2020

ASSET MANAGEMENT PLAN
City of Pickering

Asset Inventory Data is current as of December 31st, 2020
Annual Capital Funding includes the 2021 Capital Budget
Reserve Balances are current as of December 31st, 2020
Levels of Service for Other Infrastructure updated as of June 30th, 2022

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Key Statistics

Replacement cost of asset portfolio
$1.36 billion

Replacement cost of infrastructure per household
$42,842

Percentage of assets in satisfactory or better condition
80.42%

Percentage of assets with assessed condition data
46.49%

Annual capital infrastructure deficit
$24.5 million

Recommended timeframe for eliminating annual infrastructure deficit
15 Years

Target reinvestment rate
2.96%

Actual reinvestment rate
1.16%

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Executive Summary

Municipal infrastructure supports the economic, social, and environmental health and growth of a community through the delivery of critical services. The goal of asset management is to deliver an adequate level of service in the most cost-effective manner. This involves the development and implementation of asset management strategies and long-term financial planning.

Scope

This asset management plan (AMP) identifies the current practices and strategies that are in place to manage public infrastructure and makes recommendations where they can be further refined. Through the implementation of sound asset management strategies, the City can ensure that public infrastructure is managed to support the sustainable delivery of municipal services.

This AMP includes the following asset categories:

With the development of this AMP the municipality has achieved compliance with O. Reg. 588/17 to the extent of the requirements that must be completed by July 1, 2024. There are additional requirements concerning proposed levels of service and growth that must be met by July 1, 2025.

Purpose

This AMP leverages the collaborative effort of all departments. Providing sustainable infrastructure service delivery requires a holistic approach, involving finance, engineering, and operations etc. Therefore, this AMP should be used as a guiding document for all departments.

Findings

The overall replacement cost of the asset categories included in this AMP totals $1.36 billion. 80.42% % of all assets analysed in this AMP are in satisfactory or better condition and assessed condition data was available for 46.49% of assets. For the remaining 53.51% of assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation in this AMP.

The development of a long-term, sustainable financial plan requires an analysis of whole lifecycle costs. This AMP uses a combination of proactive lifecycle strategies (roads and stormwater wet ponds) and replacement only strategies (all other assets) to determine the lowest cost option to maintain the current level of service.

To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the City's average annual capital requirement totals $40.27 million. Based on a historical analysis of sustainable capital funding sources, the City is committing approximately $15.75 million towards capital projects or reserves per year. As a result, there is currently an annual funding gap of $24.51 million.

It is important to note that this AMP represents a snapshot in time and is based on the best available processes, data, and information at the City. Strategic asset management planning is an ongoing and dynamic process that requires continuous improvement and dedicated resources.

Annual Capital Requirements per Household

Recommendations

A financial strategy was developed to address the annual capital funding gap. The following graphics shows annual tax/rate change required to eliminate the City's infrastructure deficit based on a 15-year plan for tax-funded assets:

Recommendations to guide continuous refinement of the City's asset management program include the following:

- Review data to update and maintain a complete and accurate dataset
- Develop a condition assessment strategy with a regularly scheduled update and review process
- Extension of the implementation of risk-based decision-making as part of asset management planning and budgeting to all departments.
- Extension of the continuous review, development, and implementation of optimal lifecycle management strategies for all asset categories across departments.

- Continue to develop and regularly review short- and long-term plans to meet capital requirements across departments.
- Measure current levels of service and identify sustainable proposed levels of service for all asset categories

1 Introduction & Context

Key Insights

- The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value tax and ratepayers receive from the asset portfolio

- The City's asset management policy provides clear direction to staff on their roles and responsibilities regarding asset management

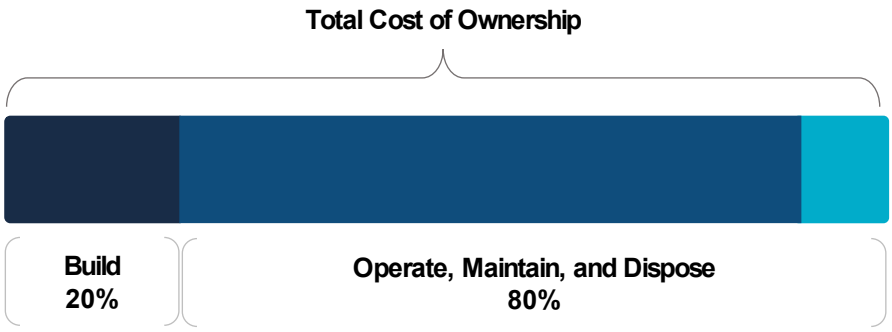
- An asset management plan is a living document that should be updated regularly to inform long-term planning

- Ontario Regulation 588/17 outlines several key milestones and requirements for asset management plans in Ontario between July 1, 2022 and 2025

1.1 An Overview of Asset Management

Municipalities are responsible for managing and maintaining a broad portfolio of infrastructure assets to deliver services to the community. The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers receive from the asset portfolio.

The acquisition or construction of capital assets accounts for only 10-20% of their total cost of ownership. The remaining 80-90% derives from operations and maintenance. This AMP focuses its analysis on the capital costs to maintain, rehabilitate, and replace existing municipal infrastructure assets.



These costs can span decades, requiring planning and foresight to ensure financial responsibility is spread equitably across generations. An asset management plan is critical to this planning, and an essential element of a broader asset management program. The industry-standard approach and sequence to developing a practical asset management program begins with a Strategic Plan, followed by an Asset Management Policy and an Asset Management Strategy, concluding with an Asset Management Plan.

This industry standard, defined by the Institute of Asset Management (IAM), emphasizes the alignment between the corporate strategic plan and various asset management documents. The strategic plan has a direct, and cascading impact on asset management planning and reporting.

1.1.1 Asset Management Policy

An asset management policy represents a statement of the principles guiding the municipality's approach to asset management activities. It aligns with the organizational strategic plan and provides clear direction to municipal staff on their roles and responsibilities as part of the asset management program.

The City adopted Policy No. FIN 080 "Strategic Asset Management Policy" on June 25, 2018, in accordance with Ontario Regulation 588/17.

The purpose of the policy is to provide a framework for implementing asset management to enable a strategic approach at all levels of the organization. As outlined in the policy, the City seeks to leverage the lowest total lifecycle cost of ownership with regard to the service levels that best meet the needs of the community while being cognizant of the risk of failure that is acceptable.

1.1.2 Asset Management Strategy

An asset management strategy outlines the translation of organizational objectives into asset management objectives and provides a strategic overview of the activities required to meet these objectives. It provides greater detail than the policy on how the municipality plans to achieve asset management objectives through planned activities and decision-making criteria.

The City's Asset Management Policy contains many of the key components of an asset management strategy and may be expanded on in future revisions or as part of a separate strategic document.

1.1.3 Asset Management Plan

The asset management plan (AMP) presents the outcomes of the municipality's asset management program and identifies the resource requirements needed to achieve a defined level of service. The AMP typically includes the following content:

- State of Infrastructure
- Asset Management Strategies
- Levels of Service
- Financial Strategies

The AMP is a living document that should be updated regularly as additional asset and financial data becomes available. This will allow the municipality to re-evaluate the state of infrastructure and identify how the organization's asset management and financial strategies are progressing.

1.2 Key Concepts in Asset Management

Effective asset management integrates several key components, including lifecycle management, risk management, and levels of service. These concepts are applied throughout this asset management plan and are described below in greater detail.

1.2.1 Lifecycle Management Strategies

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment. Asset deterioration has a negative effect on the ability of an asset to fulfill its intended function, and may be characterized by increased cost, risk and even service disruption.

To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration. There are several field intervention activities that are available to extend the life of an asset. These activities can generally fall within the categories of maintenance, rehabilitation, and replacement. The following table provides a description of each type of activity and the general difference in cost.

Lifecycle Activity	Description	Example (Roads)	Cost
Maintenance	Activities that prevent defects or deteriorations from occurring	Crack Seal	$
Rehabilitation/ Renewal	Activities that rectify defects or deficiencies that are already present and may be affecting asset performance	Mill & Re-surface	$$
Replacement/ Reconstruction	Asset end-of-life activities that often involve the complete replacement of assets	Full Reconstruction	$$$

Depending on initial lifecycle management strategies, asset performance can be sustained through a combination of maintenance and rehabilitation, but at some point, replacement is required. Understanding what effect these activities will have on the lifecycle of an asset, and their cost, will enable staff to make better recommendations.

The City's approach to lifecycle management is described within each asset category outlined in this AMP. Developing and implementing a proactive lifecycle strategy will help staff to determine which activities to perform on an asset and when they should be performed to maximize useful life at the lowest total cost of ownership.

1.2.2 Risk Management Strategies

Municipalities generally take a 'worst-first' approach to infrastructure spending. Rather than prioritizing assets based on their importance to service delivery, assets in the worst condition are fixed first, regardless of their criticality. However, not all assets are created equal. Some are more important than others, and their failure or disrepair poses more risk to the community than that of others. For example, a road with a high volume of traffic that provides access to critical services poses a higher risk than a low volume rural road. These high-value assets should receive funding before others.

By identifying the various impacts of asset failure and the likelihood that it will fail, risk management strategies can identify critical assets, and determine where maintenance efforts, and spending, should be focused.

This AMP includes a high-level evaluation of asset risk and criticality. Each asset has been assigned a probability of failure score and consequence of failure score based on available asset data. These risk scores can be used to prioritize maintenance, rehabilitation, and replacement strategies for critical assets.

1.2.3 Levels of Service (LOS)

A level of service (LOS) is a measure of what the City is providing to the community and the nature and quality of that service. Within each asset category in this AMP, technical metrics and qualitative descriptions that measure both technical and community levels of service have been established and measured as data is available.

These measures include a combination of those that have been outlined in O. Reg. 588/17 in addition to performance measures identified by the City as worth measuring and evaluating. The City measures the level of service provided at two levels: Community Levels of Service, and Technical Levels of Service.

Community Levels of Service

Community levels of service are a simple, plain language description or measure of the service that the community receives. For core asset categories (Road Corridor, Bridges & Culverts, and Stormwater Services) the Province, through O. Reg. 588/17, has provided qualitative descriptions that are required to be included in this AMP.

Technical Levels of Service

Technical levels of service are a measure of key technical attributes of the service being provided to the community. These include mostly quantitative measures and tend to reflect the impact of the municipality's asset management strategies on the physical condition of assets or the quality/capacity of the services they provide.

For core asset categories (Road Corridor, Bridges & Culverts, and Stormwater System) the Province, through O. Reg. 588/17, has provided technical metrics that are required to be included in this AMP.

Current and Proposed Levels of Service

This AMP focuses on measuring the current level of service provided to the community. Once current levels of service have been measured, the City plans to establish proposed levels of service over a 10-year period, in accordance with O. Reg. 588/17.

Proposed levels of service should be realistic and achievable within the timeframe outlined by the City. They should also be determined with consideration of a variety of community expectations, fiscal capacity, regulatory requirements, corporate goals, and long-term sustainability. Once proposed levels of service have been established, and prior to July 2025, the City must identify a lifecycle management and financial strategy which allows these targets to be achieved.

1.3 Ontario Regulation 588/17

As part of the *Infrastructure for Jobs and Prosperity Act, 2015*, the Ontario government introduced Regulation 588/17 - Asset Management Planning for Municipal Infrastructure (O. Reg 588/17). Along with creating better performing organizations, more liveable and sustainable communities, the regulation is a key, mandated driver of asset management planning and reporting. It places substantial emphasis on current and proposed levels of service and the lifecycle costs incurred in delivering them.

The diagram below outlines key reporting requirements under O. Reg 588/17 and the associated timelines.

2019

Strategic Asset Management Policy

2022

Asset Management Plan for Core Assets with the following components:

1. Current levels of service
2. Inventory analysis
3. Lifecycle activities to sustain LOS
4. Cost of lifecycle activities
5. Population and employment forecasts
6. Discussion of growth impacts

2024

Asset Management Plan for Core and Non-Core Assets

2025

Asset Management Policy Update and an
Asset Management Plan for All Assets with the following additional components:

1. Proposed levels of service for next 10 years
2. Updated inventory analysis
3. Lifecycle management strategy
4. Financial strategy and addressing shortfalls
5. Discussion of how growth assumptions impacted lifecycle and financial

1.3.1 O. Reg. 588/17 Compliance Review

The following table identifies the requirements outlined in O. Reg 588/17 for municipalities to meet by July 1, 2022, for core assets only. Next to each requirement a page or section reference is included in addition to any necessary commentary.

Requirement	O. Reg. Section	AMP Section Reference	Status
Summary of assets in each category	S.5(2), 3(i)	4.1.1 - 4.6.1	Complete
Replacement cost of assets in each category	S.5(2), 3(ii)	4.1.1 - 4.6.1	Complete
Average age of assets in each category	S.5(2), 3(iii)	4.1.3 - 4.6.3	Complete
Condition of core assets in each category	S.5(2), 3(iv)	4.1.2 – 4.6.2	Complete
Description of municipality's approach to assessing the condition of assets in each category	S.5(2), 3(v)	4.1.2 – 4.6.2	Complete
Current levels of service in each category	S.5(2), 1(i-ii)	4.1.6 - 5.6.6	Complete
Current performance measures in each category	S.5(2), 2	4.1.6 - 5.6.6	Complete
Lifecycle activities needed to maintain current levels of service for 10 years	S.5(2), 4	4.1.4 - 4.6.4	Complete
Costs of providing lifecycle activities for 10 years	S.5(2), 4	Appendix A	Complete
Growth assumptions	S.5(2), 5(i-ii) S.5(2), 6(i-vi)	5.1-5.2	Complete

Furthermore, The City of Pickering has also met all of the requirements mentioned above for its non-core assets as well in this AMP, which makes the City compliant with the O. Reg 588/17 for municipalities to meet by July 1, 2024.

2 Scope and Methodology

Key Insights

- This asset management plan includes 6 asset categories that fall under the tax-funded category
- The source and recency of replacement costs impacts the accuracy and reliability of asset portfolio valuation
- Accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life

2.1 Asset categories included in this AMP

This AMP for the City of Pickering is produced in compliance with Ontario Regulation 588/17. The July 2022 deadline under the regulation—the first of three AMP deadlines—requires analysis of only core assets (roads, bridges & culverts, and stormwater). However, the City of Pickering has included all assets categories in this AMP, thereby covering all regulations for the July 2022 and July 2024 deadlines.

The AMP summarizes the state of the infrastructure for the City's asset portfolio, establishes current levels of service and the associated technical and customer oriented key performance indicators (kpis), outlines lifecycle strategies for optimal asset management and performance, and provides financial strategies to reach sustainability for the asset categories listed below.

Asset Category	Source of Funding
Road Corridor	Tax-Funded Assets
Stormwater System	Tax-Funded Assets
Bridges & Culverts	Tax-Funded Assets
Buildings & Facilities	Tax-Funded Assets
Parks	Tax-Funded Assets
Other Infrastructure	Tax-Funded Assets

2.2 Deriving Replacement Costs

There are a range of methods to determine the replacement cost of an asset, and some are more accurate and reliable than others. This AMP relies on two methodologies:
User-Defined Cost and Cost/Unit: Based on costs provided by municipal staff which could include average costs from recent contracts; data from engineering reports and assessments; software solutions linked to industry-standard costing databases; staff estimates based on knowledge and experience
Cost Inflation/CPI Tables: Historical cost of the asset is inflated based on Consumer Price Index or Non-Residential Building Construction Price Index
User-defined costs based on reliable sources are a reasonably accurate and reliable way to determine asset replacement costs. Cost inflation is typically used in the absence of reliable replacement cost data. It is a reliable method for recently purchased and/or constructed assets where the total cost is reflective of the actual costs that the City incurred. As assets age, and new products and technologies become available, cost inflation becomes a less reliable method.

2.3 Estimated Useful Life and Projected Service Life Remaining

The estimated useful life (EUL) of an asset is the period over which the City expects the asset to be available for use and remain in service before requiring replacement or disposal. The EUL for each asset in this AMP was assigned according to the knowledge and expertise of municipal staff and supplemented by existing industry standards when necessary.

By using an asset's in-service data and its EUL, the City can determine the projected service life remaining (PSLR) for each asset. Using condition data and the asset's PSLR, the City can more accurately forecast when it will require replacement. The PSLR is calculated as follows:

$$Projected\ Service\ Life\ Remaining\ (PSLR) = In\ Service\ Date + Estimated\ Useful\ Life(EUL) - Current\ Year$$

2.4 Reinvestment Rate

As assets age and deteriorate they require additional investment to maintain a state of good repair. The reinvestment of capital funds, through asset renewal or replacement, is necessary to sustain an adequate level of service. The reinvestment rate is a measurement of available or required funding relative to the total replacement cost.

By comparing the actual vs. Target reinvestment rate the City can determine the extent of any existing funding gap. The reinvestment rate is calculated as follows:

$$Target\ Reinvestment\ Rate = \frac{Annual\ Capital\ Requirement}{Total\ Replacement\ Cost}$$

$$Actual\ Reinvestment\ Rate = \frac{Annual\ Capital\ Funding}{Total\ Replacement\ Cost}$$

2.5 Deriving Asset Condition

An incomplete or limited understanding of asset condition can mislead long-term planning and decision-making. Accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life.

A condition assessment rating system provides a standardized descriptive framework that allows comparative benchmarking across the City's asset portfolio. The table below outlines an example of the condition rating system used in this AMP to determine asset condition. This rating system is aligned with the Canadian Core Public Infrastructure Survey which is used to develop the Canadian Infrastructure Report Card. When assessed condition data is not available, service life remaining is used to approximate asset condition. The City has some asset condition ratings that are aligned with the Canadian Infrastructure Report Card condition rating system. However, for some assets such as roads and bridges, a different rating criterion that better suit each of these assets' deterioration profiles were adopted.

Condition	Description	Criteria	Projected Service Life Remaining (%)
Very Good	Fit for the future	Well maintained, good condition, new or recently rehabilitated	80-100
Good	Adequate for now	Acceptable, generally approaching mid-stage of expected service life	60-80
Satisfactory	Requires attention	Signs of deterioration, some elements exhibit significant deficiencies	40-60
Below Satisfactory	Increasing potential of affecting service	Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	20-40
Needs Substantial Improvement	Unfit for sustained service	Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable	0-20

The analysis in this AMP is based on assessed condition data only as available. In the absence of assessed condition data, asset age is used as a proxy to determine asset condition. Appendix D includes additional information on the role of asset condition data and provides basic guidelines for the development of a condition assessment program.

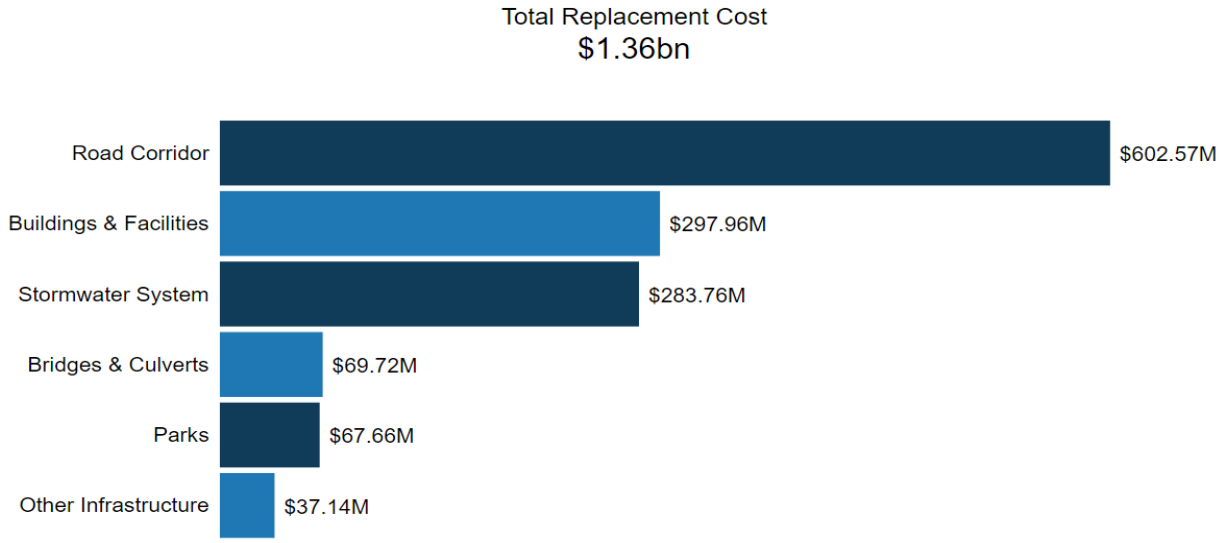
3 Portfolio Overview

Key Insights

- The total replacement cost of the City's asset portfolio is $1.36 billion
- The City's target re-investment rate is 2.96%, and the actual re-investment rate is 1.16%, contributing to an expanding infrastructure deficit
- 80.42% of all assets are in satisfactory or better condition
- 25.94% of assets are projected to require replacement in the next 10 years
- Average annual capital requirements total $40.27 million per year across all assets

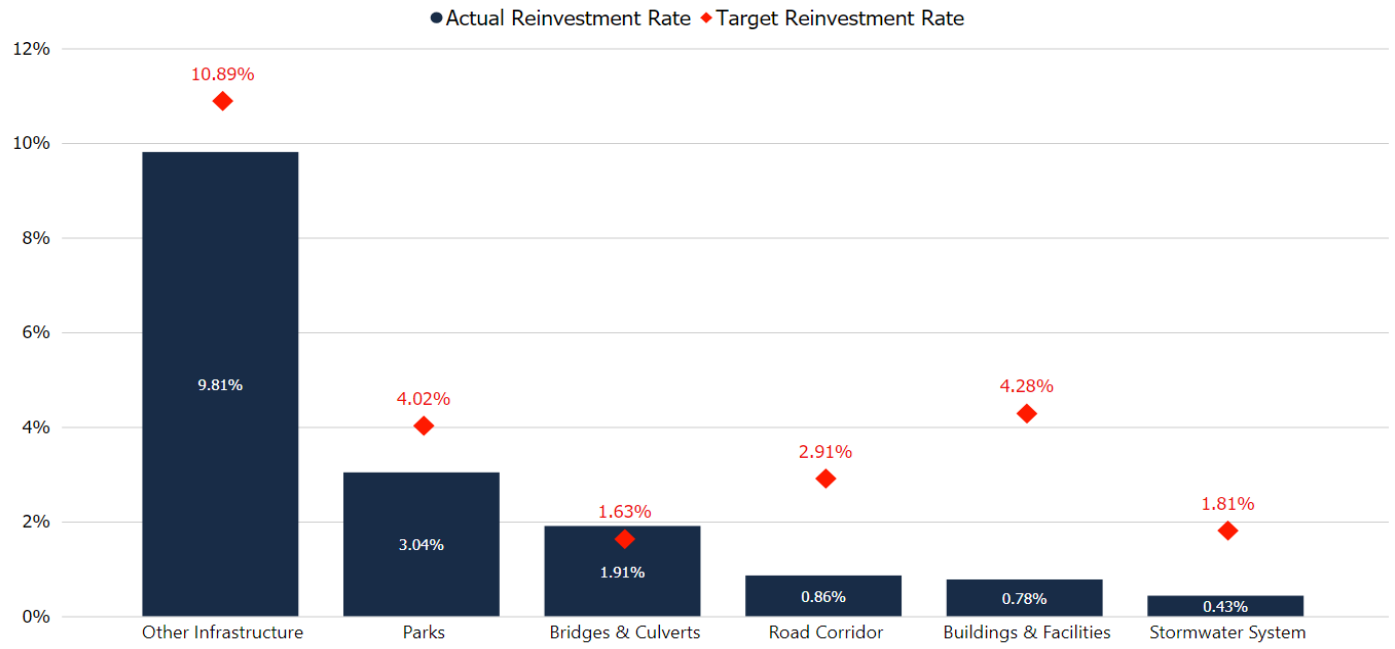
3.1 Total Replacement Cost of Asset Portfolio

The asset categories analysed in this AMP have a total replacement cost of $1.36 billion based on inventory data from 2020. This total was determined based on a combination of user-defined costs and historical cost inflation. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today.



3.2 Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing target vs actual reinvestment rate. To meet the long-term replacement needs, the City should be allocating approximately $40.27 million annually, for a target reinvestment rate of 2.96%. Actual annual spending on infrastructure totals approximately $15.75 million, for an actual reinvestment rate of 1.16%. It is worth noting that any surplus in budget for Bridges and Culverts gets transferred to Road Corridor.



3.3 Condition of Asset Portfolio

The current condition of existing assets is central to all asset management planning. Collectively, 80.42% of assets in Pickering are in satisfactory or better condition. This estimate relies on age-based, field condition data, and staff assessments. Staff assessments were used whenever possible as they provide a more precise condition estimate than age-base assessments. Staff leveraged their knowledge and experience with maintenance related and operational issues to enhance the level of accuracy of age-based conditions.

This AMP relies on assessed condition data for 46.39% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is

invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

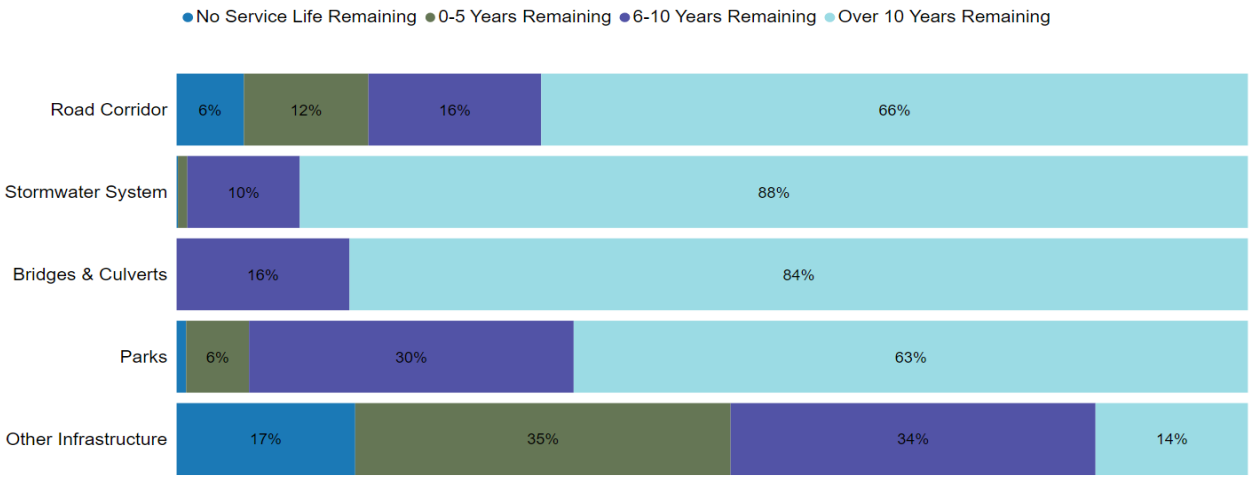
Asset Category	Asset Segment	Asset Sub-segment	% of Assets with Assessed Condition	Source of Condition Data
Road Corridor	Roads	Arterial	62% Assessed, 38% Age-based	R.J. Burnside & Associates Limited - 2016
Road Corridor	Roads	Collector	80% Assessed, 20% Age-based	R.J. Burnside & Associates Limited - 2016
Road Corridor	Roads	Local	89% Assessed, 11% Age-based	R.J. Burnside & Associates Limited - 2016
Road Corridor	Roadside Appuretances	Broadband	0% Assessed	100% Age-based
Road Corridor	Roadside Appuretances	Guide Rails	0% Assessed	100% Age-based
Road Corridor	Roadside Appuretances	Retaining Walls	0% Assessed	100% Age-based
Road Corridor	Sidewalks	Sidewalks	0% Assessed	100% Age-based
Road Corridor	Street Lights	Head Luminaires	83% Assessed, 17% Age-based	Staff Assessments
Road Corridor	Street Lights	Poles & Assemblies	93% Assessed, 7% Age-based	Staff Assessments
Road Corridor	Traffic & Pedestrian Signals	Controllers	86% Assessed, 14% Age-based	Staff Assessments
Road Corridor	Traffic & Pedestrian Signals	Infrastructure	88% Assessed, 12% Age-based	Staff Assessments
Stormwater System	Drainage Channels	Drainage Channels	0% Assessed	100% Age-based
Stormwater System	Storm Sewers	Catch Basin and Lead	88% Assessed, 12% Age-based	Staff Assessments
Stormwater System	Storm Sewers	Clean Water Collectors	0% Assessed	100% Age-based
Stormwater System	Storm Sewers	Inlet/Outlet Structures	0% Assessed	100% Age-based

Asset Category	Asset Segment	Asset Sub-segment	% of Assets with Assessed Condition	Source of Condition Data
Stormwater System	Storm Sewers	Oil Grit Separators	0% Assessed	100% Age-based
Stormwater System	Storm Sewers	Service Connections	93% Assessed, 7% Age-based	Staff Assessments
Stormwater System	Storm Sewers	Storm Sewer Mains	0% Assessed	100% Age-based
Stormwater System	Stormwater Ponds	Dry Ponds	0% Assessed	100% Age-based
Stormwater System	Stormwater Ponds	Wet Ponds	64% Assessed, 36% Age-based	Staff Assessments
Bridges & Culverts	Bridges	Bridges	100% Assessed	2020 OSIM Inspections
Bridges & Culverts	Structural Culverts	Structural Culverts	99% Assessed	2020 OSIM Inspections
Buildings & Facilities	Civic Complex	Civic Complex	100% Assessed	VFA Database
Buildings & Facilities	Community & Cultural Buildings	Community & Cultural Buildings	100% Assessed	VFA Database
Buildings & Facilities	Fire Services	Fire Services	100% Assessed	VFA Database
Buildings & Facilities	Operations Centre	Operations Centre	100% Assessed	VFA Database
Buildings & Facilities	Recreation, Pools & Arenas	Recreation, Pools & Arenas	100% Assessed	VFA Database
Parks	Active Recreation Facilities	Playground Equipment	100% Assessed	Staff Assessments
Parks	Active Recreation Facilities	Sport Playing Surfaces	100% Assessed	Staff Assessments
Parks	Amenities, Furniture & Utilities	Buildings	100% Assessed	Staff Assessments
Parks	Amenities, Furniture & Utilities	Electrical/Lighting	100% Assessed	Staff Assessments

Asset Category	Asset Segment	Asset Sub-segment	% of Assets with Assessed Condition	Source of Condition Data
Parks	Amenities, Furniture & Utilities	Site Furniture	100% Assessed	Staff Assessments
Parks	Amenities, Furniture & Utilities	Site Structures	Site Structures	Staff Assessments
Parks	Amenities, Furniture & Utilities	Subsurface Infrastructure	100% Assessed	Staff Assessments
Parks	Amenities, Furniture & Utilities	Waterfront Infrastructure	100% Assessed	Staff Assessments
Parks	Vehicular & Pedestrian Networks	Parking Lots & Internal Roads	100% Assessed	Staff Assessments
Parks	Vehicular & Pedestrian Networks	Pedestrian Corridors	100% Assessed	Staff Assessments
Other Infrastructure	Furniture & Fixtures	Furniture & Fixtures	0% Assessed	100% Age-based
Other Infrastructure	Information Technology	Information Technology	0% Assessed	100% Age-based
Other Infrastructure	Library Collection Materials	Library Collection Materials	0% Assessed	100% Age-based
Other Infrastructure	Machinery & Equipment	Major	0% Assessed	100% Age-based
Other Infrastructure	Machinery & Equipment	Minor	0% Assessed	100% Age-based
Other Infrastructure	Vehicles	Fire Vehicles	0% Assessed	100% Age-based
Other Infrastructure	Vehicles	Vehicles	0% Assessed	100% Age-based

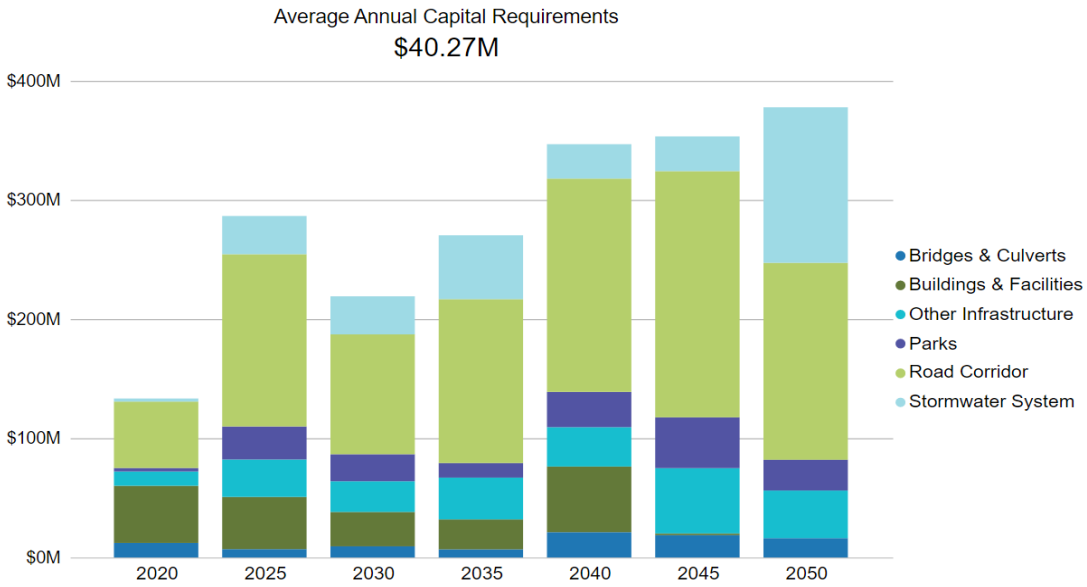
3.4 Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 25.94% of the City's assets will require replacement within the next 10 years. Capital requirements over the next 10 years are identified in Appendix A. Buildings & Facilities assets were excluded from this analysis due to the nature of the assets. Building and Facilities have multiple components that have a very short service life. However, the building themselves are long-lasting.



3.5 Forecasted Capital Requirements

The development of a long-term capital forecast should include both asset rehabilitation and replacement requirements. With the development of asset-specific lifecycle strategies that include the timing and cost of future capital events, the City can produce an accurate long-term capital forecast. The following graph identifies capital requirements over the next 25 years. It is worth noting that the Average Annual Capital Requirements are equal to the sum of the annualized lifecycle costs of all assets. The annualized lifecycle cost is calculated by dividing the total lifecycle cost of the asset by its respective estimated useful life.


Average Annual Capital Requirements
$40.27M
$400M
$300M
$200M
$100M
$0M
2020
2025
2030
2035
2040
2045
2050
Bridges & Culverts
Buildings & Facilities
Other Infrastructure
Parks
Road Corridor
Stormwater System

4 Analysis of Tax-funded Assets

Key Insights

- Tax-funded assets are valued at $1,358.8 million
- 80.42% of tax-funded assets are in satisfactory or better condition
- The average annual capital requirement to sustain the current level of service for tax-funded assets is approximately $40.27 million
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

4.1 Road Corridor

The Road Corridor are critical components of the provision of safe and efficient transportation services and represent the highest value asset category in the City's asset portfolio. It includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure including sidewalks, streetlights, traffic signals, guiderails, and retaining walls.

The Operations Department provides roadway operational maintenance including, patching, grading, sweeping, ditching as well as winter control activities such as sanding, salting, and plowing.

The Engineering Department is responsible for the design and construction of major roadway maintenance and rehabilitation activities such as crack seal, asphalt resurfacing, curb and sidewalk repair/replacement, and reconstruction. They are also responsible for the maintenance and repair of streetlights, traffic signals, and guide rails.

Staff are working towards improving the accuracy and reliability of their Road Corridor inventory to assist with long-term asset management planning.

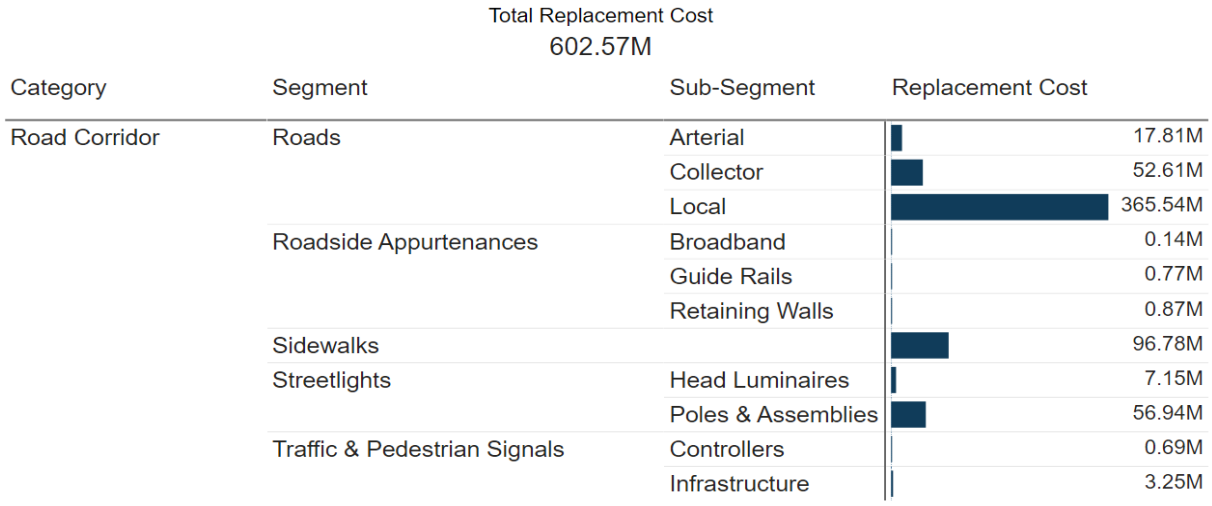
4.1.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the City's Road Corridor inventory.

Asset Segment	Sub-Segment	Quantity [1]	Unit of Measure	Replacement Cost Method	Replacement Cost
Roads	Arterial	13	Centreline KM	100% Cost per Unit	$17,810,198
Roads	Collector	37	Centreline KM	100% Cost per Unit	$52,612,912
Roads	Local	268	Centreline KM	100% Cost per Unit	$365,537,102
Roads	Gravel	102	Centreline KM	Not planned for replacement	Not planned for replacement

1 The level of maturity of the asset quantity data is still at a basic level. Staff plan to prioritize data refinement and consolidation efforts to increase confidence in the accuracy and reliability of asset data and information.

Asset Segment	Sub-Segment	Quantity	Unit of Measure	Replacement Cost Method	Replacement Cost
Roadside Appurtenances	Broadband	1	KM	100% CPI Inflation	$143,175
Roadside Appurtenances	Guide Rails	746	M	100% CPI Inflation	$774,280
Roadside Appurtenances	Retaining Walls	529	M	100% CPI Inflation	$868,766
Sidewalks	Sidewalks	331	KM	99% Cost per Unit, 1% CPI Inflation	$96,784,783
Streetlights	LED Lights	8,295	Quantity	100% CPI Inflation	$7,151,314
Streetlights	Poles & Assemblies	8,101	Quantity	100% CPI Inflation	$56,943,137
Traffic & Pedestrian Signals	Controllers	25	Intersection	100% CPI Inflation	$691,198
Traffic & Pedestrian Signals	Infrastructure	25	Intersection	100% CPI Inflation	$3,253,735
					$602,570,600



4.1.2 Asset Condition

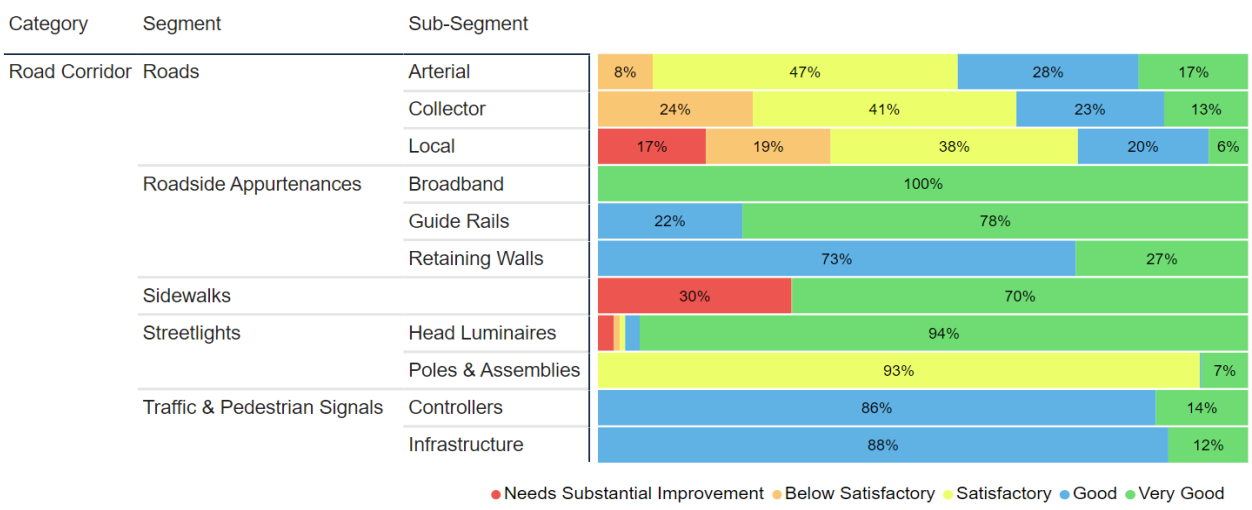
The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition Rating is a weighted value based on replacement cost.

Asset Segment	Sub-Segment	Average Condition (%)	Average Condition Rating	Condition Source
Roads	Arterial	75%	Good	62% Assessed, 38% Age-based
Roads	Collector	72%	Good	80% Assessed, 20% Age-based
Roads	Local	63%	Good	89% Assessed, 11% Age-based
Roadside Appurtenances	Broadband	95%[2]	Very Good	100% Age-based
Roadside Appurtenances	Guide Rails	84%[2]	Good	100% Age-based
Roadside Appurtenances	Retaining Walls	75%[2]	Good	100% Age-based
Sidewalks	Sidewalks	65%	Good	100% Age-based
Streetlights	Head Luminaires	86%	Very Good	83% Assessed, 17% Age-based[3]
Streetlights	Poles & Assemblies	56%	Satisfactory	93% Assessed, 7% Age-based[3]

2 Currently, the average condition reflects the condition of all assets that are available in the City's central inventory. City staff are working to consolidate asset information associated with Roadside Appurtenances in the central database. Once completed, the average condition will be more accurate and reflective of the whole asset portfolio.

3 A desktop assessment was completed by City staff. The results of the assessment were used along with Age-based ratings to calculate the average condition of assets. Desktop assessment ratings were given a weight of 90% compared to 10% for the age-based rating when performing the final condition calculation for Head Luminaires. For Poles & Assemblies, the desktop assessments were given a weight of 55% compared to 45% for the age-based rating when performing the final condition calculation. Age-based conditions were solely used when desktop assessments were not performed.

Asset Segment	Sub-Segment	Average Condition (%)	Average Condition Rating	Condition Source
Traffic & Pedestrian Signals	Controllers	75%	Good	86% Assessed, 14% Age-based[4]
Traffic & Pedestrian Signals	Infrastructure	67%	Good	88% Assessed, 12% Age-based[4]
		64%	**Good**	



To ensure that the City's Road Corridor continue to provide an acceptable level of service, the City should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of Road Corridor.

4 A desktop assessment was completed by City staff. The results of the assessment were used along with Age-based ratings to calculate the average condition of assets. Desktop assessment ratings were given a weight of 75% compared to 25% for the age-based rating when performing the final condition calculation for Controllers. For Infrastructure, the desktop assessments were given a weight of 65% compared to 35% for the age-based rating when performing the final condition calculation. Age-based conditions were solely used when desktop assessments were not performed.

Current Approach to Condition Assessment

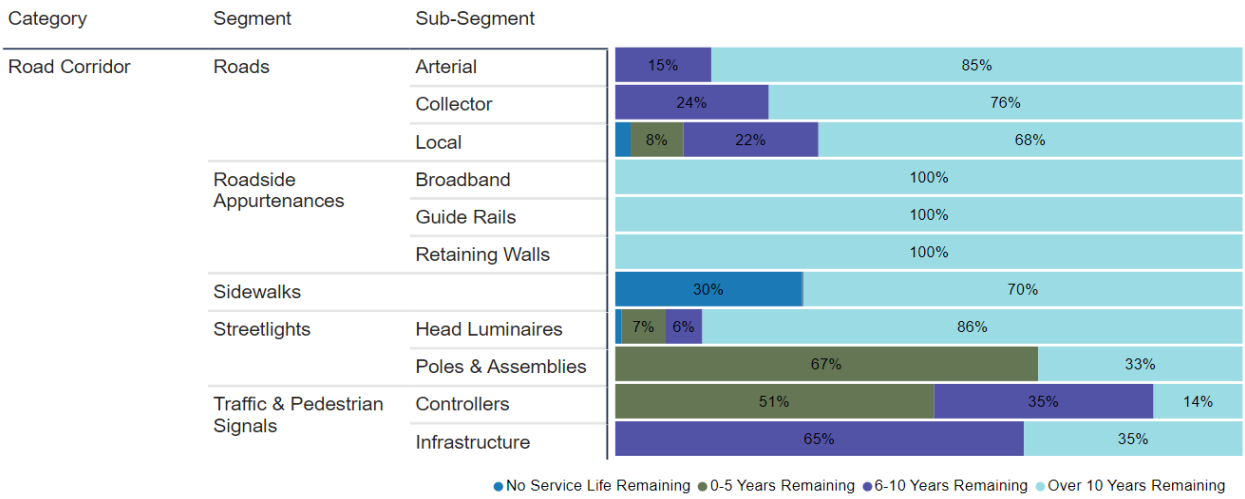
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:
The City's entire road network is assessed by an external contractor. The last Road Needs Study was completed in 2016 based on assessments made in 2011.A road condition assessment update is planned for 2021.
The Road Needs Study includes a Pavement Condition Index (PCI) rating for all paved roads. The 1-100 value is a measure of the surface condition of the roads and is based on a formula that takes into account surface distresses and ride comfort.
The Road Needs Study also includes another measure, a Priority Guide Number (PGN). The PGN is established using the older Ministry of Transportation of Ontario (MTO) methodology, however, the PGN does provide a relative comparison of the priority of the roads for improvement, based on condition, traffic, and improvement costs. Therefore, the PGN ranking can be considered as one of the comparison factors for consideration in setting capital programs.
As a supplement to the comprehensive network-wide assessments, City staff complete regular inspections annually and re-prioritize capital works and maintenance activities as necessary.

- The City utilizes desktop assessments along with age-based assessments to estimate the condition of streetlights.
- For traffic & pedestrian signals, the City contracts the services of Durham Region (The Works Department's Traffic Engineering and Operations Division handles Durham's traffic control signals by planning, designing, constructing, operating, and maintaining the traffic control systems). They use an internal asset management system to effectively manage the City's traffic signals infrastructure.

4.1.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Road Corridor has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Projected Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Sub-Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Projected Service Life Remaining (Years)
Roads	Arterial	≤50	18.0	17.1
Roads	Collector	≤50	23.3	14.4
Roads	Local	≤50	32.9	12.7
Roadside Appurtenances	Broadband	≤30	1.5	28.4
Roadside Appurtenances	Guide Rails	≤40	6.3	33.7
Roadside Appurtenances	Retaining Walls	≤40	7.5	32.5
Sidewalks	Sidewalks	≤75	30.6	34.1
Streetlights	Head Luminaires	≤20	4.0	6.3
Streetlights	Poles & Assemblies	≤50	5.0	32.8
Traffic & Pedestrian Signals	Controllers	≤13	9.9	6.8
Traffic & Pedestrian Signals	Infrastructure	≤25	12.8	13.1
			27.7	**21.8**



Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

4.1.4 Lifecycle Management Strategy

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment.

The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of hard-surfaced (asphalted) rural and urban roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost. Lifecycle management strategies were not developed for other road types[5] within the City.

Asphalt Roads (Surface)

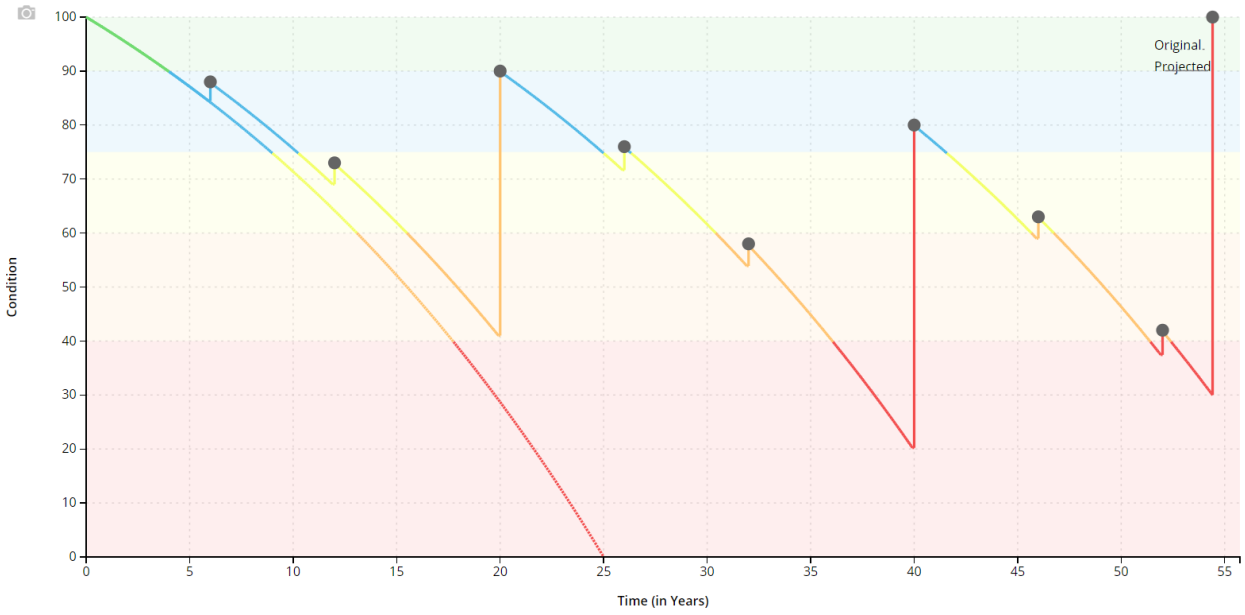
Event Name	Event Class	Event Trigger
Crack Seal # 1	Preventative Maintenance	Year: 6
Crack Seal # 2	Preventative Maintenance	Year: 12
New Surface – Single Lift	Rehabilitation	Year: 20
Crack Seal # 3	Preventative Maintenance	Year: 26
Crack Seal # 4	Preventative Maintenance	Year: 32
New Surface – Double Lift	Rehabilitation	Year: 40
Crack Seal # 5	Preventative Maintenance	Year: 46
Crack Seal # 6	Preventative Maintenance	Year: 52
Asset Replacement	Replacement	Condition: 30

The first and second crack seal treatments applied in years 6 and 12 reset the condition to 88 and 73 respectively. These preventative maintenance activities are then followed by a new surface – single lift rehabilitation in year 20, which restores the condition back to 90.

5 The City only owns and operates 500m of concrete roads (old gravel pit). Once this road reaches its end of service life, it will be replaced with asphalt.
Gravel roads have low AADT and are inspected regularly. Grading is an important part of rural road maintenance and involves reshaping the roads. Public Works replaces gravel that has been either pushed off the road during winter operations and/or swept away during the spring thaw. While the City owns and operates some roads that are surfaced treated, there is no official maintenance program for this type of road.

Furthermore, the third and fourth crack seal treatments applied in years 26 and 32 reset the condition to 76 and 58 respectively. These preventative maintenance activities are then followed by a new surface – double lift rehabilitation in year 38, which restores the condition back to 80.

Finally, the fifth and sixth crack seal treatments applied in years 46 and 52 reset the condition to 46 and 52 respectively. Then, the asset is used until the end of its Lifecyle, which is reached when the condition of the asset drops to 30. The aforementioned lifecycle activities manage to extend the estimated useful life of the asset from 25 to 54 years as seen below



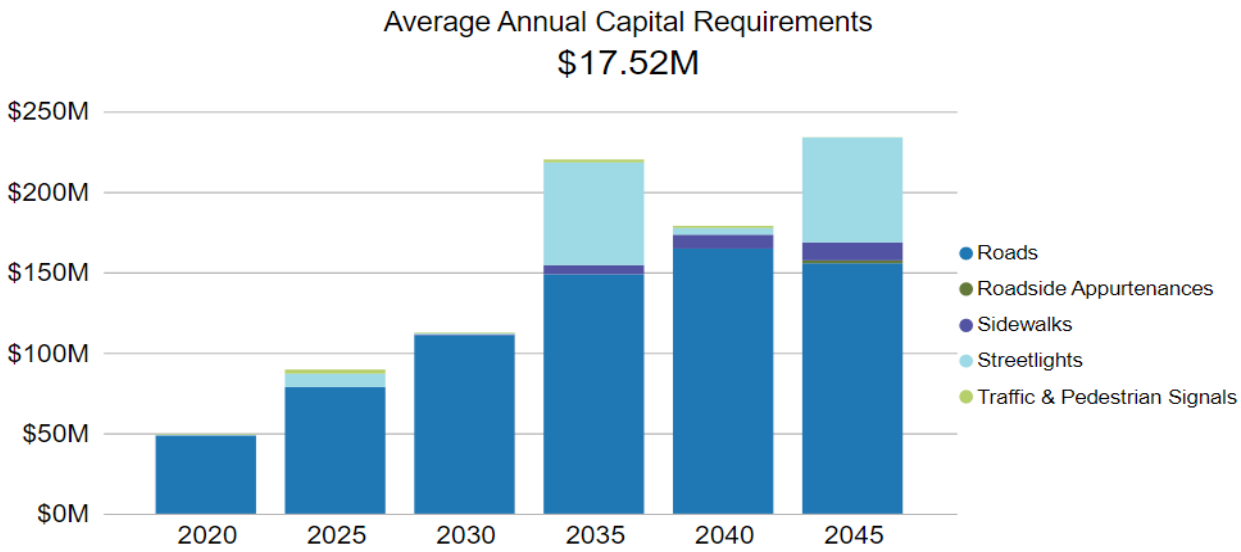
The following table further expands on the City's current approach to lifecycle management:

Activity Type	Description of Current Strategy
Maintenance	The City employs preventative maintenance programs to minimize the destructive impact of climate and traffic through the timely application of remedial treatments to the pavement.
Maintenance	Asphalt Roads – crack sealing/filling and spot base repairs (small area patching) Surface Treatment Roads – small area patching and drainage improvements
Rehabilitation/ Replacement	The most cost-effective expenditures for road rehabilitation can be achieved through the application of the right rehabilitation at the right time. This decision-making process relies primarily on the condition of the road surface.
Rehabilitation/ Replacement	The city's current road rehabilitation methods include: • Grind and Overlay • Full depth surface replacement • Full reconstruction
Rehabilitation/ Replacement	Full road reconstruction may be required when substantial base repairs are necessary or when sub-surface infrastructure also requires replacement.
Rehabilitation/ Replacement	The City develops a 5-year capital forecast which includes a mix of named reconstruction projects and general budget allocations for road resurfacing projects.

Forecasted Capital Requirements

Based on the lifecycle strategies identified previously for roads, and assuming the end-of-life replacement of all other assets in this category, the following graph forecasts capital requirements for the Road Corridor.

The annual capital requirement represents the average amount per year that the City should allocate towards funding rehabilitation and replacement needs to meet future capital needs.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

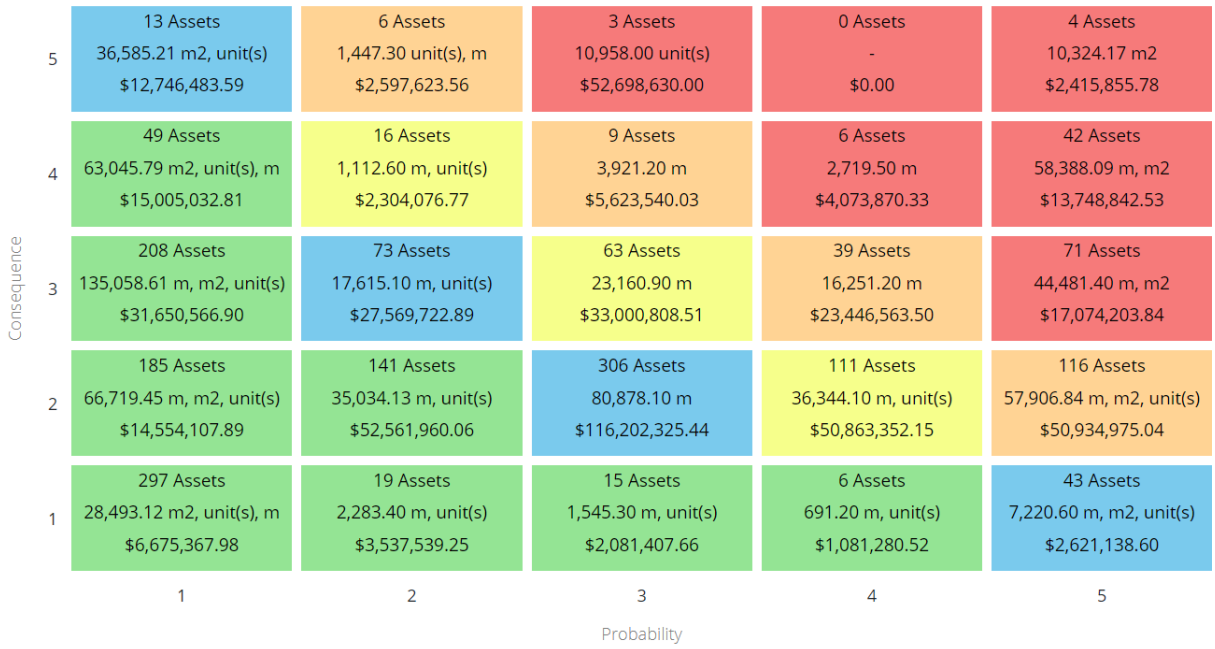
4.1.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the level of risk exposure for this asset category. It considers both the probability of failure and consequence of failure.

- Assets that fall in the uper right quadrant require immediate action as they have high chances of failure and major consequences associated to their failure.
- Assets that fall in the lower right quadrant require monitoring and predictive analysis of failure as they have high chances of failure with minor to moderate consequences associated to their failure, which may be tolerable by the City.
- Assets that fall in the upper left quadrant require proactive maintenance to keep their probability of failure low to moderate since they have moderate to high consequences associated to their failure.
- The assets that fall in the lower left quadrant have a low to moderate probability and low to moderate consequences of failure. Therefore, they require usual routine monitoring

The metrics that have been used to determine both can be found in Appendix C.



Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the City is currently facing:

Asset Data & Information

The level of maturity is at a basic level for the available inventory data for Road Corridor used in this Asset Management Plan. Staff plan to prioritize data refinement and consolidation efforts to increase confidence in the accuracy and reliability of asset data and information. Once completed there will be greater confidence in the development of data-driven strategies to address infrastructure needs.

Climate Change & Extreme Weather Events

An increase in rain causes impact to the road base, leading to the exposure of the road base. The design of the Stormwater System is the primary consideration instead of the roadway design itself.

Lifecycle Management Strategies

The current lifecycle management strategy for roads is considered more reactive than proactive. The goal for the City is to defer the needs for road reconstruction as it is costly and disruptive. Some potential additional programs are being considered:

- Single lift re-surfacing completed in the 10–15-year mark to push off double lift requirements another 20 years

4.1.6 Levels of Service (LOS)

The following tables identify the City's current level of service for the Road Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the City has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the Road Corridor.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the Road Corridor in the municipality and its level of connectivity	See Appendix B
Quality	Description or images that illustrate the different levels of road class pavement condition	The Pavement Condition Index (PCI) is a measure of the surface condition of the road based on empirical formula that take into account surface distresses and ride comfort resulting in a rating between 1 and 100. The assessment is detailed and allows for future monitoring and comparisons A Priority Guide Number (PGN) provides a relative comparison of the priority of the roads for improvement, based on condition, traffic, and improvement costs.

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Road Corridor.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	0.24
Scope	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	0.66
Scope	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	3.35
Quality	Average pavement condition index for paved roads in the municipality	60.63
Quality	Average surface condition for unpaved roads in the municipality (e.g., excellent, good, satisfactory, Below Satisfactory)	Satisfactory
Performance	Capital reinvestment rate	0.86%
Performance	Operating & Maintenance costs for paved roads / lane-km (excluding winter control)	$5,395.70
Performance	Operating & Maintenance costs for unpaved roads / lane-km (excluding winter control)	$6,751.79
Performance	% of sidewalks inspected	100%
Performance	% of road network inspected	100%
Performance	#/year of reported incidents related to the sidewalk network	17

4.1.7 Recommendations

Asset Inventory

- Continue to review and refine the Road Corridor inventory to ensure that it aligns with the City's database and that new assets and betterments are reflected and attributes are detailed.

Condition Assessment Strategies

- A comprehensive assessment of the road network was completed in 2016 and there are plans to conduct a network-wide road condition assessment in 2021 and every 5 to 10 years. Prioritize regular cursory inspections in between comprehensive assessments using consistent and standardized condition rating criterion.
- Develop and conduct condition assessment programs for all other transportation assets (roadside appurtenances and sidewalks).

Lifecycle Management Strategies

- Implement the identified lifecycle management strategies for roads to realize potential cost avoidance and maintain an acceptable quality of road pavement condition.
- Evaluate the efficacy of the City's lifecycle management strategies at regular intervals to determine the impact cost, condition, and risk.
- Develop cursory life cycle management strategies for all other transportation assets (sidewalks, streetlights, roadside appurtenances, park trails, bike/multi-use pathways/trails, and traffic & pedestrian signals).

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to the availability of additional data and also an evolving understanding of the probability and consequences of asset failure.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the City believes to provide meaningful and reliable inputs into asset management planning.

- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

4.2 Stormwater System

The City is responsible for owning and maintaining a Stormwater System consisting of storm sewer mains and other supporting infrastructure. Staff are working towards improving the accuracy and reliability of their Stormwater System inventory to assist with long-term asset management planning.

4.2.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the City's Stormwater System inventory.

Asset Segment	Sub-Segment	Quantity[6]	Unit of Measure	Replacement Cost Method	Replacement Cost
Drainage Channels	Drainage Channels	788	M	100% CPI Inflated	$3,455,020
Storm Sewers	Catch Basin and Lead	5,342	Quantity	100% Cost per Unit	$18,697,000
Storm Sewers	Clean Water Collectors	5	KM	100% CPI Inflated	$1,009,478
Storm Sewers	Inlet/Outlet Structures	69	Quantity	100% Cost per Unit	$1,857,825
Storm Sewers	Maintenance Holes	3,235	Quantity	100% Cost per Unit	$27,982,750
Storm Sewers	Oil Grit Separators	33	Quantity	100% Cost per Unit	$3,300,000
Storm Sewers	Service Connections	17	KM	100% Cost per Unit	$10,860,200
Storm Sewers	Storm Sewer Mains	210	KM	89% Cost per Unit, 11% CPI Inflated	$194,248,963
Stormwater Ponds	Dry Ponds	30,838	M3	100% CPI Inflated	$1,138,672
Stormwater Ponds	Wet Ponds	135,844	M3	93% Cost per Unit, 7% User-Defined Cost	$21,209,415
					$283,759,323

6 The level of maturity of the asset quantity data is still at a basic level. Staff plan to prioritize data refinement and consolidation efforts to increase confidence in the accuracy and reliability of asset data and information.

Total Replacement Cost
283.76M

Category	Segment	Sub-Segment	Replacement Cost
Stormwater System	Drainage Channels		3.46M
	Storm Sewers	Catch Basin and Lead	18.70M
		Clean Water Collectors	1.01M
		Inlet/Outlet Structures	1.86M
		Maintenance Holes	27.98M
		Oil Grit Separators	3.30M
		Service Connections	10.86M
		Storm Sewer Mains	194.25M
	Stormwater Ponds	Dry Ponds	1.14M
		Wet Ponds	21.21M

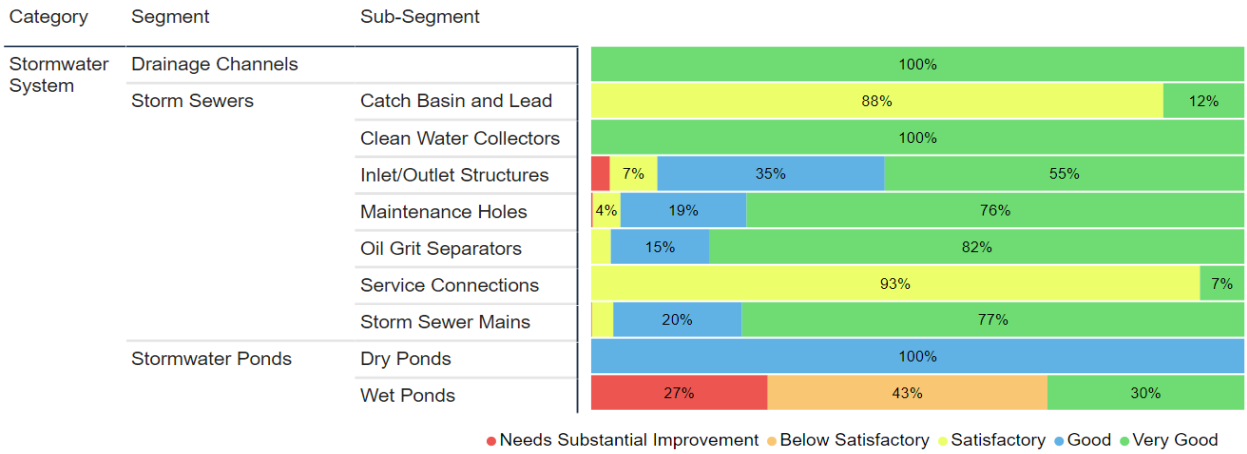
4.2.2 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition Rating is a weighted value based on replacement cost.

Asset Segment	Sub-Segment	Average Condition (%)	Average Condition Rating	Condition Source
Drainage Channels	Drainage Channels	99%	Very Good	100% Age-based
Storm Sewers	Catch Basin and Lead	54%	Satisfactory	88% Assessed, 12% Age-based[7]
Storm Sewers	Clean Water Collectors	100%	Very Good	100% Age-based
Storm Sewers	Inlet/Outlet Structures	80%	Good	100% Age-based
Storm Sewers	Maintenance Holes	86%	Very Good	100% Age-based
Storm Sewers	Oil Grit Separators	88%	Very Good	100% Age-based

7 A desktop assessment was completed by City staff. The results of the assessment were used along with Age-based ratings to calculate the average condition of assets. Desktop assessment ratings were given a weight of 50% compared to 50% for the age-based rating when performing the final condition calculation for Catch Basin and Leads. For Service Connections, the desktop assessments were given a weight of 55% compared to 45% for the age-based rating when performing the final condition calculation. Age-based conditions were solely used when desktop assessments were not performed.

Asset Segment	Sub-Segment	Average Condition (%)	Average Condition Rating	Condition Source
Storm Sewers	Service Connections	56%	Satisfactory	93% Assessed, 7% Age-based
Storm Sewers	Storm Sewer Mains	86%	Very Good	100% Age-based
Stormwater Ponds	Dry Ponds	66%	Good	100% Age-based
Stormwater Ponds	Wet Ponds	42%	Satisfactory	64% Assessed, 36% Age-based
		80%	**Good**	



To ensure that the City's Stormwater System continues to provide an acceptable level of service, the City should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Stormwater System.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

Stormwater Management Facilities

In 2020 all stormwater management facilities were assessed by an external consultant and a detailed Asset Management Plan was provided. Staff recommend that this detailed assessment be completed every 10 years, but there is no firm schedule in-place.

Using the 2020 assessment as a baseline, City staff plan to complete regular visual inspections of facilities to identify recommended lifecycle activities, monitor performance and address any maintenance concerns

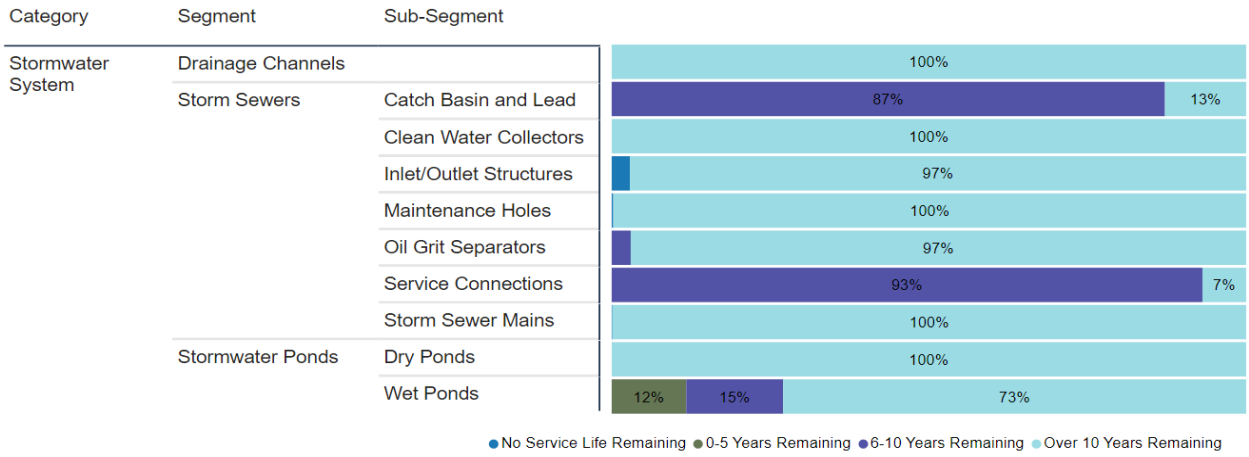
Storm Sewers

The City completes Closed Circuit Television (CCTV) inspections in conjunction with storm sewer flushing activities. The CCTV inspection program is being evaluated to ensure that there is a defined cycle of inspection across the entire network.

4.2.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Stormwater System assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Projected Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Sub-Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Projected Service Life Remaining (Years)
Drainage Channels	Drainage Channels	≤50	4.5	45.4
Storm Sewers	Catch Basin and Lead	≤50	34.5	11.3
Storm Sewers	Clean Water Collectors	≤75	2.9	68.3
Storm Sewers	Inlet/Outlet Structures	≤75	41.3	35.5
Storm Sewers	Maintenance Holes	≤75	34.7	40.3
Storm Sewers	Oil Grit Separators	≤50	20.4	28.8
Storm Sewers	Service Connections	≤50	34.8	9.2
Storm Sewers	Storm Sewer Mains	≤75	34.3	40.6
Stormwater Ponds	Dry Ponds	≤100	32.8	67.2
Stormwater Ponds	Wet Ponds	≤50	17.3	16.3
			34.2	**27.3**



Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

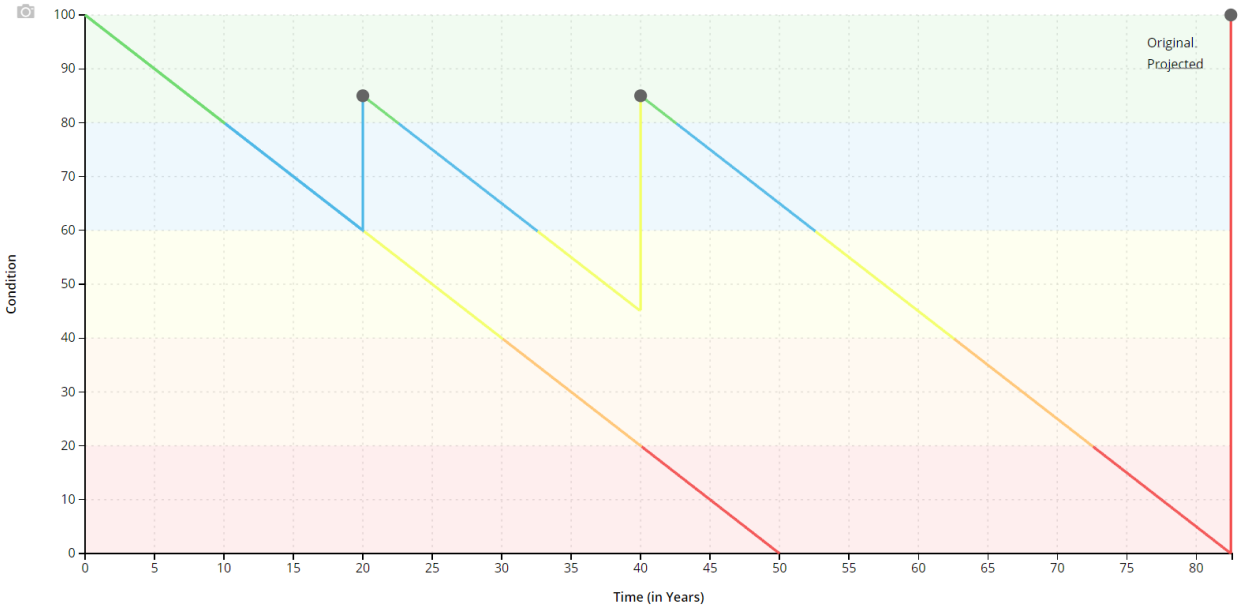
4.2.4 Lifecycle Management Strategy

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment.

The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of wet stormwater ponds. Instead of allowing the stormwater ponds to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of stormwater ponds at a lower total cost.

Stormwater Ponds (Wet)		
Event Name	**Event Class**	**Event Trigger**
Pond Cleanout 1st cycle	Maintenance	Year: 20
Pond Cleanout 2nd Cycle	Maintenance	Year: 40
Asset Replacement	Replacement	Condition: 0

Two cycles of pond cleanout are included in this lifecycle strategy as maintenance activities. The cleanout includes sediment cleanout, earthworks, landscaping, and outlet structure repair. The first cycle takes place at year 20 and the second cycle takes place at year 40. Both cycles restore the condition back to 85. By applying these activities, the estimated useful life of the asset can get extended from 50 years to 82 years as seen in the graph below.



Stormwater Management Facilities

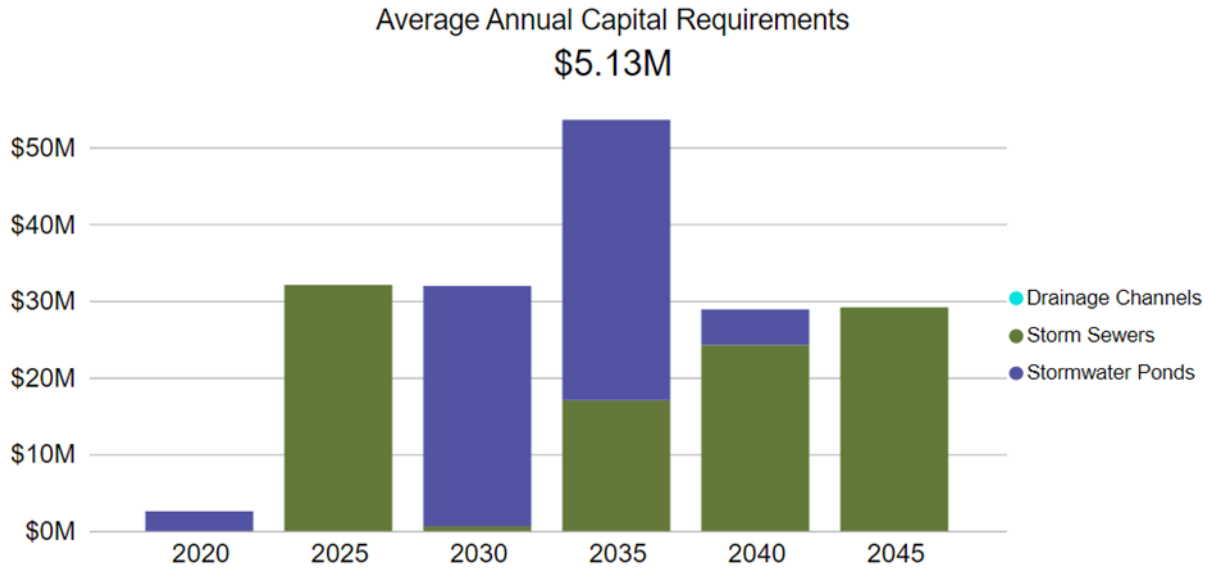
Activity Type	Description of Current Strategy
Maintenance	Regular inspections are completed across all facilities. When more detailed inspections were completed in 2020 this included: Inspection of maintenance hole covers, control structures and access barriers Bathymetric surveys and sediment depth measurements at wet ponds Sediment quality sampling to determine proper disposal requirements
Maintenance	Staff are in the process of evaluating and implementing a proactive maintenance program which may include: Debris cleanup Repairs to outlets, grates, and fences
Rehabilitation /Replacement	Sediment removal and disposal needs to occur on a regular basis (~ every 20 years).
Rehabilitation /Replacement	The excavation and removal of sediment from ponds will require a sampling and analysis plan outlining frequency and testing parameters.
Rehabilitation /Replacement	Due to the relatively young age of the City's stormwater management facilities, there has not been a previous urgency or requirement to plan for reconstruction/retrofit needs. The 2020 AMP is the first step in developing a long-term lifecycle management strategy for facilities.

Storm Sewers

Activity Type	Description of Current Strategy
Maintenance	The City's annual maintenance program for storm sewer mains includes: Storm sewer flushing and video inspection Calcite blockage removal (reaming) Catch basin cleaning
Rehabilitation	The city is in the process of refining its inventory data and collecting better condition data on linear storm sewer infrastructure. Once this process is completed staff will consider the benefits of trenchless sewer re-lining.
Replacement	Storm sewer replacement is aligned with road reconstruction programs. When a road is planned for reconstruction, CCTV inspections are completed to determine if the storm sewer needs repair or replacement. This project coordination ultimately leads to lower total project costs and reduces the impact of more frequent road reconstruction.
Replacement	The City develops a 5-year capital forecast which includes specific named projects

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the City should allocate towards funding rehabilitation and replacement needs. The vast majority of the assets that are due for replacement within the next 25 years are split between Storm Sewers and Stormwater Ponds as seen below.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

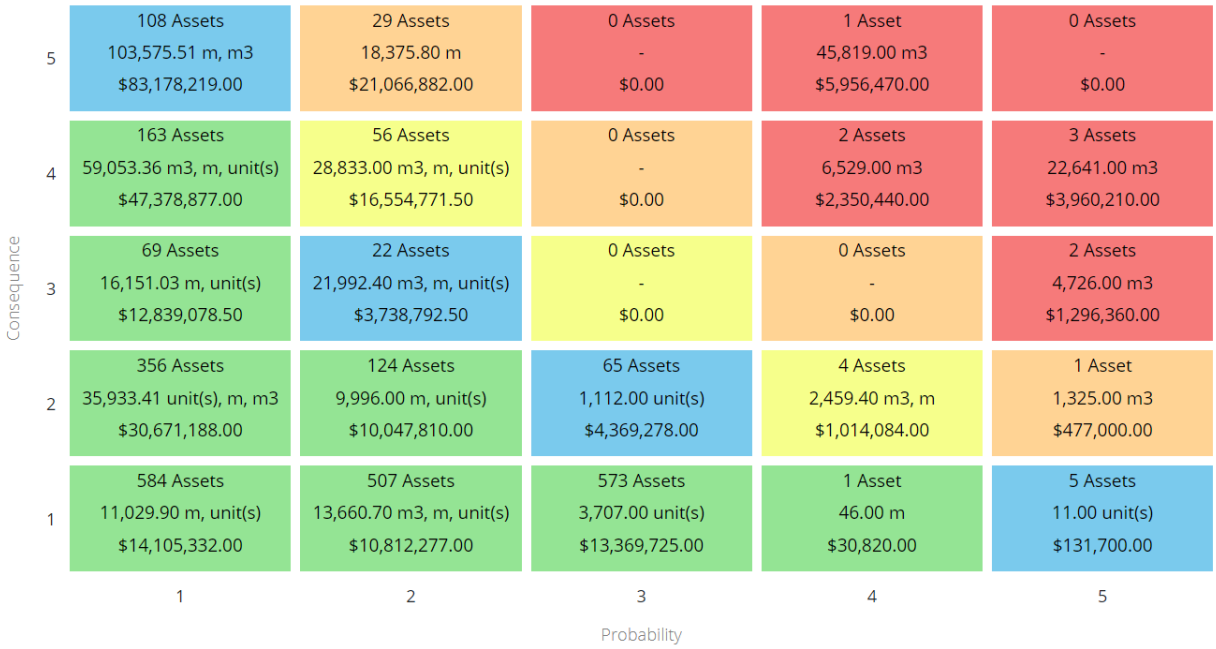
4.2.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the level of risk exposure for this asset category. It considers both the probability of failure and consequence of failure.

- Assets that fall in the uper right quadrant require immediate action as they have high chances of failure and major consequences associated to their failure.
- Assets that fall in the lower right quadrant require monitoring and predictive analysis of failure as they have high chances of failure with minor to moderate consequences associated to their failure, which may be tolerable by the City.
- Assets that fall in the upper left quadrant require proactive maintenance to keep their probability of failure low to moderate since they have moderate to high consequences associated to their failure.
- The assets that fall in the lower left quadrant have a low to moderate probability and low to moderate consequences of failure. Therefore, they require usual routine monitoring

The metrics that have been used to determine both can be found in Appendix C.



Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the City is currently facing:

Climate Change & Extreme Weather Events

Changes to intensity, duration, and frequency of rainfall may impact the condition and performance of the Stormwater System. Design criteria can become outdated as Intensity, duration, and Frequency (IDF) curves are updated. The IDF curves have not been updated yet. This risk is rather industry driven than City centered.

Infrastructure Design/Installation

Design guidelines have been updated to reflect new requirements around storm sewer sizing for new developments. Although newer subdivisions are being designed to meet overland flow requirements, this is not necessarily the case for all of the older developments.

Currently, design standards for linear infrastructure are built to capture and convey the 1 in 5-year storm event. However, updated IDF curves may impact this.

Infrastructure Re-investment

Plans to maintain and rehabilitate ponds are entirely dependant on budget approvals. When adequate budgets are not available, these plans may be deferred or canceled.

Lifecycle Management Strategies

For storm sewers, inspections are not completed on a strategic level. Inspections are done on a geographic zone basis, not necessarily targeted towards areas of elevated need.

The storm sewer age is relatively young north of the Highway 401 (the majority) and getting older south of the Highway. It is rare that the City has to plan for full reconstruction/replacement. However, The City is looking to expand inspection programs to become more strategic as the average age of storm infrastructure increases.

Furthermore, ponds within the City are relatively new and not at the end of their lifecycle. The City will be developing a robust lifecycle management strategy based on recently completed asset management plan.

4.2.6 Levels of Service (LOS)

The following tables identify the City's current level of service for the Stormwater System. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the City has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the Stormwater System.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include map, of the user groups or areas of the municipality that are protected from flooding, including the extent of protection provided by the municipal Stormwater System	Appendix B

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Stormwater System.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties in municipality resilient to a 100-year storm	60%[8]
Scope	% of the municipal stormwater management system resilient to a 5-year storm	95%[8]
Performance	% of storm sewer mains flushed and inspected	4.59%
Performance	% of catch basins cleaned	34.8%
Performance	Operating & Maintenance cost / km of storm sewers and urban ditches	$ 10,777.09
Performance	Operating & Maintenance cost / # of stormwater management facilities	TBD
Performance	Annual capital reinvestment rate	0.43%

8 The City has assumed that 'resilient to the 5-year event' is the amount of Pickering's minor system within urban settlement and estate development areas that has been designed to convey the 5-year event.
Similarly, the City assumes that 'resilient to the 100-year event' is the amount of area where the major system is capable of conveying the 100-year event with no impact to buildings within urban settlement and estate development areas.
Further studies are required to better determine the percentage accuracy to convey both the 5-year and 100-year event with no impact to infrastructure.
Staff have begun efforts to measure the asset performance against the indicated metrics in the Ontario Regulation. That work remains ongoing, and a more accurate representation of the City's Level of Service (LOS) will be provided in a future AMP.

4.2.7 Recommendations

Asset Inventory

- The City's Stormwater System inventory remains at a basic level of maturity and staff do not have a high level of confidence in its accuracy or reliability. Staff recognize that there is a need for additional investment of time and resources to development a comprehensive inventory of the Stormwater System and make it a priority.
- Prepare to add all newly assumed Stormwater System infrastructure to the asset inventory to support future planning for maintenance and rehabilitation.

Condition Assessment Strategies

- The development of a comprehensive inventory should be accompanied by a system-wide assessment of the condition of all assets in the Stormwater System through CCTV or zoom camera inspections.
- Include newly assumed stormwater management ponds in condition assessment strategies.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to the availability of data and also an evolving understanding of the probability and consequences of asset failure.

Lifecycle Management Strategies

- Document and review lifecycle management strategies for the Stormwater System on a regular basis to achieve the lowest total cost of ownership while maintaining adequate service levels.
- Consider the development of more preventative maintenance programs.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the City has established in this AMP. Additional metrics can be established as

they are determined to provide meaningful and reliable inputs into asset management planning.

- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

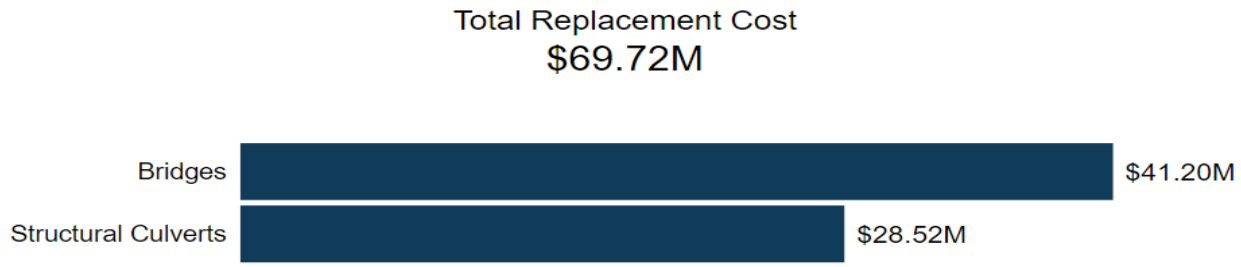
4.3 Bridges & Culverts

Bridges & Culverts represent a critical portion of the transportation services provided to the community. Engineering Services is responsible (though the Capital Budget process) for any structure replacements or rehabilitation. The Operations Department is responsible for the maintenance of all bridges and culverts located across municipal roads with the goal of keeping structures in an adequate state of repair and minimizing service disruptions. This AMP is for bridges and culverts with a span of three meters or more. The City has many culverts with a span that is less than three meters, including driveway culverts, that are not included in this section.

4.3.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the City's Bridges & Culverts inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Bridges	38[9]	100% User-Defined Cost	$41,201,000
Structural Culverts	28[10]	97% User-Defined Cost, 3% CPI Inflated	$28,520,727
	66		**$69,721,727**



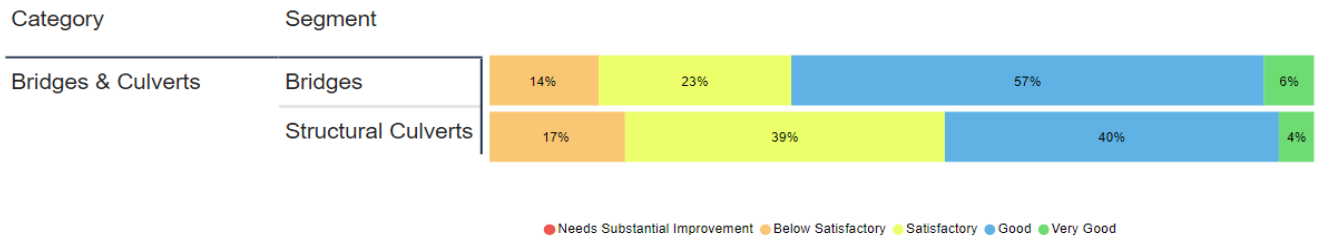
9 The bridge quantity represents the total number of bridges with a span of 3 m and more, including 9 pedestrian bridges.

10 The culvert quantity represents the total number of culverts with a span of 3 m and more, including 1 pedestrian culvert.

4.3.2 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition Rating is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Bridges	71%	Good	100% Assessed - 2020 OSIM Inspections
Structural Culverts	69%	Satisfactory	99% Assessed - 2020 OSIM Inspections
	70%	**Good**	**99% Assessed**



To ensure that the City's Bridges & Culverts continue to provide an acceptable level of service, the City should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation, and replacement activities is required to increase the overall condition of the Bridges & Culverts.

Current Approach to Condition Assessment

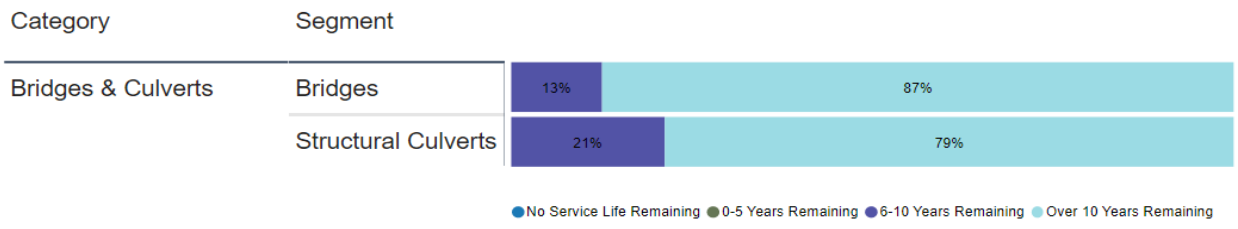
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:
Ontario Regulation 104/97 Standards for Bridges requires that every bridge or culvert with a span of 3.0 m or greater be inspected at least once in every second calendar year under the direction of a professional engineer and in accordance with the Ontario Structure Inspection Manual (OSIM).

Each structure receives a Bridge Condition Index (BCI) Rating from 1-100
While the BCI is a useful comparative measure for common bridges and culverts to plan for maintenance and repairs, it does not indicate the safety of the bridge

4.3.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Bridges & Culverts assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Projected Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Projected Service Life Remaining (Years)
Bridges	≤75	59.3	46.5
Structural Culverts	≤75	47.9	44.1
		53.9	**45.3**



Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

4.3.4 Lifecycle Management Strategy

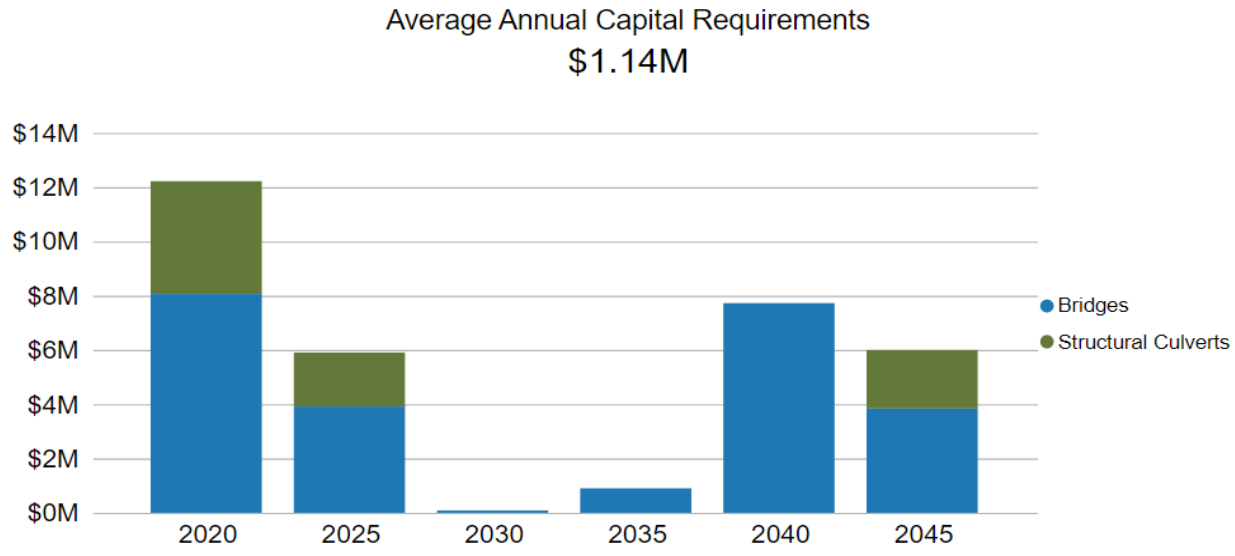
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers and the Ontario Regulation, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following table outlines the City's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Rehabilitation / Replacement	Biennial OSIM inspection reports including a Capital Needs List identifying recommended rehabilitation and replacement activities with estimated costs.
Rehabilitation / Replacement	The report also includes a 2-year priority report to assist the City with determining the timing and urgency of capital needs when developing budgets and capital plans.
Maintenance	Biennial OSIM inspections including a list of recommended maintenance activities that the City considers and completes according to cost and urgency.
Maintenance	Typical maintenance activities include: • Obstruction removal • Cleaning/sweeping • Erosion control • Brush/tree removal

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements aggregated for every 5 years. The annual capital requirement represents the average amount per year that the City should allocate towards funding rehabilitation and replacement needs.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

4.3.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the level of risk exposure for this asset category. It considers both the probability of failure and consequence of failure.

- Assets that fall in the uper right quadrant require immediate action as they have high chances of failure and major consequences associated to their failure.
- Assets that fall in the lower right quadrant require monitoring and predictive analysis of failure as they have high chances of failure with minor to moderate consequences associated to their failure, which may be tolerable by the City.
- Assets that fall in the upper left quadrant require proactive maintenance to keep their probability of failure low to moderate since they have moderate to high consequences associated to their failure.
- The assets that fall in the lower left quadrant have a low to moderate probability and low to moderate consequences of failure. Therefore, they require usual routine monitoring

The metrics that have been used to determine both can be found in Appendix C.

Consequence	1	2	3	4	5
5	0 Assets - $0.00	2 Assets 807.28 m2, m $10,867,704.82	0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00
4	2 Assets 615.30 m2, m $2,911,899.70	8 Assets 1,835.32 m2, m $12,280,690.64	6 Assets 1,045.74 m2, m $8,880,656.54	4 Assets 353.68 m2, m $5,070,412.11	0 Assets - $0.00
3	1 Asset 574.00 m2 $687,100.30	9 Assets 1,002.61 m2, m $6,557,398.33	11 Assets 726.31 m2, m $7,415,392.21	6 Assets 257.63 m2, m $4,579,220.97	0 Assets - $0.00
2	0 Assets - $0.00	9 Assets 580.07 m2, m $3,665,345.94	9 Assets 734.51 m2, m $3,099,419.95	0 Assets - $0.00	0 Assets - $0.00
1	4 Assets 41.03 m $132,228.00	15 Assets 1,084.07 m2, m $1,668,911.22	12 Assets 935.32 m2 $1,212,860.68	5 Assets 423.91 m2 $692,485.92	0 Assets - $0.00

Probability

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the City is currently facing:

Climate Change & Extreme Weather Events

Changes to intensity, duration, and frequency of rainfall may impact the condition of bridges and culverts. Although design standards have evolved over time to meet changing climate, older structures were designed to a different standard, and therefore not as resilient as newer structures.

Infrastructure Re-investment

Major capital rehabilitation projects for bridges and culverts are sometimes dependant on the availability of grant funding opportunities. When grants are not available, bridge rehabilitation projects may be deferred. However, bridges and culverts are also funded by the Roads and Bridges Reserve or by the issuance of debt. An annual capital funding strategy reduces dependency on grant funding and help prevent deferral or capital works.

Lifecycle Management Strategies

In the past several years maintenance and capital priorities have followed OSIM recommendations quite closely. However, the unavailability of adequate capital budget forced the City to prioritize some projects over others in the past.

4.3.6 Levels of Service (LOS)

The following tables identify the City's current level of service for Bridges & Culverts. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the City has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Bridges & Culverts.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	Bridges and structural culverts are a key component of the municipal transportation network. At this time, there are nine bridges with a load limit by-law. Unless otherwise posted, there are no restrictions to the types of traffic that can use municipal bridges and structural culverts, meaning heavy transport, motor vehicles, emergency vehicles and cyclists can cross them without restriction.
Quality	Description or images of the condition of bridges and how this would affect use of the bridges	Appendix B
Quality	Description or images of the condition of culverts and how this would affect use of the culverts	Appendix B

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by Bridges & Culverts.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of bridges in the City with loading or dimensional restrictions	23.68%
Quality	Average bridge condition index value for bridges in the City	70.6%
Quality	Average bridge condition index value for structural culverts in the City	70.2%
Performance	Capital re-investment rate	1.91%
Performance	Operating & Maintenance costs for bridges & culverts / m2	$ 26.11
Performance	# of unplanned bridge closures	TBD

4.3.7 Recommendations

Data Review/Validation

- Continue to review and validate inventory data, assessed condition data and replacement costs for all bridges and structural culverts upon the completion of OSIM inspections every 2 years.

Condition

- Ensure that the condition ratings from OSIM are entered into asset inventory to support planning for deterioration modeling.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Lifecycle Management Strategies

- Maintenance, rehabilitation, and replacement projects recommended by OSIM cannot all be met due to budget constraints. Prioritize reinvestment into bridges and structural culverts to ensure capital rehabilitation and maintenance is achieved on schedule.
- Work towards developing lifecycle models to prolong estimated useful life and optimize funding.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the City believe to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

4.4 Buildings & Facilities

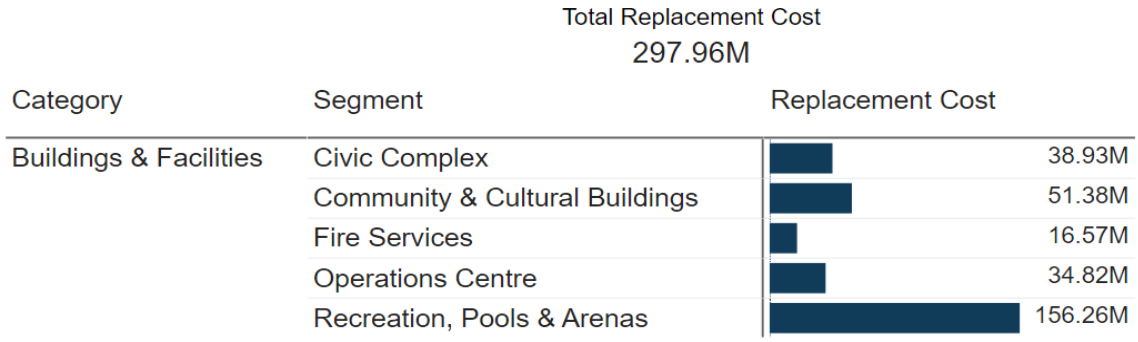
The City owns and maintains several facilities and recreation centres that provide key services to the community. These buildings fall under the following categories:

- Civic Complex
- Community & Cultural Buildings
- Fire Services
- Operations Centre
- Recreation, Pools & Arenas

4.4.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the City's Buildings & Facilities asset inventory.

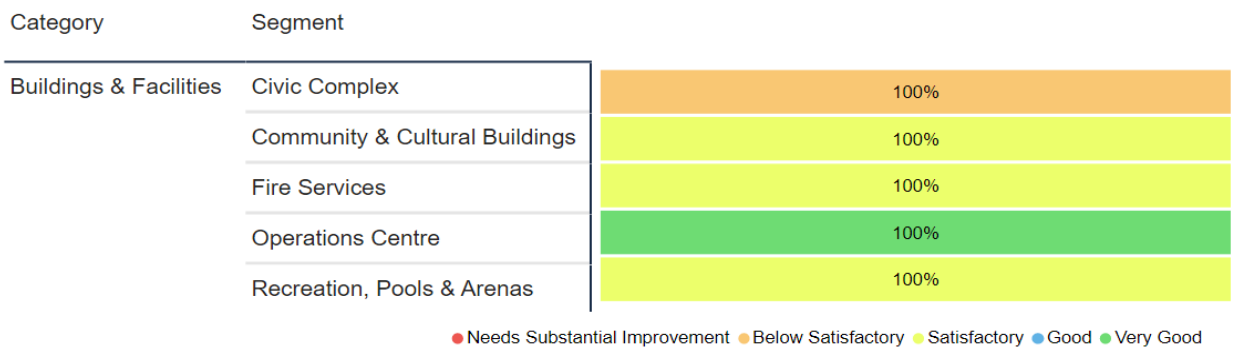
Asset Segment	Quantity (# of Facilities)	Replacement Cost Method	Replacement Cost
Civic Complex	1	100% User-Defined Cost	$38,927,479
Community & Cultural Buildings	16	100% User-Defined Cost	$51,377,603
Fire Services	4	100% User-Defined Cost	$16,568,369
Operations Centre	5	99% User-Defined Cost, 0.02% CPI Inflated	$34,822,278
Recreation, Pools & Arenas	4	100% User-Defined Cost	$156,260,360
	30		**$297,956,089**



4.4.2 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The FCI Condition Rating is a weighted value based on replacement cost.

Asset Segment	Facility Condition Index (FCI)[11]	FCI Condition Rating	Condition Source
Civic Complex	0.30	Below Satisfactory	VFA Database
Community & Cultural Buildings	0.26	Satisfactory	VFA Database
Fire Services	0.27	Satisfactory	VFA Database
Operations Centre	0.00	Excellent	VFA Database
Recreation, Pools & Arenas	0.21	Satisfactory	VFA Database
	0.21	**Satisfactory**	



11 Appendix E provides details on the FCI Condition Rating Scale

To ensure that the City's Building & Facilities continue to provide an acceptable level of service, the City monitors the condition of all assets in each of its facilities. As their condition declines, staff re-evaluate their lifecycle management and funding strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of Buildings & Facilities.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:
The City has completed and maintains current facility condition assessments through use of the VFA Facilities software solution, supported by audits undertaken by staff and third-party consultants over the past five years. It is expected that all facilities will be re-inspected on a 5-year cycle moving forward. The condition data from the VFA software is used in this report.

Each facility component is assessed based on inspections, estimated useful life and discussion with facilities maintenance staff. All component-based data rolls up to provide an overall Facility Condition Index (FCI) score. The FCI is an industry standard measure used to compare relative building conditions and defined as the value of deferred maintenance expected over the next five years divided by the total replacement value of the building.

The database is updated, upon completion of any new or lifecycle replacement project, to keep the database current and reflect the changes to the facility condition.

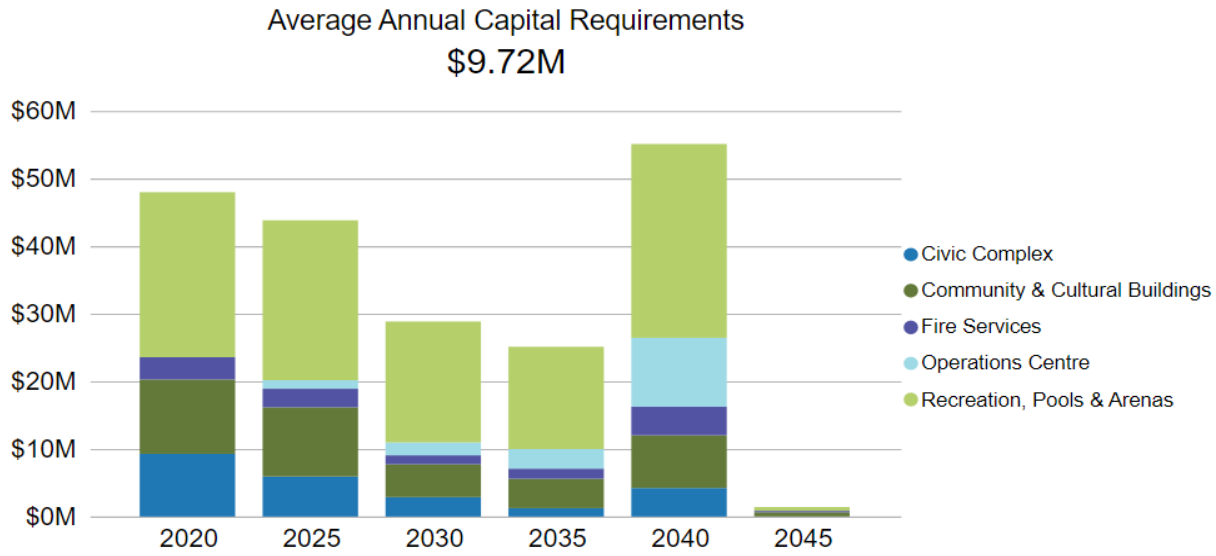
4.4.3 Lifecycle Management Strategy

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment. The following table further expands on the City's current approach to lifecycle management:

Activity Type	Description of Current Strategy
Maintenance	City Facilities Maintenance staff develop preventative maintenance plans that are tailored for each facility. These plans include a variety of activities that are completed by both internal staff and external contractors including: Routine health & safety inspections and general facility maintenance Elevator & life safety systems testing Utilities inspection & maintenance (e.g., generators, plumbing, HVAC)
Rehabilitation	Facility rehabilitation relies on determining the optimal time to replace components to minimize costs and manage risks without jeopardizing facility safety and operational standards. Staff prioritize rehabilitation needs into three broad categories: Primary: health & safety, roof replacement Secondary: HVAC and electrical systems Tertiary: cosmetics, lighting, cladding, flooring
Rehabilitation	In general terms, the City's approach is to look at facilities in term of generational life cycles, with each cycle lasting roughly 25-30 years. A major renovation is typically required at that point to address the end of life of a broad number of building systems (HVAC, roofs, finishes, etc.). Most buildings have 2-3 generational cycles in them, leaning towards the lower number if each generation is stretched to 30+ years.
Replacement	Determining facility replacement requirements involves several key sources of information, including: Facility condition index & staff inspections Maintenance and work order records. Master Plans Stakeholder input
Replacement	Staff aim to start evaluating and planning for facility replacements at least 5-10 years in advance of required capital works.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the City should allocate towards funding rehabilitation and replacement needs. The City uses a generational life cycle approach, with each cycle lasting 25-30 years. A major renovation is typically required at that point to address the end of life of a broad number of building systems (HVAC, roofs, finishes, etc.). Most buildings have 2-3 generational cycles in them, leaning towards the lower number. Therefore, a 25-year projection was adopted in this Asset Management Plan. The following graph does not take into account the potential closure of facilities[12].



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

12 Several major facilities have been identified for potential closure (FS5, ESCC and DBA). Removing and replacing these facilities with new buildings would reduce projected lifecycle capital costs from the point of each closure as new buildings typically do not incur high costs for the first 10-15 years after construction. Replacement needs are also pushed back as long as possible to avoid the related costs prior to closure, save those essential to sustaining operations.

4.4.4 Risk & Criticality

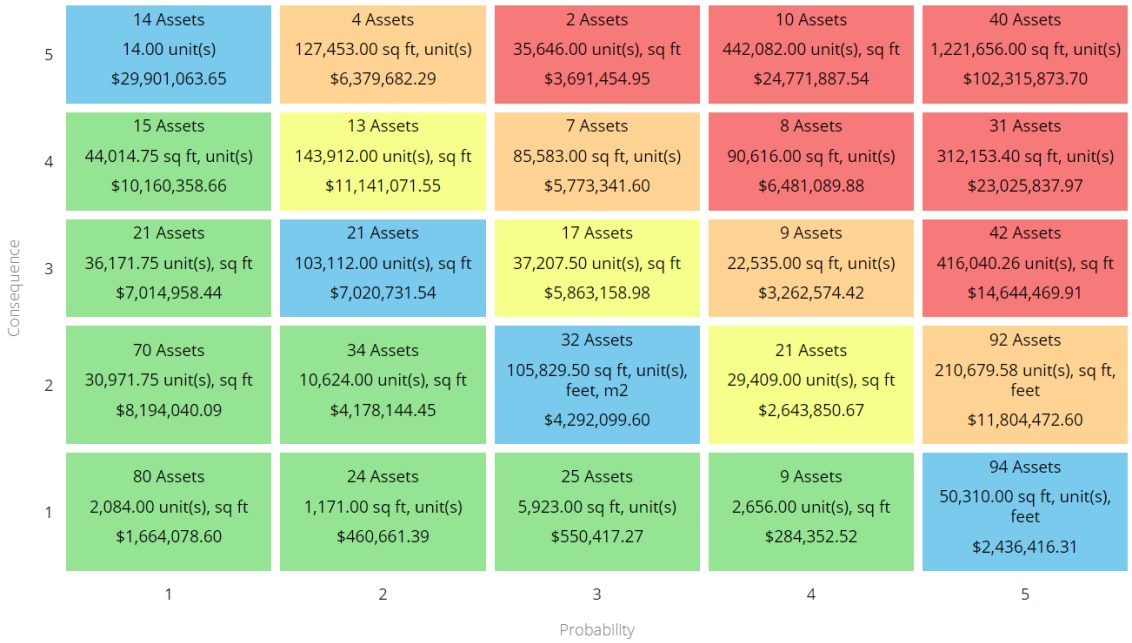
Risk Matrix

The following risk matrix provides a visual representation of the level of risk exposure for this asset category. It considers both the probability of failure and consequence of failure.

- Assets that fall in the uper right quadrant require immediate action as they have high chances of failure and major consequences associated to their failure.
- Assets that fall in the lower right quadrant require monitoring and predictive analysis of failure as they have high chances of failure with minor to moderate consequences associated to their failure, which may be tolerable by the City.
- Assets that fall in the upper left quadrant require proactive maintenance to keep their probability of failure low to moderate since they have moderate to high consequences associated to their failure.
- The assets that fall in the lower left quadrant have a low to moderate probability and low to moderate consequences of failure. Therefore, they require usual routine monitoring

For Buildings and Facilities, the "assets" represented in the risk matrix represent individual components of the assets. Therefore, the quantities represented below are more than 30 (total number of facilities).

The metrics that have been used to determine both can be found in Appendix C.



Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the City is currently facing:

Climate Change & Extreme Weather Events

The concern is regarding the long-term trend rather than individual events. Increasing temperatures place greater stress on HVAC systems. Climate resiliency is already a key consideration in any discussion of new construction/retrofits - E.g., building roof curbs to allow additional insulation thickness at a later date.

Infrastructure Design/Installation

Future-proofing is a key strategy for all City capital projects. The City acknowledges the need to build in as much resilience, durability, and flexibility as possible. The City wants to be able to keep up with technological advancements, and aging systems often become more difficult to maintain as parts and required expertise become sparse. Redundancy is key for critical systems, such as HVAC, electrical and life safety systems

Lifecycle Management Strategies and Long-term Planning
The current lifecycle management strategy for buildings and facilities prioritizes certain buildings that are key to the delivery of critical municipal services (City Hall and Emergency Services as a top priority then Rec Facilities and Support/Auxiliary).

Long-term planning can be complicated by frequent changes in strategic priorities affecting the continuity required to effectively deliver major projects. The City is currently reviewing options to improve funding and sequencing of works, including a 5–10-year long term plan. This will address both growth needs, as well as rejuvenation and replacement of older facilities.

All asset management plans data accuracy degrades with time. The City's strategy is to renew it by completing physical audits on a five-year cycle. The construction cost database software used to cost the work identified in the asset management plan is automatically updated annually.

Organizational Knowledge & Capacity

Effective facilities planning is a lengthy and laborious process. Staff turnover can also lead to loss of institutional knowledge, making extensive and long-term record-retention essential as a backup. It is particularly impactful for facilities, where investigation of areas in active use might not be feasible.

4.4.5 Levels of Service (LOS)

The following tables identify the City's current level of service for Buildings and Facilities. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the City has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the Buildings & Facilities assets.

Service Attribute	Technical Metric	Current LOS (2020)
Accessible & Reliable	Description of Pickering's Accessibility Advisory Committee and examples of accessible facility equipment.	The City of Pickering prepares a Multi-Year Accessibility Plan that sets out the steps that will be taken to: Work toward removing existing barriers for persons with disabilities Plan for the prevention of new barriers Achieve compliance with the AODA regulations The implementation of the Plan is supported by the Pickering Accessibility Advisory Committee. Examples of accessible facility equipment includes: Steps with non-slip treads and stair lifts Ramps, sliding doors and automatic doors Accessible washrooms and shower facilities
Safe & Regulatory	Description of inspections processes in place for facilities	There are several inspection programs in place to ensure that municipal facilities are kept in a good state of repair and maintenance activities are addressed in a timely manner. These are completed by a combination of both City staff and external contractors when subject matter expertise is required. The frequency and scope of inspections is determined by both regulatory requirements and risk. There are three levels of prioritization as follows: Primary: Health & Safety, Roofing Secondary: HVAC and electrical systems Tertiary: Cosmetics, lighting, flooring etc.

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Building & Facilities assets.

Service Attribute	Technical Metric	Current LOS (2020)
Accessible & Reliable	% of facilities with accessible entrances and washrooms	62%
Safe & Regulatory	% of facilities where monthly inspections have been completed	100%
Affordable	Annual maintenance rate (total maintenance and repair budgets / total ft^2 of all facilities)	$ 3.27
Affordable	Total utility costs / ft^2 of all facilities	$ 2.17
Sustainable	Overall Facilities Condition Index	0.21
Sustainable	Annual capital reinvestment rate	0.78%

4.4.6 Recommendations

Asset Inventory

- Continue to review and refine the Building & Facilities asset inventory to ensure new assets and betterments are reflected and attributes are detailed.

Condition Assessment Strategies

- Ensure that condition ratings from building condition assessments are entered into the asset inventory on continuous basis to support planning for deterioration modeling.

Lifecycle Management Strategies

- Maintenance, rehabilitation, and replacement projects recommended by building condition assessments cannot all be met due to budget constraints. Keep prioritizing capital projects based on health and safety issues, as well as public feedback.
- Work towards developing lifecycle models to prolong estimated useful life and optimize use of available funding.

Risk Management Strategies

- Continue to implement risk-management based decision-making as part of asset management planning and budgeting processes. This includes the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to the availability of additional data and also an evolving understanding of the probability and consequences of asset failure.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the City believes to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

4.5 Parks

The City owns and operates several assets that are fall under the Parks assets category. These assets are essential for the Parks' service delivery. The asset segments include[13]:

- Active Recreation Facilities
- Amenities, Furniture & Utilities
- Vehicular and Pedestrian Networks

4.5.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the City's Parks asset inventory.

Asset Segment	Sub-Segment	Quantity [14]	Unit of Measure	Replacement Cost Method	Replacement Cost
Active Recreation Facilities	Playground Equipment	86	Quantity	100% CPI Inflation	$6,519,728
Active Recreation Facilities	Sport Playing Surfaces	19,736	M^2	100% CPI Inflation	$18,967,710[15]
Active Recreation Facilities	Sport Playing Surfaces	116	Quantity	100% CPI Inflation	-
Amenities, Furniture & Utilities	Buildings	1,489	M^2	100% CPI Inflation	$3,636,048

13 Note: The asset inventory includes only traditional tangible capital assets and does not include natural assets.

14 The level of maturity of the asset quantity data is still at a basic level. Staff plan to prioritize data refinement and consolidation efforts to increase confidence in the accuracy and reliability of asset data and information.

15 Replacement cost is for all Sport Playing Surfaces.

Asset Segment	Sub-Segment	Quantity [14]	Unit of Measure	Replacement Cost Method	Replacement Cost
Amenities, Furniture & Utilities	Buildings	14	Quantity	100% CPI Inflation	-
Amenities, Furniture & Utilities	Electrical/ Lighting	516	Quantity	100% CPI Inflation	$7,297,086
Amenities, Furniture & Utilities	Site Furniture	106	M^2	100% CPI Inflation	$1,134,689[16]
Amenities, Furniture & Utilities	Site Furniture	182	M	100% CPI Inflation	-
Amenities, Furniture & Utilities	Site Furniture	375	Quantity	100% CPI Inflation	-
Amenities, Furniture & Utilities	Site Structures	1,116	M^2	88% User-Defined Cost, 12% CPI Inflation	$8,381,552[17]
Amenities, Furniture & Utilities	Site Structures	4,311	M	88% User-Defined Cost, 12% CPI Inflation	-
Amenities, Furniture & Utilities	Site Structures	196	Quantity	88% User-Defined Cost, 12% CPI Inflation	-
Amenities, Furniture & Utilities	Subsurface Infrastructure	2,744	M	100% CPI Inflation	$1,254,598[18]
Amenities, Furniture & Utilities	Subsurface Infrastructure	163	Quantity	100% CPI Inflation	-

16 Replacement cost is for all Site Furniture.

17 Replacement cost is for all Site Structures.

18 Replacement cost is for all Subsurface Infrastructure.

Asset Segment	Sub-Segment	Quantity	Unit of Measure	Replacement Cost Method	Replacement Cost
Amenities, Furniture & Utilities	Waterfront Infrastructure	762	M2	100% CPI Inflation	$10,102,767[19]
Amenities, Furniture & Utilities	Waterfront Infrastructure	3	Quantity	100% CPI Inflation	-
Vehicular & Pedestrian Networks	Parking Lots & Internal Roads	51	KM^2	100% CPI Inflation	$2,467,565
Vehicular & Pedestrian Networks	Pedestrian Corridors	80	KM^2	100% CPI Inflation	$7,893,946
					$67,655,689

Total Replacement Cost
67.66M

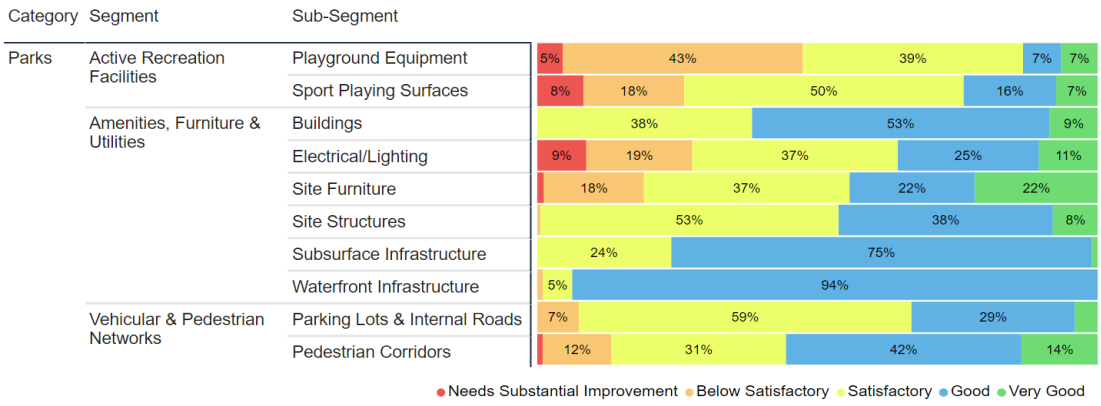
Category	Segment	Sub-Segment	Replacement Cost
Parks	Active Recreation Facilities	Playground Equipment	6.52M
		Sport Playing Surfaces	18.97M
	Amenities, Furniture & Utilities	Buildings	3.64M
		Electrical/Lighting	7.30M
		Site Furniture	1.13M
		Site Structures	8.38M
		Subsurface Infrastructure	1.25M
		Waterfront Infrastructure	10.10M
	Vehicular & Pedestrian Networks	Parking Lots & Internal Roads	2.47M
		Pedestrian Corridors	7.89M

19 Replacement cost is for all Waterfront Infrastructure

4.5.2 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition Rating is a weighted value based on replacement cost.

Asset Segment	Sub-Segment	Average Condition (%)	Average Condition Rating	Condition Source
Active Recreation Facilities	Playground Equipment	49%	Satisfactory	100% Assessed
Active Recreation Facilities	Sport Playing Surfaces	46%	Satisfactory	100% Assessed
Amenities, Furniture & Utilities	Buildings	66%	Good	100% Assessed
Amenities, Furniture & Utilities	Electrical/Lighting	52%	Satisfactory	100% Assessed
Amenities, Furniture & Utilities	Site Furniture	63%	Good	100% Assessed
Amenities, Furniture & Utilities	Site Structures	73%	Good	100% Assessed
Amenities, Furniture & Utilities	Subsurface Infrastructure	67%	Good	100% Assessed
Amenities, Furniture & Utilities	Waterfront Infrastructure	74%	Good	100% Assessed
Vehicular & Pedestrian Networks	Parking Lots & Internal Roads	53%	Satisfactory	100% Assessed
Vehicular & Pedestrian Networks	Pedestrian Corridors	60%	Good	100% Assessed
		58%	**Satisfactory**	



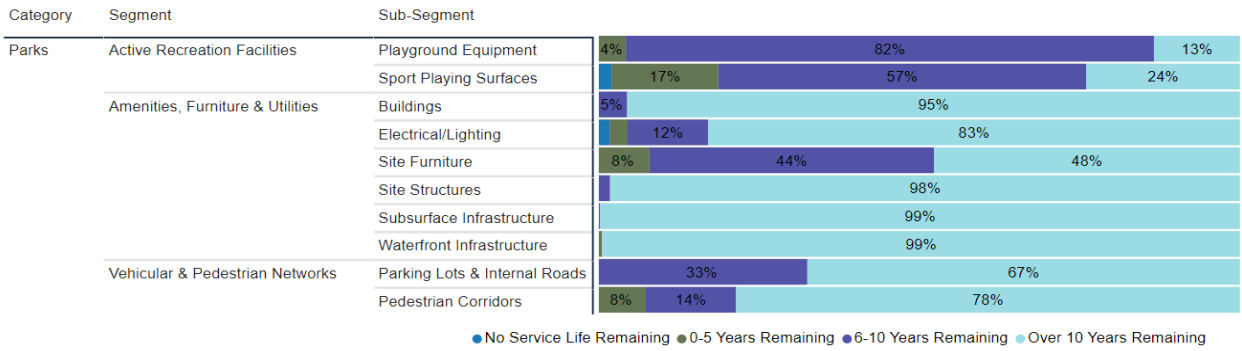
Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:
Staff began to implement a condition assessment program for parks infrastructure in 2017. Assessments have been continuously completed and there are plans to continue assessing parks infrastructure using co-op students and other internal staff.
In addition to annual condition assessments, the City employs a Parks Inspector who inspects all City playgrounds monthly to ensure playground equipment is in good repair and playgrounds are safe.

4.5.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Parks assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Projected Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Sub-Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Projected Service Life Remaining (Years)
Active Recreation Facilities	Playground Equipment	≤20	16.7	7.4
Active Recreation Facilities	Sport Playing Surfaces	≤40	26.3	8.7
Active Recreation Facilities	Buildings	≤40	17.3	18.8
Active Recreation Facilities	Electrical/Lighting	≤40	27.1	11.5
Active Recreation Facilities	Site Furniture	≤30	17.6	9.8
Amenities, Furniture & Utilities	Site Structures	≤40	11.0	19.8
Amenities, Furniture & Utilities	Subsurface Infrastructure	≤50	28.9	24.1
Amenities, Furniture & Utilities	Waterfront Infrastructure	≤100	12.3	26.6
Amenities, Furniture & Utilities	Parking Lots & Internal Roads	≤40	22.7	15.5
Amenities, Furniture & Utilities	Pedestrian Corridors	≤40	21.3	17.7
			21.4	**14.1**



Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

4.5.4 Lifecycle Management Strategy

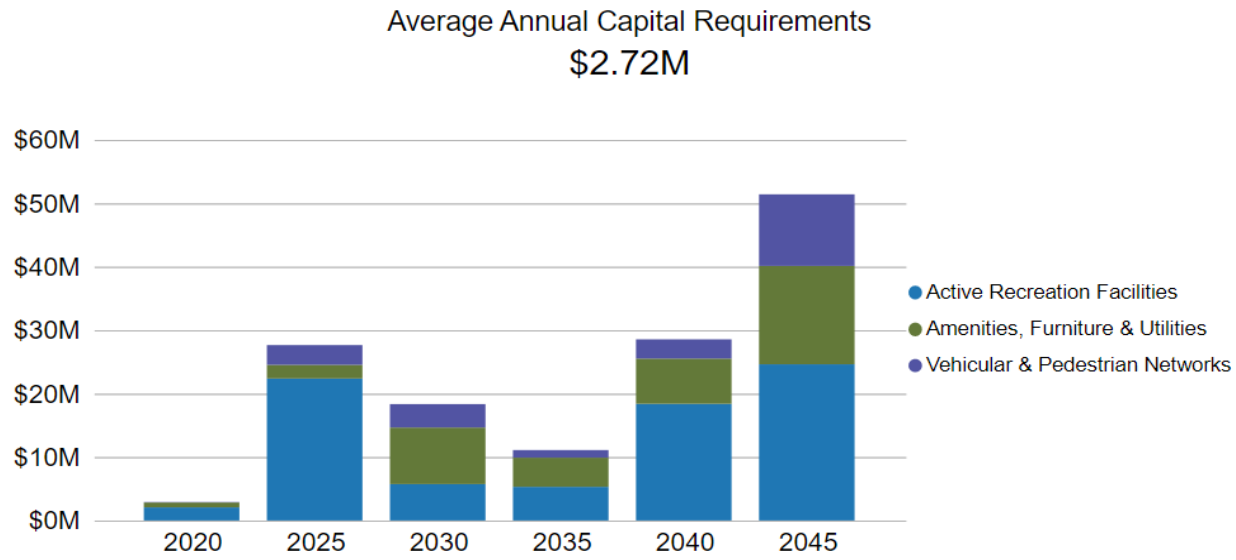
The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment.

The following table further expands on the City's current approach to lifecycle management:

Activity Type	Description of Current Strategy
Maintenance	The City's parks maintenance program is tailored to each park and includes activities such as: • Garbage disposal • Grass cutting • Park and playground inspections & repairs • Park lighting inspections & repairs • Irrigation system inspections & repairs
Rehabilitation /Replacement	Based on condition assessment and inspections some repairs can be completed on-site. Where an external contractor or specialized materials/equipment are required additional follow-up may be required.
Rehabilitation /Replacement	Parks staff also receive feedback from park users that informs the development of both maintenance and capital plans.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the City should allocate towards funding rehabilitation and replacement needs.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

4.5.5 Risk & Criticality

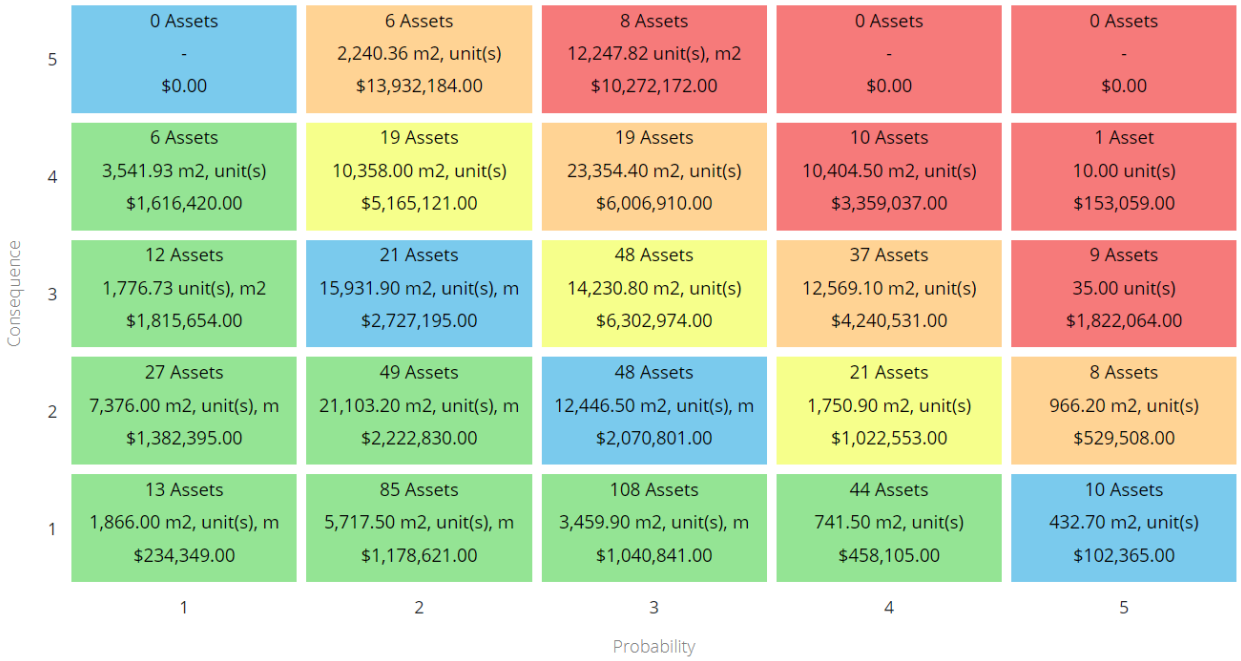
Risk Matrix

The following risk matrix provides a visual representation of the level of risk exposure for this asset category. It considers both the probability of failure and consequence of failure.

- Assets that fall in the uper right quadrant require immediate action as they have high chances of failure and major consequences associated to their failure.
- Assets that fall in the lower right quadrant require monitoring and predictive analysis of failure as they have high chances of failure with minor to moderate consequences associated to their failure, which may be tolerable by the City.
- Assets that fall in the upper left quadrant require proactive maintenance to keep their probability of failure low to moderate since they have moderate to high consequences associated to their failure.

- The assets that fall in the lower left quadrant have a low to moderate probability and low to moderate consequences of failure. Therefore, they require usual routine monitoring

The metrics that have been used to determine both can be found in Appendix C.



Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the City is currently facing:

Asset Data Confidence

Currently, the asset data level of maturity is still at a basic level. The City is undergoing an additional data refinement exercise to continue to improve parks inventory datasets and to ensure that the inventory captures all infrastructure with sufficient details to inform asset management planning. There are some concerns with underestimating the total life cycle costs for parks infrastructure using the current datasets.

Climate Change & Extreme Weather Events

Flooding can impact programs and activities (e.g., soccer fields). Waterfront is a major flood risk are (two record high flooding levels have been recorded in the past 4 years). Erosion has been a problem as well as damage, causing damages to waterfront infrastructure - e.g., break-wall. Furthermore, the waterfront infrastructure is deteriorating and suffering from premature wear from flooding, and also the sandblasting effect caused by the City's natural sandy beach and wind.

Infrastructure Design/Installation

There are concerns with contractors and installation practices (e.g., grading and its impact on drainage and safety with grass cutting).

Lifecycle Management Strategies

The lifecycle management strategies have been rather reactive than proactive due to staff resource availability, and budget dollars. Some maintenance activities are deferred based on staff resources and availability of budget.

On another note, there is premature wearing of sport field surfaces due to overbooking of existing infrastructure / lack of sufficient quantity to meet demand. The Sports Turf Association publication "Athletic Field Construction Manual" 2nd edition (2012) lays out a 5-part Athletic Field Classification System, as well as Permitting Hours & Maintenance Cost for Field Categories that indicates that the City is overbooking its fields (All - turf and artificial). Furthermore, the City is not programming the bookings in accordance with the required maintenance capacity and downtime required for field recovery.

4.5.6 Levels of Service (LOS)

The following tables identify the City's current level of service for the Road Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the City has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the Parks assets.

Service Attribute	Qualitative Description	Current LOS (2020)
Accessible & Reliable	A map of the municipality with all municipal parks highlighted	See Appendix B
Safe & Regulatory	Description of the parks inspection process and timelines for regular inspection	The City employs a Parks Inspector who is responsible for inspecting all playground facilities on a monthly basis. Additionally, Parks staff complete cursory inspections on an regular basis as part of regular maintenance and operating activities. From these inspection activities a deficiency list is created which is reviewed and implemented by a combination of City staff and external contractors when subject matter expertise is required.

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Parks assets.

Service Attribute	Technical Metric	Current LOS (2020)
Accessible & Reliable	Square metres of outdoor recreation facility space per 1,000 population	659.8
Safe & Regulatory	# of customer complaints about conditions in parks	51
Safe & Regulatory	% of monthly park inspections completed	100
Affordable	Operating & maintenance cost for parks per # of parks	$ 56,773.21
Sustainable	Average condition of parks infrastructure	Satisfactory
Sustainable	Annual capital reinvestment rate	3.04%

4.5.7 Recommendations

Asset Inventory

- Continue to review and refine the Parks asset inventory to ensure new assets and betterments are reflected and attributes are detailed.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk assets.
- Review assets that have surpassed their estimated useful life to determine if immediate replacement is required or whether these assets are expected to remain in-service. Adjust the service life and/or condition ratings for these assets accordingly.

Lifecycle Management Strategies

- Work towards developing lifecycle models to prolong estimated useful life and optimize funding.

Risk Management Strategies

- Review risk models on a regular basis and adjust according to the availability of additional data and also an evolving understanding of the probability and consequences of asset failure.

Levels of Service

- Work towards ensuring that the sport field / infrastructure capacity is in place to meet the public / user group demand. The City needs to reduce the wear on its fields and infrastructure caused by over-usage by increasing the sport field inventory count.
- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the City believes to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

4.6 Other Infrastructure

The City owns and maintains several Other Infrastructure that provide key services to the community. These Other Infrastructure fall under the following categories:

- Furniture & Fixtures
- Information Technology
- Library Collection Materials
- Machinery & Equipment
- Vehicles

4.6.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the City's Other Infrastructure inventory.

Asset Segment	Sub-Segment	Quantity	Unit of Measure	Replacement Cost Method	Replacement Cost
Furniture & Fixtures	Furniture & Fixtures	860	Quantity	100% CPI Inflation	$1,527,300
Information Technology	Information Technology	638	Quantity	100% CPI Inflation	$2,270,128
Library Collection Materials[20]	Library Collection Materials	11	Quantity	100% CPI Inflation	$2,096,525
Machinery & Equipment	Major	35	Quantity	$6,114,758	$6,114,758
Machinery & Equipment	Minor	1,310	Quantity	$6,981,929	$6,981,929
Vehicles	Fire Vehicles	11	Quantity	$8,647,552	$8,647,552
Vehicles	Vehicles	115	Quantity	$9,501,444	$9,501,444
					$37,139,636

20 Through the Current Budget, the Library purchases an additional $300,000 per year in short term Library collection assets such as e-books and magazines that is not reflected in the above Library long term assets.

Total Replacement Cost

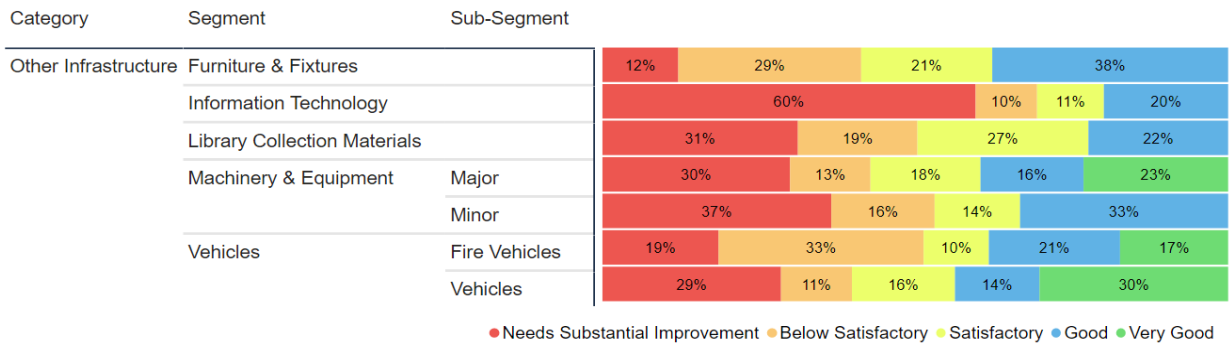
37.14M

Category	Segment	Sub-Segment	Replacement Cost
Other Infrastructure	Furniture & Fixtures		1.53M
	Information Technology		2.27M
	Library Collection Materials		2.10M
	Machinery & Equipment	Major	6.11M
		Minor	6.98M
	Vehicles	Fire Vehicles	8.65M
		Vehicles	9.50M

4.6.2 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Sub-Segment	Average Condition (%)	Average Condition Rating	Condition Source
Furniture & Fixtures	Furniture & Fixtures	57%	Satisfactory	100% Age-based
Information Technology	Information Technology	29%	Below Satisfactory	100% Age-based
Library Collection Materials	Library Collection Materials	46%	Satisfactory	100% Age-based
Machinery & Equipment	Major	45%	Satisfactory	100% Age-based
Machinery & Equipment	Minor	44%	Satisfactory	100% Age-based
Vehicles	Fire Vehicles	47%	Satisfactory	100% Age-based
Vehicles	Vehicles	49%	Satisfactory	100% Age-based
		46%	**Satisfactory**	



To ensure that the City's Other Infrastructure continue to provide an acceptable level of service, the City should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of Other Infrastructure.

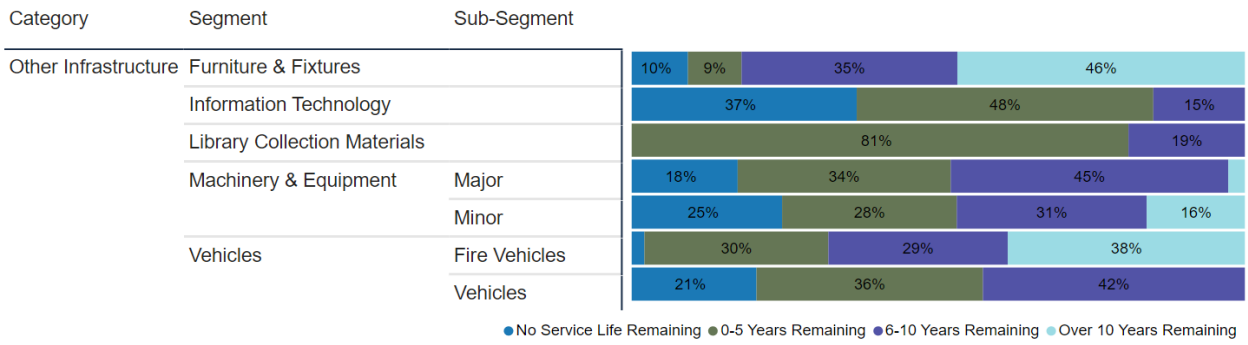
4.6.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Other Infrastructure has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Projected Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age.

Asset Segment	Sub-Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Projected Service Life Remaining (Years)
Furniture & Fixtures	Furniture & Fixtures	≤50	8.8	13.3
Information Technology	Information Technology	≤10	6.5	-1.1[21]
Library Collection Materials	Library Collection Materials	≤7	2.9	2.9
Machinery & Equipment	Major	≤15	6.1	4.6
Machinery & Equipment	Minor	≤25	7.5	2.6

21 A negative Average Projected Service Life Remaining (Years) means that the majority of assets have surpassed their useful lives. In other words, there are more assets that have surpassed their useful lives than those that have not yet reached their useful lives.

Asset Segment	Sub-Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Projected Service Life Remaining (Years)
Vehicles	Fire Vehicles	≤15	8.7	6.3
Vehicles	Vehicles	≤9	4.8	3.2
			6.8	**2.8**

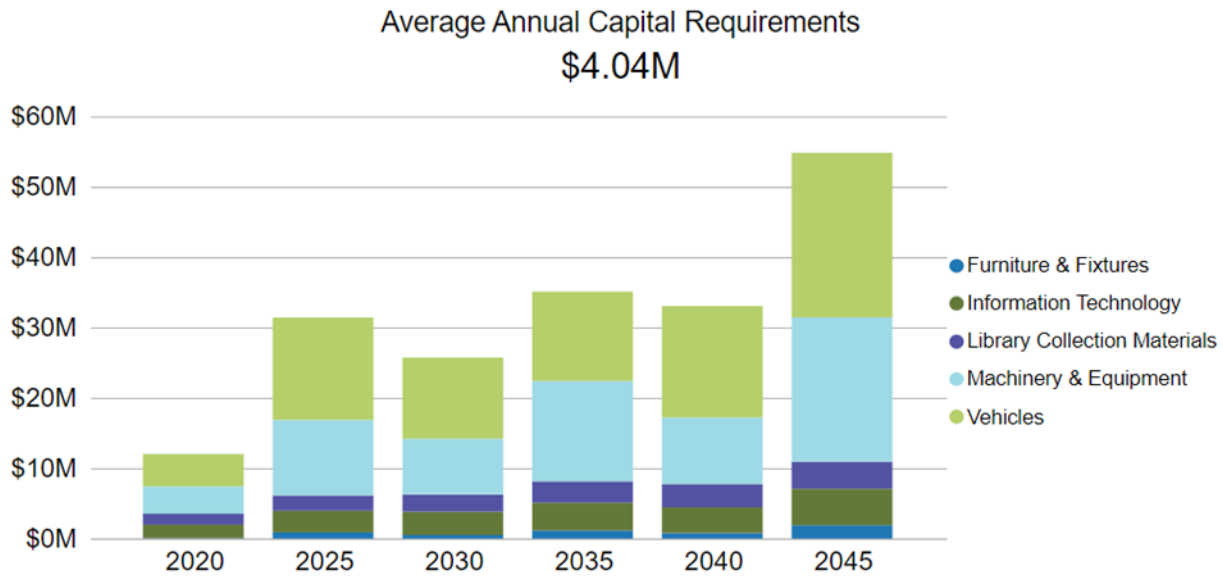


Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

4.6.4 Lifecycle Management Strategy

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the City should allocate towards funding rehabilitation and replacement needs.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

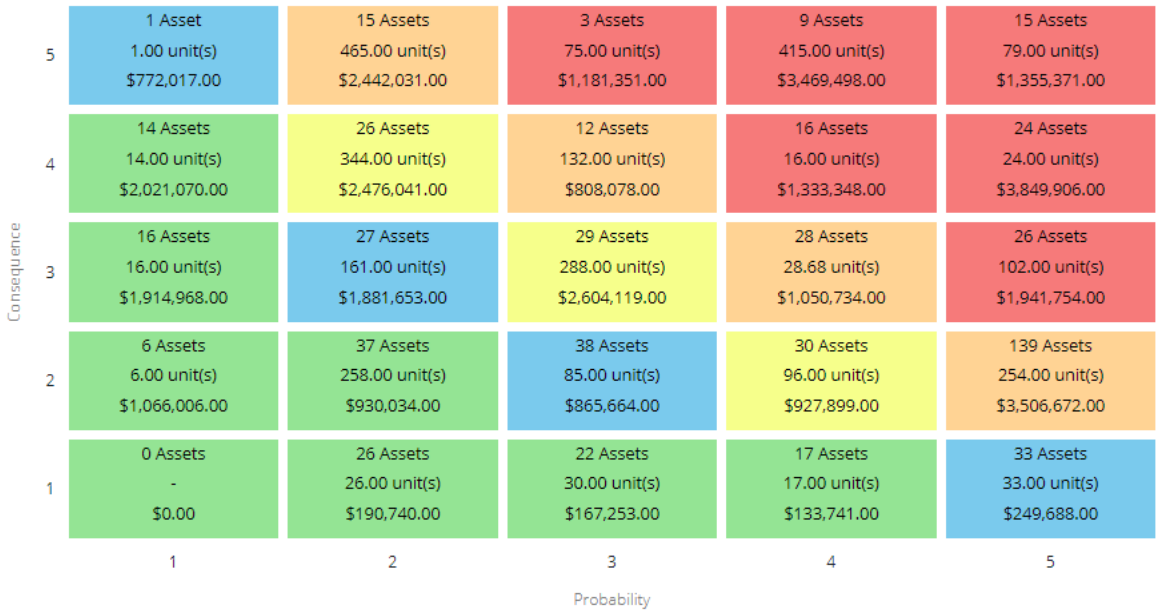
4.6.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the level of risk exposure for this asset category. It considers both the probability of failure and consequence of failure.

- Assets that fall in the uper right quadrant require immediate action as they have high chances of failure and major consequences associated to their failure.
- Assets that fall in the lower right quadrant require monitoring and predictive analysis of failure as they have high chances of failure with minor to moderate consequences associated to their failure, which may be tolerable by the City.
- Assets that fall in the upper left quadrant require proactive maintenance to keep their probability of failure low to moderate since they have moderate to high consequences associated to their failure.
- The assets that fall in the lower left quadrant have a low to moderate probability and low to moderate consequences of failure. Therefore, they require usual routine monitoring

The metrics that have been used to determine both can be found in Appendix C.



4.6.6 Levels of Service

The following tables identify the City's current level of service for the Other Infrastructure. These metrics include technical and community level of service metrics that the City has selected for this AMP. These metrics are aligned with O. Reg. 588/17.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the Other Infrastructure assets.

Service Attribute	Asset Segment	Qualitative Description	Current LOS (2020)
Safe & Reliable	Machinery & Equipment	Description of the machinery & equipment inspection process and any licensing requirements for operators	The machinery and equipment receive a minimum of two inspections per year. The City seeks to employ drivers who have a D class license. However, not all departments require this. For example, lawn mowers employed by the parks department only require a G class license.
Safe & Reliable	Vehicles	Description of the Fleet Management and Safety Program	PMA (light service and safety inspection) and PMB (complete vehicle service) inspections and repairs on CVOR vehicles (GVW greater than 45,000 kg) are carried out 3-4 times a year (3 PMA and 1 PMB). Usually, one vehicle is inspected per week. PMA (light service and safety inspection) and PMB (complete vehicle service) inspections and repairs on non-CVOR vehicles such as passenger cars/SUVs are carried out up to 4 times a year (3 PMA and 1 PMB). Usually, five vehicles are inspected per week.

Service Attribute	Asset Segment	Qualitative Description	Current LOS (2020)
Safe & Reliable	Vehicles	Description of the Fleet Management and Safety Program	11 fire trucks and 7 support vehicles, including command vehicles and rescue trucks, are inspected and repaired every 18 months on average, meeting NFPA (National Fire Protection Association) requirements. Furthermore, the 7 pumper trucks owned by the City undergo an annual pump testing every year. This is done under the form of a contracted service that is completed by Dependable[22]. The activity is completed in collaboration with the City's Mechanics who assist in the process that takes up to three days.

[22] Private company

Service Attribute	Asset Segment	Qualitative Description	Current LOS (2020)
Safe & Reliable	Vehicles	Description of the Fleet Management and Safety Program	City staff also perform an annual ground ladder "Non-destructive" testing on 11 fire trucks as well as all other assets that have a crane component. This is done under the form of a contracted service that is completed by Onsite, a company specialized in certifying the structural integrity of ladders and lifting equipment. The activity is completed in collaboration with the City's Mechanics who assist in the process. Moreover, an Annual Aerial ladder testing gets completed on 2 Aerial trucks every year.
Affordable	Furnitures & Fixtures	Description of the lifecycle activities (maintenance, rehabilitation and replacement) performed on furniture & fixtures	Furniture and fixtures are maintained as needed. City staff will complete any repairs to furniture as may be required. Full workstation/desk replacement is contracted out. Should the furniture be deemed unrepairable by City staff and a replacement be required, a contractor will be used to supply and install the new furniture.

Service Attribute	Asset Segment	Qualitative Description	Current LOS (2020)
Affordable	Information Technology	Description of the lifecycle activities (maintenance, rehabilitation and replacement) performed on information technology assets	Information technology assets are maintained as needed. Usually, these assets are replaced when they fail or are no longer in a functional state.
Affordable	Library Collection Materials	Description of the lifecycle activities (maintenance, rehabilitation and replacement) performed on library collection materials	Usually, these assets are replaced when they are no longer of interest to clients or are no longer in a functional state.

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Other Infrastructure assets.

Service Attribute	Asset Segment	Technical Metric	Current LOS (2020)
Safe & Regulatory	Machinery & Equipment	% of Assets where Age > Useful Life	19.17%
Sustainable	Machinery & Equipment	Average condition[23] of machinery & equipment	Below Satisfactory
Sustainable	Machinery & Equipment	Average risk for machinery and equipment	High
Safe & Regulatory	Vehicles	% of Assets where Age > Useful Life	6.41%
Sustainable	Vehicles	Average condition[1] of vehicles	Below Satisfactory
Sustainable	Vehicles	Average risk for vehicles	High
Sustainable	Furniture & Fixtures	Average condition of furniture & fixtures	Satisfactory
Sustainable	Furniture & Fixtures	Average risk for furniture & fixtures	High
Sustainable	Information Technology	Average condition of information technology assets	Below Satisfactory
Sustainable	Information Technology	Average risk for information technology assets	Moderate
Sustainable	Library Collection Materials	Average condition of library collection materials	Satisfactory

[23] It is worth noting that the condition scores assigned for vehicles and machinery are age-based. Usually, the condition of the vehicle is determined by Fleet staff who then make recommendations on whether the asset should be replaced or not. As more condition data becomes available, this metric will get updated in future iterations of the AMP.

Service Attribute	Asset Segment	Technical Metric	Current LOS (2020)
Sustainable	Library Collection Materials	Average risk for library collection materials	High
Sustainable	All Asset Segments	Annual capital reinvestment rate gap	1.08%
Sustainable	All Asset Segments	Annual capital reinvestment rate	9.81%
Sustainable	All Asset Segments	Annual required capital reinvestment rate	10.89%

4.6.7 Recommendations

Asset Inventory

- Start to review and validate inventory data, assessed condition data and replacement costs for all Other Infrastructure.

Condition Assessment Strategies

- Start obtaining and entering condition ratings from assessments into the asset inventory on a continuous basis to support planning for deterioration modeling.

Risk Management Strategies

- Review risk models on a regular basis and adjust according to the availability of data and also an evolving understanding of the probability and consequences of asset failure.

Lifecycle Management Strategies

- Document and review lifecycle management strategies for Other Infrastructure on a regular basis to achieve the lowest total cost of ownership while maintaining adequate service levels.
- Consider the development of preventative maintenance programs.

Levels of Service

- Work towards identifying current and proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service by July 1st, 2025

5 Impacts of Growth

Key Insights

- Understanding the key drivers of growth and demand will allow the City to more effectively plan for new infrastructure and the upgrade or disposal of existing infrastructure. There is a Provincial mandate to intensify development around Major Transit Station Areas and within Strategic Growth Areas (e.g., within centres and along corridors), within the built-up areas of the city, and to identify greenfield areas for growth outside the city's built-up area, in accordance with the provisions of A Place to Grow: The Growth Plan for the Greater Golden Horseshoe.

- Significant population and employment growth is expected.

- The costs of growth should be considered in long-term funding strategies that are designed to maintain the current level of service.

5.1 Description of Growth Assumptions

The demand for infrastructure and services will change over time based on a combination of internal and external factors. Understanding the key drivers of growth and demand will allow the City to plan for new infrastructure more effectively, as well as upgrade or dispose of existing infrastructure. Increases or decreases in demand can affect what assets are needed and what level of service meets the needs of the community.

5.1.1 Pickering Official Plan – Edition 8 (October 2018)

In 1997, the City of Pickering (Corporation of the Town of Pickering, at the time) and the Council of the Regional Municipality of Durham approved the Official Plan. The Official Plan lays the "foundation" for building a good community. As a foundation, it provides a vision of the City, identifies how the vision can be reached, and establishes a monitoring program for checking progress and making necessary adjustments. The last consolidation of the plan was in October 2018.

This vision of the plan can be translated into the following set of guiding principles for Pickering's future growth and development:

A. To meet people's needs while ensuring environmentally appropriate actions;
B. To become more self-sufficient while seeking broader connections;
C. To support individual rights while upholding community goals;
D. To welcome diversity while respecting local context; and
E. To manage change while recognizing uncertainty.

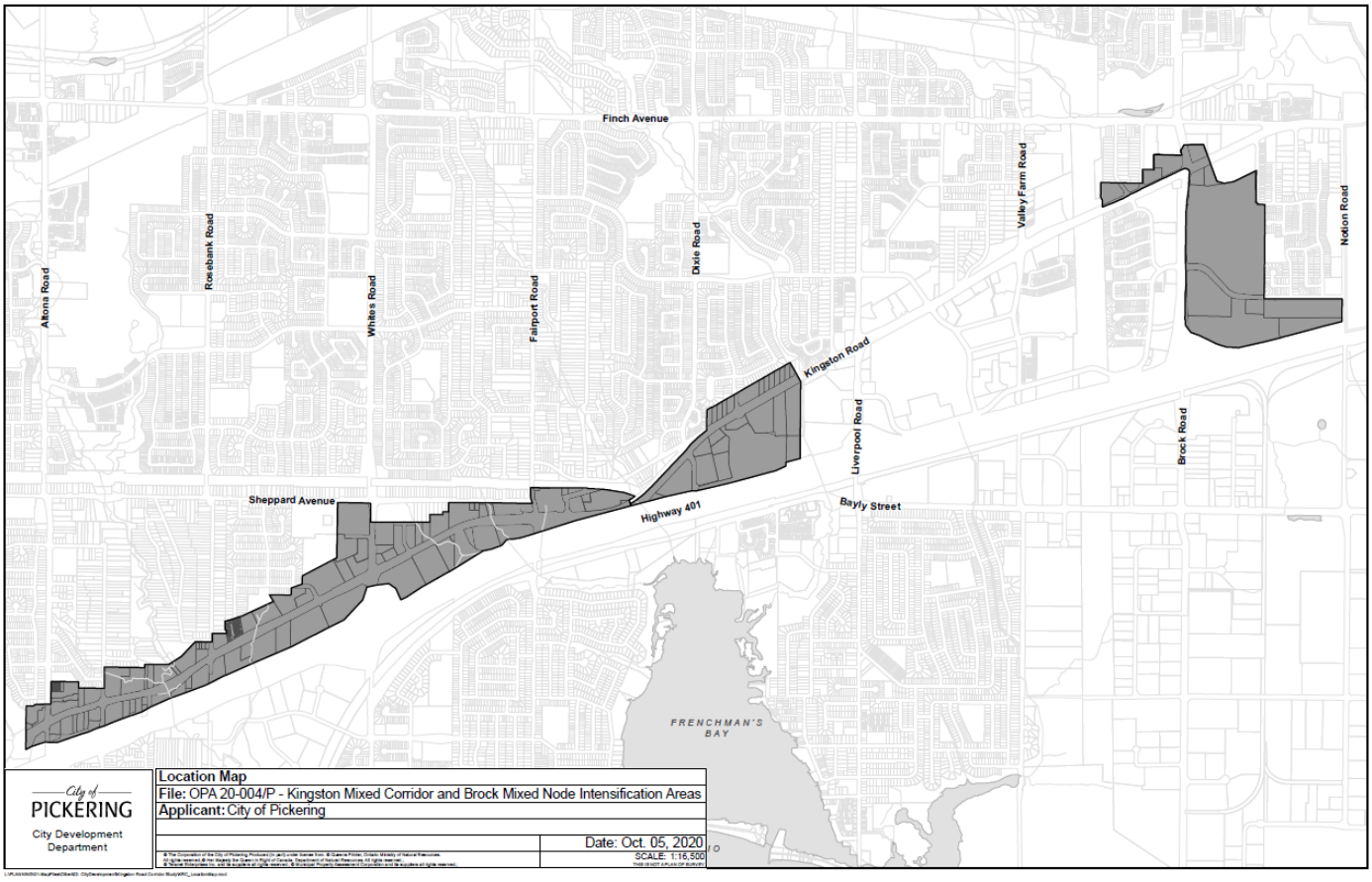
Future growth in the City is centered principally around redevelopment and intensification in the Pickering City Centre and on lands along the Kingston Road Corridor and within the Specialty Retailing Node (located east of Brock Road, north of Highway 401 and south of Kingston Road), new development within the Duffin Heights Neighbourhood and the new Seaton Urban Area.

The City Centre

The Pickering Official Plan supports growth in all portions of the City Centre and restricts new residential development in City Centre south of Highway 401 to 6,300 people or 3,400 units by 2031 until at least an additional 2,000 people or 1,100 new units have been developed on lands north of Highway 401 in the City Centre. Furthermore, South Pickering Urban Area Employment Target Policy adopts an employment target for the City Centre of 13,500 jobs for the year 2031, which represents adding 8,800 jobs to the area. Moreover, the total population in the City Centre is expected to grow from 5,100 (2011) to 13,500 by 2031.

The Kingston Road Corridor and Specialty Retailing Node

The Pickering Official Plan is currently being amended to provide a comprehensive policy framework for the redevelopment and intensification of lands along the Kingston Road Corridor and within the Specialty Retailing Node. The potential mix of uses and densities along the Corridor and within the Node is expected to yield a total of 22,000 residents and 8,100 jobs by 2041. A map depicting the Kingston Road Corridor and Specialty Retailing Node Intensification Plan Area can be found below.



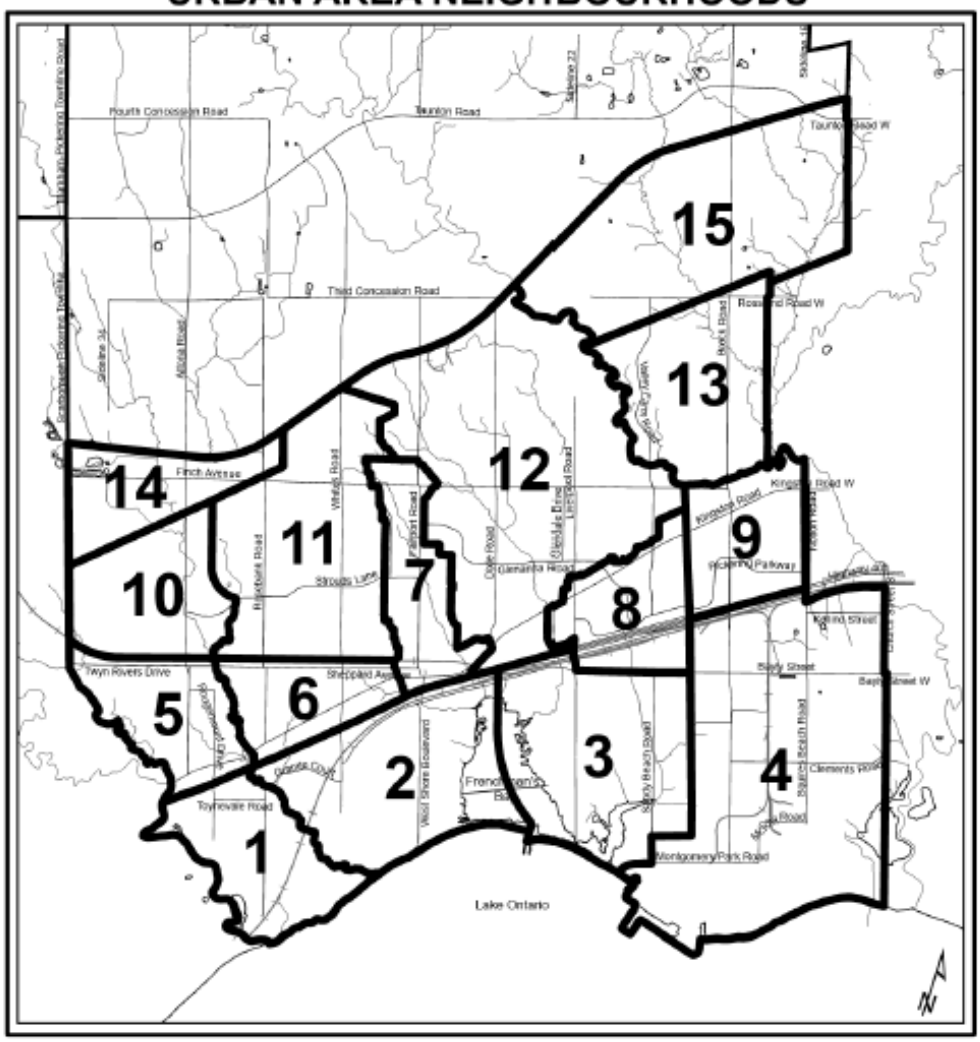
The Duffin Heights Neighbourhood

The development of the Duffin Heights Neighbourhood, located north of Third Concession Road and centered around Brock Road, kicked off in 2011. According to the City's 20-year Detailed Population Forecast, the Duffin Heights neighbourhood is forecasted to grow to 12,461 people and 4,360 units by 2031.

The following map presents the Duffin Heights Neighborhood as part of the South Pickering Urban Area Neighbourhoods:

MAP 3-A

SOUTH PICKERING
URBAN AREA NEIGHBOURHOODS



Neighbourhood #	Neighbourhood Name
1	Rosebank
2	West Shore
3	Bay Ridges
4	Brock Industrial
5	Rougemount
6	Woodlands
7	Dunbarton
8	City Centre
9	Village East
10	Highbush
11	Amberlea
12	Liverpool
13	Brock Ridge
14	Rouge Park
15	Duffin Heights

The Seaton Urban Area

According to the *Seaton Urban Area Population and Employment Policy,* City Council supports the development of an urban community that will accommodate 61,000 people by 2031 and be planned to accommodate up to 70,000 people through long-term intensification. The plan also includes the provision of high-quality employment opportunities that reflect the needs of the community with the identification of sufficient employment lands to generate approximately one job for every two residents with 30,500 jobs by 2031, and up to 35,000 jobs through long-term intensification.

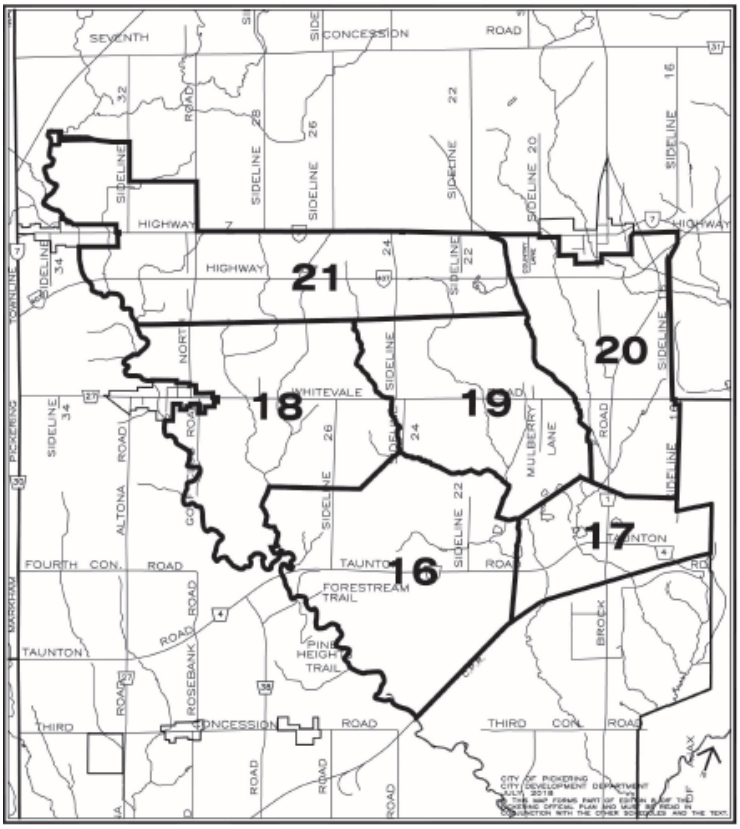
The following table provides a breakdown of the of the 2031 population forecast of the Seaton Urban Area:

Neighbourhood	2031 Population
Lamoreaux	17,500
Brock-Taunton	5,000
Mount Pleasant	18,000
Wilson Meadows	15,000
Thompson's Corners	5,500
Pickering Innovation Corridor	0

The following map exhibits the neighbourhood of the Seaton Urban Area listed above:

MAP 3-B

CENTRAL PICKERING
SEATON URBAN AREA NEIGHBOURHOODS



Neighbourhood #	Neighbourhood Name
16	Lamoreaux
17	Brock Taunton
18	Mount Pleasant
19	Wilson Meadows
20	Thompson's Corners
21	Innovation Corridor

5.1.2 Growth Forecasts

The Durham Regional Official Plan was consolidated on May 26, 2020. The Region's original Official Plan was adopted by Regional Council on July 14, 1976 and approved by the Minister of Housing on March 17, 1978.

The goal of the plan is to manage growth and to develop the Region to its economic potential and increase job opportunities for its residents, while focusing on creating healthy and complete sustainable communities within the urban environment. The plan takes into consideration provincial land use policy and plans such as the Growth Plan for the Greater Golden Horseshoe, the Greenbelt Plan, and the Oak Ridges Moraine Conservation Plan.

The Regional Official Plan recognizes the importance of key economic drivers that will influence the future growth and development of the Region in several hotspot areas. Hotspots in Pickering include: the Highway 401 and 407 corridors, the Urban Growth Centre, and the Federal lands.

The 2006 Growth Plan for the Greater Golden Horseshoe projected the Region of Durham's population to reach 960,000 and the employment to reach 350,000 by 2031. Based on the Region's update to its Official Plan to address the 2006 Growth Plan forecasts for Durham, the Region's population, housing, and employment forecast for the City of Pickering is reflected in the following table.

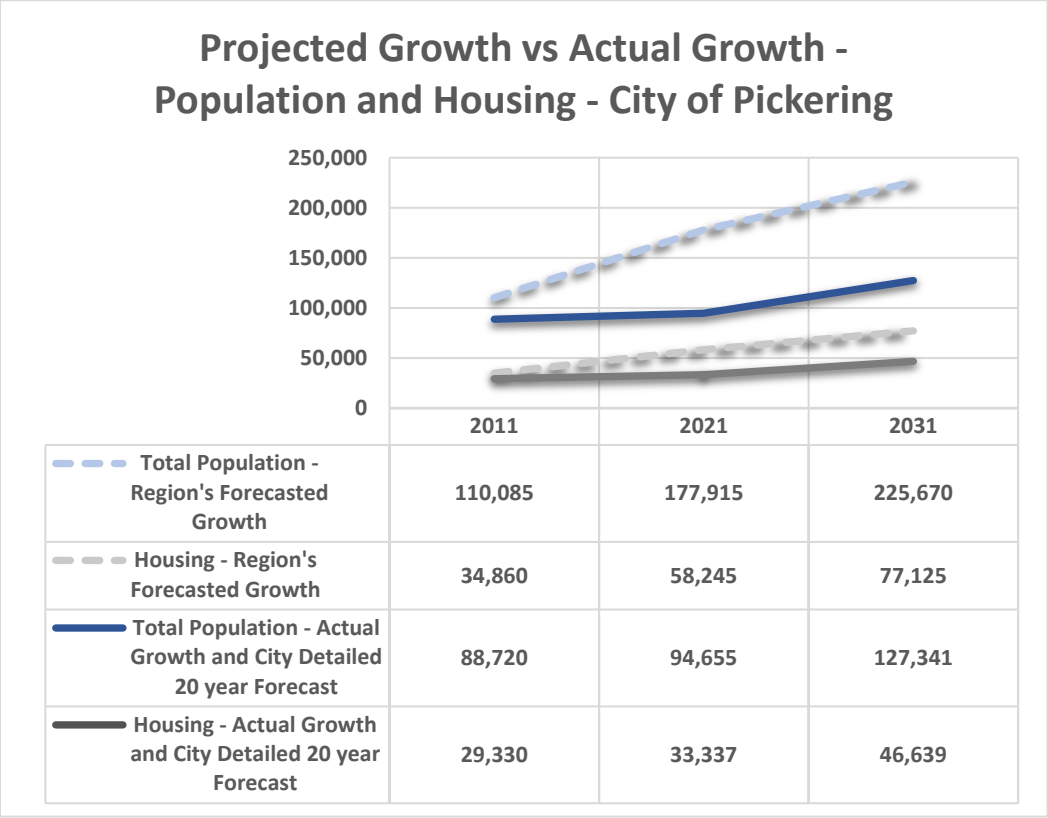
Pickering's Forecasted growth	2011	2021	2031
Total Population	110,085	177,915	225,670
Housing	34,860	58,245	77,125
Employment	41,000	67,910	76,720

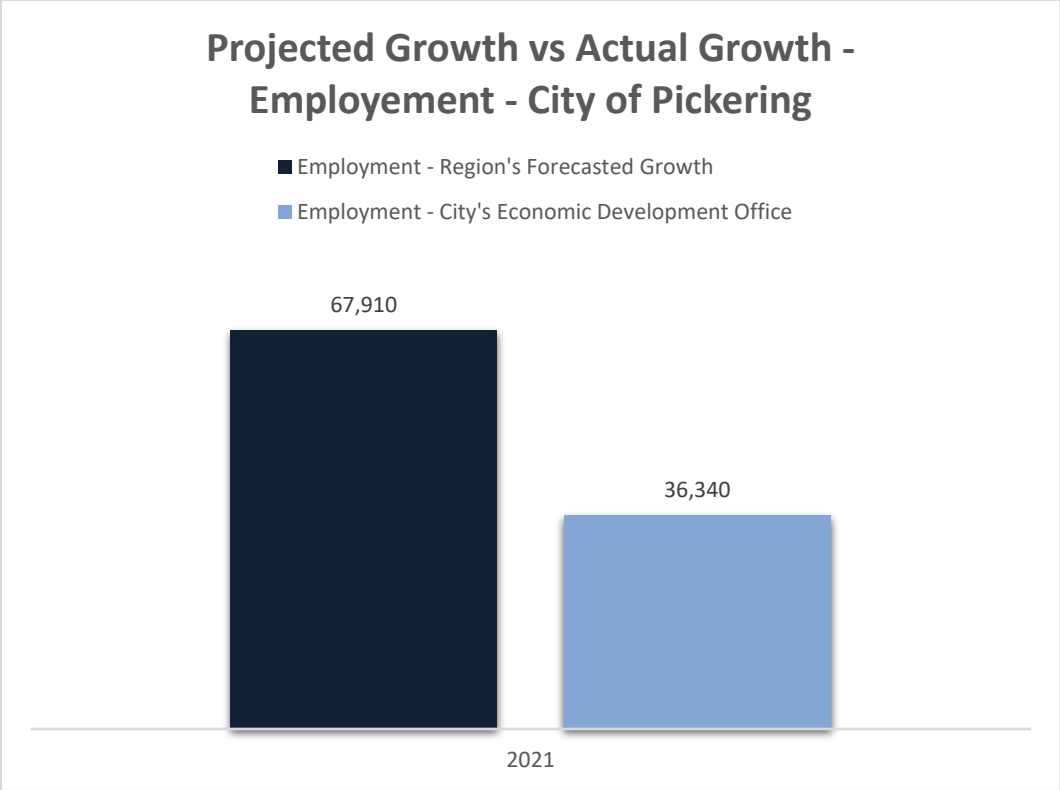
Due to delays in the development of the Seaton Urban Area, and slower than anticipated growth in South Pickering, population and employment growth in Pickering has been significantly slower than what is forecasted in the Regional Official Plan. The following table reflects the actual population and housing numbers for Pickering in 2011, based on Statistics Canada data, as well as a more conservative forecast for 2021 and 2031 based on the City's Detailed 20 Year Population Forecast (updated in December 2020).

Actual Growth & City Detailed 20 Year Forecast	2011	2021	2031
Total Population	88,720	94,655	127,341
Housing	29,330	33,337	46,639

According to data from the City's Economic Development Office, the employment number in Pickering stands at approximately 36,340 in 2021.

The gaps between the projected growth in terms of population, housing and employment between the Region's numbers and the City's numbers are highlighted in the two graphs below:





A Place to Grow

The Growth Plan for the Greater Golden Horseshoe (2020) extended the timeframe of the Growth Plan to 2051, projecting the Region of Durham's population to reach 1,300,000 and the employment to reach 460,000 by 2051. At this time, projections for local municipalities to 2051, are still pending. According to Durham Region's website, the estimated population for the region at the end of December 2019 is 699,460 people. Comparing this figure to the projected population of 1,300,000 for 2051, Durham's population will have to nearly double over the next 30 years.

5.2 Impact of Growth on Lifecycle Activities

By July 1, 2025, the City's asset management plan must include a discussion on how the Assumptions regarding future changes in population and economic activity informed the preparation of the lifecycle management and financial strategy.

Planning for forecasted population growth may require the expansion of existing infrastructure and services. As growth-related assets are constructed or acquired, they should be integrated into the City's AMP. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the City will need to review the lifecycle costs of growth-related infrastructure on an

ongoing basis. These costs should be considered in long-term funding strategies that are designed to, at a minimum, maintain the current level of service.

6 Financial Strategy

Key Insights

- The City is committing approximately $15,755,000 towards capital projects per year from sustainable revenue sources
- Given the annual capital requirement of $41,259,000, there is currently a funding gap of $25,504,000 annually
- For tax-funded assets, we recommend increasing tax revenues by 1.8% each year for the next 15 years to achieve a sustainable level of funding

6.1 Financial Strategy Overview

For an asset management plan (AMP) to be effective and meaningful, it must be integrated with a long-term financial plan (LTFP). The development of a comprehensive LTFP will allow the City of Pickering to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

This report develops such a financial plan by presenting several scenarios for consideration and culminating with final recommendations. As outlined below, the scenarios presented model different combinations of the following components:

1. The financial requirements for:
    a. Existing assets
    b. Existing service levels
    c. Requirements of contemplated changes in service levels (none identified for this plan)
    d. Requirements of anticipated growth (none identified for this plan)
2. Use of traditional sources of municipal funds:
    a. Tax levies
    b. User fees
    c. Reserves
    d. Debt
    e. Development charges
3. Use of non-traditional sources of municipal funds:
    a. Reallocated budgets
    b. Partnerships
    c. Procurement methods
4. Use of Senior Government Funds:
    a. Gas tax
    b. Annual grants

Note: Periodic grants are normally not included due to Provincial requirements for firm commitments. However, if moving a specific project forward is wholly dependent on receiving a one-time grant, the replacement cost included in the financial strategy is the net of such grant being received.

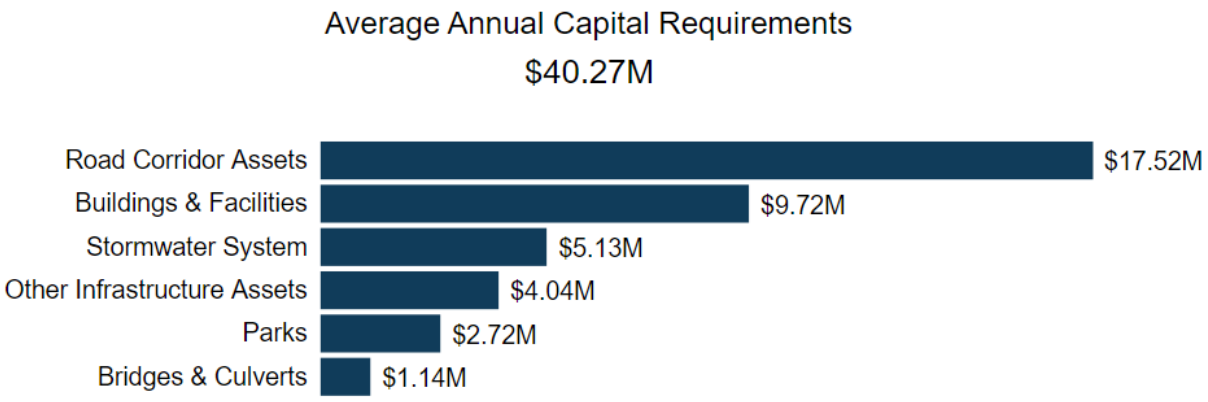
If the financial plan component results in a funding shortfall, the Province requires the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the Province may evaluate a City's approach to the following:

1. In order to reduce financial requirements, consideration has been given to revising service levels downward.
2. All asset management and financial strategies have been considered. For example:
    a. If a zero-debt policy is in place, is it warranted? If not the use of debt should be considered.
    b. Do user fees reflect the cost of the applicable service? If not, increased user fees should be considered.

6.1.1 Annual Requirements & Capital Funding

Annual Requirements

The annual requirements represent the amount the City should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs, and achieve long-term sustainability. In total, the City must allocate approximately $40.27 million annually to address capital expenditures (capex) for the assets included in this AMP.



For most asset categories the annual requirement has been calculated based on a "replacement only" scenario, in which capex are only incurred at the construction and replacement of each asset.

However, for the Road Corridor and Stormwater System, lifecycle management strategies have been developed to identify capex that are realized through strategic rehabilitation and renewal of the City's roads and stormwater's wet ponds respectively.

The development of these strategies allows for a comparison of potential cost avoidance if the strategies were to be implemented. The following table compares two scenarios for the Road Corridor and Stormwater System:

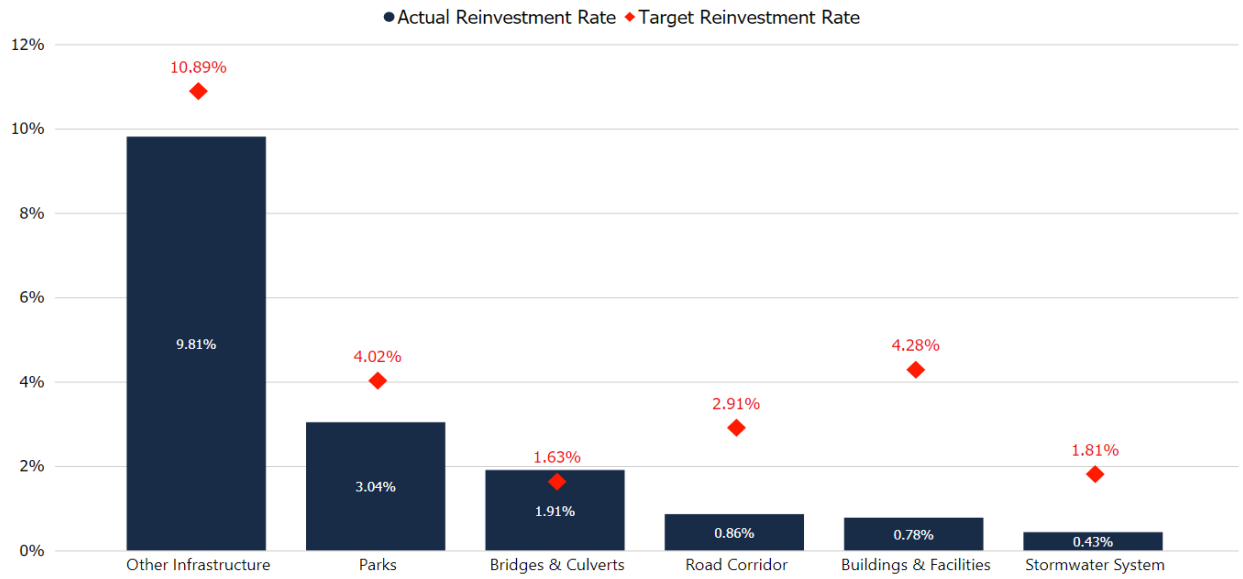
1. **Replacement Only Scenario**: Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.
2. **Lifecycle Strategy Scenario**: Based on the assumption that lifecycle activities are performed at strategic intervals to extend the service life of assets until replacement is required.

Asset Category	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Road Corridor	$21,280,331	$17,519,766	$3,760,565
Stormwater System	$4,146,033	$5,131,544	$(985,511)

The implementation of a proactive lifecycle strategy for roads leads to a potential annual cost avoidance of $3,760,565 for the Road Corridor. This represents an overall reduction of the annual requirements for the Road Corridor by 17.67%. As the lifecycle strategy scenario represents the lowest cost option available to the City, we have used these annual requirements in the development of the financial strategy.

Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the City is committing approximately $15,755,000 towards capital projects per year. Given the annual capital requirement of $40,270,000, there is currently a funding gap of $24,515,000 annually.



6.2 Funding Objective

We have developed a scenario that would enable the City of Pickering to achieve full funding within 1 to 20 years for the following assets:

1. **Tax Funded Assets:** Road Corridor, Stormwater System, Bridges & Culverts, Buildings & Facilities, Parks, and Other Infrastructure.

Note: For the purposes of this AMP, we have excluded gravel roads since they are a perpetual maintenance asset and end of life replacement calculations do not normally apply. If gravel roads are maintained properly, they can theoretically have a limitless service life.

For each scenario developed we have included strategies, where applicable, regarding the use of cost containment and funding opportunities.

6.3 Financial Profile: Tax Funded Assets

6.3.1 Current Funding Position

The following tables show, by asset category, the City of Pickering's average annual capex requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

		Annual Funding Available						
		Taxes	**Gas Tax**	**OCIF**	**Reserve Funds**	**Taxes to Reserves**	**Total Available**	
Road Corridor	$17,520,000	$65,000	$2,911,000	$880,000	$800,000	$529,000	$5,185,000	$12,335,000
Stormwater System	$5,131,000	$0	$0	$0	$700,000	$529,000	$1,229,000	$4,811,000
Bridges & Culverts	$1,136,000	$0	$0	$0	$800,000	$529,000	$1,329,000	($193,000)
Buildings & Facilities	$9,718,000	$209,000	$0	$0	$300,000	$1,804,000	$2,313,000	$7,405,000
Parks	$2,722,000	$27,000	$0	$0	$1,000,000	$1,029,000	$2,056,000	$666,000
Other Infrastructure	$4,043,000	$499,000	$0	$0	$0	$3,144,000	$3,643,000	$480,000
	$40,270,000	**$800,000**	**$2,911,000**	**$880,000**	**$3,600,000**	**$7,564,000**	**$15,755,000**	**$24,515,000**

The average annual capex requirement for the above categories is $40.27 million. Annual revenue currently allocated to these assets for capital purposes is $15.755 million leaving an annual deficit of $24.515 million. Put differently, these infrastructure categories are currently funded at 39.12% of their long-term requirements.

6.3.2 Full Funding Requirements

In 2021, City of Pickering has budgeted annual tax revenues of $77.971 million. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time:

Asset Category	Tax Change Required for Full Funding
Road Corridor	15.8%
Stormwater System	5.0%
Bridges & Culverts	-0.2%
Buildings & Facilities	9.5%
Parks	0.9%
Other Infrastructure	0.5%
	10.9%

The following changes in costs and/or revenues over the next number of years should also be considered in the financial strategy:

a) Pickering's debt payments for these asset categories will be decreasing by $3.588 million over the next 20 years.

Our recommendations include capturing the above changes and allocating them to the infrastructure deficit outlined above. The table below outlines this concept and presents several options:

	Without Capturing Changes				With Capturing Changes[24]			
	5 Years	**10 Years**	**15 Years**	**20 Years**	**5 Years**	**10 Years**	**15 Years**	**20 Years**
Infrastructure Deficit	$24,515,000	$24,515,000	$24,515,000	$24,515,000	$24,515,000	$24,515,000	$24,515,000	$24,515,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-$1,949,000	-$3,190,000	-$3,487,000	-$3,588,000
Change in OCIF Grants	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Resulting Infrastructure Deficit:	24,515,000	**24,515,000**	**24,515,000**	**24,515,000**	**22,566,000**	**21,325,000**	**21,028,000**	**20,927,000**
Tax Increase Required	31.5%	31.5%	31.5%	31.5%	28.9%	27.3%	27.0%	26.8%
Annually:	6.3%	**3.1%**	**2.1%**	**1.6%**	**5.8%**	**2.7%**	**1.8%**	**1.3%**

6.3.3 Financial Strategy Recommendations

Considering all the above information, we recommend the 15-year option. This involves full capex funding being achieved over 15 years by:

[24] In the 2021 CapEx budget, there are projects totalling $15.568 million that could require debentures not reflected in the table. The City of Pickering has chosen to not include these potential debentures in the analysis due to uncertainty.

a) When realized, reallocating the debt cost reductions of $3.487 million to the infrastructure deficit as outlined above.
b) Increasing tax revenues by 1.8% each year for the next 15 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
c) Allocating the current gas tax and OCIF revenue as outlined previously.
d) Allocating the scheduled OCIF grant increases to the infrastructure deficit as they occur.
e) Reallocating appropriate revenue from categories in a surplus position to those in a deficit position.
f) Increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.
g) Increasing tax revenues relative to changes in debt costs from the issuance of any new debt.

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included OCIF formula-based funding, if applicable since this funding is a multi-year commitment[25].
2. We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.
3. There are projects totalling $15.568 million that could require debentures not reflected in the analysis. The City of Pickering has chosen to not include these debentures in the analysis due to uncertainty. If this debt is issued, the resulting debt costs should be considered as noted in the recommendations above.

Although this option achieves full funding on an annual basis in 15 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $5,509,000 for the Road Corridor, $607,000 for Parks, $111,366,000 for the Buildings & Facilities, $399,000 for the Stormwater System, and $5,682,000 for Other Infrastructure.

25 The City should take advantage of all available grant funding programs and transfers from other levels of government. While OCIF has historically been considered a sustainable source of funding, the program is currently undergoing review by the provincial government. Depending on the outcome of this review, there may be changes that impact its availability.

Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

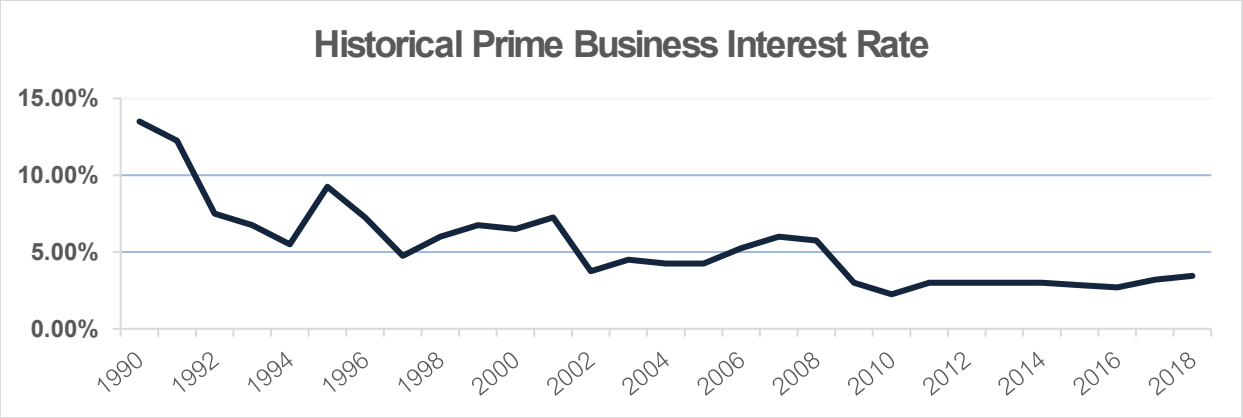
6.4 Use of Debt

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a $1M project financed at 3.0%[26] over 15 years would result in a 26% premium or $260,000 of increased costs due to interest payments. For simplicity, the table does not consider the time value of money or the effect of inflation on delayed projects.

Interest Rate	Number of Years Financed					
	5	**10**	**15**	**20**	**25**	**30**
7.0%	22%	42%	65%	89%	115%	142%
6.5%	20%	39%	60%	82%	105%	130%
6.0%	19%	36%	54%	74%	96%	118%
5.5%	17%	33%	49%	67%	86%	106%
5.0%	15%	30%	45%	60%	77%	95%
4.5%	14%	26%	40%	54%	69%	84%
4.0%	12%	23%	35%	47%	60%	73%
3.5%	11%	20%	30%	41%	52%	63%
3.0%	9%	17%	26%	34%	44%	53%
2.5%	8%	14%	21%	28%	36%	43%
2.0%	6%	11%	17%	22%	28%	34%
1.5%	5%	8%	12%	16%	21%	25%
1.0%	3%	6%	8%	11%	14%	16%
0.5%	2%	3%	4%	5%	7%	8%
0.0%	0%	0%	0%	0%	0%	0%

It should be noted that current interest rates are near all-time lows. Sustainable funding models that include debt need to incorporate the risk of rising interest rates. The following graph shows where historical lending rates have been:

26 Current municipal Infrastructure Ontario rates for 15-year money is 3.2%.



A change in 15-year rates from 3% to 6% would change the premium from 26% to 54%. Such a change would have a significant impact on a financial plan.

The following tables outline how Pickering has historically used debt for investing in the asset categories as listed. There is currently $17,321,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $3,588,000, well within its provincially prescribed maximum of $19,497,000.

		Use of Debt in the Last Five Years				
Asset Category	**Current Debt Outstanding**	**2016**	**2017**	**2018**	**2019**	**2020**
Road Corridor	$6,194,000	$1,478,000	$2,128,000	$367,000	$2,565,000	$486,000
Stormwater System	$376,000	$0	$174,000	$342,000	$0	$0
Bridges & Culverts	$1,074,000	$0	$0	$0	$0	$0
Buildings & Facilities	$6,322,000	$3,608,000	$1,570,000	$1,946,000	$690,000	$191,000
Parks	$1,412,000	$0	$0	$0	$1,276,000	$0
Other Infrastructure	$1,943,000	$1,390,000	$538,000	$949,000	$0	$0
Total Tax Funded:	**$17,321,000**	**$6,476,000**	**$4,410,000**	**$3,604,000**	**$4,531,000**	**$677,000**

	Principle & Interest Payments in the Next Ten Years[27]						
	2021	**2022**	**2023**	**2024**	**2025**	**2026**	**2031**
Road Corridor	$1,586,000	$1,351,000	$857,000	$700,000	$623,000	$622,000	$0
Stormwater System	$66,000	$66,000	$29,000	$29,000	$29,000	$28,000	$28,000
Bridges & Culverts	$98,000	$99,000	$99,000	$100,000	$99,000	$99,000	$0
Buildings & Facilities	$1,082,000	$1,059,000	$850,000	$558,000	$558,000	$517,000	$370,000
Parks	$270,000	$271,000	$146,000	$146,000	$145,000	$145,000	$0
Other Infrastructure	$486,000	$407,000	$354,000	$231,000	$232,000	$228,000	$0
Total Tax Funded:	**$3,588,000**	**$3,253,000**	**$2,335,000**	**$1,764,000**	**$1,686,000**	**$1,639,000**	**$398,000**

The revenue options outlined in this plan allow Pickering to fully fund its long-term infrastructure requirements without further use of debt.

[27] In the 2021 CapEx budget, there are projects totalling $15.568 million that could require debentures not reflected in the table. The City of Pickering has chosen to not include these potential debentures in the analysis due to uncertainty.

6.5 Use of Reserves

6.5.1 Available Reserves

Reserves play a critical role in long-term financial planning. The benefits of having reserves available for infrastructure planning include:

a) The ability to stabilize tax rates when dealing with variable and sometimes uncontrollable factors
b) Financing one-time or short-term investments
c) Accumulating the funding for significant future infrastructure investments
d) Managing the use of debt
e) Normalizing infrastructure funding requirement

By asset category, the table below outlines the details of the reserves currently available to Pickering.

Asset Category	Balance on December 31, 2020
Road Corridor	$12,025,000
Stormwater System	$4,056,000
Bridges & Culverts	$1,975,000
Buildings & Facilities	$16,632,000
Parks	$11,452,000
Other Infrastructure	$6,418,000
Total Tax Funded:	**$52,558,000**

There is considerable debate in the municipal sector as to the appropriate level of reserves that a City should have on hand. There is no clear guideline that has gained wide acceptance. Factors that municipalities should consider when determining their capital reserve requirements include:

a) Breadth of services provided
b) Age and condition of infrastructure
c) Use and level of debt
d) Economic conditions and outlook
e) Internal reserve and debt policies.

These reserves are available for use by applicable asset categories during the phase-in period to full funding. This coupled with Pickering's judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity

can be used for high priority and emergency infrastructure investments in the short- to medium-term.

6.5.2 Recommendation

In 2025, Ontario Regulation 588/17 will require Pickering to integrate proposed levels of service for all asset categories in its asset management plan update. We recommend that future planning should reflect adjustments to service levels and their impacts on reserve balances.

7 Appendices

Key Insights

- Appendix A identifies projected 10-year capital requirements for each asset category
- Appendix B includes several maps that have been used to visualize the current level of service
- Appendix C identifies the criteria used to calculate risk for each asset category
- Appendix D provides additional guidance on the development of a condition assessment program
- Appendix E identifies criteria used in the FCI condition rating

Appendix A: 10-Year Capital Requirements

The following tables identify the capital cost requirements for each of the next 10 years in order to meet projected capital requirements and maintain the current level of service.

Road Corridor												
Segment	**Sub-Segment**	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Roads	Arterial	$0	$864,600	$251,458	$197,948	$0	$172,726	$535,585	$0	$0	$881,388	$1,053,613
Roads	Collector	$0	$0	$851,178	$2,199,505	$700,718	$1,207,628	$1,225,800	$529,350	$1,050,219	$1,082,056	$698,565
Roads	Local	$9,050,539	$15,982,815	$7,139,108	$12,277,252	$13,576,039	$18,160,343	$13,439,686	$14,674,893	$10,682,836	$32,580,485	$19,113,865
Roadside Appurtenances	Broadband	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roadside Appurtenances	Guide Rails	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roadside Appurtenances	Retaining Walls	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sidewalks	Sidewalks	$974,763	$974,763	$0	$0	$63,426	$0	$0	$0	$0	$0	$37,059
Streetlights	Head Luminaires	$78,284	$7,169	$157,886	$157,049	$171,833	$56,156	$45,271	$408,143	$60,424	$0	$0
Streetlights	Poles & Assemblies	$0	$0	$0	$0	$0	$44,489,981	$0	$0	$0	$0	$0
Traffic & Pedestrian Signals	Controllers	$0	$0	$0	$0	$395,064	$0	$0	$0	$0	$0	$324,889
Traffic & Pedestrian Signals	Infrastructure	$0	$0	$0	$0	$0	$0	$2,530,333	$0	$0	$0	$0
Total:		$10,103,587	$16,854,584	$8,399,630	$14,895,181	$14,843,653	$64,086,833	$17,776,675	$15,612,386	$11,793,478	$34,580,988	$21,329,021

Stormwater System

Segment	Sub-Segment	Backlog	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Drainage Channels	Drainage Channels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Sewers	Catch Basin and Lead	$0	$0	$0	$0	$0	$0	$0	$18,363,330	$1,136,403	$0	$0
Storm Sewers	Clean Water Collectors	$53,850	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Sewers	Inlet/Outlet Structures	$77,850	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Sewers	Maintenance Holes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$30,465	$0
Storm Sewers	Oil Grit Separators	$0	$0	$0	$0	$0	$0	$0	$0	$12,406,168	$130,477	$0
Storm Sewers	Service Connections	$279,544	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Sewers	Storm Sewer Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Stormwater Ponds	Dry Ponds	$0	$384,300	$2,182,107	$0	$0	$0	$0	$0	$0	$0	$0
Stormwater Ponds	Wet Ponds	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total:		**$411,244**	**$384,300**	**$2,182,107**	**$0**	**$0**	**$0**	**$0**	**$18,363,330**	**$13,542,571**	**$160,943**	**$0**

Bridges & Culverts

Segment	Backlog	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Bridges	$2,954,674	$4,176,000	$1,626,000	$1,804,000	$456,000	$1,276,000	$0	$0	$2,640,000	$0	$0
Structural Culverts	$2,045,326	$2,376,000	$1,014,729	$102,000	$668,000	$1,342,149	$0	$0	$649,853	$0	$0
Total:	**$5,000,000**	**$6,552,000**	**$2,640,729**	**$1,906,000**	**$1,124,000**	**$2,618,149**	**$0**	**$0**	**$3,289,853**	**$0**	**$0**

Buildings & Facilities											
Segment	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Civic Complex	$1,745,570	$2,927,131	$635,007	$976,641	$2,992,941	$507,449	$1,782,161	$154,076	$2,332,705	$1,147,054	$845,457
Community & Cultural Buildings	$2,093,261	$1,880,121	$644,189	$3,468,097	$2,909,771	$1,890,277	$3,999,238	$896,067	$2,440,570	$1,007,890	$1,200,926
Fire Services	$536,383	$372,671	$217,616	$228,326	$1,942,769	$366,058	$327,939	$1,762,211	$61,402	$231,743	$281,377
Operations Centre	$0	$0	$0	$0	$0	$0	$0	$0	$1,102,185	$163,179	$0
Recreation, Pools & Arenas	$8,587,290	$1,887,036	$5,361,024	$4,370,121	$4,199,635	$4,800,070	$5,519,616	$2,827,992	$2,416,316	$8,083,531	$3,052,205
Total:	$12,962,503	$7,066,960	$6,857,835	$9,043,185	$12,045,116	$7,563,854	$11,628,953	$5,640,347	$8,353,178	$10,633,397	$5,379,965

Parks												
Segment	**Sub-Segment**	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Active Recreation Facilities	Playground Equipment	$9,359	$0	$0	$318,913	$0	$0	$3,327,614	$0	$0	$3,340,356	$0
Active Recreation Facilities	Sport Playing Surfaces	$467,181	$1,098,921	$0	$641,470	$0	$1,733,290	$1,260,840	$0	$1,229,773	$11,489,488	$0
Amenities, Furniture & Utilities	Buildings	$0	$0	$0	$0	$0	$0	$0	$0	$0	$229,439	$0
Amenities, Furniture & Utilities	Electrical/Lighting	$157,651	$0	$75,753	$145,067	$0	$0	$13,707	$812,401	$0	$108,294	$209,542
Amenities, Furniture & Utilities	Site Furniture	$0	$14,272	$0	$0	$90,388	$0	$127,110	$0	$39,094	$474,665	$0
Amenities, Furniture & Utilities	Site Structures	$0	$198,000	$0	$238,000	$0	$0	$46,919	$0	$67,447	$117,856	$0
Amenities, Furniture & Utilities	Subsurface Infrastructure	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,533	$0
Amenities, Furniture & Utilities	Waterfront Infrastructure	$0	$0	$0	$0	$0	$109,888	$0	$0	$0	$0	$0
Vehicular & Pedestrian Networks	Parking Lots & Internal Roads	$0	$0	$0	$0	$0	$0	$0	$0	$121,202	$931,481	$0
Vehicular & Pedestrian Networks	Pedestrian Corridors	$0	$68,480	$0	$0	$0	$629,415	$0	$17,999	$148,163	$1,262,556	$10,378
Total:		**$634,191**	**$1,379,673**	**$75,753**	**$1,343,451**	**$90,388**	**$2,472,592**	**$4,776,190**	**$830,400**	**$1,605,678**	**$17,964,669**	**$219,920**

Other Infrastructure												
Segment	**Sub-Segment**	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Furniture & Fixtures	Furniture & Fixtures	$161,095	$0	$30,928	$0	$31,076	$86,976	$0	$149,796	$134,726	$307,337	$90,276
Information Technology	Information Technology	$874,945	$416,713	$320,351	$216,314	$165,517	$920,482	$378,955	$325,045	$678,780	$1,433,927	$283,494
Library Collection Materials	Library Collection Materials	$0	$404,723	$430,800	$419,778	$324,082	$444,563	$431,257	$374,649	$398,615	$541,026	$538,034
Machinery & Equipment	Major	$1,149,139	$90,569	$668,816	$553,739	$220,172	$785,431	$471,510	$749,869	$610,796	$1,471,081	$161,046
Machinery & Equipment	Minor	$1,820,184	$416,546	$420,272	$473,292	$231,814	$1,113,831	$998,157	$721,958	$603,045	$1,093,964	$1,073,573
Vehicles	Fire Vehicles	$287,737	$1,367,843	$0	$0	$0	$1,430,690	$1,907,608	$0	$1,140,962	$0	$0
Vehicles	Vehicles	$2,119,693	$295,382	$873,691	$678,755	$509,295	$1,442,734	$929,280	$1,120,784	$2,780,725	$1,949,259	$2,304,506
Vehicles	Major	$1,149,139	$90,569	$668,816	$553,739	$220,172	$785,431	$471,510	$749,869	$610,796	$1,471,081	$161,046
Total:		**$6,412,792**	**$2,991,777**	**$2,744,859**	**$2,341,878**	**$1,481,957**	**$6,224,707**	**$5,116,767**	**$3,442,101**	**$6,347,648**	**$6,796,594**	**$4,450,929**

Appendix B: Level of Service Maps

Dunbarton Rd Culvert
(BCI Rating 95)

South elevation

West approach

East approach

Asphalt on deck

North guide rail

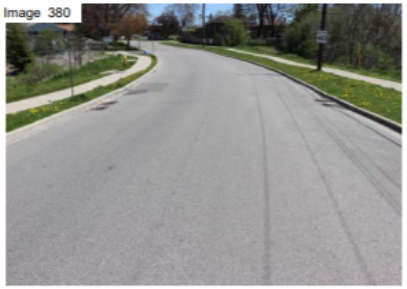
South railing

Radom St Culvert
(BCI Rating 56.5)

Image 407

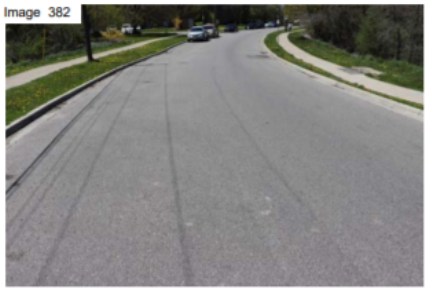
North inlet

Image 380



West approach

Image 382



East approach

Image 396

North inlet

Image 397

North inlet perforation

Image 398

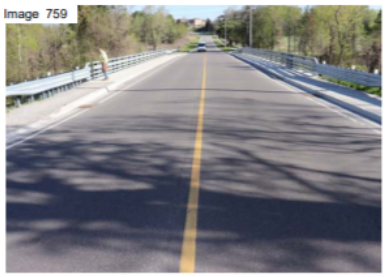
Mid east wall fill leaking

Palmer Bridge
(BCI Rating 86.6)

Image 767

East elevation

Image 759



South approach

Image 760

North approach

Image 761

Guide rail

Image 762

West sidewalk

Image 763

West railing

Michell Bridge
(BCI Rating 57.1)

Image 39

Asphalt on deck

Image 41

East abutment wall

Image 42

West abutment wall

Image 43

Soffit (typical)

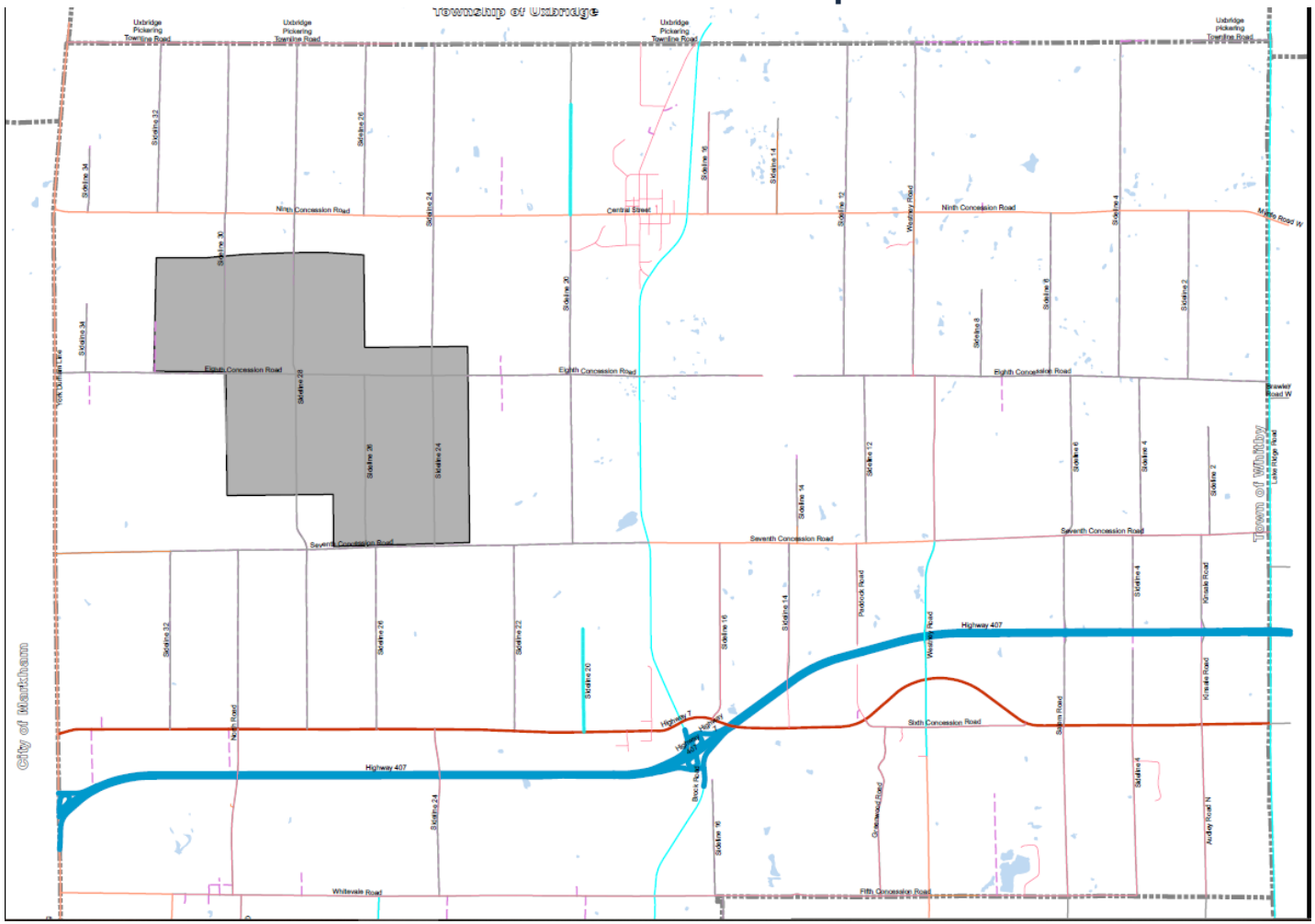
Image 44

North elevation

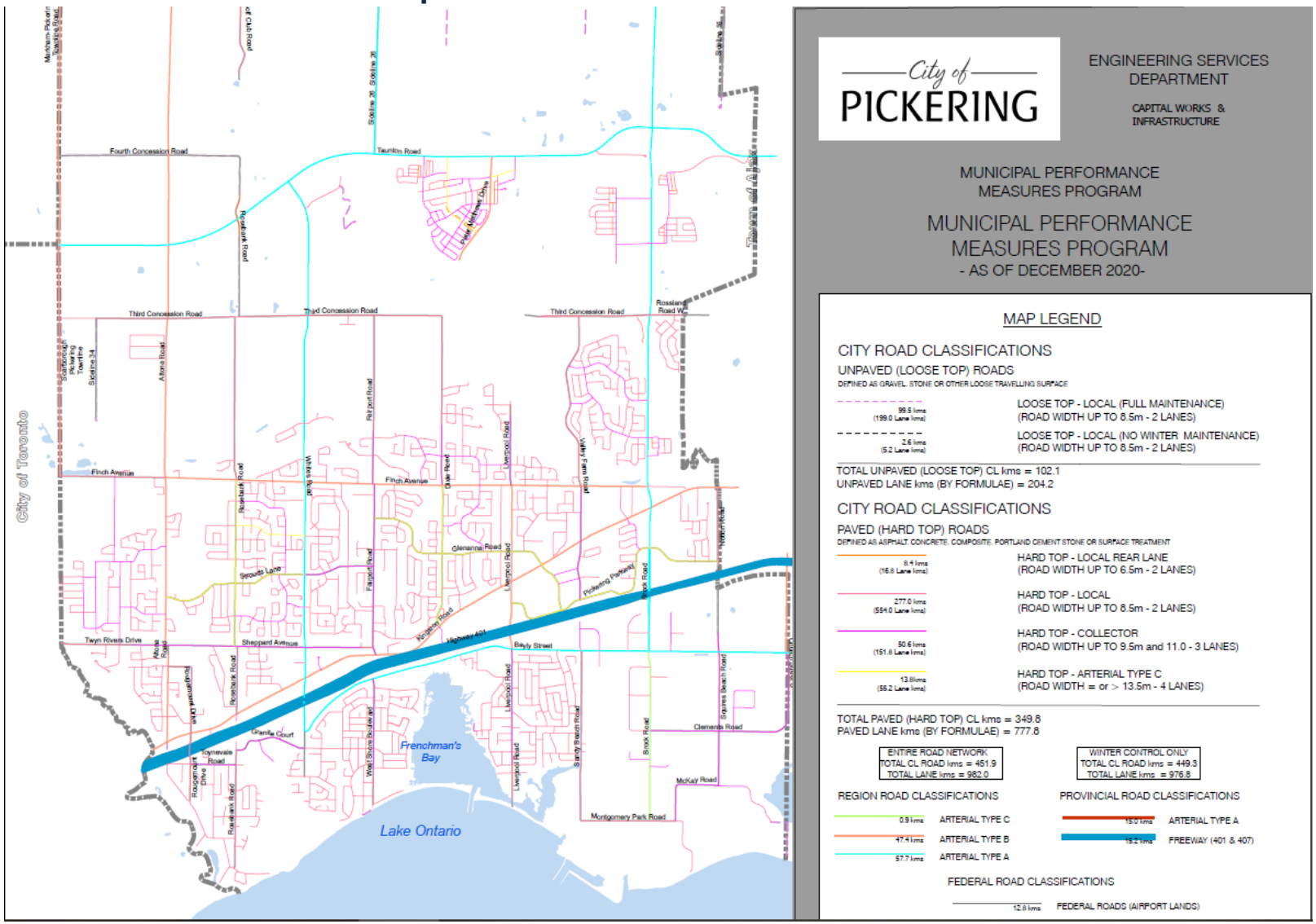
Image 45

NW fascia major disintegration

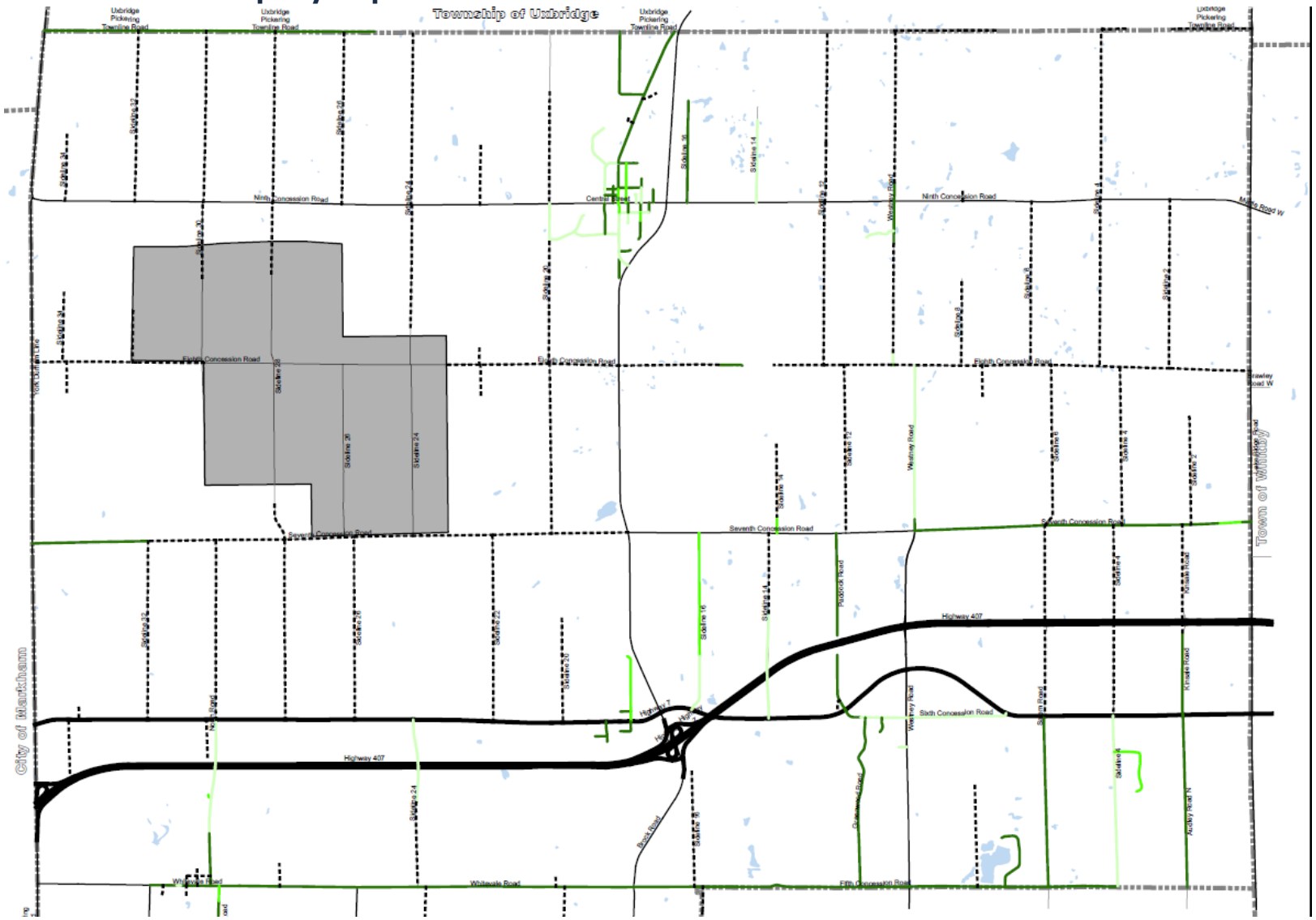
Road Network Classification Map Part 1



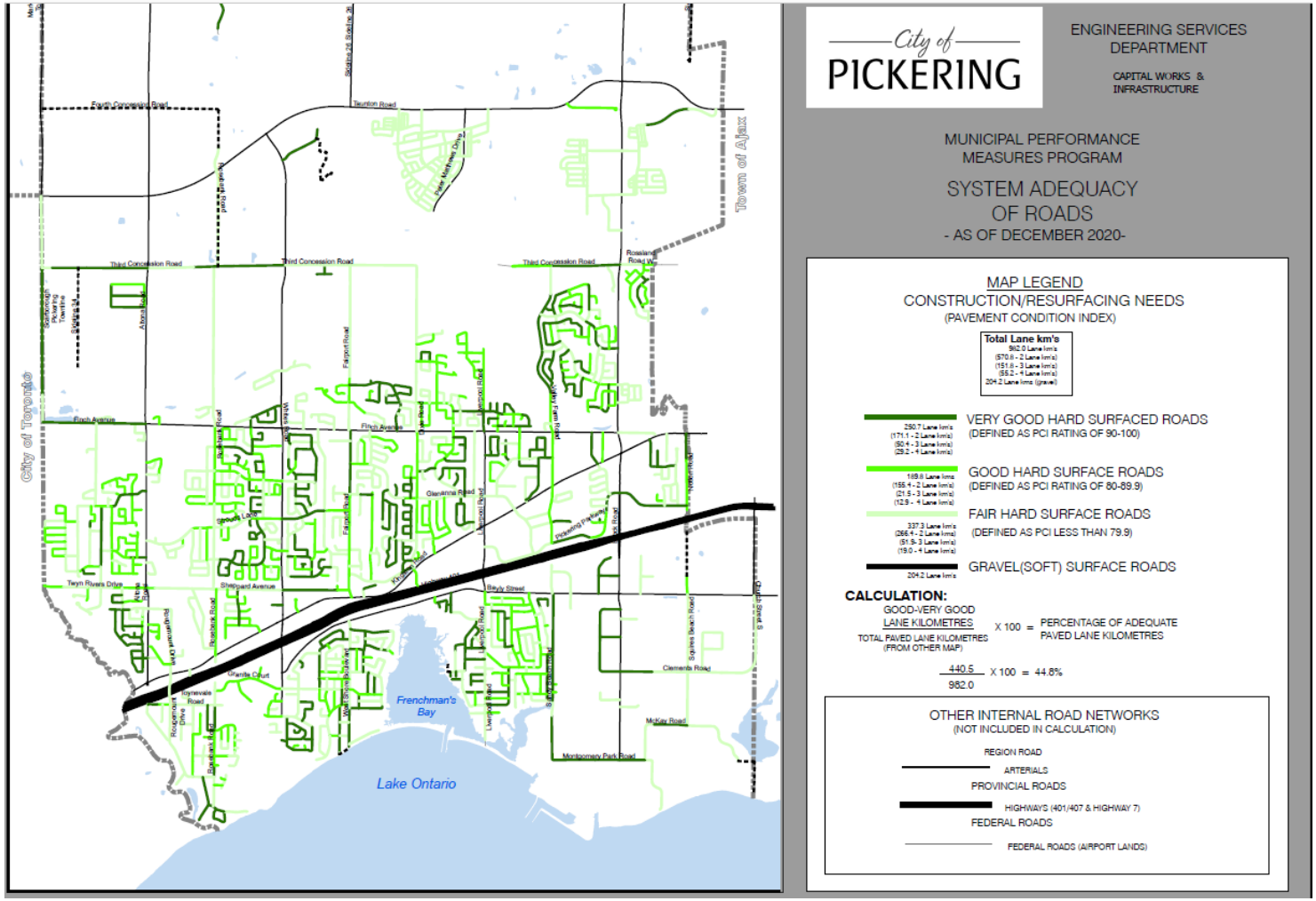
Road Network Classification Map Part 2



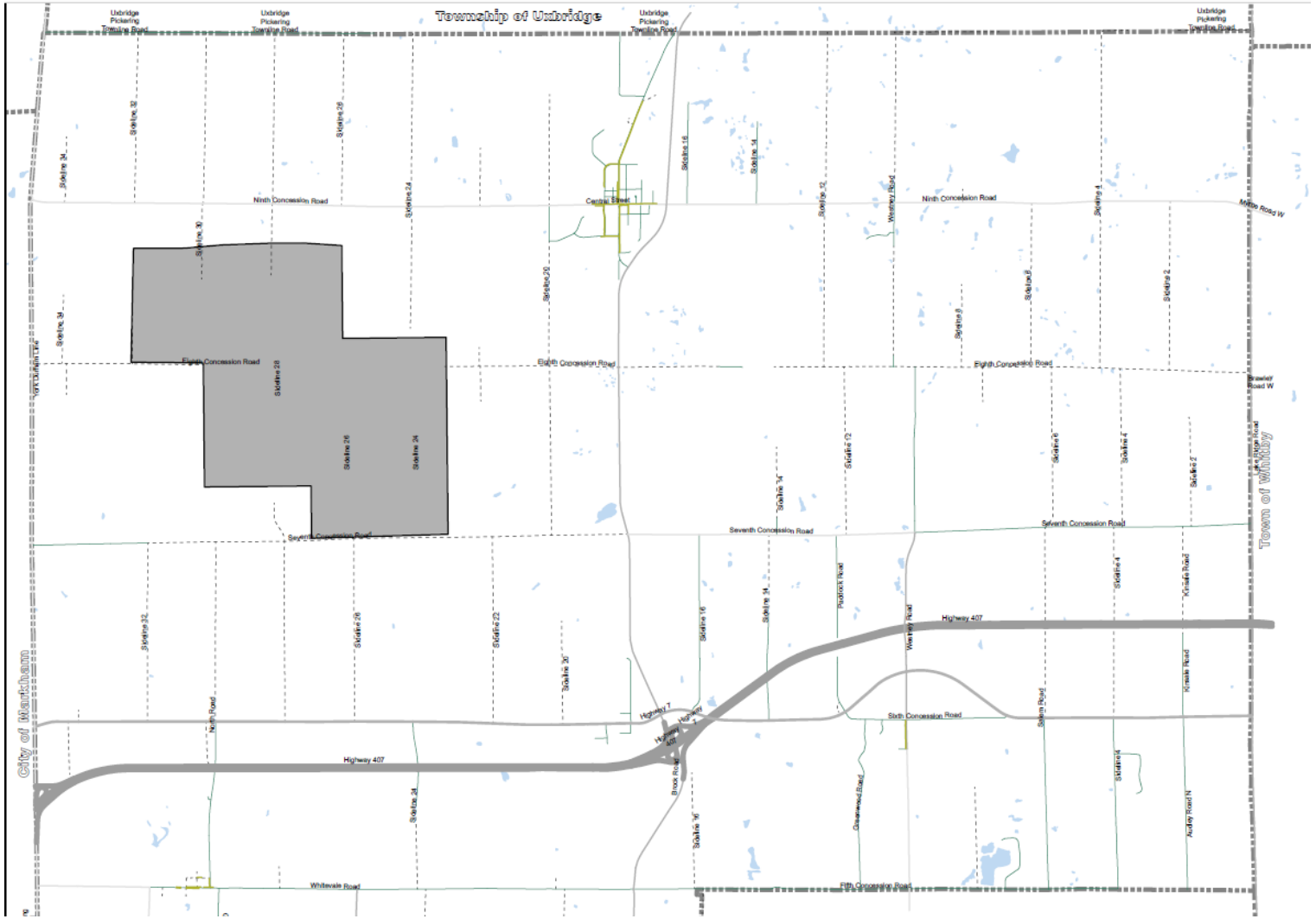
Road Network Adequacy Map Part 1



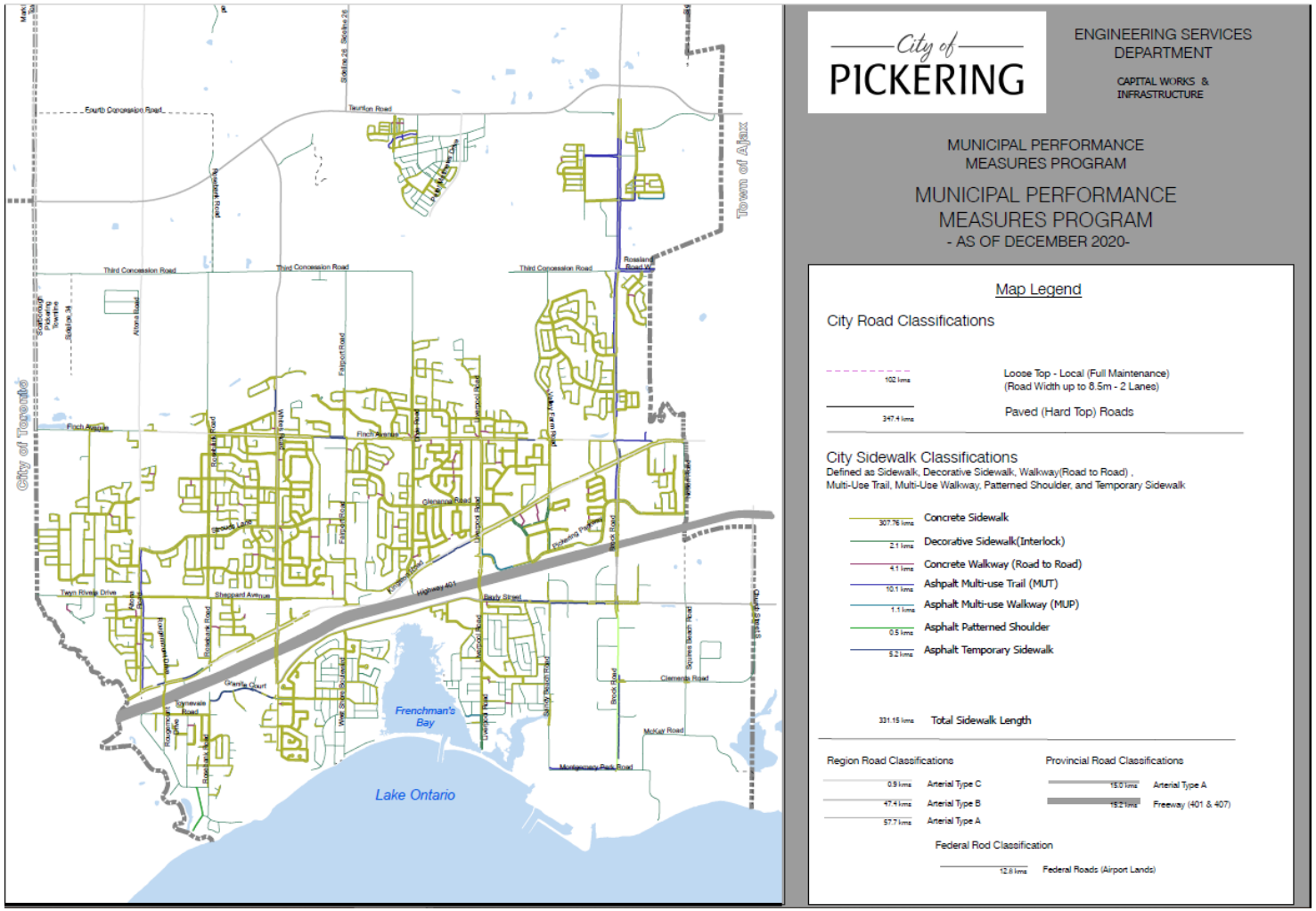
Road Network Adequacy Map Part 2



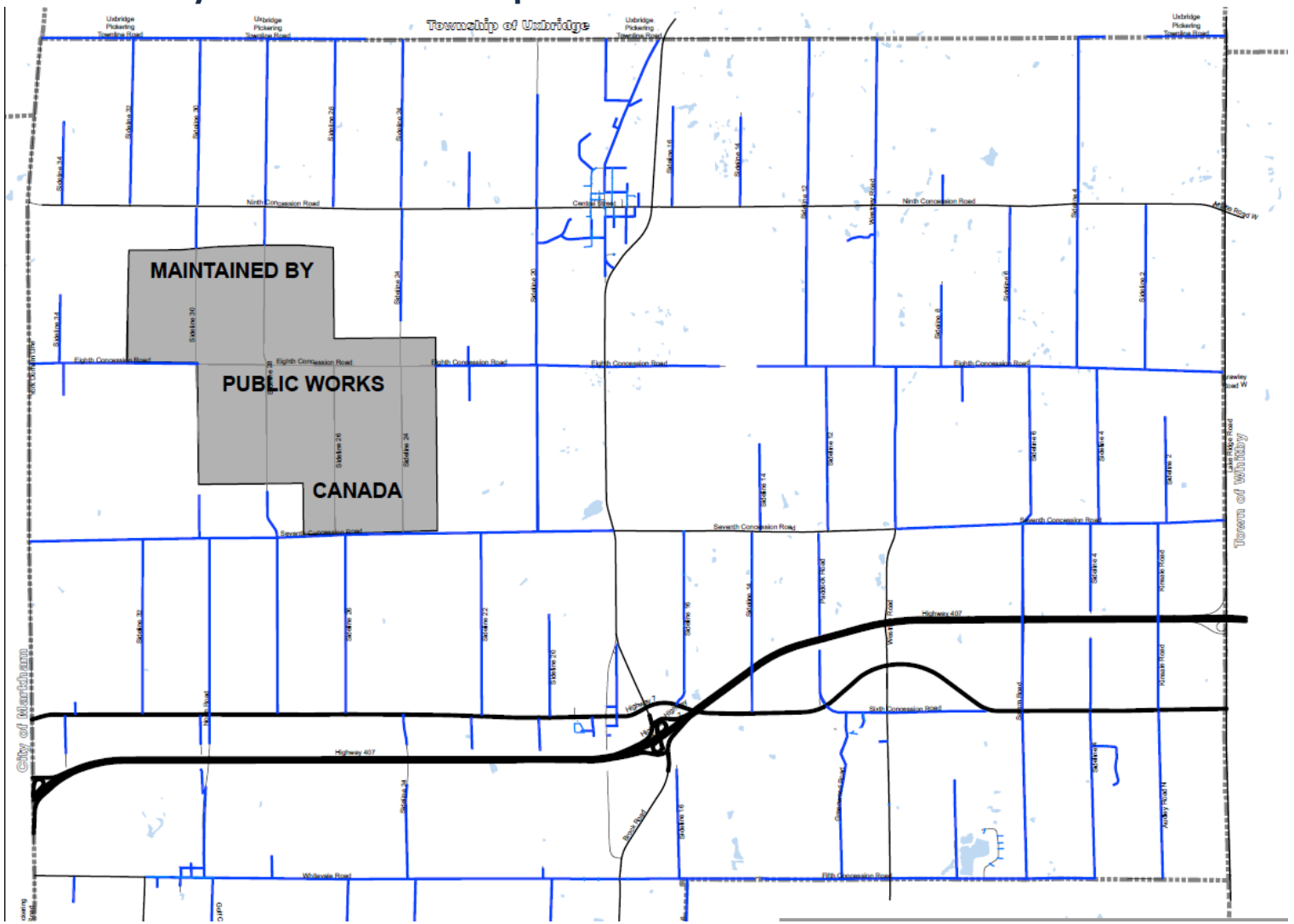
Sidewalk Network Classification Map Part 1



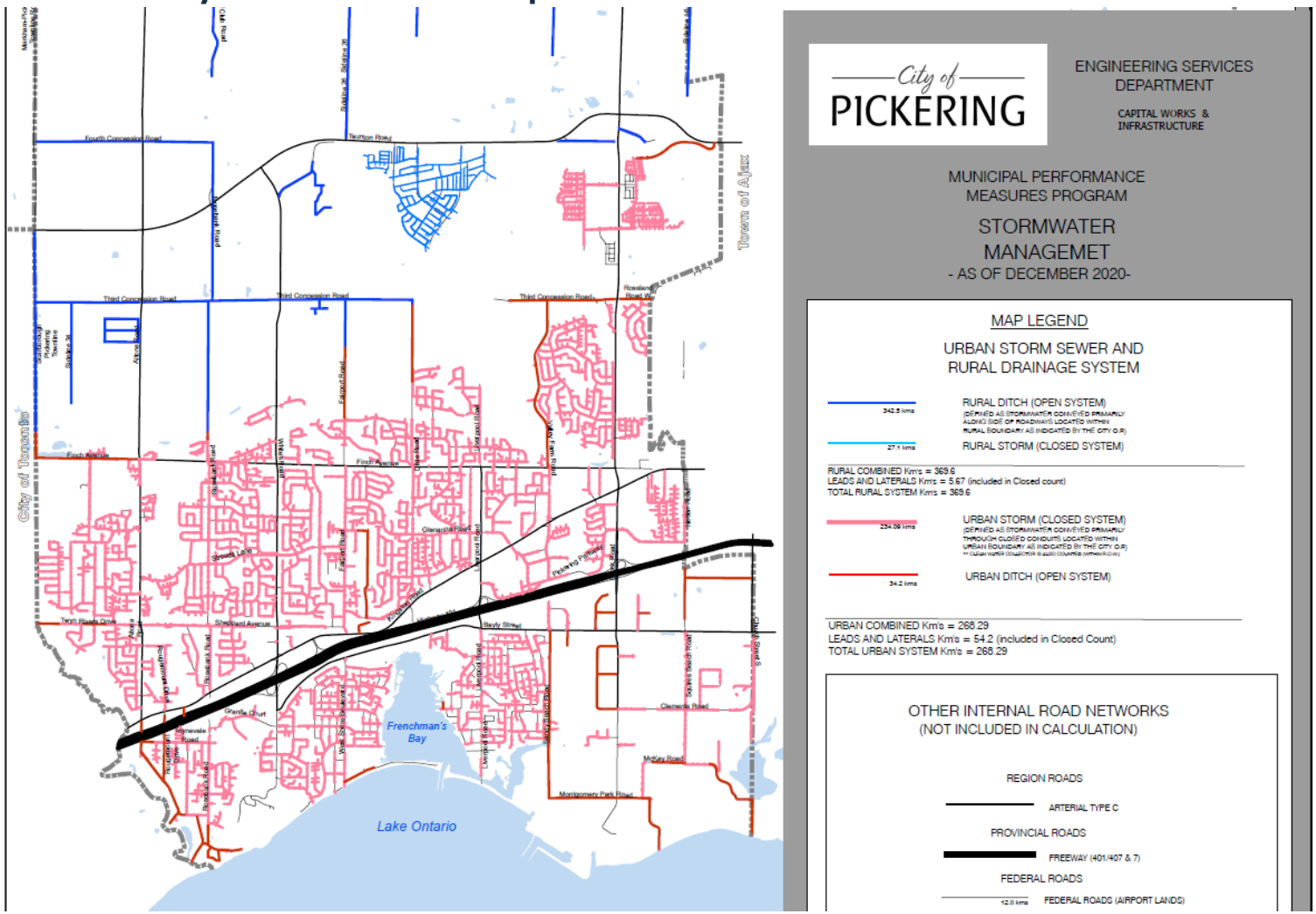
Sidewalk Network Classification Map Part 2



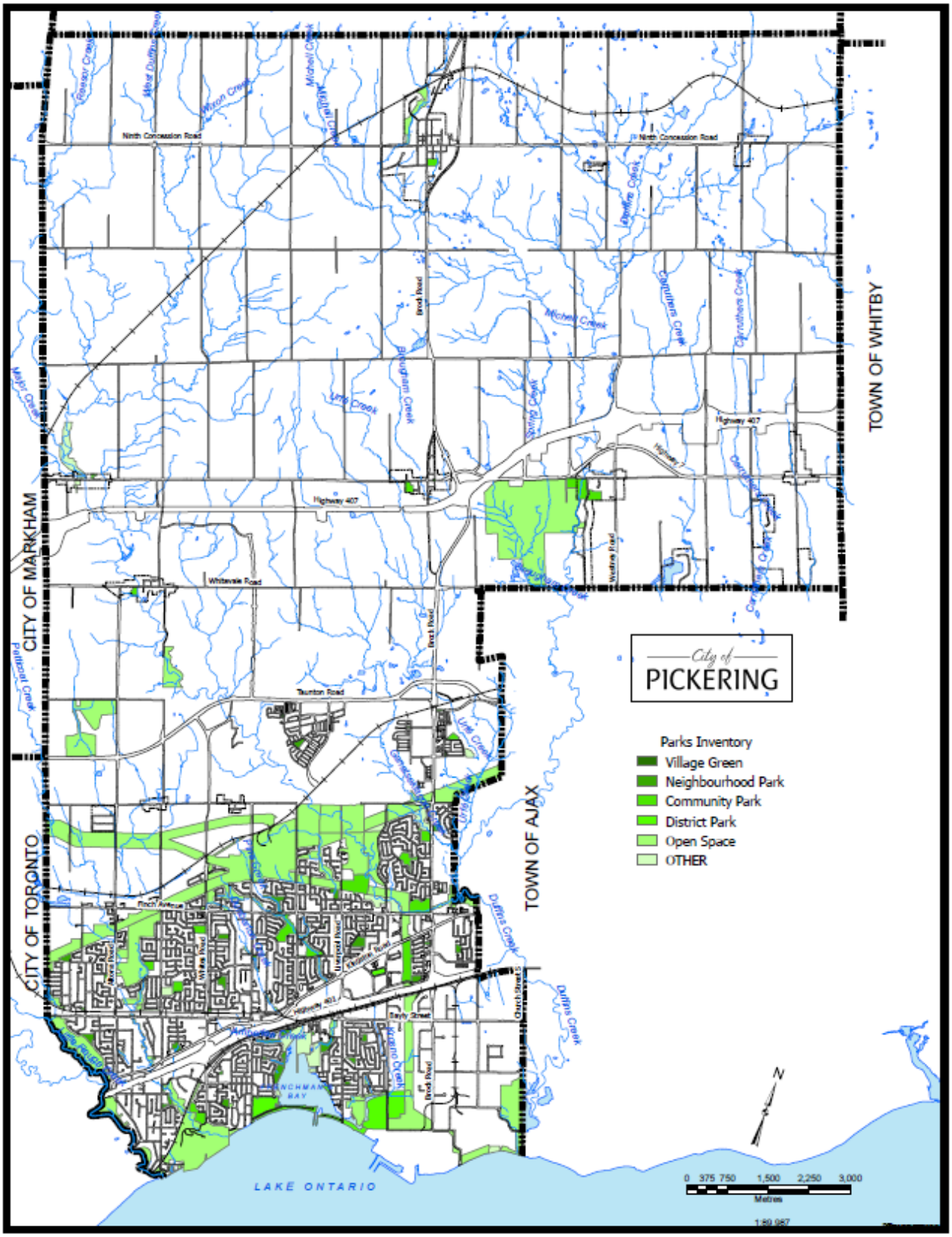
Stormwater System Classification Map Part 1



Stormwater System Classification Map Part 2



Parks Inventory Map



Appendix C: Risk Rating Criteria

Probability of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Road Corridor	Condition	100%	0-40	5
Road Corridor	Condition	100%	41-60	4
Road Corridor	Condition	100%	61-75	3
Road Corridor	Condition	100%	75-90	2
Road Corridor	Condition	100%	91-100	1
Stormwater System (Main)	Condition	90%	0-20	5
Stormwater System (Main)	Condition	90%	21-40	4
Stormwater System (Main)	Condition	90%	41-60	3
Stormwater System (Main)	Condition	90%	61-80	2
Stormwater System (Main)	Condition	90%	80-100	1
Stormwater System (Main)	Pipe Material	10%	Concrete	2
Stormwater System (Main)	Pipe Material	10%	Steel	3
All Other Assets	Condition	100%	0-20	5
All Other Assets	Condition	100%	21-40	4
All Other Assets	Condition	100%	41-60	3
All Other Assets	Condition	100%	61-80	2
All Other Assets	Condition	100%	81-100	1

Consequence of Failure

Asset Category	Risk Classification	Risk Criteria
Road Corridor	Economic (100%)	Surface Material (20%)
Road Corridor	Economic (100%)	Design Class (25%)
Road Corridor	Economic (100%)	AADT Range (35%)
Road Corridor	Economic (100%)	Roadside Environment (20%)
Stormwater System (Main)	Economic (100%)	Replacement Cost (100%)
All Other Assets	Economic (100%)	Replacement Cost (100%)

Appendix D: Condition Assessment Guidelines

The foundation of good asset management practice is accurate and reliable data on the current condition of infrastructure. Assessing the condition of an asset at a single point in time allows staff to have a better understanding of the probability of asset failure due to deteriorating condition.

Condition data is vital to the development of data-driven asset management strategies. Without accurate and reliable asset data, there may be little confidence in asset management decision-making which can lead to premature asset failure, service disruption and suboptimal investment strategies. To prevent these outcomes, the City's condition assessment strategy should outline several key considerations, including:
The role of asset condition data in decision-making
Guidelines for the collection of asset condition data
A schedule for how regularly asset condition data should be collected

Role of Asset Condition Data

The goal of collecting asset condition data is to ensure that data is available to inform maintenance and renewal programs required to meet the desired level of service. Accurate and reliable condition data allows municipal staff to determine the remaining service life of assets, and identify the most cost-effective approach to deterioration, whether it involves extending the life of the asset through remedial efforts or determining that replacement is required to avoid asset failure.

In addition to the optimization of lifecycle management strategies, asset condition data also impacts the City's risk management and financial strategies. Assessed condition is a key variable in the determination of an asset's probability of failure. With a strong understanding of the probability of failure across the entire asset portfolio, the City can develop strategies to mitigate both the probability and consequences of asset failure and service disruption. Furthermore, with condition-based determinations of future capital expenditures, the City can develop long-term financial strategies with higher accuracy and reliability.

Guidelines for Condition Assessment

Whether completed by external consultants or internal staff, condition assessments should be completed in a structured and repeatable fashion, according to consistent

and objective assessment criteria. Without proper guidelines for the completion of condition assessments there can be little confidence in the validity of condition data and asset management strategies based on this data.

Condition assessments must include a quantitative or qualitative assessment of the current condition of the asset, collected according to specified condition rating criteria, in a format that can be used for asset management decision-making. As a result, it is important that staff adequately define the condition rating criteria that should be used and the assets that require a discrete condition rating. When engaging with external consultants to complete condition assessments, it is critical that these details are communicated as part of the contractual terms of the project.
There are many options available to the City to complete condition assessments. In some cases, external consultants may need to be engaged to complete detailed technical assessments of infrastructure. In other cases, internal staff may have sufficient expertise or training to complete condition assessments.

Developing a Condition Assessment Schedule

Condition assessments and general data collection can be both time-consuming and resource intensive. It is not necessarily an effective strategy to collect assessed condition data across the entire asset inventory. Instead, the City should prioritize the collection of assessed condition data based on the anticipated value of this data in decision-making. The International Infrastructure Management Manual (IIMM) identifies four key criteria to consider when making this determination:

1. **Relevance**: every data item must have a direct influence on the output that is required
2. **Appropriateness**: the volume of data and the frequency of updating should align with the stage in the assets life and the service being provided
3. **Reliability**: the data should be sufficiently accurate, have sufficient spatial coverage and be appropriately complete and current
4. **Affordability**: the data should be affordable to collect and maintain

Appendix E: Facility Condition Index

FCI Condition Rating scale	Condition Rating
Less than .10	Excellent
Less than .20	Good
Less than .30	Fair
Less than .40	Poor
Above .40	Disposal