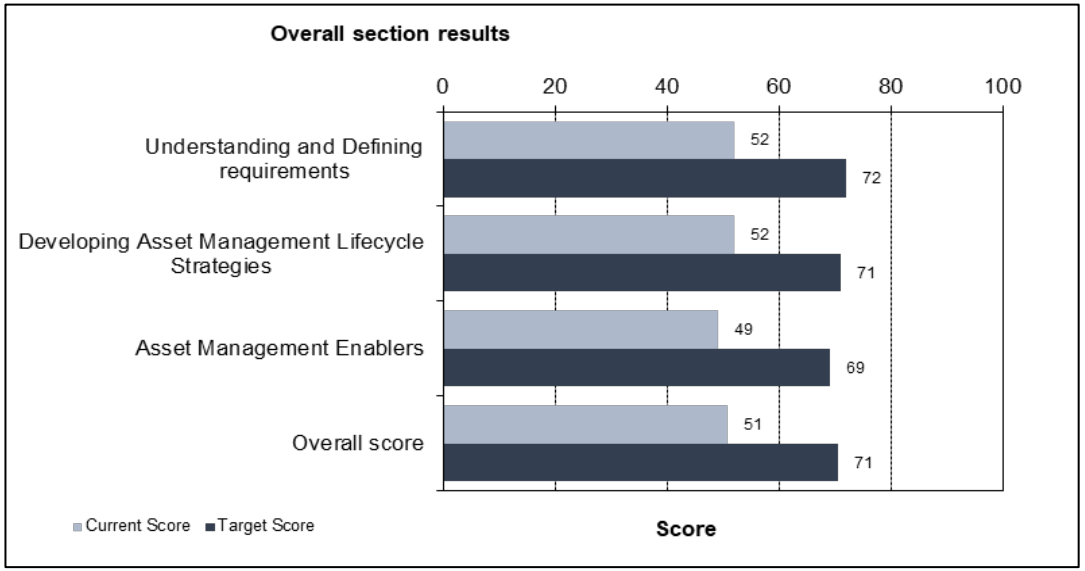
51 **Pre-Project Score**

71 **Target Score**



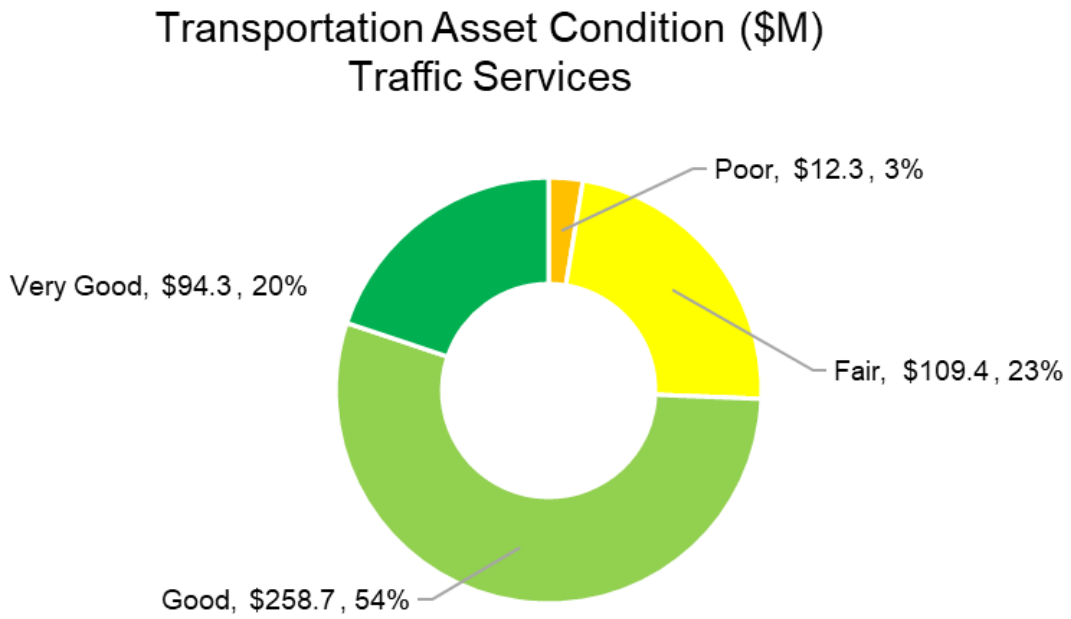
Activities to Achieve Target Score in Future

- Track and report on the performance of levels of services and associated key performance indicators.
- Establish condition assessment frameworks, approach, procedures and lifecycle activities to address identified deficiencies for each asset type (and sub asset type if applicable).
- Continue to review and update operating and maintenance requirements (based on criticality) that are specific to each asset type.
- Implement a decision support system to facilitate advanced analytics and scenario analysis to support renewal and capital planning.



D - TRAFFIC

State of Local Infrastructure Summary



Assets in Very Poor Condition

- No assets are in Very Poor condition

D - TRAFFIC

Risk Management Summary

Risk Identification

The methodology is discussed in detail in the Risk Management section of the report is applied consistently across all service areas. The table below provides a summary of a guide that can be used to interpret the results of the risk analysis.

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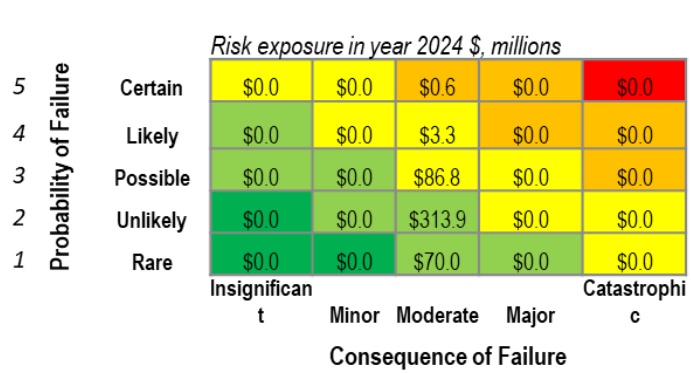
Risk Evaluation



Risk Exposure Ratings	
Very High	$0.0
High	$0.0
Medium	$92.1
Low	$384.0
Insignificant	$0.0
Total	$474.6

Risk Treatment

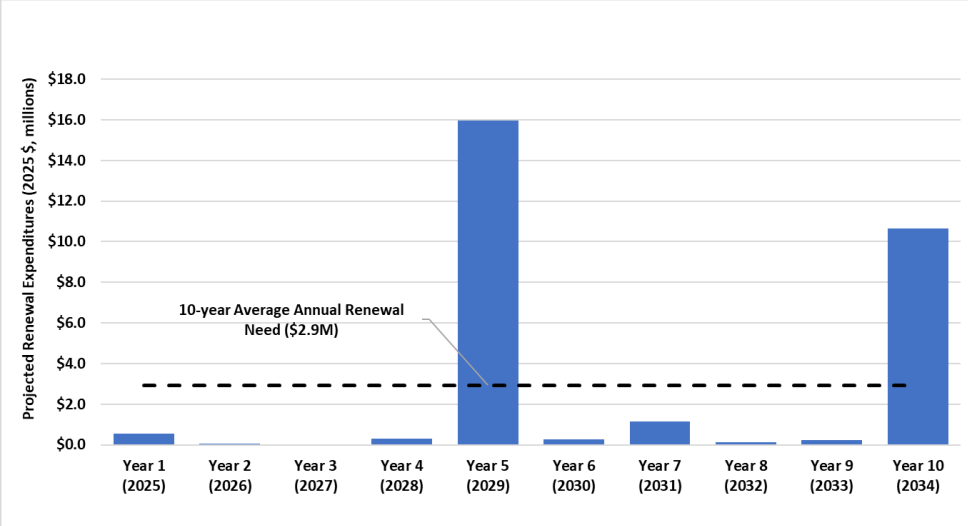
Through detailed analysis of the Risk Assessment, the results show:

- The risk map indicates that there are no assets which fall into the Very High or High risk category. That said, there is a proportion of assets which are assessed as Moderate risk.
- The analysis indicates that some assets within the Moderate risk category possess a high likelihood of failure, despite the consequence of failure being fairly low. The high likelihood of failure is due to assets being in Poor condition.
- If the nature of the service changes and the consequence of failure increases, these assets will begin to create “High” risk to the City. No further strategies are required to manage this risk at this time.

D - TRAFFIC

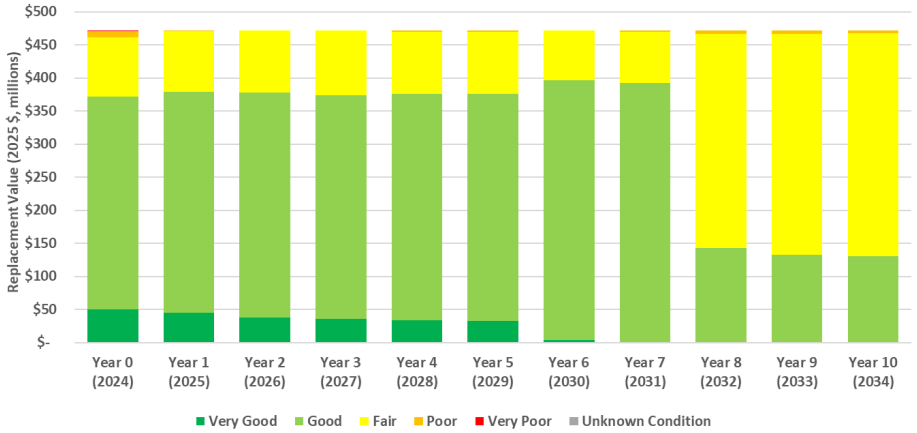
Lifecycle Management Needs Summary

Maintain LOS – Renewal Needs



Maintain LOS – Condition Forecast

Projected Funding – Condition Forecast



D - TRAFFIC

Monitoring and Improvement Plan

1. Data Enhancement & Governance

- Standardize asset classification and coding to support consistent maintenance tracking and lifecycle planning.
- Define data ownership and update protocols across departments and contractors to ensure timely updates to system records after maintenance or upgrades.
- Introduce a data confidence rating system specific to traffic assets to guide investment decisions based on data quality.

---

2. Process Optimization

- Implement a proactive inspection and maintenance schedule for signals, signage, and lighting based on asset criticality, age, and condition.
- Develop condition and performance thresholds to trigger lifecycle activities (e.g., bulb failure rate, structural pole condition, outdated controller units).
- Establish a formalized prioritization framework for capital replacement of traffic signals based on safety, age, and integration needs (e.g., adaptive signal systems).

---

3. Technology & Tools

- Integrate traffic assets into the City's GIS platform to support spatial analysis, gap identification, and network optimization.
- Use smart sensor technology and IoT devices (e.g., signal health monitoring, automated outage detection) for real-time asset performance tracking.
- Develop dashboards and analytics tools to monitor service levels, failure trends, and backlog metrics for continuous performance improvement.

General Appendices

E.1

Relevant AMP Documents & Policies

Related AM Plan Policies and Documents

Category	Document	Purpose / Description
Policies	Strategic Asset Management Policy	Establishes principles and guidelines for managing municipal assets to ensure sustainability, efficiency, and alignment with long-term service delivery objectives.
	Discretionary Capital Reserves Policy	Defines the purpose, governance, and use of discretionary reserves to fund capital projects and ensure financial sustainability.
	Debt Management Policy	Outlines the municipality's approach to borrowing, including limits, repayment strategies, and risk management to maintain fiscal responsibility.
	Capital Expenditure Control Policy	Sets procedures for planning, approving, and monitoring capital expenditures to optimize investments and control costs.
	Operating Budget Management Policy	Provides a framework for preparing, reviewing, and monitoring the operating budget to ensure financial stability and effective service delivery.
Plans and Studies	Transportation Asset Management Plan (2022)	Details the current state, expected performance, and investment strategies for transportation assets to ensure sustainable and cost-effective management.
	Service Area Asset Management Plan (2024)	Summarizes the current state, expected performance, and investment strategies for all City assets.
	Corporate Strategic Plan (2024)	Defines the municipality's overarching vision, goals, and priorities for governance, infrastructure, and community services.
	Corporate Asset Management Plan (2021)	The foundation document for the AM Plan which include relevant frameworks and templates utilized for this AM Plan.
	Official Plan (Brampton Plan)	Comprehensive land-use planning document guiding growth, development, and sustainability in Brampton.
	Brampton Mobility Plan (in development)	Strategic framework to improve mobility, accessibility, and transportation options within Brampton.
	Transportation Master Plan (2015)	Establishes long-term transportation infrastructure goals, policies, and investment strategies to enhance mobility and connectivity.
	Active Transportation Master Plan (2019)	Focuses on expanding pedestrian and cycling infrastructure to promote sustainable and active modes of transportation.
Financial Reports	Tangible Capital Asset Financial Statements	Provides an accounting of the municipality's fixed assets, including valuation, depreciation, and compliance with financial reporting standards.
	Operating and Capital Budgets	Outlines planned revenues and expenditures, balancing short-term service delivery with long-term financial sustainability.
Legislation	Accessibility of Ontarians with Disabilities Act, 2005	Provides accessibility standards to benefit all Ontarians.
	Building Code Act, 1992	Provides requirements to adhere to construction and safety practices.

Category	Document	Purpose / Description
	Conservation Authorities Act, 1990	Provides guidance for the organization and delivery of programs and services that further the conservation, restoration, development, and management of natural resources in watersheds in Ontario.
	Development Charges Act, 1997	Provides municipalities the ability to levy charges to fund growth-related municipal infrastructure, on the principle that growth pays for growth.
	Emergency Management and Civil Protection Act, 1990	Provides requirements for emergency management.
	Environmental Protection Act, 1990	Provides for the protection of the natural environment through regulations regarding discharge of contaminants into the natural environment.
	Fish and Wildlife Conservation Act, 1997	Regulates hunting, trapping, and fishing practices and aims to preserve at-risk wildlife, as well as the conservation of wildlife.
	Fisheries and Oceans Canada (DFO)	Provides guidelines and laws to protect the habitat of fisheries in proximities to roadways and bridges.
	Municipal By-Laws	Regulations approved by Council to safeguard and protect persons and properties.
	O. Reg 239/02: Minimum Maintenance Standards	Provides requirements for minimum standards of repair for municipal highways.
	O. Reg. 472/10 and O. Reg. 104/97: Standards for Bridges – Ontario Structure Inspection Manual	Defines which structures must be inspected routinely.
	O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure	Provides policies and guidelines for levels of service considerations in stormwater management assets.
	Occupational Health and Safety Act, 1990	Rules governing health and safety in Ontario's workplaces.
	Ontario Heritage Act, 1990	Provides guidance for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario.
	Ontario Water Resources Act, 1990	Provides guidance in the inspection and maintenance frequency of stormwater management facilities (i.e., storm ponds).
	Planning Act, 1990	Provides direction on municipal planning activities.

General Appendices

E.2

Maturity Assessment Framework

Section	MATURITY LEVEL				
	Aware 0-20	Basic 21-40	Core 41-60	Intermediate 61-80	Advanced 81-100
Understanding and Defining Requirements					
Analysing the Strategic Direction	The organization demonstrates an awareness of its external and internal strategic environment (evident in responses to interview questions).	A high-level, informal strategic analysis has been carried out to determine major trends (strategic issues) influencing the delivery of AM, and the results documented. Strategic organizational planning may be in place but not integrated with asset management.	Governance and leadership expectations of the AM System are expressed through an approved and AM Policy and AM Objectives. The AM policy and objectives cover all aspects of the asset lifecycle. The AM policy and objectives are being actively applied. The AM Objectives are aligned to organizational objectives.	As for Core, plus: The AM Policy and Objectives have been developed with demonstrable consideration of the implications of: · Analysis of the strategic context (internal, external, customer environment) analysed. · Analysis of the asset portfolio to determine fitness-for-purpose (current and future).	As for Intermediate, plus: Achievements against AM Objectives and delivery of the AM Policy are regularly monitored and reported. Regular environmental scans are in place to identify strategic changes implicating the AM System and required changes are managed through SAMP and AMP review processes.
LOS Framework	The organization recognises the benefits of defining levels of service, but they are not yet documented or quantified (evident in responses to interview questions).	Customer Groups defined and requirements informally understood. Some key performance measures have been defined for the activity.	Customer groups needs or expectations are analysed and documented. Level of service statements cover a range of service attributes are: · aligned with the organizational service planning and performance management processes · periodically measured and reviewed Level of service and cost relationship understood · aligned and integrated with performance measures. Level of service and cost relationship understood and described in the AMP.	As for Core, plus: Service level options (with associated risks and costs) have been presented to executive and governance teams to support level of service decisions. Levels of service are integral to decision making and business planning, with evidence that AM strategies and decision frameworks are aligned to the levels of service framework. Asset (technical) performance measures are aligned to service (customer) performance measures.	As for Intermediate, plus: A customer and stakeholder communications plan is in place outlining processes for engaging with customers and stakeholders, with evidence the plan is implemented. Key customers and stakeholders are presented with, and consulted on, significant service levels and options, with key outcomes documented in the AMP.
Demand Forecasting & Management	Future demand requirements generally understood but are not well documented (evident in responses to interview questions).	Demand forecast trends based on knowledgeable staff. Demand drivers are understood and described. Demand management strategies are being developed. Some basic demand information is being collected and monitored.	Demand forecasts are based on relevant primary demand factors (e.g. population growth) and extrapolation of historic demand trends. Demand forecasts are presented in the AMP with supporting assumptions. Risk associated with demand change are broadly understood and documented in the AMP. Strategies to manage demand (demand management strategies, asset-responses) are documented in the AMP. Demand management is considered in investment evaluations.	Demand forecasts are based on analysis of historic demand trends and all material demand factors. A range of demand scenarios is developed (e.g. high/medium/low) and presented in the AMP with supporting assumptions. Strategies to manage demand (demand management strategies, asset-responses) are documented in the AMP with supporting evidence that costs and benefits have been evaluated in determining the best strategy. Demand management is considered in all strategy and capital project decisions.	As for Intermediate, plus: Risk assessment carried out for different demand scenarios with mitigation actions identified and evaluated in determining the appropriate demand forecast scenario for AM planning. Sensitivity testing is carried out to determine confidence levels in demand forecasting scenarios. Demand risks are included in organizational risk registers.

Section	MATURITY LEVEL				
	Aware 0-20	Basic 21-40	Core 41-60	Intermediate 61-80	Advanced 81-100
Understanding and Defining Requirements					
Asset Condition & Performance	The need for condition and performance information is understood but is not quantified or documented.	Condition and performance information is based on knowledgeable staff and is described in the AM Plan. Some asset condition and performance data is collected but is not well-linked to defined levels of service and performance measures.	Adequate data and information is collected to report current performance against levels of service. A condition and performance monitoring process is documented and followed for critical assets. Condition and performance information is suitable to be used to plan and prioritise short term maintenance and renewals. Performance results are reviewed to identify areas failing to achieve targets.	A condition and performance monitoring strategy and programme is developed for all assets, with consideration of factors such as asset criticality, inherent risk, lifecycle and demand. Condition and performance information is routinely captured and updated in line with the programme. Future condition and performance information is modelled to assess whether levels of service can be met in the long term. Performance results are regularly evaluated to determine appropriate responses.	The condition and performance assessment strategy is implemented and audited with a 5+year data history.
The Strategic AMP	The organization is aware of the concept of, and benefits of, a SAMP and AM System (evident in responses to interview questions).	The AM System is broadly understood in terms of the assets and functions covered. A process for the establishing the AM System has commenced (though these aspects may not be documented in a 'SAMP').	The scope of the AM System is defined. The links between organizational and AM objectives are defined. The process for establishing and maintaining the AM System is developed (e.g. the AM Improvement Plan). Strategic issues have been identified and options developed. The above aspects are documented in the SAMP or equivalent document. SAMP input from relevant teams and stakeholders (internal and external) occurs.	As for Core, plus: The relationships and processes between the AM System and other parts of the organization are defined in the SAMP or equivalent document. Strategic issues and options have been analysed and prioritised and a long-term strategy has been developed. There is evidence that the SAMP is widely communicated and is actively used to support decision making . A regular SAMP review and approvals process is in place.	A SAMP is in place, with content as per ISO 55002. Formal review, audit and approvals processes are documented with evidence of implementation.
Developing Asset Management Lifecycle Strategies					
Managing Risk & Resilience	Risk management is identified as a future improvement (evident in responses to interview questions).	High level organizational risks are identified and reported to management. Critical services and assets are understood and considered by staff involved in maintenance / renewal decisions (evident in responses to interview questions).	An organizational risk management policy, framework and process is in place. An asset criticality framework has been developed and critical assets are recorded in the AIMS. Activity risks are identified in the risk register and regularly updated and monitored. Management strategies for highest risks and most critical assets are developed and documented (in the AMP, risk management plan or similar). The approach to managing asset network resilience is described in the AMP or other supporting document.	As for core, plus: A resilience strategy has been developed (may be part of the SAMP or AMP) and is being implemented. Systematic risk analysis and resilience considerations are incorporated into major decisions. The risk register is regularly updated, actions monitored and reported to management. Risk is managed, prioritised and escalated consistently across the organization.	Asset risks are assessed for multiple failure modes. An ongoing programme of asset network and organizational resilience assessments are completed with improvements identified and actively progressed. Risk and resilience levels are quantified for the organization and risk mitigation options to close identified gaps are evaluated. Risk and resilience are integrated into all aspects of decision making.

Section	MATURITY LEVEL				
	Aware 0-20	Basic 21-40	Core 41-60	Intermediate 61-80	Advanced 81-100
Developing Asset Management Lifecycle Strategies					
Operational Planning	Operational processes based on historical practices but there is awareness of opportunities to improve and optimise operational activities.	Operating plans are available for critical operational areas. Operational scheduling is largely based on historic practices with adjustments to planned and unplanned maintenance frequencies based on experienced staff and contractor knowledge. Operations organizational structure in place and roles assigned.	Operating plans are available for all operational areas. Incident and emergency management plans are in place. Operational support requirements have been reviewed against good practice and are in place, including consideration of critical spares requirements. Trends in planned and unplanned maintenance and renewal activities are analysed and trade-offs considered in determining optimal maintenance and renewal frequencies.	As for core, plus: Operational objectives and intervention levels defined (aligned to AM Objectives) and results analysed to drive improvements. A formal and regularly reviewed operational planning process is in place. Incident and emergency management plans are regularly tested. Optimal planned and unplanned maintenance and renewals programmes are established with analysis of operating cost, asset condition/ performance, risk and asset criticality.	Decision frameworks (e.g. multi-criteria analysis, benefit-cost analysis) are used to prioritise and optimise expenditure across planned and unplanned maintenance and renewals programmes. Continual review and improvement can be demonstrated for all operational processes. Reviews are undertaken after significant events and recommendations are implemented.
Capital Works Planning	Capital investment projects are identified during annual budget process. There is awareness of the need for longer-term capital budgeting (evidenced in interviews).	There is a schedule of proposed capital projects and renewal programmes based on historical costs and staff judgement of future requirements. Renewals strategies are verbalised in interviews but are not well documented. CAPEX projects and programmes justified in AMP (high level) and supporting CAPEX database (detail).	Projects have been collated from a wide range of sources (e.g. through reviews of asset performance, growth, risk management and renewal analysis) and are collated into a project register. Projects are tracked (in a project register or similar) through capital planning stages. Short term capital projects are fully scoped (including options analysis) and cost-estimated. Renewals programme is based on age and limited condition data. The CAPEX programme is prioritised, based on agreed decision criteria, to rank the relative importance of capital projects and programmes.	As for core, plus: A capital delivery / options evaluation framework is in place and used consistently across the organization. Formal options analysis and business case development has been completed for major projects in the next three years. Long term major capital projects are conceptually identified and broad cost estimates are available. A formal prioritisation framework is routinely applied to all capital projects and programmes (utilising a multi-criteria or benefit-cost approach).	As for intermediate, plus: Formal options analysis and business case development has been completed for significant major projects beyond 3 years. Long-term capital investment programmes are derived from advanced decision techniques such as predictive renewal and network modelling which evaluate level of service and cost scenarios.
Asset Financial Planning & Management	Financial planning of asset related expenditure is largely an annual budget process, but there is intention to develop longer term forecasts (evident in interviews).	Financial planning of asset related expenditure is largely an annual budget process, but there is intention to develop longer term forecasts (evident in interviews).	Depreciated replacement cost valuations aligned to asset information used in renewal forecasts. Asset expenditure categories are suitable to enable AM costing / forecasting analysis. Asset-related financial forecasts are aligned to operational and capital planning and forecasting processes. Consequential OPEX for all new assets is included in OPEX forecasts. Asset and corporate long-term financial planning processes are aligned. Funding strategies are developed and documented.	As for core, plus: Long term asset funding options are regularly reviewed and evaluated with consideration of distribution of benefits (user pays), practicality, financial prudence and intergenerational equity. Major expenditure proposals incorporate whole of life costing.	As for Intermediate, plus:As for intermediate, plus: Advanced financial modelling includes sensitivity testing of assumptions, demonstrable whole of life costing and cost analysis for level of service options. A decision framework enables budgets, projects and programmes to be optimised across all activity areas. Formal risk-based sensitivity analysis of financial forecast scenarios is carried out. Asset and financial data and reporting are fully integrated or regularly reconciled.

Section	MATURITY LEVEL				
	Aware 0-20	Basic 21-40	Core 41-60	Intermediate 61-80	Advanced 81-100
Developing Asset Management Lifecycle Strategies					
AM Plans (for the Asset Portfolio & Assets)	Stated intention to develop AMPs (evident in responses to interview questions).	A portfolio AMP contains basic information on assets, service levels, planned works and financial forecasts and future improvements. The AMP may not cover all asset types or services, may only have a short term focus, may be developed in isolation from organizational planning, or may not be otherwise sufficiently mature for the organization.	Portfolio AMPs contain core content including asset information, levels of service, demand and lifecycle strategies linking to financial forecasts with key assumptions stated. AMPs are aligned with corporate long-term strategic and financial plans and objectives and are signed off by managers. AMP input from relevant teams and stakeholders. Internal and external reviews occur. AMPs are updated in accordance with the AM Policy / SAMP.	As for core, plus: The Portfolio AMP is supported by Asset Class AMPs, where appropriate. AMPs include confidence levels, detailed significant assumptions and associated risks. AMPs are fully integrated with corporate long-term financial planning process and iterations are formally managed. AMPs are periodically updated, discussed and approved by governance and leaders.	As for intermediate, plus: AMPs are managed as a 'live' document and updated when significant changes signalled. Formal review, audit and approvals processes are documented with evidence of implementation.
Asset Management Enablers					
AM People & Leaders	The organization recognises the benefits of an asset management function within the organization, but has yet to implement a structure to support it (evident in responses to interview questions).	AM functions are carried out by small groups, but AM is not embedded or coordinated across the organization.	Regular ongoing AM coordination processes established (e.g. a cross-divisional committee) which support an integrated and consistent approach across the organization. Position descriptions incorporate the main AM roles and training is made available suitable to those roles. Visible ownership and support of AM by governance and leadership and awareness of AM purpose across most of the organization (evident through interviews).	As for core, plus: Leadership is involved in AM coordination (e.g. membership on a regular AM Steering Group or separate AM Governance coordination group). An internal AM communications and training plan is in place and being implemented. Roles reflect AM System competency requirements (defined in SAMP or equivalent document) and are defined in all relevant position descriptions. Demonstrable alignment between AM objectives, team and individual responsibilities.	As for core, plus: Leadership is involved in AM coordination (e.g. membership on a regular AM Steering Group or separate AM Governance coordination group). An internal AM communications and training plan is in place and being implemented. Roles reflect AM System competency requirements (defined in SAMP or equivalent document) and are defined in all relevant position descriptions. Demonstrable alignment between AM objectives, team and individual responsibilities.
Asset Data & Information	Asset information is not available. Awareness of need for asset information (evident in responses to interview questions).	Basic physical asset information recorded (e.g. location, size, type), but may be based on broad assumptions or not complete.	Sufficient information to complete depreciated replacement cost valuation (physical attributes, replacement cost and asset age/life) and to manage operational requirements for assets. Asset hierarchy, identification and attribute standards documented and implemented. Metadata held as appropriate. A formal information needs analysis has been undertaken and an Information Strategy and data improvement plan developed. Knowledge of asset criticality and risk supports the regularity of data collection and updating.	As for core, plus: A reliable register of physical, financial and risk attributes recorded. The Information strategy and data improvement programme are being actively monitored and reported. The use of asset information in asset management planning and decision making is reviewed for effectiveness. Documented, systematic and audited data collection process in place based on a formal information needs analysis.	As for intermediate, plus: All asset data is accurate, consistent and reliable and is used to inform both short term and long-term decision making. Information on work history type and cost recorded at an appropriate asset or component level to enable analysis. Systematic and fully optimised data collection programme with supporting metadata.

Section	MATURITY LEVEL				
	Aware 0-20	Basic 21-40	Core 41-60	Intermediate 61-80	Advanced 81-100
Asset Management Enablers					
AIMS	Intention to develop an electronic asset register / AIMS (evident in responses to interview questions). A financial fixed asset register may be in place but only captures accounting data.	Asset register capable of recording all core asset attributes – capacity, type, size, material, etc. Asset information reports can be manually generated for AM Plan input. Simple asset database in use (such as spreadsheet or Access database).	Industry-recognised AIMS or asset register system enables hierarchical asset capture and reporting to component level. AIMS enables live tracking of customer requests linked to maintenance tasks. AIMS provides basic AM reporting capability - condition / performance, renewal forecasts, valuations. The AIMS meets most user requirements (functionality, reporting, usability).	Financial, asset and customer service systems are integrated or able to be fully reconciled (to provide a 'single source of truth' for all data). An information systems strategy for asset related systems is implemented and regularly reviewed. AIMS has spatial mapping capability or interface. AIMS captures remote, 'live' data from operators. More automated analysis and reporting on a wider range of information. AIMS provides renewal modelling capabilities using factors such as age, condition, criticality and performance.	All advanced AM functions are available, including asset risk assessment, predictive maintenance and renewal modelling for different level of service scenarios. Availability of 3D models to enable visual integration with data (e.g.: BIM/Digital Twin)
AM Process Management	Awareness of need to formalise systems and processes (evident in responses to interview questions).	Simple AM process documentation in place for service-critical AM activities, covers operation, maintenance and renewal activities.	Critical AM processes are identified, documented, monitored and subject to review. There is evidence that these critical AM processes are followed in practice. AM process interfaces with other teams and organisations, are defined and managed.	As for core, plus: All AM processes have been identified and prioritised. AM Process documentation implemented in accordance with the AM System to appropriate level of detail, depending on process criticality (including business process mapping or similar). All internal management systems and cross-departmental processes are aligned and managed.	As for intermediate, plus: AM processes are regularly reviewed and audited and improvements implemented. ISO certification of processes to multiple standards for large asset intensive organisations. AM System has been assessed and meets the requirements of ISO 55001. Strong integration of all management systems and cross-departmental processes within the organisation.
Outsourcing & Procurement	Procurement and service delivery practices are informal. Organisation is aware of different service delivery options (evident in responses to interview questions).	Service delivery and procurement practices clearly documented (internal and external), generally following historic approaches.	Procurement strategy/policy in place. Internal service level agreements (SLA) with the primary internal service providers, and contracts for the primary external service providers, are in place. Contract and SLA performance specifications are aligned to levels of service. Procurement and contract performance management processes are in place and regularly reviewed.	As for core, plus: Risks, benefits and costs of various outsourcing and lease/buy options considered in determining the service delivery approach. Suitably qualified roles manage procurement and contract management processes. Procurement and contract management processes are regularly audited and improvements identified.	All potential service delivery mechanisms reviewed and formal analysis carried out to identify best delivery mechanism.

Section	MATURITY LEVEL				
	Aware 0-20	Basic 21-40	Core 41-60	Intermediate 61-80	Advanced 81-100
Asset Management Enablers					
Continual Improvement	Recognition of the need for AM improvement process, evident in responses to review questions.	Improvement actions identified and allocated to appropriate staff and progress monitored.	Current and future AM maturity assessed (gap analysis) and used to identify improvement actions. Appropriate maturity has been defined for each AM function. Identified improvement actions collated from the maturity assessment and other relevant studies and have been prioritised with input from relevant staff and management. Improvement plans identify timeframes, deliverables, resources and responsibilities and are monitored by the AM team. Improvement plans are monitored.	As for core, plus: Formal periodic monitoring of the AM improvement plan is in place with reporting to appropriate levels of the organisation, at frequencies specified in the SAMP or AMP. Major improvement actions are managed within the organisation's project management framework. Evidence of effective change management practices support AM Improvement Plan implementation. A formal audit and review framework is established.	A regular cycle of audit and maturity assessment is undertaken with actions fed back into improvement planning. KPIs for monitoring the effectiveness of AM improvement plan outcomes are reported.

General Appendices

E.3

Asset Hierarchy

Transportation Services

Phase

Level 2 Services Areas

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Public Works & Engineering

Level 3 Services

Transportation Services

Level 4 Linear vs. Discrete

- Roadway Network
- Structures
- Traffic Services
- Sidewalks/ Walkways
- Transportation Fleet
- Transportation IT (software)
- Transportation Facility

Responsibility of Other service areas:
Refer to Fleet, IT and Facility asset hierarchy

Level 5 Geographic Area

Level 6 Types of Assets

- Arterial
- Collector
- Local
- Bike Lane
- Traffic Vertical Calming Devices
- Bridges
- Culverts
- Walls
- Rails
- Gateway Features
- Steps
- Traffic Signals
- Street Lighting
- Traffic Signs
- Sidewalks
- Walkways
- Multi-use Paths

Level 7 Disciplines

- Roadway Bridges
- Pedestrian Bridges
- Noise Walls
- Retaining Walls
- Fences
- Guiderails
- Handrails

Level 8 Classification Level (Equipment)

Level 9 Component

Level 10 Subcomponent

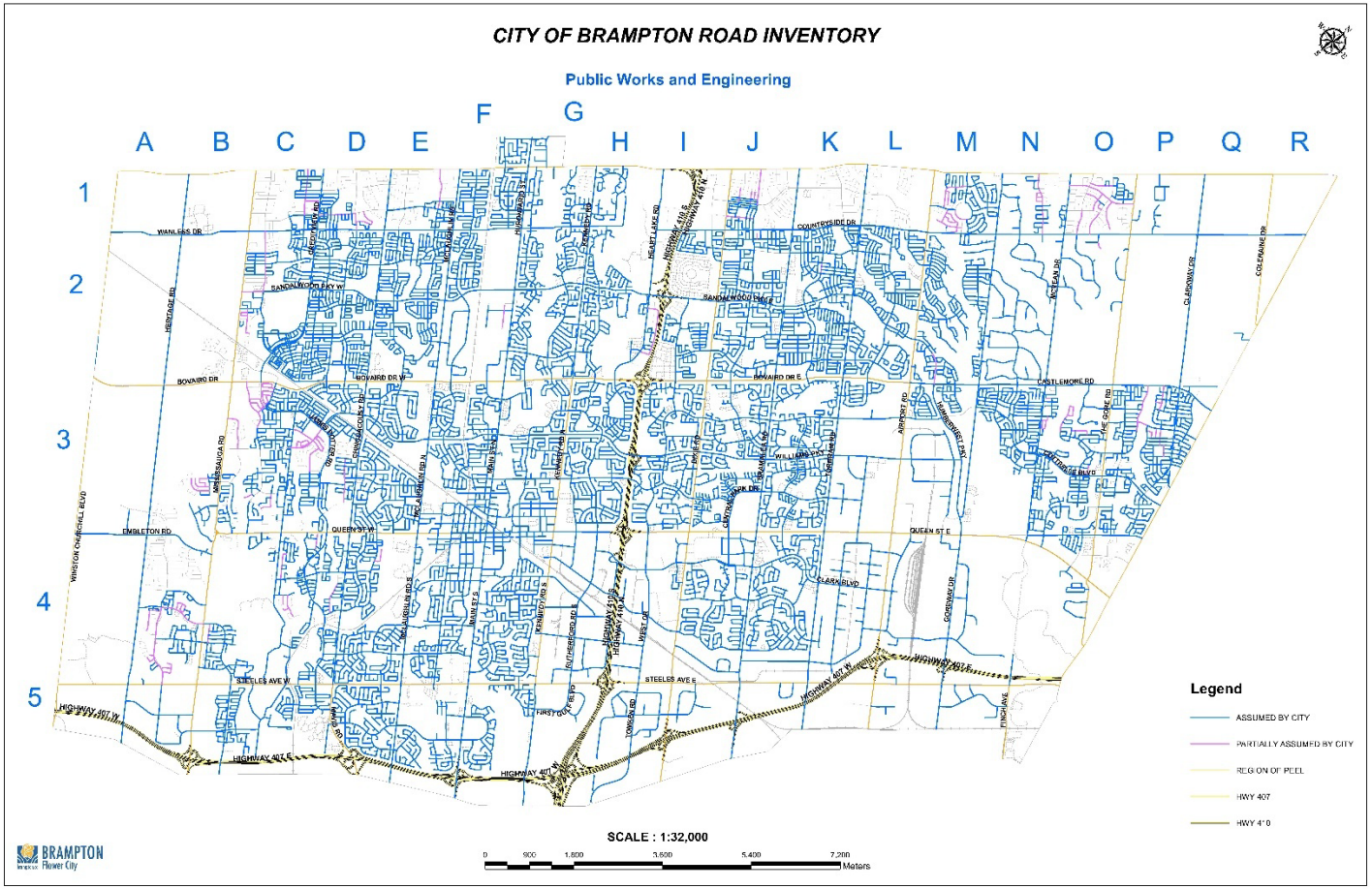
E.4

O.Reg 588/17 LOS Images

Roads

The following map of the road network shows its level of connectivity with the community.

Figure D.1 Road Network



The condition of the Arterial, Collector and Local Roads is shown below.

Figure D.2 Arterial Road Network

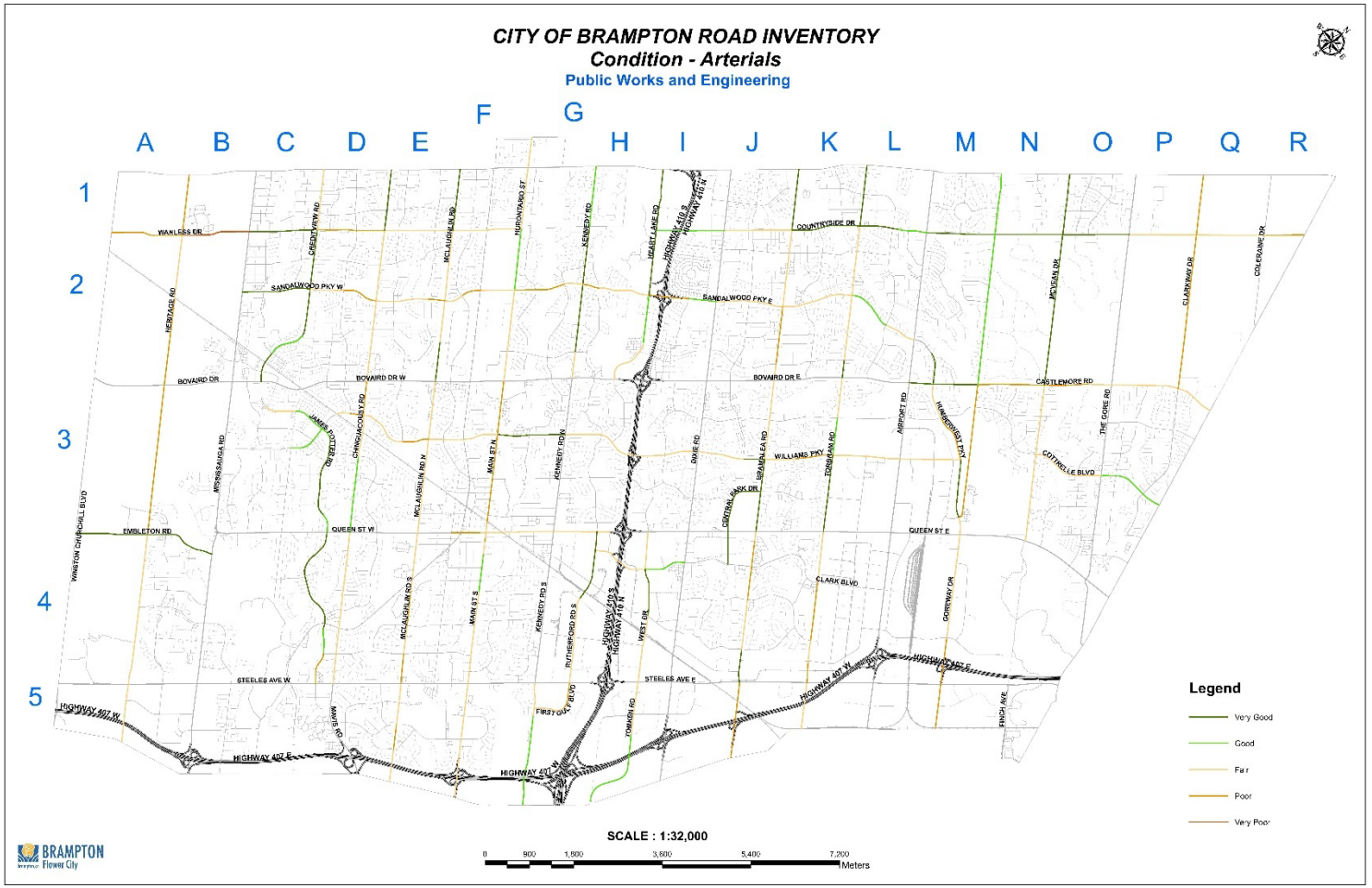


Figure D.1 Collector Roads

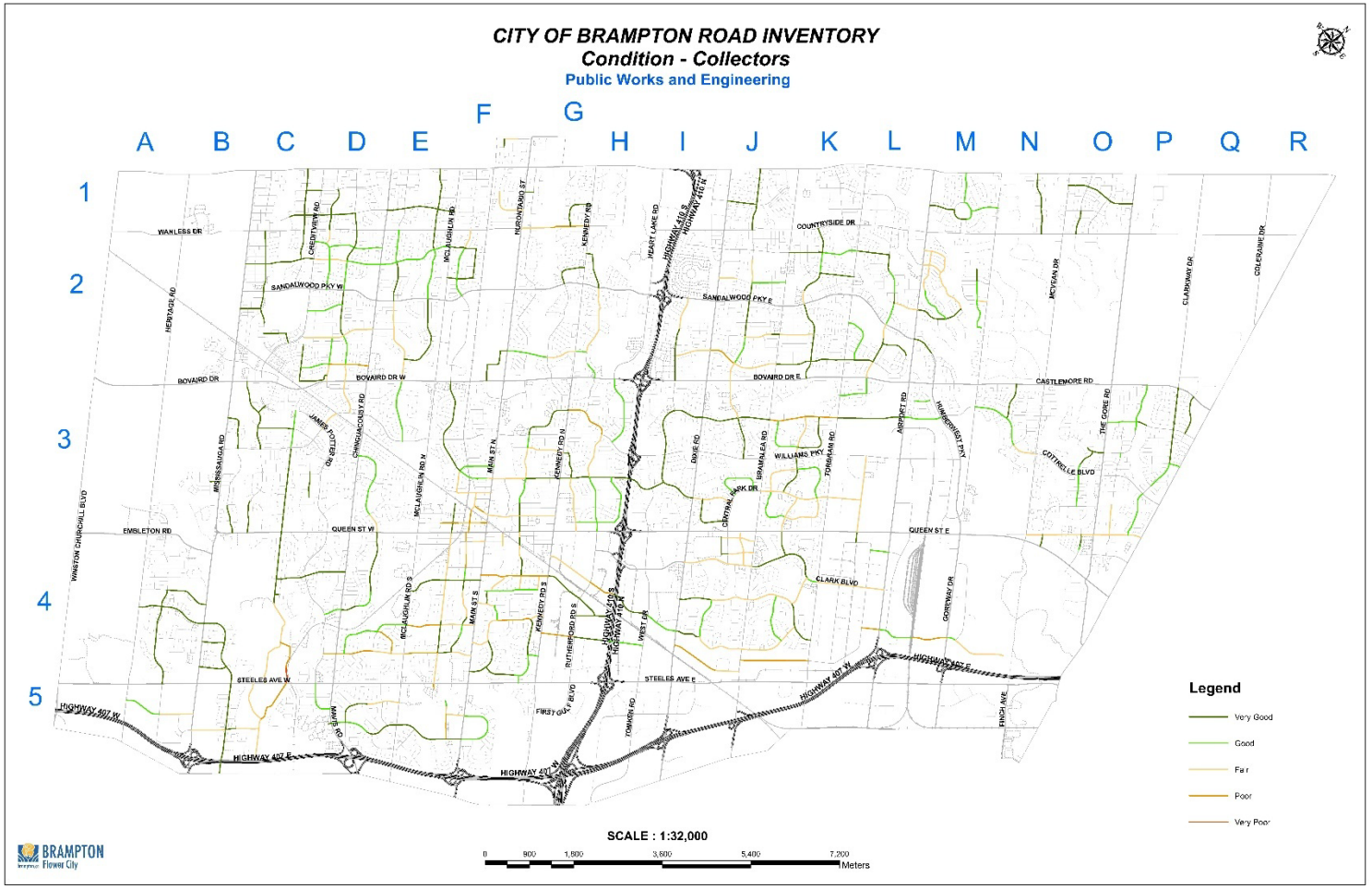
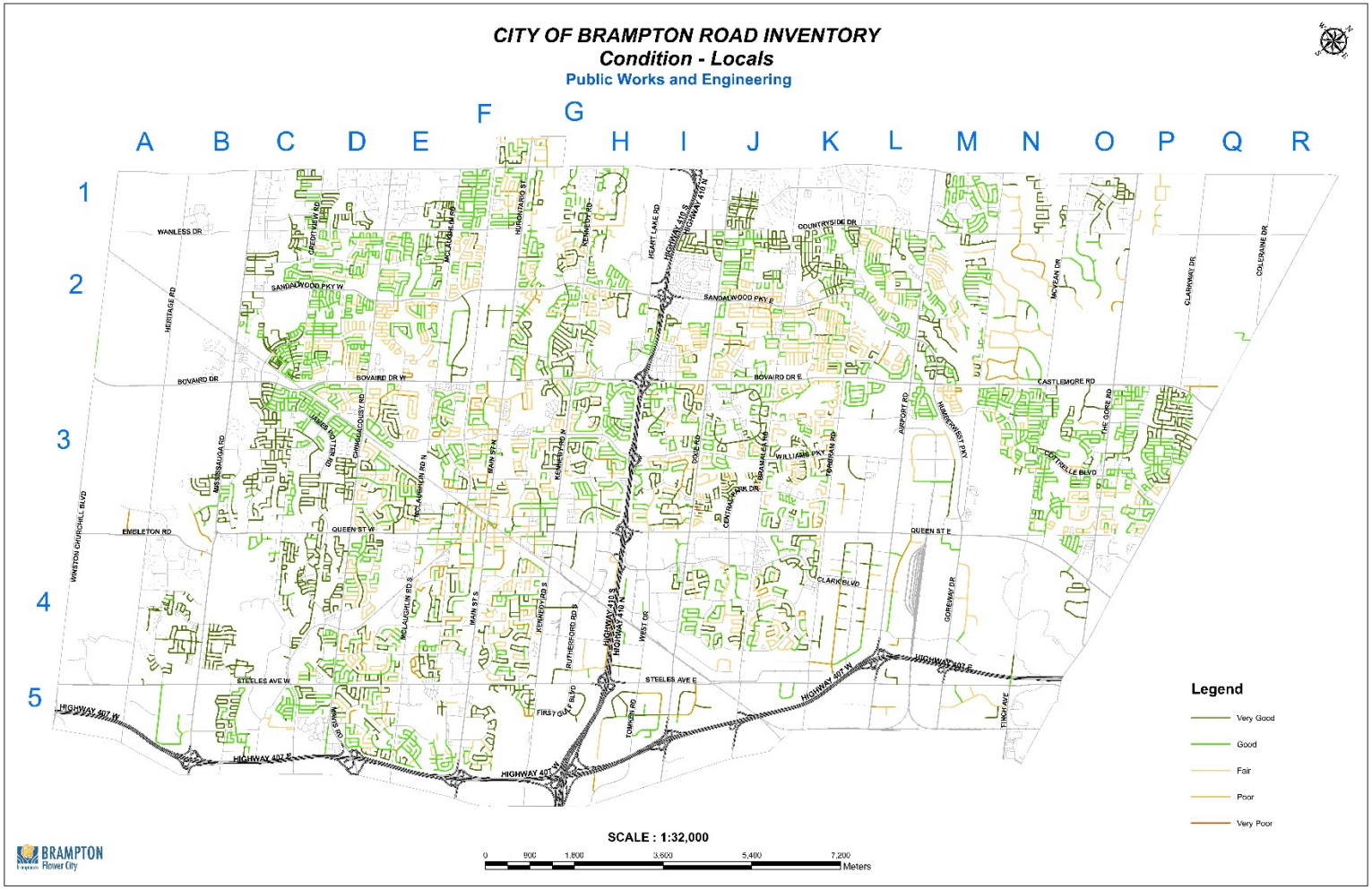
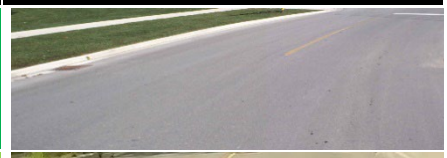
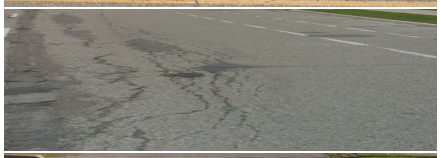
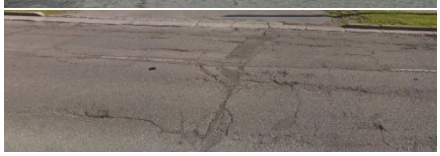


Figure D.2 Local Roads



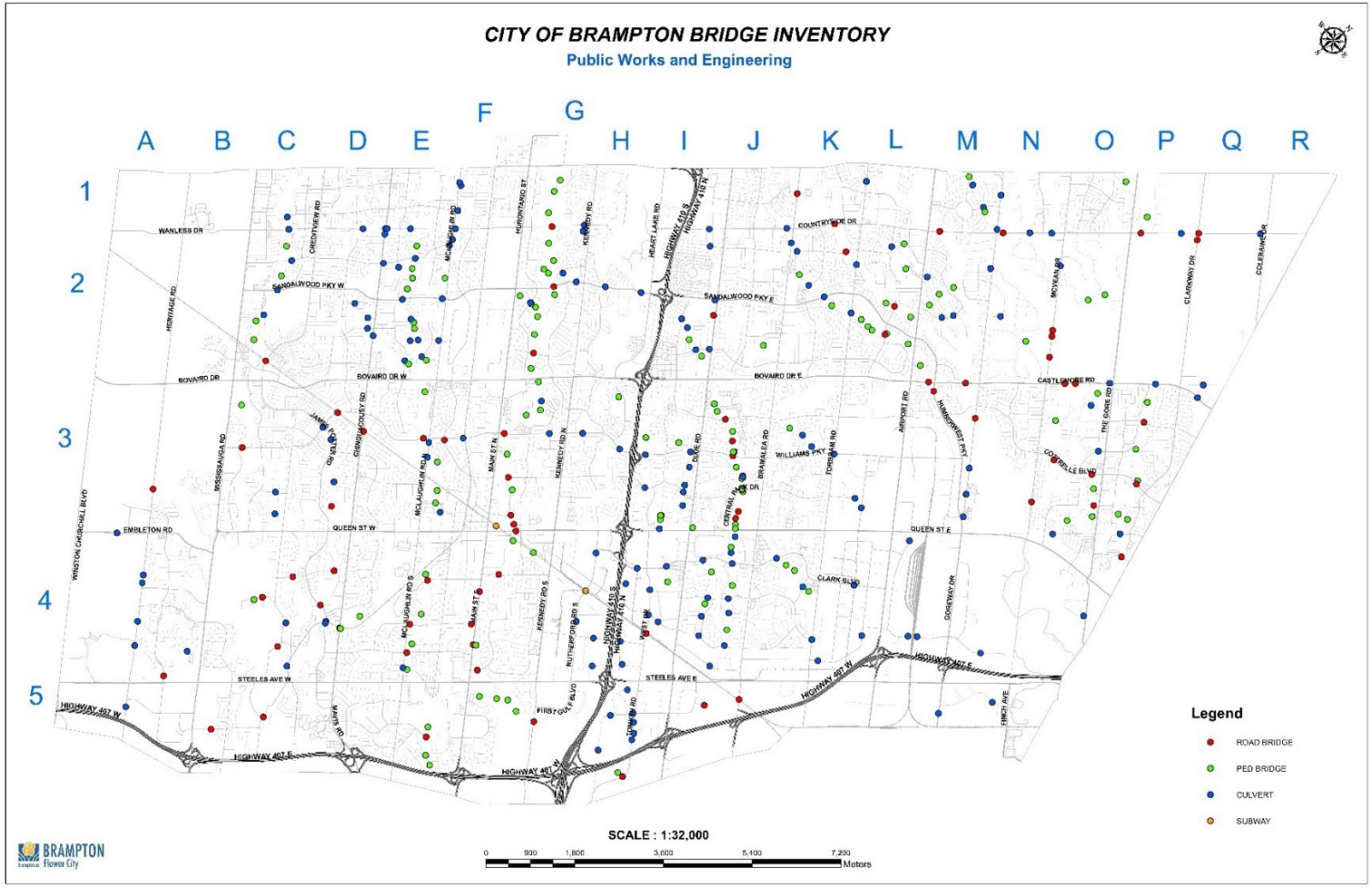
Pavement condition data is collected on the entire road network every four years. Data collected includes the type, extent and severity of distresses (cracks and rutting) and smoothness or ride comfort of the road. An overall PCI is calculated from all collected data and is used as input into the annual road resurfacing and reconstruction program. The index is scaled from 0 to 10 and has been divided into ranges to assess condition. Examples of roads in each of the PCI rating categories are provided in the following table:

Condition Grade	Urban Road Example
Very Good (PCI = 8 to 10)	
Good (PCI = 7 to 8)	
Fair (PCI = 6 to 7)	
Poor (PCI = 5 to 6)	
Very Poor (PCI < 5)	

Bridges and Culverts

The need for mobility requires that the City's roadway system be kept in a state of good repair. Structures are a vital part of this system. An effective structure management system involving the systematic inspection of the structures on the roadway network is required to maintain structures in a state of good repair. In accordance with O. Reg. 104/97 Standards for Bridges, the City conducts detailed inspections of all its bridges every two years. All inspections are supervised by a trained, professional engineer following the guidelines in Ontario's Structure Inspection Manual (OSIM) which sets standards for the visual inspection and condition rating of bridges and their elements. The inspector assesses each bridge element and records the condition in each of Five condition states: Very Good, Good, Fair, Poor, and Very Poor. The inspector also records suspected performance deficiencies and recommends maintenance and renewal activities, with costs. The typical follow-up action for a suspected load carrying capacity deficiency would be to carry out a strength evaluation of the structure (or element) to determine the load carrying capacity in accordance with the requirements of the Canadian Highway Bridge Design Code.

Figure D.3 Bridges and Culverts



An overall Bridge Condition Index (BCI) is calculated from all collected data and informs the annual bridge and structural culvert rehabilitation and reconstruction program. The index is scaled from 0 to 100 and has been divided into ranges to assess condition. The BCI is not used to rate or indicate the safety of a bridge or structural culvert. Any safety issues are immediately reported by the inspector to supervising engineers and maintenance crews. Condition grade examples are provided in the following table:

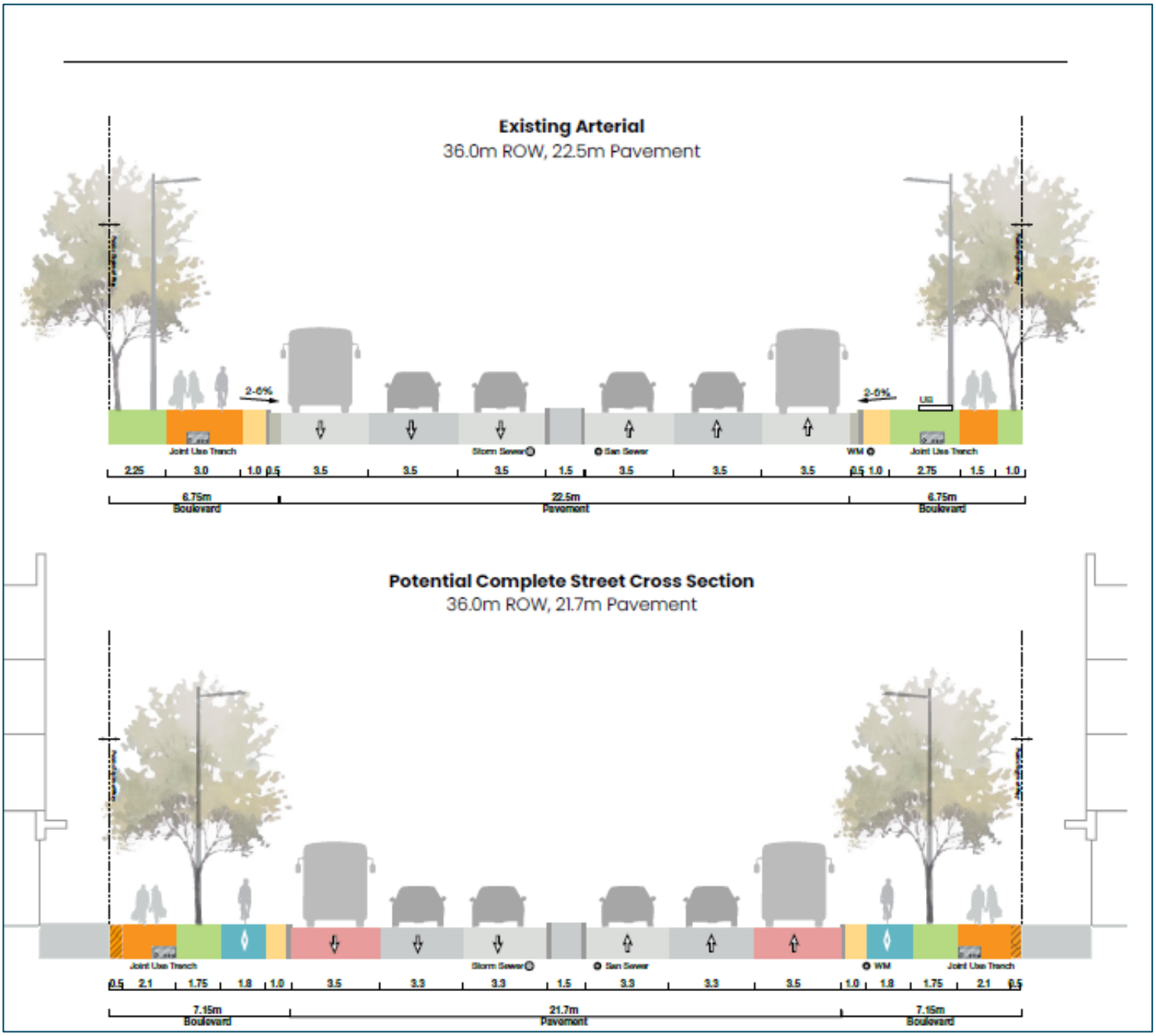
Table D.1 Bridge Condition Grade Scale

Condition Grade	Bridge Examples	Culvert Examples
Very Good BCI >90	 J3RBPKE387 – Chinguacousy Park road bridge over pond (2019 BCI = 99)	 L1RCNTH386 – Torbram Rd over Humber Tributary (2019 BCI = 96)
Good BCI >70 to 90	 B3RBNTC001 – Heritage Rd over Credit River (2019 BCI = 74)	 E2RCNTF244 – Lormel Gate over McLaughlin Rd (2019 BCI = 76.5)
Fair BCI >60 to => 70	 G4RBWTE085 – Bartley Bull Pkwy over Etobicoke Creek (2019 BCI = 67.8)	 I3RCNTE109 – Hazelwood Dr over Etobicoke Creek (2020 BCI = 67)
Poor BCI >50 to =>60	 G3RBNTE075 – Scott St over Etobicoke Creek div. channel (2020 BCI = 59.0)	 B4RCNTC005 – Heritage Rd over Credit River Tributary (2019 BCI = 56.9)
Very Poor BCI < 50	 TRCA bridge as an example: Wylie bridge (2020 BCI = 49)	 No culvert in Very Poor Condition

General Appendices

E.5

Brampton Complete Streets Graphic



From City of Brampton Complete Street Guide 2023

General Appendices

E.6

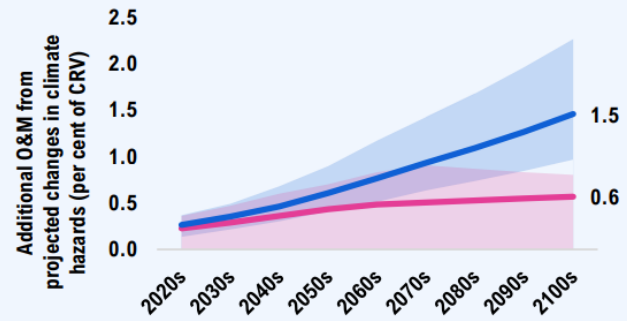
FAO Climate Change Scenarios

Costing Climate Change Impacts to Public Infrastructure: Transportation

Medium emissions scenario High emissions scenario

Road

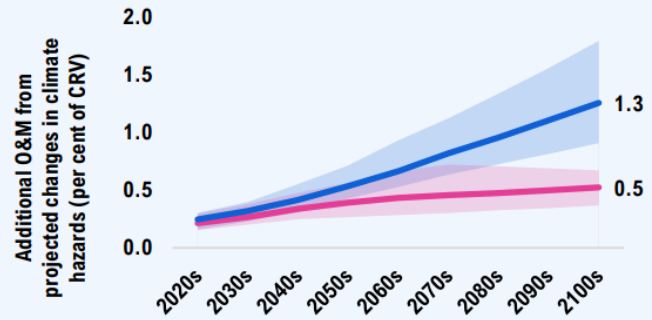
Operations & Maintenance



- Trends in extreme rainfall and extreme heat are projected to increase the O&M (as a share of CRV) of public roads in Ontario in both emissions scenario.
- In the medium emissions scenario, the O&M is projected to increase by 0.6 percentage point of CRV by the end of the century.
- In the high emissions scenario, the O&M is projected to increase by 1.5 percentage points of CRV by the end of the century.

Bridges

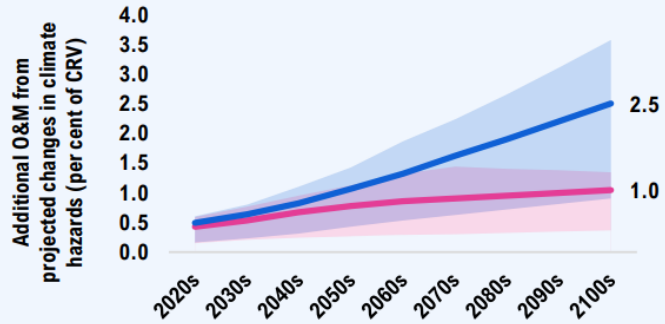
Operations & Maintenance



- The O&M as a share of CRV of bridges is projected to increase due to the increase in extreme rainfall.
- In the medium emissions scenario, the O&M is projected to increase by 0.5 percentage point of CRV by the end of the century.
- In the high emissions scenario, the O&M is projected to increase by 1.3 percentage points of CRV by the end of the century.

Large Structural Culvert

Operations & Maintenance



- Increases in extreme rainfall are projected to increase the O&M (as a share of CRV) of public culverts in Ontario in both emissions scenarios.
- In the medium emissions scenario, the O&M is projected to increase by 1.0 percentage point of CRV by the end of the century.
- In the high emissions scenario, the O&M is projected to increase by 2.5 percentage points of CRV by the end of the century.

E.7

Asset Interdependencies

Governance of Interdependent Service Areas

The City of Brampton provides a series of different services to its residents. Although many of the services provided by the City may be managed and provided independently from each other, certain service areas are codependent and coordinate asset management activities to utilize relevant expertise and achieve cost efficiencies. Currently, much of this coordination occurs at the departmental level and has largely remained undocumented as part of the City's overall asset management strategy. The City recognizes that development of a framework to identify asset interdependencies is important in order for the City to coordinate asset management activities across service areas in the most cost-effective manner.

Asset interdependency is defined as:

> *"The extent to which customer levels of service (capacity, functionality and quality) provided by one service area, are dependent on the lifecycle activities carried out by another service area."*

In order to help identify the asset interdependencies across different service areas, an interdependence model was developed as part of the 2021 Corporate AMP. The model outlines and qualifies the relationship between customer levels of service and lifecycle activities across service areas. Customer levels of service are considered based on asset capacity, functionality and quality while lifecycle activities are considered for operations/maintenance, renewal, replacement and expansion activities. City staff undertook a qualitative review to identify if a dependence exists for each level of service attribute relative to the lifecycle activities across service areas. Furthermore, the City has also identified the potential asset relationships with external partners particularly the Region of Peel as it relates to Regional roads, water, wastewater, and stormwater services. Table 16 summarizes the services areas that have been considered under this exercise.

Table 16 – Inter-Municipal Asset Interdependency

Area	Service Areas Considered
City of Brampton	• Transportation • Stormwater • Facilities • Transit • Information Technology • City Support Fleet • Fire • Parks • Recreation • Cultural Services • Library • Animal Services
Region of Peel	• Stormwater • Water • Wastewater • Roads

Note: Transportation and Stormwater assets are captured in their respective departmental plans but are included here for completeness. The services provided by the Region of Peel represent the Regional responsibility as of January 1 2024.

The dependence of levels of service to other service area lifecycle activities were assessed based on a scoring system out of 12 points. A score of 12/12 would indicate a high asset dependence where a score on the lower end of the spectrum, closer to 1/12, would indicate low asset dependence. The scoring system was derived qualitatively with consideration to some key factors:

- Where justifiable and interdependence is more obvious, the relationship between service areas is considered to be strongly dependent. Dependence exists where it is understood there is a need for capital coordination and/or an SLA (Service Level Agreement) between the service

areas that clearly states the services required and the desired levels of service.

- Avoiding indirect interdependencies, such as risk events, other infrastructure external to the City such as utility infrastructure or phone lines, and hypothetical scenarios. This maintains the analysis focused on direct implications to the City asset management practices.
- Where interdependency is not obvious, it would be assumed that the relationship between service areas is lower.

The interdependence is then assessed on a qualitative basis based on the 12 point scoring system. Table 17 outlines a summary of the scoring system. A score greater than 66% (out of 12) indicates a strong dependence, indicated by a darker colour. Lighter colours indicate weaker dependence. A not applicable category is assigned in comparison of service areas with themselves, as this comparison does not add value to the analysis.

Table 17 – Interdependence Assessment Parameters

Colour Code	Description	% of Interdependence (out of 12)
	Strong Dependence	>66%
	Moderate Dependence	34%-66%
	Low Dependence	1%-33%
	No Dependence	0%
	Not Applicable	Not Applicable

Note: Not applicable applies to comparisons of service areas with themselves which are excluded.

Figure 29 summarizes the key results of the qualitative asset interdependency analysis that was undertaken. There are a number of service areas where strong interdependency exists between the lifecycle activities and the levels of service provided by another service area.

To optimize service delivery in Brampton, it's crucial to address these interdependencies among its service areas. This would include prioritizing identification of critical interdependencies, establishing effective communication channels, fostering collaboration and joint planning, enhancing data sharing and integration, developing SLAs, and implementing robust monitoring and evaluation mechanisms. By following these best practices, the City can streamline operations, allocate resources effectively, and improve service delivery to residents and stakeholders.

Figure 29 – Asset Interdependence Matrix

		City Infrastructure (Technical Levels of Service)												Regional Infrastructure (Technical Levels of Service)		
	Dependence Matrix	Transportation	Stormwater	Facilities	Transit	Corporate Information Technology	Fleet	Fire Services	Parks	Recreation	Cultural Services	Brampton Library	Animal Services	Storm Water (Regional)	Water / Wastewater (Regional)	Roads (Regional)
City Services (Lifecycle Activities)	Transportation															
	Stormwater															
	Facilities															
	Transit															
	Corporate Information Technology															
	Fleet															
	Fire Services															
	Parks															
	Recreation															
	Cultural Services															
	Brampton Library															
	Animal Services															
Regional Services (Lifecycle Activities)	Storm Water (Regional)															
	Water / Wastewater (Regional)															
	Roads (Regional)															

E.8

Financing Strategy Assumptions

Forecasted Budget Analysis Assumptions

Category	Analysis Assumptions
Capital Forecasted Budget	• 5-Year Capital Budget as Baseline: The City's approved 5-year Capital Plan was used as the foundation for projecting capital revenues related to transportation assets. • Categorization by Lifecycle Activity and Asset Class: In collaboration with City stakeholders, capital budget items were reviewed and allocated into three distinct categories and asset class: renewal, growth, and upgrade. This classification ensured alignment with asset management lifecycle needs. • Extrapolation of Average Values: The 5-year average capital investment for each category (renewal, growth, upgrade) was calculated and assumed to be representative of the 10-year average, in the absence of a longer-term forecast. • Exclusion of Operating-Related Accounts: Specific capital accounts associated with operating functions—such as preventative maintenance programs—were excluded from the capital analysis. These were reallocated and considered under the operating expenditure (OpEx) forecast to ensure accurate lifecycle cost representation.
Operating Forecasted Budget	• Use of Operating Budget Accounts: The City's current operating accounts related to transportation services were included to establish a baseline for operating expenditures. This included costs associated with routine maintenance, inspections, and service delivery. • Categorization by Lifecycle Activity: Similar to the capital analysis, operating budget items were reviewed and categorized based on their alignment with asset management lifecycle activities (e.g., operations, preventative maintenance, minor repairs). • Inclusion of Previously Excluded Accounts: Capital accounts previously used to fund operational activities—such as preventative maintenance—were reclassified and integrated into the operating expenditure forecast for a more accurate reflection of lifecycle costs. Labour Cost Allocation: In coordination with departmental leads, labour costs were reviewed and evenly distributed across applicable lifecycle activities and asset classes, based on best available information and service delivery models.

Category	Analysis Assumptions
Development Charges (DCs)	• Use of the City's Mobility Plan: Growth projections were derived from the City's Mobility Plan, which reflects infrastructure needs based on future population and employment growth. • Alignment with the 2024 DC Background Study: The capital requirements identified in the Mobility Plan were informed by the 2024 Development Charges (DC) Background Study, ensuring consistency with the City's long-range financial planning and growth management framework. • Asset Class Segmentation: Forecasted growth investments were disaggregated by asset class (e.g., roads, sidewalks, traffic infrastructure) to enable integration into asset-specific lifecycle models and financial planning. Stormwater assets which were originally included in roadway costs were separated from the analysis. • For this AM Plan, we have assumed that growth needs are fully funded.

Financing Strategy: Assumptions Used to Determine Repair and Replacement Activities

Service	Methodology
Roads	Annual provision accounts for the asset renewal needs to maintain assets above PCI thresholds by road type. It does not include full road replacement activities based on best practices from other communities.
Bridges	Annual provision accounts for both bridge/culvert reconstruction costs and regular asset rehabilitation expenditures over the planning period. It does not include full replacement activities based on best practices from other communities.
Street Lighting	Annual provision accounts for the rehabilitation and replacement of both poles and brackets over the planning period.
Sidewalks, Traffic Signals	Annual provision accounts for the rehabilitation and replacement of assets over the planning period.
All Other Assets	Annual provision accounts for the replacement of assets over the planning period based on reconstruction cost.

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