

ASSET MANAGEMENT PLAN 2018-2019



City of Windsor – Corporate Asset Management Plan



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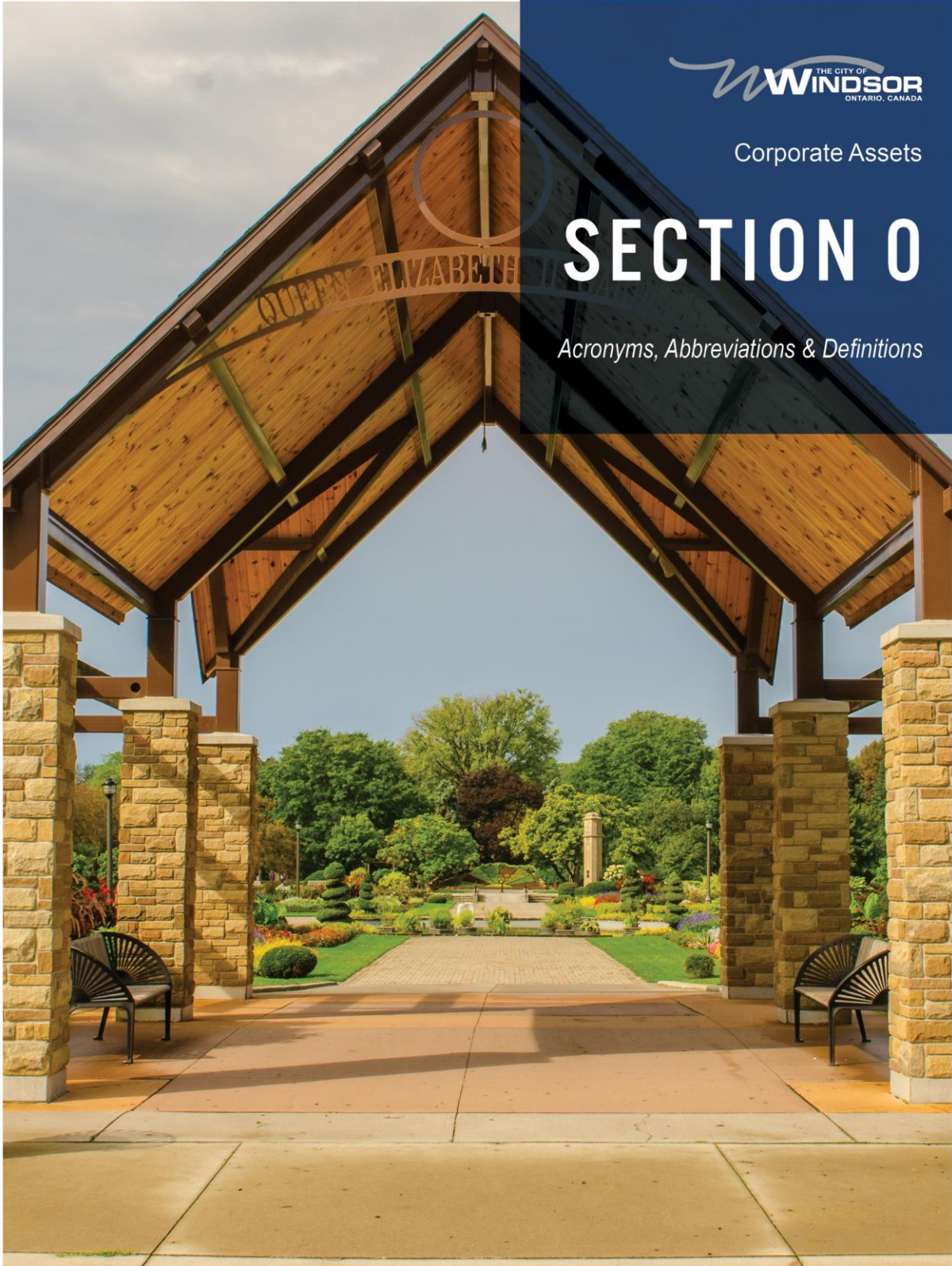
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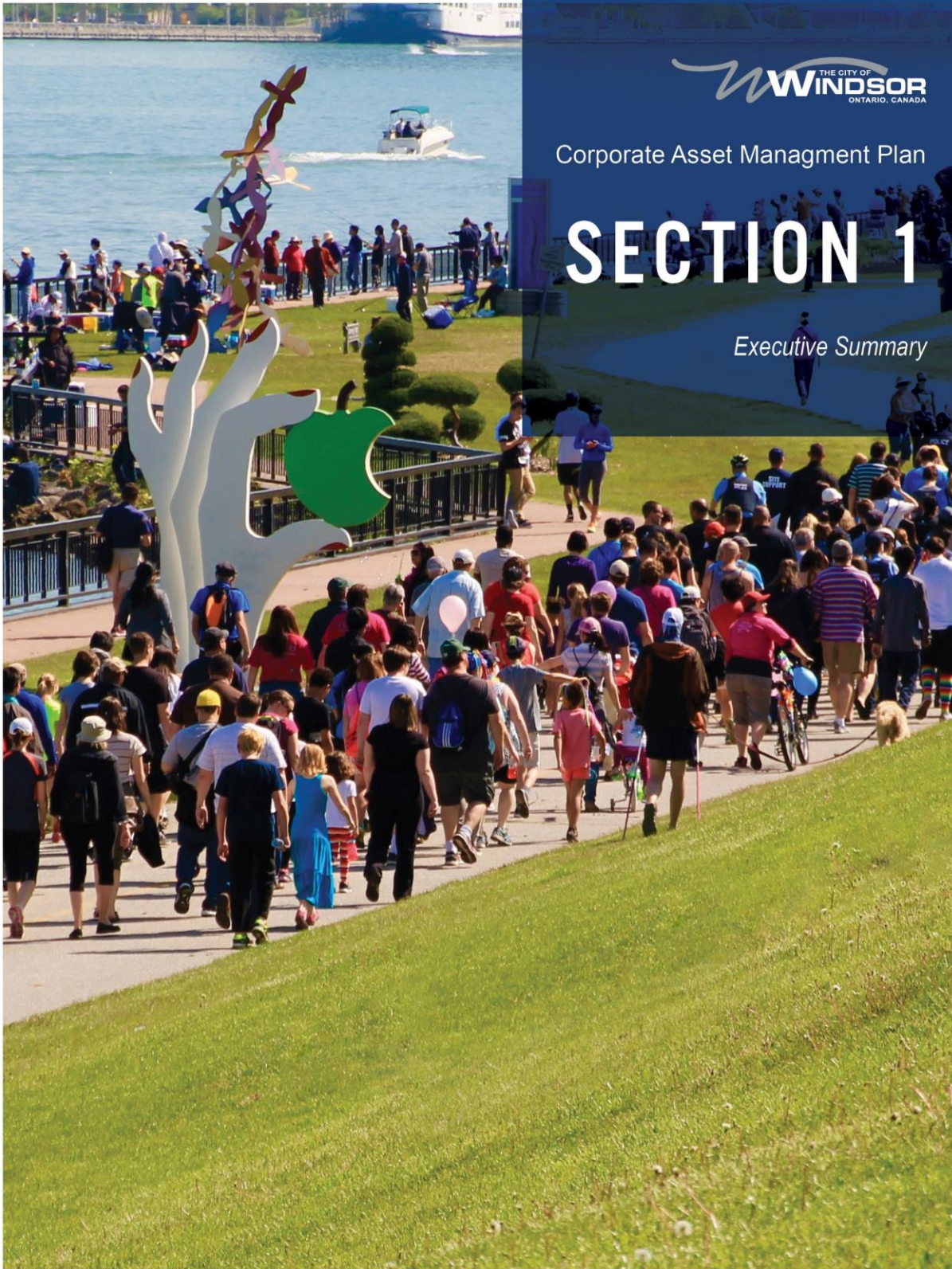
SECTION 0

Acronyms, Abbreviations & Definitions

Acronyms and Abbreviations

1. **AM** – Asset Management
2. **AMP** – Asset Management Plan
3. **Amortization** – The accounting process of allocating the cost less the residual value of a tangible capital asset over its useful life.
4. **Betterment** – A cost incurred to enhance the service potential of a tangible capital asset. Such expenditures would be added to the tangible capital asset's cost.
5. **BAF** – Biological Aerated Filter
6. **BCE** – Business Case Evaluation
7. **CBA** – Cost-Benefit Analysis
8. **CCA** – Canadian Construction Association
9. **CCTV (Closed Circuit Television)** – Used to monitor and assess corporate infrastructure
10. **CMMS** – Computerized Maintenance Management System
11. **CMU** – Concrete Masonry Units
12. **CNAM** – Canadian Network of Asset Managers
13. **Core Assets** – Ontario Regulation 588/17 defines these as; roads, storm and waste water collection, transmission, treatment, retention, infiltration, control and or disposal and bridge/structure or culvert.
14. **Cost of TCA** – The gross amount of consideration given up to acquire, construct, develop or better a tangible capital asset, and includes all costs attributable to the asset's acquisition, construction, development or betterment, including installing the asset at the location and in the condition necessary for its intended use.
15. **CRIP** – Central Riverfront Implementation Plan
16. **CSAP** – Corporate Strategic Action Plan
17. **CSCE** – Canadian Society for Civil Engineering
18. **Design Life** – The period of time during which the item is expected, by its designers, to work within its specified parameters.
19. **Disposal** – The processes involved in the removal of the TCA from use and from the TCA sub-ledger subsequent to: **donation, sale, abandonment, or destruction.**
20. **ESR** - Environmental Study Report
21. **Fair Value** – The amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction who are under no compulsion to act.
22. **FCM** – Federation of Canadians Municipalities
23. **FIR (Financial Information Return)** - A standard set of year-end reports which capture financial and statistical information for each municipality in the Province.
24. **Historical Cost** – The original cost to acquire an asset and/or make it operational. Includes all costs associated with the purchase (e.g. delivery, set-up).
25. **IT** – Information Technology
26. **KPI** – Key Performance Indicator
27. **Life Cycle Costing** – A method of economic analysis to estimate the total cost of ownership of an asset, over its expected life.
28. **Linear Assets** – Assets constructed or arranged in a continuous and connected network. Roads and sewers are examples of linear assets.

29. **LOS** – Levels of Service
30. **LRWRP** – Lou Romano Water Reclamation Plant
31. **MBNCanada** – Municipal Benchmarking Network Canada
32. **MCA (Multi Criteria Analysis)** – A structured approach used to determine overall preferences among alternative options, where the options accomplish several objectives.
33. **MOI** – Ministry of Infrastructure
34. **NBV (Net Book Value)** – The remaining value of an asset as defined by the assets original cost (historical cost) minus accumulated amortization
35. **O & M** – Operations and Maintenance
36. **OMBI** – Ontario Municipal Benchmarking Initiative
37. **OSIM** – Ontario Structure Inspection Manual
38. **PACP** – Pipeline Assessment & Certification Program
39. **Pooled Assets** – Assets that are homogenous in terms of their physical characteristics, use and expected useful life. Pooled assets are amortized using a composite amortization rate based on the average useful life of the different assets in a group.
40. **PSAB** – Public Sector Accounting Board
41. **Replacement Cost** – The cost to replace an asset today. All stated replacement costs are as of 2017 closing balances
42. **Replacement Cost End of Life (future replacement cost)** – Estimated cost of replacing an asset at the end of its useful life based on an estimated rate of inflation.
43. **ROW** – Right-of-Way
44. **SCADA** – Supervisory control and data acquisition system
45. **Straight-line Amortization** – Allocates the cost less estimated residual value of a capital asset equally over each year of its estimated useful life.
46. **Sustainable** – the approach to service delivery is financially achievable over the long term, is not wasteful of resources, minimizes or reverses environmental damage, continuously improves social and inter-generational equality. The approach for estimating asset investment need and developing AM strategies is based on achieving triple-bottom-line outcomes over the long term and considers the full lifecycle of assets.
47. **SUV** – Sport Utility Vehicle
48. **TCA (Tangible Capital Assets)** – Non-financial assets that are held for use in the production or supply of goods and services, used for administrative purposes or for the development, construction, maintenance or repair of other tangible capital assets, have useful economic lives extending beyond an accounting period, and are to be used on a continuing basis
49. **UPS** – Uninterruptible power supply
50. **Useful Life** – The period over which the municipality expects to use a tangible capital asset.
51. **WECHC** – Windsor Essex Community Housing Corporation
52. **WIP (Work in Progress)** – The accumulation of costs for Tangible Capital Assets that are in construction or development in progress but are not yet in use or the capital project is still open to accumulate costs.
53. **WLC** – Whole Life-Cycle Costing
54. **Write-down** – A reduction in the cost of a tangible capital asset to reflect the decline in the asset's value due to a permanent impairment.
55. **WUC** – Windsor Utilities Commission



THE CITY OF
WINDSOR
ONTARIO, CANADA

Corporate Asset Management Plan

SECTION 1

Executive Summary

Executive Summary

Asset Management directly supports a number of the City of Windsor's (City) Strategic goals through the maintenance of existing and new infrastructure as detailed in the City's Official Plan. Council is committed to ensuring that infrastructure is provided in a sustainable, orderly and coordinated fashion. To achieve this Vision, the Official Plan outlines the following goals:

- Safe, sustainable, effective and efficient infrastructure.
- Optimal use of existing infrastructure.
- An accessible, affordable and available transportation system.
- An environment in which all modes of transportation can play a balanced role.
- The provision of infrastructure in a coordinated, efficient and cost effective manner.
- Integration of planning for infrastructure with the planning for growth.
- Protection of natural features.

These goals are supported by this AMP, which provides the plans for the effective and efficient management of City assets. This Asset Management Plan (AMP) serves as a strategic, tactical, and financial document ensuring that the management of the City's municipal infrastructure follows sound asset management practices and principles and complies with Ontario Regulation 588/17, while optimizing available resources and meeting levels of service (LOS) at an acceptable level of risk. It replaces the 2013 Corporate Asset Management Plan and will remain current until the next planned update in 2023.

1.1 Asset Management Plan Overview

In 2011, the City identified the need to establish an Asset Management Program to facilitate sustainable asset management practices. Over the course of two years, a framework was established, containing comprehensive practices in achieving efficiencies, cost control, environmental protection, and defined LOS. By 2013, a comprehensive and robust Asset Management Strategy was developed as a foundation for implementing the City's first AMP in alignment with the Ontario Ministry of Infrastructure requirements set out by their guidance document, Building Together: Guide for Municipal Asset Management Plans. Over the past few years, the legislative landscape has continued to evolve with revised regulations. In 2015, the provincial government enacted The Infrastructure for Jobs and Prosperity Act (IJPA), which contained principles to regulate asset management planning for municipalities. On December 27, 2017, Ontario Regulation 588/17 (the "Regulation") was released requiring municipalities to:

- Finalize a strategic Asset Management Policy by July 1, 2019 (reviewed and updated every 5 years)
- Have an approved asset management plan for core assets, including current levels of service and cost of maintaining those services by July 1, 2021
- Have an approved asset management plan for all infrastructure assets, including current levels of service and cost of maintaining those services by July 1, 2023
- Have an approved asset management plan for all infrastructure assets that includes proposed levels of service, what activities will be required to meet proposed levels of service, and a strategy to fund the activities (over a 10-year period) by July 1, 2024.

The approval of the City's Asset Management Policy and Strategy in November 2017 achieved compliance with the July 1, 2019 requirement. This AMP meets the year 2021 Regulation requirements for core assets, which includes roads, wastewater and storm assets, and bridges and culverts. The City has taken a proactive approach to meeting Regulation requirements, and has also included information to meet some of the year 2023 requirements for non-core assets, including facilities, the Riverfront Shorewall, Transit Windsor, parks, fleet, information technology (IT), and equipment. Due to differing levels of asset management maturity

between departments, the level of detail provided for these assets varies, and the City has identified the next steps required to develop an updated AMP in 2023 meeting all additional Regulation requirements. Any assets owned by external agencies, boards or commissions are not included in this AMP.

The Financial Strategy Section of the AMP discusses the annual investment needs over the next 20-year period, which goes beyond the Regulation requirements, which only require a 10-year forecast. This analysis moves the City towards industry best practices, rather than meeting minimum requirements. The 20-year forecast enables a longer-term understanding of the costs for sustaining current LOS, improving the City's understanding of its financial sustainability. The City compares the annual investment needs to the capital budget to evaluate an estimated funding shortfall, and this additional analysis also moves the City closer to meeting the year 2024 Regulation requirements. This forward-looking approach will assist the City in meeting the Regulation requirements in the specified timeline.

The funding shortfall analysis in this AMP is for existing assets only. The AMP estimates the growth needs based on the current planned budget for growth and enhancement projects in the 2019 to 2025 Capital Budget. This is deemed as the City's current best estimate on new and upgraded assets to meet growing demands. This estimate is likely understated, as the City is currently conducting on-going studies such as the Sewer Master Plan, Active Transportation Master Plan and Transit Service Delivery Review, which will provide recommendations on growth and enhancement projects. These recommendations will be incorporated in the next AMP update to improve the City's understanding of the needs for new and enhanced infrastructure.

1.2 Section 3—State of Local Infrastructure

The assets covered in this AMP are valued at a replacement cost of \$6.12 billion. The road, structures, storm water and wastewater assets represent approximately 81% of the assets (by value) with a total **2017** replacement cost estimated at \$4.98 billion (refer to Figure 1-1 and Table 1-1). Overall, the condition of the City's assets is **Good**, an improvement compared to the **Fair** rating indicated in the 2013 AMP.

Through a comprehensive Service Delivery Review Program completed in 2009, the City identified how various functions and assets relate to services provided to the community. This work has been leveraged to communicate the overall reporting for assets in this AMP within a Service Area. For example, the Transportation Service Area includes roads, paved alleys, sidewalks, bridges, culverts, traffic lights, streetlights, noise barriers, parking garages and equipment which individually and collectively service the transportation needs in the community. Similarly, the Environmental Protection Service Area includes storm, sanitary, combined, force main, and trunk sewers as well as the water reclamation plants and pump stations. These assets provide services to manage the collection and treatment of wastewater and storm water. This AMP provides an overall high-level view of the assets by Service Area, with additional details provided at lower levels in the hierarchy where appropriate to provide insight and clarity on specific asset areas.

The following assets, organized by Service Area, are included in the AMP:

Core Assets

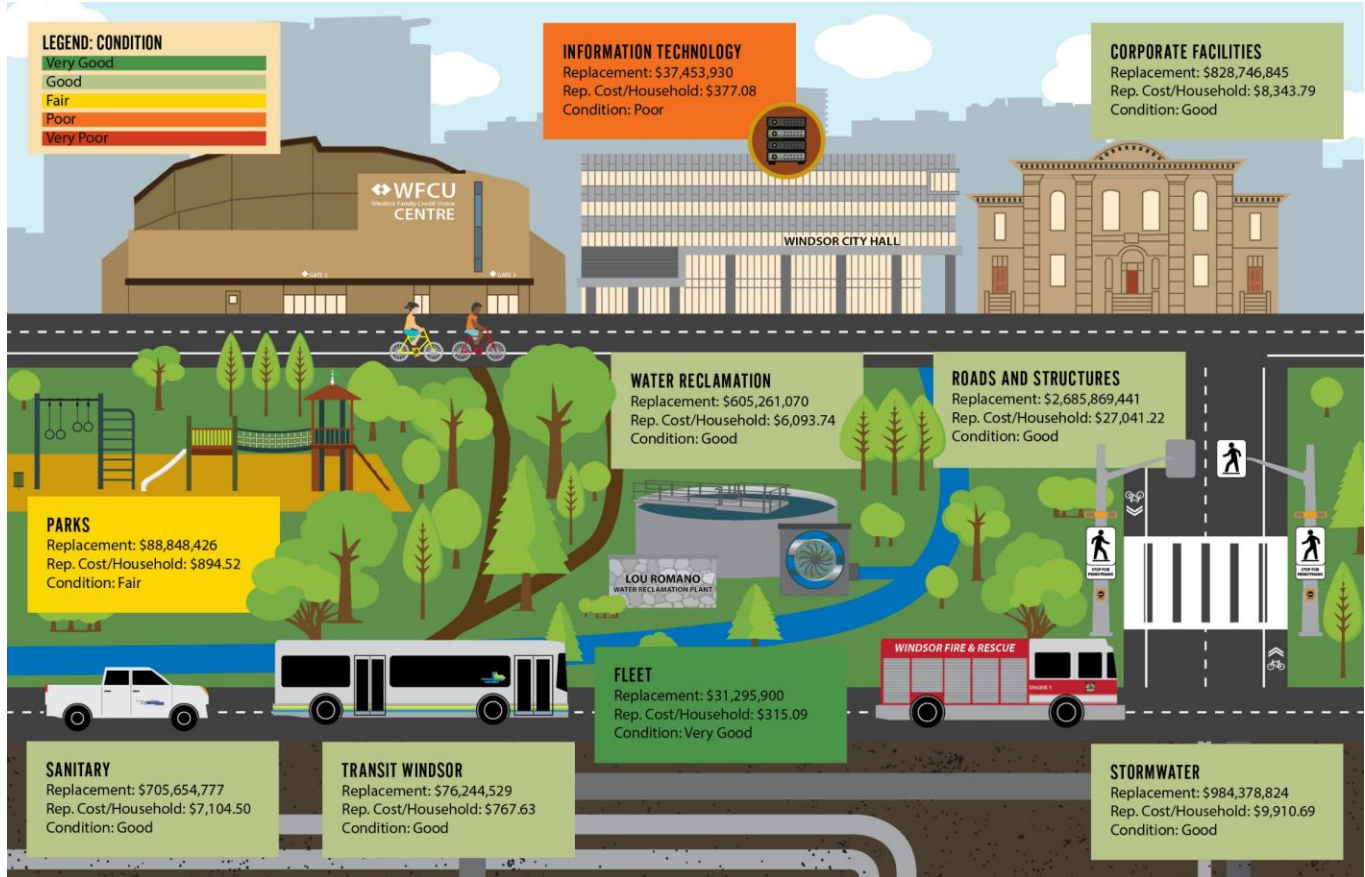
- Environmental Protection Assets:
 - Wastewater and Stormwater Collection
 - Pollution Control: Storm Water Pumping Stations, Environmental Equipment, Wastewater Removal – Water Reclamation Plant and Pumping Stations
- Transportation Assets: Roadways, Structures

Non-Core Assets

- Other Transportation Assets: Sidewalks (ROW), Alleys, Signals, Noise Barriers, Parking Garages and Equipment, Street Lighting
- Corporate Facilities (includes several facilities occupied by an external agency, board and/or commission but still owned by the City)

- Parks Services: Fountains, Parking Lots, Off-road Fleet and Equipment, Pedestrian Bridges, Playgrounds, Sports Fields, Spray Pads, Trails, and Trees (right of way)
- Riverfront Parks Shorewall
- Corporate Fleet and Fuel Sites
- Transit Windsor: Fleet and Equipment
- Information Technology: Business Solutions & Personal Computing and Data & Networking
- Other Corporate Equipment: Equipment owned by Public Works Operations, Fire, Energy Systems, Huron Lodge, Parks & Recreation, Roseland, and various other departments

FIGURE 1-1—OVERALL SUMMARY OF CONDITION AND REPLACEMENT VALUE FOR THE CITY OF WINDSOR*



*Not included in Figure 1.1 are the following assets: Riverfront Parks Shorewall and Other Corporate Equipment

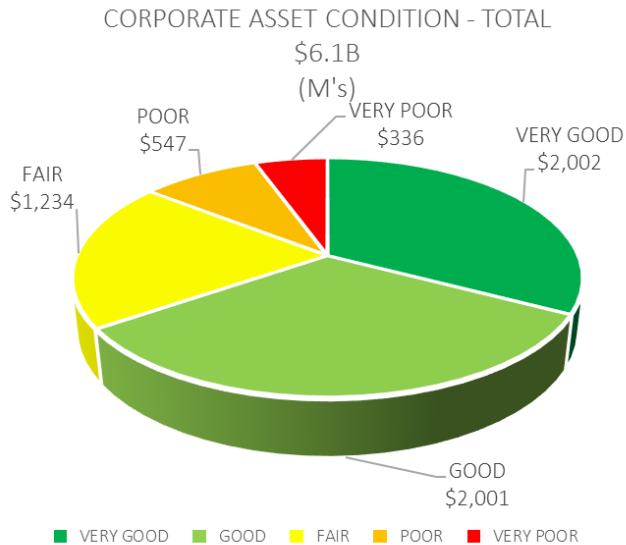
TABLE 1-1— OVERALL SUMMARY OF SERVICE AREA VALUE AND CONDITION

Service Area	Replacement Value (\$M)	Overall Condition
Roads and Structures	\$2,685.9	Good
Environmental Protection	\$2,295.3	Good
Transit Windsor	\$76.2	Good
Corporate Facilities	\$828.7	Good
Parks	\$88.8	Fair
Fleet	\$31.3	Very Good
Information Technology	\$37.5	Poor
Corporate Equipment	\$22.4	Poor
Riverfront Parks Shorewall	\$54.6	Good
Total	\$6,120.7	Good

As shown in FIGURE 1-2, 65% of the City's asset portfolio is in a **Good to Very Good** condition, a 15% increase compared to 2013. The improved condition is directly attributed to investments made by the City over the past few years in allocating funds to reduce the backlog of work, as well as investing in condition assessments to improve the City's understanding of renewal needs. In particular, over the past five years, the City replaced 28 playground structures and converted all streetlights to LED. In addition, it has invested in conducting condition assessments for wastewater and storm sewers using zoom camera technology. These assessments have shown that many sewers are in fact in better condition than previously estimated based on material type and age in 2013. The overall improved condition is also associated to the construction of new assets; for corporate facilities, the overall improved condition of the portfolio is mainly attributed to the construction of new recreation facilities over the past few years, such as the downtown Aquatic Centre, and the disposal of several older buildings that were in poor condition and are no longer part of the portfolio.

The improved overall condition grade for the City does not necessarily mean that risks to the infrastructure have been optimally addressed. The City still has \$336 million of assets estimated to be in very poor condition, with some asset areas decreasing in overall condition compared to 2013. In particular, the value of roads in Poor and Very Poor condition has increased, and investment is required to avoid further deterioration; these maintenance and rehabilitation activities need to be completed in an appropriate timeframe because at a certain point of deterioration, more costly reconstruction work becomes the only available option. Without appropriate funding, these assets will continue to deteriorate over the next few years, and certain critical assets will need to be prioritized to mitigate significant risks, such as segments of the Expressway currently in Very Poor condition. Information Technology assets are also considered to be in Poor condition mainly due to three enterprise systems, two of which (PeopleSoft HRMS and Amanda) will require funding for replacement or upgrade in the next few years. Also, the overall improvement in City-wide condition is not necessarily due to successful reduction in backlog work; the upward trend is partly due to the newly constructed facilities, which are currently in Good condition but will represent an additional demand on future operating and capital funding needs.

As indicated above, the City has invested in zoom camera inspections for sewers over the past few years, and this resulted in an improvement in understanding the actual condition of the assets and future maintenance needs. Similarly, City processes are being revised to initiate and integrate a complete inspection process for pollution control plants and corporate facilities. These assessments provide a foundation to determine the appropriate LOS as well as informing maintenance and rehabilitation activities that result in managing assets at a lower lifecycle cost. These approaches are examples in which City departments have reviewed and revised their asset management practices to incorporate recommendations made at the corporate level, which have included adoption of the Asset Management Policy and Framework, as well as Whole Lifecycle Costing, Triple Bottom Line, and Business Case tools.

FIGURE 1-2—CITY OF WINDSOR OVERALL ASSET CONDITION

1.3 Section 4—Level of Service

Since 2013, the City's Asset Management Policy, Framework, Processes and Philosophy have continuously evolved and advanced throughout the organization. Considerable advancement has been made with the LOS Framework across the City to align with the requirements outlined in Ontario Regulation 588/17. This has been accomplished by utilizing operational and technical measures capturing factors such as condition ratings, failure rates, and cost effectiveness. In 2015, the City also developed a Standard Risk Assessment Tool to understand the criticality and risk of various assets to supplement the City's understanding of appropriate LOS for the various asset classes. The Standard Risk Assessment Tool has matured since the last iteration of the AMP by incorporating the latest risk management principles, and has been programmed into the City's project risk management practices.

For this AMP, the LOS and Risk Assessment tools were applied to the road network, sidewalks, bridges and facilities. The balance of the City's assets use Municipal Benchmarking Network Canada measures, with a comparison of performance reported between 2013 and 2018. The approach to LOS and Risk for these assets will be enhanced in the 2023 AMP by applying the tools and techniques from the LOS and Risk Assessment tools. The City's LOS measures will continue to be developed to support the City's strategic goals, including those from the Official Plan, which specifies the City's commitment to providing safe, sustainable, effective, and efficient infrastructure. The proposed LOS will need to consider current performance levels, community expectations and affordability.

An assessment of the LOS and risk to service delivery is summarized in Table 1-2, with the following four trends summarized for each asset area:

- Condition: Trend of overall asset condition from 2013 to 2018 based on State of Local Infrastructure analysis
- Service Levels: Trend of overall performance on all LOS for the asset class from 2013 to 2018
- Risk to Service Delivery: Expected trend of risk in the City's ability to sustain current LOS performance, assuming funding levels remain comparable to current funding levels over the next 20 years
- Projected Service Levels: Expected trend of LOS over the next 20 years assuming funding levels remain comparable to current funding levels over the next 20 years

The trends reflect that several asset areas are expected to decline in service level and therefore, maintaining funding at current levels will likely not be sufficient over the long term. This issue is not unique to the City, as it is a challenge faced by many municipalities across the province and across the entire country.

TABLE 1-2— OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS

Potential Facilities LOS Trends					
Service Area	Condition	Service Levels	Risk to Service Delivery	Projected Service Levels	Data Confidence
Transportation					
Environmental Protection – Water Reclamation					
Environmental Protection – Sanitary & Storm Sewers					
Corporate Fleet					
Transit Windsor					
Corporate Facilities					
Information Technology (IT)					
Parks Services					
Riverfront Parks Shorewall					
Other Corporate Equipment					

LEGEND

SYMBOL	TREND	DESCRIPTION
	Negative Upward Trend	An upward trend represents a negative outcome for the City of Windsor e.g. higher risk to service delivery
	Positive Upward Trend	An upward trend represents a positive outcome for the City of Windsor e.g. improving LOS
	Negative Downward Trend	A downward trend represents a negative outcome for the City of Windsor e.g. declining LOS
	Positive Downward Trend	A downward trend for this category to service delivery represents a positive outcome for the City of Windsor e.g. lower risk to service delivery
	Consistent/Stable Trend	No anticipated changes noted at this time

1.4 Section 5—Asset Management (Lifecycle) Strategy

The City’s approach to managing assets includes having in place clearly defined LOS, obtaining a better understanding of the condition of the assets along with the identification of the optimal interventions based on the lowest whole-of-life cost. Prioritization techniques, including risk, are also detailed as an approach to determining which priority projects should take precedence and be brought forward as a capital or operating budget issue.

In this AMP, the City has identified lifecycle activities that will be required to sustain the current LOS. An understanding of the needed activities has been improved through the City’s investment in assessments such as the zoom camera sewer inspections, third-party condition assessment of the Lou Romano Water Reclamation Plant, and the new condition assessment program for corporate facilities. These studies not only assist the City in evaluating the current state of infrastructure, but also enable the City to produce a reliable forecast for the required maintenance and renewal needs that minimize costs over the asset lifecycle.

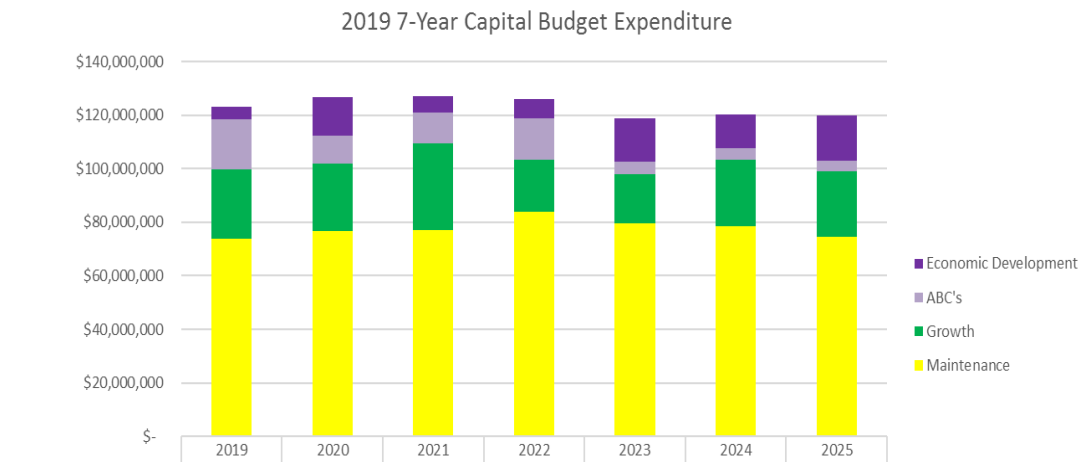
As the lifecycle strategies for each Service Area are further developed, a broader range of asset and non-infrastructure solutions will be considered. The City will also develop an implementation process that assists in identifying the following needs to effectively manage assets: renewal, enhanced LOS, growth, legislative and efficiency related projects. Determining and prioritizing these needs while minimizing lifecycle costs will enable the City to develop a robust and defensible multi-year Capital Budget that will ensure the best overall health and performance of the City’s infrastructure.

1.5 Section 6—Financing Strategy

To maintain current LOS while managing risk and cost, the City has developed a 20-year needs forecast for each asset type and is developed considering whole lifecycle costs and the associated asset management strategies. For some asset areas, such as roads and sidewalks, the City uses advanced modeling software to link forecasted budget scenarios to LOS, resulting in a robust understanding of cost and its impact on service delivery. The objective of the financing strategy is to establish a disciplined approach to strategic planning for long-term affordability and sustainability. This assessment of financial sustainability requires a funding shortfall analysis, which is determined based on comparing the future estimated needs to the funding available. The funding available is defined by the City’s 2019 to 2025 7-Year Capital Budget.

The City’s average annual historical funding from 2013 to 2018 was \$111.0 million, and for 2019 to 2025, this funding has increased to an average of \$123.2 million per year. The 2019 to 2025 7-year budget is shown in Figure 1-3.

FIGURE 1-3—APPROVED CAPITAL BUDGET 2019 TO 2025



\$34.2 million is associated with growth, service enhancement, and Agency, Board or Commission (ABC) type projects, and \$77.6M allocated to rehabilitation or reconstruction of existing assets. The other \$9.9 million of the annual average is allocated to economic development type projects. The City's two main Capital Budget funding sources are Pay-as-you-go (funded through the Operating Budget, Sewer Surcharges, and Debt Reduction) and Sewer Surcharges. Other funding sources include Dedicated Reserves, Development Charges, Federal Gas Tax, Grants, and Third-Party Recoveries.

Over the years, the City has taken a prudent and comprehensive approach to maximizing available funding sources to reduce the shortfall and will continue to do so into the future to respect the impact on citizens. The City has implemented solutions to more efficiently manage its assets, such as portfolio rationalization; in 2018, the City decided to sell the Canderel parking garage and directed the funds to build a reserve for the remaining two garages that would cover future rehabilitation needs. In 2014, the City also implemented modest increases in property taxes while ensuring that taxes were below the average compared to other municipalities. In 2019, additional transfers have increased Pay-as-you-go funding to an average of \$58.5 million annually in the Capital Budget. An increase of \$9.6 million in Sewer Surcharge funding was also approved in the 2019 budget deliberations of which over \$6 million annually will be directed to sewer project work.

The City has estimated an overall annual funding shortfall of \$34 million. The analysis for those asset areas contributing to the funding shortfall is summarized in Table 1-3 and demonstrates that roads and facilities account for a significant portion of the shortfall. Assets for which funding is deemed sufficient are not included.

TABLE 1-3— OVERALL SUMMARY OF FUNDING SHORTFALL BY SERVICE AREA

Transportation Assets	Annual Funding Need	Average Annual funding (2019 to 2025)	Annual Shortfall in Funding
Roads and Alleys	\$ 37,000,000	\$ 18,949,757	\$ 18,050,243
Sidewalks	\$ 1,500,000	\$ 1,171,428	\$ 328,572
Streetlights	\$ 1,366,584	\$ 317,428	\$ 1,049,156
Traffic Signals	\$ 2,000,000	\$ 1,116,285	\$ 883,715
Total Transportation	\$ 41,866,584	\$ 21,554,898	\$ 20,311,686
Park Assets	Annual Funding Need	Average Annual funding (2019 to 2025)	Shortfall in Funding
Playgrounds	\$ 2,553,640	\$ 1,051,428	\$ 1,502,212
Various Park Assets	\$ 3,540,349	\$ 2,810,142	\$ 730,207
Riverfront Shore line	\$ 592,000	\$ 578,571	\$ 13,429
Trees	\$ 2,080,000	\$ 785,857	\$ 1,294,143
Total Park	\$ 8,765,989	\$ 5,225,998	\$ 3,539,991
Environmental Protection	Annual Funding Need	Average Annual funding (2019 to 2025)	Shortfall in Funding
Plants and Pumps*	\$ 5,436,131	\$ 4,867,745	\$ 568,386
Total Environmental Protection	\$ 5,436,131	\$ 4,867,745	\$ 568,386
Facilities, Fleet & Other Assets	Annual Funding Need	Average Annual funding (2019 to 2025)	Shortfall in Funding
Corporate Equipment	\$ 1,705,184	\$ 661,985	\$ 1,043,199
Corporate Facilities	\$ 11,821,549	\$ 4,231,374	\$ 7,590,175
Business Solutions & Personal Computing	\$ 2,000,000	\$ 1,323,813	\$ 676,187
Total Facilities, Fleet and Other	\$ 15,526,733	\$ 6,217,172	\$ 9,309,561
Total Shortfall in Annual Funding	\$ 71,595,437	\$ 37,865,813	\$ 33,729,624
Assets not recommended for additional funding			
Other - including studies, barriers and parks equip	\$ 6,005,321	\$ 6,005,321	\$ -
Parking Garage and Equipment	\$ 764,286	\$ 764,286	\$ -
Structures (Bridges)	\$ 2,804,714	\$ 2,804,714	\$ -
Sanitary and Waste Water Collection	\$ 22,366,930	\$ 22,366,930	\$ -
Corporate Fleets	\$ 2,930,210	\$ 2,930,210	\$ -
Infrastructure Operations - IT	\$ 641,714	\$ 641,714	\$ -
Transit Windsor	\$ 4,172,748	\$ 4,172,748	\$ -
Total assets not recommended for add'tl funding	\$ 39,685,923	\$ 39,685,923	\$ -
Total Annual Funding for Assets in this AMP	\$ 111,281,360	\$ 77,551,736	\$ 33,729,624

In addition to the increases in the funding for the 2019 to 2025 7-Year Capital Budget, the City has investigated other opportunities to decrease the funding shortfall. Recommendations include directing the savings from energy projects to the Pollution Control and Corporate Facilities Maintenance Reserves, continuing to leverage grant funding (Disaster Mitigation and Adaptation Funding (DMAF) for road work and allocating some of the Sewer Surcharge to road maintenance associated with required sewer work. These initiatives are estimated to reduce the annual funding shortfall to approximately \$28.8 million, thereby reducing tax implications on the City's citizens. As indicated in Section 1.1, this shortfall does not include an analysis of growth assets or enhancements.

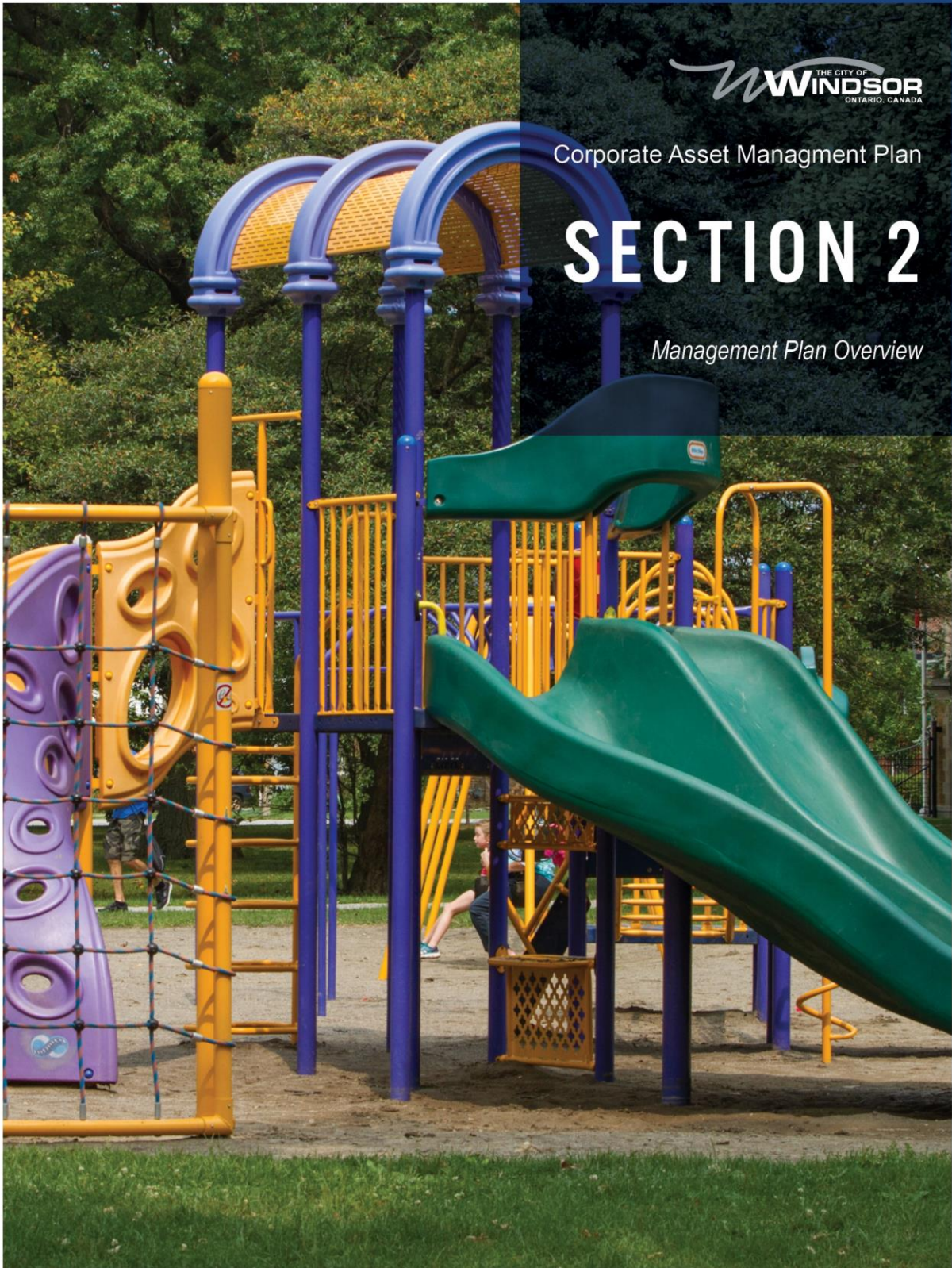
1.6 Section 7—Plan Improvement and Monitoring

The City's Asset Management Plans will continue to evolve over time and improve in data reliability and accuracy as the Asset Management practices, frameworks, and philosophies become entrenched in each City Service Area. The evolution of asset management planning is continuous as process documents, guidelines, and business case evaluation (BCE) are implemented to consider triple bottom-line factors and whole lifecycle costing.

The Asset Planning program enables the City to ensure compliance to legislation, assess the service levels delivered, as well as develop strategies that balance LOS, risk, and costs such that infrastructure provided to citizens is safe and effectively managed.

The City has made significant improvements since the 2013 AMP with regards to developing and implementing asset management practices policies and procedures. There remains a significant amount of work to be completed to ensure compliance with Ontario Regulation 588/17 in the 2023 AMP, which will also enhance the City's overall program, understanding of its assets and future needs for existing assets. The 2023 AMP will also need to incorporate the recommendations of on-going studies such as the Sewer Master Plan to better understand the City's growth needs. As with many other municipalities across the province, the remaining work will require an investment in resourcing and time to complete.

This AMP is a living document which is relevant and integral to the daily Asset Management activities at the City. The AMP is expected to be updated and communicated to Council at least every 5 years, and an update on the implementation of the recommendations in this AMP is to be reviewed annually.



Corporate Asset Management Plan

SECTION 2

Management Plan Overview

Corporate Asset Management Plan Overview

2.1 What is Asset Management?

Municipalities throughout Ontario, large and small, own a diverse portfolio of infrastructure assets that provide a varied range of services to their citizens. The infrastructure, in essence, is a conduit for the various public services the municipality provides to the community, such as the following:

- Roads provide a means in which to travel to and from various locations throughout the City and into connecting areas, and cycling facilities on these roads provide for additional active transportation opportunities as well as a means for accessibility,
- Wastewater and storm water infrastructure provide for the collection and appropriate processing of wastewater and storm water from municipal, domestic, commercial and industrial sources,
- Pools and splash pads provide recreation activities, attract tourists and are also a means for people to cool down during the summer months,
- Trees provide shade as well as help to purify the air.

A community's prosperity, economic development, competitiveness, image, and overall quality of life are inherently and explicitly tied to the reliable performance of its infrastructure assets. Asset management seeks to continuously deliver the required service levels to citizens at an acceptable level of risk while minimizing lifecycle costs. Effective asset management practices are developed through the coordination of various disciplines and skillsets including engineering, planning, operations, procurement, environmental, natural areas, finance and technology. Over the last 10 years, since the introduction of PSAB 3150, the public sector has become more engaged in and aware of the benefits of asset management. Asset management has also been given a higher profile with the introduction for the ISO 55000 standard in 2017 that has been guiding many program implementations. For municipalities across the country, there is a strong movement towards adopting and implementing asset management plans, policies and practices. This progression is made clear through Federal requirements to develop Asset Management Plans (AMPs) to support projects requesting grant funding as well as federal gas tax funding. At the Provincial level, in 2015, the government enacted the Infrastructure and Jobs Prosperity Act which contained principles to regulate asset management planning for municipalities. Under the Act, on December 27, 2017, Ontario Regulation 588/17 (the Regulation) was enacted requiring municipalities to develop an asset management policy, as well as develop an AMP according to the following requirements:

- Have an approved AMP for core assets, including current levels of service (LOS) and cost of maintaining those services by July 1, 2021
- Have an approved AMP for all infrastructure assets, including current LOS and cost of maintaining those services by July 1, 2023
- Have an approved AMP for all infrastructure assets that includes proposed LOS, what activities will be required to meet proposed LOS, and a strategy to fund the activities (over a 10-year period) by July 1, 2024.

This AMP meets the year 2021 Regulation requirements for core assets, which includes roads, wastewater and storm assets, bridges and culverts. The City has taken a proactive approach to meeting Regulation requirements, and has therefore also included information to meet some of the requirements for years 2023 and 2024. A discussion of recommendations on next steps to meet Regulation requirements and improve asset management practices at the City is provided in Section 7.

2.2 Purpose - Supporting the City of Windsor's Goals

This AMP serves as a strategic, tactical, and financial document ensuring that the management of the municipal infrastructure follows sound asset management practices and principles, while optimizing available resources and maintaining LOS. The objective of this AMP is to provide an objective overview of the how City

assets are performing, estimate the funding levels required to sustain the assets at current LOS, and discuss funding shortfalls and ways to mitigate these gaps. This version of the AMP does not provide recommendations on desired LOS nor the funding levels required to achieve them. This analysis will be included in the next AMP for compliance to year 2024 Regulation requirements. This AMP focuses on existing asset sustainability considering current LOS, asset deterioration rates, maintenance and rehabilitation activities to maintain current LOS, and the associated costs for these activities. This AMP will drive changes to the City's Capital Budget and ensure funding levels and proposed projects are consistent with the AMP recommendations. It will provide clarity on the funding needs for existing assets versus the funding needs associated with growth, service enhancement or economic development.

Asset Management directly supports a number of the City of Windsor's (City) Strategic goals in the Official Plan. Specifically in the Infrastructure section, with regard to accommodating the transportation and physical service needs in the City, Council is committed to ensuring that infrastructure is provided in a sustainable, orderly and coordinated fashion. Council's infrastructure goals are to achieve:

- Safe, sustainable, effective and efficient infrastructure.
- Optimal use of existing infrastructure.
- An accessible, affordable and available transportation system.
- An environment in which all modes of transportation can play a balanced role.
- The provision of infrastructure in a coordinated, efficient and cost effective manner.
- Integration of planning for infrastructure with the planning for growth.
- Protection of natural features.

These goals are supported by this AMP, which provides the plans for the effective and efficient management of City assets.

2.3 Relationship to Other Municipal Plans and Documents

An AMP is a key component of the municipality's planning process linking with various other corporate plans and documents. The AMP should reflect these plans and documents and incorporate them through LOS, risk, project priorities and required funding levels to achieve the objectives of these plans. In addition, asset management processes and procedures should be included in other plans and documents to ensure they provide appropriate information regarding the full lifecycle cost and value of any recommendations. The following is a description of other City plans and documents that need to align with the AMP:

- The Official Plan – The AMP will both utilize and influence the land use policy directions for long-term growth and development as described in the Official Plan.
- Long Term Financial Plan – The AMP will both utilize and conversely influence the financial forecasts within the long-term financial plan.
- Capital Budget – The decision framework and infrastructure needs identified in the AMP form the basis on which future capital budgets are prepared.
- Infrastructure Master Plans – The AMP will utilize goals and projections from infrastructure master plans and in turn will influence future master plan recommendations.
- Service Area AMPs – The Transportation, Facilities, and Environmental Protection Service Areas each have their own dedicated AMPs that provide more detail on their specific infrastructure and services.
- By-Laws, standards, and policies – The AMP will influence and utilize policies and by-laws related to infrastructure management practices and standards.
- Regulations – The AMP must recognize and adhere to industry and government regulations.
- Business Plans – The service levels, policies, processes, and budgets defined in the AMP are incorporated into business plans as activity budgets, management strategies, and performance measures.

The City has invested in several on-going studies and plans that represent its specific initiatives and current priorities, many of which will have a direct impact on growth and service enhancement needs that will need to be incorporated and addressed in the next AMP. A summary of each of these studies and plans and their expected linkages to asset management and alignment with the 2023 AMP are provided in the following subsections.

2.3.1 Eight Point Plan for Flooding Reduction

The City has experienced an increase in significant weather events over the past several years including two events that occurred within less than one year of each other, resulting in significant flooding throughout the City. After the last major event in August 2017, an Eight Point plan was endorsed by City Council to put in place short-term and long-term adaptation and mitigation activities to address the flooding issue. Several of the programs have been implemented, including sewer camera inspections, a basement subsidy flooding program, down spout disconnections, and expediting the development of a Sewer Master Plan. These programs both influence and inform the recommendations of the AMP as well as the capital budget. The recommendations in the Sewer Master Plan will factor in mitigation to climate change impacts and on-going condition and flooding studies and will influence the long-term funding levels required for the sewer network for both existing assets and growth/enhancements.

2.3.2 Sandwich South Growth Study

The lands known as Sandwich South require significant planning to ensure that as the area is developed, the necessary roads, sewers, water, utilities, cycling, parks and other amenities are put in place. Many of these investments need to occur prior to development and as such, a growth study for these lands is currently being completed by the City's Planning department with Hemson Consulting. The result of this study will advise on the roll out plan and associated costs for building out the area over the next 20 to 30 years. This information will be the single largest growth area for the City, and the ability to fund this work will be addressed in the next AMP.

2.3.3 Transit Windsor Service Delivery Review

The Transit Windsor Service Delivery Review project is well underway, with various public consultations occurring during development of this AMP. This Service Delivery Review is developing recommendations which may significantly shift the City's Transit system. The possible expansion into additional regional areas as well as new technology and ways to offer transit services is transformative. The Service Delivery Review, therefore, if approved in whole or in part, will override the City's Life Cycle Costing report recommendations from 2015, which provided recommendations on bus lifecycle and replacement needs. The Service Delivery Review will likely result in new recommendations as well as mixed fleet recommendations. The associated impact to operations, maintenance and capital reserves which will be necessary to sustain possible growth and service enhancement changes will be reviewed and addressed in the 2023 AMP.

2.3.4 Community Energy Plan and Climate Change

There are three (3) reports related to climate change: Community Energy Plan; Corporate Climate Action Plan and the Climate Change Adaptation Plan. Additional information on these three plans and their link to the Asset Management Plan are included in Section 5 of the AMP. Briefly these documents can be defined as:

Community Energy Plan

The Community Energy Plan (CEP) is a long-term plan that identifies ways to support Windsor's local economy by increasing competitiveness, creating jobs in the energy sector, and serves as a business retention strategy.

Corporate Climate Action Plan

The Corporate Climate Action Plan (CCAP) is a corporate-wide plan to reduce energy and emissions from municipal operations and fleets.

Climate Change Adaptation Plan (2012)

The 2012 Climate Change Adaptation Plan is currently being updated. It is a high-level plan which identifies vulnerability and risks to the Corporation and Community based on climate change projections. This high-level plan aims to identify climate change risks and prioritize actions across various services.

2.3.5 Urban Forest Management Plan

The City recognizes the wide-ranging benefits of trees, including helping to mitigate climate change impacts, reducing heat island effects, absorption of atmospheric pollution, providing canopy cover, and enhancing the natural environment. This AMP is a first step towards formalizing the management of natural assets and identifies the needs for a 7-year trimming program for trees. The City is also developing an Urban Forest Management Plan (UFMP) which will include a full canopy assessment and provide a framework of objectives, targets and methodologies designed to preserve, protect, and manage the urban forest and its environmental and community benefits. The 2023 AMP will be informed by the UFMP and build upon the current tree database, develop a more accurate valuation, identify the diversity of species and condition, and incorporate recommendations for the overall tree canopy.

2.3.6 Active Transportation

The expansion of active transportation for municipalities has become a larger focus over the past five years. Several grant programs have been released which provide funding for expanded cycling, multi-purpose trails, sidewalks and public transit. The Investing in Canada's Infrastructure Plan (ICIP) Public Transit stream was also released on April 2, 2019 and will lead to just over \$144 million in project funding from all three levels of government for the City. This program encourages the development of cycling, sidewalks and trails which lead to and from public transit stops. Expanded services to neighbouring communities is also encouraged, and the City currently provides such a service for the Town of LaSalle. The City has made significant investments in bikeway developments over the past few years and is currently completing an Active Transportation Master Plan which will detail the proposed expanded active transportation network. This Master Plan will inform the 2023 AMP in terms of the proposed enhancements such as more sidewalks, cycling paths and trails, as well as expanded transit services. The costs for the expanded active transportation network recommendations will need to be fully understood over the full asset lifecycle such that appropriate decisions can be made regarding their approval when balanced against the funding needs to maintain the existing network.

2.4 Methodology

The City's Corporate Asset Planning Team has led the development of this AMP, with support from staff across various departments who are part of the Asset Manager Network and CMMS (Computerized Maintenance Management System) Network. Reviews were also undertaken by the Asset Planning Steering Committee for endorsement and approvals with a final review of the AMP by the CAO. City representatives who are part of the City's Asset Management governance structure are provided below:

Asset Planning Steering Committee: Joe Mancina, Mark Winterton, Shelby Askin Hager, Harry Turnbull, Jan Wilson, Dwayne Dawson, Tom Graziano, Thom Hunt

Asset Manager Network: Dwayne Dawson, Wes Hicks, Shawna Boakes, France Isabelle-Tunks, Ed Valdez, Jake Renaud, Sergio Mannina, Angela Marazita, Earl Larking, Victor Ferranti, Tom Graziano, Mike Clement, Paul Giroux, Yvan Mantha, James Chacko, Mel Douglas

Computerized Maintenance Management System (CMMS) Network: Diana Digirolamo, Eric Bailey, Jodi Maskery, Heidi Baillargeon, Ivanna Nimchuk, Tim Stevenson

Corporate Asset Management Team: Melissa Osborne, Gabe Taba, Kathy Roeder, Luigi Congi

2.4.1 Data Sources and Alignment

The basis for much of the information within this AMP is the City's database of municipal infrastructure information, *City Wide Asset Manager* (previously *City Wide TCA*). This system maintains the City's financial record of all assets deemed to be a tangible capital asset (TCA). The AMP also leverages asset data from Service Areas to validate and confirm completeness of this database. For some asset areas, information was also physically located by internal staff or consultants to populate the overall database.

Infor (Hansen) CMMS is used extensively for the operational management of linear assets. Therefore, for roads, bridges, sidewalks, and sewers, the core data and condition information held in the *Infor (Hansen) CMMS* was used to populate the *City Wide Asset Manager* database. For fleet, *Fleet Focus CMMS* is used to manage and maintain all technical, operational and maintenance data, and this data was also transferred to *City Wide Asset Manager*. This data transfer process served to identify and correct gaps and validate the asset inventories across all relevant systems. Due to timing differences of status changes in an asset, immaterial variances in quantities between *Infor (Hansen) CMMS* and *City Wide Asset Manager* were expected. For assets without objective condition data, subjective condition ratings based on remaining useful life were populated in *City Wide Asset Manager*, with a final review and confirmation by expert staff in each Service Area. This validation process required a change in the remaining useful life for some asset classes.

City Wide Asset Manager will ultimately contain the municipality's asset base, valuation information, life cycle activity predictions, costs for activities, sustainability analysis, project prioritization parameters, key performance indicators and targets, 10 year asset management strategy, and the financial plan to deliver the required infrastructure budget. *City Wide Asset Manager* and the information in this AMP will be further synchronized over time, and will evolve together year-to-year as more detailed information becomes available. This alignment will allow for ease of updates, modeling and scenario building, annual reporting of performance measures, and overall continuous improvement. It is therefore recommended that the alignment requirements between *City Wide Asset Manager* and the AMP be reviewed and updated on an annual basis.

Asset data for roads, bridges, sidewalks and sewers is based on an extract of data from the following systems:

City Wide Asset Manager

Infor (Hansen) CMMS

Fleet Focus CMMS

Updated condition data and assets acquired and/or disposed after these dates are not reflected in this AMP.

The data confidence for the valuation and condition estimates for each asset class is provided in Section 3 and is assessed for both data accuracy and reliability. The data confidence in the financial data is discussed in Section 6.

2.4.2 Condition Ratings

In this AMP, objective condition data exists for roads, structures, sidewalks, corporate fleet, playgrounds, park riverfront shorewall, 54% of facilities, Lou Romano Reclamation Plant and approximately 80% of the storm and sanitary sewers. All other asset condition grades were assessed using the current age of the asset in comparison to its overall useful or design life.

A five-point rating scale has been used which aligns with the National Infrastructure Report Card. Ratings range from 1 to 5, as described in Table 2-1 below, reflecting each asset group's physical condition. Use of these condition ratings allows for consistent reporting of all assets, despite the various condition rating processes applied to the assets. Appendix A outlines the mapping among the various condition assessment programs to the definitions of the Very Good through Very Poor ratings.

TABLE 2-1—ASSET CONDITION GRADE SUMMARY

1	Very Good	The infrastructure in the system or network is generally in Very Good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.
2	Good	The infrastructure in the system or network is in Good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.
3	Fair	The infrastructure in the system or network is in Fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.
4	Poor	The infrastructure in the system or network is in Poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.
5	Very Poor	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service.

The process used by the Canadian Infrastructure Report Card for overall condition rating has been utilized by the City for their condition calculations as well. The calculation is determined as the sum of: % of Very Poor x .2, Poor x .4, Fair x .6, Good x .8 and Very Good x 1.0. The sum provides an equivalent overall qualitative rating based on the globally recognised scale in Table 2-2. The City's overall calculation is 75.65 % and therefore results in an overall **Good** condition rating. The focus of this AMP is to ensure this overall rating is sustained both at the overall network level as well at the asset category level.

TABLE 2-2—CONDITION RATING SCALE

	Condition	Rating
1	Very Good	Greater than 80%
2	Good	60%-79.9%
3	Fair	40% - 59.9%
4	Poor	20%-39.9%
5	Very Poor	Less than 20%

2.5 Assets Covered by this Plan

This AMP includes the core asset types, as detailed in the O.Reg. 588/17 regulation, as well as several other asset types the City manages and are listed in the City TCA database. Through a comprehensive Service Delivery Review Program completed in 2009, the City identified how various functions and assets relate to services provided to the community. This work has been leveraged to communicate the overall reporting for assets in this AMP within a Service Area. For example, the Transportation Service Area includes roads, paved alleys, sidewalks, bridges, culverts, traffic lights, streetlights, noise barriers, parking garages and equipment which individually and collectively service the transportation needs in the community. This AMP provides an overall high-level view of the assets by Service Area, with additional details provided at lower levels in the hierarchy where appropriate to provide insight and clarity on specific asset areas.

The following assets, organized by Service Area and core/non-core assets, are included in the AMP:

Core Assets

- Environmental Protection Assets:
 - Wastewater and Stormwater Collection
 - Pollution Control: Storm Water Pumping Stations, Environmental Equipment, Wastewater Removal – Water Reclamation Plant and Pumping Stations
- Transportation Assets: Roadways, Structures

Non-Core Assets

- Other Transportation Assets: Sidewalks (ROW), Alleys, Signals, Noise Barriers, Parking Garages and Equipment, Street Lighting
- Corporate Facilities (includes several facilities occupied by an external agency, board and/or commission but still owned by the City)
- Parks Services: Fountains, Parking Lots, Off-road Fleet and Equipment, Pedestrian Bridges, Playgrounds, Sports Fields, Spray Pads, Trails, and Trees (right of way)
- Riverfront Parks Shorewall
- Corporate Fleet and Fuel Sites
- Transit Windsor: Fleet and Equipment
- Information Technology: Business Solutions & Personal Computing and Data & Networking
- Other Corporate Equipment: Equipment owned by Public Works Operations, Fire, Energy Systems, Huron Lodge, Parks & Recreation, Roseland, and various other departments

This AMP is a Corporate Plan and serves as a summary document of each Service Area. Appendix F and Appendix G expand on the State of Infrastructure (Section 3), Levels of Service (Section 4) and Asset Management Strategies (Section 5) for roads, sidewalks, structure, and facilities. For clarity and conciseness purposes, the information provided in the main body of the AMP for these assets are higher level summaries.

The Regulation is being reviewed for clarity on certain requirements for 2023, which may result in some other assets that will need to be included in the 2023 AMP as non-core assets. The following assets are not included in this version of the AMP:

- Art, Culture, Museum, Recreational artifacts memorials, statues and other assets of this nature
- Land, including brownfields
- Horticulture and the assets within them
- Manholes, curbs, and catch basins
- Recreation assets excluding facilities and other assets already captured in Parks off-road fleet
- All Park assets not reflected in this plan (reference Appendix E for a listing of additional park assets)
- City agencies, boards and commissions including but not limited to: Windsor Essex Community Housing Corporation, Windsor Police Services, Enwin and all related businesses, and Windsor Public Library. These agencies, boards, and commissions’ assets are managed independently. Some facilities which they occupy are still owned and maintained by the City and are therefore included in the AMP.

2.6 Asset Management Plan Structure

Figure 2-1 depicts the main sections of the AMP, including the key components and links between the components. The AMP supports corporate goals and is driven by strategic goals and community expectations.

FIGURE 2-1—COMPONENTS OF ASSET MANAGEMENT PLAN (AMP)



In the *State of Infrastructure* (Section 3), the AMP evaluates the replacement cost and condition of the City's asset portfolio. In future updates to the AMP, this section will improve in accuracy as objective condition assessments are conducted on more assets and more asset types.

In *Levels of Service* (Section 4), a framework is provided for the City to define current LOS and performance measures. The measures for some assets are based on the City's LOS template and processes and the balance of assets use the Municipal Benchmarking Network Canada (MBNCanada). There are also specific LOS measures required for roads, structures, wastewater and storm assets in compliance to O.Reg. 588/17. As the City continues to enhance its AM practices, the City's LOS template and processes will be applied for all assets. In addition, future AMP's will also define proposed LOS rather than reporting on solely current LOS.

The *Asset Management Strategy* (Section 5), provides an overview of the approach to the management of assets within the City. It includes examples of where the City has been implementing good and best practice asset management approaches. This section provides an overview of strategies that the City employs to sustain its current LOS, including condition assessment techniques for each asset class, interventions considering a whole lifecycle cost approach, and prioritization techniques, including risk quantification to determine which priority projects should move forward in the Capital Budget.

The *Financing Strategy* (Section 6), fully integrates with the LOS and lifecycle strategies to provide a forecasted cost to sustain current LOS for existing assets. The City also provides an analysis of the funding shortfall for each Service Area by comparing the forecasted needs to the funding available in the Capital Budget. Section 6 provides an in-depth discussion on ways in which to mitigate the shortfall through a detailed review of available revenue sources, such as the tax levy, debt allocations, rates, reserves, grants, gas tax, development charges, and utility savings. This analysis reduces the shortfall and represents the City's prudent approach to using available resources and minimizing financial impacts on citizens. Current and future challenges are identified that should be addressed in order to maintain sustainable infrastructure services on a long-term, life cycle basis, to help move the City to sustainable and effective management of City infrastructure.

Growth and service enhancements in this AMP are currently estimated as the planned projects set out in the 2019 to 2025 Capital Budget, and a shortfall analysis has not been conducted for any growth or enhancement needs. The actual growth needs will need to be updated in the next AMP, as it will be influenced significantly by several on-going initiatives such as the Sewer Master Plan, Transit Windsor Service Delivery Review, and other plans and studies described in Section 2.3.

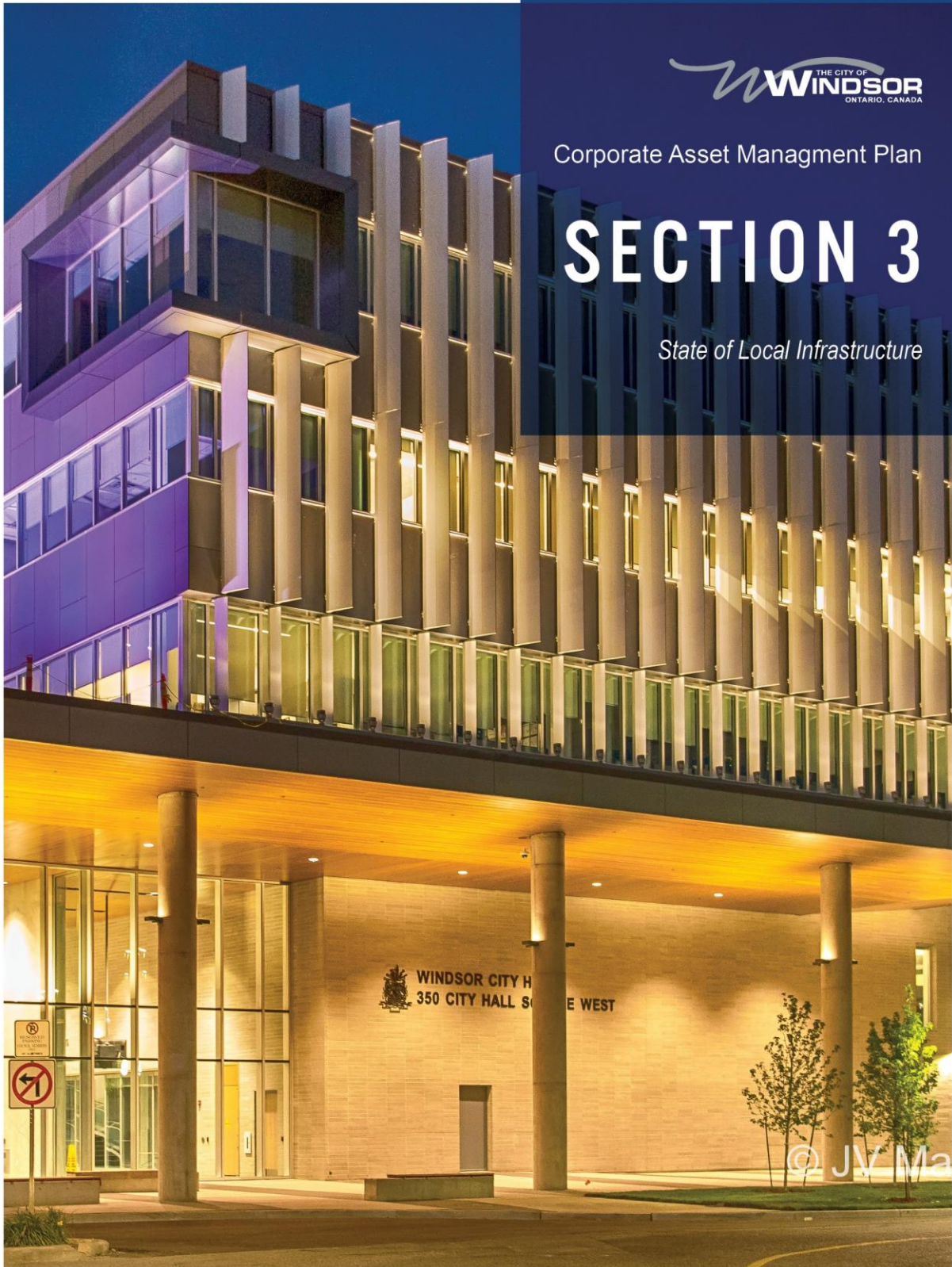
AMP Improvement and Monitoring (Section 7) provides a progress review of the 2013 AMP recommendations and identifies additional opportunities which will continue to enhance the asset management program for the City into the future. As previously indicated, the City has taken a proactive step towards meeting Regulation requirements and has included some year 2023 and 2024 requirements into this AMP. Section 7 details the remaining steps required for the City to meet full Regulation compliance in the next AMP. While this AMP focuses on costs to sustain current LOS, by 2024, the AMP will need to forecast the cost to meet proposed LOS, with a direct link to the associated lifecycle activities required to meet the proposed LOS.

2.7 On-Going Monitoring and Review

The City's progress as measured against the AMP will be monitored on an annual basis by the Corporate Asset Management Office, taking into account both changes to business drivers and improved information, and the actual progress of planned capital projects and operational activities. The AMP will be subject to a major update every four to five years. If significant changes arise within this timeframe that impact the AMP, an interim review will be undertaken. Table 2-3 below shows the proposed update frequencies of the AMP and associated documents. The timelines for the AM Policy, Corporate AMP, and review on AMP implementation progress are required per O.Reg. 588/17.

TABLE 2-3—TIMEFRAMES AND FREQUENCY FOR REVIEW

Document	Frequency
AM Policy	Every 5 years
Corporate AMP	Every 4-5 years
State of Infrastructure Report	Every 2-3 years
Service Area AMPs	Every 4-5 years
Review on AMP implementation progress	Annually
Capital Budget	Annually



State of Local Infrastructure

3.1 City Overview and Concepts Explained

Asset Inventory

The Corporation of the City of Windsor owns and operates a sizable portfolio of assets that span several service areas. This section of the AMP covers the City's infrastructure aligned to the services under the direct control of the City and excludes indirect services administered by Agencies, Boards and Commissions.

The data in this section for facilities and transportation service assets is a summary of the detailed information included in Appendix F - Facilities and G - Transportation Assets. The Transportation Assets appendix includes: roads, paved alleys, sidewalks, structures (bridges and culverts), parking garage and equipment, street lights, traffic signals and noise barriers.

The replacement cost value of the assets covered in this AMP is \$6,122,414,450. The core assets which must be reported for compliance to O.Reg 588/17 are roads, structures, storm water and wastewater assets. These asset categories make up approximately 80% of the total City's asset defined in this plan at an estimated replacement cost of \$4.89 billion. Table 3-1 below provides a high-level overview of the roads, structures, and storm and wastewater inventory included within the scope of this AMP.

TABLE 3-1—INVENTORY OF MINISTRY REQUIRED ASSETS (ROADS, STRUCTURES, WASTEWATER AND STORM WATER)

Asset Type		Inventory
Total Wastewater & Storm Water		
Linear: Pipes and Appurtenances		1775.82 km of pipe
Facilities: Pumps Stations, Reservoirs and Wells		45 Facilities
Wastewater: Sanitary		
Collection System: Local and Trunk Sanitary Sewers		959.1 km of pipe
Treatment facilities: Water Reclamation Plants and Pump Stations		14 Facilities
Storm Water: Storm		
Storm Water System: Storm Sewers Pipe and Conveyances		816.77 km of pipe
Storm Water Facilities: Pumping Stations & Interceptors		31 Facilities
Roadways		
Roads and Paved Alleys		1,148,558.42 m
Structures	Bridges and subway	61
	Major Culverts (> 3 m)	11
	Pedestrian Bridge (ROW only)	5

In addition to the core assets detailed above, the City also manages a considerable portfolio of assets which are included in this AMP and listed in Section 2.

In comparison to the required core asset categories, the total replacement value of the other assets is less than 20% of the total value of the City's asset base identified in this report and is estimated at \$1.14B. While they make up only 20% of the assets identified in this plan, they are material to the City and require capital and operational funding to sustain and ensure they continue to meet current levels of service over the next 20 years.

While there are still more assets throughout the City, mainly in the Parks area as well as various equipment, the data is not readily available and their capital valuation does not meet PSAB thresholds. Asset Planning is continuing to work with the operational areas to refine and improve asset reporting and data management to improve and expand the information in the corporate asset management plan as many of these assets

require funding and provide service to the community regardless of their financial value which does not warrant PSAB reporting.

Asset Valuation

Based on the asset inventory data that was compiled for each service area, a valuation was undertaken based on the replacement cost for the majority of asset types. The replacement cost of the assets is based on data in our Tangible Capital Asset system which houses our PSAB 3150 data.

The population of the Tangible Capital Asset system was part of the PSAB financial reporting requirements. This required local government to present information about the complete stock of their tangible capital assets and amortization in the summary financial statements. All Canadian municipalities were required to comply by January 1, 2009. Administration recalculates these values on an annual basis, using Consumer based indices appropriate for each of the asset types. To ensure the resulting costs remain as reasonable replacement costs, a test sample of replacements costs are compared to the actual costs annually for various asset types. Based on the annual sampling approximately 80% of the replacement project cost for these assets have been within a reasonable range of current costs. As such the 2017 replacement costs, used in our financial reporting, have been utilized for the majority of the assets covered within the AMP.

Some assets have experienced higher than usual cost increases. The transit fleet in less than 5 years has experienced a 46% increase, well above the expected 2 to 3% increase for inflation. There are significant factors causing this including the Public Transit Infrastructure Funding which resulted in transit agencies across Canada ordering higher than usual volumes of buses that year, including Windsor which ordered 26. Additional factors include the unfavourable change in exchange rate over this period as well as changes to steel tariffs causing further cost increases unexpected and outside of the City's control. For this reason, some assets, including transit fleet and playgrounds, have used a replacement cost which is more reflective of known 2018 pricing. Changes to the Tangible Capital Asset System will be made to ensure it is more reflective of current costs for future use.

All replacement costs are based on the cost to replace the asset with the exact same asset. There is no growth, technology change and or enhancement assumptions included in the costs. The projected funding levels required for the assets in this AMP also take this direction to assume funding required for the assets as is, without growth or other enhancements. It is also the reason this report does not address the needs of our storm and sanitary network beyond continuance of various preventative and rehabilitation programs. The Sewer Master Plan, due late 2019, will provide insight into the various city-wide projects which need to be completed to reduce the probability of flooding and are expected to include growth and service enhancement needs rather than just replacement of aging assets. The recommendations in the Sewer Master Plan are anticipated to drive the funding and projects required for the next 20 years. Future AMPs will include these results, LOS, risk, funding and priorities.

It should also be noted that 71 of our largest corporate facilities, Lou Romano Water Reclamation Plant and the shore along the riverfront parkland had condition assessments completed. These reports provided the annual investment in preventative and rehabilitation work required to sustain these assets over the next 20 years, which differs from cost to replace the entire asset. These costs are used in the AMP as they are for funding maintenance and replacement of various significant components to extend the overall life of the facility or shore, thereby reducing the chance of failure resulting in a reduced level of service and eventually complete reconstruction.

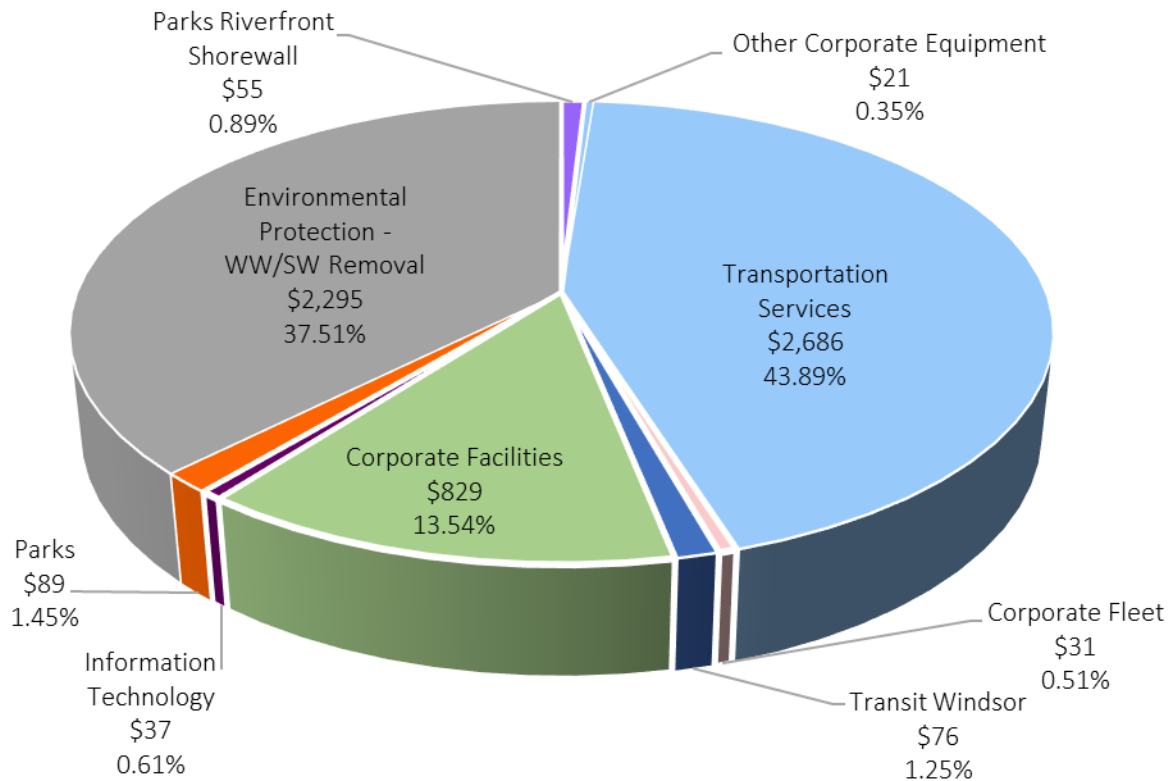
Many of these recommendations also result in lower cost options if applied at appropriate times rather than running to failure and having a larger scope and impact to resolve. Examples of these recommendations include but are not limited to roof replacement strategies, maintenance and replacement of heating and cooling systems; elevator maintenance; steel sheet piling replacement; armour rock supplement; and several other significant preventative maintenance and rehabilitation programs which extend the critical assets and reduces the impact of the failure of the components on the overall facility or shore. These programs are like the mill and pave program for roads which are a quarter of the cost of reconstruction, as well as the many rehabilitation programs applied to our bridges to address deterioration and avoid closures and complete reconstruction. The objective is to apply these various rehabilitation programs to continually extend the life of the asset, maintain it's service level and avoid reaching "Poor" or "Very Poor" conditions. Which, for many of

these assets not only means higher costs, it also could result in the asset being taken out of service and or creating a Significant or Critical risk to the City.

It should be noted that for assets that have relatively lengthy useful lives such as bridges, wastewater and storm water assets and roads, the use of replacement cost valuation along with an assessment of condition is a more useful indicator for decision-making compared to using the asset’s depreciated value. Many long-life assets may still be serviceable for some time to come, despite being fully depreciated.

As such the AMP relies on the use of current replacement cost of assets as its basis for asset valuation. It should be noted that some assets may have a replacement cost that is drastically lower than the value of the asset. Trees, heritage and cultural assets are examples of assets in this situation. While we could estimate the cost to replace a tree at \$500, the new tree is much smaller, does not provide the same sized canopy and may or may not be the same specie. For these reasons the tree information in this report looks at the annual cost to maintain the tree inventory through a 7-year tree trimming program and provides a cautionary estimate of \$50,000,000 to replace the number of trees in our inventory (ROW and parks). The Forestry division is currently working on inventorying the trees in the ROW and parks, which in turn will provide more specific details on each tree, so that an appropriate value can be calculated and attributed to each tree. The value of each tree is expected to be significantly higher than the \$500 cost to replace them. This information will be reported by the Forestry division and included in the next AMP in 2023.

FIGURE 3-1—TOTAL 2017 REPLACEMENT COST OF ALL ASSETS COVERED WITHIN THE AMP (MILLIONS OF DOLLARS)



Useful Life

The determination of the life of an asset for TCA purposes was a combination of useful life and design life. For the sanitary and storm assets the estimated remaining useful life of a physical asset, based on the age of the asset, is considered a good starting point to estimate the overall well-being of an asset pool, however in many cases the percentage of useful life consumed may not be the most suitable indicator of current asset condition. Infrastructure assets undergo a continual process of repair, rehabilitation and refurbishment to maintain their intended purpose. For example, roads, bridges and facilities typically undergo a continual

maintenance and rehabilitation process and hence age may not be the most suitable indicator to use for asset management planning. As such in many cases asset useful life needs to be augmented with other information such as actual asset condition rating, history of asset upgrades, and expert judgment.

It should be noted that estimated useful lives, based purely on age, can sometimes provide a misleading view of the replacement timing for the assets. In many cases assets that are properly constructed and maintained may outlive their estimated useful life and continue providing valued service. In other cases, due to poor workmanship, impact of climate events and lack of proactive maintenance and rehabilitation, assets may fail before they fulfill their estimated useful life.

The City of Windsor has utilized a hybrid approach in the AMP which relies on asset age, assumed useful life, actual asset condition rating where available, and expert judgment to evaluate the condition state of the various asset types. A comprehensive matrix of all asset condition definitions and assumptions are provided in Appendix A.

Condition

A five-point rating scale has been used which aligns with that employed by the National Infrastructure Report Card produced by the Federation of Canadian Municipalities (FCM), Canadian Society of Civil Engineers (CSCE), and Canadian Construction Association (CCA). In addition to providing a sound basis for assessment, this will allow for future high-level benchmarking against other municipalities across Canada. Ratings range from 1 to 5, as described in Table 3-2 below, reflecting each asset group's physical condition. Use of these condition ratings allows for consistent reporting of all assets, despite the various condition rating processes applied to the assets. Appendix A outlines the mapping between the various condition assessment programs to the definitions of the Very Good through Very Poor ratings identified in Table 3.2 below.

TABLE 3-2—ASSET CONDITION GRADE SUMMARY

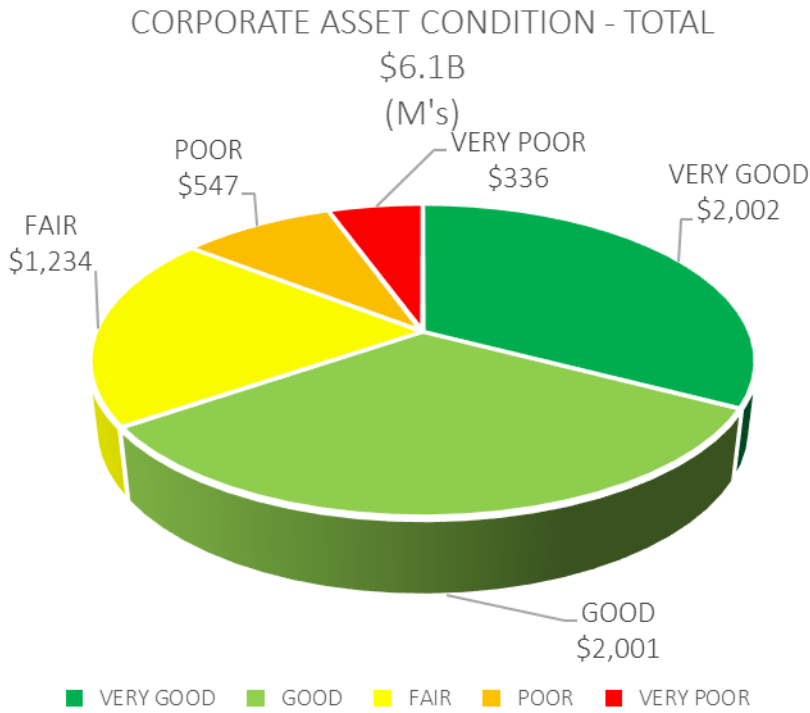
1	Very Good	The infrastructure in the system or network is generally in Very Good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.
2	Good	The infrastructure in the system or network is in Good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.
3	Fair	The infrastructure in the system or network is in Fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.
4	Poor	The infrastructure in the system or network is in Poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.
5	Very Poor	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service.

The following section provides a high-level overview of the condition of each asset class included within the scope of the City's current AMP.

Generally, replacement values have been used to enable the condition grades to be rolled up and summarized at the Service Area level. For roads, alleys, sidewalks and the sewer network it was determined that the use of linear meters in each condition grading would be a more accurate reflection of the true overall condition of these particular asset classes.

For the current AMP, the condition of each asset group was evaluated in order to gain an overall perspective on the current 'health' of the City's infrastructure. Future iterations of the municipal AMP will expand this assessment to include other service measures such as adequacy and reliability which will better reflect the ability of the city's assets to meet the service needs of the City of Windsor citizens. Figure 3-2 gives an overall view of the condition of the City assets covered by this plan, based on their replacement values.

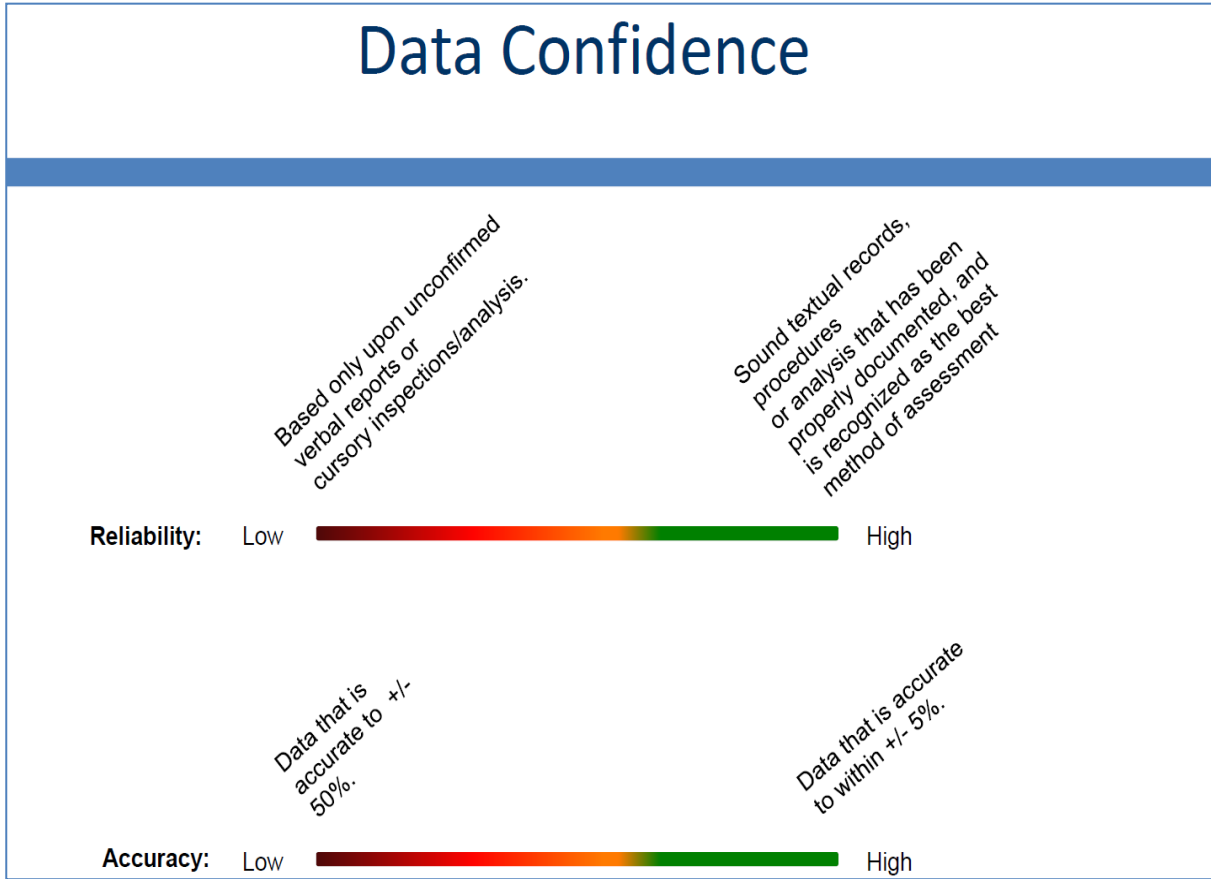
FIGURE 3-2—CITY OF WINDSOR'S OVERALL ASSET CONDITION - 2017



Data Confidence

An assessment has been made of the data confidence for data used for each of the asset classes. Data Confidence takes in consideration the reliability and the accuracy of the data as detailed in Figure 3-3.

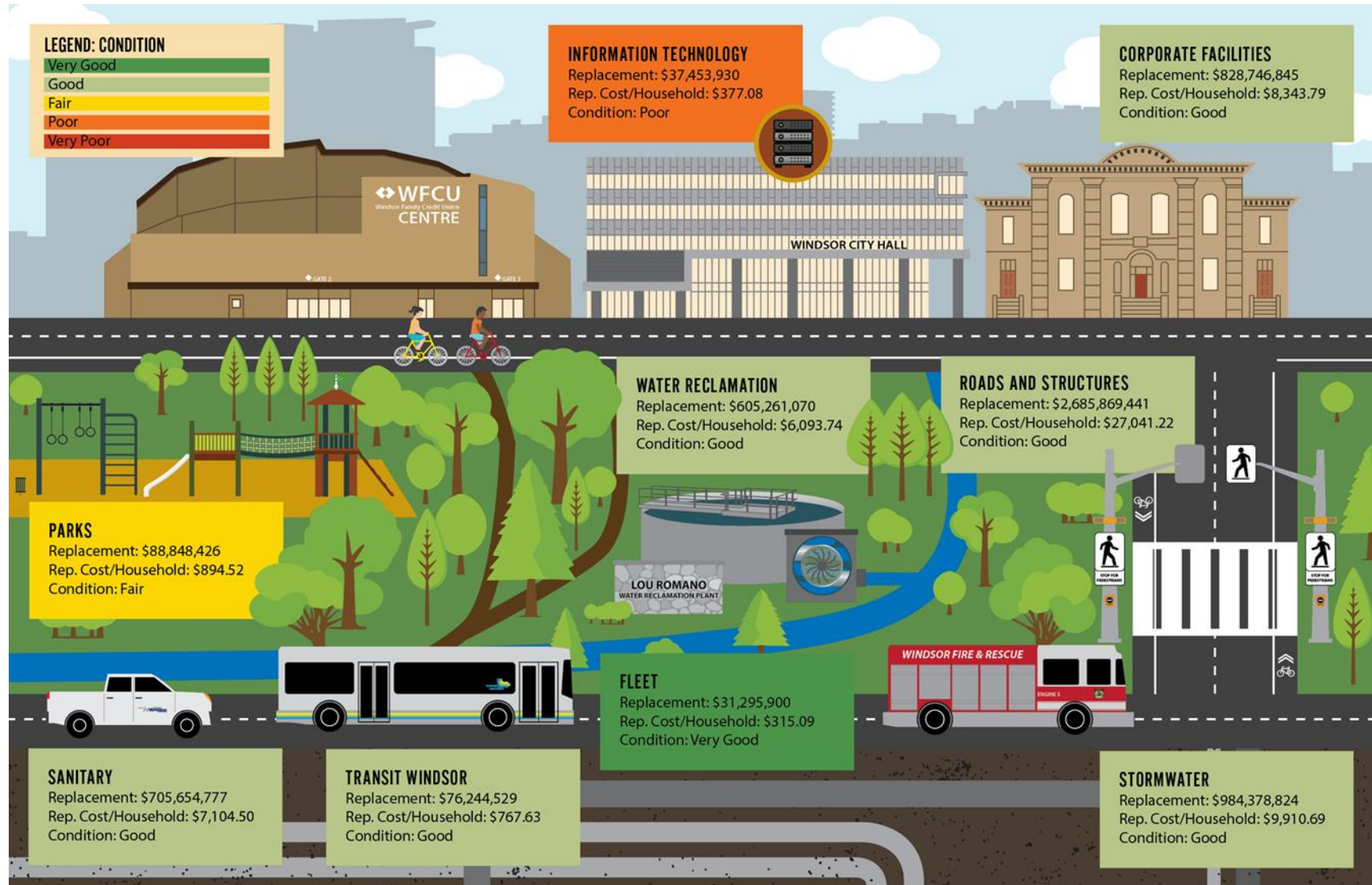
FIGURE 3-3—DATA CONFIDENCE – RELIABILITY AND ACCURACY LEVELS



3.1.1 City Overview Infographic

Figure 3-4 is an urban graphic summarizing the replacement value, and condition of the City’s assets.

FIGURE 3-4—OVERALL SUMMARY OF CONDITION, REPLACEMENT VALUE AND ESTIMATED INFRASTRUCTURE GAP FOR THE CITY OF WINDSOR*



*Not included in Figure 3.4 are the following assets: Riverfront Parks Shorewall and Other Corporate Equipment.

3.2 Transportation Infrastructure

This section summarizes the state of the City’s Transportation Assets as extracted from Appendix G. For more information and additional details, please refer to Appendix G.

The Transportation assets covered by this plan are valued at replacement cost of \$2,685,869,441.

City of Windsor transportation assets included in the report are:

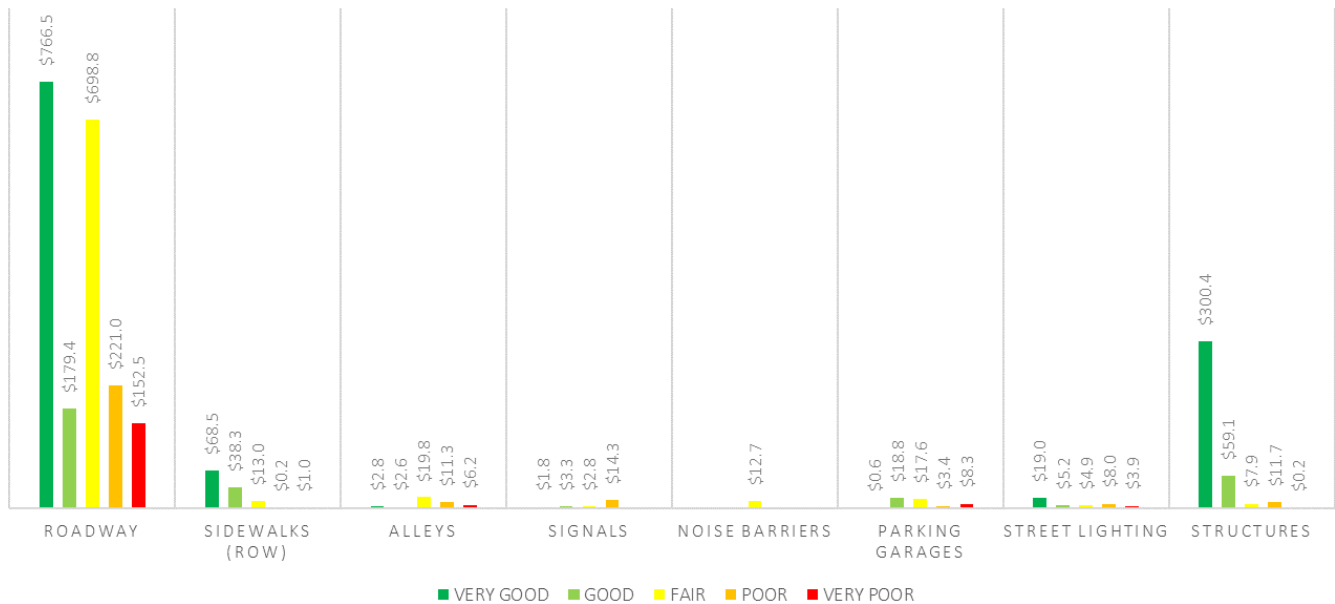
- Road network, including paved alleys
- Structures (bridges and culverts with >3m span)
- Sidewalks
- Traffic signals
- Street lights (ROW)
- Noise barrier walls
- Parking garages and equipment

Any transportation assets owned by any agencies, boards or commissions are not included in this report. Compliance with Ontario Regulation 588/17 sets out specific requirements for inclusion of assets owned by organizations whose financial statements are consolidated with the City’s. These requirements are to be met by 2023 and noted in Section 7 – Plan Improvement and Monitoring.

This AMP meet O.Reg 588/17 year 2021 requirements for core assets. Other assets have been included in varying levels of detail and will be further developed to meet the year 2023 requirements in the next AMP update.

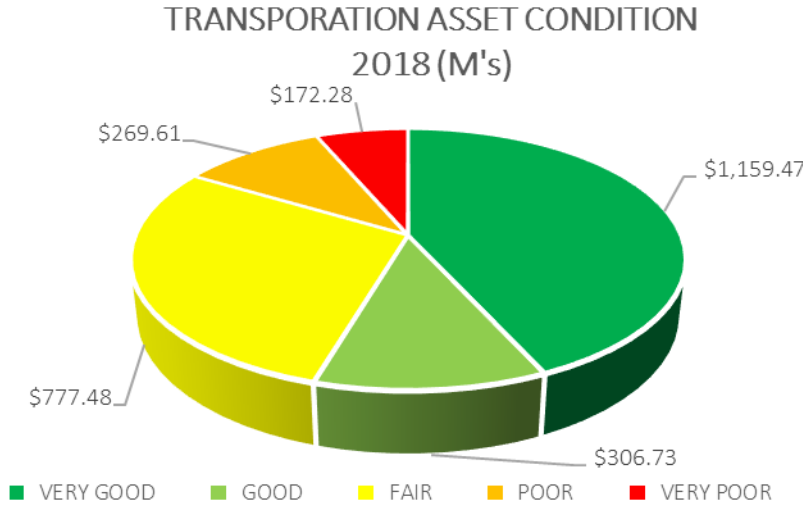
FIGURE 3-5—OVERALL SUMMARY OF CONDITION AND REPLACEMENT VALUE BY ASSET CATEGORY FOR TRANSPORTATION AMP

TRANSPORTATION ASSETS CONDITION SUMMARY (Ms)



Overall, the condition of the City of Windsor’s Transportation Assets is **Good**, which is consistent with our 2013 overall average as well as what was reported in the 2016 Canadian Infrastructure Report Card. It should be noted that roads are particularly prone to age-based deterioration and climate impacts which could significantly alter the overall rating in subsequent years.

FIGURE 3-6—CITY OF WINDSOR OVERALL TRANSPORTATION ASSET CONDITION



The process used by the National Infrastructure Report card for overall condition rating has been utilized by the City for their condition calculations as well. The calculation is % of Very Poor x .2, Poor x .4, Fair x .6, Good x .8 and Very Good x 1.0. The sum of these results in an overall rating based on greater than or equal to:

Condition Rating	Low Range	High Range
Very Good	80	100
Good	70	79.99
Fair	60	69.99
Poor	50	59.99
Very Poor	0	49.99

The City of Windsor’s overall calculation is 69.4% and as such results in an overall Fair condition rating.



Data Confidence

Data reliability for road, alley (paved), structure and sidewalks are rated as high. Inventory has been verified through our TCA database and backed up with Infor (Hansen)CMMS data. Condition and investment forecasts for these assets are also based on good engineering practices and analysis as well as expert

opinion. Overall road and alley condition accuracy is rated high as it is derived from road pavement inspections using an objective structured formula-based approach to minimize subjective data influence. Structures are also assessed from an objective structured formula-based approach, as defined by the Ontario Structure Inspection Manual (OSIM) as per O.Reg 472/10.

Signals and parking garage data (annual condition assessment reports) are also deemed as reliable and accurate and backed up by the TCA database. The condition of the parking garages is monitored routinely as is signal system performance. While objective condition ratings are not yet completed for signals, the subjective evaluation is based on expert opinion of in field staff responsible for the maintenance and inspection of these assets in compliance with the highway traffic act and the regulations contained within as well as the requirements of the Ontario Traffic Manuals (OTM).

3.2.1 Roadways

The replacement cost value of the City's extensive road network is \$2,061,006,000, an increase of \$165,824,814 since 2013, despite a reduction in the total lane kms. The Roads asset base includes all municipal roads and paved alleys. Provincial freeways pass through Windsor but fall under the ownership and control of the Province and therefore are not included within this plan. Paved alleys account for \$42,815,008, or 2% of the total \$2.06B.

Road classifications include Arterial (A1 and A2), Collector (C1 and C2), Expressways, Local Residential, Local Commercial/Industrial, and Scenic Parkways. A definition of these classes can be found in Appendix G. These assets include road base, drainage, pavement, curb and gutter and islands. Paved alleys are also included in the AMP's road inventory listing.

All critical data regarding asset details on roads is managed and maintained in the *Infor (Hansen)CMMS* database by the Technical Support Infrastructure Management System team of the Public Works Operations Department. Objective pavement condition data is maintained for each road segment in *Infor (Hansen)CMMS*. On an annual basis, City staff performs pavement inspections of the road segments that have been identified and scheduled for inspection for that given year. A road segment is scheduled for inspection on a frequency ranging from a maximum of once every year to a minimum of once in a 7-year period based on set criteria. The criteria includes last inspection date, age of current pavement, road classification, and current condition rating.

Generally speaking, the higher the traffic volumes and the worse the pavement condition, the more frequent the inspections on a road segment. Alley segments are scheduled for inspection on a lesser frequency because of the lower traffic volume. Pavement inspections are performed in a structured manner and are based on industry principles. Pavement inspection data is then used to generate a numeric condition rating of the overall performance of the pavement. The numeric road condition rating (calculated in the *Infor (Hansen)CMMS*) is derived from road pavement inspections using an objective structured formula-based approach to minimize subjective data influence.

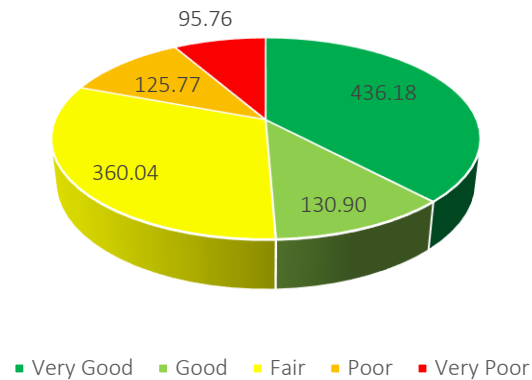
Road condition ratings are also updated following the completion of road rehabilitation / reconstruction projects and new construction projects as information becomes available. The numeric condition ratings are used routinely by Public Works for the purposes of rehabilitation, reconstruction, and maintenance planning and in budget planning. These numeric condition ratings have been mapped to the AMP Condition Rating categories of Very Good, Good, Fair, Poor and Very Poor, the details for which can be found in Appendix A – Condition Rating Approach.

Roads and Paved Alleys **Replacement Value: \$2.06B**

Approximately 80% of the city's roads and alleys are in Fair to Very Good condition, with the remainder approaching the end of their expected useful lives. The city's transportation assets have sustained this overall condition rating allocation since 2005. To sustain this level of service increased funding has been required over the years, and to continue to sustain it will require additional investment to address the cost increases due to inflation as well as address the sections in fair condition as soon as possible to extend their useful life at a cost which is less than what is required at the Poor and Very Poor stage.



2018 Road and Paved Alley Condition Ratings (km)



Overall Condition = Good

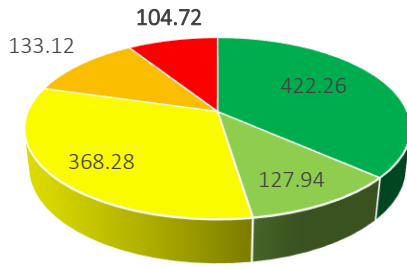
Data Confidence:

Data reliability for road and alley (paved), are rated as high. Inventory has been verified through our TCA database and backed up with Infor (Hansen)CMMS data. Condition and investment forecasts for these assets are also based on good engineering practices and analysis as well as expert opinion. Overall road and alley (paved) condition accuracy is rated high as it is derived from road pavement inspections using an objective structured formula-based approach to minimize subjective data influence.



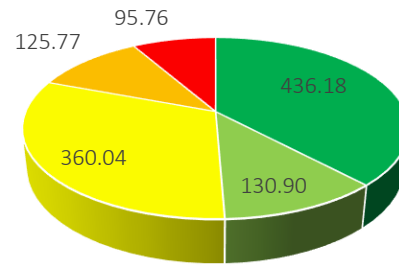
In comparing 2013 to 2018 by kilometers, there was 237.84 kms in 2013 in Poor or Very Poor condition compared to 221.53 kms in 2018, keeping in mind we have several kms of road acquired by the Province for the Herb Gray Parkway, so our total inventory is lower. When reviewing this data there is an overall positive shift, however when considering reduction of Poor and Very Poor kms by road classifications local roads is lower by 26 kms, arterial by 1 km, collector by 4 kms. While this is positive, particularly for the local roads, the expressway added 6 kms to the Poor and Very Poor, which given the significant risk associated with this road classification, priority should be placed on this road for funding. The paved alley network also saw an increase in poor and very poor conditions rating by approximately 9 kms.

2013 Road and Paved Alley Condition Ratings (km)



■ Very Good ■ Good ■ Fair ■ Poor ■ Very Poor

2018 Road and Paved Alley Condition Ratings (km)



■ Very Good ■ Good ■ Fair ■ Poor ■ Very Poor

The table below compares the 2013 to 2018 AMP inventory and replacement values for the various road classifications and paved alleys. As stated above the majority of the reduction in road lane kms is associated with the section assumed by the Province for the Herb Gray Parkway. As can also be seen by the information below, while local roads make up the majority based on length (58%), their reconstruction cost is much less and only accounts for 37% of the total replacement cost. This is another reason why directing funding to roads which cost more to reconstruct and pose a greater risk if they fail, should influence priority.


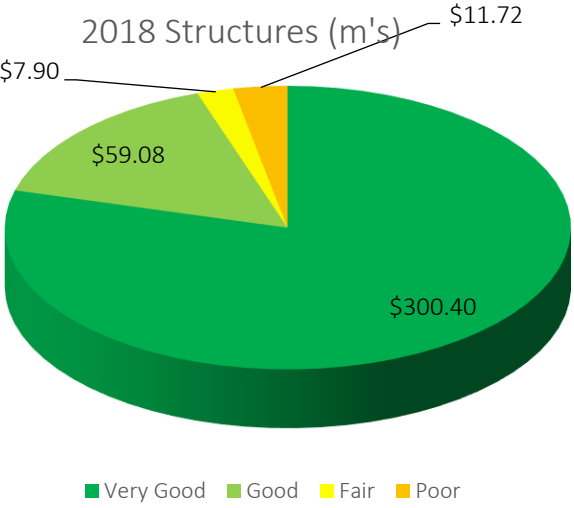
TABLE 3-3—ROADWAYS ASSET VALUATION

Asset Type			2013 AMP	2018 AMP	2013 Replacement Value	2018 Replacement Value
			(m)	(m)	(\$K)	(\$K)
Roadways	Roads	C1 Arterial	13,098	9,847	\$ 112,399	\$ 80,920
		C1 Collector	99,415	96,504	\$ 171,380	\$ 183,109
		C2 Arterial	127,969	126,141	\$ 492,187	\$ 593,772
		C2 Collector	71,976	78,530	\$ 115,719	\$ 133,326
		Local Residential	668,313	668,259	\$ 702,078	\$ 768,209
		Local Commercial / Industrial	14,675	17,315	\$ 19,694	\$ 24,513
		Scenic Parkway	15,989	16,046	\$ 22,997	\$ 35,644
		Expressway	65,842	56,275	\$ 219,070	\$ 198,698
	Alleys	Paved Alleys	79,017	79,643	\$ 39,659	\$ 42,815
TOTAL			1,156,294	1,148,558.42	\$ 1,895,181	\$ 2,061,006

Ontario Regulation 588/17 also requires the City to provide the average age of our road network, which has been calculated at 50 years. While the City has calculated this number to meet the requirement it is not a number which is used in any of the City’s evaluation or comments for reasons outlined in section 4.2.2.1.

3.2.2 Road Structures

Assets falling under the Structures category are broken out based on their primary purpose. Bridges and major culverts (greater than 3m span) are classified as vehicle crossing structures and pedestrian bridges are major pedestrian crossings at highways or waterways. Subways are structures that support vehicle movement under railways. Bridges and major culverts are inspected and assessed according to Ontario Structures Inspection Manual (OSIM) and maintained accordingly. The remaining structures are assessed and renewed on a planned basis according to the findings of engineering studies and expert opinion. All pedestrian bridges which reside in parks are included in the Park Asset Inventory report.

Bridges, Subways, Pedestrian (ROW) & Culverts >3m	Replacement Value: \$379M										
<p>Approximately 95% of the city’s structures are in Good to Very Good condition. There is one subway and one culvert which are in Poor condition and one smaller size bridge in Very Poor condition. These assets are already undergoing work to remediate the concern. These assets are governed by O. Reg. 472/10 and as a result must be addressed when OSIM ratings deem a failure causing a Poor rating. The on-going funding of these assets to maintain them in Good condition avoids large and unexpected funding requirements and sustains them so they can remain in service.</p>											
 <p>Overall Condition = Very Good</p>	 <table border="1"> <caption>2018 Structures (m's) by Condition</caption> <thead> <tr> <th>Condition</th> <th>Replacement Value (\$M)</th> </tr> </thead> <tbody> <tr> <td>Very Good</td> <td>\$300.40</td> </tr> <tr> <td>Good</td> <td>\$59.08</td> </tr> <tr> <td>Fair</td> <td>\$7.90</td> </tr> <tr> <td>Poor</td> <td>\$11.72</td> </tr> </tbody> </table>	Condition	Replacement Value (\$M)	Very Good	\$300.40	Good	\$59.08	Fair	\$7.90	Poor	\$11.72
Condition	Replacement Value (\$M)										
Very Good	\$300.40										
Good	\$59.08										
Fair	\$7.90										
Poor	\$11.72										
<p>Data Confidence:</p> <p>Data reliability for structures is rated as high. Inventory has been verified through our TCA database and backed up with Infor (Hansen)CMMS data. Condition and investment forecasts for these assets are also based on good engineering practices and analysis as well as compliance with OSIM inspection protocols and processes. Overall, the structure condition accuracy is rated high as it is derived from expert inspectors using an objective structured formula-based approach defined by the Province to minimize subjective data influence.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div> <p>Low High</p> </div> <div> <p>RELIABILITY ↓ ACCURACY</p> </div> </div>											

Over the past five years significant increases to fund bridge rehabilitation has been put in place. This is largest driver of the positive change in the overall condition rating for these assets. As these assets pose a

Critical risk to the City should they fail they are one of the few assets for which priority funding should always be considered.

As per Ontario Regulation 588/17 the average age of our structures is also required. The average age of our bridges is 45 years and culverts 30 years. As with the roads, major work to rehabilitate or reconstruct these assets does not change the original in-service / construction date. While this information may assist some municipalities the City of Windsor has a robust inspection and maintenance program for these assets which generates accurate information on the condition and various preventative and rehabilitation activities required to sustain them. Additional information on this can be found in section 4.2.4.1

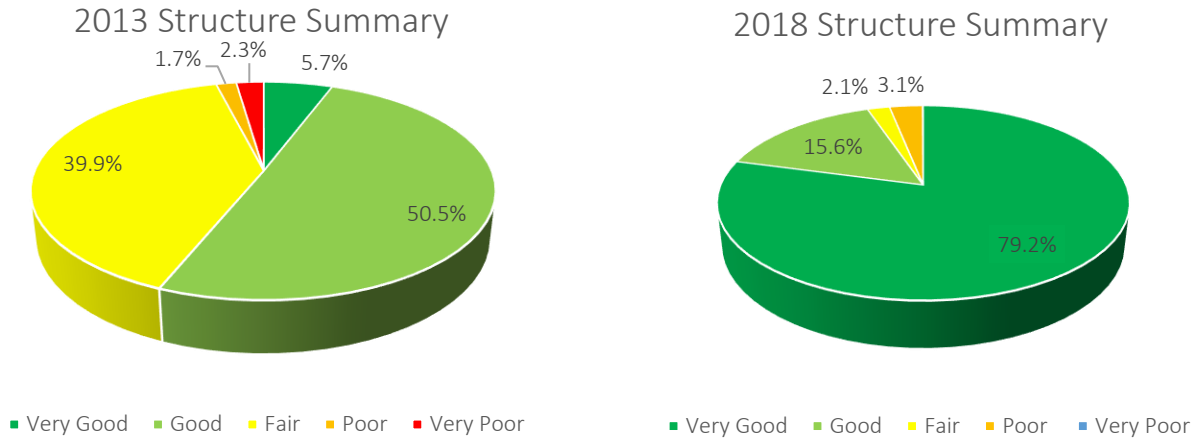

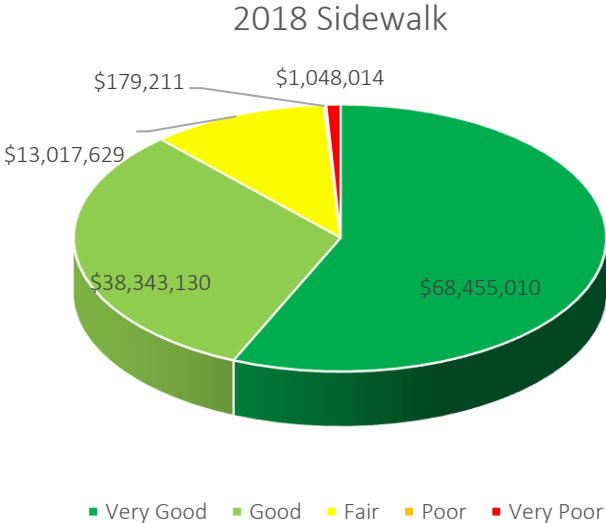


TABLE 3-4—STRUCTURES ASSET VALUATION

Asset Type	Asset	Inventory 2013	Inventory 2018	Unit	Replacement Cost 2013	Replacement Cost 2018
Structures	Bridges and Subway	61	61	Ea.	\$316,664,090	\$359,479,153
	Major Culverts (> 3m id)	8	11	Ea.	\$4,309,324	\$7,631,397
	Pedestrian Bridges (ROW)	6	5	Ea.	\$11,375,183	\$12,215,197
TOTAL					\$332,348,597	\$379,325,747

3.2.3 Sidewalks

Sidewalks	Replacement Value: \$121 (m)												
Approximately 95% of the city's sidewalk assets are in Fair to Very Good condition, with the remainder approaching the end of their expected useful lives. Approximately 10kms of the total 938km network are in need for reconstruction, with 116.5 in Fair condition and likely requiring some rehabilitation to improve them and stop the deterioration causing the need for reconstruction.													
	<div style="text-align: center;"> <h4>2018 Sidewalk</h4>  <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th>Condition</th> <th>Value (\$)</th> </tr> </thead> <tbody> <tr> <td>Very Good</td> <td>\$68,455,010</td> </tr> <tr> <td>Good</td> <td>\$38,343,130</td> </tr> <tr> <td>Fair</td> <td>\$13,017,629</td> </tr> <tr> <td>Poor</td> <td>\$1,048,014</td> </tr> <tr> <td>Very Poor</td> <td>\$179,211</td> </tr> </tbody> </table> </div> <p style="text-align: center;">Overall Condition = Good</p>	Condition	Value (\$)	Very Good	\$68,455,010	Good	\$38,343,130	Fair	\$13,017,629	Poor	\$1,048,014	Very Poor	\$179,211
Condition	Value (\$)												
Very Good	\$68,455,010												
Good	\$38,343,130												
Fair	\$13,017,629												
Poor	\$1,048,014												
Very Poor	\$179,211												
<p>Data Confidence: Data reliability for these assets is high. Sidewalks are maintained in Infor (Hansen) by the IMS division of PW. In addition, there is an objective condition inspection program in place for the sidewalks which puts great reliability and accuracy on the condition of these assets.</p>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 5px;">RELIABILITY</div> <div style="margin-bottom: 5px;">▼</div> <div style="display: flex; align-items: center; gap: 20px;"> <div style="background-color: #808080; padding: 5px 10px; border: 1px solid black;">Low</div> <div style="background-color: #4F81BD; padding: 5px 10px; border: 1px solid black; color: white;">High</div> </div> <div style="margin-bottom: 5px;">▲</div> <div>ACCURACY</div> </div>												

Over the past 5 years approximately 20 kms has been added to the sidewalks network, this being the major factor in the increase in replacement cost value of the network noted below in Table 3-5. Sidewalks are generally concrete however some sections are brick.

TABLE 3-5—SIDEWALK ASSET VALUATION

Asset Category	Replacement Cost 2013	Replacement Cost 2018
Sidewalks	\$114,364,450	\$121,042,990

3.2.4 Other Transportation Assets

Other assets such as noise barriers, street lights, traffic signals and parking garages and equipment, are considered part of the Transportation Assets.

TABLE 3-6—ASSET VALUE OF OTHER TRANSPORTATION ASSETS

Asset Category	Replacement Cost 2013	Replacement Cost 2018
Noise Barrier	\$10,666,548	\$12,693,679
Street Lighting	N/A	\$40,997,539
Traffic Signals	\$20,221,528	\$22,177,958
Parking Garages & equipment	\$83,730,622	\$48,625,331


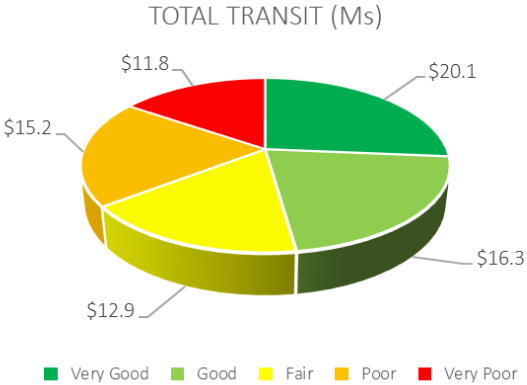
Of concern, the City has seen a significant decline in the condition and level of service of Traffic Signals across the network which presents a major risk to the City and its citizens due to the shortfall in maintenance and replacement funding. In 2013, 33% of the signals were in Poor condition, and by 2018 this number has increased to 64% of signals being in Poor condition.

City parking lots (excluding parking lots associated with city parks) contain over 51% of parking lots and associated equipment in Very Poor condition. Assets in a very poor state could be suffering from drainage issues, deteriorating sealant and waterproofing applications, structural and aesthetic issues, all of which has contributed to shortening the life of the asset. In addition to maintaining the condition of these assets, compliance of accessibility standards is required. This could include, but not limited to, providing wider spaces to accommodate mobility aids and standard-width requirements.

As such, the Public Works department draws upon a dedicated Off-Street reserve for asset rehabilitation, maintenance, and repair. The recent sale of the Canderel Parking Garage has also provided funding in these areas of asset improvement. As the Asset Management Plan develops over time through more formal condition assessment processes and reporting, maintenance and operations programs will evolve leading to lowering costs. These programs are required for preserving and extending the useful life of these assets and will be fruitful during constrained economic times.

For more information and additional details, please refer to Appendix G.

3.3 Transit Windsor

Transit Windsor	Total Replacement Value: \$76,244,529M												
<p>Approximately 45% of TW’s Asset Portfolio is in Good to Very Good condition with the remainder approaching the end of their expected useful lives. The majority of the asset portfolio has been subjectively rated utilizing expert knowledge and experience with specific assets.</p> <p>**Bus shelters have been excluded from analysis as sufficient data was not available at the time and TW is currently in the process of renewing their shelter portfolio through the PTIF funding program. Previously, TW utilized at third party vendor to manage their bus shelter network and therefore detailed asset data is not known.</p>													
	 <p>TOTAL TRANSIT (Ms)</p> <table border="1"> <tr> <th>Condition</th> <th>Value (Ms)</th> </tr> <tr> <td>Very Good</td> <td>\$20.1</td> </tr> <tr> <td>Good</td> <td>\$16.3</td> </tr> <tr> <td>Fair</td> <td>\$12.9</td> </tr> <tr> <td>Poor</td> <td>\$15.2</td> </tr> <tr> <td>Very Poor</td> <td>\$11.8</td> </tr> </table>	Condition	Value (Ms)	Very Good	\$20.1	Good	\$16.3	Fair	\$12.9	Poor	\$15.2	Very Poor	\$11.8
Condition	Value (Ms)												
Very Good	\$20.1												
Good	\$16.3												
Fair	\$12.9												
Poor	\$15.2												
Very Poor	\$11.8												
<p>Overall Condition = Good</p>													
<p>Data Confidence:</p> <p>Data reliability and accuracy has increased slightly over the past several years due to recent studies and projects that have provided a high-level overview of general asset condition. Third party lifecycle analysis studies provided sample size condition assessments and confirmed the accuracy of current subjective ratings methodologies. Data reliability is therefore relatively high, however overall accuracy is somewhat hindered by the fact that studies included random samples of buses and not the entire asset portfolio. TW asset data is maintained in the FleetFocus CMMS which tracks all inventory (both revenue fleet and support vehicles) and provides work order management. As such, the reliability and accuracy of maintenance data is relatively high and allows TW to have access to real-time operating metrics. Further utilizing FleetFocus data could help drive detailed future KPI tracking and allow for increased efficiency within the maintenance and operations functions.</p> <div> <p>RELIABILITY</p> <p>Low High</p> <p>ACCURACY</p> </div>													

Transit Windsor (TW) is a City of Windsor owned entity which reports to the Environment, Transportation and Public Safety Standing Committee and falls within the portfolio of the City Engineer and under the guidance of the Executive Director of Transit Windsor.

TW operates the public transit service for the City of Windsor as well as providing direct service to the Town of LaSalle and the City of Detroit and associated attractions (Comerica Park and Ford Field) via the Detroit-Windsor Tunnel. This means that every year, TW buses provide transportation to over 6 million passengers covering an area of 121 square kilometers with a population in excess of 216,000.

Additional services include bus charters, servicing of out-of-town buses and supplementary service for secondary students, seniors, and Windsor Spitfires games.

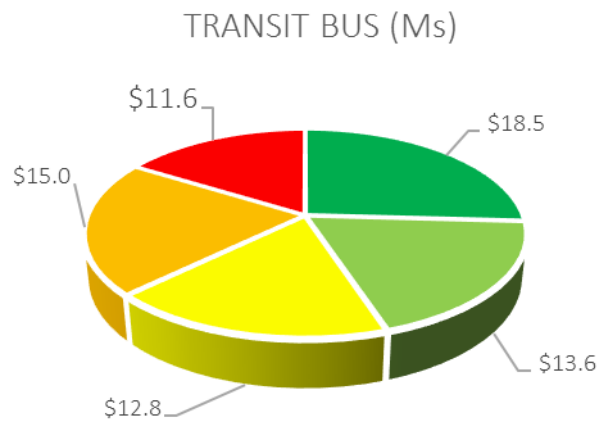
TW’s core business is providing safe, reliable, and affordable public transit for the community through continuous improvement in customer care, environmental stewardship and employee excellence.

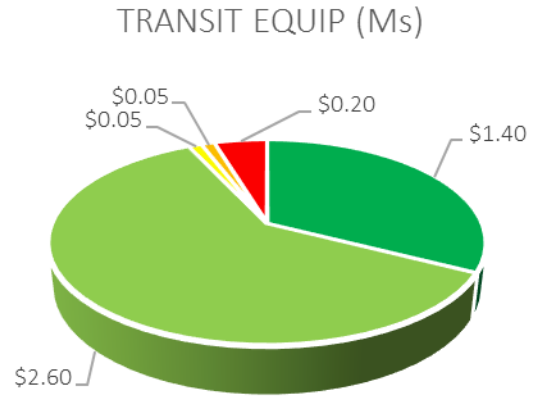
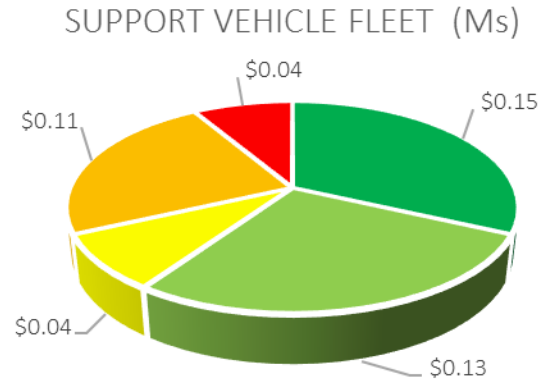
TW typically operates a fleet of 112 buses, of which 102 are fully accessible, plus a support fleet compliment of 17 service vehicles. During peak weekday operating times there are up to 82 buses and 6 service vans in service while scheduled weekend service can typically include up to 45 buses and 6 supporting service vehicles. Special events occurring during specific times of the year as well as demand spikes during certain days or months would require additional buses. Of the entire current transit fleet compliment, 29 buses are utilizing alternative fuels (fully accessible diesel-electric hybrids) representing approximately 26 percent of the operating vehicles.

TW also manages a network of 210 bus shelters under 2 classifications throughout the City of Windsor. There are currently 135 non-advertising shelters and 75 advertising shelters which are managed and maintained by TW. TW previously utilized a third-party vendor to maintain the bus shelter network however they have recently taken on full management of the shelter network lifecycle including all maintenance, refurbishment and replacement functions. As a result of previous Federal Funding from Infrastructure Canada’s Public Transit Infrastructure Fund (PTIF), TW has undertaken a project to replace the majority of their oldest shelters, most of which are beyond their useful life in excess of 35 years. For purposes of this version of the AMP, insufficient data was available to provide a proper condition assessment and long-term analysis of TW’s bus shelter network.

3.3.1 Transit Windsor Asset Condition Levels

Although a full Life Cycle report on TW’s fleet was reported in 2015 to City Council, the assets were not included in the 2013 AMP and therefore comparison charts are not provided, only 2018 condition information.



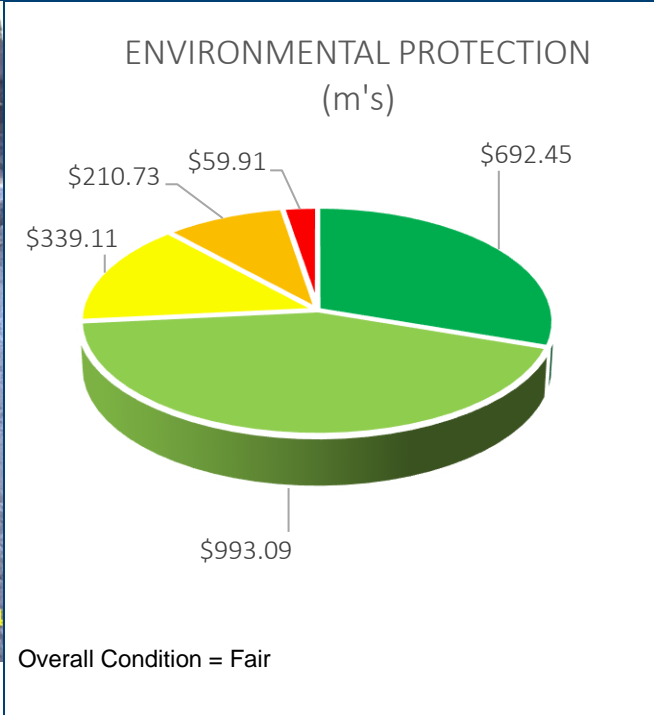


3.4 Environmental Protection

The Environmental Protection Service Area ensures the collection, treatment and or conveyance of sanitary and storm water. The City of Windsor has 2 water reclamation plants, 45 pump stations (including the Retention Treatments Basin (RTB) and 1,775 kms of pipe, all of which totals \$2.29B or 37% of the replacement cost for all the assets in this AMP. While these assets are rarely seen or noticed they are critical to the City’s ability to address flooding, as well as ensure water is treated prior to being reintroduced to the River. Ensuring these assets are properly maintained through preventative maintenance strategies and timely rehabilitation or replacement ensures their continued operation. The Sewer Master Plan is expected to be released late 2019, and as such the recommendations from that report will drive the sewer programs for at least the next 20 years. This report therefore focuses on the necessary programs and funding to maintain the assets in operational condition, which includes various preventive maintenance programs as well as rehabilitation programs such as relining for sewers and various replacements at the plant and pumps to ensure continued full functionality of the assets.

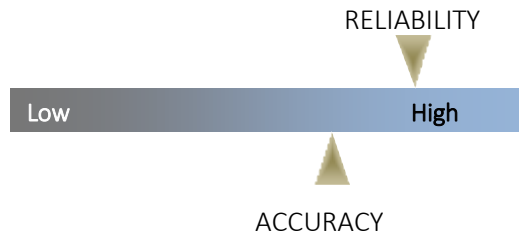
Environmental Protection – Wastewater/ Storm water Removal	Replacement Value: \$2.29B
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Approximately 88% of the City’s Wastewater and Storm Water collection system are in **Fair to Very Good** condition, with the remainder approaching the end of their expected useful lives, indicating a need for investment in the short to medium term. The City’s Environmental Protection assets are overall in **Fair** condition, indicating that they are adequately meeting the current needs of the municipality.



Data Confidence:

Given the extensive asset data held regarding these assets in *Infor (Hansen)CMMS* and *Antero CMMS* there is a high degree of reliable and accurate information regarding these assets. The accuracy rating has improved significantly for these assets since 2013. This information is also used for the 10-year replacement forecasting on these assets to ensure reserve funding levels are sufficient. The recent Zoom camera work on the sewer network has dramatically improved the condition ratings. As of this report over 64% of the network has objective ratings, which is a significant improvement since 2013 where it was less than 20%. In addition, a condition assessment for the Lou Romano Water Reclamation Plant was also completed and that objective condition information used for the needs at that plant as well as to consider the likely funding needs for the other plant and the pump stations. Objective condition assessment for these assets is continuing and expected to be completed by 2020. Should the results have a significant impact on the projections in this AMP a separate report and request for funding will be identified in the 2021 recommended operating budget for Council consideration.



The system is split between Storm and Waste water as well as the various system which provide for collection, treatment and or conveyance. The tables below, 3.7 and 3.8, provide a high level summary of how these assets are separated.

TABLE 3-7—WASTEWATER – SANITARY ASSET VALUATION

Asset Type	Asset	2013			2018		
		Inventory	Unit	Replacement Value (\$M)	Inventory	Unit	Replacement Value (\$M)
COLLECTION	Sanitary Sewers (incl. combined and force mains) *Avg Age:50.4yrs	949.32	km	620.4	959.05	km	705.7
TREATMENT	Water Reclamation Plants (Incl. Equipment)	2	Ea.	420.5	2	Ea.	425.4
	Pump Stations & Interceptors (Incl. Equipment)	14	Ea.	47.9	14	Ea.	93.0
	TOTAL			1,088.8			1,224.1

*Provided to meet requirements of O.Reg 588/17. Many Wastewater assets have undergone improvements, refurbishments and reconstruction since being commissioned and therefore this statistic is not used for any further analysis.

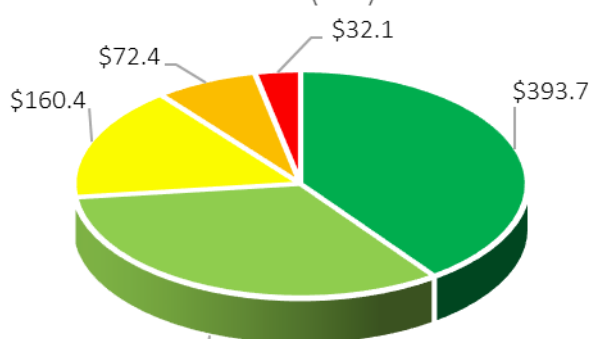
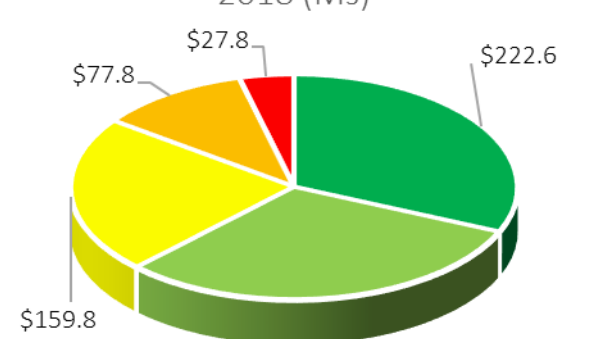
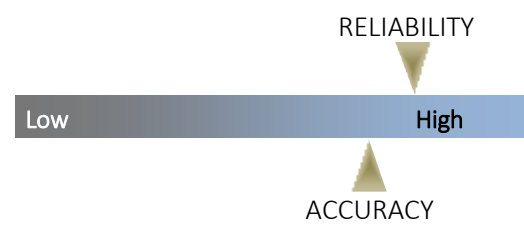
TABLE 3-8—STORM WATER ASSET VALUATION

Asset Type	Asset	2013			2018		
		Inventory	Unit	Replacement Value (\$K)	Inventory	Unit	Replacement Value (\$M)
STORM WATER CONVEYANCE SYSTEM	Storm Sewers *Avg Age:40.86yrs	761.3	km	791.0	816.17	km	984.4
	Pumping Stations, Drains and Interceptors	30	Ea.	72.5	31	Ea	85.2
TOTAL				863.5			1,069.6

*Provided to meet requirements of O.Reg 588/17. Many Storm water assets have undergone improvements, refurbishments and reconstruction since being commissioned and therefore this statistic is not used for any further analysis.

3.4.1 Sewer Network

The initial collection of storm and sanitary water is accomplished through the 1,775kms of buried pipes which make up our sewer network. One of the challenges with buried assets is the ability to assess their condition. The cost for the CCTV program can be rather expensive and time consuming to complete. As such the average number of pipe segments with objective conditions had been less than 20% on average. Since the 2013 AMP great strides have been taken to improve the number of pipe segments with objective condition data. New technology has allowed for more cost-effective solutions which also require less set up and advanced planning than traditional CCTV. The Clean Water Wastewater Fund (CWWF) also presented an opportunity to fund the project resulting in over 60% of the network having objective condition data by November 2018. The condition information continues to be provided and as of March 2019 more than 75% of the network now has objective condition data. This information has also been provided to the consultants developing the Sewer Master Plan for more accurate information regarding the actual structural and service ratings of these pipes. As a result, the condition of the network compared to 2013 AMP reporting reflects more assets in the good to very good category than 2013, much of which is attributed to the pipes considered in fair condition due to age and material type are actually showing to perform better than expected. The charts below identified as Storm and Sanitary Water Collection refer only to the sewer network.

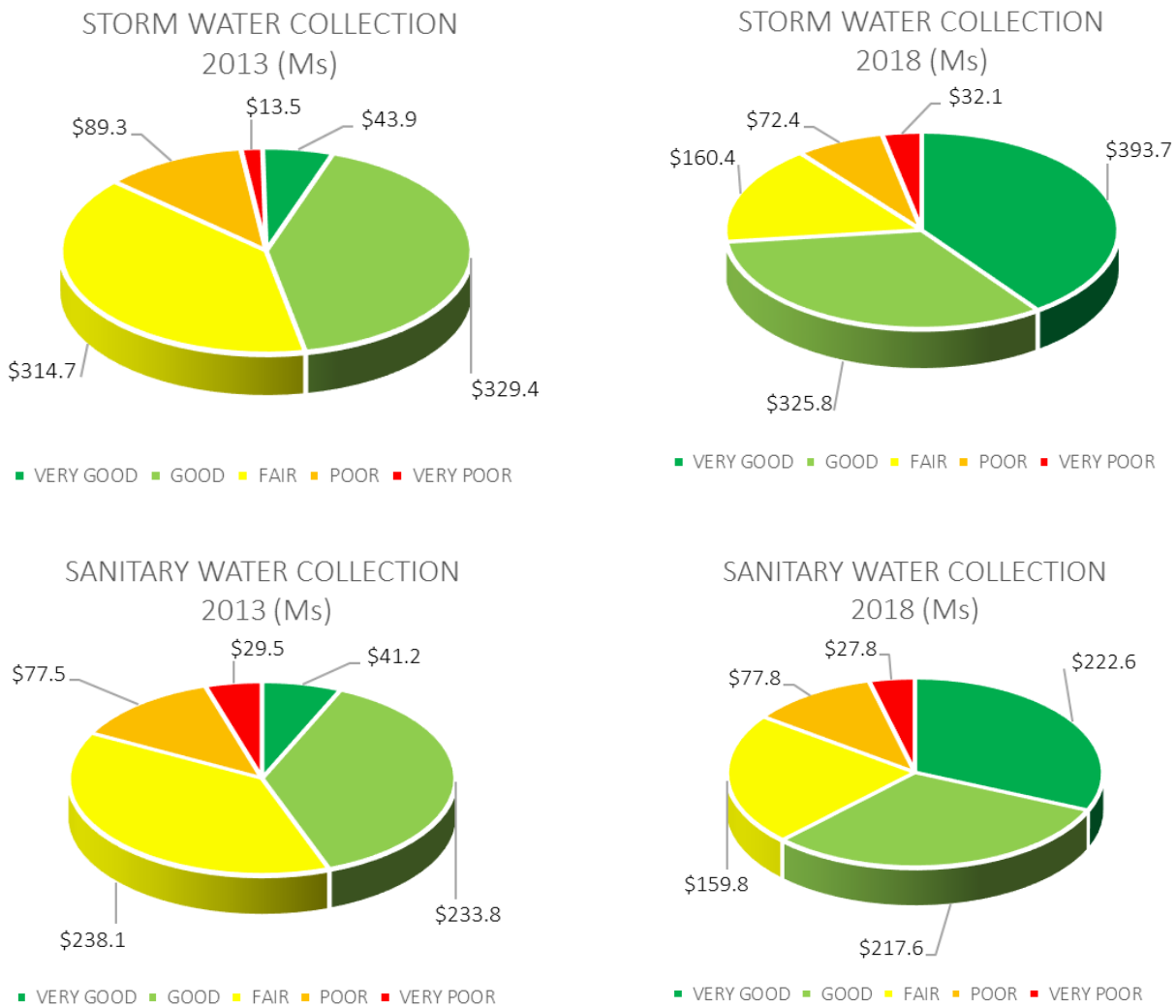
<p>Storm & Sanitary Water – Collection</p>	<p>Replacement Value Storm Water Collection: \$984.4M Sanitary Water Collection: \$705.7M</p>																								
<p>Over 80% of the city’s storm and sanitary water linear assets are in Fair to Very Good condition, with the remainder approaching the end of their expected useful lives. Recent grant funding has provided the opportunity to increase the % of objective condition ratings used by applying the latest technology. As a result, the percentage of objective ratings for these assets as of November 2018 has grown from 18% to 64% since the 2013 AMP. The analysis of these condition reports continues to drive proactive measures that address maintenance, repair and service needs and improve upon corresponding programs.</p>																									
<div style="display: flex; justify-content: space-around;"> <div> <p>Storm Water Collection 2018 (Ms)</p>  <table border="1"> <caption>Storm Water Collection 2018 (Ms)</caption> <thead> <tr> <th>Condition</th> <th>Value (Ms)</th> </tr> </thead> <tbody> <tr> <td>VERY GOOD</td> <td>\$393.7</td> </tr> <tr> <td>GOOD</td> <td>\$325.8</td> </tr> <tr> <td>FAIR</td> <td>\$160.4</td> </tr> <tr> <td>POOR</td> <td>\$72.4</td> </tr> <tr> <td>VERY POOR</td> <td>\$32.1</td> </tr> </tbody> </table> </div> <div> <p>Sanitary Water Collection 2018 (Ms)</p>  <table border="1"> <caption>Sanitary Water Collection 2018 (Ms)</caption> <thead> <tr> <th>Condition</th> <th>Value (Ms)</th> </tr> </thead> <tbody> <tr> <td>VERY GOOD</td> <td>\$222.6</td> </tr> <tr> <td>GOOD</td> <td>\$217.6</td> </tr> <tr> <td>FAIR</td> <td>\$159.8</td> </tr> <tr> <td>POOR</td> <td>\$77.8</td> </tr> <tr> <td>VERY POOR</td> <td>\$27.8</td> </tr> </tbody> </table> </div> </div> <p>Overall Condition: Good</p>		Condition	Value (Ms)	VERY GOOD	\$393.7	GOOD	\$325.8	FAIR	\$160.4	POOR	\$72.4	VERY POOR	\$32.1	Condition	Value (Ms)	VERY GOOD	\$222.6	GOOD	\$217.6	FAIR	\$159.8	POOR	\$77.8	VERY POOR	\$27.8
Condition	Value (Ms)																								
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<p>Data Confidence: Data reliability for the sewer network assets is rated as high. Inventory has been verified through our TCA database and Infor (Hansen)CMMS data. Data accuracy has improved over time as more objective condition ratings are being used.</p> <div style="text-align: center;">  <p>RELIABILITY</p> <p>Low High</p> <p>ACCURACY</p> </div>																									

The replacement cost of the City’s storm and sanitary sewer network is \$984.4 million and \$705.7 million respectfully. Both storm and sanitary sewer networks are managed and maintained in the Infor (Hansen)CMMS system. Previously the condition ratings for these two asset classes were a combination of objective Closed Circuit Television (CCTV) ratings and subjective ratings. In the previous AMP it was noted that both sanitary and storm water evaluations consisted of a high degree of subjective condition ratings. Although objective condition ratings were obtainable, they were subject to a 15-year CCTV citywide cycle program under current funding levels. In an effort to increase the quantity and frequency of objective condition ratings, the city acquired grant funding through the Clean Water Wastewater Fund. The grant funding allowed for the commissioning of a comprehensive zoom camera technology sewer inspection project stretching across the city. Additional data continues to be updated and an extract of the sewer condition information at 75% objective data did not result in a significant shift from the data used for this AMP and therefore extending the timelines for the AMP was not warranted to include more current information.

The Information collected from the inspections allowed the city to take proactive measures in repairing and maintaining sewers to prevent further damage or decay. The information also highlighted specific areas as

candidates for existing maintenance and rehabilitation programs thus improving on precision and accuracy. As a residual benefit from this initiative, improved network accuracy, revised manhole location, and a framework for a manhole inspection program were realized. As depicted by Figure 3-7, the percentage of Fair condition ratings for storm and sanitary sewers in 2013 fell from 40% and 23% to 16% and 23% respectively, while Very Good condition ratings increase from 6% and 7% in 2013 to 37% and 32% respectively. This is a direct result of the maintenance and repair efforts triggered by Zoom camera inspection reporting and re-inspection after work completion. The timeliness and informative zoom inspection data will assist in understanding the sewer network, identify service level needs and improve those programs that support it.

FIGURE 3-7—STORM AND SANITARY CONDITION RATING 2013 VS 2018



The City of Windsor’s Sewer Master Plan will attempt to determine causes of failure, alternative solutions, establish operational and maintenance standards, and prioritize future upgrades and expansion requirements. As the Sewer Master Plan continues to evolve, current and relative sewer condition data will prove beneficial in formulating and supporting the plan’s recommendations. Future Asset Management Plans will serve as a reflection of the outcomes, prioritized solutions, and strategies identified by the Sewer Master Plan.

3.4.2 Pollution Control - Plant and Pump Stations

The City of Windsor owns and operates two pollution control plants, Lou Romano Water Reclamation Plant and Little River Water Reclamation Plant, in addition to 45 pumping stations throughout the City. These are considered the vertical assets which provide collection, treatment and or conveyance functions. The use of Pollution Control in the AMP refers to both the plants and pump stations. The system also provides treatment of sanitary water for the surrounding communities, Tecumseh and LaSalle. Figure 3-8 details the comparison between 2013's Pollution Control AMP report and 2018's updated Pollution Control assessment. As outlined previously, the City's Pollution Control condition assessment program was established in 2018 and began the era of assessing City of Windsor Pollution Control facilities and equipment on a detailed sub-component asset level. For purposes of asset condition reporting, the 2018 Pollution Control AMP utilizes third-party objective condition data combined with subjective ratings for those facilities and processing assets that were not yet inspected within the Corporate assessment program. In 2013, Pollution Control condition data was derived entirely with subjective information and based primarily on an age and internal knowledge and understanding of Pollution Control operations.

Several primary distinctions between 2013 and 2018 asset data must be understood in order to fully and properly comprehend the current state of the Pollution Control asset portfolio. The 2013 condition rankings were completely based on subjective feedback and each facility was analyzed at an overall facility level. This meant that a single significant component in Poor or Very Poor condition could affect the ranking and reporting of the entire facility in the 2013 AMP. In 2018, recent objective condition information at the facility and process equipment sub-component level allows for more accurate reporting and mitigates the affect a poor component has on the entire rating. Therefore, the percentage of Poor and Very Poor rankings in 2013 was reflective of the fact that there was yet a sufficient and reliable means to report Pollution Control data with any level detail and structure.

Along with the improved objective condition ratings program, the improved 2018 condition ratings are a reflection of the many capital and operating projects that have enabled and enhanced the ability of the Pollution Control Division to deliver an acceptable and often enhanced level of service to the community. Many significant repairs and improvements have taken place in the last several years that include but are not limited to:

- Grit system improvement with increased removal capacity
- Roof system repairs at LRWRP
- Centrifuge overhaul, upgrades and repairs
- Overhaul of valves at Main Pump House
- Work to remediate dry well flooding in 2016
- Refurbishment and overhaul of filters and screens including improvements that utilize stainless-steel components and other modifications
- Overhaul of many valves and pumps across the plant
- Biological Aerated Filter (BAF) – Complete overhaul of Cell 16 including all stone, biolite and nozzles and repair/calibration of existing air and water valves
- Replacement and overhaul of valves at Maplewood pump station

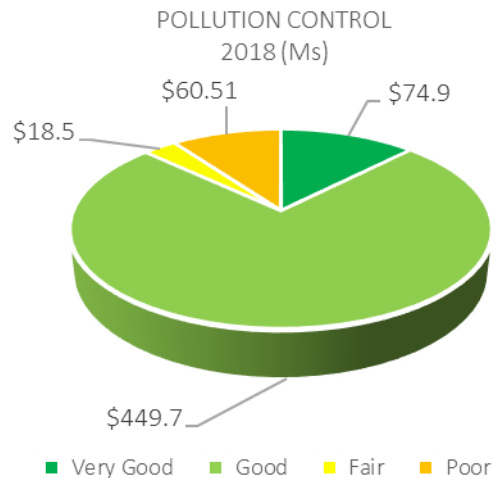
It must also be stated that the objective condition data reported in the 2018 includes a rounded-up condition score of many sub-components. Therefore, although it appears most assets are in good condition, the condition graphs based on replacement cost do not capture the many subcomponents that are in Fair to Very Poor condition.

TABLE 3-9—PLANTS AND PUMP STATIONS BY CATEGORY

Asset Type		*Total (Approx.) ft ²	**Average Age
Category	Pollution Control Plant		
	Lou Romano Water Reclamation Plant	156,550	48
	Little River Pollution Control Plant	118,740	52
	Number of Facilities	Stormwater Pumping Station	
	31	22,486	24
	Number of Facilities	Sanitary Pumping Station	
	6	3,211	23
	Number of Facilities	Combined Pumping Station	
8	43,142	43	
<p>*In most instances reported ft² reflects the footprint of the above ground building which often simply acts as access to the larger facility underground. The majority of pump station infrastructure is underground and not reflected in the reported value.</p> <p>**Provided to meet requirements of O.Reg 588/17: Many facilities have undergone improvements, refurbishments and reconstruction since being commissioned and therefore this statistic is not used for any further analysis.</p>			

Corporate Pollution Control	Replacement Value of Plants and Pump Stations: \$603.6M
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Over 80% of the City's Corporate Pollution Control Portfolio is in Good to Very Good condition with the remainder approaching the end of their expected useful lives. The assets in this section of the AMP are a combination of objective ratings obtained by a third-party engineering consultant and those that have not been assessed under the Corporate Condition Assessment Program and are therefore subjectively rated based on sound internal knowledge, experience and data. It is expected that over the next several years, all Pollution Control assets will have undergone an objective condition assessment under the current program. In order to sustain the current level of service, increased funding has been required and will continue to be required to maintain the existing assets. Over the coming years, it is expected that many of the components in Fair or worse condition will experience noticeable signs of deterioration and will require significant maintenance funding to prevent them from further degrading. Due to the harsh environment in which they operate as well as the strict regulations which the Pollution Control division must adhere to, assets must not be allowed to degrade beyond a certain state without putting the health and well-being of the community in jeopardy. A failure of any component at a pollution control plant or pumping station could have significant health, environmental and financial ramifications for the City and surrounding region. Pollution Control equipment and systems are also highly specialized and are known to require greater maintenance further necessitating the need for a more robust funding formula and the continued funding of a maintenance reserve. These condition ratings also do not account for the fact that critical operating components do not exist at the pollution control plants and will be required in the future.



Overall Condition = Good

Data Confidence:

Utilizing the Antero CMMS to manage and maintain the asset data provides a of level reliability on information. The commencement of the Pollution Control asset condition assessment program and the inclusion of such objective data for the Lou Romano Water Reclamation Plant leads to another level of data reliability. Limited accuracy however remains below average as a whole because almost half of the data utilized in the condition analysis is still subjectively rated. As detailed previously, the remaining assets are expected to undergo a detailed condition assessment however that data is not available for this version of the AMP.

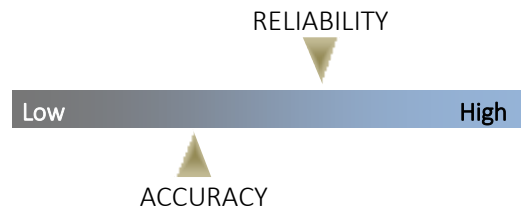
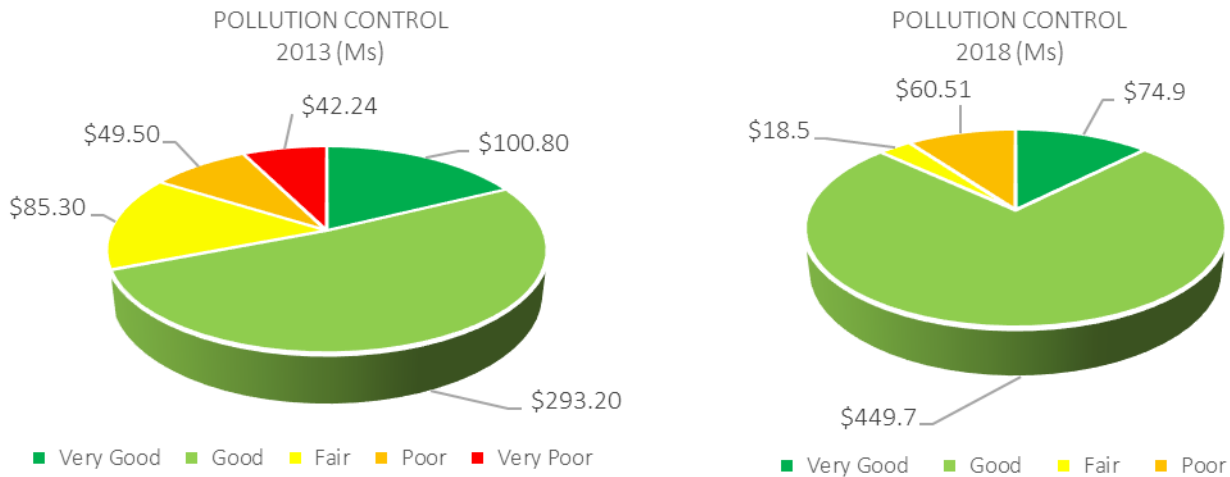


FIGURE 3-8—2013 - 2018 POLLUTION CONTROL ASSET CONDITION COMPARISON (PUMPS AND PLANTS)



In the 2013 AMP it was reported that high level subjective condition ratings were utilized in the absence of a deeper understanding of pollution control facility component and system needs. Although whole facility and processing equipment rankings are a widely accepted and understood methodology for reporting asset performance, it has several obvious drawbacks the most glaring of which is the effect a single perceived negative issue has on the overall ranking of a Pollution Control facility. In previous reported assessments, a roof in Poor condition would necessitate the downgrading of the entire facility often leading to a misleading overall portfolio rating.

Environmental equipment has also been identified in this AMP and accounts for \$1,655,546, or less than 1% of the total value of the pollution control assets. While the value of these assets is quite small when compared to the larger assets, they should be noted as they are necessary for the operations and maintenance of these assets. All of these assets are deemed in Very Good to Fair condition, with 73% being in Very Good.

3.5 Corporate Facilities Management

The Corporate Facilities Management service area encompasses a very wide network of diverse buildings and structures and is therefore quite unique in its purpose and function. Because every facility is different in its operating and maintenance requirements, Corporate Facilities cannot take a one-size-fits-all methodology in its operational approach and long-term forecasting. Whether analyzing the prospects and feasibility of a new build or planning for the rehabilitation of an older facility, a proper working plan, condition assessment, project analysis and business case is required to ensure all of the required community needs are taken into account while still following established industry construction and maintenance standards. Therefore the ongoing asset condition data program and long-term operational analysis being developed is critical in allowing and ensuring the City is making decisions using proper whole life-cycle costing analytics and asset management principles.

The City of Windsor’s Corporate Facilities Operations includes a vast array of assets across several facility types some of which include multi-use recreation; recreation; park; police; environmental; transitional; administrative; parking; home for the aged and operations yards. The Corporate Facilities listing also includes several facilities owned by the City but managed by an agency, board and/or commission as they operate

and provide services out of these locations. The Facilities Department also offers inspection, maintenance and other services to various departments and agencies. The roof inspection program for example is a service provided to all corporately affiliated buildings even though many buildings do not fall within the responsibility of the Facilities Department.

Ultimately the Facilities Department's primary objective is to properly maintain the City's entire portfolio of buildings in the most efficient and effective manner possible while delivering an acceptable level of service to the community. The City of Windsor's Facility asset inventory is continuously aging and deteriorating requiring resources to effectively operate and maintain each facility in an acceptable condition. The Department has also continuously taken ownership of new facilities and assets, some with significant operating ramifications, without the corresponding maintenance support (both financial and human resources) that reflect the true nature of the long-term facilities needs. Along with this, ever increasing regulatory standards for social and safety requirements are placing both technical and financial pressure on both old and new buildings within the Facility portfolio.

However, many positive steps have been taken in recent years to help address some of the primary operational needs of the Facilities Department and in support of the long-term Corporate vision statements and objectives. The ongoing Facility Condition Assessment program and the continuous implementation of sound Asset Management principles and practices will not only help to continuously maintain the City's significant portfolio of facility assets but also potentially provide a means for better predicting the required/scheduled maintenance on a facility thereby reducing the need for significant repair and maintenance work and the corresponding service interruptions for the community. This should lead to reduced wait times for services in Corporate facilities and drive an overall better level of service.

Compared to the prior Corporate Asset Management Plans developed in 2013, there is a notable increase in square footage and replacement cost of Facilities assets found in this updated version of the AMP. This is due to several factors including the Facilities department absorbing several buildings into their portfolio and the new development of multiple prominent corporately managed facilities including the downtown Aquatic Centre, South Windsor Arena Expansion, East Windsor aquatic development at the WFCU Centre and multiple fire halls and libraries.

The Tangible Capital Asset (TCA) value of Facilities assets is \$828,746,845 based primarily on 2017 replacement cost data combined with up to date capitalized costs for several current construction projects. When looking to the replacement cost of the Facilities portfolio, it becomes clearer that the primary driver in the increase in corporate building infrastructure can be found in the Recreation area and specifically the major aquatic and arena/convention spaces referenced previously. In fact, over \$94 Million of the replacement cost increase can be allocated to the new development of major recreational facilities. In providing these services to the community however, there will be a future need for increased capital and operating resources to properly maintain these facilities to regulatory standards and at an acceptable level of service.

Implementation of the new Facilities Condition Inspection project began in 2015 with tendering of a contract to inspect the City's most prominent and integral buildings in alignment with the recently developed sub-component framework. Over the two years that followed, 71 of the City's most integral facilities were inspected based on their current condition as well as projected capital needs over a 20-year horizon (in alignment with AMP direction for 20-year funding projection). The focus of the initial phases of the condition program were on the larger recreation, administrative, operations, fire hall and library buildings as this represented a large proportion of the Corporate operating and maintenance needs as well as the largest percentage of the Facilities portfolio replacement cost.

The initial results and output of this program can be found in Appendix F, which provides additional detail on the Corporate Facility assets. Table 3-10 below provides a high-level overview of the Facilities portfolio.

TABLE 3-10—FACILITIES BY CATEGORY

Asset Type		Inventory 2017	*Average Age
Facilities			
Total Facilities		171	28.5
Category	Administrative	5	20.8
	Library	9	30.4
	Recreation	25	22.6
	Transit	2	19.7
	Operations Yard	20	28.9
	Long-Term Care	1	11.5
	Parks	64	32.2
	Heritage	6	107.3
	Recreation/Culture	1	5.5
	Golf	5	25.9
	Airport	5	14.8
	Fire	9	20.1
	Multi-Use Recreation	4	24.8
	Police	6	20
Other/Transitional	8	43.5	

* Provided to meet requirements of O.Reg 588/17. Average age refers to the date a building was in service. Although additions and maintenance work are often completed on facilities bringing certain components or systems up to date, the overall facility is given an age that reflects the date the primary facility was actually put into service.

The reporting of Facilities assets in the City's current Asset Management Plan serves to meet the requirements of Ontario's new Regulation 588/17. Although this requirement was not due to be met until 2023 for these assets, the significance of the Facilities asset portfolio combined with recent and significant progress in asset management projects within the department allowed for this critical reporting to be completed before the expected regulatory implementation date.

The replacement cost value of the City's Facilities asset portfolio is \$828,746,845, an increase of \$173,033,050 since the 2013 AMP. The Facilities asset base includes all facilities owned and managed by the City including fire halls, libraries, golf facilities and airport buildings. This is consistent with the reporting found in the 2013 AMP.

It must also be noted that the current actual cost to replace specific facilities will likely be higher than the value projected in the TCA database utilized for financial purposes. Many variables can affect this valuation and many factors cannot be accurately reflected using available decision-making tools. Construction costs have steadily increased and are very much influenced by the supply and demand of materials and available human/worker resources. The critical need to design, build and maintain facilities to new and ever more stringent regulations and standards has added a significant financial and resource burden to new builds and maintenance alike. And replacement of a Corporate facility with a new asset rarely equates to a direct replacement of equal scope and value. New facilities are often larger, include energy and environmental reduction solutions which can be costlier, are more accommodating and technologically and mechanically advanced than the older buildings they replaced. Although it is agreed that these new amenities are critical to the health, well-being and overall enjoyment of the community as a whole, they add significantly to the financial and human resource demand and cannot be accurately reflected in the current replacement cost. This must also be accompanied with appropriate operating and maintenance resources should the City wish to continue to deliver the

services at an appropriate and expected level. This underlies the importance of long-term financial and operations planning and the requirement for a reasonable Facilities Reserve to be established.

Generally speaking, the larger and higher profile facilities absorb the majority of the Facilities Department's attention in terms of operating and maintenance practices and consequently the resources during the implementation of the condition assessment program. Huron Lodge, prominent recreational/destination facilities, critical operations buildings, fire halls, libraries and community centric administrative buildings are deemed critical to the general operation of the City and therefore inherently assume a higher profile and carry a higher risk. For this reason, as stated previously, these facilities have been the focus of the Corporate inspection program in an effort to accumulate valuable third-party expert advice on long-term maintenance expectations. Objective condition ratings are sought for all such critical buildings with the remaining facilities receiving a subjective rating based on age, expected useful life and expert internal knowledge of particular buildings. In all cases, ratings are mapped to the AMP Condition Rating categories of Very Good, Good, Fair, Poor and Very Poor, the details for which can be found in Appendix A – Condition Rating Approach.

The table below outlines the 2017 Facility inventory and replacement values for all building classifications:

TABLE 3-11—FACILITIES ASSET VALUATION

Asset Type		2017 Inventory	2017 Valuation
Facilities			
Total Facilities		171	\$828,746,845
Category	Administrative	5	\$143,571,335
	Library	9	\$10,889,732
	Recreation	25	\$220,636,276
	Transit	2	\$40,403,897
	Operations Yard	20	\$23,701,605
	Long-Term Care	1	\$45,995,686
	Parks	64	\$36,273,517
	Heritage	7	\$9,022,000
	Recreation/Culture	1	\$5,163,985
	Golf	5	\$22,070,356
	Airport	5	\$53,601,947
	Fire	9	\$40,174,467
	Multi-Use Recreation	4	\$117,473,868
	Police	6	\$29,927,317
Other/Transitional	8	\$29,840,857	

Given the uniqueness of the City of Windsor's Facility Condition Program, this section will be different than the previous AMP (2013) in that there will be 2 primary sections. The first section will focus on the facilities that were rated subjectively as per the guidelines used to rate all facilities in the previous AMP. The second section will utilize data obtained through the recent Facility Condition Assessment project and will therefore provide condition data based on a much more detailed and service level-oriented analysis of building components and systems. The goal is to eventually be able to provide detailed condition assessment data on all the facilities within the Corporate portfolio.

FIGURE 3-9—2013 - 2018 FACILITY ASSET CONDITION COMPARISON

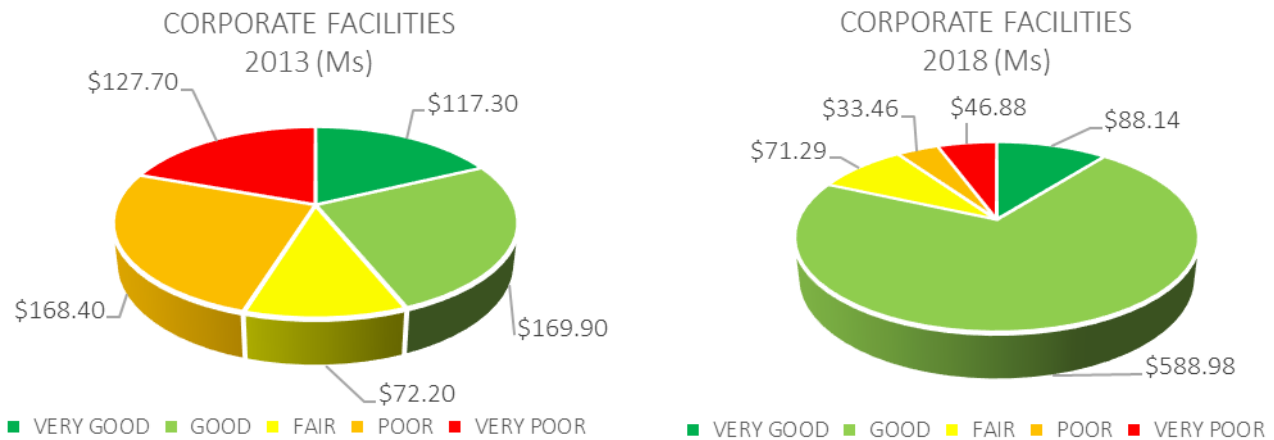


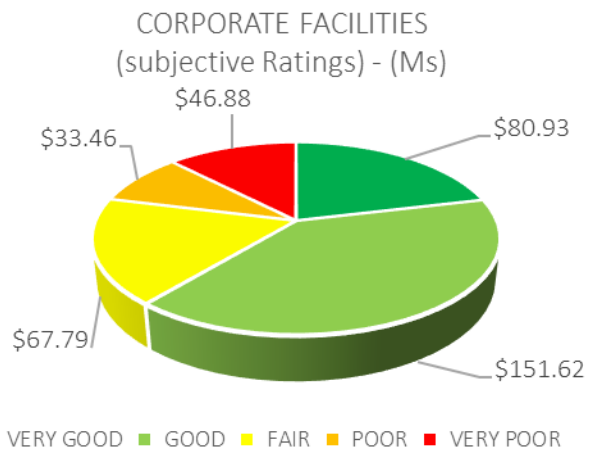
Figure 3-9 details the comparison between 2013’s facility AMP report and 2018’s updated facility assessment. As outlined previously, the City’s facility condition assessment program was established in 2015 and began the era of assessing City of Windsor facilities on a detailed sub-component asset level. For purposes of asset condition reporting, the 2018 facility AMP utilizes third-party objective condition data combined with subjective ratings for those facilities that were not yet inspected within the Corporate assessment program. In 2013, facility condition data was derived entirely with subjective information and based primarily on an age and internal knowledge and understanding of facility operations.

Several primary distinctions between 2013 and 2018 asset data must be understood in order to fully and properly comprehend the current state of the facility asset portfolio. Following the release of the City’s 2013 Asset Management Plan and within the development cycle of the 2018 AMP, the City has disposed of several older, Very Poor buildings and added multiple large, high profile facilities which contributed greatly to the variance in the respective asset portfolio rankings. In fact, a significant percentage of the facilities in the 2018 AMP’s Good and Very Good condition threshold can be attributed to several large recreational developments new to the City in the past few years. Although these buildings are early in their expected lifecycle, they represent a significant operating and maintenance risk due to their unique character and the nature of their operations. The 2013 condition rankings were also completely based on subjective feedback and each building was analyzed at an overall facility level. This meant that a single significant component in poor or very poor condition could affect the ranking and reporting of the entire facility in the 2013 AMP. In 2018, recent objective condition information at the building sub-component level allows for more accurate reporting and mitigates the affect a Poor facility component has on the entire rating. Therefore, the percentage of Poor and Very Poor rankings in 2013 was reflective of the fact that there was yet a sufficient and reliable means to report facility data with any level of detail and structure.

Summary of Facility Asset Subjective Condition Ratings

Corporate Facilities	Replacement Value of all Corporate Facilities: \$828.7M	Replacement Value of Subjectively rated Facilities: \$380.6M
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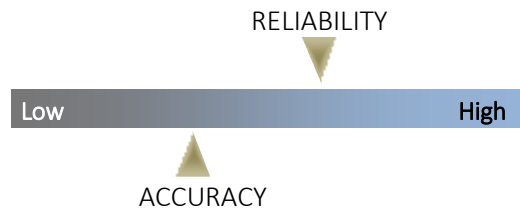
Approximately 61% of the City’s Corporate Facilities Portfolio are in Good to Very Good condition with the remainder approaching the end of their expected useful lives. The facilities in this section of the AMP have not been assessed under the Corporate Condition Assessment Program and are therefore subjectively rated based on sound internal knowledge, experience and data. It would be prudent to eventually include these facilities as part of a future phase of the Condition Program in order to allow for the same detailed needs analysis of each facility’s component and system requirements. In order to sustain the current level of service, increased funding has been required and will continue to be required to maintain the existing building stock. Over the coming years, it is expected that many of the facilities in Fair or worse condition will experience noticeable signs of deterioration that will require significant maintenance funding in order to prevent them from further degrading. Several of the newer high value facilities that are in the Good and Very Good category offer special amenities and services that require specialized equipment and systems that are known to require greater maintenance further necessitating the need for a more robust funding formula and the establishment of a maintenance reserve.

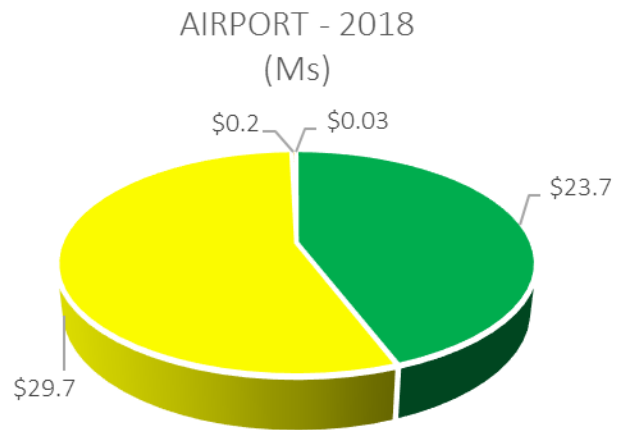
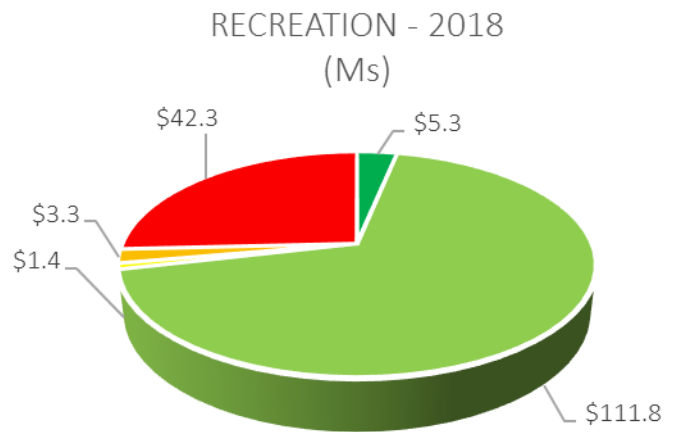
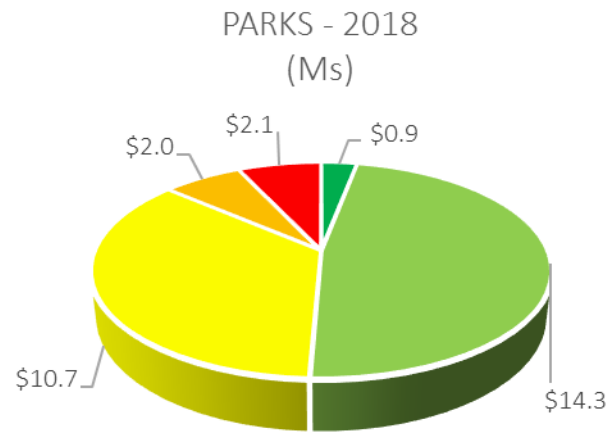


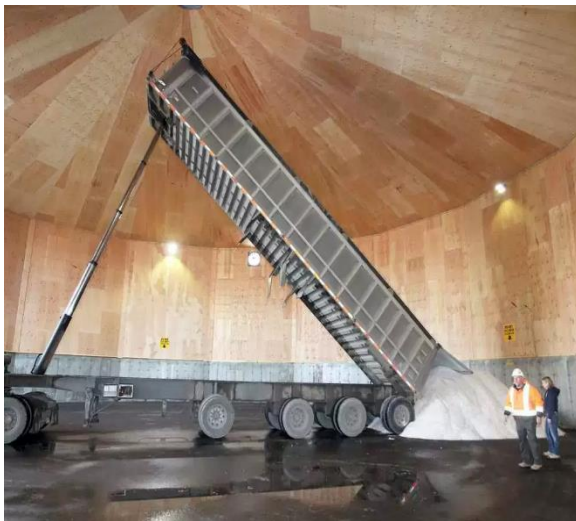
Overall Condition = Good

Data Confidence:

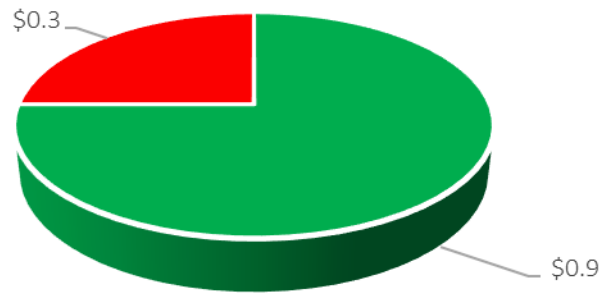
Implementing 360Facility CMMS to manage and maintain the asset data, including reactive and preventative maintenance work orders provides more reliability of information. The accuracy remains below average as the information currently available is at the building level and condition information is subjective. As detailed previously, these Corporate Facilities should ultimately be inspected through the Condition Assessment Program. Breaking down each facility into major components against which replacement costs and condition are applied, will provide a more accurate metric in which to identify what system in a building needs to be addressed. Currently, the overall building condition assumes the rating is applicable to the entire facility and as such, limited reliability should be placed on the information. In addition, replacement costs are based on the entire building often leading to an unreliable valuation of the cost of assets in any given rating category. Inventory has been verified through our TCA database and verified with 360Facility CMMS data and valuations are based on 2017 replacement costs from the TCA database combined with WIP reporting for newer projects. Condition and investment forecasts for these assets are based on sound engineering practices and analysis combined with expert opinion.



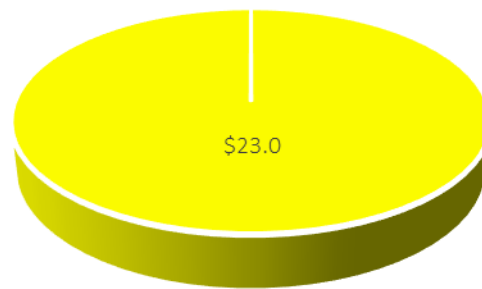




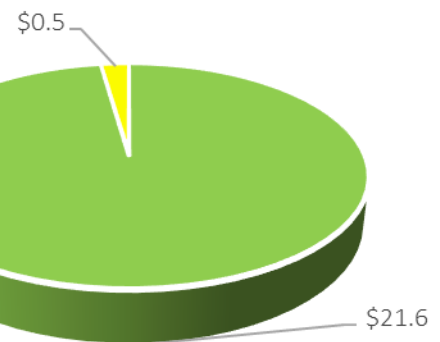
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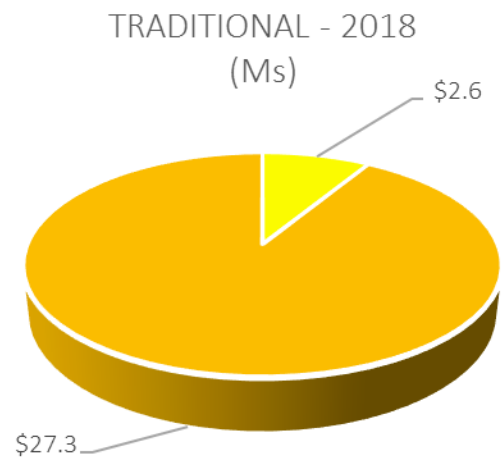
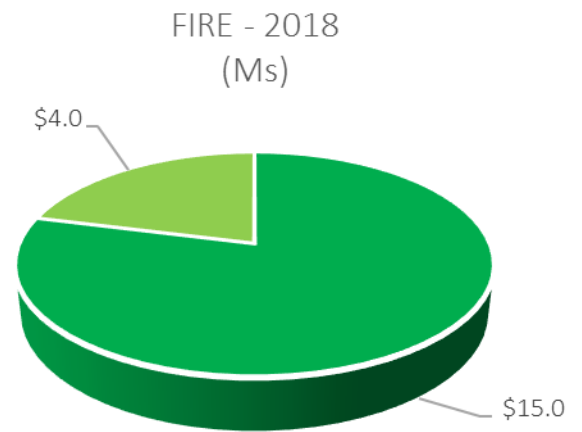
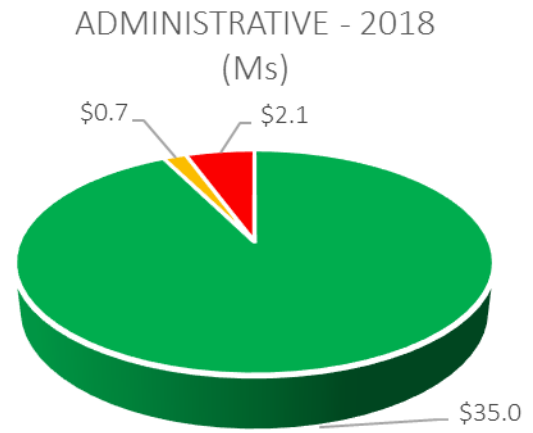


POLICE - 2018
(Ms)



GOLF - 2018
(Ms)





Summary of Facility Asset Objective Condition Ratings

Corporate Facilities	Replacement Value of Objectively rated Facilities: \$448.1M
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Implementation of the new Facilities Condition Inspection project began in 2015 with the intent to inspect the City's most prominent and integral buildings. Over the two years that followed, 71 of the City's most integral facilities were inspected based on their current condition and each facility report was given an overall high-level rating. The focus of the initial phases of the condition program were on the larger recreation, administrative, operations, fire hall and library buildings as this represented a large proportion of the Corporate operating and maintenance needs as well as the largest percentage of the Facilities portfolio replacement cost. The primary facilities that make up the first 2 phases of the assessment program represent over 54% of the entire Corporate building asset base. Although the Corporate Condition Assessment Program was initially developed in order to analyze facilities at a sub-component level, having the engineering consultant provide a single high level rating helps satisfy certain reporting criteria which seeks to understand the general condition of the City's facility portfolio. It should be clarified that the single facility rating is made up of many sub-ratings and therefore a final condition of Very Good or Good does not necessarily mean that there are not building components in a Poor condition. It also must be stated that many of the condition graphs/pies in the following section are comprised of only 1 or 2 facilities and therefore an entire graph with a single rating can be expected.



Overall Condition = Good

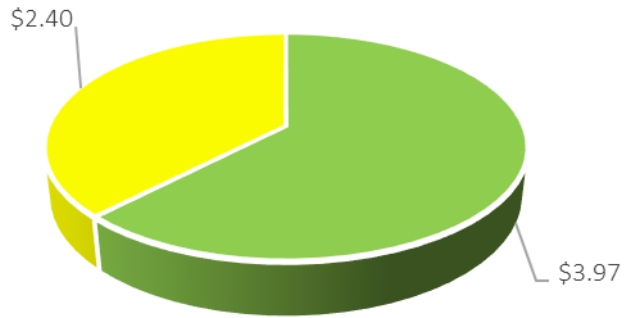
Data Confidence:

Utilizing the 360Facility CMMS to manage and maintain the Corporate Facilities network asset data, including reactive and preventative maintenance work orders, intrinsically provides a level of reliability for information. With the recent implementation of the new Facility Condition Assessment Program and the collection of expert information on each facility's overall condition, the reliability of the data in this section of the AMP is classified as High. The data accuracy is above average as it is the outcome of an in-depth engineering condition study however it is not considered High as the total building condition referenced in this section is a high-level indicator and therefore doesn't reflect the minor components which often have different ratings than the overall building ranking. The following data has been collected through an intensive multi-year inspection project and is the work of independent third-party facility consulting engineers working in collaboration with City of Windsor staff. Condition and investment forecasts for these assets are therefore based on sound, widely accepted engineering practices and analysis.

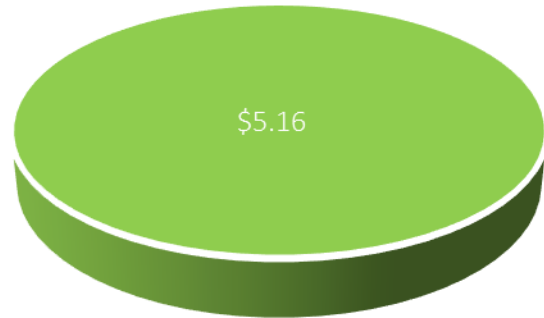




PARKS - 2018
(Ms)

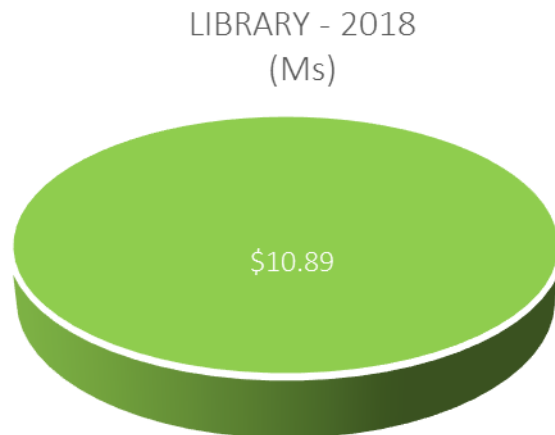
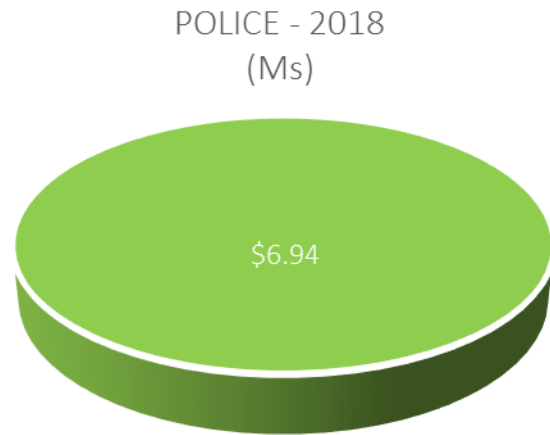
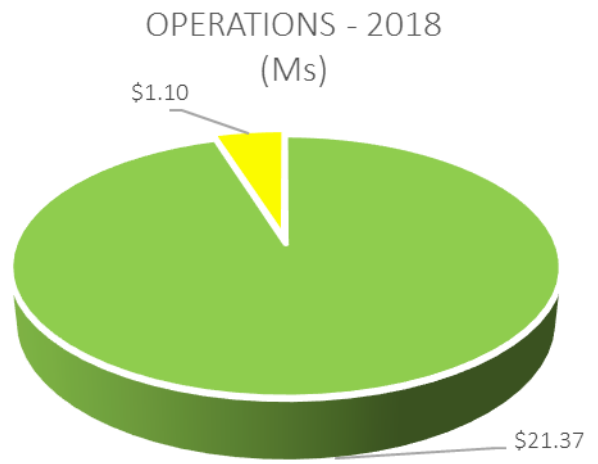


RECREATION/CULTURE - 2018
(Ms)



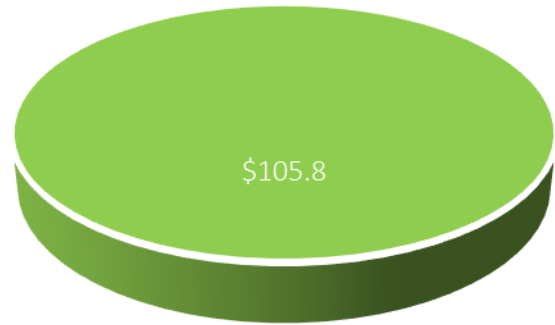
TRANSIT -2018
(Ms)







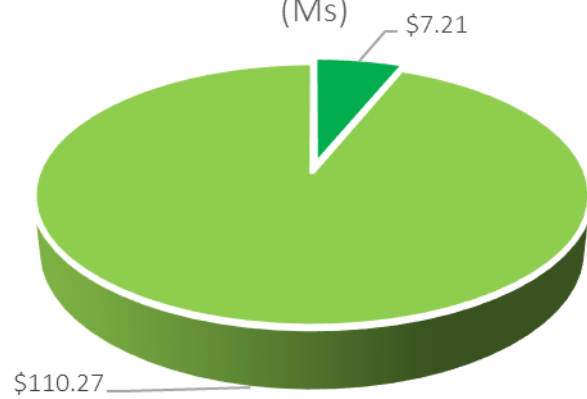
ADMINISTRATION - 2018
(Ms)



FIRE - 2018
(Ms)

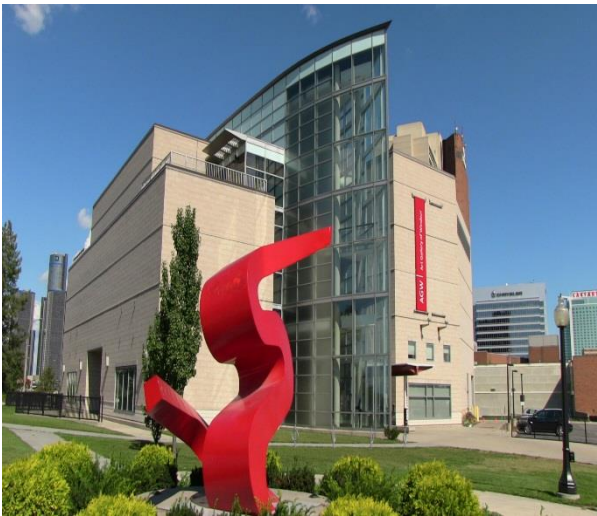
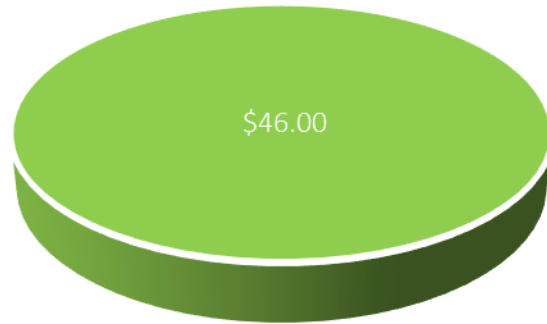


MULTI-USE RECREATION - 2018
(Ms)

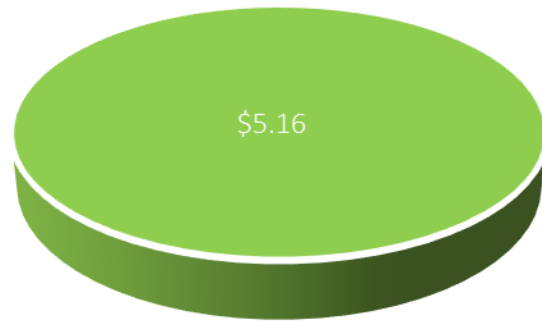




LONG-TERM CARE - 2018
(Ms)



RECREATION/CULTURE - 2018
(Ms)



HERITAGE - 2018
(Ms)



It must be stated that the ratings for each condition pie in this section are a rounded-up average of sub-components within each facility inspected by the consultant. Therefore, observing a condition pie that displays an entirely Good rating does not necessarily mean that there were no Fair or Poor components within a particular facility or facility sub-system. In fact, there are fair and poor components in almost every category, however upon averaging each small component within a particular system and then subsequently rounding up to achieve a singular high-level rating, the overall condition reported often appears better than what was actually observed across all components during the field inspections. The surest measure of Facility component needs remains the 20-year capital maintenance expenditure plan proposed by the Corporate Condition Assessment Consultant as detailed in the Financial Strategy of Section 6.

In several categories there were also only 1 or 2 facilities that contribute data to the entire chart therefore it is expected, as observed above, that there would be a single rating (ex. Good) within many of the condition graphs.

With the new condition assessment program, the City can objectively assess the true maintenance needs of a particular facility leading to a maintenance plan that can be dialed in to provide resources where they are most needed. The City also gets a truly detailed condition assessment where each system stands alone and is not affected by other subsystems within the same facility. It is important to note however that the overall funding needs of the Facilities maintenance program have not decreased with a new understanding of the facility component requirements.

A new facility, of which there are many within the City, receives a Very Good or Good rating by the simple fact that they are new, however the condition charts do not capture the expected almost immediate needs of newer high profile facilities. The City had developed a whole lifecycle costing approach to new development which aims to capture the true nature of a particular asset and its corresponding financial (operating and maintenance) needs. Such a methodology would account for the fact that even new assets require a significant financial commitment in order to function effectively. New assets (growth) should most assuredly be accompanied with an immediate supporting financial commitment/reserve to support the operating and maintenance needs that are becoming ever more important during the early stages in a facility's lifecycle. Ultimately all assets, and especially new ones, would have a corresponding long-term whole-life maintenance and financial plan that would allow for the establishment of a potential reserve to accommodate for the financial needs of a particular facility at all stages of its expected useful life.


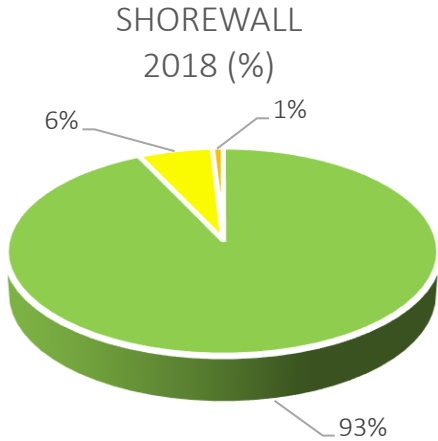

3.6 Riverfront Parks Shorewall

The Riverfront Parks shorewall is a vital asset not just for Parks but for the City as a whole. A number of the parks included in the Parks portfolio are found along the shoreline of the Detroit River and Lake St. Clair. Parks is responsible for approximately 5.2 km of Parks shorewall. The Riverfront Parks' shorewall is an asset with a long useful life (50-75 years) that must withstand the changes in climate, including more frequent and severe storms and rising water levels. This asset is a collection of assorted shorewall designs and materials. This is the result of acquiring the riverfront properties that currently cover the Riverfront Parks Shorewall, at various times since the City of Windsor was formed.

The Lakeview Marina shorewalls are included in this AMP however any shorewalls on Peche Island are not. All information included in this AMP for the Riverfront Parks Shorewall has been supplied by an external engineering firm. Most recently an assessment report for a large majority of the city's riverfront park shorewalls was delivered. The scope of the services for this report was limited to identifying deficiencies that relate to the core purpose of the Riverfront Parks shorewall, to mitigate erosion and to protect the land base. Identifying where safety standard might be impacted was out of the scope of this assessment.

The replacement costs, condition ratings and remaining life of each of the Riverfront Parks shorewall sections included in this plan have been sourced from this assessment report. This assessment provides objective condition ratings. Since this work was completed in early 2019, replacement costs are reflective of 2019 costs rather than the 2017 replacement costs used for many assets included in this plan. The report includes estimated costs to resolve any high priority issues. The Caron Pier was included in this assessment, however the shorewall that exists between the shore and the Caron pier was not inspected. The land that rests on top of the Caron Pier is currently experiencing some deterioration. Some of this is due to erosion behind the Caron Pier shorewall. It is recommended that an assessment of the shorewall behind the Caron Pier be undertaken to determine its condition. If it is in a Very Poor or Poor condition, replacement of the shorewall will trigger the potential need to remove the Caron pier before any work can be completed. A project of this scale will require substantial funding however at this time no firm estimates can be supplied.

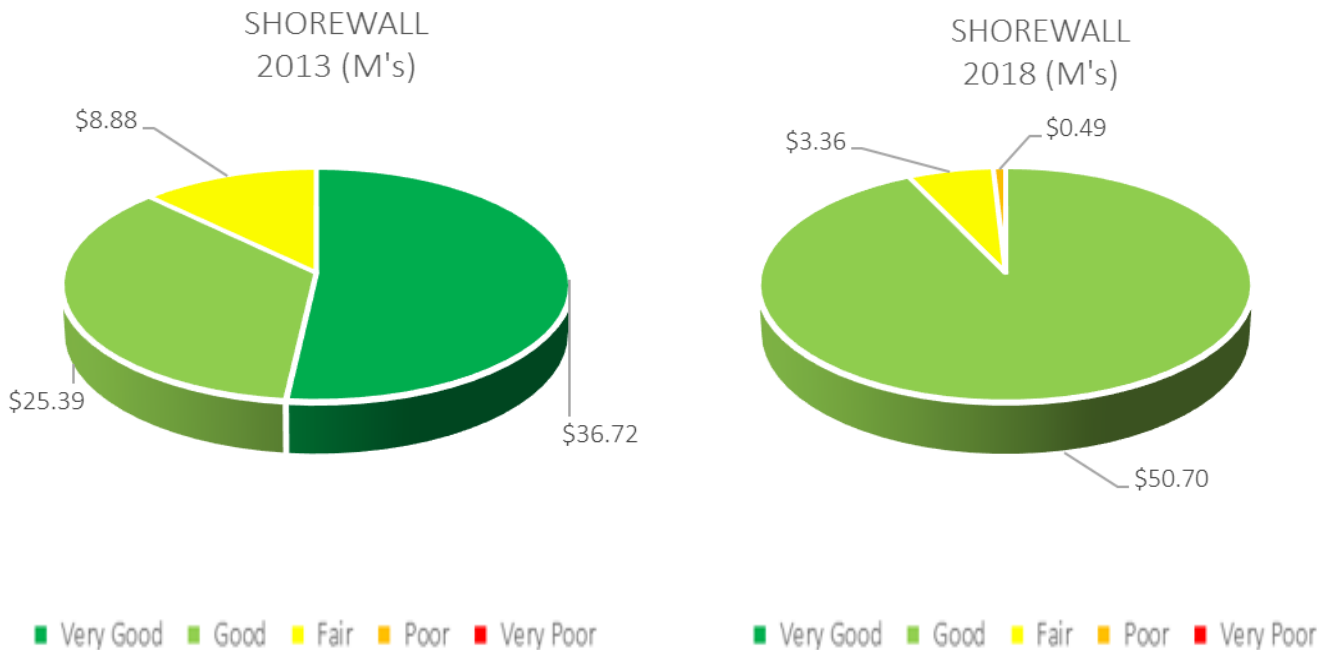
It must be noted that the replacement costs outlined in the assessment report do not include the cost of replacing the railing and the abutting walkways. In addition, at the time of this report there are noted concerns in the area just East of the Caron Pumping Station. Some parts of this Riverfront section are blocked off due to issues in the area. The shorewall condition inspection did not indicate the shorewall to be the root cause of the issues in this area. It is suspected the pier which is behind the shorewall and on which the parkland is located may be the issue. At the time of this report we were unable to obtain objective condition information to assess this area of land and determine the root cause, criticality and/or any recommendations, including cost, to remediate the situation. It is very likely work will need to be completed in this area and those costs are not considered in this report as they are unknown and more in line with unexpected events rather than forecasted deterioration of an asset.

Riverfront Parks Shorewall	Replacement Value: \$36.46 M												
<p>A shorewall assessment was pursued with the intent to inspect the riverfront Parks' shorewall. The assessment report ratings are reflected in the below 2019 graph. The majority of the Riverfront Parks' shorewall sections were inspected. Approximately 99% of the city's Riverfront Parks' Shorewall are in a Fair to Good condition. The remaining 1% is approaching the end of their expected useful lives. However with these assets having a useful life of between 50 to more than 75 years, approaching end of life could be as long as 10 years. With 93% being in a Good condition, the shorewalls are meeting current needs, however as they age they'll require funding to extend their useful life. The assessment recommended that two sections of railings be addressed however plans were already underway to address these railings. Within the next 2 to 3 years approximately \$1 million of rehabilitation work is recommended be done on some Parks shorewall sections with about 50% of the funds going towards revetment at Walker Shores.</p>													
	 <p>SHOREWALL 2018 (%)</p> <table border="1"> <tr> <th>Condition</th> <th>Percentage</th> </tr> <tr> <td>Very Good</td> <td>0%</td> </tr> <tr> <td>Good</td> <td>93%</td> </tr> <tr> <td>Fair</td> <td>6%</td> </tr> <tr> <td>Poor</td> <td>1%</td> </tr> <tr> <td>Very Poor</td> <td>0%</td> </tr> </table>	Condition	Percentage	Very Good	0%	Good	93%	Fair	6%	Poor	1%	Very Poor	0%
Condition	Percentage												
Very Good	0%												
Good	93%												
Fair	6%												
Poor	1%												
Very Poor	0%												
<p>Overall Condition = Good</p>	<p>■ Very Good ■ Good ■ Fair ■ Poor ■ Very Poor</p>												
<p>Data Confidence:</p> <p>Due to the Parks Riverfront shorewall assessment being completed by an external expert the reliability of the data in this section of the AMP is classified as High. Typically the accuracy of data supplied by an external expert would be considered High since its based on sound, widely accepted engineering practices and analysis, however due to the fact that assessments for components buried or otherwise concealed weren't completed and the Caron Shorewall wasn't inspected, the accuracy of the data is classified as above average.</p> 													

In the 2013 AMP the Riverfront Parks shorewalls were included in the Parks Services total however in the 2018 AMP Parks Shorewall will be reported separate from the total parks services. For this analysis the individual shorewall data from 2013 will be analyzed against the 2019 data condition rating from the assessment report.

Over the last 5 years, the Parks shorewall condition has not changed significantly. In 2013 88% of the replacement costs were assessed as Very Good to Good. In the current figures 93% is assessed as Good while 1% is in a Poor condition. This shift can be attributed to using condition ratings derived from objective versus subjective rating. The assessment identified some sections that require some maintenance and rehabilitation. By implementing and funding an on-going inspection process for the shorewalls if issues arise, they can be repaired and brought back into compliance at a lower cost than replacement.

FIGURE 3-10 —RIVERFRONT PARKS SHOREWALL CONDITION LEVELS RATINGS –2013 VS 2018



3.7 Parks Services

The City of Windsor has 202 Parks comprising approximately 2,500 acres. City parks contribute to the well-being of both physical and psychological health of the people that use and live near them. They strengthen communities both physically and economically by making neighbourhoods more attractive places to live, work and play. The various park amenities are the attraction of parks. Each park contains extensive infrastructure that ranges significantly in terms of type and value. The Parks assets are very diverse; they help support other City departments and are used by the public. Each park is unique in size, location, service area, configuration and use, which can affect the level of service provided. The Parks department is responsible for properly managing and maintaining all parks amenities and infrastructure for use by other City departments and the public.

Parks has an extensive number of assets however this AMP only address 9 target assets. 8 of which were included in the 2013 AMP and are also captured as Tangible Capital Assets for PSAB 3150 reporting and the other being right of way trees. The information provided for right of way trees will be at a higher level which will not include condition or replacement data. That information is currently being gathered as part of a 2019 project for forestry. The remaining Parks assets, identified in Appendix E, will be revisited to determine which ones should be included in future AMP's in accordance with O.Reg 588/17 and operational needs. The park assets covered in this AMP are Parks Off-Road Fleet, Sports Fields (including Tennis Courts), Parking Lots, Spray Pads, Fountains, Trails, Parks bridges, Playgrounds and Right of Way Trees. The information for the Parks assets was compiled from various sources, which included the 2013 AMP, several City of Windsor software applications including Fleet Focus, Infor (Hansen) and City Wide. Other sources included excel files and hard copy files that had to be physically located by internal staff.

The source of the replacement costs for all Parks assets outlined in this document, except for Playgrounds and Park Bridges, was the City's database of municipal infrastructure information, City Wide TCA (Tangible Capital Assets), the same source used for the 2013 AMP. The TCA costs are estimates and may be considerably lower than actual replacement costs. Playground replacement costs were generated by applying

a Consumer Price Index factor of 3% to a replacement cost (generated in 2015) derived from a 20-year whole life-cycle costing asset management model (as per 2015 Council Report) which takes into account the cost of complying with AODA (Accessibility for Ontarians with Disabilities Act) for playground surfaces. The Park bridge information was sourced from Infor (Hansen)CMMS, the same software that holds road, R.O.W. bridge and sewer information. Parks is striving to be at a point where costs will be derived from whole life costing (WLC) model or based on actual costs for a particular asset for the 2023 AMP.

Replacement costs for all Parks assets, except Playgrounds, is based on TCA closing balances for 2017. Assets acquired and or disposed of since these dates will not be reflected in this report, nor will condition data updated since that time because of ongoing inspection programs. Playgrounds replacement costs reflect 2018 amounts as they are materially higher than TCA replacement cost values.

The useful life of an asset is an accounting estimate of the number of years it is likely to remain in service. For park assets the useful asset lives vary by asset and for the most part have been determined using historic information (e.g. how long assets last in the field), best practices, information from other municipalities or organizations and consultation with third party subject matter experts.

A key focus of this AMP is that park asset renewals will be based on the strategy of optimizing the value of infrastructure by replacing assets at the end of their anticipated useful life. There will be cases when the asset life will be shorter or longer than anticipated and replacement timelines will be adjusted to reflect the condition of the asset. At the time when a park asset is forecasted for renewal, a more detailed analysis of the park, including where the asset resides, and what customer expectations are, may be triggered. As this will influence which assets can be decommissioned, rehabilitated or replaced to a similar function or equivalent utility. This was evident in the 2015 playground level of service review that determined 125 playgrounds strategically placed within the City's parks would provide an acceptable level of service to the public.

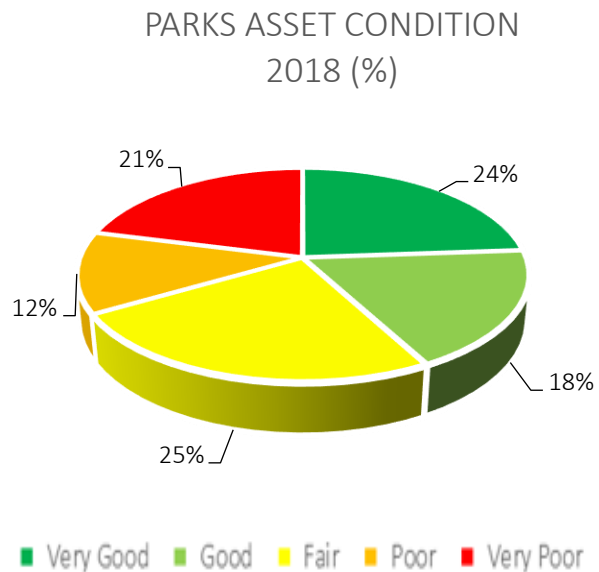
The information outlined in this section provides evidence that over the past 5 years a substantial amount of funding was allocated to Parks Services to replace a number of assets in a Very Poor condition and unable to be rehabilitated. This accounts for less than 50% of Parks funding. The Parks Service is involved in a large number of growth projects on an annual basis. This trend in the short term is intended to enhance LOS to the public. However, if sufficient funding to support the whole life cost of existing assets and these new assets is not made available the long-term effect will decrease LOS to the public.

Parks Services	Replacement Value: \$172.32M
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The current overall condition of Park Assets with a condition rating and replacement cost is Fair. The increase in the number of Parks assets in a Very Good condition can be attributed in part to the \$7.4 million investment to replace more than 28 playgrounds and the use of WLC methods to determine the replacement costs of Playgrounds. This also resulted in the Very Poor segment decreasing. Without the impact of the playgrounds the status of the Parks asset would reflect a scenario where assets are falling short of meeting service needs even with the investment over the last 5 years. This is evident in 2018 where 58% are rated as Fair to Very Poor as compared to 56% in 2013. Going forward, cost increases due to inflation and the costs to potentially extend the useful life of the assets in a Fair, Poor and very Poor condition need to be considered in future funding needs. Increases in replacement costs based on obtaining objective estimates also need to be considered for determining future funding levels. Over the last five years Parks asset replacement costs have increased about 85%.

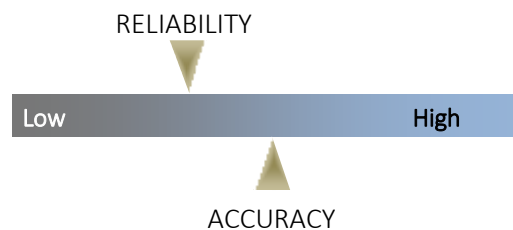


Overall Condition = Good



Data Confidence:

Data reliability for Parks Services is rated as below average due to the replacement cost for the majority of the target assets being based on what was initially collected for TCA purposes and any changes recorded to date. Playground costs aren't based on TCA data. For some of the Parks Assets the TCA costs are represented by a single "pooled" cost for each year. While this is an acceptable method of recording costs for some park assets, for example garbage bins, it's not the optimal method for all Park assets. In general the TCA costs used are a very conservative estimate and may differ considerably to the actual replacement costs. Playground costs were derived from a Whole Life-cycle Costing (WLC) analysis completed in 2015. A Consumer Price Index (CPI) rate was used to calculate current replacement costs. There is currently no application to manage and maintain the Park Assets inventory, maintenance, condition and cost information with the exception of the parks bridges that are inspected and rated by Public works and tracked in Infor (Hansen) CMMS. This gap has been identified and a project is currently underway to address this.



Overall, the majority of Parks Services assets, excluding playgrounds and parks bridges, have been solely rated subjectively therefore the accuracy of condition and investment forecast data might differ from actual needs. Bridges are inspected using Ontario Structure Inspection Manual (OSIM) standards and Playgrounds are inspected based on CSA standards. Overall accuracy is rated Average, as there is the need for a solution to manage and maintain their information for consistency and continuity. Parks has begun the process to gather, compile and enter inventory into a software application. Further work is necessary to get to a stage similar to where some of the core assets, such as roads, are with regards to asset management process. This includes, but is not limited to, updating condition ratings based on regular inspection data, validating replacement costs on a consistent basis, obtaining and managing other data required to satisfy the 2023 AMP requirements and to assist with normal Parks operations.

For those assets that do not have objective condition rating, condition ratings were calculated based on the percentage of remaining life of the asset, as defined in Appendix A. Condition ratings based purely on age can sometimes provide a misleading view of the replacement timing for the assets. In many cases, assets that are properly constructed and maintained may outlive their estimated useful life and continue providing valued service. In other cases due to poor workmanship and/or lack of proactive maintenance, assets may fail before they fulfill their estimated useful life. In some cases, a subject matter expert has reviewed the age-based condition ratings and made changes to the rating based on their expertise and knowledge of the asset. This is not the optimal solution for assigning condition however, with the same Park strategies expected to be implemented in the future, it is anticipated that objective conditions will be available for these assets in future AMPs.

The below graphs provide an overall view of the condition of the City's Parks assets from the 2013 AMP and those covered within this plan, based on their 2017 replacement values except for the Playground assets that reflect 2018 replacement values. The 2018 values differ from what was included in the 2013 since the Riverfront park's shorewall has been removed and these figures restated.

FIGURE 3-11—PARKS CONDITION RATINGS 2013 VS 2018

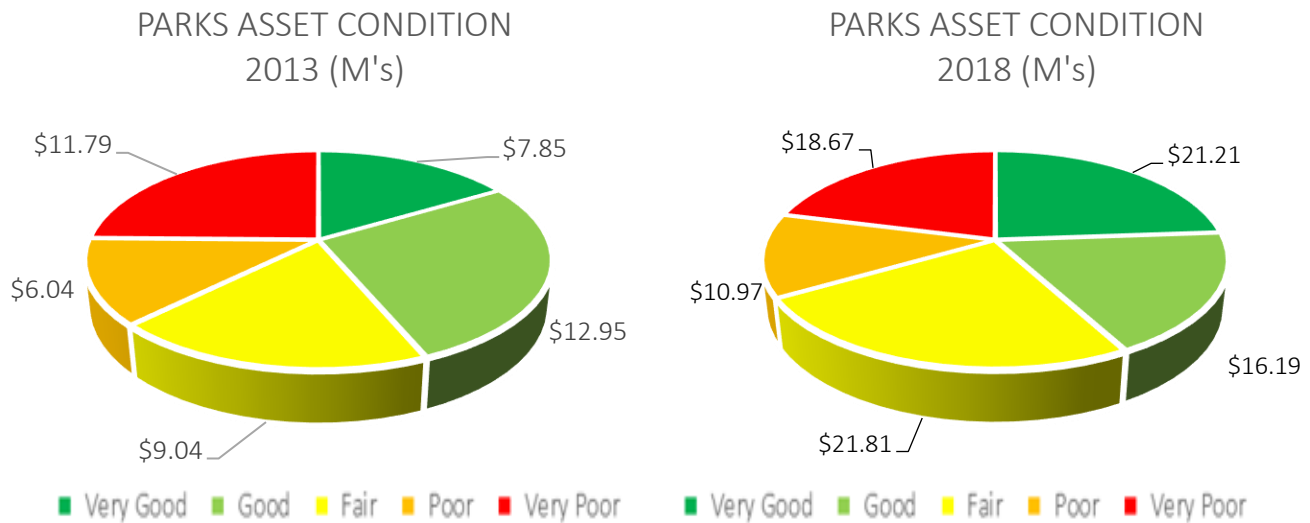
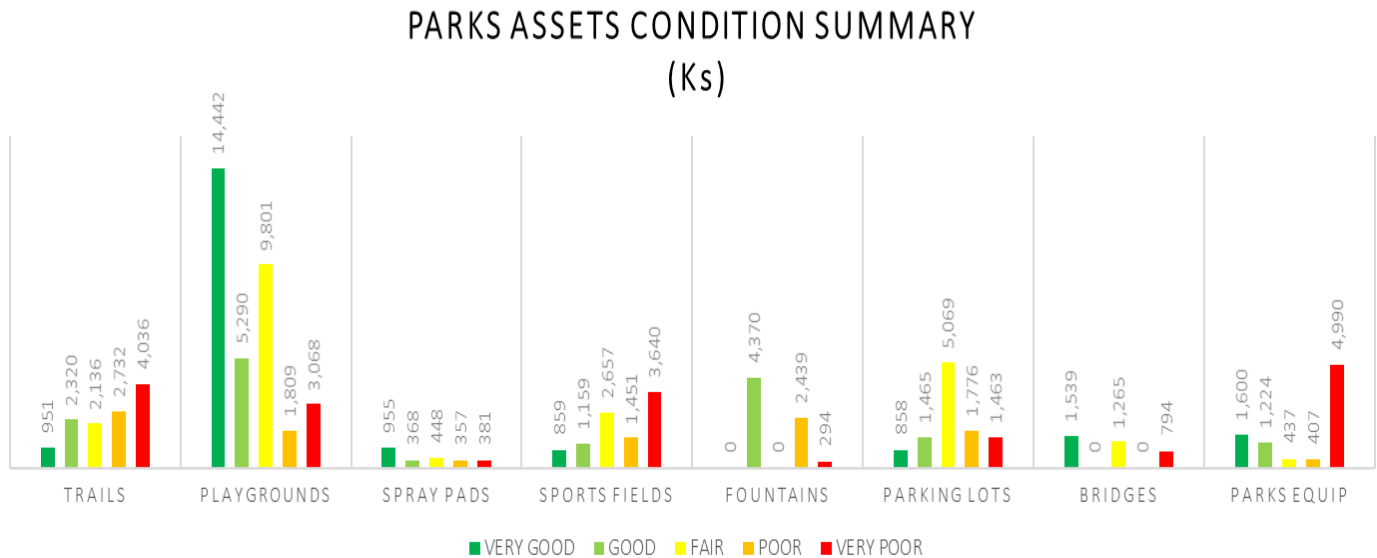


FIGURE 3-12—PARKS SUMMARY OF CONDITION AND REPLACEMENT VALUE BY ASSET CATEGORY FOR PARKS

The Fair overall condition rating for the Parks assets can be largely attributed to the condition of the playgrounds. The percentage of assets in a very poor condition is highest for trails, sport fields and parks off-road equipment. These assets need to be addressed. The recommendation is to perform regular inspections on these assets so an objective condition rating can be obtained. Additional funding to cover the cost to perform regular inspections and costs associated with maintaining, rehabilitating or replacing these assets on an on-going basis, to minimize the risk of injury to the public is recommended. If the condition of these assets and the other Parks assets is not addressed, their condition will continue to decline which in turn increases the risk, decreases the level of service and will likely require a larger investment to reconstruct or replace the asset, rather than the cost to maintain and rehabilitate them to maximize the service life of the asset.

The table below compares the 2013 to 2018 inventory and replacement values for the 8 Park assets. Trees are excluded from this table.

TABLE 3-12—PARK ASSET VALUATION

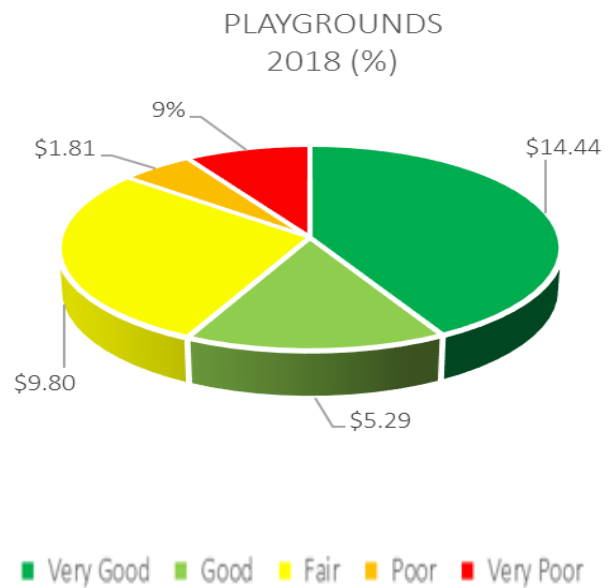
Asset Type	Asset	Inventory 2013	Inventory 2018	Unit	Replacement Cost 2013	Replacement Cost 2018
Parks	Pedestrian Bridges	14	16	each	\$1,884,830	\$3,597,995
	Parking Lots	49	49	each	\$7,988,118	\$10,630,811
	Fountains	4	4	each	\$6,456,820	\$7,102,381
	Parks Off-Road Fleet	131	164	each	\$6,851,425	\$8,658,671
	Playgrounds	153	125	each	\$7,242,120	\$34,409,821
	Sports Fields	117*	149	each	\$6,541,061	\$9,766,836
	Trails	105	125	km	\$9,441,948	\$12,173,429
	Spray Pads	4	10	each	\$1,266,075	\$2,508,482
TOTAL					\$47,672,397	\$88,848,426

* Excludes Tennis Courts. Tennis Courts included only in 2018 AMP figures

3.7.1 Playgrounds

TCA costs haven't been used to source the replacement costs of playgrounds. The replacement costs for playgrounds are the result of a whole life cost process that was undertaken in 2015. They encompass all infrastructure that support the playgrounds, including drainage, the base and curbing. The playground replacement costs and funding amounts outlined in this section are reflective of the 125 playgrounds approved in report #P&R 15-142. Technically 141 playgrounds are contained in the Parks inventory however many of the 16 playgrounds not considered in this AMP are miscellaneous pieces of equipment for example a single swing set, that are at or near noncompliance, cannot be rehabilitated and will be removed when deemed out of service and not replaced.

FIGURE 3-13—PLAYGROUNDS CURRENT CONDITION LEVELS



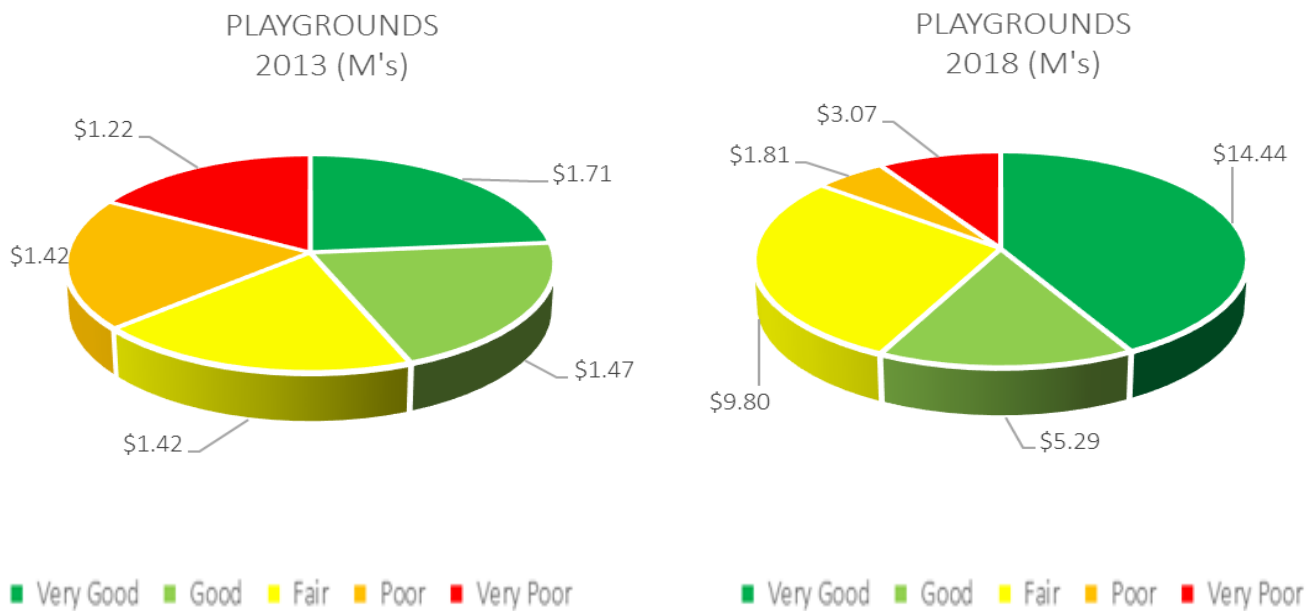
The total replacement costs for playgrounds have increased over 400% from 2013 to 2018. The 2018 replacement costs used in this report are more reflective of actual costs as compared to the TCA costs. This increase is driven by the use of a replacement cost (generated in 2015) derived from a 20 year whole life-cycle (WLC) costing asset management model (as per 2015 Council Report), rather than the TCA replacement costs, sourced from City Wide TCA, used in the 2013 AMP. The 2015 replacement cost takes into account the cost of complying with AODA (Accessibility of Ontarians with Disabilities Act) standards which includes the cost of safety rubberized surface rather than sand, pea stone and engineered wood fibre. A study undertaken by the City identified that rubberized surfacing was most expensive when only considering initial capital outlays, however it exhibited the lowest ongoing operating and maintenance type costs over the 20 year life of the playground, it provided the best solution to reduce risk of injury to the user and it was AODA compliant. The intent is to continue to use WLC costing methods to periodically verify the completeness of the playground replacement costs, and in the future to calculate and verify other Park assets' replacement costs.

Currently 57% of the playgrounds are in a Good to Very Good condition compared to 43% in 2013. This positive shift can be attributed to the \$7.4 million investment (C 142/2017) approved by Council in 2017 to replace 28 playgrounds (22% of the current inventory) that had already been removed or were slated to be removed due to non-compliance. This investment was required to sustain the level of service to the public based on the Official Plan as approved by Council.

Currently 9% of playgrounds are in a Very Poor condition. This amounts to about 12 playgrounds. Funding to replace these playgrounds has not been identified however these 12 playgrounds are needed to meet approved level of service for playgrounds. A few of these 12 playgrounds are found to be non-compliant about 5 years prematurely. This can be attributed to the wear and tear from extensive usage and/or to the earlier than expected degradation of lower quality components. The introduction of a process to prequalify vendors has worked to minimize issues with the quality of component material and will be used when funding is made available to replace these 12 playgrounds.

The Miracle Park playground that is under construction in the Riverside area is not currently a City asset however once it's placed in service ownership will be transferred to the City. This playground has not been included in this AMP however it will be included in future AMPs.

FIGURE 3-14—PLAYGROUNDS CONDITION RATINGS 2013 VS 2018



3.7.2 Trails

Parks has an extensive inventory of trails amounting to about 125 km trails. It is estimated that 85% of the trails are asphalt, 10% multiple stone and 5% other materials. Not all trails are AODA compliant however; the City is working towards meeting these standards for trails as they are replaced. It is estimated that about 74% of existing trails are in need of significant repairs as capital budget funding in past years has only addressed replacement of trails which are beyond their useful lives or need to be addressed as part of another capital project improvement. The condition ratings reflected in the graph in Figure 3-15 was compiled based on a combination of age-based and subjective ratings by Parks experts. In the 2019 budget, a proposed annual maintenance budget is being requested to allow the Parks department to begin to adopt strong asset management principles to ensure that the expected useful life of trails is being optimized and any deficiencies are being addressed to protect the public from any safety concerns. While this annual maintenance budget will allow administration to prioritize trails that need immediate maintenance, a gap still exists. Further funding, as outlined in section 6 is needed to inspect, rehabilitate or replace sections of the Parks' trail system to not impact the level of service by closing some trails. The financial details for trails were sourced from TCA information. Before 2014 most of the TCA amounts have been pooled based on years. Since 2014

the trend in TCA has been to record amounts against specific trail networks. This change in philosophy signifies a positive shift towards the asset management process Parks is committed to achieve in the future. The majority of trails have a 20-year useful life however the City has a few trails with useful lives of 30 and 50 years. The Decorative Concrete Pathway at Willistead Park has a 50-year life.

FIGURE 3-15—TRAILS CURRENT CONDITION LEVELS

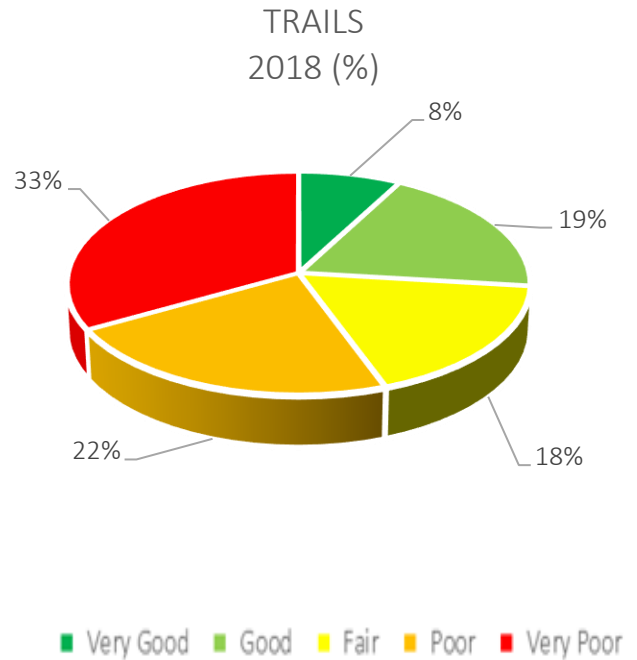
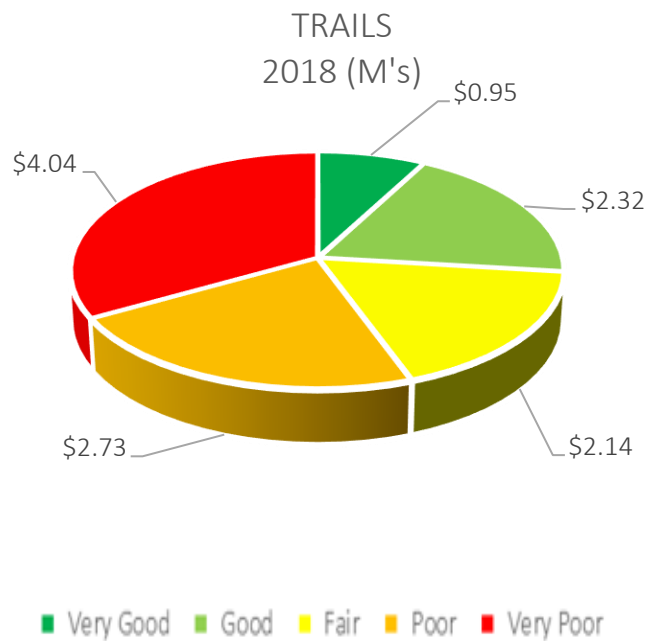
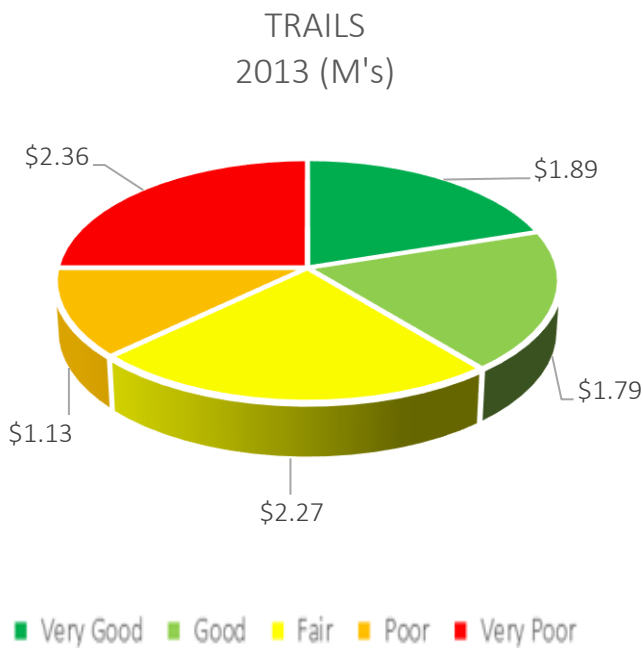


FIGURE 3-16—TRAILS CONDITION RATINGS 2013 VS 2018



In the last 5 years the trail inventory has increased in value by \$1.6 Million which accounts for both growth and maintenance components. Conversely, the trails in a Poor to Very Poor condition increased from 37% to 55% and trails in a Very Good condition decreased by 60% over this same timeframe.

The asphalt trails are similar to roads in that if they are constructed with material that is below the recommended standard their useful life will be significantly lower than expected. Also if regular maintenance is not performed on asphalt trails, once they get to a very poor condition the cost to replace them is much higher than the cost of maintaining them over time. Additional investment is needed to maintain the current level of service and more investment is needed to shift the amount of trails from the Very Poor and Poor condition, alternatively some trails may need to be closed. Additional funding to support additional resources will help to support a formal trail inspection process that is to be piloted in the fall and to fund any trail repairs and rehabilitation identified through the inspection process.

3.7.3 Parks Off-Road Fleet

Parks off-road fleet is used by the Parks team to maintain the various parks, beaches and to support some recreational activities. For example: mowers, tractors, beach rakes, Zambonis and carts or ATV's. Some of the Park off-road fleet is used by Facilities and other departments within the City. The useful lives of this equipment vary from 5 to 25 years. Those pieces of equipment with shorter useful lives, for example trimmers, have not been considered in this AMP since they are, for the most part, purchased with operational funding rather than capital funding. Condition ratings for Park off-road fleet was determined based on subjective ratings by Parks experts and information provided by the Corporate fleet team. This should not be deemed as an exhaustive list.

Although Parks use their off-road fleet, the Corporate Fleet team manages the inventory in that they coordinate the purchases and disposal of all capital Park equipment. Corporate fleet is also responsible for the maintenance of Parks large truck fleet; however these assets are included in the Corporate Fleet assets. The off-road fleet is maintained by Parks resources. Since 2013 the approach to managing these assets has changed and implementation of a strategy similar to Corporate Fleet has been adopted. This has resulted in annual contribution to a reserve fund for the replacement of these assets based on projections for deterioration and replacement needs. The Parks department and the Corporate Fleet Management team are currently working on verifying the inventory levels for the Parks off-road fleet to ensure accuracy and completeness for future AMPs.

The introduction of the reserve has resulted in \$2.3 Million dollars of capital funding to replace off-road fleet equipment. This accounts for a large portion of the park equipment, \$2.88M (34%), being in Very Good to Good condition, an improvement from 2013 which had only \$1.23M (18%) in this same condition. Without the implementation of this new strategy the percentage of assets in a Very Poor condition would be much larger than 58%. As with the Corporate Fleet program, and requirements to purchase additional equipment as a result of growth or service enhancements, one-time capital funding is required as well as an increase to the operational contribution to the reserve to sustain the assets.

FIGURE 3-17—PARK OFF-ROAD FLEET CURRENT CONDITION LEVELS

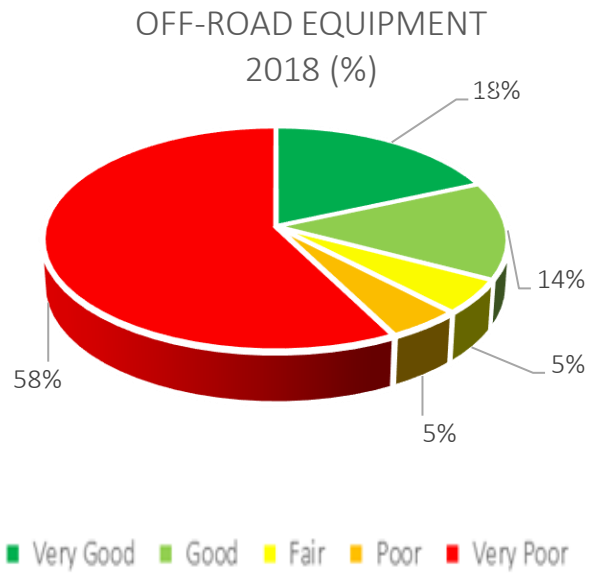
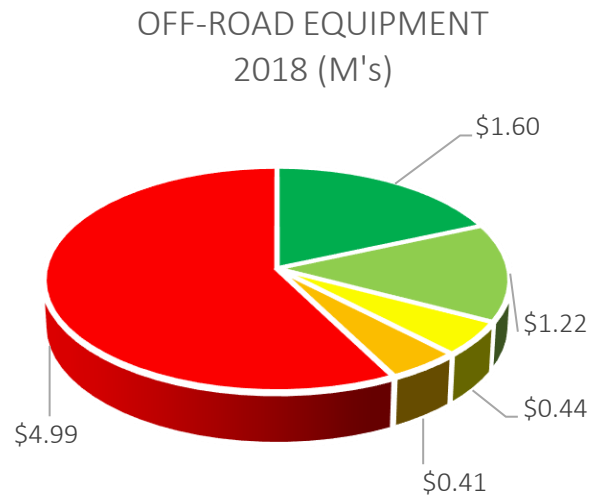
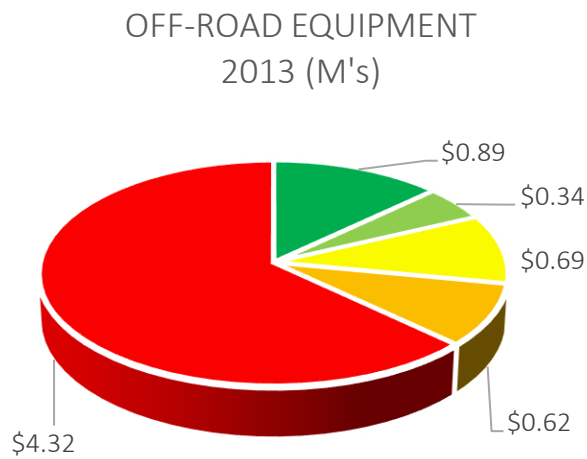


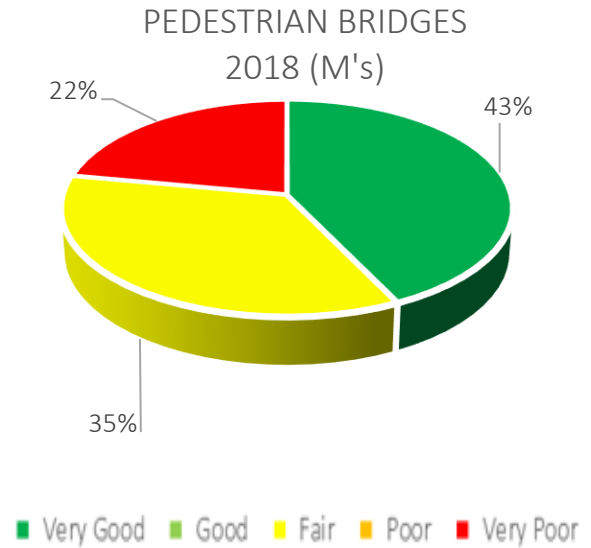
FIGURE 3-18—OFF-ROAD EQUIPMENT CONDITION RATINGS 2013 VS 2018



3.7.4 Pedestrian Bridges

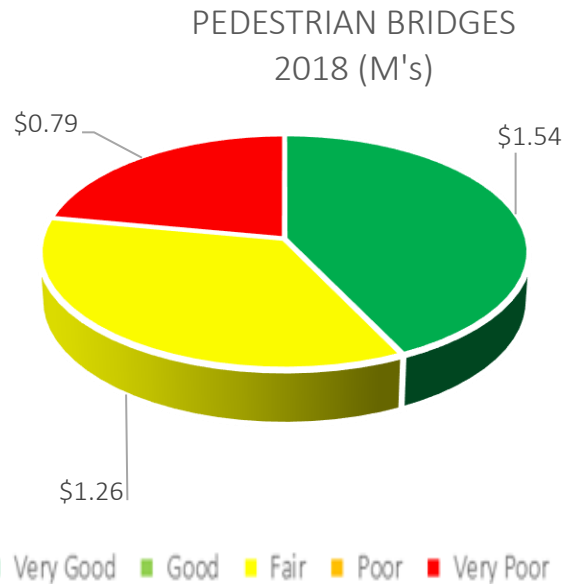
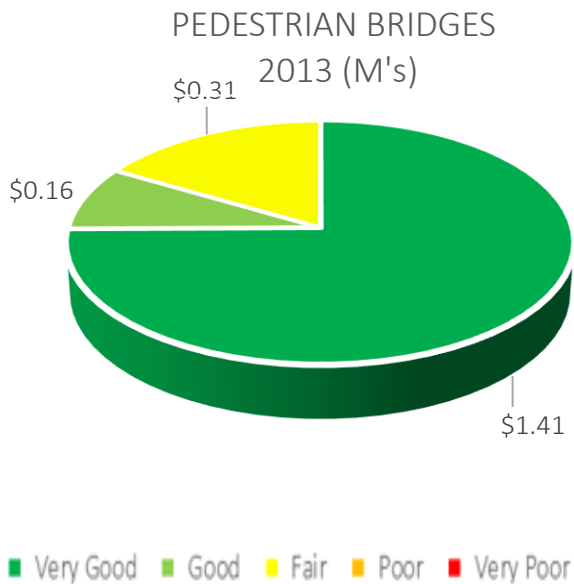
The Parks pedestrian bridges are maintained by Parks but inspected by the Technical Support Infrastructure Management System team of the Public Works Operations Department and per OSIM requirements. It is for this reason that the bridge inventory is housed within the Infor (Hansen) CMMS database.

FIGURE 3-19—PREDESTRIAN BRIDGES CURRENT CONDITION LEVELS



There has been a definite shift in condition ratings of pedestrian bridges since the last AMP. However, this shift is not only due to a deterioration of the bridges and initiatives are underway to address the Very Poor bridges. One asset was flagged as Good in 2013 based on its remaining life. However, after an objective inspection, it was assessed as Very Poor. Since the last AMP, four (4) pedestrian bridges have been removed from the inventory, an underpass classified as pedestrian Right of Way (ROW) in 2013 is now included as part of the Parks Pedestrian Bridge inventory and two pedestrian bridges on Peche Island are also now included. Additional funding is required to rehabilitate, repair and adequately maintain all the park bridges in a fair condition to ensure level of service improves to that of previous years and a base level of being functional and safe for use.

FIGURE 3-20—PREDESTRIAN BRIDGES CONDITION RATINGS 2013 VS 2018

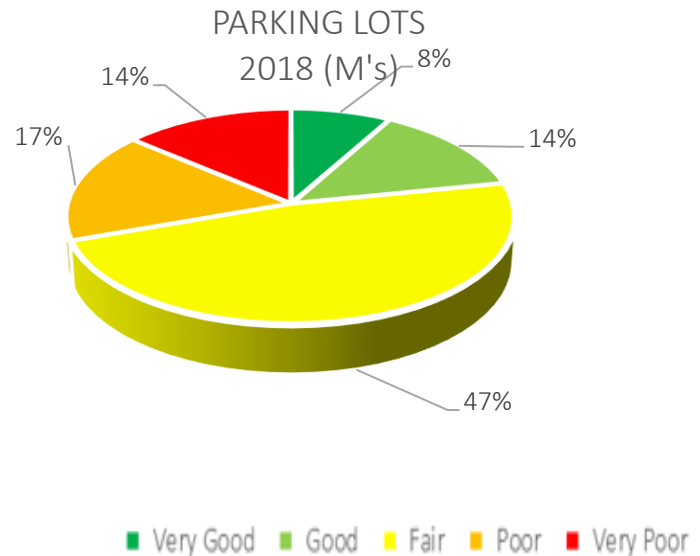


3.7.5 Parking Lots

The Parks Parking Lots are those that are used to access the City's Parks. Pay and display parking lots are not Parks assets and are covered in the Transportation asset section of this AMP.

Currently operational and maintenance strategies are based on on-site inspections in the absence of a formal condition assessment process. An age-based condition evaluation was used to determine condition rating and as such, caution should be taken in reviewing this information. Although subjective, this approach has brought attention to those assets nearing their useful life. As per figure 3-21 below, about 78% of the parking lots are in Fair to Very Poor condition resulting in the need for more funding to replace and rehabilitate these parking lots and ultimately more resources and funding are needed to establish a robust parking lot assessment process that would generate an objective condition rating process, and to perform an analysis of level of service and risk to help Parks better predict what maintenance levels are needed to extend the life of parking lots in the future and deliver an appropriate level of service for parking lots.

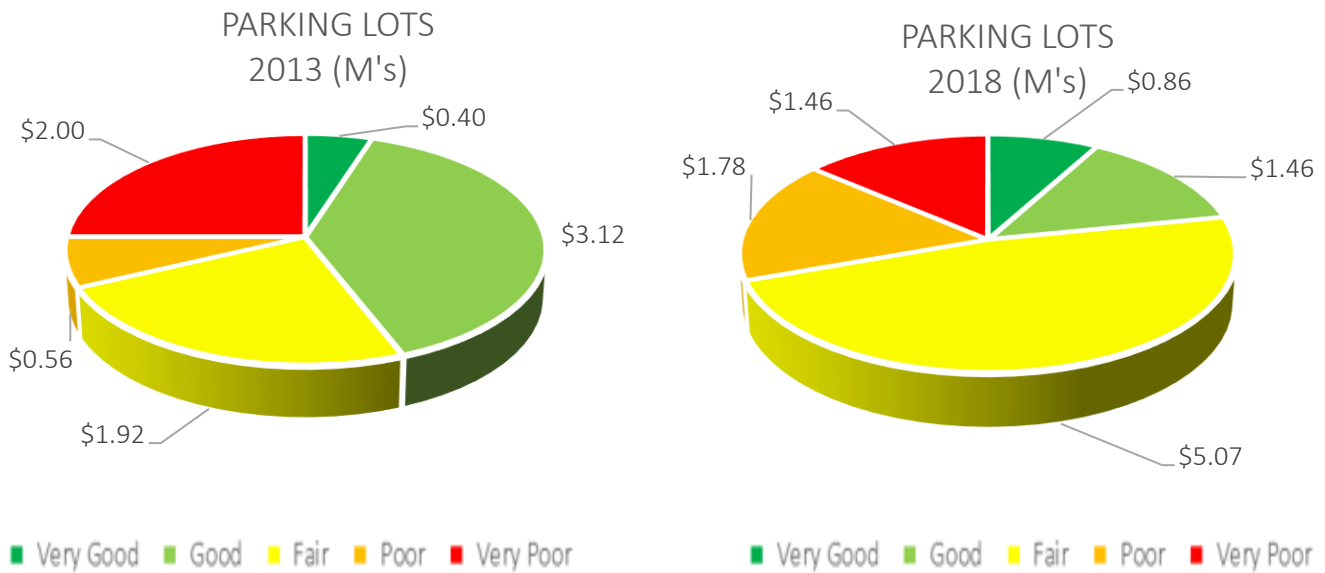
FIGURE 3-21—PARKING LOTS CURRENT CONDITION LEVELS



The overall trend in the last five years is that the parking lots' conditions have deteriorated. Three parking lots have been removed from inventory since 2013. The Forest Glade parking lot had extensive work done to it and Little River Acres and Kiwanis parking lots were installed. These changes impact the Good and Very Good condition sections. A Mic Mac parking lot with a replacement cost of over \$2.3 Million that was excluded from the 2013 AMP is included in these figures. The result of including this Mic Mac parking lot (representing more than 21% of the current replacement costs) in these figures results in the Fair segment of the graph being substantially larger.

More than 50% of the City of Windsor parking lots are at or past their expected life. The condition ratings for parking lots were determined first based on age and then adjusted based on expert advice. As these are mainly asphalt, there is an ability to implement an objective condition rating process for future AMP's. This is being reviewed as part of the Parks asset management database project currently underway. It is expected that the replacement costs of Parking lots in the future will increase due to the fact that they will include costs to comply with site plan control zoning by-law and AODA standard. Landscaping, lighting, drainage, curbs and/or asphalt needs to be considered in any future replacement costs estimates, however these are considered service enhancements to these assets and therefore not considered as part of the funding needs in this AMP.

FIGURE 3-22—PARKS PARKING LOTS CONDITION RATINGS 2013 VS 2018



3.7.6 Fountains

Based on TCA information 4 fountains are owned by the City. The other fountains owned by the City will be included in the next AMP as required to meet the legislative requirements of Ontario Regulation 588/17. The useful lives of the four fountains range from 40 to 50 years. Condition ratings of the fountains were subjectively determined based on inspection information. Several of the assets in this category were donated to the City. While donations aid with the capital cost of these assets, recognition of the on-going maintenance and rehabilitation costs is starting to also be included in the discussions to ensure the total cost of owning an operating the assets is properly funded for their sustainability and continued enjoyment.

FIGURE 3-23—FOUNTAINS CURRENT CONDITION LEVELS

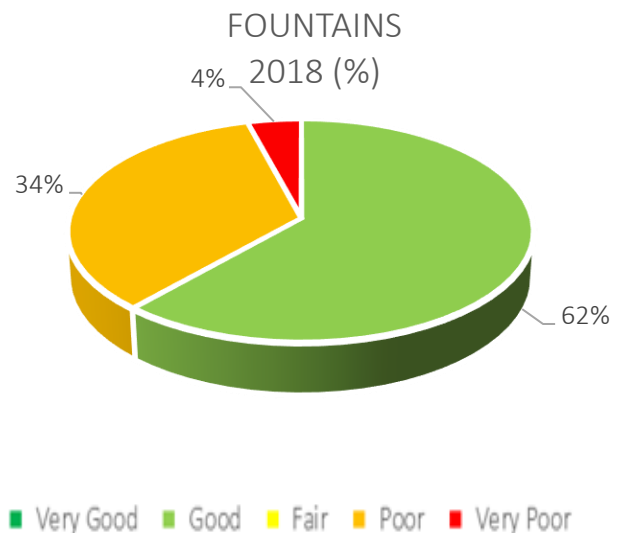
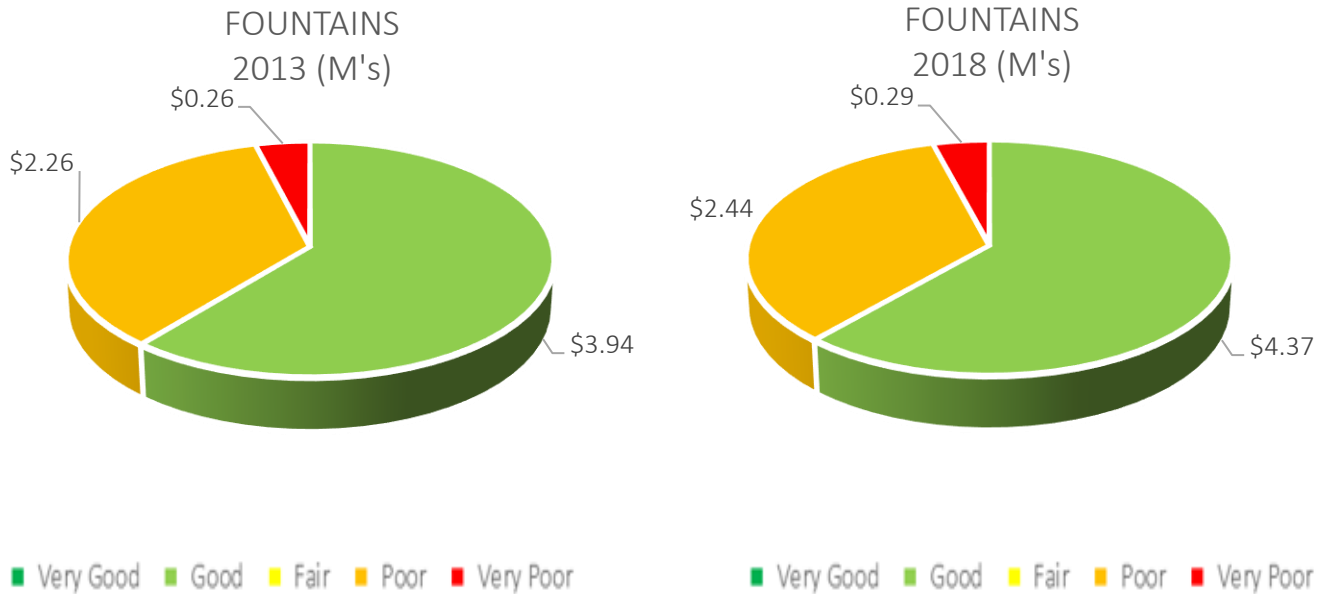


FIGURE 3-24—FOUNTAINS CONDITION RATINGS 2013 VS 2018



The Bert Weeks Memorial Fountain accounts for over 60% of the costs of Fountains and is assessed in Good condition. There is minimal change over the last 5 years; however as the Bert Weeks Memorial Fountain continues to deteriorate current LOS will not be maintained. The Good condition of the Bert Weeks Memorial fountain has been achieved due to a resource being reallocated from one job to do any necessary maintenance on this fountain. It is recommended that funding be set aside to plan for the replacement of these fountains as well as the maintenance and rehabilitation of them. Currently as some fountains reach a Very Poor or Poor condition the water is turned off and they remain out of service until funding is made available and repairs made. In addition, some of the fountains are specialized, such as the Peace Fountain, and failures in their mechanical systems can result in significant delays in repairs. Proactive maintenance and condition assessments of these assets will assist in maintaining them in operational condition and reducing the frequency with which they are not operational.

3.7.7 Spray pads

Currently the City has 10 Spray Pads, more than double the number in 2013. They vary in size and location. The useful life of spray pads is estimated at 20 years. The condition ratings for these assets were determined using a combination of age based and subjective ratings by Parks experts.

FIGURE 3-25—SPRAY PADS CURRENT CONDITION LEVELS

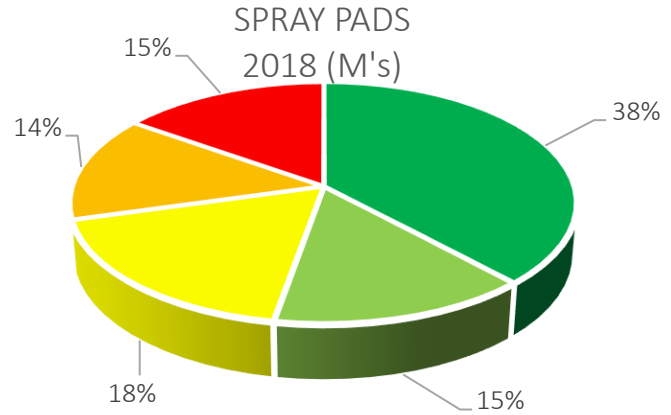
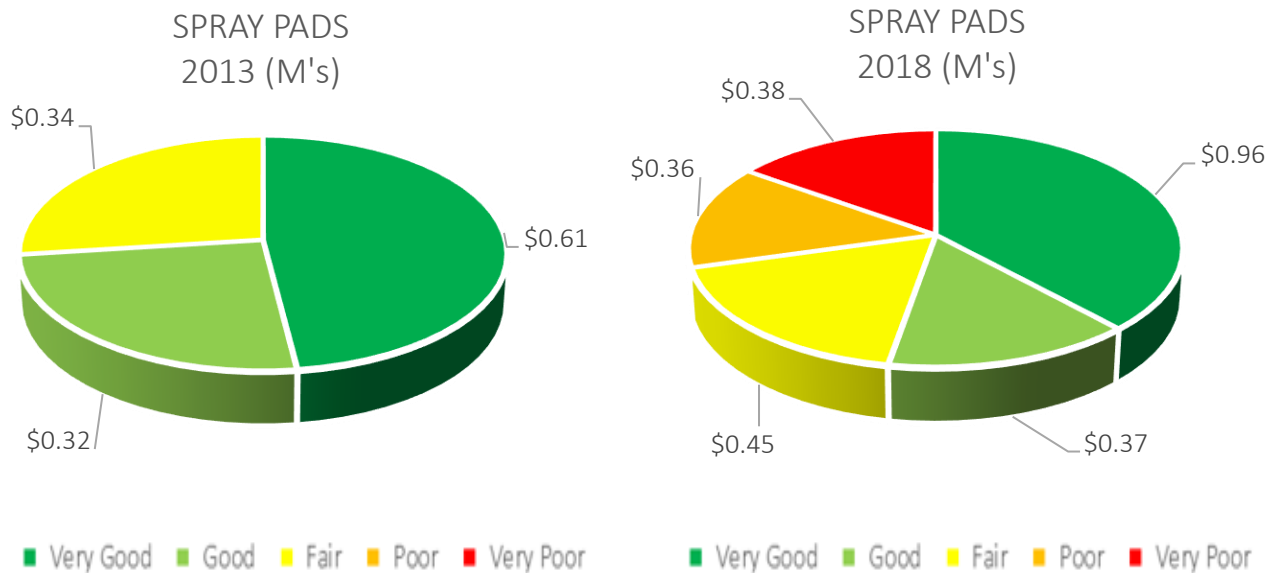


FIGURE 3-26—SPRAY PAD CONDITION RATINGS 2013 VS 2018



Currently 53% of Spray pads are in a Very Good or Good condition compared to the 73% in 2013. This is a 20% decrease since the 2013 AMP. Three new spray pads have been installed since the last AMP and account for most of the 38% with a Very Good condition, which can be interpreted as the 2013 inventory has deteriorated quite a bit in the last 5 years. Just under 30% of the spray pads are in a Poor and Very Poor condition. No funding has been set aside to replace these units as they near the end of their useful life. Sufficient funding to support the existing infrastructure needs to be made available to maintain today's level of service, meaning all spray pads continue to be operational. Any future growth components aren't considered in the financial information found in section 6.

3.7.8 Sports Fields

The City has a variety of sport fields. Baseball, soccer, football and cricket fields are included in this AMP as well as Tennis Courts. Tennis courts were excluded from the 2013 AMP. The sports fields that are not manicured and are maintained as part of the regular maintenance cycle, will not be addressed in this AMP.

Only the revenue generating fields are reflected in this document. Sport fields are maintained to a level that makes them useable. Irrigation systems have been key in ensuring the sport fields are in a useable condition however minimal funding has been allocated to sport fields since the last AMP. As the impact of climate change is realized, the costs associated with maintaining these fields will be impacted.

The Parks department is also looking to increase the maintenance of city owned tennis and basketball courts. Historically, parks have been provided with a budget for replacing the nets and re-painting the lines, but there has been no specific budget for surface repairs and maintenance. Over time, the sports courts have developed large cracks. Sufficient levels of regular funding is necessary to address these cracks in a timely manner to prevent further deterioration of the surface.

TCA data for sport fields is pooled by year and/or by project rather than by type or location of sports field. As part of the initiative to implement asset management strategies within Parks services, it is expected that this process will be halted and a redesigned process will be implemented.

FIGURE 3-27—SPORTS FIELD CURRENT CONDITION LEVELS

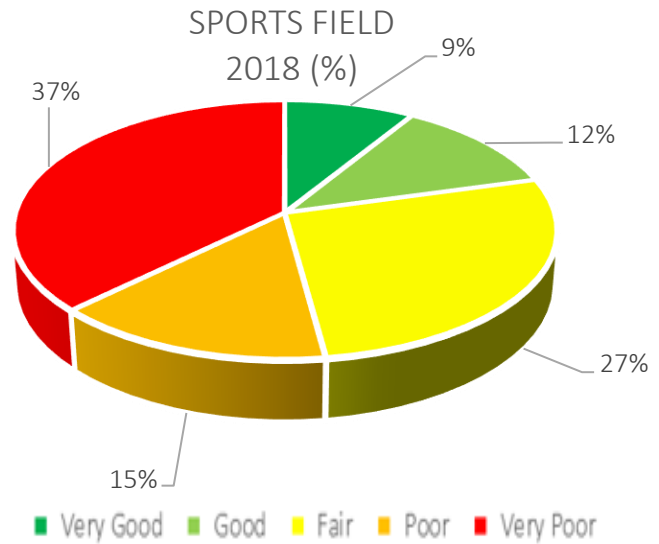
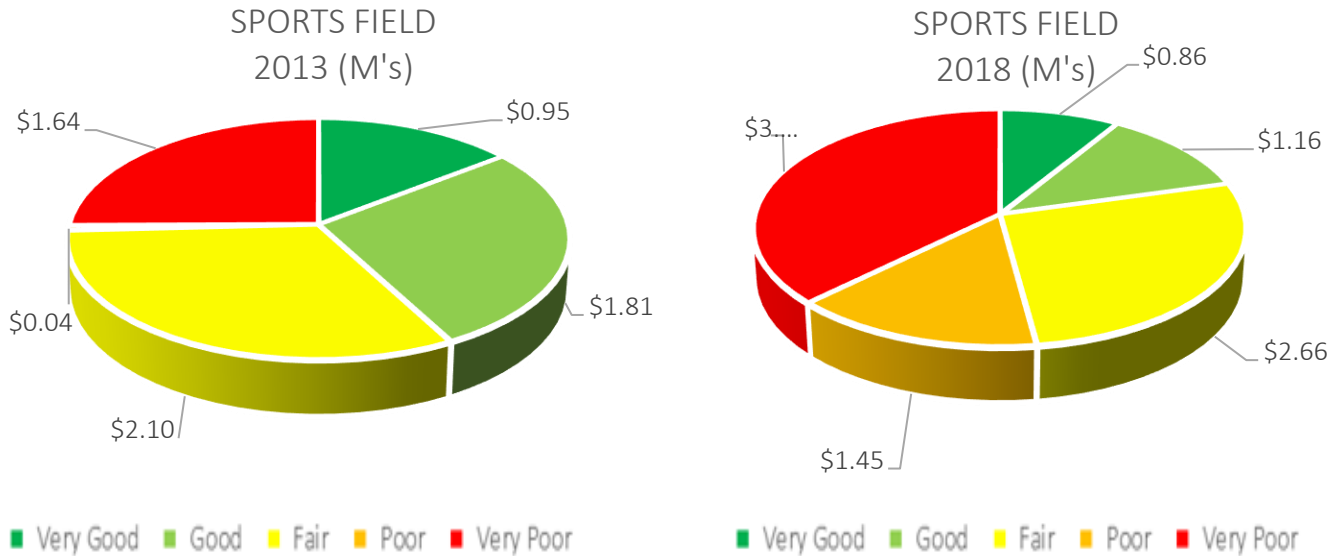


FIGURE 3-28—SPORTS FIELD CONDITION RATINGS 2013 VS 2018



About 25% of the sport fields are past their useful lives. 52% of the Sports fields are currently in a Very Poor to Poor condition. This is double to what it was in the 2013 AMP. Adding tennis courts to this category this year is responsible for some of this shift since most of the tennis courts are in a Poor to Very Poor condition. Another cause is deterioration of sports fields due to the lack of appropriate levels of maintenance funding to support the upkeep of them. In 2018 some funding was allocated to updating some tennis courts. If no further investment is made in Sports fields, the trend for condition to move to Very Poor and Poor will continue and the current level of service will not be met. The revenue generating ability of the Sports fields could be impacted if condition ratings are allowed to slip further.

3.7.9 Trees

The Forestry Division’s goal is to improve the overall management of trees throughout the City. To improve tree health and tree diversity, while reducing risk to the public and by maximizing the benefits of a healthy urban forest. Future versions of the AMP will provide a broader scope of information for Tree assets. Windsor has some of the highest number of growing degree days in all of Canada and our wide variety of soils throughout the City, lends itself to an Urban Forest full of genetic diversity and majestic trees.

The Parks department maintains over 70,000 trees along the Right of Way and an additional 30,000 shade trees in our Parks. This does not include our natural area parks such as Black Oak Heritage Park or Peche Island, nor does it include privately owned trees which is estimated to be as much as 3 or 4 times more numerous than city trees. It is currently estimated that all these trees combined cover approximately 21% of the City; 32 square kilometers (3,200 ha) of treed lands across the City. It must be noted that the City is not responsible for any privately owned trees. Data regarding the street trees located along the Right of Way is being housed in one of the City’s computerized management maintenance programs (CMMP). Currently, the data collected includes the species of the tree, its size, the year it was planted and provides a historical record of the tree’s maintenance record.

Every year the City adds to its tree inventory. Approximately 1,000 trees (50-120 mm in diameter and 3 to 4 metres high) are planted along the right of way (ROW) and in our Parks every year. In addition, the City plants and receives another 5,000 trees from various partners throughout our natural areas and park lands.

The age distribution of our street trees is as follows: 22% are under 20 years old; 18% are between 20-40 years old; 30% are between 40-60 years old; and 30% are over 60 years old. The City has some trees over 120 years old. To maintain this extensive asset, it is critical that tree maintenance be performed on a regular basis, based on regular inspections data. Regularly maintained trees lead to optimal health and longevity and reduce the risk of damage claims to private property. Preventative maintenance should result in a significant reduction of service requests and damage claims, allowing for our resources to be directed to other pressing concerns. Cyclical Tree Maintenance is also the framework for 'Routine Inspections' which is critical for health and safety concerns and reducing liability risks.

Currently preventive maintenance and routine inspections are not feasible. Funding originally budgeted towards tree maintenance, has been reallocated to tree removals and to help reduce the backlog of work activity spawned by citizen requests. Parks no longer carries out any proactive trimming. All trimming is carried out on a reactive basis, which results in high call volumes to 311 for tree trimming. The Forestry team is moving towards a 7 year trimming cycle to begin the process to eliminate the backlog of tree trimming requests supported by consistent funding levels in the coming years and going forward.

Trees are a highly variable, constantly changing and unfortunately, usually come to the forefront of people's attention if and when they become a problem. Trees quietly performing their normal function as part of the City's Green Infrastructure, are seldom recognized for the active, unseen benefits they provide on a daily basis.

The Forestry Division has been working with Asset Planning regarding the value of trees as natural assets belonging to the City. City owned trees are becoming part of the discussion and will be framed with future policy regarding the value of these natural assets. City owned trees and natural areas help mitigate climate change and reduce the heat island effect in this city but also remain vulnerable to severe weather such as wind and ice storms.

Parks remain committed to protecting and enhancing the Urban Forest and its canopy cover, through the protection of our current inventory, through the planting and watering of trees, routine inspections, the trimming of trees, and the removal of high risk trees as well as other Arboriculture Best Management Practices.

By using the Tree Canopy assessment software, iTree Canopy, a preliminary assessment determined that City of Windsor currently maintains 21% canopy cover and this living canopy cover absorbs an estimated 25,800 tonnes of atmospheric pollution, particulate matter and sequestered carbon annually and estimates the annual benefit at \$2.7 million in terms of pollution absorption and carbon sequestration. In addition, the current city wide tree canopy holds, as solid wood, an estimated value of sequestered carbon at \$45 million. Established research identifies numerous other benefits derived from an urban tree canopy that at this time have not been quantified for the City of Windsor including such benefits as storm water flow reduction, temperature amelioration, traffic calming and property value impacts.

In 2019, the City will undertake an inventory of all City owned street and park trees. This inventory will serve as the basis for a shift to pro-active management of the City's urban forest trees pending funding from the City's Capital Budget deliberations. It will also serve as the base information for the development of a city wide Urban Forest Management Plan (UFMP). Beginning in late 2019 the City will undertake a full and detailed urban tree canopy assessment and benefits analysis. The canopy assessment will expand on the street tree inventory and include an assessment of the City's natural areas and non-city owned trees across Windsor. The benefits analysis, based on all trees in the City of Windsor, will provide details in Canadian values of the environmental and community benefits derived from the City's tree canopy at city wide and local

neighbourhood levels. Together, the Street & Park Tree Inventory and the Canopy Assessment & Benefits study, will inform the development of the city-wide UFMP to be developed in 2020-21. The UFMP will provide a framework of objectives, targets and methodologies that will be designed to preserve, protect and manage our urban forests and the benefits of that forest into the future and it will describe in detail the City of Windsor's Green Infrastructure Tree Assets.

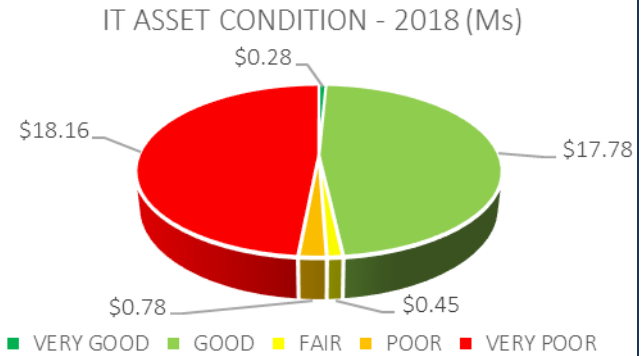
It is estimated that approximately 5% of all trees inspected will be identified for removal due to their old age and their inherent structural issues. In order to protect and enhance the City's canopy cover, trees that are removed from the inventory need to be replaced, either in the same location if practical or slated for a different location in the area.

The first step has already been initiated by the Forestry department, which will be working towards their vision by first reducing and eventually eliminating the tree trimming backlogs and implementing a 7-year tree trimming cycle.

3.8 Information Technology

Information Technology	Replacement Value: \$37.45M
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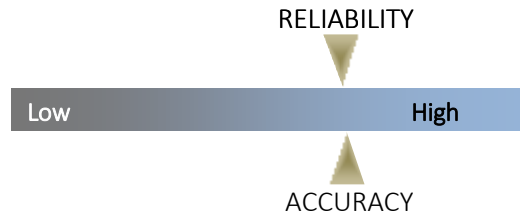
Approximately 48.2% of the City’s Information Technology (IT) assets are in Good to Very Good condition. Significant investment has been made since the previous AMP in 2013 as well as existing assets continuing beyond their estimated useful life, both contributing to the overall condition rating. Emerging concerns are developing around critical systems requiring upgrade and/or alternative solutions required due to obsolescence/vendor support. As a result, investment will be needed in the short to medium term to sustain enterprise systems used by the City end users and ongoing needs analysis is required to determine the best strategy in replacing aging technology.



Overall Condition = Poor

Data Confidence:

Data reliability is rated as above average and the inventory is continually verified and updated. Personal computing equipment inventory is maintained in City Wide TCA Network and data services and applications inventories are managed on spreadsheets. Major applications are routinely upgraded to remain supported by the vendor. Policies for replacement of personal computing equipment and servers are in place and followed. As such, condition, while subjective, is based on previously defined standards and best practices. There are several peripheral inventory items and applications which are not included in this report as they do not meet TCA thresholds. Consideration of how to expand the scope of these assets to include them in future versions will be reviewed.



The goal of IT asset management is to utilize financial, business and technological requirements to support the life cycle management and strategic decision making for the City’s IT infrastructure. The practices established provide guidance in properly allocating technology assets to optimize usage and productivity, simplify technical support and maintenance requirements, lower ownership costs, and maximize IT Return on Investment. Part of this analysis includes software management where licensing, version control, and maintenance are considered in controlling IT costs and minimizing business, legal, and security risk while maximizing IT responsiveness. The PC Maintenance/Support and Pay-as-you-go (PAYG) Reserves exists where the City’s departments contribute annually. The funds are used for IT support, acquisition of computers and printers and various hardware and software upgrades. It has been noted that current contributions to the reserve fund may not meet future funding needs as they pertain to the change in vendor subscription-based licensing.

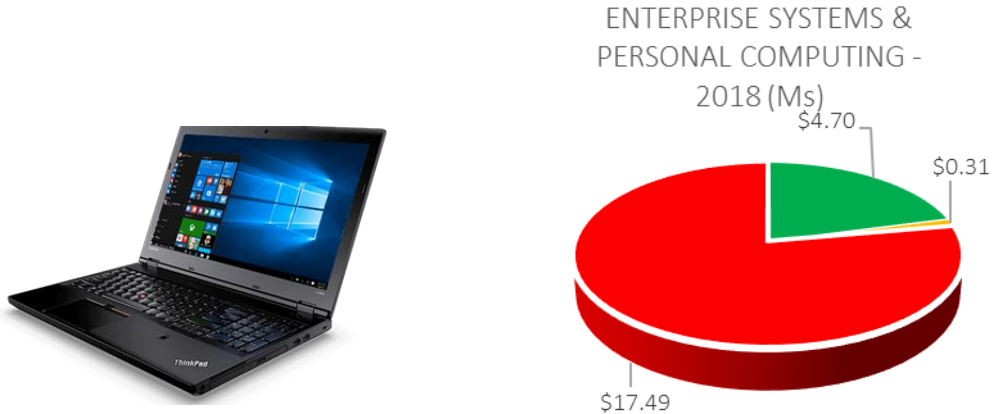
In analyzing useful life and establishing condition ratings for enterprise systems and personal computers related assets, an age-based condition evaluation was used (defined in Appendix A) and as such, caution should be taken in reviewing this information. The useful life of an asset is an accounting estimate of the number of years it is likely to remain in service. For many of the Information Technology assets, useful life can and will be extended through hardware and software upgrades. Through fiscal responsibility and

prudence, the IT department will assess the ability to extend the useful life of assets by the means previously described without jeopardizing user functionality, security and data integrity. These asset types are also subject to obsolescence due to the continual advancements in technology as well as the need to continue to ensure these assets are able to achieve high levels of security protocols. As such, in evaluating these asset modifications and the impact on the related systems, software, and infrastructure, a certain level of subjective condition rating was used to more accurately define the state of the infrastructure. Although subjective, this approach has highlighted the need for building on the communication and flow of information captured by IT and transmitted to the City’s City-Wide Tangible Capital Assets (TCA) database. The impact will lead to consistent asset data, involving circumstances such as upgrades, decommissioning, and obsolescence. Further advancements will be made in developing more robust objective condition ratings as well, to comply with the Asset Management Planning for Municipal Infrastructure regulatory requirements. Given their importance to operations, these assets have been included in the funding allocation for replacement prior to failure.

The replacement cost of the City’s Information Technology assets is \$37,453,930, an increase of approximately \$20 million since 2013. The increase can be attributed to significant investments made in personal computing and server acquisitions as well as assigned ownership of a corporate radio system. Software and personal computing expenditures continue to expand due to evolving technology and replacing unsupported software, as well as demand on server and related infrastructure. Monetary investments have been made in servers and computers every year since 2013 with the aspirations of decommissioning these assets using a five-year and four-year useful life respectively.

The following graphs separate the condition analysis into IT software and IT hardware.

FIGURE 3-29—INFORMATION TECHNOLOGY – ENTERPRISE SYSTEMS AND PERSONAL COMPUTING ASSETS CONDITION AND REPLACEMENT COST



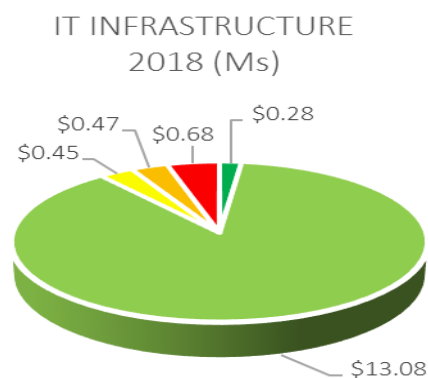
As per Figure 3-29, 78.0% of assets in this category have a condition rating of Very Poor. 69.4% of this category is represented by the following assets; PeopleSoft HRMS and Financials, Amanda (Municipal Tax System) and GIS (Geographic Information System). Table 3.13 provides additional details on specific systems which require upgrade.

TABLE 3-13—LISTING OF SIGNIFICANT IT SYSTEMS REQUIRING UPGRADE

IT System*	Upgrade	Status
Class	Completed	Upgrade has resulted in utilizing and cloud-based solution (Active.net)
Fleet Focus	Required - Ongoing	Currently taking place
Telephone system (311)	Required – Scheduled	Funding allocated and scheduled for Fall 2019
Crisys	Required - Scheduled	Target completion Spring/Summer 2019. Minimal cost since upgrade included in service cost
BeeOn	Required - Ongoing	Upgrade will replace existing system used by Fire for mandatory incident reporting and scheduling
PeopleSoft HRMS and Financials	Required – Not Scheduled	No longer supported by vendor. 3 rd party vender providing support until solution found. High cost associated
Amanda	Required – Not Scheduled	Upcoming upgrade will no longer support tax module. Solution needed. High cost associated
Hansen	Required – Not scheduled	Targeted for 2019/2020. Required funding and resources contingent on budget approval
GIS	Required – Not Scheduled	Legacy system requiring upgrade. Currently reviewing options
Fair Logistics	Required – Ongoing	Fairbox hardware requires upgrade to accept media cards. Scheduled to be completed Fall 2019
Corporate Phone Systems	Required – Ongoing	Required throughout the entire organization. Funding has been allocated for upgrade
Facility 360	Future Considerations	Increased use for asset management may lead to future upgrade due to developing needs

*Please note that this is only a partial list of system upgrades currently occurring or scheduled to occur. These systems have been identified as being critical to the operations of the City of Windsor and/or having a significant impact on internal and/or external users

FIGURE 3-30—INFORMATION TECHNOLOGY – INFRASTRUCTURE ASSETS CONDITION AND REPLACEMENT COST



IT Equipment such as servers, telephones, and communication systems are also captured in this section of the Asset Management Plan. The same approach used with IT software in establishing condition ratings has been used with IT equipment, and therefore caution should be used in reviewing this information. The subjective review reveals a different scenario than observed with IT software, as depicted in the figure above.

As per figure 3-30, 87% of assets in this category have a condition rating of Good. Within this grouping, 86% is comprised of a single asset, the Motorola Corporate Radio System. This is a communication system used throughout the organization especially when fieldwork is being conducted. The system is used to deploy personnel to residential reported emergencies, job site information relay, and any critical information concerning job-site performance, including requests for emergency services. Servers represent 8% of this category where 23.6% have a condition rating of Very Poor. Although the useful life attributed to these assets is five years, many of them are still in use. Continuous monitoring will be critical as these assets have operated longer than their useful life and will need to be replaced in the short to medium term.

3.9 Corporate Fleet Management


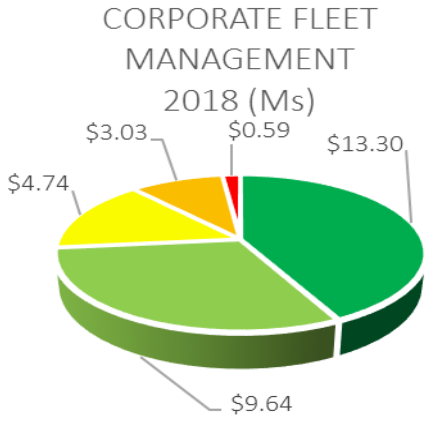
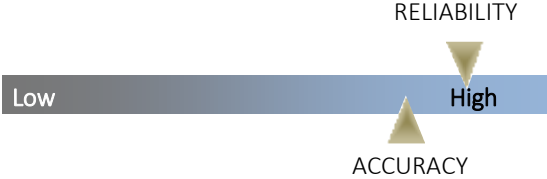
Corporate Fleet Assets range from vehicles (trucks, vans, cars, SUV's, sewer cleaners and First response fleet) to municipal fuel sites. The Fleet Division became responsible to manage Fire's First Response fleet in 2015. Most of the corporate fleet vehicles have relatively short asset lives and for the most part run on gasoline. A few vehicles are electric or hybrids, and Administration is continually seeking opportunities to leverage grant funding for the continual expansion of these types of vehicles.

Fuel sites included as part of the corporate fleet are all those with available data. The Crawford Yard garage is included in the Corporate Facilities listing as it is not separated from the balance of the building. No fleet equipment in the garages is included in this AMP as they are not identified as Tangible Capital Assets (TCA's). The Transit fuel site, which the Fleet Division is not responsible for, is included in this Corporate Fleet section of the AMP since it is part of the fuel site asset class. Corporate Fleet asset data is housed in the Fleet Focus CMMS which is used to manage and maintain all technical, operational and maintenance data on these assets.

The Corporate Fleet information included in this section of the AMP does not include police, transit, airport and parks off-road equipment. Parks off-road equipment is found in the Parks Services section of this AMP however the Fleet Division manages the purchase and disposals of the Parks off-road fleet including its reserve fund. Transit's fleet is reported under the TW section as TW has responsibility for these assets.

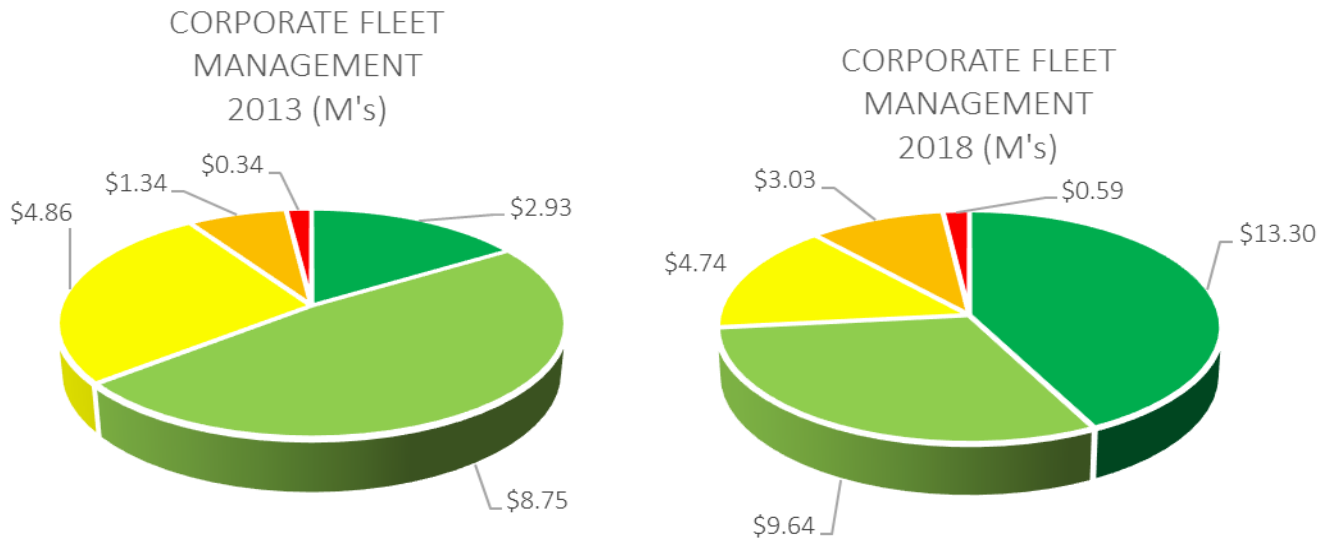
The corporate fleet infrastructure provides the necessary vehicle and equipment to enable various City departments to deliver much needed services to the public and residents of the municipality. Corporate Fleet services include:

- Acquisition, disposal and management of the corporate fleet including heavy fire equipment
- Maintenance and repair of corporate fleet excluding heavy fire equipment
- Provision of services to outside agencies as applicable
- Fuel management services in the supply and availability of fuel and operation of fuel sites managed by the Fleet division
- Materials management, motor pool and specialized services

Corporate Fleet Management	Replacement Value: \$31.29M
<p>88% of the Corporate Fleet Management assets are in a Fair to Very Good condition with the remainder approaching the end of their expected useful lives indicating a need for investment in the short to medium term. The City's Fleet assets are overall in Good condition indicating that they are meeting current needs. However, replacement will be required in the near future. There are reserves currently in place to support the replacement strategy for these assets</p>	
	
<p>Overall Condition = Good</p>	
<p>Data Confidence: Data reliability and accuracy for Corporate Fleet management is rated as High. Detailed asset information is maintained in the FleetFocus CMMS including costs. Preventative maintenance strategies are in place to sustain the life of these assets and monitor their overall condition. There are extensive policies and procedures, which govern the corporate fleet process, including 10-year forecasts for fleet replacement. The corporate fleet includes the vehicles managed by the Fleet Division of the Public Works Operations Department (i.e. vehicles used in municipal operations including heavy, medium, light and specialized vehicles including heavy Fire equipment). The corporate fleet doesn't include TW, Police, Airport fleet and Parks off-road fleet. The fuel sites are those which are represented in TCA as separate assets. Some fuel sites were adopted into the total cost of a facility and or fell under the threshold amount and as such are not identified in the fuel site graphs. In addition, although the Transit fuel site is not part of Corporate fleet's responsibility is included in this report rather than creating a separate graph for a single fuel site. In short, this should not be deemed as an exhaustive list of fuel sites nor a reflection of just those managed by the Corporate Fleet division. Efforts to separate the fuel sites from within the larger facility they are located at will be part of the work plan to improve future AMP's.</p>	

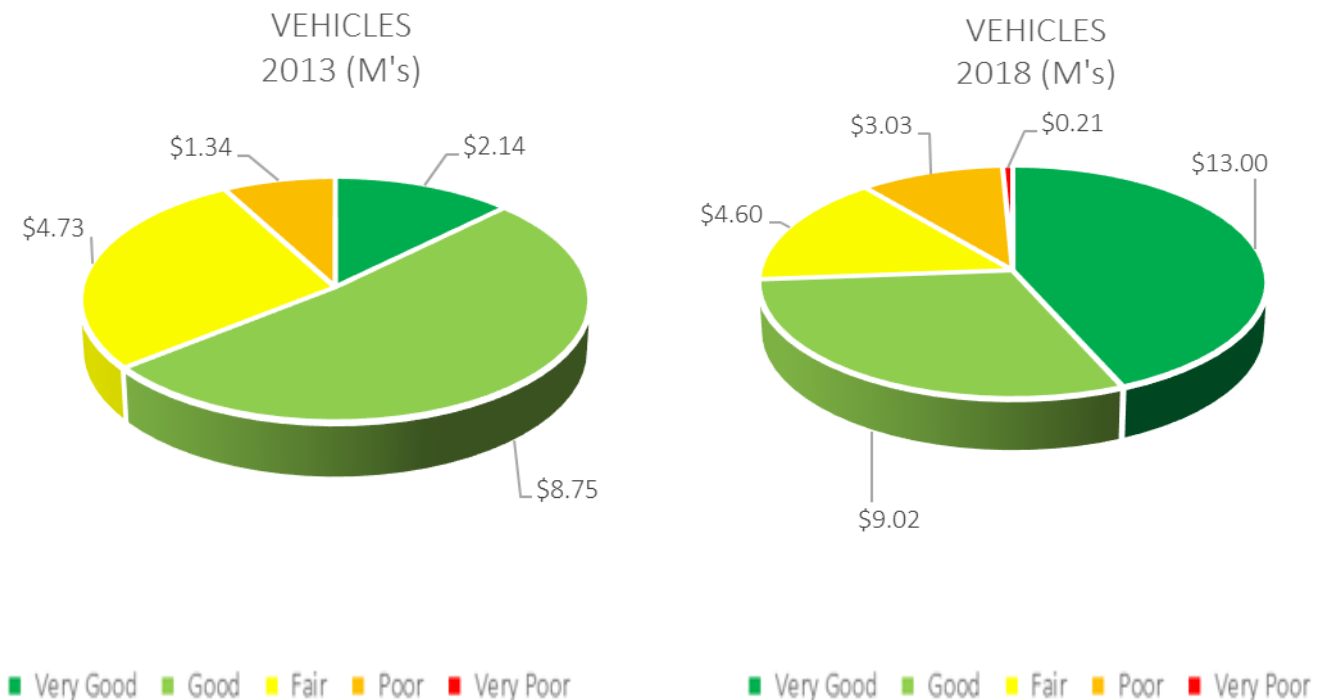
It is projected that the fleet reserve funding should sustain the current replacement schedules for the next 5 years based on replacing existing vehicles with like vehicles. This replacing like-with-like may not be possible for some vehicles within the fleet. A number of vehicle manufacturers including North American auto companies are no longer building certain vehicle types (e.g. vans, small pickups) and shifting to the production of alternatives.

FIGURE 3-31—CORPORATE FLEET MANAGEMENT CONDITION RATINGS 2013 VS 2018



The City's Corporate Fleet Management assets are overall in Very Good condition, indicating that they are meeting current needs better now than in 2013. This is a result of more than 87% of the City's Corporate Fleet Management assets being in Fair to Very Good condition. Keep in mind that in 2015 the First Response Fleet was added to this inventory which nearly doubled the replacement costs in this asset group. The remaining 12% of the assets are approaching the end of their expected useful lives. The following graphs separate the condition summary into fleet and fuel site assets.

FIGURE 3-32—CORPORATE FLEET VEHICLES CONDITION RATINGS 2013 VS 2018

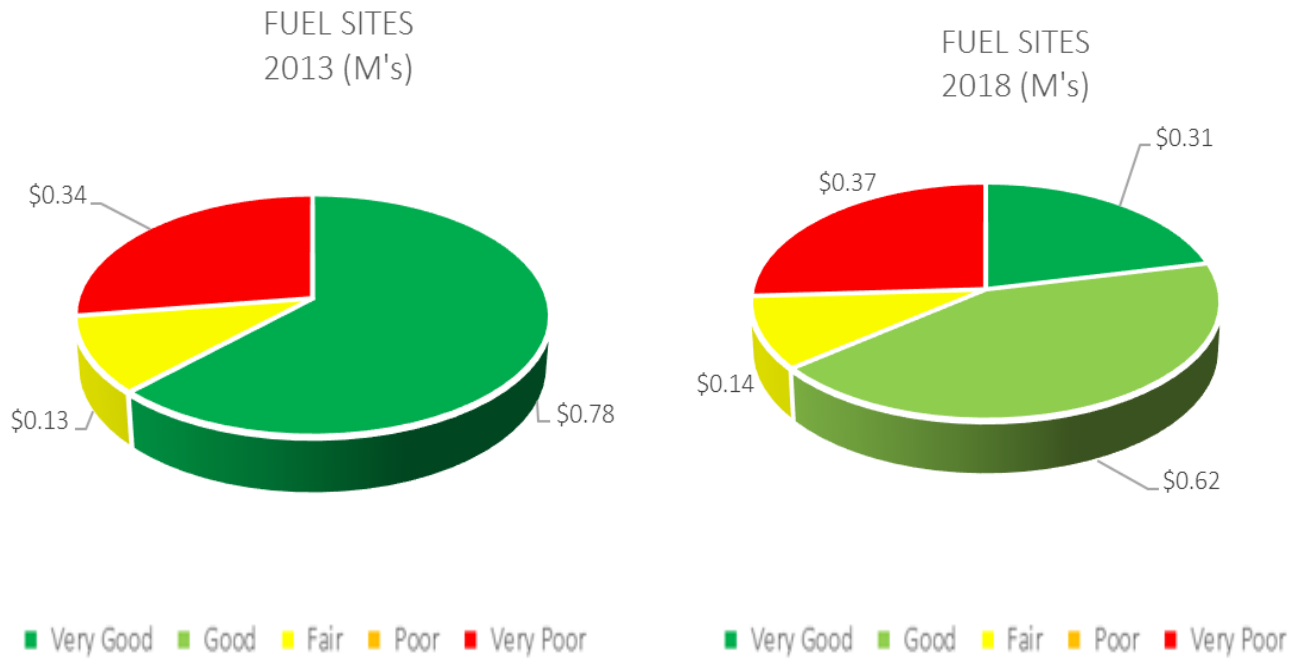


Very Good Good Fair Poor Very Poor

Very Good Good Fair Poor Very Poor

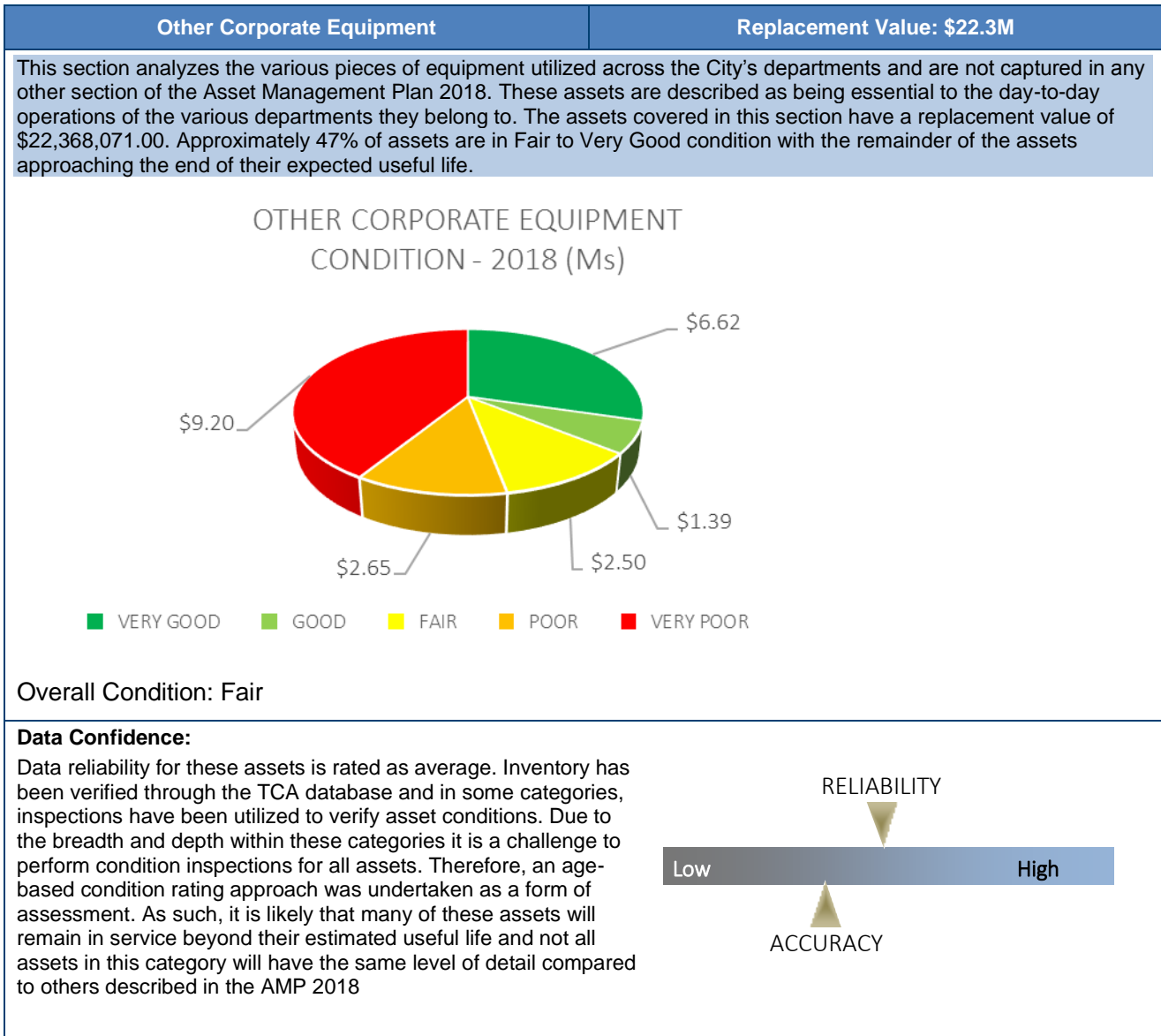
More than 88% of these assets are currently in a Fair to Very Good condition. Since the last AMP there's been over a 30% increase in the vehicles in a Very Good condition. The shift is due to the inclusion of the First Response Vehicles and the replacement of vehicles based on the replacement strategy and using the fleet reserve currently in place to fund replacements.

FIGURE 3-33—FUEL SITES CONDITION RATINGS 2013 VS 2018



For the most part the percentage of assets in a Fair to Very Good condition remained constant from 2013 to 2018. In 2018, 43% of the fuel sites are in a Good condition whereas in the 2013 AMP these assets were rated as Very Good. The work done this year on the fuel site at Lakeview Marina is not reflected in these figures

3.10 Other Corporate Equipment



An aged-based condition rating has been used for the majority of assets combined with internal knowledge, experience and any available data. Ideally, a phased in approach should be used to create and implement a more structured condition-rating program. Instituting the asset management strategies described in the AMP will provide a means in determining the service level expectations and therefore establish required funding levels needed for asset sustainability.

These assets have been included in the AMP 2018 to ensure adequate funding is allocated in the event of failure. With these assets having similar short-term lifespans and their capacity in affecting the day-to-day operations, establishing funding needs in the near term will circumvent delays in maintenance, repair, and/or replacement in the near future.

To improve our understanding of the service delivery and expected LOS in this category, the above assets will be included in the City's efforts to expand the implementation of asset management practices, policies and procedures in accordance to Ontario Regulation 588/17 for 2023 and 2024. This is in accordance with

efforts being made to establish the level of detail and analysis needed to determine funding levels required to meet expected LOS.

FIGURE 3-34—TOTAL OTHER CORPORATE EQUIPMENT SUMMARY OF ASSET CONDITION LEVELS – 2018

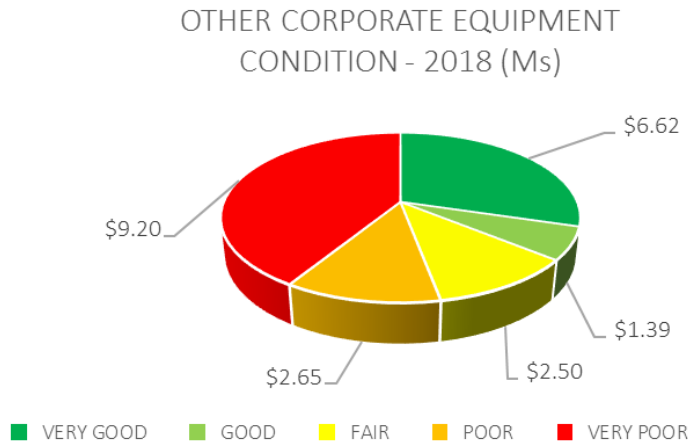
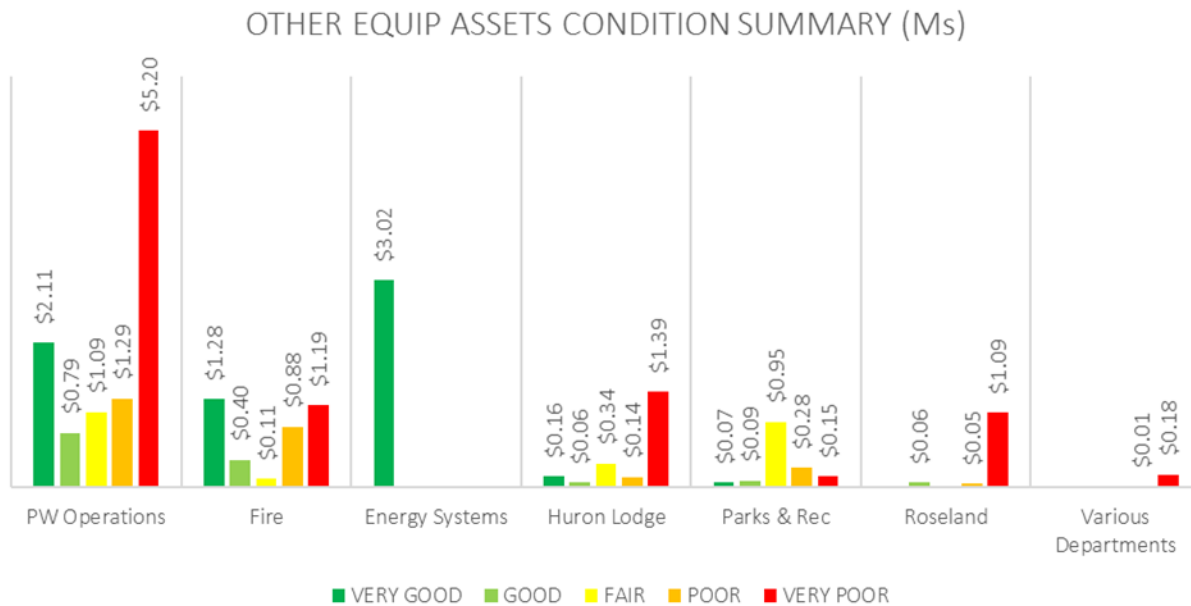


FIGURE 3-35—OTHER CORPORATE EQUIPMENT SUMMARY OF CONDITION AND REPLACEMENT VALUE BY DEPARTMENT



The Table 3-14 provides a breakdown of the equipment by department and by condition rating. Public Works Operation department has the largest amount of equipment as measured by replacement value, as well as the largest portion in the very poor condition category. This can be attributed to the extended life this type of equipment has been given through repeated repair and maintenance due to budget constraints. As a result, the equipment is able to perform beyond its estimated useful life while avoiding replacement cost expenditures. Furthermore, as noted in the transportation section of this AMP, roads are particularly prone to age-based deterioration and climate impacts which could significantly alter the overall rating, so too are these assets. The same holds true of the equipment used to repair and maintain these same roads. The impact of these actions result in a higher percentage of assets falling in the Very Poor category.

TABLE 3-14—OTHER CORPORATE EQUIPMENT GROUPINGS BY CONDITION AND REPLACEMENT VALUE

Equipment Grouping	Very Good	Good	Fair	Poor	Very Poor	TOTAL
PW Operations	\$ 2,105,162	\$ 789,983	\$ 1,090,215	\$ 1,291,797	\$ 5,198,159	\$10,475,316
Fire	\$ 1,280,702	\$ 395,848	\$ 114,950	\$ 875,582	\$ 1,192,491	\$ 3,859,573
Energy Systems	\$ 3,016,657	\$ -	\$ -	\$ -	\$ -	\$ 3,016,657
Huron Lodge	\$ 157,186	\$ 58,447	\$ 343,507	\$ 143,873	\$ 1,392,470	\$ 2,095,483
Parks & Rec	\$ 65,095	\$ 87,127	\$ 951,867	\$ 278,474	\$ 151,077	\$ 1,533,640
Roseland	\$ -	\$ 58,235	\$ -	\$ 47,403	\$ 1,087,908	\$ 1,193,546
Various Departments	\$ -	\$ -	\$ -	\$ 12,808	\$ 181,048	\$ 193,856
TOTAL	\$ 6,624,802	\$ 1,389,640	\$ 2,500,539	\$ 2,649,937	\$ 9,203,153	\$22,368,071
PERCENTAGE SPLIT	30%	6%	11%	12%	41%	

As depicted by the figure 3-35 and table 3-14 above, 41% of the City's equipment is in Very Poor condition. This has a direct impact on the City's operational efficiency; with equipment not being functional when it is needed, crews often must reschedule work orders and/or delay work until equipment is fixed or work arounds are identified. This impacts the City's ability to meet maintenance requirements and/or operational tasks in a timely manner.

3.11 Summary / Review / Conclusion

Several positive steps have occurred in the past 5 years resulting in the favourable overall rating of Good for our assets. These include the significant investments in facility replacements, sewers and roads, as well as the work completed to obtain objective condition data on our sewers, facilities and pollution control assets.

While the overall results have improved, there continues to be several assets which continue to deteriorate and, in many cases, result in asset failures requiring these assets to be pulled out of service. Administration has been before City Council on several occasions seeking reallocation of funding in the Capital Budget to address the immediate needs, which in turn pushes out other priority projects to future years. This creates a situation whereby planned replacements and rehabilitations are not being executed on a timing basis to address immediate failure needs. In some cases, it also means reallocated funding from growth or service enhancement type projects to address these challenges. The purpose of this AMP is to provide recommendations on what level of annual funding for existing assets is required to reduce these spikes in funding challenges, which also impacts the community as the assets in question are usually removed from service for extended periods of time. While several assets can be run to end of life, there are many which simply cannot, due to the risk associated with their failure. Several examples of assets, which could create a Significant or Critical risk to the City if they run to failure are bridges, pollution control plant and pump stations, trunk line sewers, as well as the road classifications of EC Row, Arterial and Collector.

Therefore, current condition is only one factor in understanding the costs to sustain these assets at their current service levels. This AMP focuses on the costs to continue to sustain the assets and ensure they achieve or exceed their design life. The AMP also provides recommendations on how various projects should be prioritized to reduce the risk of significant and or critical assets being underfunded. A good example of why prioritization is important is the roads category. While there has been notable improvement overall on this category, the majority of the improvement has been to local roads, and our higher risk road classification has continued to deteriorate with the overall kms in Very Poor condition, being higher for EC Row. In addition to the fact that EC Row presents a Significant risk at point of failure compared to a local road which results in a Moderate risk, the cost to reconstruct a kilometer of EC Row is significantly higher than a local road. Therefore, it is recommended that the condition of EC Row be maintained at a Fair level, reducing the cost to sustain it by ensuring various maintenance and rehabilitation measures are taken to avoid reconstruction as well as the risk associated with the road deteriorating to the point of requiring reconstruction.

It should also be noted that Climate Change can have an impact on the condition of several of these assets. Wind, rain, snow, freeze thaw cycles and fires can quickly impact the condition of assets. While Section 5 includes more comments on the impact of climate change and efforts to build in resiliency and adaptation for our assets, it should be noted that these events can radically change condition.

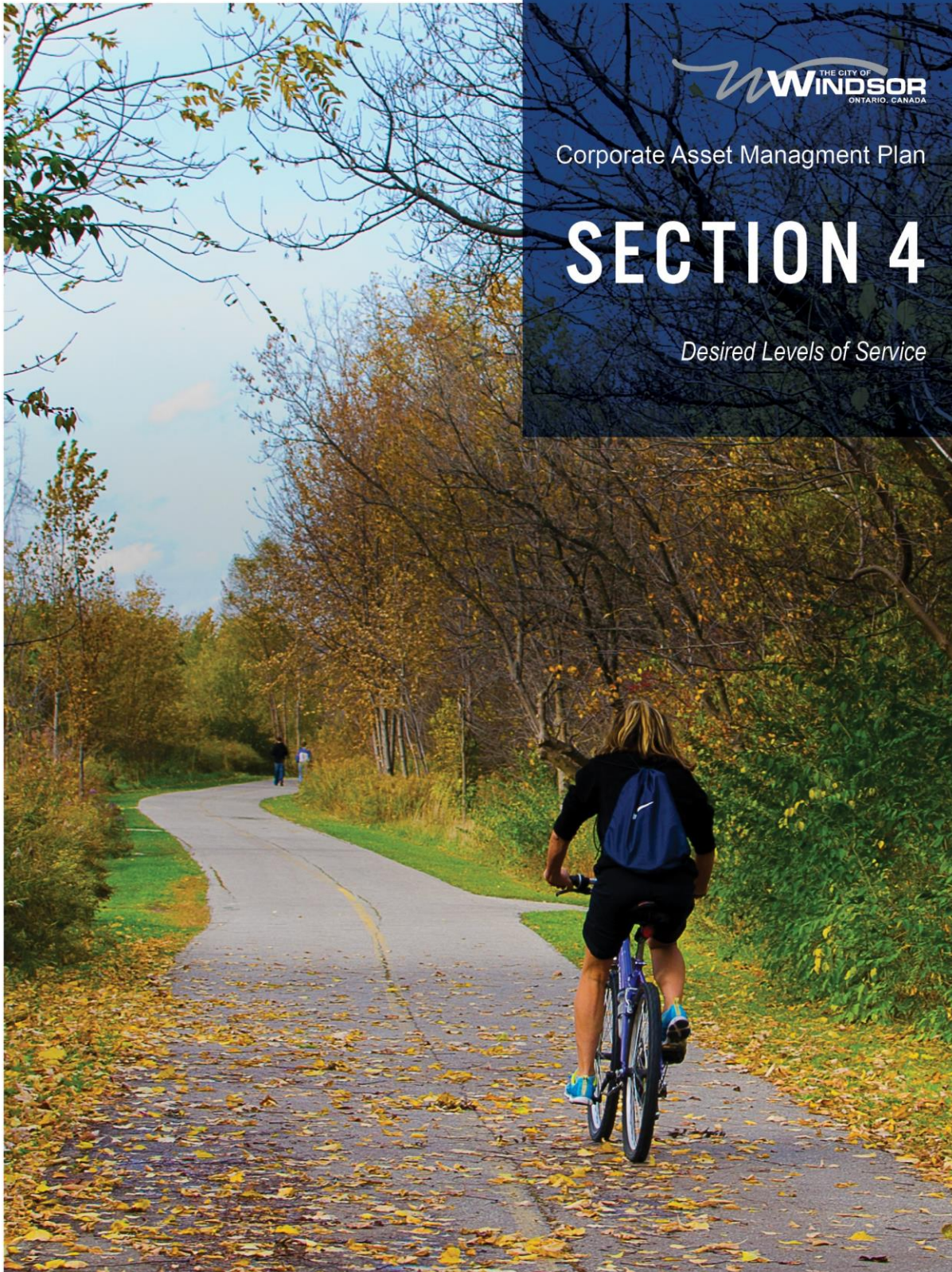
The 2013 AMP was brought forward as information due to a significant number of subjective conditions ratings. Significant improvements on the accuracy and reliability of the data for this Asset Management Plan has been made over the past five years, resulting in an ability to more accurately predict average annual funding levels required to sustain these assets at current service levels. These improvements, along with other improvements relevant to this plan, are detailed in Section 7. There are still areas for additional improvement opportunities and particular attention will be paid to the following items over the next five years:

- Develop and implement a program and software solution for Park Service asset data collection, workorder, inspections, condition assessments and forecasting
- Create and implement a process to improve the annual update of the City's TCA database with the annual changes and most recent condition assessments across the entire asset network
- Ensure sustainability between the O & M activities and the average annual capital funding required to operate and maintain our assets within an acceptable level of risk
- Ensure processes are in place to continue to capture information required in our AMP for O.Reg 588/17 requirements

Several key assumptions were made and a number of omissions were noted during the compilation of information for Section 3:

- While there have been significant improvements in obtaining objective sewer condition data, approximately 36% of the network, as of the date used for the data in this report, are subjective ratings. In addition, for the sewer network no recommendations beyond investment in various maintenance and rehabilitation investments will be provided. The Sewer Master Plan, currently in development, is modelling data which will speak to the required projects to address the flooding challenges. Some assets in Fair to Very Good condition may be recommended for replacement with larger systems to mitigate flooding risk. These recommendations and associated costs will be included in the Sewer Master Plan and adopted into future AMPs.
- There are several smaller facilities with subjective ratings in which the building condition information is based on a building as a whole. Administration is working towards obtaining objective condition data which will also provide objective recommendations on annual investments for the various facility components to maintain them over their life.
- The park assets are extensive and collectively can have a significant value. Administration is continuing their efforts to implement processes and systems for better tracking and reporting on these assets, which will assist in future AMP development, as well as the daily operations to manage these assets.
- For all other subjective ratings we will be assessing which assets should have a more objective evaluation process and which assets an age-based condition coupled with expert knowledge of the asset remains a reasonable approach to determine condition.

Moving forward, it is the Asset Planning Division's intention to continue to work with the various operational areas to assist them in producing detailed information for the Corporate Asset Management Plan. Condition data will continue to be uploaded annually to the TCA database based on the latest available information from the CMMS network. This is done with the intention of providing the best possible data available for making O & M decisions, capital investments as well as aligning with all Provincial requirements and legislation



Corporate Asset Management Plan

SECTION 4

Desired Levels of Service

Levels of Service

Levels of service (LOS) measures are high level indicators comprising many factors that establish defined quality thresholds at which municipal services are supplied to the community. They support the organization's strategic goals and are derived from customer needs and expectations, Council objectives, City policies, legislative and regulatory requirements, standards, along with the financial capacity of the municipality to deliver those LOS.

LOS can be used:

- To inform customers of the proposed type and LOS of service to be offered,
- To identify the costs and benefits of the services offered,
- To assess suitability, affordability and equity of the services offered,
- To understand service areas of under-performance or over-performance,
- As a measure of the effectiveness of the asset management plan,
- As a focus for the asset management strategies developed to deliver the required LOS.

Since the first AMP in 2013, the City has made significant steps forward with their LOS Framework across the City, demonstrating an advancement in asset management practice. The corporate template developed for Levels of Service (LOS) considers the following service type factors for assets: safety, quality, quantity, reliability, responsiveness, cost/efficiency and legislative compliance as listed in Table 4-1. This framework will include Community LOS, sometimes referred to as Customer LOS, which relates to how our community receives the service.

Supporting the Community LOS (CLOS) are operational or technical measures (TLOS) of performance developed to ensure that the minimum Customer LOS are met. These technical measures relate to service criteria such as: condition, failure rates, cost effectiveness, etc. Many industries would refer to these as Key Performance Indicators (KPIs). The AMP focuses on CLOS measures, and other internal management and tracking efforts within the service area are used for the TLOS measures. The framework is based on asset management industry best practice and aligns with the level of service requirements outlined in Ontario Regulation 588/17. In developing the measures there is always a balance between having too many measures, resulting in data overload and lack of clarity, which can make it difficult to focus on those of highest importance, but at the same time having sufficient measures to enable a focus on the key aspects of the asset management plan and those that will result in more efficient and effective service delivery.

TABLE 4-1—LEVEL OF SERVICE ATTRIBUTE CATEGORIES

Windsor Strategic Plan Pillars & Objectives	Our Society	Our Environment					Our Economy	Our Government			
	Diverse & Caring	Clean & Efficient					Cultivated & Competitive	Responsive & Responsible			
	Stay Safe	Maintain Infrastructure	Improve our Environment	Develop Responsibly	Conserve Energy	Make Transportation Efficient & Convenient	Grow Business	Improve Financial Success	Make Services Responsive	Form Beneficial Partnerships	Encourage Public Engagement
	Ensure public safety and the protection of residents, visitors and property	Improve the physical infrastructure, buildings, and public structures	Preserve and enhance the natural environment and our urban green spaces	Develop land efficiently, attractively, and in ways that protect the environment	Be an energy-efficient community	Provide transportation systems that enhance physical mobility and better serve the economic and social needs of all citizens	Cultivate a positive and diverse economic environment for business growth	Maintain and improve the City's financial health	Be accountable for providing top-quality municipal services that serve citizens better	Develop innovative partnerships between the public, private, and not-for-profit sectors	Engage citizens openly and frequently in decisions that affect their lives

Asset Management Plan (AMP) Service Attributes	Safe	Reliable	Suitable	Sustainable	Available	Cost Effective	Responsive
	Services are delivered such that they minimize health, safety and security risks	Services are predictable and continuous	Services are suitable for the intended function (fit for purpose)	Services preserve and protect the natural and heritage environment	Services of sufficient capacity are convenient and accessible to the entire community	Services are provided at the lowest possible cost for both current and future customers, for a required level of service, and are affordable	Opportunities for community involvement in decision making are provided; and customers are treated fairly and consistently, within acceptable timeframes, demonstrating respect, empathy and integrity

The CLOS measures in this report were developed by GHD who worked with the City’s Asset Planning Team, Asset Management Network and Asset Planning Steering Committee, in addition to other appropriate staff for specific asset areas. In building the LOS framework for each service area the criteria had to be specific, measurable, achievable and relevant for each Service Area across the City. To date measurements developed through the corporate LOS framework are isolated to the following: Transportation Assets, roads, sidewalks and structures.

The suite of measures for all assets were developed from several information sources including;

- Existing City reporting systems provide staff with many different metrics that can support objective performance review. Various software and reporting systems were reviewed for each service area to identify appropriate CLOS (and TLOS) measures for infrastructure service planning requirements. The City also established a comprehensive 311 system to help serve the public and the many other users of its corporate-wide infrastructure. This service is critical in not only allowing City leadership and service areas to relay information to the public and end-users, but also provides critical feedback on the actual performance of city-wide service delivery. This feedback in turn, allows service groups to customize or personalize their delivery systems and methods to best meet the needs of both municipal staff and the general public.
- Ontario Regulation 588/17 includes several measures that all municipalities in the province need to track. To meet compliance requirements, the TLOS measures specified in 588/17 have been included in this section of the AMP.
- Municipal Benchmarking Network Canada (MBNCanada) is a partnership between Canadian municipalities who believe in the power of data to inspire accountability, transparency and continuous improvement in the delivery of services to their communities.

Section 4 of the AMP captures current LOS levels, the projected trend of this measure (whether levels are getting better or worse), and the target level the City is aiming for. Future versions of the AMP will start to consider what level of service is desired to be achieved for assets, and what investment is required to achieve it. This is also a requirement by 2024 under O.Reg 588/17.

These trends are based on the current state of the asset base combined with the funding levels remaining relatively the same over the next 20 years. The trends shown reflect that many assets are nearing the end of their useful lives and that maintaining funding at current levels will likely not be sufficient to hold service levels at their current level. Windsor is not unique as the situation is pervasive across the province and indeed, the country. While municipalities will have to certainly play a major role in addressing this deficit, they rely largely on one revenue stream (the property tax levy). Therefore, it is critical for the senior levels of government,

which have a much more diversified revenue stream, to help fund an ongoing sustainable infrastructure program. The City of Windsor over the past 2 years has been very aggressive in submitting applications to various grant programs to assist with this financial challenge whenever possible and as of this report have leveraged over \$60M in grant funding. Further discussion on the use of grants to address our funding level shortfalls can be found in Section 6.

Moving forward, the City will continue to track LOS performance measures and ability to meet the target levels. As many of the City's assets require significant time to complete the projects the LOS indicators will occur at the start of 2021 in preparation for the 2023 Asset Management Plan to ensure our investment strategy, projections and project delivery work is meeting the expected target levels.

4.1 Key Factors for setting Windsor's Levels of Service Targets

In developing the City's LOS measures to date, we have taken into account a broad range of factors including the following:

- Strategic Goals
- Legislative and Regulatory requirements along with City Policies
- Current state of assets
- Community Expectations
- Affordability

4.1.1 Strategic Goals

The City's LOS are founded upon the City's strategic goals and Council Objectives. These spell out what the City wants to become, how it's going to get there, and helps decide how and where to allocate resources, ensuring alignment to the strategic priorities and objectives. This helps identify priorities and guides how municipal tax dollars and revenues are spent into the future. The vision for the City of Windsor is dependent upon its infrastructure and people, and therefore the desired LOS provide tangible measures of how the City is progressing towards its goals

4.1.2 Legislative and Regulatory Requirements, including Ontario Regulation #588/17

Ontario Regulation 588/17, "Asset Management Planning for Municipal Infrastructure" came into effect in January 1, 2018, laying out some more advanced municipal requirements for asset management that built on Ontario's past connection between provincial funding and municipal AMP documents. This AMP demonstrates the City's compliance for 2021 requirements stated in this new regulation.

In addition to Ontario Regulation 588/17, there are several legislative and regulatory requirements and/or guidelines that relate to specific asset types.

4.1.3 City Policies

The City also has in place a number of approved policies and standards, for example regarding snow and ice removal or for maintaining the City's roads at a certain standard and these too will be reflected in LOS measures.

4.1.4 Current State of our Assets

The current LOS that the citizens of Windsor experience, are largely influenced by the current state of the asset base, along with performance and limitations with regards to safety, capacity and the level of redundancy that is built into the asset network. Therefore, regardless of what the desired LOS are, the current asset base can only support a certain LOS. This iteration of the AMP captures the current LOS measures and dependence on the condition of the assets, highlighting the need to invest in maintaining our existing assets.

4.1.5 Community Expectations

Community expectations have a direct impact on the City's desired LOS. Based on the citizen's experience of the service provided within the City, when compared to other Cities, there may be an expectation that the service should be higher. This may not be possible based on the current assets condition, funding and or capability. This can equally apply within the City, where there can exist examples of LOS differing significantly depending on the location within the City. Community perceptions can also be driven by very localized asset failures e.g. poor sections of road, however these deficiencies may only apply to a small proportion of the population and the City as a whole may be performing relatively well. Therefore, moving forward it is not only important that the public is consulted with regard to LOS, but also that they become better educated with regard to the associated costs of maintaining or improving service levels and in this way they will be better informed on what is the right LOS for the City.

4.1.6 Affordability

Availability of finances and willingness to pay will ultimately control all aspects of the desired level of service for the City of Windsor. Ideally funds would be available to achieve all of the City's goals, meet legislative requirements, meet community expectations and at the same time address the aging asset stock across the City. However with an aging asset base and the need to invest more in our existing assets just to maintain service, this AMP focuses solely on the sustainability of current service levels. Any potential increases in LOS will need to be assessed in the next AMP and compared against the risks associated with our existing assets and the funding mechanisms available. Moving forward the aim of the Asset Management Program is to more accurately assess the costs associated with maintaining current service levels, both with regard to Capital and Operating costs, and to better understand the true costs of service level increases and conversely the potential savings that could be made by lowering certain LOS. This information can then be shared with the public and will be the basis for further informed discussions on desired LOS.

4.2 Performance Measures and Targets

4.2.1 City Level of Service Summary Overview

An assessment of the current condition of the asset base along with a summary view on the associated LOS being delivered across the City is shown in Tables 4-2 and 4-3 below. Also shown are projections of the risk profile of the assets along with the expected service trend. These trends are based on the current state of the asset base combined with the expected levels of funding over the next 20 years i.e. assuming that the future spending will be comparable with current funding levels.

Table 4-3 below provides a summary of the trend symbols. The first two columns, Condition and Service Level, provide a comparison of trends to previously reported information in 2013. The Risk to Service Delivery and Projected Service Levels reflect the trends based on previous versus current trends as well as projected impacts current funding levels are likely to have on the assets.

For the roads, bridges and sidewalks, the City's LOS framework and template were used to determine indicators in 2014. These indicators were revisited and updated in 2018 to reflect comparisons over that timeframe. As such there is more detail to support the trends for these assets, which can be found in Appendix G.

For all other assets, corporately established KPI data is only available for specific indicators and for specific years. Because some of the indicators are so detailed and specific and will require the further development of standardized processes to regularly retrieve the data, OMBI or MBNCanada benchmarking measures are utilized in this 2018 version of the AMP, as they were in 2013, to supplement LOS performance measures. OMBI/ MBNCanada statistics and 311 data are also widely reported to and accepted by the City's executive leadership and Council, so familiarity and confidence in data accuracy is already established. As the City's LOS and Risk guidelines and templates are applied to the remaining assets, a robust and accurate set of internal KPI data for performance measure reporting will be completed. As such the tables and figures in this section, with the exception of the roads, bridges and sidewalks, reference the most recent publicly available OMBI/ MBNCanada statistics (2016) and incorporate internal KPI's when the data is sufficient and accurate.

Lastly, it should be noted that both TW and Other Equipment were not in the 2013 AMP and therefore do not have Condition and Service Level comparisons.

TABLE 4-2—LEGEND OF TREND DESCRIPTIONS






SYMBOL	TREND	DESCRIPTION
	Negative Upward Trend	An upward trend represents a negative outcome for the City of Windsor e.g. higher risk to service delivery
	Positive Upward Trend	An upward trend represents a positive outcome for the City of Windsor e.g. improving LOS
	Negative Downward Trend	A downward trend represents a negative outcome for the City of Windsor e.g. declining LOS
	Positive Downward Trend	A downward trend for this category to service delivery represents a positive outcome for the City of Windsor e.g. lower risk to service delivery
	Consistent/ Stable Trend	No anticipated changes noted at this time

TABLE 4-3—OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS

Potential Facilities LOS Trends					
Service Area	Condition	Service Levels	Risk to Service Delivery	Projected Service Levels	Data Confidence
Transportation					RELIABILITY ACCURACY
Environmental Protection – Water Reclamation					RELIABILITY ACCURACY
Environmental Protection – Sanitary & Storm Sewers					RELIABILITY ACCURACY
Corporate Fleet					RELIABILITY ACCURACY
Transit Windsor					RELIABILITY ACCURACY
Corporate Facilities					RELIABILITY ACCURACY
Information Technology (IT)					RELIABILITY ACCURACY
Parks Services					RELIABILITY ACCURACY
Riverfront Parks Shorewall					RELIABILITY ACCURACY
Other Corporate Equipment					RELIABILITY ACCURACY

4.2.2 Transportation Services

The transportation infrastructure enables the City to deliver transportation and pedestrian facility services and give people a range of options for moving about in a safe and efficient manner including:

- **Movement** – providing for the movement of people and goods
- **Access** – providing access to residential, commercial, and industrial properties and other community amenities
- **Recreation** – providing for recreational use in Right of Ways for activities such as walking, cycling, or special events such as parades

4.2.2.1 Ontario Regulation 588/17 Community and Technical Levels of Service (Roads, Bridges and Culverts)

Section 5.2.1.i of the O. Reg. 588/17 identifies the requirements for qualitative and technical metrics with respect to LOS for roads, bridges and culverts. The following represents evidence that the City is in compliance with the July 1, 2021 as outlined in Section 5.2.1.i.

ROADS – O. Reg 588/17 Table 4 Requirement

Scope:

Community LOS (Qualitative Descriptions):

- 1) Map of the municipal roads network broken down by road classification to represent municipal connectivity can be found in Appendix Dii.
- 2) Supplemental to the map is short description outlining EC Row Expressway as a major central expressway/highway, representing 5% of the entire municipal roads network, and which connects the eastern-most and western-most regions of the City while providing access to the City's primary Arterial network including Huron Church Road which feeds Southwestern Ontario's largest international border crossing.

Technical LOS:

- 1) Lane-kilometers of major classifications of roads as a proportion of square kilometers of municipal land area:

C1 Arterial	9.847 km
C2 Arterial	<u>126.141 km</u>
	135.988 km
Municipal Land Area	÷ <u>146.9 sq. km</u>
	0.926

C1 Collector	96.504 km
C2 Collector	<u>78.530 km</u>
	175.034 km
Municipal Land Area	÷ <u>146.9 sq. km</u>
	1.192

Local Residential	668.259 km
Local Commercial/Ind.	<u>17.315 km</u>

	685.574
Municipal Land Area	÷146.9 sq. km
	4.667

Quality:

Community LOS (Qualitative Descriptions):

- 1) The City of Windsor uses a Pavement Condition Index/SCI condition rating matrix that is directly translated into the corporately approved 5–point infrastructure condition rating scale of Very Good, Good, Fair, Poor and Very Poor. This corporate rating system includes detailed definitions of each condition category and terminology that can be translated to effectively describe the condition of any corporate asset including roads. This rating scale and translation is outlined in the attached Appendix A.

Technical LOS:

- 1) The average pavement condition index/SCI value for paved roads in the municipality is 10.1 based on 5738 road segments.
- 2) The municipality does not technically own any roads that are unpaved and any alleys that contain grass, stone and/or other materials are generally inaccessible to the general public by vehicle.

To satisfy item iii of paragraph 3. of the “asset management plans” section of O.Reg 588/17, the average age of the municipal roads network is 50 years. The following caveats/stipulations must be stated:

- 1) Age is based on Tangible Capital Asset (TCA) database age. When a road is reconstructed the old one will be disposed and the new one added.
- 2) TCA took effect in 2008 so point 1 only applies from 2008 forward.
- 3) TCA core data came from Hansen database and in-service date in Hansen was used to build the inventory.
- 4) Hansen sustains the original asset ID and in-service date for roads. Any mill and pave or reconstruction of a road does not change the in-service date. These are work orders against the road only.
- 5) Since TCA is based on Hansen, there is a strong likelihood that many of the older roads have been reconstructed after their original in-service date and prior to 2008. This means the reconstruction of a road to reflect a newer pavement is not reflected in TCA. Only reconstructions after 2008 are tracked in TCA. As such, the average age date is viewed as overstated and condition is how the City reviews the road network needs.

BRIDGES AND CULVERTS - O. Reg 588/17 Table 5 RequirementScope:

Community LOS Qualitative Descriptions:

- Traffic supported by municipal bridges is general public and commercial duty which includes heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, and cyclists.

Technical LOS:

- 1) There are no bridges in the municipality with loading restrictions.

Quality:

Community LOS Qualitative Descriptions:

- 1) The municipal bridge condition is generally in a Good” to Very Good state. A more specific breakdown is detailed below:

Very Good	68% of total network (rounded)
Good	23%
Fair	6%
Poor	2%
Very Poor	2%

- 2) A structural culvert is classified as anything exceeding 3m and the municipal culvert condition is generally in a Good to Very Good state. A more specific breakdown is detailed below:

Very Good	55% of total network (rounded)
Good	27%
Fair	9%
Poor	9%

Condition ratings for bridges and culverts adhere to strict OSIM requirements and are therefore inspected and maintained to strict standards. All bridges and culverts in the municipality are open to traffic both vehicular and pedestrian. Assets deemed in Poor to Very Poor condition often may only have a single component of the larger “whole” asset in a Poor condition which reflects on the entire asset condition rating. The asset however is typically considered structurally sound. Assets in Poor to Very Poor condition are also often subject to inspections from third party engineers/consultants to ensure safe operation and delivery of expected LOS.

Technical LOS:

- 1) The average municipal bridge condition index is 91.02 which can be translated into a corporate condition rating of Very Good.
- 2) The average municipal culvert condition index is 89.80 which can be translated into a corporate condition rating of Good.

To satisfy item iii of paragraph 3. of the “asset management plans” section of O.Reg 588/17, the average age of the municipal bridge network is 45 years. The following caveats/stipulations must be stated:

- 1) Age is based on Tangible Capital Asset (TCA) database age.
- 2) TCA took effect in 2008 so point 1 only applies from 2008 forward.
- 3) TCA core data came from Hansen database and in-service date in Hansen was used to build the inventory.
- 4) Hansen sustains the original asset ID and in-service date for bridges. Any rehabilitation work of a bridge does NOT change the in-service date. These are work orders against the asset only.
- 5) Since TCA is based on Hansen, there is a strong likelihood that many of the older bridges have had rehabilitation work done after their original in-service date and prior to 2008. This means the rehabilitation of a bridge to reflect an upgraded/refurbished asset is NOT reflected in TCA. Only rehabilitation works AFTER 2008 are tracked in TCA. As such, the average age date is viewed as overstated and condition along with adherence to strict OSIM standards is how the City reviews the bridge network needs.

To satisfy item iii of paragraph 3. of the “asset management plans” section of O.Reg 588/17, the average age of the municipal culvert network is 30 years. The following caveats/stipulations must be stated:

- 1) Age is based on Tangible Capital Asset (TCA) database age.


- 2) TCA took effect in 2008 so point 1 only applies from 2008 forward.
- 3) TCA core data came from Hansen database and in-service date in Hansen was used to build the inventory.
- 4) Hansen sustains the original asset ID and in-service date for culverts. Any rehabilitation work of a culvert does NOT change the in-service date. These are work orders against the asset only.
- 5) Since TCA is based on Hansen, there is a strong likelihood that many of the older culverts have had rehabilitation work done after their original in-service date and prior to 2008. This means the rehabilitation of a culvert to reflect an upgraded/refurbished asset is NOT reflected in TCA. Only rehabilitation works AFTER 2008 are tracked in TCA. As such, the average age date is viewed as overstated and condition rating is how the City reviews the bridge network needs.


4.2.2.2 City of Windsor Levels of Service (LOS)


Since the 2013 AMP the City has developed a LOS framework and template the road, bridge and sidewalk assets have used to define our LOS indicators. Table 4-4 below provides the high-level trend of the various road classifications based on these LOS stats. Appendix G contains more detailed LOS data for the various road classifications.


The trends noted for each road classification are based on LOS trends from 2014 to 2018 as noted in Appendix G. For the roads, bridge and sidewalk assets the trend over the past 4 years along with various maintenance, rehabilitation and reconstruction works which should be executed, is considered to determine the funding level required to achieve the LOS targets over the next 20 years.


TABLE 4-4—SUMMARY OF ROAD, STRUCTURE AND SIDEWALK LEVEL OF SERVICE TRENDS


Service Trend Overview	Comments and Proposed Strategy
 <p>Expressway Service Levels in DECLINE, presenting a negative outcome for the City of Windsor</p>	<p>Comments</p> <p>While some additional funding was secured for Transportation & Roads in recent budget years, the funding was not directed towards the Expressway roads, where 0% of roads were reconstructed, renewed, or repaired during the 2014 to 2018 period, including 2015 and 2016. Maintenance work has been done on Bridges that are part of the Expressway as Bridge work has taken precedence, however that work is categorized under Bridges. In 2018 there has been some reconstruction work done on Expressway, but the year end figures have not been included in this AMP.</p> <p>The deterioration of the Expressway happens more rapidly than other types of roads. This is directly attributed to the speed, volume and heavy loaded vehicles which use this road. As a result, Expressway road conditions have declined materially since 2014 with the percent of roads rated Good or Very Good condition declining 45%, and the weighted average pavement condition decreasing from 9.423 to 12.107 (where 1 is best). Total lane KMs in Poor or Very Poor condition has increased as well from 5.39 to 13.97, a 159% increase. While some of these sections are on and off ramps, the overall expressway roads condition could decline quickly in future years given the declining proportion of Good or Very Good condition roads.</p> <p>Target</p> <p>As there is a significant risk associated with the failure of the Expressway, both in terms of likelihood of an adverse event and the consequences to the City, the Expressway should be maintained at a Fair condition, and the target of having zero lane KMs being in Poor or Very Poor condition should be met.</p>


Service Trend Overview	Comments and Proposed Strategy
 <p>Arterial Roads Service Levels in DECLINE, presenting a negative outcome for the City of Windsor</p>	<p><u>Comments</u></p> <p>Additional funding secured for Transportation & Roads has been directed towards arterial roads compared to 2014, with more roads as a percentage of the total being reconstructed, renewed, and repaired. Maintenance activities have focused on larger maintenance projects (reconstruction and renewals) that result in a significant improvement in road condition, as compared to panel repairs. There are several major arterial projects which have been started since 2013 including Walker Rd and Cabana. These projects have not been just to replace the existing road, they required enhancements to the roads, including expansion of them.</p> <p>This funding has not been sufficient to maintain the overall arterial roads in the same condition as 2014. Arterial roads in Good or Very good condition have declined by 17% since 2014 from 51.86% to 42.96% in 2018 and the weighted average pavement condition has decreased from 9.098 to 9.181 (where 1 is best). As roads deteriorate at an increasing pace, the overall arterial roads condition could decline quickly in future years given the declining proportion of Good or Very Good condition roads.</p> <p><u>Target</u></p> <p>There is a significant risk associated with the failure of the Arterial, both in terms of likelihood of an adverse event and the consequences to the City. Arterials should be maintained at a Fair condition, and the target of having zero lane KMs being in Poor or Very Poor condition should be met.</p>

Service Trend Overview	Comments and Proposed Strategy
 <p>Collector Roads Service Levels in DECLINE, presenting a negative outcome for the City of Windsor</p>	<p><u>Comments</u></p> <p>Additional funding secured for Transportation & Roads has been directed towards collector roads as compared to 2014. Similar to arterial roads, maintenance activities have focused on larger maintenance projects (reconstruction and renewals) that result in a significant improvement in road condition, as compared to panel repairs.</p> <p>However, this funding has not been enough to maintain collector roads in the same condition as 2014. Collector roads in Good or Very Good condition have declined by 9% since 2014 from 50.10% to 45.67% in 2018 while the weighted average pavement condition rating has remained stable. As roads deteriorate at an increasing pace as they decline in condition, the overall collector roads condition could decline quickly in future years given the declining proportion of Good or Very Good condition roads.</p> <p><u>Target</u></p> <p>Creating and encouraging proactive maintenance targets could potentially reduce long-term maintenance costs, such as addressing sections in Fair condition as soon as possible to extend their useful life at a cost which is less than what is required at the Poor and Very Poor stage.</p>

Service Trend Overview	Comments and Proposed Strategy
 <p>Scenic Parkway Service Levels as of this report are trending down. However, this is quickly changing and as such the overall trend is noted as favourable to reflect the investment made even though the timing of construction was not complete as of the date of this AMP.</p>	<p><u>Comments</u></p> <p>The Scenic Parkway classification refers to one road in Windsor, Riverside Drive. This road has received sizable investment in the Riverside Vista project, which consists of 8 major phases, many of which have sub-phases. This work is inclusive of storm and sanitary, water and road work as well as several utility moves and land acquisitions. While this AMP is not able to reflect the investment as only a single phase was completed as of data capture, it should be noted that funding extends out to Phase 2B as of the 2018 6-year capital budget.</p> <p>Scenic Parkway road conditions have declined materially since 2014 with the percent of roads rated Good or Very Good declining 20% from 47.45% to 38.12% in 2018 and the weighted average pavement condition decreasing from 9.450 to 11.976 (where 1 is best). As roads deteriorate at an increasing pace as they decline in condition, the overall collector roads condition could decline quickly in future years given the declining proportion of Good or Very Good condition roads.</p> <p><u>Target</u></p> <p>Once completed, the Riverside Vista project will not only improve the overall roadway it will address several buried assets and expand the existing roadway. The current target is therefore not specified for this classification as the target is to complete the entire Riverside Vista project, which will take several years improving the roadway each year as phases are completed.</p>

Service Trend Overview	Comments and Proposed Strategy
 <p>Local Roads Service Levels have IMPROVED, presenting a positive outcome for the City of Windsor</p>	<p><u>Comments</u></p> <p>Local road maintenance has occurred at a relatively stable level, with renewals and repair levels similar to 2014 while reconstructions have increased.</p> <p>Funding levels have been sufficient to slightly improve local roads to better average condition as compared to 2014 from 11.320 to 9.825 (where 1 is best) with a higher proportion of roads in Good or Very Good condition, while alleys have deteriorated with the weighted average pavement condition increasing from 8.621 to 17.770.</p> <p><u>Target</u></p> <p>Creating and encouraging proactive maintenance targets could potentially reduce long-term maintenance costs, such as addressing sections in Fair condition as soon as possible to extend their useful life at a cost which is less than what is required at the Poor and Very Poor stage.</p> <p>As there is a low risk of failure of local roads and alleys, both in terms of likelihood of an adverse event and the consequences to the City, other higher risks assets like expressway roads should be prioritized.</p>

Service Trend Overview	Comments and Proposed Strategy
 <p>Structures including vehicle and pedestrian bridges, subways and culverts (>3m span)</p>	<p>Comments</p> <p>Although the 2014 to 2018 data show there remains two bridges/subways in Poor or Very Poor condition it should be highlighted that in 2013 the AMP noted there were 9 bridges in Poor or Very Poor condition. Significant investment has been made over the last 5 years to reduce this risk. This explains why the percentage of bridges/subways in Very Good or Good condition as a function of replacement cost has increased as well.</p> <p>It should also be noted that one of the Poor/Very Poor condition bridge/subway is the Wyandotte / Via subway, which was funded in 2017 to address the deficiencies. However, at the time of this report the completion of the project and updated condition assessments were not available.</p> <p>Target</p> <p>As it relates to assets in this category it is necessary to ensure they are addressed immediately if they exhibit any failures. These assets are highly regulated and condition inspections must be completed every 2 years. Funding over the past 5 years has been directed to these assets and the improvements from this investment are evident. The target for these assets should continue to be sustaining them at Very Good or Good conditions and addressing any failure points immediately to avoid further deterioration.</p>

Service Trend Overview	Comments and Proposed Strategy
 <p>Sidewalks</p>	<p>Comments</p> <p>The trend for sidewalks remains fairly consistent when compared to the 2014 LOS information. The additional investment made over the 2013 to 2018 timeframe has been able to keep these assets at consistent service levels.</p> <p>Target</p> <p>The condition ratings from the 2013 AMP compared to this AMP reflect improvements in the overall condition of these assets. This trend started to take shape in 2014 when additional funding was directed to improve these assets, and as a result the steady state of condition from 2014 to 2018 remains the target moving forward.</p>

Level of Service measures have not been specifically developed for the balance of the Transportation Assets, those being Parking Garages, Traffic Signals, Noise Barriers and Street lights. Despite not having specific LOS measures it should be noted that there are risks, particularly for the traffic signals should they fail. It would not be an option to not replace a full failed traffic signal or streetlight without risk. As a result, unplanned expenditure requests or deferring or cancelling other planned projects would be needed to bring the assets back online. Administration has included in this report funding levels which would ensure replacement of these assets prior to failure to avoid these risks.

An assessment of the current condition of the asset base along with a summary view on the associated LOS being delivered across Transportation Services is shown in Table 4-5 below. Also shown are projections of the risk profile of the assets along with expected service trends. The slide of additional sections of the Expressway, Arterial and Collection road classifications to Poor or Very Poor condition is what continues to drive the projected increase to risk and reduction in service. Should funding continue at current levels for the next 20 years there will not be sufficient funding to implement many of the various maintenance and rehabilitation options listed in Section 5 which would extend the life of the road network. As the roads continue to deteriorate, fewer roads will be provided proper maintenance and rehabilitation resulting in deterioration to Poor and Very Poor conditions requiring costly reconstruction costs.

TABLE 4-5—OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS: TRANSPORTATION SERVICES

Potential Transportation LOS Trends					
Service Area	Condition	Service Levels	Risk to Service Delivery	Projected Service Levels	Data Confidence
Transportation Services (2013 AMP Report)					<p>RELIABILITY</p> <p>ACCURACY</p>
Transportation Services (2018 AMP Report)					<p>RELIABILITY</p> <p>ACCURACY</p>

4.2.3 Transit Windsor

TW typically operates a fleet of 112 buses, of which 102 are fully accessible, plus a support fleet compliment of 17 service vehicles. During peak weekday operating times there are up to 82 buses and 6 service vans in service while scheduled weekend service can typically include up to 45 buses and 6 supporting service vehicles. Special events occurring during specific times of the year as well as demand spikes during certain days or months would require additional buses. Of the entire current transit fleet compliment, 29 buses are utilizing alternative fuels (fully accessible diesel-electric hybrids) representing approximately 26 percent of the operating vehicles.

TW also manages a network of 210 bus shelters under 2 classifications throughout the City of Windsor. There are currently 135 non-advertising shelters and 75 advertising shelters which are managed and maintained by TW. TW previously utilized a third-party vendor to maintain the bus shelter network however they have recently taken on full management of the shelter network lifecycle including all maintenance, refurbishment and replacement functions. As a result of previous Federal Funding from Infrastructure Canada’s Public Transit Infrastructure Fund (PTIF), TW has undertaken a project to replace the majority of their oldest shelters most of which are beyond their useful life in excess of 35 years, as well as the continued replacement of buses as per the life cycle costing report from 2015.

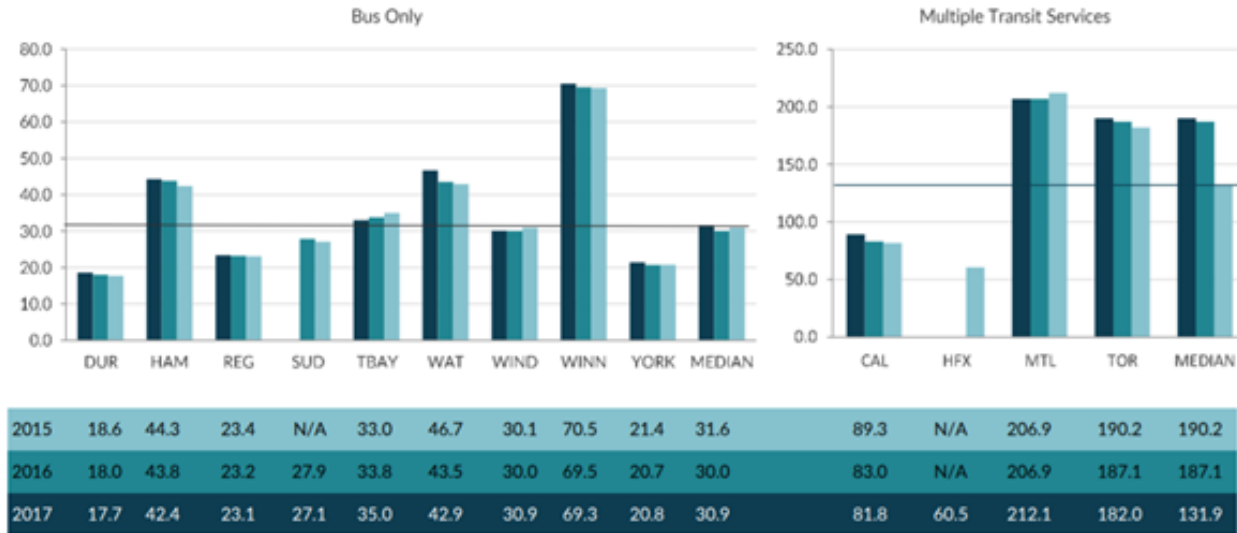
4.2.3.1 City of Windsor OMBI/MBNCanada Transit Windsor Indicators

The corporate LOS template has not yet been applied to TW assets. The pending TW Service Delivery review will assist in determining which factors should be used in the LOS template for the 2023 AMP. For this AMP the key indicators for TW are listed and are sourced from the MBNCanada benchmarking indicators and identified in the various figures below. TW in the past 2 years has seen growth both in the planned expansion to LaSalle, as well as the unexpected increase in ridership due to College and University students. There are also current discussions with other municipalities to expand services for TW. Many of these changes are included in the Transit Windsor Service Delivery Review which is underway, however will not be completed until later in 2019. As such the LOS indicators below are used to identify funding and LOS requirements to sustain current service levels and any future expansion and or service level increases will be brought forward in the TW Service Delivery Review report.

FIGURE 4-1- THE NUMBER OF REGULAR SERVICE PASSENGER TRIPS PER CAPITA IN SERVICE AREA

The population used in this measure is based on the service area population as reported to CUTA (Canadian Urban Transit Association).

The first graph shows the municipalities with Bus only; and the second graph shows the municipalities with multiple services including Bus, Streetcar, Light Rail (LRT, ALRT, DMU, etc.), Heavy Rail, Commuter Rail, and Ferry.



Source: TRNT106 (Community Impact)

Toronto: Based on Toronto service area population only. Does not include York Region service area population related to Toronto-York Spadina Subway Extension (TYSSE) as revenue service began December 17, 2017.

FIGURE 4-2- REVENUE VEHICLE HOURS PER CAPITA IN SERVICE AREA

This measure shows the annual vehicle hours operated by active revenue vehicles (buses, trains, etc.) in regular passenger revenue service, including scheduled and non-scheduled service. It does not include auxiliary passenger services (e.g. school contracts, charters, cross-boundary services to adjacent municipalities), deadheading, training, road tests, or maintenance. The population used in this measure is based on the service area population as reported to CUTA (Canadian Urban Transit Association).

The first graph shows the municipalities with Bus only; and the second graph shows the municipalities with multiple services including Bus, Streetcar, Light Rail (LRT, ALRT, DMU, etc.), Heavy Rail, Commuter Rail, and Ferry.



Source: TRNT210 (Service Level)

Toronto: Based on Toronto service area population only. Does not include York Region service area population related to Toronto-York Spadina Subway Extension (TYSSE) as revenue service began December 17, 2017.

FIGURE 4-3– TOTAL COST (EXPENSES) PER REVENUE VEHICLE HOUR

This measure reflects the total cost to operating the conventional transit system over the revenue vehicle hours. Revenue vehicle hour includes revenue passenger service hours and layover hours. Amortization rates and capitalization thresholds are unique to each municipality. The variation in municipal amortization policies partly explains the differences in performance between municipalities.

The first graph shows the municipalities with Bus only; and the second graph shows the municipalities with multiple services including Bus, Streetcar, Light Rail (LRT, ALRT, DMU, etc.), Heavy Rail, Commuter Rail, and Ferry.



An assessment of the current condition of the asset base along with a summary view on the associated LOS being delivered across TW is shown in Table 4-6 below. Also shown are projections of the risk profile of the assets along with expected service trends. It should be noted that TW infrastructure was not included in the 2013 AMP.

TABLE 4-6—OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS: TRANSIT WINDSOR

Potential Transit LOS Trends					
Service Area	Condition	Service Levels	Risk to Service Delivery	Projected Service Levels	Data Confidence
Transit Windsor (2018 AMP Report)					<p>RELIABILITY</p> <p>ACCURACY</p>

4.2.4 Environmental Protection

The Environmental Protection infrastructure network enables the City to deliver wastewater and storm water collection services to all the residents of the municipality, including:

- The removal of wastewater through a collection network of sanitary sewer mains
- The treatment of wastewater flows and discharge back to the water environment
- The removal of storm water through a collection network of storm sewer mains, municipal drains, roadside ditches and catch basins

4.2.4.1 Ontario Regulation 588/17 Community and Technical Levels of Service (Wastewater and Stormwater Management Assets)

Section 5.2.1.i of the O. Reg. 588/17 identifies the requirements for qualitative and technical metrics with respect to LOS for roads, bridges and culverts. The following represents evidence that the City is following the July 1, 2021 requirements as outlined in Section 5.2.1.i.

Wastewater Assets – O. Reg 588/17 Table 2 Requirements

Scope: Community LOS (Qualitative Descriptions)

- 1) Map of network can be found in Appendix Di.

Scope: Technical LOS (Technical Metrics)

- 1) *99% of properties/households are connected to the municipal wastewater system.

Reliability: Community LOS (Qualitative Descriptions)

- 1) The City of Windsor maintains 28 combined sewer overflows in order to control flow in the sewer network during severe weather events. The City recently constructed a High-Rate Retention Treatment Basin to help control and partially treat influent before being discharged. The project included a 1,650 mm to 2,250 mm diameter consolidation/conveyance tunnel along the Windsor riverfront with a tunnel that collects, stores, and conveys combined sewer overflows over a length of 2,400m to a chemically enhanced 680 ML/d high-rate RTB facility with polymer flocculation. This RTB is an underground concrete structure with a precast roof comprised of 12 storage and treatment cells with a total storage capacity of 8,000 cubic meters. The RTB's footprint is 85% smaller than what would be typically required to convey such a large volume of water.
- 2) The data available at the time of reporting was for the year 2017. Across the entire network of 28 CSO's, there were a total of 307 overflows for an average of 25.5 per month. Over this same period, there was a total effluent discharge of 489,565m³ or an average of 40,797m³ per month. The months of July and August accounted for the highest percentage of CSO discharging in the system.
- 3) There are several ways in which stormwater or storm runoff can enter the sanitary sewer network. Inflow and infiltration (I & I) are a common source of unwanted entry and is the result of inappropriate connections to the sanitary networks as well as broken or cracked pipe segments and defective pipe joints. Many properties have both downspouts and sump pumps improperly connected to the sanitary network causing further problems during extreme weather events. Unwanted storm water can also enter through manholes and connections within an over-under sewer segment.
- 4) The City of Windsor is currently undergoing both a Sewer Master plan as well as a stormwater financing study to help inform decision-making moving forward. In 2011, the City completed a revolutionary Retention Treatment Basin project intended to help process higher volumes of water and reduce strain on the current system. The project included a 1,650 mm to 2,250 mm diameter consolidation/conveyance tunnel along the Windsor riverfront with a tunnel that collects, stores, and conveys combined sewer overflows over a length of 2,400m to a chemically enhanced 680 ML/d high-rate RTB facility with polymer flocculation. This RTB is an underground concrete structure with a precast roof comprised of 12 storage and treatment cells with a total storage capacity of 8,000 cubic meters. The City also has subsidized downspout disconnection and backflow prevention programs to help alleviate strain on the system during extreme weather events. The City is working to separate sewer systems wherever possible and is also working on revised IDF curves to help guide the engineering and decision-making process moving forward.

- 5) Effluent discharged from the CSO network can potentially contain suspended solids, total phosphorus (TP) and biological oxygen demand (BOD). The development of Windsor's RTB was intended to reduce the percentage of such contaminants. The City of Windsor operates 2 pollution control plants which have been retrofitted and expanded to include secondary treatment capacity using cutting-edge technology such as Biological Aerated Filter (BAF) process and ultraviolet disinfection.

Reliability: Technical LOS (Technical Metrics)

- 1) The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity (307) compared to the *total number of properties connected to the municipal wastewater system (98,711).

$$i. = 307:98,711$$

$$ii. = 0.00311$$

- 2) The **number of connection days per year due to wastewater backups (5,982) compared to the total number of properties connected to the municipal wastewater system (98,711).

$$i. = 5,982:98,711$$

$$ii. = 0.0606$$

- 3) The number of effluent violations per year due to wastewater discharge (5) compared to the total number of properties connected to the municipal wastewater system (98,711).

$$= 5:98,711$$

$$= 0.00005$$

*Number used for this statistic (number of properties connected to the municipal wastewater system) is households in City of Windsor less number of properties exempt from sewer surcharge.

** Connection day per year calculated by using number of properties that registered a flood call multiplied by number of days on which the properties were affected (assumed 1 day per call).

Stormwater Management Assets – O. Reg 588/17 Table 3 Requirements

Scope: Community LOS (Qualitative Descriptions)

- 1) Map of network can be found in Appendix Di.

Scope: Technical LOS (Technical Metrics)

- 1) 0% of properties are resilient to a 100-year storm. Only those properties developed without a lower level and on raised lands would be considered resilient, however the City does not plan for this.
- 2) The entire stormwater management system (100%) is technically developed to be resilient to a 5-year storm. This does not mean however that system issues and backups do not occur during severe weather events.

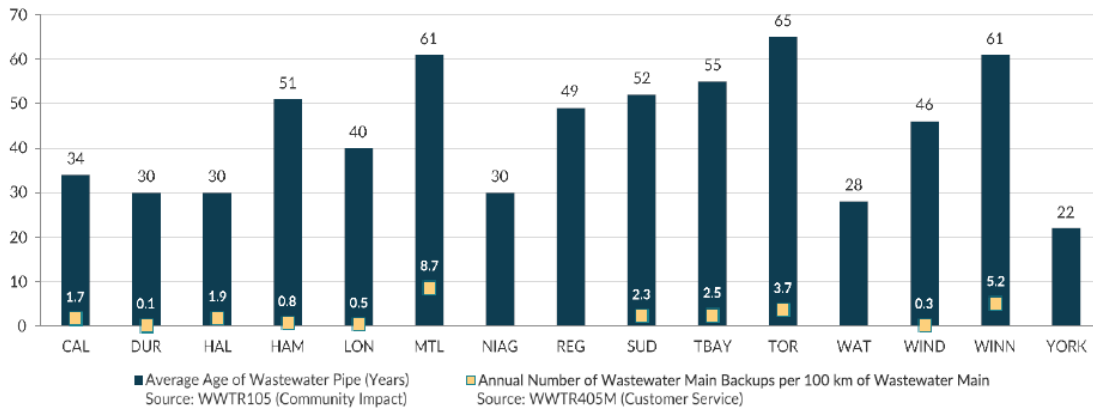
4.2.4.2 City of Windsor OMBI/MBNCanada Storm and Wastewater Sewer Network Indicators

Currently the City is still using LOS measures from OMBI/MBNCanada and those benchmarking initiatives. Over the course of the next five years the City’s LOS template and guidelines will be applied to these assets for more consistent reporting on LOS indicators and trends. The Sewer Master Plan will also inform the various KPI’s which will provide clarity on trends and targets for these assets.

The first two graphs speak to the LOS related to our storm and sanitary sewer network and are followed by the graphs which relate to the plants and pumps and are referred to as Pollution Control.

FIGURE 4-4— AVERAGE AGE OF WASTEWATER PIPE/ANNUAL NUMBER OF WASTEWATER MAIN BACKUPS PER 100 KM OF WASTEWATER MAIN

Older wastewater pipes are often in poor condition and contain cracks, leaking joints and broken sections, contributing to increased pipe blockages and/or an inflow of groundwater into the system causing increased flow. These factors result in an increased frequency of wastewater main back-ups relative to newer systems that do not have such deficiencies and result in higher maintenance costs for older systems. The annual number of wastewater backups is directly related to the design of the wastewater pipe and the design of the wastewater collection system, i.e. the extent to which storm sewers are connected to or combined with sanitary sewers resulting in increased flow. Design criteria, age and condition of the wastewater collection infrastructure combined with localized major precipitation events can result in flows that exceed system capacity and result in wastewater backups.

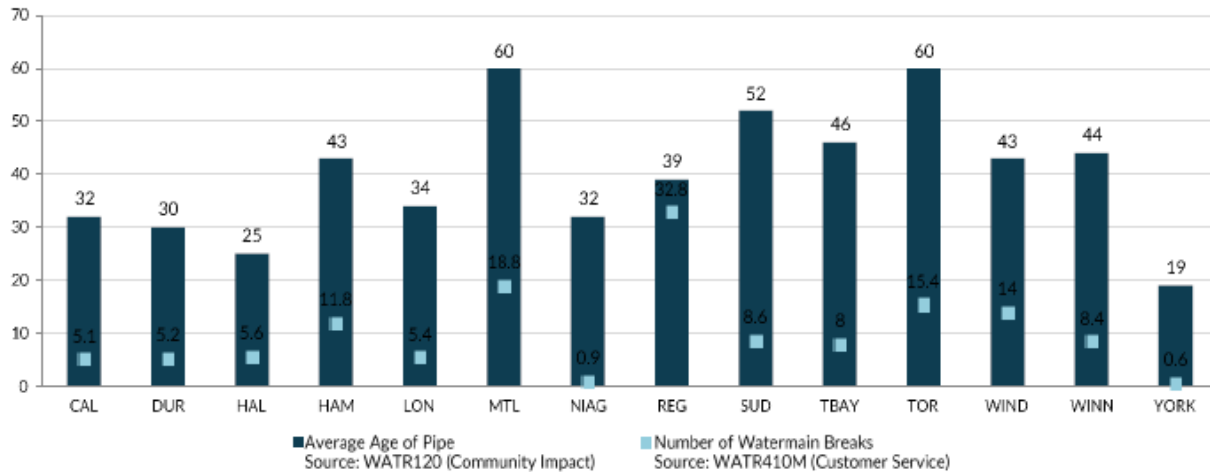


Niagara, Regina, Waterloo and York: Reports average age of wastewater pipe only.

FIGURE 4-5— AVERAGE AGE OF WATER PIPE/NUMBER OF WATER MAIN BREAKS PER 100 KM OF WATER DISTRIBUTION PIPE

Age of Water Distribution Pipe: Old pipes are usually in poor condition as a result of pipe corrosion, pipe materials (susceptible to fractures), and leakage at pipe joints and service connections which contributes to an increased frequency of water main breaks relative to newer systems that do not have such deficiencies. The practice of relining pipes has caused inconsistent reporting on the age of the pipe.

Number of Watermain Breaks: Excludes service connections and hydrant leads.



An assessment of the current condition of the asset base along with a summary view on the associated LOS being delivered across Environmental Protection – Sanitary & Storm Sewers is shown in Table 4-7 below. Also shown are projections of the risk profile of the assets along with expected service trends.

TABLE 4-7—OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS: ENVIRONMENTAL PROTECTION – SANITARY & STORM SEWER NETWORK

Potential Environmental Protection – Sanitary & Storm Sewers LOS Trends					
Service Area	Condition	Service Levels	Risk to Service Delivery	Projected Service Levels	Data Confidence
Environmental Protection – Sanitary & Storm Sewers (2013 AMP Report)					RELIABILITY ACCURACY
Environmental Protection – Sanitary & Storm Sewers (2018 AMP Report)					RELIABILITY ACCURACY

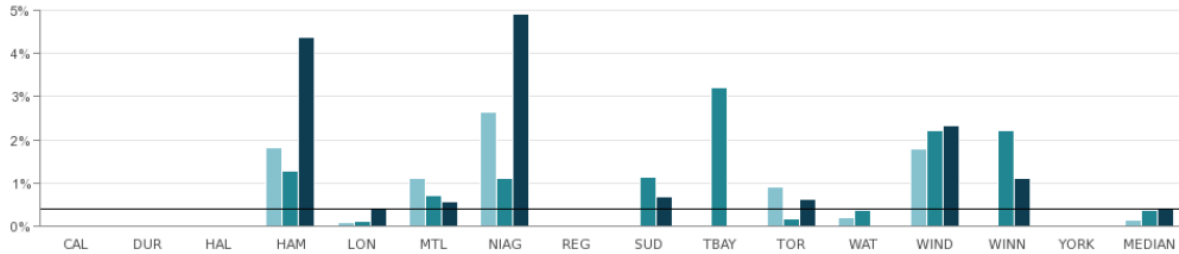
4.2.4.3 City of Windsor OMBI/MBNCanada Pollution Control Indicators

This very critical infrastructure, made up of the plants and pump stations, enables the City to deliver much needed services to the residents of the municipality and surrounding region as well as provide a safe environment for members of the community. The delivery of Pollution Control services is absolutely critical for the health and well-being of area residents as well as provide protection against innumerable environmental

vulnerabilities. In delivering such services, it is often beneficial to understand how other municipalities and regions offer these same services and to what degree they also are successful in providing them.

FIGURE 4-6— PERCENT OF WASTEWATER ESTIMATED TO HAVE BYPASSED TREATMENT

Frequency and severity of weather events can have a significant negative impact on results.



2015	0.00%	0.02%	0.00%	1.81%	0.08%	1.09%	2.65%	N/A	N/A	0.00%	0.90%	0.20%	1.79%	N/A	0.00%	0.14%
2016	0.00%	0.00%	0.00%	1.27%	0.10%	0.69%	1.10%	0.00%	1.13%	3.21%	0.15%	0.37%	2.21%	2.22%	0.00%	0.37%
2017	0.00%	0.00%	0.01%	4.37%	0.40%	0.55%	4.93%	0.00%	0.67%	0.00%	0.61%	0.00%	2.34%	1.09%	0.03%	0.40%

Source: WWTR110M (Community Impact)

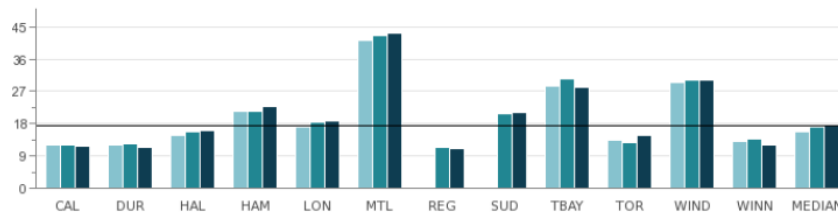
Hamilton, London, Niagara, and Toronto: High lake levels and increased precipitation impacted 2017 results.

FIGURE 4-7— MEGALITRES OF TREATED WASTEWATER PER 100,000 POPULATION

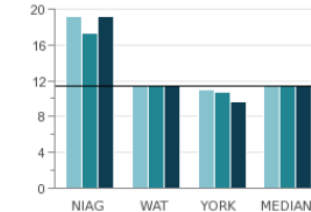
Integrated Systems: The term applies to municipalities that have full responsibility for all wastewater activities including collection, conveyance, treatment and disposal.

Two-Tier Systems: The term applies to municipalities that have responsibility for components of wastewater activities, e.g. Niagara, Waterloo and York are responsible for all components with the exception of collection which is the responsibility of local municipalities within their boundaries.

Integrated Systems (In Thousands)



Two-Tier Systems (In Thousands)

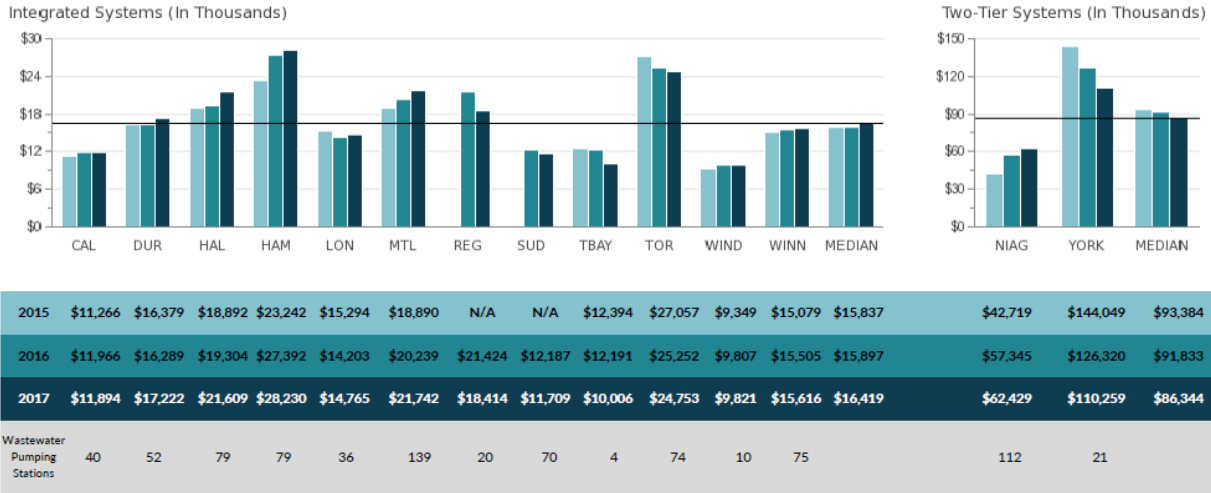


2015	12,151	12,170	14,611	21,464	17,233	41,261	N/A	N/A	28,401	13,463	29,587	12,997	15,922	19,151	11,534	11,032	11,534
2016	12,022	12,320	15,810	21,525	18,444	42,575	11,276	20,886	30,384	12,645	30,011	13,751	17,127	17,362	11,431	10,701	11,431
2017	11,885	11,540	16,237	22,784	18,687	43,134	10,908	21,159	28,237	14,769	30,326	12,006	17,462	19,207	11,430	9,696	11,430

Source: WWTR210 (Service Level)

FIGURE 4-8— TOTAL COST OF WASTEWATER COLLECTION/CONVEYANCE PER KM OF PIPE RELATIVE TO THE NUMBER OF WASTEWATER PUMPING STATIONS OPERATED

This measure reflects the total cost for the collection and conveyance of wastewater, and includes amortization which can vary significantly from year to year depending on the type of infrastructure, capital fund expenditures, etc. Municipalities providing services over a broad geographic area generally have higher operating costs due to the number and type of wastewater facilities and pumping stations operated. The distance between the individual systems has an impact on the daily operating costs for both the collection and conveyance of wastewater. Refer to Fig. 35.2 for description of Integrated and Two-Tier Systems.

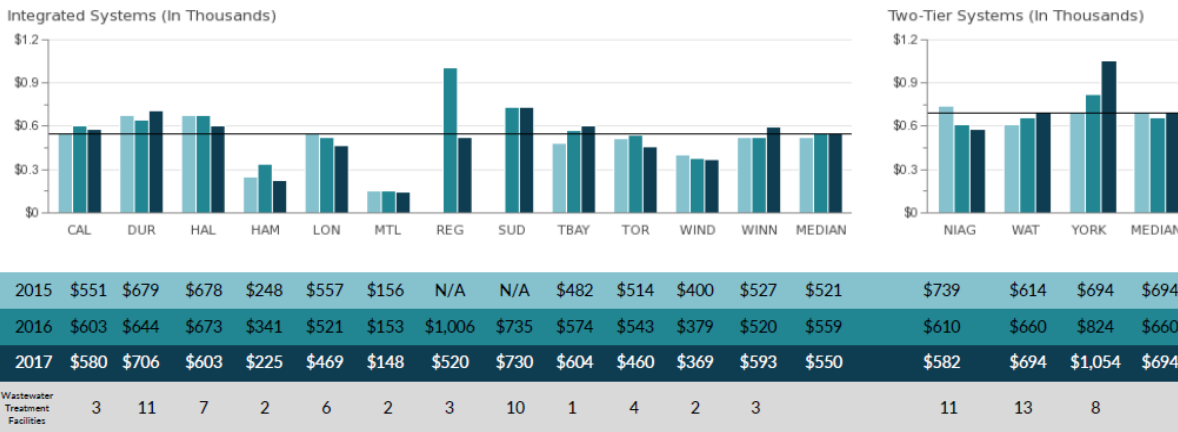


Source: WWTR305T (Efficiency); WWTR804 (Statistic)

Waterloo: Does not report – only partial jurisdiction over wastewater collection.

FIGURE 4-9— TOTAL COST FOR TREATMENT/DISPOSAL PER MEGALITRE TREATED RELATIVE TO THE NUMBER OF WASTEWATER TREATMENT PLANTS OPERATED

This measure reflects the total cost for the treatment and disposal of wastewater. It also includes amortization which can vary significantly from year to year depending on the type of infrastructure, capital fund expenditures, etc. Municipalities providing services over a broad geographic area generally have higher operating costs due to the number and type of wastewater plants operated. The distance between the individual systems has an impact on the daily operating costs for both the treatment and disposal of wastewater. Refer to Fig. 35.2 for description of Integrated and Two-Tier Systems.

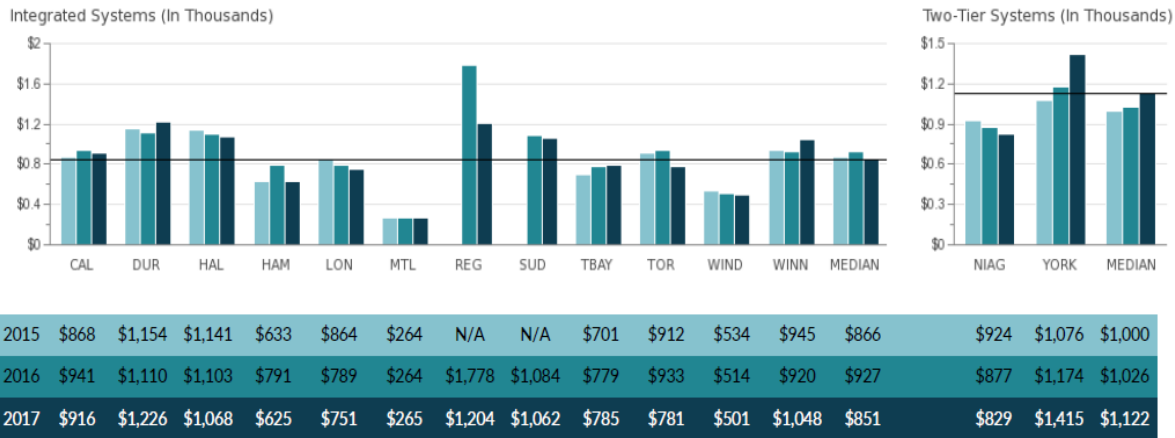


Source: WWTR310T (Efficiency); WWTR801 + WWTR802 + WWTR803 (Statistics)

York: The Region is responsible for treatment costs on behalf of 9 local municipalities.

FIGURE 4-10— TOTAL COST OF WASTEWATER OF COLLECTION/CONVEYANCE AND TREATMENT/DISPOSAL PER MEGALITRE

This measure reflects the combined total cost for the collection, conveyance, treatment and disposal of wastewater. Municipalities providing service over a broad geographic area generally have higher operating costs due to the number and type of wastewater pumping stations and treatment plants operated. The distance between the individual system has an impact on the daily operating costs for wastewater treatment/disposal and collection/conveyance. Amortization can vary significantly from year to year depending on the type of infrastructure, capital fund expenditures, etc. Refer to Fig. 35.2 for description of Integrated and Two-Tier Systems.



Source: WWTR315T (Efficiency)

Waterloo: Does not report - only responsible for treatment and disposal. See Fig. 35.5.

An assessment of the current condition of the Pollution Control asset base along with a summary view on the associated LOS being delivered is shown in the figure below. Also shown are projections of the risk profile of the assets along with expected service trend. These trends are based on the current state of the asset base combined with the expected levels of funding over the next 20 years i.e. assuming that the future spending will be comparable with current funding levels.

TABLE 4-8—OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS: ENVIRONMENTAL PROTECTION – POLLUTION CONTROL

Potential Facilities LOS Trends					
Service Area	Condition	Service Levels	Risk to Service Delivery	Projected Service Levels	Data Confidence
Environmental Protection – Water Reclamation Control (2013 AMP Report)					RELIABILITY ACCURACY
Environmental Protection – Water Reclamation (2018 AMP Report)					RELIABILITY ACCURACY

This figure represents a stable reality for the City’s Pollution Control operations. Although the Pollution Control Division is facing many challenges including aging assets, more frequent and ever-changing climatic events and increased stringency with regulations and operating standards, the ongoing condition assessment program should allow the City to have a firm grasp on the condition and available level of service of the asset portfolio. Despite having detailed asset condition data and an understanding of what level of service is required, it is critical that the City continue to fund critical maintenance programs and building of a robust

Pollution Control reserve. The immense value and criticality of most components and systems within a plant or pumping station mean a single breakdown could cause significant financial hardship and risk the delivery of critical and mandatory public services. The various AM Strategies identified in Section 5, most importantly the preventative maintenance program utilized for these assets, is the key to current and future stability for these assets. Funding levels are based on project preventative maintenance activities over the next 20 years compared to current annual contributions to the reserve.

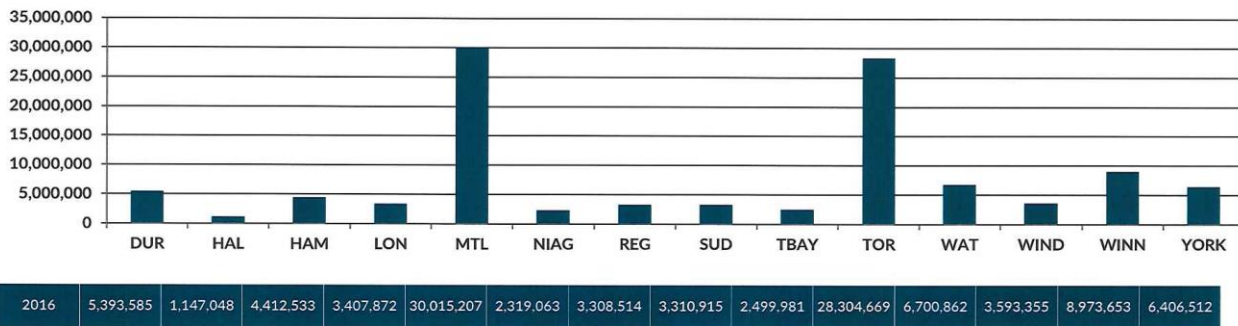
4.2.5 Corporate Facilities Management

This very critical infrastructure enables various City departments to deliver much needed services to the residents of the municipality as well as provide a safe and welcoming environment for members of the community to gather. Corporate facilities, whether recreation or administrative buildings, are often viewed as the face of the City by members of the public and as such, demand a high level of care, performance and monitoring.

- The primary purpose of the Facilities Department is to properly manage, maintain and acquire buildings and facilities for the use of all City departments, outside agencies and the general public.

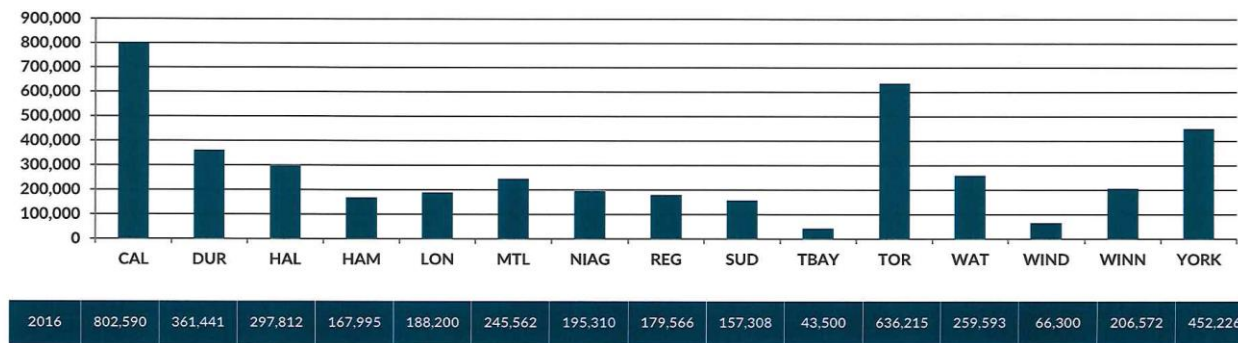
4.2.5.1 City of Windsor OMBI/MBNCanada Corporate Facilities Indicators

FIGURE 4-11—GROSS SQUARE FOOTAGE – ALL BUILDINGS OWNED AND LEASED BY MUNICIPALITY



Source: FCLT805 (Statistic)

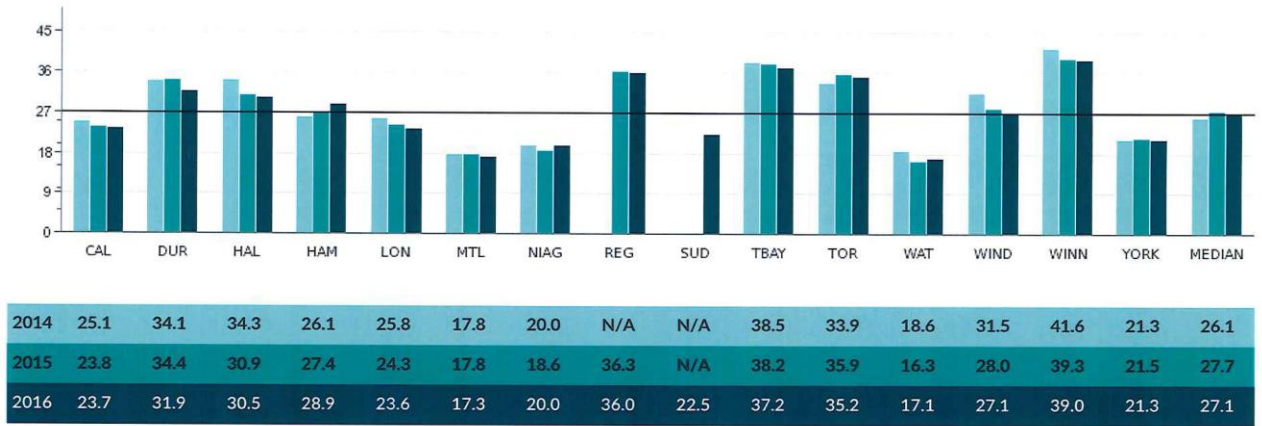
FIGURE 4-12—GROSS SQUARE FOOTAGE – HEADQUARTERS ONLY



Source: FCLT820 (Statistic)

FIGURE 4-13—TOTAL EQUIVALENT KWH ENERGY CONSUMPTION PER HEADQUARTERS PER SQUARE FOOT

Energy consumption includes both electricity and natural gas consumption.



Source: FCLT240 (Efficiency)

FIGURE 4-14—TOTAL COST OF FACILITY OPERATIONS FOR HEADQUATER BUILDING PER SQUARE FOOT

Generally, all facility operating costs include four cost categories: internal and external facility repairs & maintenance, custodial, utilities and security costs.



Source: FCLT335T (Efficiency)

Shown below are projections of the risk profile of the assets along with expected service trend for the Facilities portfolio. These trends are based on the current state of the asset base combined with the expected levels of funding over the next 20 years i.e. assuming that the future spending will be comparable with current funding levels. The trends shown reflect that many assets are nearing the end of their useful lives and that maintaining funding at current levels will likely not be sufficient to hold service levels at their current level.

TABLE 4-9—OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS: CORPORATE FACILITIES

Potential Facilities LOS Trends					
Service Area	Condition	Service Levels	Risk to Service Delivery	Projected Service Levels	Data Confidence
Corporate Facilities (2013 AMP Report)					RELIABILITY ACCURACY
Corporate Facilities (2018 AMP Report)					RELIABILITY ACCURACY

The reliability and accuracy of facilities data is much higher than in previous years due to the ongoing Facility Condition Assessment Program and the data being produced as a result. When looking at the Facilities portfolio as a whole, it appears that the overall condition of the asset base has stabilized from its previous downward trend. While this may appear to be true on the surface, much of the “overall” condition improvement is due to several very large new facilities being built in the past 5 or 6 years. There is however the reality that much of the remaining Facility assets outside of the several large recreation and administrative buildings recently built has seen little investment to execute the various AM Strategies identified in Section 5 and therefore still poses a LOS risk to the City. Over the next 10 years, many of the new facilities will begin to degrade and will likely not be able to maintain expected LOS at current levels of funding. Compounding the

issue is the fact that several critical facility components within the portfolio and observed on new buildings more regularly, have been experiencing premature degradation and significant maintenance requirements.

The LOS picture and the City’s ability to deliver even minimum expected service levels to the community is further impacted by the diverse asset base within the portfolio. While funding is based on general expected expenditure guidelines and projected on the entire asset base, specific categories of facilities, such as heritage buildings, have shown the drastic need for an improved asset management program. Heritage, and other significant “recreation and cultural” buildings, are often seen as the face of a City and reflect to those in the community and abroad the incredible history and values held prominent by the City. Accordingly, the financial and human resources required to maintain even basic LOS in these facilities can often be far greater than expected and planned for.

Other prominent and critical facilities such as Huron Lodge serve a vital role in the health and well-being of the community as a whole and particularly to a vulnerable population. The risk associated with the loss of service or even a minor service disruption at a long-term care home would be grave at worst and a public relations issue at the very least. Recent trends show the maintenance and capital repairs for all such facilities referenced above is far greater than anticipated and certainly greater than the current funding levels will allow. Heritage and cultural buildings as well as Care Homes by their very nature will require many services that are considered “specialized” and often come with significant cost implications and maintenance delays. There is also an inherent risk that goes far beyond simple safety, insurance and cost parameters and touches on the very real possibility of losing historical, social and health hubs considered essential to the community. Without the appropriate funding levels required to maintain these important facilities, and with large recreational facilities soon to see degradation, future expected LOS can be expected to decline.

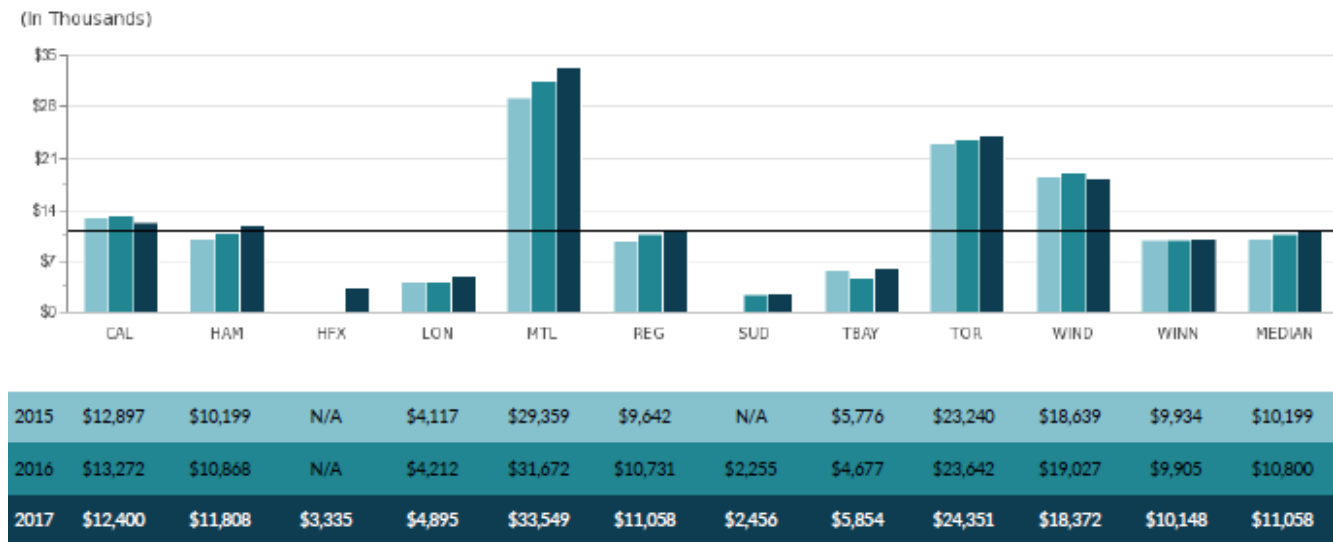
For more information and additional details, please refer to Appendix F.

4.2.6 Parks

This unique infrastructure helps support other City departments as well as contributing to the overall beautification, health, and well-being of the City and its residents. Parks services include, but not limited to, proper management and maintenance of all parks facilities for use by other City departments, as well as the public.

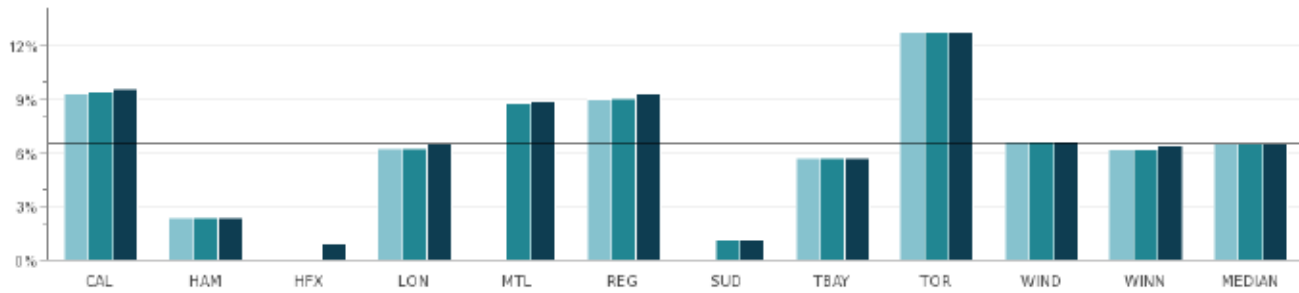
4.2.6.1 City of Windsor OMBI/MBNCanada Parks Indicators

FIGURE 4-15—OPETATING COST PER HECTARE – MAINTAINED AND NATURAL PAKLAND



Source: PRKS315 (Efficiency)

FIGURE 4-16—ALL PARKLAND IN MUNICIPALITY AS A PERCENT OF TOTAL AREA OF MUNICIPALITY



2015	9.4%	2.4%	N/A	6.3%	N/A	9.0%	N/A	5.7%	12.8%	6.7%	6.2%	6.5%
2016	9.5%	2.4%	N/A	6.3%	8.8%	9.1%	1.1%	5.7%	12.8%	6.7%	6.2%	6.5%
2017	9.6%	2.4%	0.9%	6.5%	8.9%	9.4%	1.1%	5.7%	12.8%	6.7%	6.4%	6.5%

Source: PRKS125 (Community Impact)

Legislative requirements such as Accessibility for Ontarians with Disabilities mandate Parks to meet certain level of service measures. Similarly, industry standards, for example CSA standards, drive the requirement for regular inspections of playgrounds. For Parks these two factors result in not being able to replace like-for-like. Future playgrounds require additional investment to fund the cost of meeting new requirements or to fund the cost of resources to perform inspections to comply with these legislative and industry standards. By investing in the maintenance of playgrounds (via on-going funding for personnel to facilitate the inspection and maintain equipment and to fund the costs of repairs), LOS is maintained, the life of the asset may be extended and the risk to the City is mitigated since inspections are being done in a timely manner and issues are addressed/fixed as identified and before further deterioration can occur.

Currently, the Parks Services team has several informal LOS. There is a gap in the number of formalized LOS metrics for their asset portfolio and they will be working to define LOS for these assets in future years. It must be stated when funding is not available for inspections, routine maintenance, rehabilitation, removal (if applicable) and replacement of failing Park assets, LOS cannot be met. To minimize any impact to the LOS it is recommended that a reserve be created to assist Parks Services with fulfilling any commitment that is approved by City Council.

An assessment of the current condition of the asset base along with a summary view on the associated LOS being delivered across Parks Services is shown in Table 4-10 below. Also shown are projections of the risk profile of the assets along with expected service trends.

TABLE 4-10—OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS: PARKS SERVICES

Parks Services LOS Trends					
Service Area	Condition	Service Levels	Risk to Service Delivery	Projected Service Levels	Data Confidence
Parks & Natural Areas (2013 AMP Report)					RELIABILITY ACCURACY
Parks Services (2018 AMP Report)					RELIABILITY ACCURACY
Riverfront Parks Shorewall (2018 AMP Report)					RELIABILITY ACCURACY

4.2.7 Information Technology

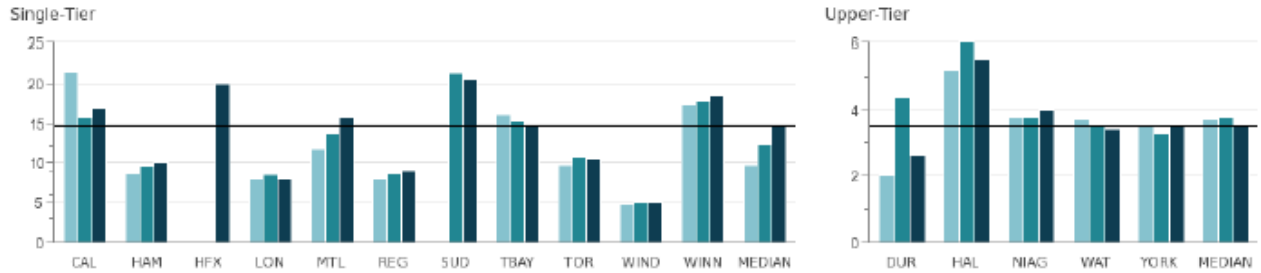
The Information Technology (IT) infrastructure network plays a critical role in allowing all City departments systems to function properly and efficiently. Ultimately, this will allow the City to operate as effectively as possible while delivering critical services on time to all municipal workers and community members. Services include:

- The proper maintenance, refurbishment and acquisition of all corporate hardware and software
- The proper maintenance of all network infrastructure assets including computing servers and telephone systems

4.2.7.1 City of Windsor OMBI/MBNCanada Information Technology Indicators

FIGURE 4-17—NUMBER OF VISITOR SESSIONS TO MUNICIPAL PER CAPITA

This measure reflects the number of visitor sessions to the main municipal website. A visitor session is a group of interactions that take place on the website within a given time frame, by an individual visitor.

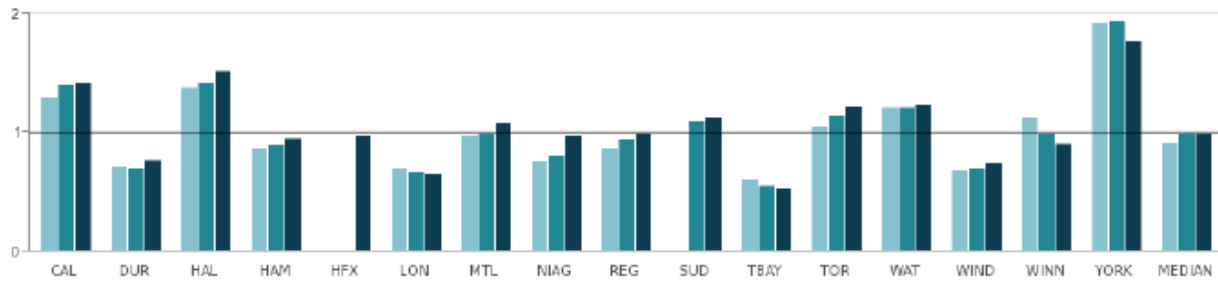


2015	21.4	8.8	N/A	8.0	11.8	8.0	N/A	16.1	9.8	4.8	17.3	9.8	2.0	5.2	3.8	3.7	3.5	3.7
2016	15.7	9.5	N/A	8.6	13.7	8.8	21.3	15.3	10.8	5.0	17.7	12.3	4.4	6.0	3.8	3.5	3.3	3.8
2017	17.0	10.1	20.0	8.0	15.8	9.1	20.4	14.5	10.6	5.0	18.5	14.5	2.6	5.5	4.0	3.4	3.5	3.5

Source: INTN105 (Community Impact)

FIGURE 4-18—NUMBER OF INFORMATION TECHNOLOGY DEVICES PER TOTAL SUPPORTED MUNICIPAL FULL TIME EQUIVALENT (FTE)

This measure represents how many IT devices are used to support municipal service delivery. It includes desktops, laptops, smartphones, handheld PDA, and tablets.

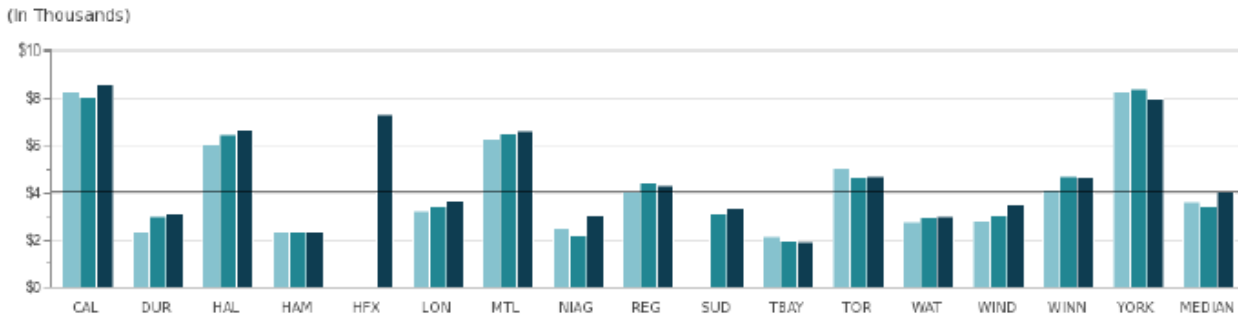


2015	1.28	0.72	1.38	0.85	N/A	0.70	0.97	0.76	0.85	N/A	0.61	1.05	1.21	0.69	1.12	1.92	0.91
2016	1.40	0.70	1.41	0.88	N/A	0.67	0.98	0.81	0.93	1.09	0.56	1.14	1.20	0.70	0.99	1.94	0.98
2017	1.41	0.77	1.51	0.94	0.97	0.66	1.07	0.97	0.99	1.13	0.53	1.22	1.23	0.75	0.90	1.77	0.98

Source: INTN205 (Service Level)

FIGURE 4-19—TOTAL COST FOR INFORMATION TECHNOLOGY PER SUPPORTED MUNICIPAL FULL TIME EQUIVALENT (FTE)

This measure includes the operating cost, plus amortization for information technology.



	CAL	DUR	HAL	HAM	HFX	LON	MTL	NIAG	REG	SUD	TBAY	TOR	WAT	WIND	WINN	YORK	MEDIAN
2015	\$8,281	\$2,372	\$6,105	\$2,352	N/A	\$3,213	\$6,303	\$2,513	\$4,055	N/A	\$2,167	\$5,056	\$2,795	\$2,855	\$4,135	\$8,310	\$3,634
2016	\$8,090	\$3,003	\$6,487	\$2,371	N/A	\$3,460	\$6,551	\$2,207	\$4,447	\$3,142	\$1,974	\$4,631	\$2,937	\$3,066	\$4,737	\$8,411	\$3,460
2017	\$8,607	\$3,093	\$6,721	\$2,369	\$7,337	\$3,714	\$6,662	\$3,058	\$4,291	\$3,332	\$1,944	\$4,737	\$3,003	\$3,493	\$4,629	\$8,049	\$4,003

Source: INTN243T (Efficiency)

Calgary: The results for 2015 and 2016 were restated using the Cost of IT per Supported Municipal FTE instead of Cost of IT per Budgeted Municipal FTE to more accurately reflect the total number of consumers of IT products and services.

An assessment of the current condition of the asset base along with a summary view on the associated LOS being delivered across Information Technology (IT) is shown in Table 4-11 below. Also shown are projections of the risk profile of the assets along with expected service trends. Although condition of certain enterprise systems have deteriorated over time, proper planning and implementation strategies are being assessed to identify a course of action for a seamless transition that will not disrupt the day-to-day operations that these systems support. New technological advancements have been researched and introduced into the City’s IT framework, contributing to the increase in service level. Service level delivery and projected service levels remain at a stable and consistent rate as technological trends are monitored and evaluated to determine the best fit for the organization.

TABLE 4-11—OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS: INFORMATION TECHNOLOGY (IT)

Information Technology (IT) LOS Trends					
Service Area	Condition	Service Levels	Risk to Service Delivery	Projected Service Levels	Data Confidence
Information Technology (IT) (2013 AMP Report)					RELIABILITY ACCURACY
Information Technology (IT) (2018 AMP Report)					RELIABILITY ACCURACY

4.2.8 Corporate Fleet Management

The corporate fleet infrastructure provides the necessary vehicle and equipment to enable various City departments to deliver much needed services to the public and residents of the municipality. Corporate Fleet services include:

- Acquisition, maintenance, repair, disposal and management of the corporate fleet
- Provision of services to outside agencies as applicable
- Fuel management services in the supply and availability of fuel and operation of fuel sites managed by the Fleet division
- Materials management, motor pool and specialized services

The services delivered by the Fleet Division are impacted by the requirement to meet various Legislative/Regulatory requirements for example the various regulations of the Highway Traffic Act, the Technical Standards and Safety Authority and Liquid Fuels Handling Code for fuel sites and the Motor Vehicle Dealers Act.

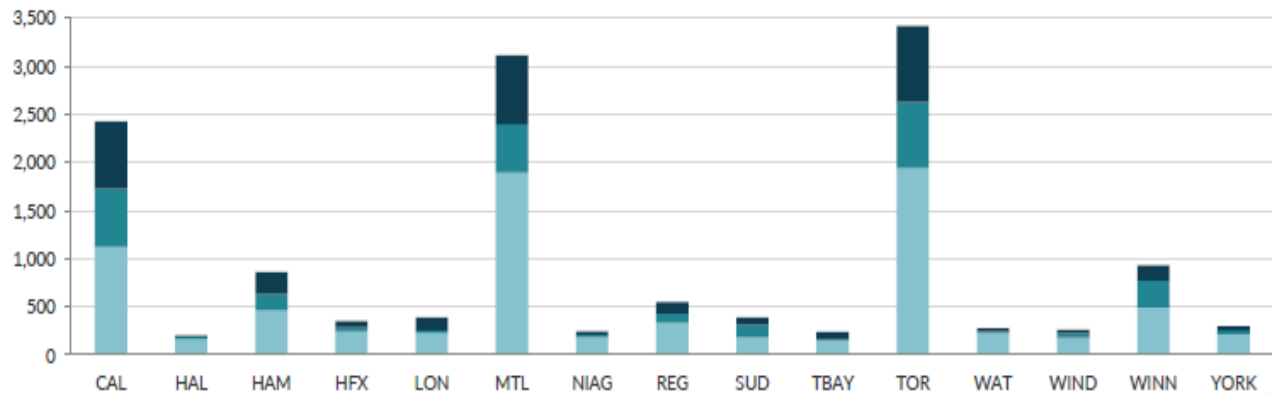
4.2.8.1 City of Windsor OMBI/MBN Canada Corporate Fleet Indicators

FIGURE 4-20—TOTAL NUMBER OF LIGHT, MEDIUM AND HEAVY VEHICLES (MUNICIPAL EQUIPMENT)

Each Municipality's fleet is comprised of a number of vehicles in each of these 3 classes:

- Light vehicles weigh less than 4,500 kg, e.g. cars, vans, or light pickups
- Medium vehicles weigh between 4,500 kg and 9,000 kg, e.g. heavy-duty pickups and medium size work trucks
- Heavy vehicles weigh greater than 9,000 kg, e.g. garbage trucks, tandem dump trucks, street sweepers, flushers, vacuum trucks, etc.

The variation between Municipalities in heavy vehicle measures is largely due to whether a Municipality delivers a garbage pickup service internally or through outsourcing. Garbage pickup is generally a low km traveled, high fuel volume, high equipment maintenance/repair cost service. The increases for Ontario municipalities between 2016 and 2017 can be attributed to a regulation change by Ontario's Ministry of Transportation that redefined the types of vehicles and equipment that can be classified as a road building machine. This change means the 2017 results for all municipalities is more comparable because out-of-province members have always included these types of units.

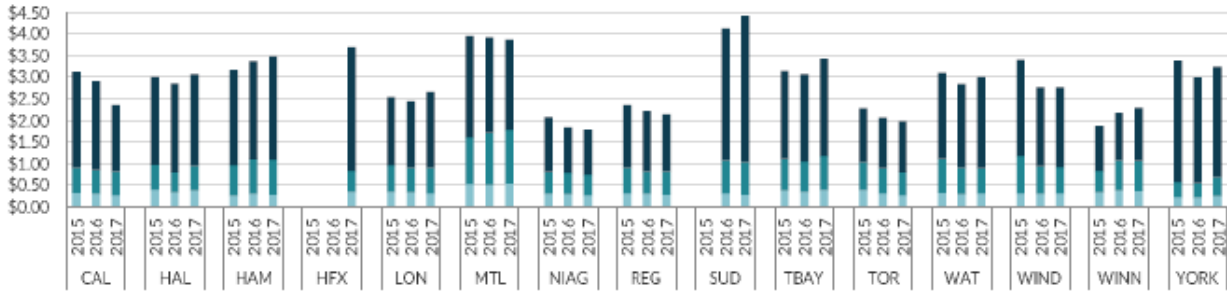


	CAL	HAL	HAM	HFX	LON	MTL	NIAG	REG	SUD	TBAY	TOR	WAT	WIND	WINN	YORK	MEDIAN
Light	1,122	168	468	243	234	1,894	188	343	186	151	1,943	230	181	496	215	234
Medium	607	22	166	45	20	505	22	87	129	14	683	13	48	280	42	48
Heavy	692	10	225	62	136	712	32	119	73	75	790	36	32	155	39	75

Source: FLET227 (Statistic); FLET228 (Statistic); FLET229 (Statistic)

FIGURE 4-21— OPERATING COST PER LIGHT, MEDIUM, AND HEAVY VEHICLE PER VEHICLE KM (MUNICIPAL EQUIPMENT)

The 3 measures represent the operating costs for maintaining the different types of vehicles in municipal fleet per vehicle KM.



Light Vehicles															Median	
2015	\$0.33	\$0.41	\$0.26	N/A	\$0.35	\$0.53	\$0.31	\$0.32	N/A	\$0.39	\$0.40	\$0.33	\$0.32	\$0.34	\$0.23	\$0.33
2016	\$0.31	\$0.34	\$0.31	N/A	\$0.34	\$0.51	\$0.30	\$0.31	\$0.32	\$0.35	\$0.32	\$0.30	\$0.31	\$0.38	\$0.22	\$0.32
2017	\$0.28	\$0.38	\$0.29	\$0.35	\$0.32	\$0.54	\$0.28	\$0.29	\$0.29	\$0.40	\$0.28	\$0.32	\$0.32	\$0.37	\$0.25	\$0.32

Source: FLET327 (Efficiency)

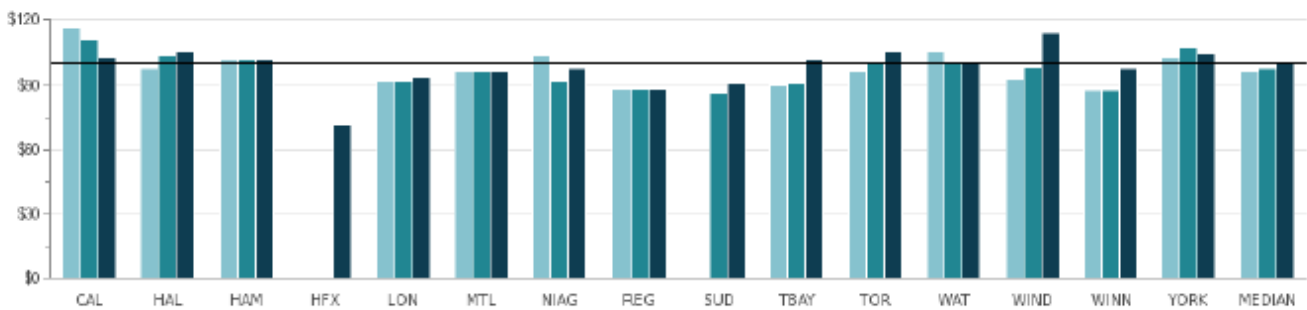
Medium Vehicles															Median	
2015	\$0.58	\$0.57	\$0.71	N/A	\$0.62	\$1.09	\$0.50	\$0.60	N/A	\$0.73	\$0.64	\$0.79	\$0.87	\$0.50	\$0.35	\$0.62
2016	\$0.55	\$0.46	\$0.80	N/A	\$0.58	\$1.21	\$0.49	\$0.52	\$0.76	\$0.70	\$0.58	\$0.62	\$0.64	\$0.70	\$0.34	\$0.60
2017	\$0.54	\$0.58	\$0.81	\$0.49	\$0.59	\$1.25	\$0.47	\$0.54	\$0.75	\$0.78	\$0.52	\$0.58	\$0.61	\$0.70	\$0.45	\$0.58

Source: FLET328 (Efficiency)

Heavy Vehicles															Median	
2015	\$2.22	\$2.03	\$2.20	N/A	\$1.57	\$2.34	\$1.27	\$1.44	N/A	\$2.03	\$1.24	\$1.99	\$2.22	\$1.03	\$2.81	\$2.03
2016	\$2.05	\$2.06	\$2.26	N/A	\$1.53	\$2.21	\$1.05	\$1.39	\$3.05	\$2.02	\$1.17	\$1.93	\$1.82	\$1.10	\$2.43	\$1.98
2017	\$1.54	\$2.11	\$2.38	\$2.86	\$1.75	\$2.08	\$1.03	\$1.31	\$3.38	\$2.25	\$1.18	\$2.10	\$1.84	\$1.22	\$2.54	\$2.08

Source: FLET329 (Efficiency)

FIGURE 4-22— HOURLY CHARGE-OUT RATE FOR VEHICLE REPAIRS



2015	\$116.24	\$98.00	\$102.00	N/A	\$91.96	\$97.00	\$103.35	\$88.48	N/A	\$90.37	\$97.19	\$105.46	\$93.43	\$88.00	\$102.27	\$97.19
2016	\$110.45	\$103.25	\$102.00	N/A	\$92.45	\$97.00	\$92.00	\$88.48	\$86.91	\$91.26	\$99.67	\$99.36	\$99.18	\$88.00	\$107.00	\$98.09
2017	\$102.24	\$105.04	\$102.00	\$71.52	\$94.17	\$97.00	\$98.57	\$88.48	\$91.50	\$101.44	\$105.34	\$99.92	\$113.87	\$98.00	\$104.57	\$99.92

Source: FLET347 (Efficiency)

An assessment of the current condition of the asset base along with a summary view on the associated LOS being delivered across Corporate Fleet Management is shown in Table 4-12 below. Also shown are projections of the risk profile of the assets along with expected service trends.

TABLE 4-12—OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS: CORPORATE FLEET MANAGEMENT

Information Technology (IT) LOS Trends					
Service Area	Condition	Service Levels	Risk to Service Delivery	Projected Service Levels	Data Confidence
Corporate Fleet (2013 AMP Report)					
Corporate Fleet (2018 AMP Report)					

4.2.9 Other Corporate Equipment

The assets in the equipment category were included to identify required funding to deal with possible failures. Although the amount is nominal, it is significant in terms of the reliance on these assets to support day-to-day operations and planning is needed to mediate these concerns. Furthermore, as various departments review and revise their approach to asset management, these assets will need to be incorporated into the process.

By applying asset management practices, frameworks, and philosophies, the owners of these assets can start to formulate service levels. To do so, key performance indicators will have to be defined that support the desired LOS. Along with an established LOS, a risk matrix will then need to be created with the intent of prioritizing assets and/or programs. Lastly budgetary needs will have to be created to align with the agreed upon delivery of service. Ideally, if LOS are maintained, the life of the asset may be extended and the risk to the City is mitigated.

4.3 Internal/External Trends with Potential to Impact Service

In addition to the impact of an aging asset base increasing the risk of service delivery failures, there are also a number of internal and external factors and trends that may impact the ability of the City to continue to deliver established LOS over the AMP period.

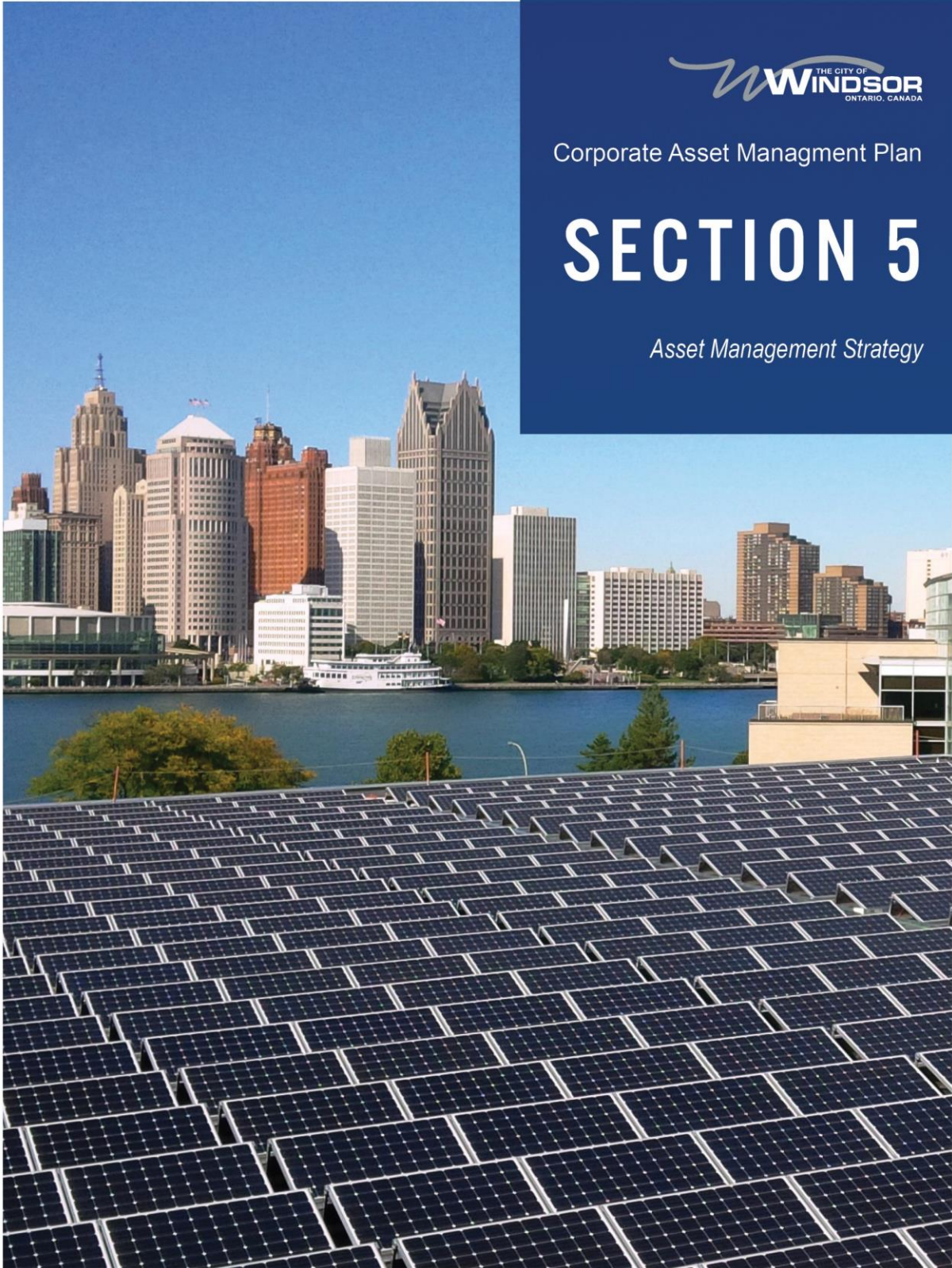
Internal factors/trends include:

- Knowledge Retention – The City has an aging workforce and as staff retire, there is a risk that their knowledge is lost to the organization. This can result in either inefficient working as staff will take additional time to carry out tasks initially or this can result in a declining LOS, as asset failures may not be prevented or the response to an asset failure may not be dealt with as promptly as it had previously. To address this, the City is working towards more formal approaches to knowledge management and succession planning to manage this trend.
- The Ability to attract/retain staff – Many municipalities struggle to compete with industry in regard to retaining existing staff and attracting new staff. As a trend, it is becoming more difficult to attract younger

staff into the City for a number of positions and this may impact on the City's ability to continue to deliver LOS. The City will continue to monitor this trend.

External factors/trends include:

- **New Legislation** – New legislation, e.g. tighter standards on vehicle emissions or improved accessibility standards for buildings, can potentially result in the existing City of Windsor assets not being able to meet the new desired LOS. To address this, the City has in place processes to monitor when and how future legislation can impact the asset base and, where possible, new assets are 'future proofed' where their design and construction takes into account the potential impact of new legislation. However regardless of the processes that are in place to deal with new legislation, there can be a lag between new legislation coming into effect and the time it takes the City to become fully compliant. The time to become fully compliant would be agreed with the relevant legislative body.
- **Environmental Changes** – The impact of climate change on the asset base is not fully understood at this time, but it potentially can impact on increased occurrences of surface water flooding as the assets increasingly struggle to cope with higher intensity storm events. The City assesses a range of climate change scenarios, for its larger storm sewer schemes. Similarly, sustainability trends may potentially impact on LOS, as the City adopts new approaches to service delivery, utilizing alternative operational and maintenance practices and asset types that may not have been in use previously at the City, but have the potential to make the management of our assets more sustainable.
- **Social Changes** – Social trends have the potential to impact on LOS delivered by the City. Citizens increasingly want more information and more dialogue, and this could be with regard to the type and quality of service delivered by the City, in addition to information about their bills. In addition, citizens expect the City to use a broader range of communication approaches including social media to connect the City and its Citizens, which the City has adopted as part of their communication in recent years. The City also recognizes the opportunities and challenges presented by a rapidly aging society. The City is working to remove social and physical barriers and is in the process of developing innovative, age friendly plans, strategies, programs and services that will accommodate this group of citizens.
- **Technology Changes** – New technology can, especially with regard to IT, have the potential to impact LOS. As existing hardware becomes obsolete or software becomes unsupported, the City is at a higher risk of failing to deliver LOS. To mitigate this risk, the City works closely with both hardware and software suppliers with regard to better understanding the timing for new technology and software, and builds this into our capital plans.



Corporate Asset Management Plan

SECTION 5

Asset Management Strategy

Asset Management Strategy

5.1 Objective

The objective of our Asset Management Strategy is to outline and establish a set of planned actions, based on best practice that will enable our assets to provide a sustainable level of service to the citizens of Windsor, while managing risk at the lowest lifecycle cost.

As this Asset Management Strategy is further developed it will consider a broad range of asset and non-infrastructure solutions and will develop an implementation process that can be applied to the identification of needs including renewal, enhanced LOS, growth, legislative and efficiency related projects, along with the prioritization of the lowest whole life cost intervention options, whether funded from operational or capital funds. This will assist in the production of a robust and defensible 10 year plan, including growth projections, to ensure the best overall health and performance of the municipality's infrastructure.

This section includes an overview of our approach to managing assets including condition assessment techniques and the identification of the optimal life cycle interventions required based on the lowest whole of life cost. Prioritization techniques, including risk, are also detailed as an approach to determining which priority projects should move forward into the budget first.

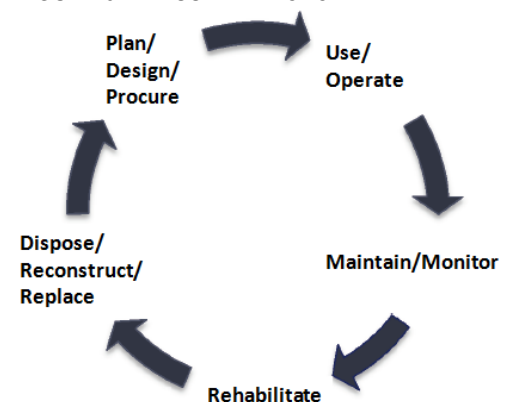
5.2 Asset Life Cycle Management Strategy

The City of Windsor recently completed and adopted, CR35/2019, which is a set of guidelines and tools for Whole Life Cycle Costing, Triple Bottom Line Plus Assessment and Business Cases. This is a significant step forward as these tools will be used to assist in understanding comparison approaches for rehabilitation or replacement of assets as well as understanding the full cost when considering growth and or service enhancements to existing assets. While the documents presented to City Council in report C11/2019 provide substantial details, a summary of whole lifecycle costing is included in this section of the AMP.

A comprehensive approach to asset management involves processes for managing and maximizing the performance of an asset while minimizing its costs throughout the course of its lifecycle, as presented in Figure 5-1. Asset lifecycle activities therefore enable the City to make better decisions throughout the whole lifecycle and not just to focus on capital/infrastructure solutions. This approach considers a range of parameters, for example, age, condition, historical performance, current capacity etc. Key components of the City's Lifecycle Management Framework include:

1. Operational Strategies – including considering non-infrastructure solutions to mitigating risks, deferring the need for upgrades/renewals, Asset Utilization & Demand management and Emergency Response Planning
2. Maintenance Strategies – Including approaches for determining the optimal mix of planned and unplanned Maintenance and for carrying out Maintenance Performance Assessments & Reviews
3. Optimized Decision Making Techniques – including risk based approaches, multi criteria analysis approaches along with approaches to optimizing investment across Service Areas
4. Investment Planning – including the identification and scoping of projects, to address Capital Maintenance, Enhanced LOS, Legislation, Growth (including development) or Efficiency needs.

FIGURE 5-1—ASSET LIFECYCLE



5.2.1 Operational and Maintenance Strategies

Operational and maintenance activities fall into the following categories, each having distinct objectives and triggering mechanisms:

1. **Operations:** Activities designed to ensure sufficient utilization of the asset. These are the regular tasks that are undertaken to ensure the assets achieve their service potential. Operations strategies include activities such as inspections & system monitoring.
2. **Maintenance:** Maintenance strategies are designed to enable existing assets to operate to their service potential over their useful life. There are two types of maintenance:
 - **Unplanned Maintenance:** Work carried out in response to reported problems (e.g. an asset failure)
 - **Planned Maintenance:** Work carried out to a pre-determined schedule or programmed as a result needs identified during inspection

A key element of asset management planning is determining the most cost effective blend of planned and unplanned maintenance including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.

The operations and maintenance of the assets is undertaken by City staff or contracted out for specialist services.

The overall operations and maintenance strategy is intended to maintain the current LOS and mitigate risk while minimizing cost. Currently the majority of asset maintenance is undertaken on a reactive basis only. This is a target area identified for improvement and will form part of the improvement program in the next version of this AMP.

3. **Non-Infrastructure:** The City currently adopts a range of non-infrastructure assets across its assets.
 - Customer side measures – managing customer demand to reduce demand on the city's services and/or to shift demand into off peak periods through pricing, regulation, education and incentives
 - Supply side practices – review of internal practices e.g. implementing enhanced maintenance regimes, waste minimization or leakage reduction thereby deferring or eliminating the need to build in extra capacity
 - The deferral of capital expenditure – e.g. The *Small Roads Repair program* utilizes a revision in the design specifications for utility cuts and has been shown to extend the residual service life of our roads.
 - A move towards a more sustainable approach to service delivery – By not constructing new assets or expanding existing assets and making better use of existing assets, the City avoids the need to add additional infrastructure to its asset base. This not only alleviates the need to spend additional capital but is a more sustainable long-term solution for the City.

WINDSOR Case Study 1: Shared Services Windsor Public Library, Airport and City IT.

The Corporation of the City of Windsor (the City) has entered into an Information Technology shared services arrangement with the Windsor International Airport (YQG) and the Windsor Public Library (WPL).

The airport, a wholly owned asset of the City, had a fairly complex information technology (IT) configuration with YQG being responsible for the IT systems and infrastructure relating to airport operations. Other systems relating to third party operations (i.e. Nav Canada, Canada Border Services Agency, car rental agencies, etc.) were not part of this arrangement and continue to be managed independently by those organizations. In the past, YQG IT support was provided by several third-party vendors. The condition rating for most YQG IT components was rated at either Poor or Very Poor and there was an acknowledged risk of operational failures and downtime due to the aging YQG IT infrastructure. The integration of YQG IT services with the City will result in immediate and long-term benefits from leveraging the City's enterprise IT services. Specifically, improved efficiencies, future cost avoidance, improved reliability and reduced down-time will be realized through this shared services arrangement.

WPL and the City are two separate entities, each with their own legal obligations. A review through the Technology Infrastructure Shared Services Initiative project identified an opportunity for a consolidated technology service delivery model for the City and WPL. The model would achieve the following objectives,

- Standardization and future replacement of Personal Computer infrastructure
- Integration of infrastructure networks
- Standardization of Telecommunications
- Standardization of software and enterprise resource planning systems
- Integration of Information Technology staff

While the project to complete the above objectives is currently in the planning and execution phases, WPL IT staff have been successfully integrated into the City's IT department and are a key resource in the planning process. Implementing the IT service delivery model will allow for a more efficient delivery of technology services, as well as, cost savings to the taxpayer.

5.2.2 Optimized Decision Making

Decision making approaches within the City using sound judgment and logic, enable a robust, repeatable and defensible process for the prioritization of the decisions for all asset types. Asset management decisions occur at:

- Operation and maintenance levels
- Project selection
- Project prioritization within service areas
- Project prioritization across service areas

Optimized decision making, either within or across service areas is currently based on a range of approaches which utilize the available asset data, such as condition assessment information and is supplemented with expert knowledge from City staff and outside agencies. For large value or complex projects, such as the Lou Romano Water Reclamation Plant Expansion, the City has utilized more advanced approaches with regard to the selection of the appropriate alternatives and solutions. The decision making process for these larger value projects includes assessing a broad range of capital solutions, such as renewal, rehabilitation and replacement options in addition to operational solutions such as enhanced maintenance regimes. In addition to utilizing these approaches for specific large value projects, a similar approach has been taken for the selection of rehabilitation work for assets such as roads, sewers, and structures, where staff have assessed a range of alternative solutions and developed a range of intervention options that are most appropriate to the City's needs.

Asset management decisions inherently involve the analysis of various options for asset intervention throughout the asset's life cycle. Options are typically analyzed at two distinct levels:

- Corporate Network Asset Management: A corporate-wide view of assets within or across service areas with the goal of prioritizing assets and identifying immediate needs across the City.
- Project-level Asset Management: Typically follows the network level analysis and is more asset-centric. It aims to identify the most suitable intervention to take for an individual asset or asset component.

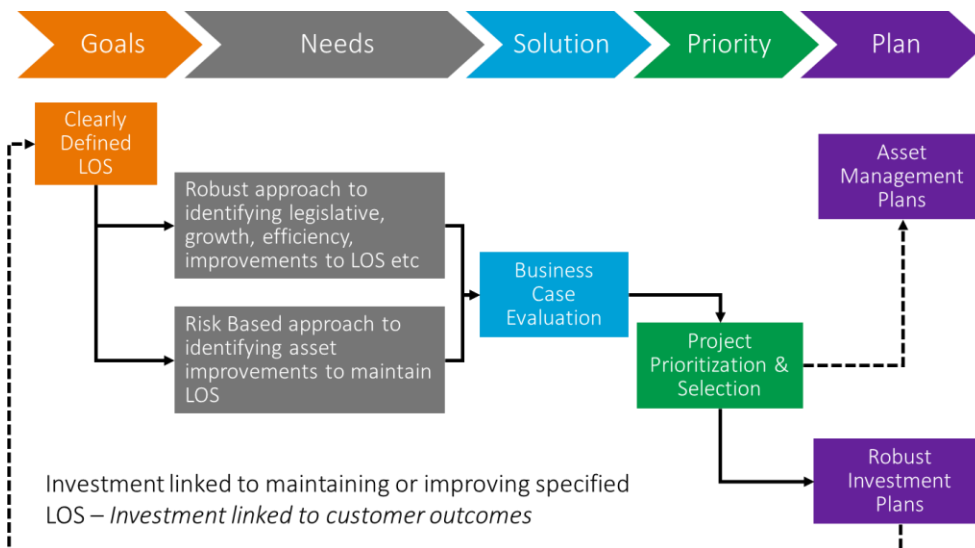
Moving forward, as part of the Corporate Asset Management Program, service areas will be able to base their decision making on a more consistent approach which will involve a combination of Risk Based Analysis, Cost- Benefit Analysis (CBA), Whole life-cycle cost (WLC) modelling and Triple Bottom Line Plus (TBL+) as defined below:

- **Risk Based Analysis:** This approach focuses on maximizing risk reduction for minimum cost. The corporation quantifies the risk, identifies mitigation measures and then sets out to reduce the risks in the most cost effective manner.
- **Cost-Benefit Analysis (CBA):** CBA involves identifying the financial impacts of various alternatives within a business case. This includes both benefits and costs over the entire analysis period with the ultimate goal of assessing which alternative presents the greatest value of benefits compared to costs.
- **Whole life-cycle cost (WLC) modelling:** The analysis of cost implications of an asset, throughout an organization's period of responsibility, to meet levels of service (LOS), manage risk and ensure the lowest cost for ownership of the assets delivering the LOS.
- **Triple Bottom Line Plus (TBL+):** An analysis that expands on the traditional view of an organization's financial bottom line by measuring the organization's commitment to economic, socio-cultural, technical, and environmental factors.
- **Business Case Evaluation:** The development of business cases to evaluate alternatives and select a preferred solution that provides the best value – when evaluated against specific weighted criteria.

5.2.3 Investment Planning

The overall investment planning process (Figure 5-2) is designed to support a Service Area's overall service delivery plan. This includes asset planning; procuring; implementing and commissioning (or bringing into operation) with the focus on linking Investment to customer outcomes as detailed in the figure below.

FIGURE 5-2—OVERALL INVESTMENT PLANNING PROCESS



Therefore, the aim is to directly link investment planning with the required service delivery outcomes that the infrastructure supports.

All Service Areas across the City follow the above process with regard to the identification of goals, carrying out a gap analysis to better understand the need, assessing a range of solutions, prioritising these solutions and developing an investment plan. However, the specific approaches within each of the defined steps varies in complexity depending on the individual Service Area. Moving forward, a more consistent approach will be used that will not only enable a more robust approach within the Service Areas, but will also facilitate informed discussions on risks and funding priorities across Service Areas.

In many cases projects do not just address just one cost driver, but when work is being carried out on an asset, it is often more efficient to address a number of deficiencies within a single project, e.g. carrying renewal type work at the same time that a legislative requirement is being met. Similarly the same approach is used for maintenance activities when the timing of maintenance activities can be scheduled so that any asset outages can be minimized and the work carried out more efficiently.

This approach enables funding to be spent more efficiently within a Service Area and for the impact on customers to be minimized.

The same approach is also taken when looking at projects that are initiated by separate service areas, but are working on assets in the same vicinity e.g. water main renewal and pavement renewal, where it may be necessary to alter the timing of the projects to enable the projects schedule to align.

5.2.4 Condition Assessment Programs

A key building block of good asset management practice is to have comprehensive and reliable information on the current condition of the infrastructure. Municipalities need to have a clear understanding regarding performance and condition of their assets, as all management decisions regarding future expenditures and field activities should be based on this knowledge. An incomplete understanding about an asset may lead to its premature failure or premature replacement.

Some benefits of objective condition assessment programs within the overall asset management process are as follows:

- Understanding of asset condition leads to better management practices
- It allows for the establishment of rehabilitation programs
- When utilized in risk frameworks, it assists in the identification and avoidance of future failures and provides liability protection
- It enables a potential reduction in operational / maintenance costs
- It can be used to develop accurate asset valuations
- It can be utilized to inform proactive repair schedules and preventive maintenance programs
- Understanding asset condition can be used to avoid unnecessary expenditures
- It improves the understanding of asset service life therefore contributing towards improving our LOS
- It improves financial transparency and accountability
- It enables accurate asset reporting which, in turn, enables better decision making

Condition assessment can involve different forms of analysis such as subjective opinion, legislated methods, mathematical models, or variations thereof, and can be completed through a very detailed or very cursory approach.

When establishing the condition assessment of an entire asset class, the cursory approach (metrics such as Good, Fair, Poor) is used. This will be a less expensive approach when applied to thousands of assets, yet will still provide a sound overview of the City's assets, and will allow for detailed assessment or follow up inspections on those assets captured as a Poor or Very Poor condition later.

5.3 Future Demand

This section of the Asset Management Plan analyzes the potential variables affecting municipal resource demand including but not limited to the triple bottom line variables; social, economic and environmental. The City has assessed the impact of these trends and has developed a number of demand management strategies to meet demand targets without compromising end-user level-of-service delivery.

Section 2 provides a summary of several key reports which are currently in development and will inform the future demand for growth and service enhancements for the City; Sewer Master Plan, Active Transportation Master Plan, Transit Windsor Service Delivery Review, Recreation Master Plan, Urban Forestry Master Plan as

well as Sandwich South Growth Studies and the 2020 Development Charge Studies. While Section 6 provides comments on current funding for growth and service enhancements the 2023 AMP will be able to provide more details regarding the funding level in comparison to the various reports based on what elements of them are adopted by Council.

At the time of AMP writing, the Planning Division was undertaking a review of growth statistics to be included in an updated official plan, however current statistics indicate that the City could potentially see population growth to between 243,809 and 264,827 by the year 2026. It must be stated that these projections are from the last Official Plan (2006) and do not reflect current projections. It is very likely the growth projections will be revised down slightly in the coming years. Nonetheless, the City of Windsor's projected growth rate is expected to increase over the next several years and this is a positive change from the 2011 – 2013 period. The most significant area of projected growth of the City are the Sandwich South Lands. As of the writing of this report a specific Growth Study Project has commenced to explore the total cost to build out this area, as well as the order in which the various infrastructure phases need to occur. The results of the study will inform the next AMP, and the Growth Study will be informed by the various asset management practices and processes which have been developed for the City. It is important to note that costs associated with developing this area will be significant and much of the costs will be incurred prior to development investments being made, as the necessary infrastructure needs to be in place first.

Likewise, the City of Windsor's employment forecast is expected to show an overall increase in jobs over the next 5-6 years. Again, at the time of AMP writing, the Planning Division was undertaking a review of current statistics to be included in an updated Official Plan, however present statistics indicate that the City could potentially see increased job growth in the next 5-6 years. Windsor is the centre for Canada's automotive industry and is an emerging green energy manufacturing centre. Windsor has had considerable success diversifying its employment base, with traditional heavy manufacturing, light and advanced manufacturing, logistics and the tourism and hospitality sector. As the restructuring of the North American economy continues, significant employment growth is anticipated to occur in the light and advanced manufacturing and logistics sectors with total employment expected to increase from about 120,000 jobs in 2006 (the date of last known statistics) to 142,000 jobs by 2026. Again, it must be stated that these projections are from the last Official Plan (2006) and do not necessarily reflect current projections. It is very likely the projections will be revised in the coming years.

Windsor also experiences population movement within the municipality and is also affected by the ever-changing age and social demographic. With a large infusion of new Canadians (historically), a trending towards an older demographic makeup, and population shifts from downtown areas to perimeter neighborhoods, the City does in fact require both new capital investment as well as maintenance and rehabilitation resources to address demand. Because of its geographic location, the City is also affected by a frequent influx of non-residents by means of the 401/Herb Gray Parkway and Gordie Howe International Bridge, currently in progress, Windsor International Airport, and the shared border crossing with the United States.

The impact of the assumptions made in relation to accommodating the City's changing demographics and future demand will not be universal across all Service Areas and is largely dependent upon the type of asset being considered and its associated life expectancy. For example, a population shift to the City's outer limits may only require existing neighborhood roads to undergo a simple mill and pave whereas that same shift may overwhelm the sewer network and require complete replacement of sewers.

5.4 Climate Change

The need to bring climate change information into asset management is key and identified in the City's Asset Management Policy. Administration continues to work towards bringing these discussions into various meetings and asset management practices. The Community Energy Plan (CEP) and its associated Corporate Climate Action Plan (CCAP) address both energy conservation and climate change mitigation while the Climate Change Adaptation Plan addresses climate resiliency. While the CEP and CCAP have set Community and Corporate targets the Climate Change Adaptation Plan has overarching strategies and is currently being updated with plans for presentation to Council in 2019.

Community Energy Plan

The Community Energy Plan aims to create economic advantage, mitigate climate change, and improve energy performance. It strives to position Windsor as an energy centre of excellence that boasts efficient, innovative, and reliable energy systems that contribute to the quality of life of residents and businesses. The Community Energy Plan (CEP) is a long-term plan that identifies ways to support Windsor's local economy by increasing competitiveness, creating jobs in the energy sector, and serves as a business retention strategy. The CEP also identifies ways to improve energy efficiency, improve energy security, and reduce greenhouse gas emissions while contributing to the overall quality of life of the Windsor Community. The CEP describes and quantifies the types of energy used in the entire Windsor community by homes, buildings, and travel, and explores how population, employment and land use impact Windsor's energy needs.

Municipalities are noted to have direct or indirect control of over 44% of the national GHG emissions. There are a number of strategies in the Community Energy Plan that link corporate assets to the reduction targets approved, including but not limited to:

- Encouraging a modal shift toward Public Transit
- Develop and Implement an Active Transportation Master Plan
- Foster the Adoption of Electric Vehicles
- Installation of Solar Arrays
- Designate and Plan District Energy Areas (WUC assets but within our ROW)

Community Targets

Through the implementation of the Plan, the Windsor community will:

1. Reduce per capita primary energy use by 40% from 2014 baseline by 2041; and
2. Reduce per capita GHG emissions by 40% from 2014 baseline by 2041.

Corporate Climate Action Plan

The Corporate Climate Action Plan (CCAP) is a corporate-wide plan to reduce energy and emissions from municipal operations and fleets. The CCAP focuses exclusively on energy and GHG emissions from municipal operations and fleets. The CCAP included direct and indirect GHG emissions produced by the City as a result of its operations. The CCAP is tightly linked to and takes direction from the broader Community Energy Plan.

The Corporate Climate Action Plan identifies 29 specific actions to be taken by the City of Windsor to reduce energy use and mitigate climate change impacts. Some of these strategies are policy based but a large number are linked to Corporate assets (ex. Building retrofits, vehicle replacement, etc.).

Corporate Targets

The City of Windsor will reduce its primary energy use from the 2014 baseline by:

- 11% by 2030 and 25 % by 2041

The City of Windsor will reduce its GHG emissions from the 2014 baseline by:

- 20% by 2030 and 40 % by 2041.

Climate Change Adaptation Plan

The overall aim of Windsor's adaptation strategy is to create a more resilient city to the effects of a changing climate. A well-adapted city is able to absorb the effects of climate change, such as extreme summer heat or intense rain events, through the advancement of sustainable policies, infrastructure investment, and public

education. This requires the City to be forward thinking and take initiative. Being prepared to handle the climate challenges facing us will be beneficial to our health, our environment and our economy.

Municipalities have a significant role to play in climate change adaptation as many climate change impacts will directly affect the services provided by the City of Windsor and its agencies. The actions taken today by the City of Windsor to proactively adapt to the changing climate will enhance community resilience to climate change while reducing the human and economic costs of climate related impacts. Adaptation actions can often lead to great cost savings as intense storm events and extreme heat can result in devastating expenses to repair infrastructure, basement flooding and health care costs.

The 2012 Climate Change Adaptation Plan is a high-level plan which identifies vulnerability and risks to the Corporation and Community based on climate change projections. This high-level plan aims to identify climate change risks and prioritize actions across various services. This plan as well as in response to recent events has resulted in other plans (i.e. Sewer Master Plan, Pontiac/St. Paul Study) to identify impacts and risks associated with Climate Change within an asset class.

The Climate Change Adaptation Plan is currently being updated with the intent of presenting the 2019 Degrees of Change (Climate Change Adaptation Plan) to City Council in the late fall of 2019. With the current update, the City of Windsor has updated the Climate Change projections, and reviewed vulnerability and risk across the broader Community.

Overarching strategies as identified in 2012 Plan

1. Incorporate climate change adaptation into city policies and high-level plans;
2. Create internal mechanism to 'ask the climate question' for new major infrastructure projects;
3. Monitor climate change, evaluate the effectiveness of adaptation strategies and adjust as needed (adaptive management);
4. Use best available science to analyze how the climate is changing locally and how this may impact the community;
5. Routinely review the City of Windsor's vulnerability to climate change;
6. Continuously conduct risk assessments to identify priority impacts requiring adaptation actions;
7. Engage the public, business and other stakeholder groups.

Efforts are continually being made to include the information and recommendations of the CEP, CCAP and Corporate Climate Adaptation Plan in our various asset management practices and strategies. The inclusion of climate change adaptation is part of the triple bottom line analysis and consideration of how to incorporate the value associated with cutting carbon and energy costs in life cycle costing calculations is being reviewed. Fundamentally, as assets are replaced or built the question we need to keep asking is, "Will our current designs for assets expected to last 60 years plus be resilient in our climate in 30-40-50 years time so they last 60 years, or should we be considering alternatives?"

5.5 Procurement Methodologies

The City has experience in the selection of alternative delivery methodologies, however these have largely been applied to individual projects without consideration to a corporate wide approach. Larger projects are generally assessed with regard to approaches, but a consistent approach for use across all Service Areas still needs to be implemented.

Road construction for example, is scheduled to maximize savings and decrease service disruption by taking advantage of Windsor's milder weather and planning projects deep into Autumn and early Winter. In addition, these types of projects also include strategies such as:

- issuance of tenders in fall for spring construction;
- communication of planned projects including involvement with Utility Coordinating Committee;

- expansion of capital budgeting from 5 to 10 years;
- mix of small and large projects;
- bundling of like projects;
- pre-committing funding in future years to allow for better planning of projects which span several years.

Although the results of the tendering process will be what they are, the use of these types of strategies helps to mitigate higher than expected tender pricing.

WINDSOR Case Study 3: Huron Church Reconstruction

As stated above significant road and sewer projects can greatly benefit from well planned projects, which includes early engagement with the heavy construction industry. A good example of how these non-infrastructure asset management strategies can work is the reconstruction of a portion of Huron Church. Huron Church is the gateway to the Ambassador Bridge which sees nearly \$500M in trade daily. Traffic volumes are significant with the majority being large trucks moving goods to and from the US. Proper planning of such a project is complex, involves several parties and is critical to ensure traffic is managed, work is completed as planned and costs are within budget.

The Huron Church road reconstruction is approximately \$6M and in mid 2018 it was awarded grant funding of \$3M. This allowed the project to proceed immediately and locked the City into defined timelines for completion to meet the grant requirements. By summer 2018, the tender for the project was issued and included an expectation to start construction in Spring 2019 as well as clarity on the relationship to the grant and timelines which must be met. With a one-year window to plan the project pricing was favourable as the contractor could lock in material, equipment and labour requirements nearly one year in advance. City Administration and the selected contractor had time to work through the project plan, street closures, labour and material readiness, inspections and communication of the project. As of the writing of this report, City Administration has seen significant value from the near 1-year planning period for this project, not only in pricing but in execution of the construction as well.

5.6 Asset Management Strategies at the City of Windsor

The City continues to improve its approach to the management of its assets and will continue to put in place processes, procedures and tools to enable a more consistent approach across the City's Service Areas. Detailed below is a brief overview of some of the current asset management practices in place across the City.

5.6.1 Transportation

The City's Transportation assets and service levels are in a state of decline. Historical Transportation budgets have not been enough to maintain our existing assets as these assets continue to age and deteriorate, our service will continue to decline. We need now to act to halt the decline, maintaining assets and service levels at their current levels, before it is too late to recover them to expected service levels, without significant investment.

The focus for the next 4 years of investment is on maintaining our existing assets and halting the decline in service levels. There are defined roadways which are planned for Growth and or Enhanced Services. This means the road will be expanded either for additional vehicle traffic and or alternative modes of transportation as well as impacting underground assets such as water, storm and sanitary pipes. Some of these projects have already completed Environmental Assessments (EA) and need to commence within the next 5 to 10 years so they do not expire. Growth over the 4-year period is expected to be focused on the previously identified projects funded in the Capital Budget as either committed or approved in principle funding.

Appendix G highlights challenges with the historical asset investment strategy for transportation and puts forward a new strategy that will allow the City to maintain current LOS, providing a long-term solution for the next 10-20 years, focused on increased maintenance and rehabilitation.

5.6.1.1 Roads

The Roads network represents the most significant portion of the City's Transportation infrastructure and as a result has received the most attention and analysis for the AMP.

If there are no increases in funding for the rehabilitation and reconstruction of our existing road network, it will continue to fail at a rate which exceeds current levels. We can expect our current figure of nearly 20% of the network being identified as Poor or Very Poor to increase to over 30% within 20 years. Not only will this create a reduced level of service for our road network, it will increase risk to the City as there will be more Arterial, Collector and EC Row classifications, which are of significant risk to the City, in a Very Poor condition. It will also create a significant financial challenge in trying to resolve the problem as once they are in Poor or Very Poor condition less costly options, such as mill and pave and panel repairs, are not viable. These roads will therefore require reconstruction.

The ability to have an impact on the deterioration trend requires a prompt response. As stated in the 2015 report to Council, 5 years may not have a significant slide of assets to a Poor or Very Poor condition, however some slide has been seen, particularly with the arterial, collector and expressway. The longer we delay increases to specifically address the existing roadways and prioritize based on risk, the more challenging it will be financing to recover from the volume of assets which are declining.

As with all assets the AMP focuses on identifying funding levels to simply sustain current LOS over the next 20 years. The advanced scenario modeling, presented to City Council in 2015, determined an approximate increase of \$16M added to the average annual amount spent on roadway rehabilitation and reconstruction is required to sustain the network at 18-20% being in Poor or Very Poor condition. This would result in approximately \$37M in annual funding to address the existing network. These funds would be used to implement additional maintenance practices such as crack sealing and panel repairs which extend the life of the road, as well as rehabilitation and reconstruction projects.

This funding would not be allocated to any growth and or service enhancement work on the roads. Expansion of the length or width of a road, as well as the addition of attributes such as cycling, sidewalk and or curbs would continue to be funded from sources such as the resident's portion of local improvements and or the funding identified for growth and or enhancements. While the 2013 to 2018 average investment for existing versus growth was \$19.9M versus \$4.2M respectively, the 2019 7-year Capital Budget shows a notable change to \$17.6M and \$11.7M respectively. The substantial increase to the expansion and additional services on the road network reflects the progress in moving projects forward which have been considered and discussed over several years. To continue to support such initiatives, the ability to define long term sustainable funding allocated specifically to address the existing network is necessary to ensure growth and enhancements do not adversely impact the ability to sustain the entire network at current levels of services.

The City has the following road asset management strategies in place:

- A road pavement inspection program – each year, pavement inspections are performed on the road segments scheduled. A risk-based approach is used to determine the frequency of inspections on a road segment. A road segment is scheduled for inspection using a range of frequencies from a maximum of once every year to a minimum of once in a 7 year period based on set criteria (e.g. last inspection date, age of current pavement, road classification, and current condition rating). Generally speaking, the higher the traffic volumes and the worse the pavement condition, the more frequent the inspections on a road segment. (Alley segments are scheduled for inspection on a lesser frequency because of the lower traffic volume.) Using a structured objective formula-based approach, the pavement inspection data is then used to generate a numeric condition rating of the overall performance of the pavement. Road condition ratings are also updated following the completion of road rehabilitation/reconstruction projects and new construction projects as information becomes available. The numeric condition ratings are used routinely by City staff for the purposes of rehabilitation, reconstruction, and maintenance planning and in budget planning.
- The computerized Infor (Hansen) infrastructure management system and database is used to track detailed road asset information, inspections, and also work orders to establish a history of activity over the life of the road asset on a segment by segment basis

- A comprehensive road reconstruction and rehabilitation program is in place
- Where possible, work is not carried out on Roads which are planned to have either sewer or water work in the next 5 years or are part of a larger project in the 5 year Capital Program
- Administration seeks approval in the fall to pre-commit capital funding for the next year to ensure tenders are issued and projects started in the spring of the following year, which yields favourable tender pricing when compared to tenders issued in the spring or summer;
- Administration seeks pre-commitments out up to 5 years for large projects allowing larger sections of the work to be tendered at one time and at current pricing;
- Administration seeks opportunities to merge projects where possible for larger tenders, and balances the size, scope and location of projects which should assist in better tender pricing;
- Similarly the City coordinates with Windsor Utilities Commission to align timing between road, sewer and water projects;
- Shift from a 'worst first' prioritization approach based on condition, to a risk-based prioritization approach where the City's most important assets are given preferential treatment. Best efforts will be made to keep EC Row, Arterial and Collectors from sliding into the reconstruction only category, aiming to have none in Poor or Very Poor condition
- The slide of assets from rehabilitation to reconstruction will be managed by;
 - Mill and Pave will only be done on roads where it will yield 10 – 15 years of added life;
 - Local roads will be managed as best as possible recognizing that, based on current funding levels, a percentage of those roads will always be in the Very Poor category. Local Improvement and sewer reconstruction work will also be factored into decisions.
- Roads order of priority: EC Row, Arterial, Collector (including Scenic), Local (industrial, commercial and residential)
- Roads which have sewer or water work scheduled to be completed will have priority to maximize benefits of shared capital costs between the City's service areas. This will act as a boost for Local Roads which will be addressed when there is a sewer project or Local improvement which needs to be done and a process is in development for this.
- The specifications for utility cuts has been enhanced to help maintain the road segment integrity and retain proper condition rating and useful life projections

One of the key future strategies that the City plans to incorporate into the road preventative maintenance program is a comprehensive crack sealing operation. This would be utilized early on in the assets life cycle and would help to extend useful life and maintain a Good condition rating. The City is currently investigating options in this area and expects potential pilot projects to be established in the near future.

The City has also directly tied their road operation and maintenance functions with the capital budget as outlined below:

- Reconstruction
 - Performed when the overall structure of the road has deteriorated to a point where the only economical action is the reconstruction of the entire road structure. Typically roads in the Poor and Very Poor corporate condition categories would require full reconstruction as they are not good candidates for a mill and pave
- Rehabilitation
 - Mill and pave program
 - Roads which are in Fair condition are within 1 to 5 years of becoming deficient and needing additional work to improve them and therefore are candidates for Mill and pave.
 - Expanded asphalt method

- Rural roads that have enough structure to be able to repurpose the base before laying another top coat of asphalt. This is used predominately for Very Poor category roads where complete rehabilitation is required
- Preventative Maintenance
 - Small road repair
 - Roads which are in Good condition are 6 to 10 years away from becoming deficient and being looked at for this program
 - Will address sections of bad road to improve its life cycle and potentially improve overall condition of road
 - Crack sealing
 - Pilot projects have shown positive results. Additional funding is required to expand this program
 - Pothole patching program
 - Preventative maintenance measure as well as a short-term repair measure; funded through operating budget

The City also understands and recognizes that there will be significant challenges with the roads asset management program moving forward in the future. Some of those challenges include:

- Trying to avoid roads falling into the Poor and Very Poor corporate condition category, while trying to also address those roads which are already in the Poor and Very Poor corporate condition category.
- EC Row Expressway costs considerably more to maintain than the equivalent length of surface elsewhere in the City, due to the complexity of setting up a construction site for the work and the road requiring a higher condition rating to be maintained than other road types. This is therefore a significant liability and is responsible for higher costs for materials and maintenance
- Coordinating with all utilities which have different needs and timescales for rehabilitation
- Keeping up with technology, methods and materials for both maintenance and replacement

The City's Asset Planning department was tasked in 2017 to create a centralized grant application process. As a result, over \$30M in grant funding has been awarded funding for several different projects or portions of projects. As it relates to roads, the Clean Water Wastewater grant identified 3 large sewer projects, which involved the removal and replacement of the corresponding roads. Grant funding allocated to these projects was \$5,513,151, or 75% of the total project cost. A large portion of the investments in local roads is a result of the increase in sewer investment over the past 5 years, which generally includes the removal and replacement of corresponding roads.

5.6.1.2 Structures

The current average funding from 2013 to 2018 as well as 2019 to 2025 continues to be sufficient to maintain and manage these assets based on current conditions. Should these assets start to exhibit deterioration which requires more significant investment the funding levels will be revisited, however at this time there is no recommendation for additional annual funding.

The City has the following key asset management strategies in place:

- Structures (i.e. bridges and culverts (over a 3m span)) are inspected every two years in accordance with the Ontario Structure Inspection Manual (OSIM)
- All inspections are in the Infor (*Hansen*) database and work orders are tracked to establish a history of activity over the life of the structure
- A preventative maintenance strategy is in place, including:

- The bridge washing program which aims to keep debris from key elements and remove corrosive de-icing chemicals.
- Recoating of barrier walls to prevent decay and or deterioration
- Minor maintenance repairs that are identified through the bi-annual inspections
- The City has in place a bridge rehabilitation program. This includes changing from expansion joints to semi integral joints when the design of the bridge allows for it. This extends the life of the joint significantly for older bridges.
- Programs are being developed to improve the overall aesthetics of the City's bridges
- A prioritized plan is in place for bridge replacement work, so that if further funding becomes available, work can be quickly and efficiently advanced to make the best use of the funds. These plans outline immediate needs based on objective ratings.

5.6.1.3 Sidewalks

The City's existing sidewalk network had some significant investment from 2013 to 2018 to address immediate challenges. Based on the modelling completed in 2015 the average annual funding for sidewalks required to maintain the existing network is approximately \$1,500,000. The average annual shortfall in funding is approximately \$350,000 annually. As with roads this is the shortfall to replace existing sidewalks, without growth or service enhancements. Considering many of our sidewalks when being replaced are required to meet AODA legislative requirements, Administration recommends the shortfall in funding of \$350,000 be doubled to \$700,000 address the required AODA compliance requirements without impact to the funding allocated for growth and service enhancements.

The City has the following key sidewalk asset management strategies in place:

- A sidewalk inspection program to identify trip hazards and other sidewalk deficiencies in-the-field for repair purposes and to generate overall sidewalk condition ratings which are used by City staff in maintenance, rehabilitation, and budget planning. A risk-based approach is used to establish inspection frequencies for a sidewalk segment based on the pedestrian traffic level and the last recorded condition rating.
- The Infor (*Hansen*) CMMS is used to track detailed sidewalk asset information, inspections, and work orders to establish a history of activities over the life of the asset on a segment by segment basis.
- Maintenance and rehabilitation programs including spot repairs, slab replacements, and total reconstruction depending on the type and severity of the deficiencies as well as site and economic considerations. A number of repair methods are used based on industry practices.

5.6.1.4 Other Transportation Assets

Street Lights

The 2013 AMP did not include these assets due to the limited information available. While the data is still not as comprehensive as needed for proper planning, these are significant assets which need to be included in the overall inventory.

The entire Street Light inventory is valued at \$40,997,539 with \$29,108,253, or 71% of the total value deemed in Very Good, Good or Fair condition. The difficulty in providing further comment on these assets is that they are pooled. This means we included a group of Street lights which were constructed and installed in a year and put their total value on our financial records, rather than the individual value. There is also no current program in place which provides the City with an understanding of the condition of individual street lights, nor condition of a pooled set of Street Lights based on proximity and installation dates. This is something which has been noted as part of the improvement opportunities for the 2023 AMP and may be addressed as final determinations of maintenance for these assets is determined.

What should be highlighted is the recent re-lamping program which converted all Street Lights to LED. This was a very positive step in reducing the annual maintenance and utility costs associated with these assets,

as well as providing additional security, safety and visual benefits. The utility savings from this project are being used to fund the capital investment and then build a reserve for future replacement.

Traffic Signals

The City has seen a significant decline in the condition and level of service of Traffic Signals across the network which presents a major risk to the City and its citizens due to the shortfall in maintenance and replacement funding. In 2013, 33% of the signals were in Poor condition, and by 2018 this number has increased to 64% of signals being in Poor condition. It should be noted that Traffic Signals are not by legislation permitted to be in Very Poor condition as that definition for Traffic Signals can only mean complete failure and inoperable. As such the use of Poor for these assets should be considered the worst condition a functional system can be in, resulting in higher maintenance costs to keep them operational, and noting that complete failure will require immediate replacement.

Traffic lights are programmed to fall into a default flashing red model turning a junction into a 4-way stop. For a local road this is a significant inconvenience and disruption to road travel. Should this happen at a major junction on an arterial or collector road, there is a major disruption to traffic flow in that part of the City.

There is currently \$14M in Traffic Signals in Poor condition which represents 184 intersections.

Parking Garages and Equipment

In the 2013 AMP the City owned and operated 3 Parking Garage structures. In 2018 it was decided to sell one of those structures, Canderel. A portion of the proceeds from the sale of Canderel, specifically \$2.5M and \$1.6M, were directed toward rehabilitation of the 2 other structures, Goyeau and Pellisier, respectfully. Both garages were also identified in the Corporate Energy LED relighting program, which will improve the lighting, improve security and reduce the annual utility costs.

There is an Off-Street Parking Reserve which funds the various capital works required to maintain and sustain these assets. While the reserve fund had previously not been sustainable, recent changes to parking increased the funding to bring the reserve to a more stable condition. The recent investments in the rehabilitation of both garages also reduced the demands on the reserve by funding these efforts through the proceeds from the sale of Canderel. As a result, this AMP does not project any concerns with these assets requiring additional funding to sustain them at current services levels. These assets and their reserve will be revisited in 2023.

Noise Barriers

Administration was reluctant to include these assets in 2018 given the significant swing in the condition rating since 2013. Neither year, 2013 or 2018, has been able to provide objective condition data on these assets. The main driver has been remaining life of the asset based on how long they were designed to last versus how long they have been in service. Although a visual inspection was done to consider if the age condition was appropriate there is no defined process to inspect them. These assets are also along the Expressway making the ability to inspect them challenging.

Given the basic civil nature of noise barriers and current condition, no maintenance or action is expected to be required over the coming years. This will be revisited in the 2023 AMP and the need to develop a more objective means of assessing the condition included in the improvements for 2023 AMP.

5.6.2 Transit Windsor

To help manage its assets, TW utilizes several advanced software programs and asset management strategies:

- The FleetFocus system was purchased in March 1999 and implemented in September 2000. FleetFocus is a comprehensive fleet management program that is capable of tracking an unlimited

number of equipment units and vehicle classes as well as all functions related to the maintenance of vehicle equipment, including repair and preventive maintenance (PM) work orders (operating expenses including fuel and mileage). The database also manages TW's parts inventory and purchasing functions.

- TW utilizes Winfuel as their fuel management program and the information collected in the database (i.e. Vehicle, fuel type/quantity and meter readings) is interfaced daily with the FleetFocus program while meter updates are used to trigger the scheduling of PM work within FleetFocus.
- SAP Crystal Reports are also utilized for numerous monthly reports specific to fleet performance and parts inventory management.

Operating these systems and asset management programs is a robust staff of operational and maintenance members working out of a 131,000 sq.ft. maintenance facility. The operations within TW's fleet garage include maintenance and overhaul of bus engines, transmissions, differentials, brakes, suspensions, electrical components, steering, air conditioning, body work and painting. The primary goal of these maintenance staff members is:

- The maintenance of transit vehicle assets through the provision of scheduled and unscheduled servicing of all transit revenue and non-revenue vehicles.
- The planning and acquisition of revenue and non-revenue vehicle assets including the development of specifications for all new vehicle purchases.
- The maintenance of all transit facility assets by ensuring repairs are completed on a timely basis in a safe and well-maintained facility for optimal efficiency and effective operations.
- The servicing of transit buses and other vehicles including cleaning of vehicles, washing of the interior of transit vehicles and daily fueling & filling of other fluids.

As detailed previously, in 2015 TW and the Asset Planning Division in conjunction with a third party transportation engineering consultant undertook a full lifecycle costing analysis study intended to better understand both the current condition of the asset portfolio as well as the optimal use and lifecycle events of several Transit asset categories. Final recommendations from the consultant included a plan to implement a 12-year transit bus lifecycle program in an effort to optimize current and projected resources as well as stabilize the maintenance program which was facing unstable and increasing demands. A 12-year lifecycle means that TW purchases 8 new buses each year as part of a stable and consistent asset procurement plan. Utilizing a steady-state procurement program allows a transit property to know exactly how many assets they will be responsible for in any given year and enables a maintenance department to better plan for projected repairs and standard lifecycle overhauls.

The recent Public Transit Infrastructure Fund (PTIF) provided funding to replace 24 buses, helping ensure the first 4 years were addressed. Current grant funding under the Investing in Canada Infrastructure Program (ICIP) – Public Transit, is further providing an opportunity to continue to replace 8 buses a year for the next several years. In turn this has helped reduce the City's portion of funding for replacements and allowed those funds to be used as matching funding for additional projects which are more growth and or service enhancement based.

TW is also currently working on a Transit Windsor Service Delivery review, which is expected to be before City Council prior to the end of 2019. The Service Delivery Review will include a review of the current service identifying gaps and opportunities for service improvements in keeping with industry best practices including route revisions, service standard revisions, transit infrastructure requirements, and strategies to increase ridership. The service review will also identify existing and possible transit services with neighboring municipalities and the steps to establishing a form of regional transit. TW's current network and ridership, existing policies, objectives, service standards and performance targets, as well as system and route

performance will also be reviewed. The review will also include a review of operating and capital budgets, organization and staffing levels, fleet and facilities, and bus stop amenities including terminals.

This Transit Windsor Service Delivery Review will have significant recommendations for rehabilitation, replacement, growth and service enhancements, which are likely to be both local and regional in nature. As such, this AMP does not recommend additional funding for TW assets. The Transit Windsor Service Delivery review along with the ICIP- Public Transit grant will generate direction on the future of TW for City Council to consider and provide direction on. The results from that report will be reflected in future AMP and the report will include practices and processes consistent with the City's asset management program.

5.6.3 Environmental Protection

5.6.3.1 Storm and Sanitary Sewer Network

The City's sewer system is a broad network of sanitary and storm sewers that provide a critical and essential service to all municipal residents and business. This network incorporates sewer laterals, trunk mains, inceptors and force mains, all of which act together to ensure proper drainage of wastewater and storm water from the City. With the new approach of obtaining objective condition ratings through the Zoom camera inspection process, strategies have been developed to capitalize on its findings. The following is a high-level description of those strategies:

- Capitalize on the efficiency and effectiveness of the zoom camera sewer inspection project by formulating a 5-year city-wide cycle program to cover 90% of the entire network. Buried or not found manholes will be inspected on a 2-year basis as they are located.
- CCTV program will be ancillary to the Zoom sewer inspection program. Where zoom inspections are inconclusive or result in maintenance/repair activity, CCTV inspection will be initiated for a more comprehensive inspection.
- Pre and post lining programs will utilize Zoom sewer inspection data to identify potential candidates. This data will be used in unison with road rehabilitation/reconstruction programs to identify any adjacent areas for inclusion in the project to drive down costs.
- Existing maintenance programs such as flushing, root cutting, rodding, and eeling, will continue and be refined using Zoom inspection data.
- Trenchless technology rehabilitation methods continue to be evaluated as a low cost, no dig option to extending the useful life of the sewer.
- Scheduled repairs are undertaken proactively based on the results of Zoom emergency inspection notifications.
- A formalized manhole inspection program driven off of Zoom camera inspection results. This also improves the condition of the road.

The following are various strategies that will continue to operate as the impact of the Zoom camera inspection process is fully digested and disseminated through all preventative maintenance programs:

- CCTV camera inspections on an ad-hoc basis and new development
- Smoke testing program to determine cracks/breaks and potential weak spots is in place
- The City downspout disconnect program to relieve burden on the storm sewer network
- Coordination with Windsor Utilities Commission (WUC) to review the scope of future projects
- Flow monitoring program to determine the full scale of its network problems, as opposed to just reacting to isolated situations.

- The *Infor (Hansen)CMMS* is used to track detailed sewer asset information, inspections, and maintenance work order information on a segment by segment basis

It should be noted that despite the current practices in place to manage the sewer network, there are still several challenges facing this vast underground network. The City maintains a considerable portion of combined sewers which are relatively old and are in the latter part of their estimated useful life and pose a significant risk of failing and hence wastewater backup. The Sewer Master Plan will provide guidance in determining specific areas susceptible to flooding, reasons for flooding, and strategies for mitigation. Based on the recent increase in Sewer Surcharge funding as well as the pending Sewer Master Plan and Storm Water Financing Studies currently underway, this AMP does not provide any further recommendations on funding for these assets. Future AMP's will reflect the results and direction of these reports, and these reports will include the use of various asset management processes and practices in the City.

5.6.3.2 Pollution Control – Plants and Pump Stations

The Pollution Control Division has a robust ongoing maintenance program that is administered through the Antero computerized maintenance management system (CMMS). This program allows the Pollution Control Division to maintain, manage and monitor asset data on a daily basis leading to a level of stability and reliability within the maintenance program. This data also supports the rehabilitation and replacement of Pollution Control equipment which is imperative in ensuring critical components are addressed before reaching a point of failure. Antero provides real-time data and issues daily maintenance work orders based on manufacturers recommendations enabling the Pollution Control Division to maintain their asset base in a timely and cost-effective manner. This ongoing maintenance program covers all operating equipment including critical electrical and mechanical components as well as preventative maintenance orders for Pollution Control's collection system and ensures strict compliance with MOE (Ministry of the Environment) regulations. This involves a robust inspection program which includes critical assets such as diesel generators and the calibration of sensitive process electrical and instrumentation such as flow meters and pressure sensors. The Pollution Control Division has also placed recent emphasis on the maintenance and refurbishment of costly equipment including all raw sewage pumps and blowers at the Little River Pollution Control Plant.

With the new condition assessment program, the Corporation can objectively assess the true maintenance needs of a particular facility or process leading to a maintenance plan that can be customized in order to provide resources where they are most needed. The City also gets a truly detailed condition assessment where each system stands alone and is not affected by other subsystems within the same facility. It is important to note however that the overall funding needs of the Pollution Control maintenance program have not decreased with a better understanding of the component and sub-system requirements. In fact, although the ratings appear to show the majority of building systems are in Good condition, the projected maintenance needs during the course of the study period (20 years) for the Lou Romano Water Reclamation Plant alone is expected to be in excess of \$54 Million. This is simply the requirement for the maintenance of the one facility and does not take into account the funding needs for growth projects and facility enhancements or the needs of the Little River Pollution Control Plant and any of the 45 pumping stations.

The unique nature of pollution control components and the environment in which they operate often leads to trends that show specific systems can function perfectly well until they simply stop working or are affected by another system. Therefore, certain components that appear to be in good condition do not necessarily follow a simple degradation curve and often slide quickly from a Good or Fair condition into a condition of immediate need. The Corporation is also seeing many cases of premature degradation of facility components which simply cannot be captured effectively in a long-term condition program plan. Systems and components often appear to be functional and operating as needed until a point in which they begin to degrade rapidly. Therefore, even systems deemed to be in Good condition may need significant attention within a few years and certainly before the next AMP would be reported.

The Energy division of Asset Planning has completed several projects at the pollution control plants over the past 5-years. The introduction of these various measures has created an annual savings of just over \$1M in the utility costs for pollution control plants and pumps. These savings are recommended in Section 6 to be redirected to the Pollution Control reserve (Fund #208) to address current shortfalls in annual funding for this reserve. There are additional energy saving projects which are being considered and Administration will

continue, where appropriate, to recommend these savings be redirected to the reserve to ensure its sustainability and reduce the need for other means to increase this reserve funding. As we continue to collect objective condition data and recommendations on annual maintenance and rehabilitation requirements over the next 20 years for the Little River Plant and 45 pump stations, there may be a need to increase the reserve funding beyond what can be achieved through energy savings at these locations. Should this occur, future AMPs will address this challenge.

5.6.4 Corporate Facilities Management

The objective of the Facilities Asset Management Strategy is to outline and establish a set of desired programs and planned actions based on industry best practices that should ultimately enable the Facility asset portfolio to provide an acceptable and sustainable level of service to the community, while managing risk at the lowest lifecycle cost.

As this Asset Management Strategy is further developed it will consider a broad range of asset and non-infrastructure solutions and will develop an implementation process that can be applied to the identification of needs including renewal, enhanced LOS, growth, legislative and efficiency related projects, along with the prioritization of the lowest whole life cost intervention options. This will assist in the production of a robust and defensible multi-year year plan that will ensure the best overall health and performance of the municipality's Facilities infrastructure.

This AMP includes an overview of the approach to managing assets including condition assessment techniques and the identification of the optimal life cycle interventions required based on the lowest whole of life cost. Prioritization techniques, including risk, are also detailed as an approach to determining which priority projects should take precedence and be brought forward as a capital or operating budget issue. The following is an outline of the many programs and strategies the Facilities Department requires funding for in order to maintain the City's asset base in a reasonable state of repair.

- An improved Roof Inspection program that enhances the detailed inspection cycle to cover every roof at least once per year. Roofing systems are one of the main building components that are regularly seeing premature degradation and a more robust inspection and maintenance program would significantly reduce the number of unplanned repairs and replacements. This would require a funding enhancement for both the operational positions and the actual maintenance work.
- A more robust roof maintenance cycle that would enhance the standard cycle for clearing clogged drains and other minor maintenance required.
- A minor program to inspect and analyze electrical panels utilizing thermal scans for all, or at the very least, the high voltage systems. There is currently no such program or plan in place.
- The development of an electrical panel ARC flash ratings system that would require an engineering study to be done to rate all panels for appropriate Personal Protective Equipment and safe work distances.
- The expansion of automated Building Automation Systems (BAS) for easier control and increased energy savings.
- The funding of a staff member to provide analytics of facility data from the 360Facility work order system. This staff member would provide much needed on-time data output that would ultimately be utilized to help find improvements, establish trends and uncover cost savings and efficiencies.
- Funding resources for the expansion of the 360Facility CMMS for additional asset information and tracking for all Corporate Facilities and the creation of automated preventative maintenance work orders that ensure manufacturer's recommended maintenance is being completed.
- The establishment of a backflow prevention program for Corporate facilities that will allow for initial installs, maintenance of existing components and the replacement of aging valves.
- Accessibility audits and assessments for all Corporate facilities that would allow for the alignment of strategies to current and expected future requirements.
- The establishment of a reserve or consistent funding mechanism to maintain and improve the overall aesthetic of significant Corporate facilities as they are often viewed as the face of the City to residents and visitors alike.

- An on-going Building Condition Assessments Program funding stream that would allow for a regular condition inspection cycle as well as the procurement of proper assessments on a project or as needed basis.
- An established program with sustainable funding for City owned transitional properties (eg. tax arrears) in order to provide grass cutting, boarding up and other repairs and risk mitigation measures that are currently not allocated as part of the Facilities Departments budget.
- The development of standard specifications for a multitude of maintenance practices.
- The development of standard specifications for various facility installations.
- Standardization fire alarm systems.
- Standardization intrusion alarm systems.
- The formation of a security division to ensure the protection of critical assets.
- The establishment of a minor card access program to increased card access at sites and replace difficulty to track keys.
- A minor funded demolition program to dispose of facilities that are condemned and/or are not worth the associated repair costs.
- The establishment of funding for minor mobile hardware solutions that would enhance the productivity of field maintenance staff.

5.6.5 Facility Lifecycle Operating and Maintenance Planning

With the new condition assessment program, the City can objectively assess the true maintenance needs of a particular facility leading to an operating and maintenance plan that can be dialed in to provide resources where they are most needed.

It is important to note however that the overall funding needs of the Facilities maintenance program have not decreased with a new understanding of the facility component requirements. In fact, although the facility component ratings appear to show the majority of building systems are in Good condition, the projected maintenance needs during the course of the study period (20 years) for the first 71 facilities alone are expected to be well in excess of \$125 Million. This is simply the requirement for the maintenance of current facilities exclusively and does not take into account the funding needs for growth projects and facility enhancements.

The unique nature of facility components and recent trends also show that specific systems often function perfectly well until they simply stop working. Therefore certain components that appear to be in Good condition do not necessarily follow a simple degradation curve and often slide quickly from a Good or Fair condition into a condition of immediate need. As stated previously, the City is also seeing many cases of premature degradation of facility components which simply can not be captured effectively in a long-term condition program plan. Systems and components often appear to be functional and operating as needed until a point in which they begin to degrade rapidly. Therefore, even systems deemed to be in Good condition may need significant attention within a few years and certainly before the next AMP would be reported. Also misleading within the condition pies above is the actual maintenance need of newer facilities that skew the condition ratings to a Good or Very Good status but do not account for the true operating and maintenance needs that begin upon commissioning and extend through the entire useful life.

Between 2013 and 2018, approximately \$3.5M annually was provided for capital projects to address existing facilities, during this same time period approximately \$14M was allocated to growth and or service enhancement projects. This is consistent with the results of the facilities portfolio and the positive shift as many older facilities were replaced and enhanced, as well as the addition of several new facilities to the portfolio over this time. As stated above, while these assets are new, several components which operate the facilities have a shorter life expectancy than the facility as a whole. To properly sustain the operations and thereby the services provided by these assets, it is imperative that long term sustainable funding needs are addressed. When considering the 2019 7-year Capital Budget, the average annual funding for addressing these assets is approximately \$3M. Based on the objective reporting on the condition and annual maintenance and rehabilitation needs report over the next 20 years, the average funding should be \$11.8M, a shortfall of \$8.8M. The increase in facilities is second only to the increase required for roads and based on the increased number and complexity of facilities in the City's inventory, these results are reasonable. As with pollution control Administration has identified energy savings, and revenue generating projects which could

be used to fund some of this annual shortfall. The financial matters section speaks further to these details and options.

5.6.6 Information Technology

For software assets, the coordination and implementation of software replacement or upgrade of these systems require in-depth analysis to ensure there is minimal disruption to the day-to-day operations of the City. Incorrect deployment of software could affect server, storage, and/or network performance creating roadblocks in end-user accessibility. If this was to occur, processing of property tax payments, payroll administration, permits and licensing, fire and building inspections, routing of 311 calls would be impacted. These impacts would affect such departments as Fire & Rescue, Building, Planning, Engineering, Licensing, Taxation and Revenue, By-law Enforcement, and Parking Enforcement. Developing a reserve tied to the asset's condition and useful life provides timely access to funds as needs arise and avoids competing with priorities. As a result, the planning, execution, and monitoring of related initiatives are allowed to proceed as planned, minimizing operational and security risk to the City of Windsor and its residents.

Two of these systems have been identified as critical to the City of Windsor operations and require an upgrade or replacement solution. A replacement for The Municipal Tax System (Amanda) has currently been approved within the 2019 7-year Capital Budget, since the major property tax module will no longer be supported. A request for proposal is being developed to identify a potential replacement. Once a replacement has been identified then the remaining modules will go through their normal upgrade. The cost of the replacement is estimated to be \$2.9M and may take up to three years to be fully implemented. During this time, no upgrades can be made, possibly affecting the system's useful life.

Additionally, PeopleSoft HRMS and Financials systems will no longer be supported. A 3rd party vendor has been contracted to support any further upgrades or system fixes. This scenario has highlighted a potential financial and business risk to the City over the next five years where both systems may need to be replaced or upgraded. In addition, there are various systems deemed critical to the operations of the City of Windsor that are or will be undergoing upgrades requiring funding and resources to ensure proper execution while minimizing operational interruptions. A list of other critical systems and their replacement timelines can be found on Table 3-13.

For hardware assets, a formal risk assessment program will be developed and fully implemented by 2023 to comply with the Asset Management Planning for Municipal Infrastructure regulatory requirements. This will allow the City to capture the overall process and method in identifying failure and the risk factors associated with the criticality of the failure. In addition, reserves have been established to support asset replacement in the short and long-term. As the Asset Management Plan develops over time through more formal condition assessment processes and reporting, maintenance and operations programs will evolve leading to lowering costs. These programs are required for preserving and extending the useful life of these assets and will be fruitful during constrained economic times.

In order to properly secure and maintain these assets, as well as project future needs and expenditures, the City has in place a set of guidelines that are intended to provide an overall framework for Information Technology's asset management approach including the following:

- Measures are in place to provide high availability and continuity of the corporate technology systems and information assets, and the processes necessary to perform normal business.
- Capacity planning is carried out to ensure business growth can be supported by the Information Technology infrastructure.
- When a new system is implemented, or a significant change is made to an existing production system, the affected asset is reviewed for security risks, and any residual risk, resulting from the change, must be approved prior to implementing the change.

- Processes are in place for the control of the entire development and maintenance life cycle, with the system development and test environment being separated and isolated from the production environment, including segregation of duties so that development personnel are not able to implement changes to production systems.
- Processes are in place covering authorization to access the corporate technology systems, and the data that it holds and are reviewed at regular intervals.
- The boundary connections to outside networks are protected by gateways that limit access and monitor attempts to interfere with the internal network, thereby enforcing the protection of the internal network.
- Processes are in place to ensure that purchased and outsourced systems have the necessary features that allow the implementation of security controls to comply with the Information Security Policy, Corporate Directives, and Standards.

With more focus being placed on cloud services, the City's IT landscape will experience significant change over time requiring a review of its governance, policies, and business case modeling. As cloud services are considered as alternatives to legacy systems, IT will need to consider the impacts associated in adapting to a changing IT landscape. IT governance and policies will have to be revised to address the decision-making process used to determine which systems are replaced with cloud services, technical characteristics of application integration with other systems, and the needs and constraints of the associated data. Other considerations include security protocol, mitigating outages, and internal technical staffing and training.

Asset management planning will play an important role to ensure continuity in all IT related equipment. Proper planning can determine when these assets should be re-evaluated prior to the end of their useful life to assess business and financial risk to the City and evaluate options such as upgrading or full replacement. Starting the planning early in the assets useful life allows decision makers to consider such things as warranty provisions, changing user needs and capital resources.

5.6.7 Corporate Fleet

The Fleet Division provides fleet management services covering the acquisition, maintenance, repair, disposal and management of the corporate fleet and in the provision of services for outside agencies. The Fleet Division is the most advanced area in implementation of strong asset management practices and processes. The program is well defined in how and when assets are replaced, there is a defined means to fund the reserve for replacement and preventative maintenance practices are in place to ensure the assets meet or exceed their useful life. The replacement schedule is based on replacing like with like vehicles.

The current use of existing vehicle types enables the existing Levels of service to be met internally and externally, however with the changing market there is a risk that LOS may need to change, or the City will need to look at other options for future purchases. Like for like replacements may not always be possible since the options available in new vehicle "base model" are much different than the options in base models from 6 to 8 years ago. The costs of new base models have increased, and the replacement schedule has attempted to consider this in its forecasts. The division has also developed a 'greening the fleet' initiative which outlines the cost and which fleet assets would be ideal to move towards more electric vehicles. Such a change would be considered a service enhancement as these types of vehicles are often a higher cost to purchase. In addition, there would be an impact to the maintenance area on training and tools necessary for such vehicles, as well as investment in EV charging stations. Currently Administration is seeking opportunities through grant funding to assist in such a migration, however should grant funding not become available the ability to fund this transition will require additional capital funding from growth and service enhancement type capital funding as the reserve is not able to fund the full transition.

Any Corporate Fleet growth or service level increases continue to be addressed outside of this reserve funding model. This includes the addition of new vehicles to the inventory, which needs to be 100% funded outside of the reserve and or significant changes to the type of vehicles, such as transitioning to electric

vehicles, which will require additional funding for the cost increase above the cost of replacing with a like vehicle.

The reserve would be able to contribute the amount previously anticipated to replace like-with-like vehicles and anything over and above would need an alternate funding source. Since this AMP speaks to funding levels required to meet existing service levels there is no recommendation on funding increases required for a service enhancement to “green” the fleet, however given Administration is seeking alternative funding to move such a transition forward, it is included in this report.

While the reserve is currently in a strong position it should be noted that exchange rates and tariffs may adversely impact the reserve prior to 2023 and would need to be brought to Council for consideration. This will continue to be monitored and reported on in the next AMP.

5.6.8 Other Corporate Equipment

Since adherence to the City’s Asset Management framework is in its infancy with respect to these equipment assets, any related strategies will be in the adaptation phase. A set of guiding principles, policies, and procedures will have to be created to establish acceptable and sustainable LOS while mitigating risk. As progress is made to meet legislative requirements, a strategy will be developed that highlights processes identifying acceptable LOS, objective condition rating programs and risk mitigation. Such initiatives will assist in establishing funding requirements that will support maintenance and growth levels. This will set a foundation for whole-life costing to identify suitable options for when these assets contribute to overall growth and enhancement projects. Furthermore, these advancements will minimize obscurity and vulnerability when creating present and future budgetary needs.

5.7 Risk

5.7.1 Corporate Risk Assessment

Since the 2013 AMP an approach to identify risk for assets was developed and implemented for some of the assets in this AMP. The approach used is based off of the Corporate Risk tools, guidelines and processes and adapted for use with assets. The tool identifies 11 different consequences to be assessed, as well as guidelines on how the impact of the risk should be considered on a scale of “Insignificant” to “Severe”. It also identifies the guidelines on how to align the probability of the risk occurring, which for assets, is directly tied to their condition.

TABLE 5-1—MEASUREMENT CRITERIA FOR THE RISK ASSESSMENT TOOL

Measurement Criteria for the Risk Assessment Tool

Probability						
Rating - Descriptor	1 - Rare	2 - Unlikely	3 - Possible	4 - Likely	5 - Almost Certain	
Description - Frequency or approximate probability	May only occur in certain conditions. Every 10 + years or 0% to 10%	Could occur some time. Every 5 to 10 years or 10% to 40%	Might occur at some time. Every 3 to 5 years or 40% to 60%	Will probably occur in most circumstances. Every 2 to 3 years or 60% to 90%	Almost certain to occur. Annually or more frequently or 90% to 100%	
Consequence						
Rating - Descriptor	1 - Insignificant	2 - Minor	3 - Moderate	4 - Major	5 - Severe	
H&S	Health & Safety - injuries to staff, public or stakeholders	No treatment required	Minor injury or illness requiring medical treatment	Serious injury or illness requiring medical treatment	Permanent disability or widespread illness	Death
Damages & Liability	Legal Liability - incur \$ (claims, lawsuits, etc.)	< \$25K	\$25K-250K	\$250K-500K	\$500K-3M	> \$3M
	Physical Assets - replacement of	Replaceable worth < \$25k	Replaceable worth \$25k-250k	Replaceable worth \$250k-500k	Replaceable worth \$500k-3M	Replaceable worth over \$3M or significant asset is irreplaceable
	Environment - damage to	Negligible event, non-permanent impact requiring no clean-up measures @ (\$0-25K)	Minor event, non-permanent impact requiring very little clean up effort @ (\$25-250k)	Major event, some permanent impact requiring moderate clean-up effort @ (\$250k-500k)	Major event, some permanent impact requiring extensive clean-up effort @ (\$500k-3M)	Severe event, permanent impact requiring significant clean-up @ (> \$3M)
Operational Impact	Quality - impact or disruption to overall quality of service delivered	Limited impact to overall quality of discretionary service	Moderate or localized impact to overall quality of discretionary service OR Limited impact to overall quality of <u>essential</u> service or major project	Serious or widespread disruption to overall quality of discretionary service OR Moderate or localized impact to overall quality of <u>essential</u> service or major project	Inability to provide an <u>discretionary</u> service OR Significant sustained impact to overall quality of <u>essential</u> service or major project	Inability to provide an <u>essential</u> service
	Budget - cost overruns or reallocation of funds for service or project	< \$25K	\$25K-250K	\$250K-500K	\$500K-3M	> \$3M
	Funding - loss of <u>external</u> funding or revenue (e.g. grants, leasing revenue, user fees)	< \$25K	\$25K-250K	\$250K-500K	\$500K-3M	> \$3M

Regulation & Reputational Impacts	Public Trust / Media Attention - <i>negative attention</i>	Limited attention by media, limited impact on public confidence	Local media coverage, department official fielding media questions,	Regional media coverage, significant impact on public confidence that damages City's image	National or Provincial media coverage, external agency inquiry, major impact on public confidence that is difficult to regain	Significant National or Provincial media coverage, external agency criminal investigation, sustained serious loss of confidence in management of City
	Impacted Customers	Under 1% of customers	2% - 25% of customers	26% - 50% of customers	51% - 100% of customers	100% of customers for sustained period of time
	Governance - <i>management oversight (e.g. Min. of Labour, TSSA)</i>	Some unfavourable comments by governing body (I.e. Management or Council)	Criticism by governing body (i.e. Management or Council)	Request for change recommendations by governing body (I.e. Management or Council)	Senior governing body demanding immediate changes to status quo (I.e. Federal or Provincial)	Senior governing body imposing temporary leadership (I.e. Federal or Provincial)
	Legislative - <i>violation of legislation</i>	Infraction of legislation with limited penalties (under \$25k)	Minor infraction of legislation with penalties (\$25k-\$250k)	Moderate infraction of legislation with penalties (\$250k-\$500k)	Major violation of legislation with significant penalties (\$500k-\$3M), high profile trial	Multiple major violations of legislation with significant penalties (over \$3M), public inquiry & high profile trial

The following assets were assessed with this tool and shows how we can compare the risk associated with the deterioration of these assets. This information can also help to drive priorities in allocation of funding.

TABLE 5-2—ASSETS ASSESSED USING THE RISK ASSESSMENT TOOL

Risk Results	Consequence	Probability	Maximum Risk Score	Maximum Risk %	Maximum Risk Rating
Road Classification					
Expressway	3.18	5	15.9	64%	Significant
Arterial (inc scenic)	2.82	5	14.1	56%	Significant
Collector	2.18	5	10.9	44%	Significant
Local	1.81	5	9.05	36%	Moderate
Bridge Classification					
Bridge/Subway/Culvert	3.73	5	18.65	75%	Critical
Pedestrian Bridge	2.36	5	11.8	47%	Significant
Facilities					
Roof (leak)	1.64	5	8.2	33%	Moderate
Roof (structural)	3.55	5	17.75	71%	Critical
Heating	1.45	5	7.25	29%	Moderate
Cooling	1.45	5	7.25	29%	Moderate
Air Handling	1.45	5	7.25	29%	Moderate
Air Handling (Huron Lodge)	1.82	5	9.1	36%	Moderate
Elevators	1.36	5	6.8	27%	Moderate
Plumbing	1.18	5	5.9	24%	Moderate
Main Electrical	1.73	5	8.65	35%	Moderate
Building Auto. Systems	1.18	5	5.9	24%	Moderate
Fire Suppression	2.36	5	11.8	47%	Significant

Flooring/Stairs	1.45	5	7.25	29%	Moderate
Fuel Storage	1.64	5	8.2	33%	Moderate
Sidewalks	1.45	5	7.25	29%	Moderate

5.7.2 Risks to the Asset Management Strategy

An assessment of the risks to the delivery of the City's Asset Management Strategy has identified a number of areas that will require close monitoring in the future. These risks are not specifically associated with failing assets, project delivery or LOS but are rather focused on large scale, corporate enterprise risks that will adversely impact the delivery of the AMP if they materialize. These risk factors could ultimately impact the ability of the City to deliver established LOS and must be monitored and addressed throughout the life of the plan. The following Table 5-1 reflects risks outside of the asset operations and maintenance realm that ultimately pose a threat to the implementation of our asset management strategy.

TABLE 5-3—SUMMARY OF POTENTIAL RISKS AND MITIGATION STRATEGIES

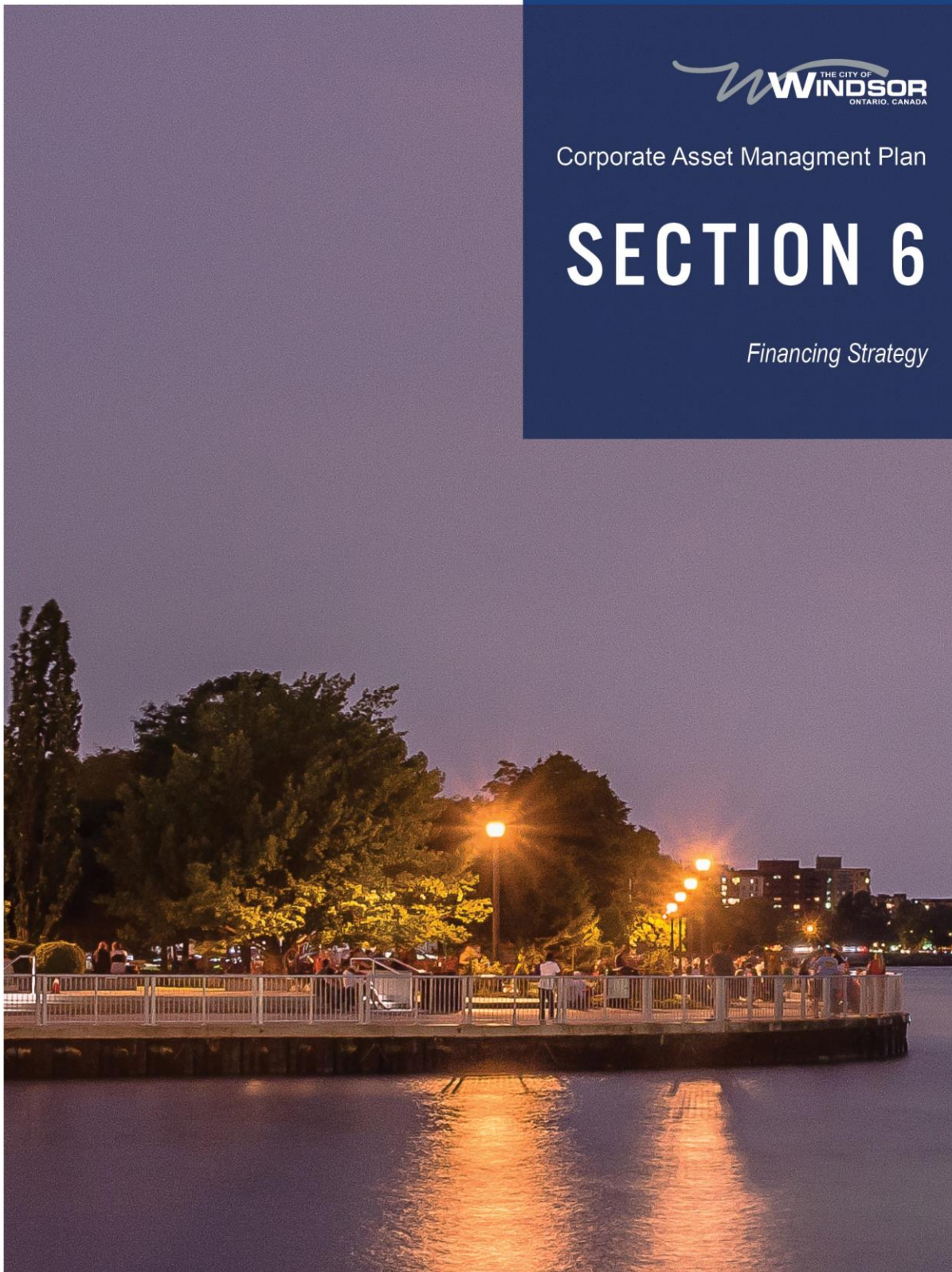
Identified Risk	Potential Mitigating Actions
Ability to retain/attract staff ensuring accurate and timely information is being collected and analyzed	Establish proper training and recruitment programs with particular emphasis on positions within CMMS network
Funding levels lower than those projected	Look into alternative funding strategies
Funding not allocated to asset management improvement initiatives such as further condition assessment work	Develop a robust business case that sets out the benefits versus the risks of the "do nothing"
Occurrence of climate change/adverse weather/unforeseen events resulting in funds being diverted to assets that were not originally planned for	Establish alternative funding methodologies to ensure all essential projects can be funded without allowing others to be pushed back beyond a reasonable timeframe
Growth projections/population movements not as planned	Conduct annual needs studies across all service areas and tie to most recent census data
Construction/Inflation prices not as assumed	Ensure all service areas tie funding requests to most up to date construction price index



Corporate Asset Management Plan

SECTION 6

Financing Strategy



Financing Strategy

6.1 Background

This section contains the financial requirements associated with the management of the City's assets over the AMP period. The financial projections presented in this section are based on the best available information to date, specifically the approved capital budgets from 2013 to 2018 as well as the 2019 7-year Capital Budget for forecasting and annual averages. Plans for the ongoing improvement of information quality and the planning process will be an integral part of the City's Corporate Asset Management Program going forward and is covered in greater detail in Section 7.

For effective implementation of the AMP, it must be fully integrated with the City's financial planning and long-term budgeting processes. The development of a comprehensive financial plan which fully reflects the City's asset needs will allow the City of Windsor to identify the financial resources required for sustainable asset management based on long term asset needs, desired LOS, legislative requirements, and projected growth requirements.

This version of the AMP is primarily focused on the City's asset lifecycle needs, specifically the expenditure required to maintain the current level of service to Windsor's community and stakeholders.

Likely levels of expenditure required to enable enhanced Levels of Service, meet new legislation, accommodate growth and enable the City to become more efficient (e.g. replacing assets as more efficient alternatives become available rather than because the asset has reached the end of its useful life), is estimated based on the funding allocated for growth and service enhancements in the City's 2019 to 2025 Capital Budget, and identified in Section 6.7. A funding shortfall, however, is not assessed for growth and service enhancement needs, as the actual growth and service enhancement needs over the next ten years are currently being assessed through on-going City projects such as the development of the Sewer Master Plan, Sandwich South Growth Study and Transit Windsor Service Delivery Review. Growth and service enhancement needs are to be updated in the next AMP based on the recommendations of these on-going studies. Therefore, the funding shortfalls discussed in Section 6 refer only to the needs and funding available for existing asset to maintain the current levels of service.

Working within current funding levels, the City has to continuously prioritize expenditures between all of these investment drivers. However, moving forward the objective is to ensure there is an increased focus on asset renewal needs. Notwithstanding significant increases in capital funding over the last decade (essentially annual funding doubled), there is still a shortfall in annual funding levels required for several assets to sustain their current level of service. This is a common challenge for cities across Canada including the City of Windsor.

6.2 Budget and Expenditure History

Figure 6-1 shows the operating expenditure budget for the period 2013 to 2018. The expenditure history detailed in this section is taken from previous Financial Information Returns (FIRs), as detailed in the figures below.

FIGURE 6-1—OPERATING EXPENDITURE HISTORY BY EXPENDITURE TYPE 2013 – 2018 (ADJUSTED FOR INTRA FUND ALLOCATIONS)

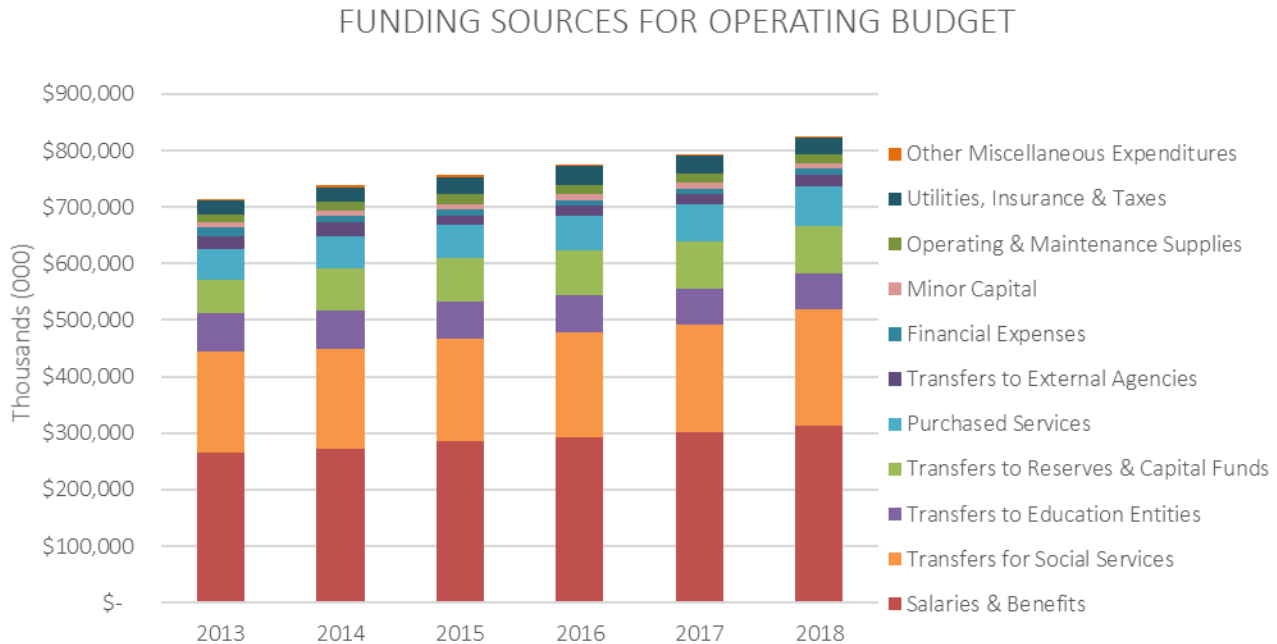


Table 6-1 and Figure 6-2 show the historical capital budget for the period 2013 to 2018. Figure 6-2 also includes the 2003 capital budget. The expenditure history detailed in this section is taken from previously approved Capital Budgets. It is noted that, 2013 and 2014 reflect the first two enhanced capital budgets and the additional funding approved for use in those years, rather than the year the funding is available. Since 2015, budgets identify the year in which the funding is available, rather than the year in which it can be expended.

Our average capital budget from 2013 to 2018 has increased to \$111M annually, double the amount in 2003. There is an average of 66% in funding for maintenance type projects, which is an increase of 4% when compared to the 2008- 2012 capital budgets reported in the 2013 AMP. The normal available funding over this 7-year period is in the range of \$111M, an increase of \$11M when compared to the 2008 – 2012 capital budgets reported in the 2013 AMP.

TABLE 6-1—TOTAL APPROVED CAPITAL BUDGET (000'S)

	2013	2014	2015	2016	2017	2018
Maintenance	\$ 90,565	\$ 85,920	\$42,018	\$57,829	\$ 77,184	\$ 88,113
Growth	\$ 24,921	\$ 64,270	\$44,966	\$25,305	\$ 20,533	\$ 24,811
*Non-infrastructure	\$ 2,832	\$ 6,699	\$ 1,400	\$ 3,040	\$ 2,675	\$ 2,954
Total Approved Capital Budget	\$118,317	\$156,888	\$88,384	\$86,175	\$100,392	\$115,879

FIGURE 6-2—HISTORICAL APPROVED CAPITAL BUDGET – 2003 AND 2013-2018

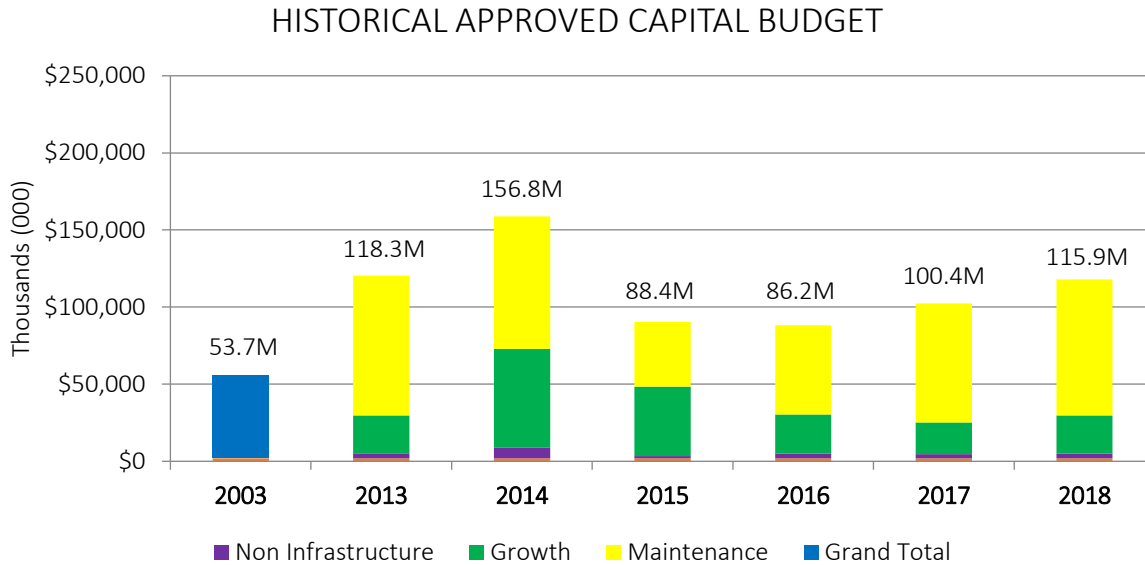


FIGURE 6-3—HISTORICAL ACTUAL CAPITAL EXPENDITURES - 2003 AND 2013-2018

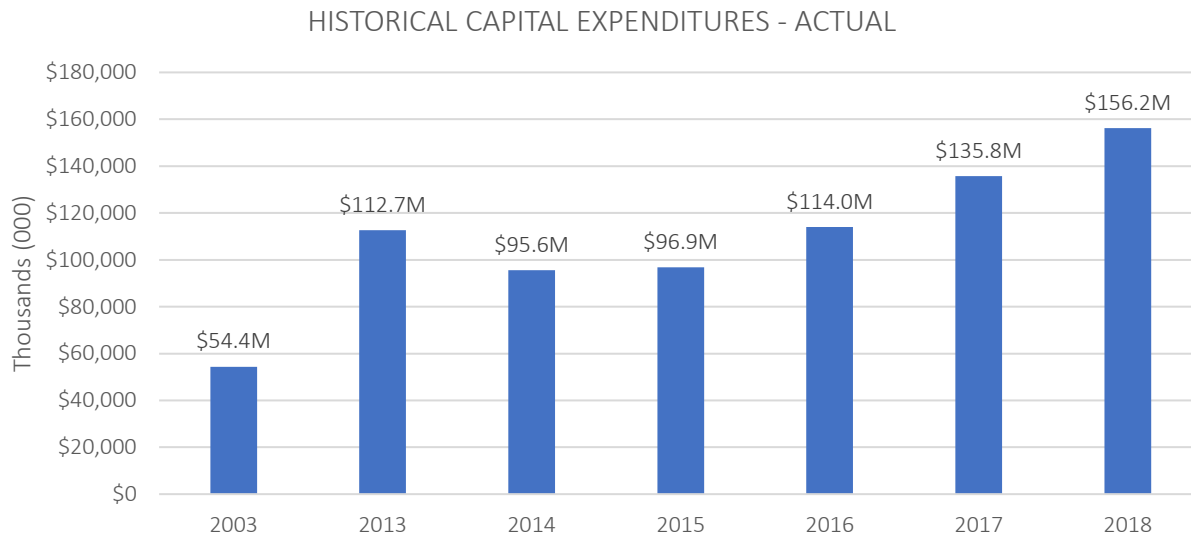


Figure 6-3 shows the historical capital expenditures each year and shows the increased volume of spending to execute capital projects on an annual basis.

The variance between the budgeted amounts and actual expenditures relate to the normal timing of capital expenditures which in many cases span multiple years. The use of pre-commitments has assisted in increasing the actual expenditures as many of the larger construction projects can tender work over several years and proceed with construction without waiting for annual capital budget approvals. This also helps with tender pricing as more work is being tender at once rather than split into several smaller sections which are bid on annually.

6.3 Budget Forecasts

Capital budget forecasts for the AMP period are based on the 2019 seven year Capital Budget. The City is currently in the process of adding one additional year to the capital budget forecasts in each of the following years so that by 2022 we will achieve a ten year capital budget forecast, which will also meet with O.Reg

588/17 requirements. The capital budget information in this AMP was also updated based on the approved 2019 capital budget Council approved on April 1, 2019. It does not, however, include the approvals for the one-time Federal Gas Tax funding and all changes resulting from this, as at the time of writing this report those funds were still not guaranteed. Given the one-time nature of these funds these investments will not substantially change the recommendations to address the annual shortfall in average funding levels.

For operating budget projections, these are based on the 2019 Recommended Operating Budget, which has been used as the basis for an additional 3 years of the Plan. These projections are subject to further review based on Council's review and approval of this AMP and its funding requirements.

6.3.1 Operating Budget

The operating budget covers the current year, as well as unmitigated annual projections for the following 3 years annually. In preparing the operating budget the capital budget forecast is taken into consideration. This ensures that sufficient funding is available to operate, repair and maintain any new assets that are created, or are subject to significant renewal projects. The ongoing maintenance of infrastructure to hold assets in Good condition continues to be a priority. Other factors such as expected inflation rates are also considered when developing the budgets. In compiling the annual operating budget, consideration is also given to how much funding is allocated to capital reserves, which will be used to fund future capital projects.

In recent years City Council has introduced moderate increases to the tax levy as the economic challenges of previous fiscal restraint have started to subside. Administration continues to provide Council with cuts to operational budgets which are achieved through; new ways of delivering service; line by line budget reviews and careful selection of reductions with minimal service impact; and achievement of collective bargaining agreements with moderate wage impacts (other than the arbitrated decisions). City Council continues to recognize and support the need for increased transfers to fund the capital budget due to inflationary pressures as well as funding increases required to address priority situations such as flooding mitigation. Full operating budgets continue to be developed keeping in mind the capital and reserve needs to address our assets.

TABLE 6-2—TOTAL OPERATING GROSS BUDGET 2013 AND 2019-2022 (ADJUSTED FOR INTRA FUND ALLOCATIONS)

	2013	2019 (Budget)	2020 (Projection)	2021 (Projection)	2022 (Projection)
Salaries & Benefits	\$ 265,105,416	\$ 329,490,042	\$ 337,956,883	\$ 346,659,317	\$ 355,604,122
Transfers for Social Services	\$ 178,762,199	\$ 204,591,905	\$ 205,423,661	\$ 206,263,734	\$ 207,112,208
Transfers to Education Entities	\$ 69,439,132	\$ 63,288,960	\$ 64,554,739	\$ 65,845,834	\$ 67,162,751
Transfers to Reserves & Capital Funds	\$ 57,132,234	\$ 90,562,211	\$ 90,562,211	\$ 90,562,211	\$ 90,562,211
Purchased Services	\$ 54,812,300	\$ 73,482,596	\$ 75,452,248	\$ 77,461,293	\$ 79,510,519
Transfers to External Agencies	\$ 24,133,813	\$ 20,258,307	\$ 20,663,473	\$ 21,076,743	\$ 21,498,277
Financial Expenses	\$ 15,126,636	\$ 11,013,058	\$ 11,233,319	\$ 11,457,986	\$ 11,687,145
Minor Capital	\$ 8,780,187	\$ 9,991,424	\$ 10,191,252	\$ 10,396,078	\$ 10,602,979
Operating & Maintenance Supplies	\$ 14,579,896	\$ 17,997,251	\$ 18,357,196	\$ 18,724,340	\$ 19,098,827
Utilities, Insurance & Taxes	\$ 23,269,776	\$ 27,533,368	\$ 28,910,036	\$ 30,355,538	\$ 31,873,315
Other Miscellaneous Expenditures	\$ 3,564,281	\$ 3,021,785	\$ 5,021,785	\$ 7,021,784	\$ 9,021,785
Total Operating Expenditure	\$ 714,705,870	\$ 851,230,907	\$ 868,326,803	\$ 885,824,858	\$ 903,734,139

Moving forward it is not anticipated that the level of operating expenditure will increase significantly for the operational components. There will likely be a need in the future to understand and secure the resourcing necessary to achieve the work requirements and ensure any increase in capital project funding, coupled with increased work due to grant funding and growth projects, can be executed in a timely manner. The components related to pay-as-you-go funding of the capital and reserve funds will continue to be reviewed in conjunction with the needs identified in this AMP. There will also be an increased focus on the best life cycle

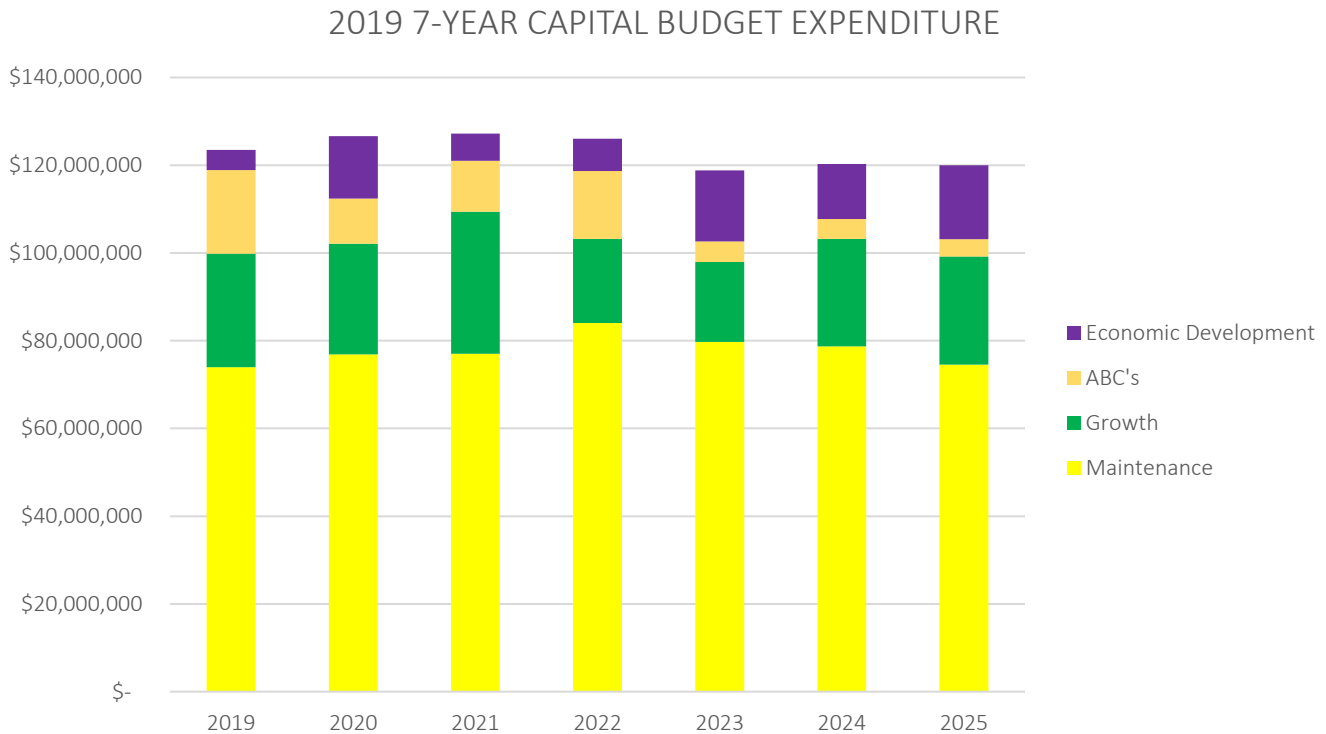
solutions for maintaining the asset base and continued delivery of current or improved LOS. Lastly there will be more emphasis put on ensuring project funding is clearly identified for maintenance/rehabilitation, growth, service enhancements and or economic development. This will ensure any increased funding approved by City Council to support the recommendations in this report, addressing the sustainability of existing assets at current LOS, is allocated as approved.

6.3.2 Capital Expenditure Budgets

A multi year capital budget is presented to Council on an annual basis and by 2022 it will be a 10 year plan. Generally, Council approves the current year's capital budget and approves, in principle, the remaining years. At times, Council may pre-commit funding for a project which has funding outside of the current year, but within the next five years. This allows a project to proceed immediately with certainty the funding is secured and can be actioned immediately. This can provide better tender pricing as tenders are released earlier and for larger pieces of work. It also helps in managing timelines for larger construction projects by tendering once then focusing on construction, rather than annual tenders for work or postponing the tender process until sufficient funding for larger portions of the work can be issued. Council may also choose to identify funding for placeholder projects, which secures the funding for the project, however does not permit it to be actioned. This can be useful when considering future projects which may or may not proceed, however placeholder funding ensures the capital funding remains in place until a final decision is made.

The selection, project development, and prioritization processes for the projects are described in Section 5 of this report (Asset Management Strategy). As described in Section 5, the requested budget is reviewed with the Service Areas to assess the program needs, trends and priorities. The review includes actual costs incurred in the past for similar projects, as well as current costs to date for projects in progress. Capital project information is gathered from the Service Areas to provide justification for recommended projects. The 2019 capital budget includes a 6 year forecast, however many departments maintain budget forecasts which exceed this time period. Once the requested budget is agreed upon, financing options for the request are determined based on the optimum funding structure taking into account the available sources of revenue.

Figure 6-4 and Table 6-3 below reflects the 2019 7-year capital budget. For this AMP the capital budget has separated out Maintenance, Growth, Economic Development, and ABC's. This additional level of detail was necessary to provide more clarity on average annual funding allocated to address the existing assets reported in this AMP for more accuracy and reliability on funding level shortfall projections. Lastly it should be noted the projected grant funding from Investing in Canada Infrastructure Program – Public Transit of \$46.5M in the capital budget has been removed from the capital budget data as it did not provide any clarity on how the funds would be used. Rather than distort the information in the AMP, the annual amount was simply removed.

FIGURE 6-4—APPROVED 2019 CAPITAL BUDGET EXPENDITURES 2019-2025**TABLE 6-3—PROJECTED CAPITAL BUDGET EXPENDITURES (000'S) 2019-2025**

Type of Expenditure	2019	2020	2021	2022	2023	2024	2025
Maintenance	\$73,942,081	\$76,860,791	\$77,053,205	\$84,042,258	\$79,696,714	\$78,702,329	\$74,561,431
Growth	\$25,911,996	\$25,225,107	\$32,382,371	\$19,201,929	\$18,245,484	\$24,499,860	\$24,623,830
ABC's	\$19,024,616	\$10,337,384	\$11,602,974	\$15,470,013	\$4,676,752	\$4,519,000	\$3,964,000
Economic Development	\$4,640,000	\$14,213,616	\$6,166,000	\$7,360,000	\$16,206,540	\$12,527,540	\$16,820,304
Total	\$123,518,693	\$126,636,898	\$127,204,550	\$126,074,200	\$118,825,490	\$120,248,729	\$119,969,565

The average annual investment in maintenance activities for all assets is \$77.6M based on the 2019 7-year capital budget. Long term sustainable funding is foundational to being able to address challenges in infrastructure deficits. The Infrastructure Sustainability Funding (ISF) provided in 2009 resulted in significant one-time funding investments. In turn, data from then shows price increases of nearly 20% as the work was not sustainable and was only for that period in time. The DMAF funding currently awarded to the City will help build out an \$89.1M project, and at this point is a one-time funding increase like ISF. In reviewing the increases recommended in this report a steady climb in funding over the 4 to 6 years will build our funding and programs such that more work will continue to be released in Windsor and should help to avoid demand spikes and higher prices resulting from one-time grant funding.

Approval of the recommendations in this report would mean the maintenance funding from 2019 – 2025 plus the increases if approved would be allocated to maintenance activities only, resulting in average annual allocation for these activities of \$111.3M. This means as future capital budgets are developed the average annual allocations for maintenance projects will be sustained at this funding level and used only for maintenance capital projects and or reserves.

The current funding sources for maintenance are noted below in Table 6-4.

TABLE 6-4— ALLOCATION OF FUNDING BY TYPE FOR MAINTENANCE PROJECTS

Funding Source - Maint	2019	2020	2021	2022	2023	2024	2025
Dedicated Reserve	\$ 10,982,000	\$ 11,322,000	\$ 10,165,500	\$ 10,908,000	\$ 7,909,333	\$ 9,076,000	\$ 9,302,000
Development Charges	\$ 95,000	\$ 95,000	\$ 95,000	\$ 95,000	\$ 5,000	\$ 5,000	\$ 5,000
Federal Gas Tax	\$ 12,762,263	\$ 12,488,939	\$ 12,367,642	\$ 12,526,512	\$ 13,875,000	\$ 11,042,000	\$ 12,042,000
Grants	\$ 22,400						
Pay as you go	\$ 22,637,293	\$ 24,379,514	\$ 26,046,126	\$ 31,197,650	\$ 27,190,535	\$ 30,080,523	\$ 23,325,776
Sewer Surcharge	\$ 27,425,000	\$ 28,562,838	\$ 26,278,937	\$ 29,290,096	\$ 30,691,846	\$ 28,473,806	\$ 29,861,655
Third Party Recovery	\$ 18,125	\$ 12,500	\$ 100,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
Total	\$ 73,942,081	\$ 76,860,791	\$ 75,053,205	\$ 84,042,258	\$ 79,696,714	\$ 78,702,329	\$ 74,561,431

Figures 6-5 and 6-6 below show how the average annual amounts are allocated to the various assets. Figure 6-5 identifies the assets which have funding levels below what is recommended to sustain the assets and Figure 6-6 identifies the funding for those assets which are not recommended for additional funding. As a reminder, the Pollution Control Plant and Pump amount noted in the graph reflects the average capital expenditure of \$5.1M. The annual shortfall of \$568,386 is based on the reserve requiring an annual amount of \$5.4M to sustain the work required for these assets. The average annual capital investment of \$5.1M for these capital projects supports the recommendation that \$4.8M in annual transfers is below what is required to continue to fund these capital projects. An increase to \$5.4M annually to the reserve is a more sustainable number based on these annual average capital budget projects.

There are several road projects which are a mix of service enhancements, growth and maintenance. Of the average annual funding of \$18.9M for road maintenance, \$7.5M annually is allocated for the maintenance portion of these growth/maintenance road projects. An increase in annual funding to \$37M per year for road maintenance would result in an increase to \$17M annually for the maintenance portion of growth/maintenance mix projects. This will help to fund a portion of those project types (i.e. Riverside Vista, Central Box, North Talbot, Provincial etc.) and move them forward, without impact to the remaining City-Wide road and preventative maintenance programs as that funding will grow from \$11.4M to \$20M annually.

FIGURE 6-5— ALLOCATION OF AVERAGE ANNUAL FUNDING TO ASSETS WITH SHORTFALLS (2019-2025)

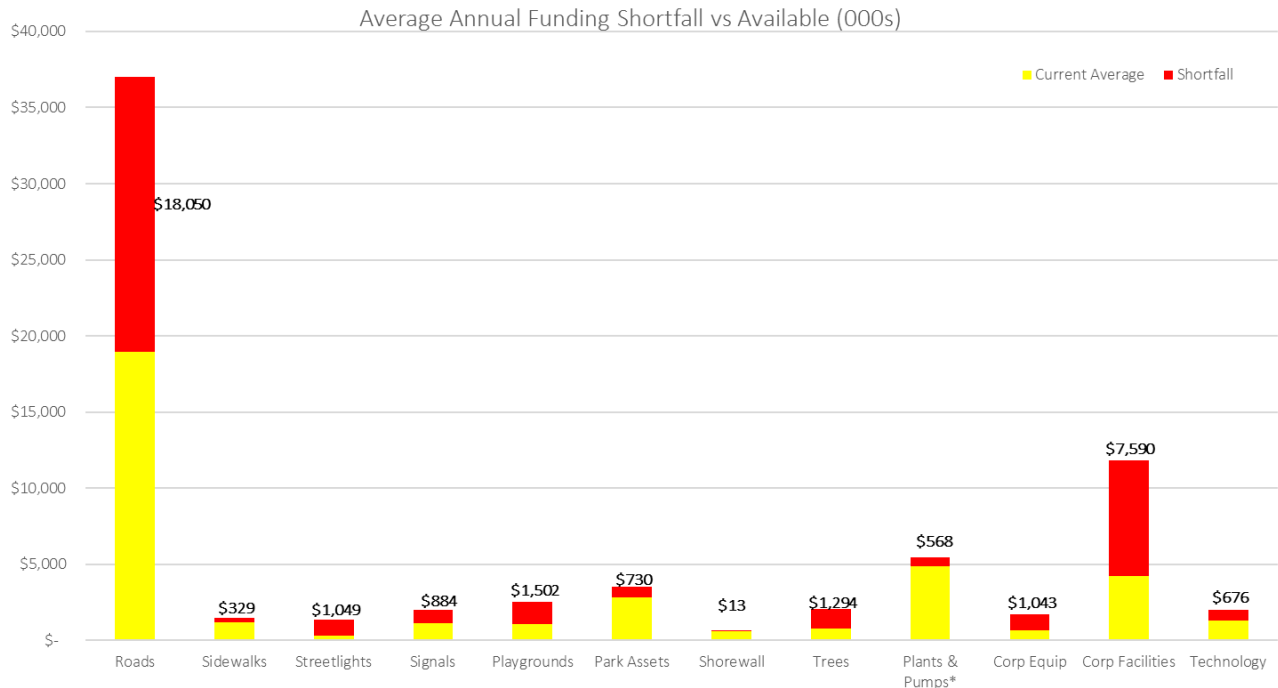
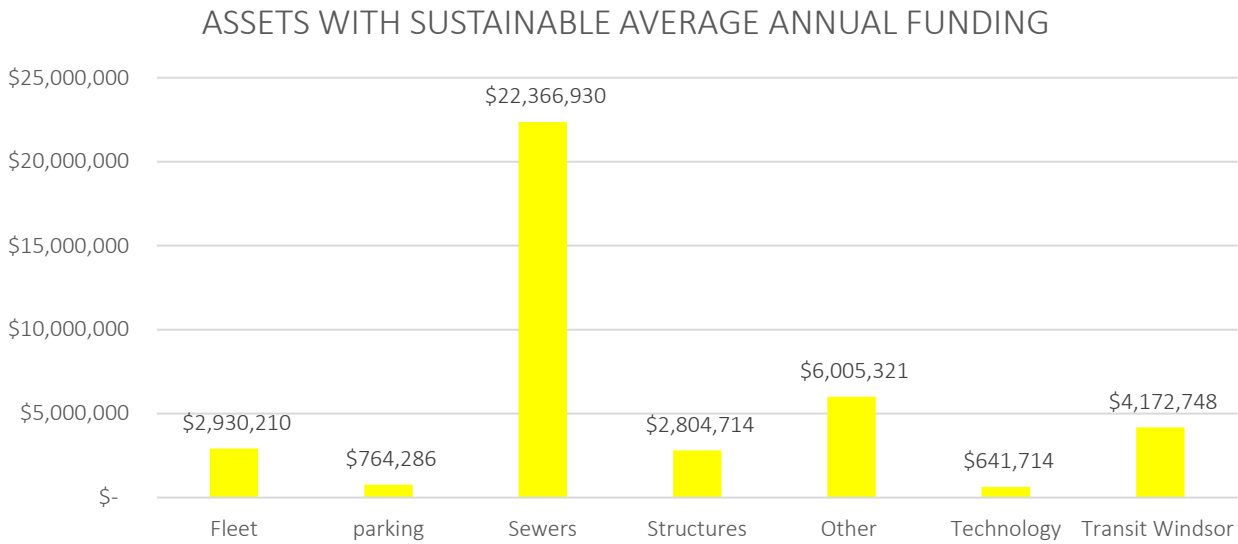


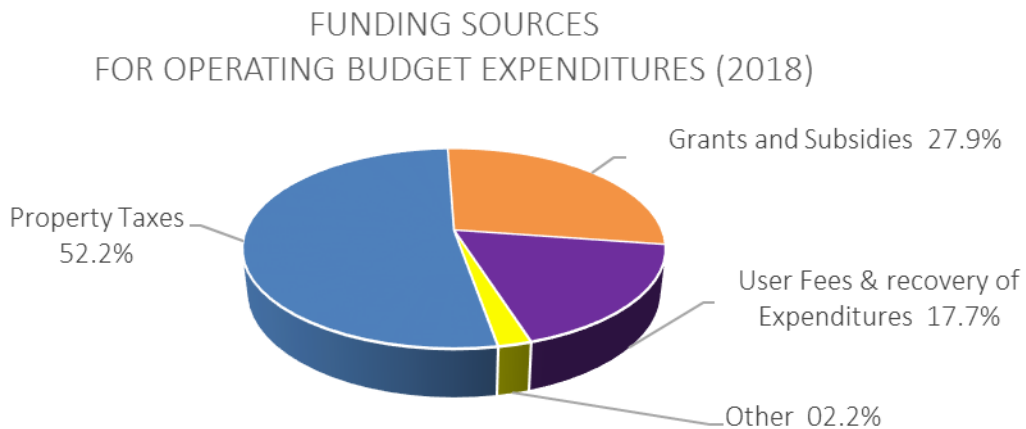
FIGURE 6-6— ASSETS WITH SUSTAINABLE AVERAGE ANNUAL FUNDING (2019-2025)



6.4 Revenues

The City obtains funding for its operating and capital expenditures from a number of sources. Funding sources for operating expenditures are shown in Figure 6-7.

FIGURE 6-7—CURRENT FUNDING SOURCES FOR OPERATING BUDGET EXPENDITURES



Slightly greater than half of its revenue is derived from property taxes. The second largest revenue sources for the City are grants and subsidies.

With regard to the funding of capital projects, the main sources of current funding for the City are as follows:

Pay As You Go

- Pay As You Go Operating Budget
- Pay As You Go Sewer Surcharge

- Pay As You Go Debt Reduction

Corporate Reserves

- Capital Expenditure Reserve
- Development Charges Reserves
- Other Reserves

External Sources

- Provincial Transit Funding
- Federal Fuel Tax Funding
- Various Grants including but not limited to: Clean Water Wastewater; Public Transit Infrastructure Funding; Canada 150 and Disaster Mitigation and Adaption Fund
- Developer Charges
- Other One-time
- Third-Party Recoveries

Funding sources available for capital over the 2019 – 2025 planned periods are detailed in Fig. 6-8 and Table 6-5 below. The increase of \$9.6M annually for Sewer Surcharge funding as well as the increased transfer from operating to Pay as you Go, as approved during the 2019 budget deliberations are also included. Despite the City’s continued increases in capital funding it is clear that to successfully deal with the infrastructure deficit, municipalities will need significant ongoing reliable funding and Provincial and Federal assistance. It should be noted the funding information does not include the recently announced Disaster Mitigation and Adaptation funding of \$32.1M nor the estimate of \$144.8M in Investing in Canada Infrastructure Grant – Public Transit Federal and Provincial funding. While we the City continues to pursue all grant opportunities for capital projects, by their nature they are not sustainable, predictable or reliable. As such, the use of grants will continue to be used to leverage funding and where applicable make available City funding for other projects.

FIGURE 6-8—PLANNED AND PROJECTED FUNDING SOURCES FOR CAPITAL (000’S) 2019-2025

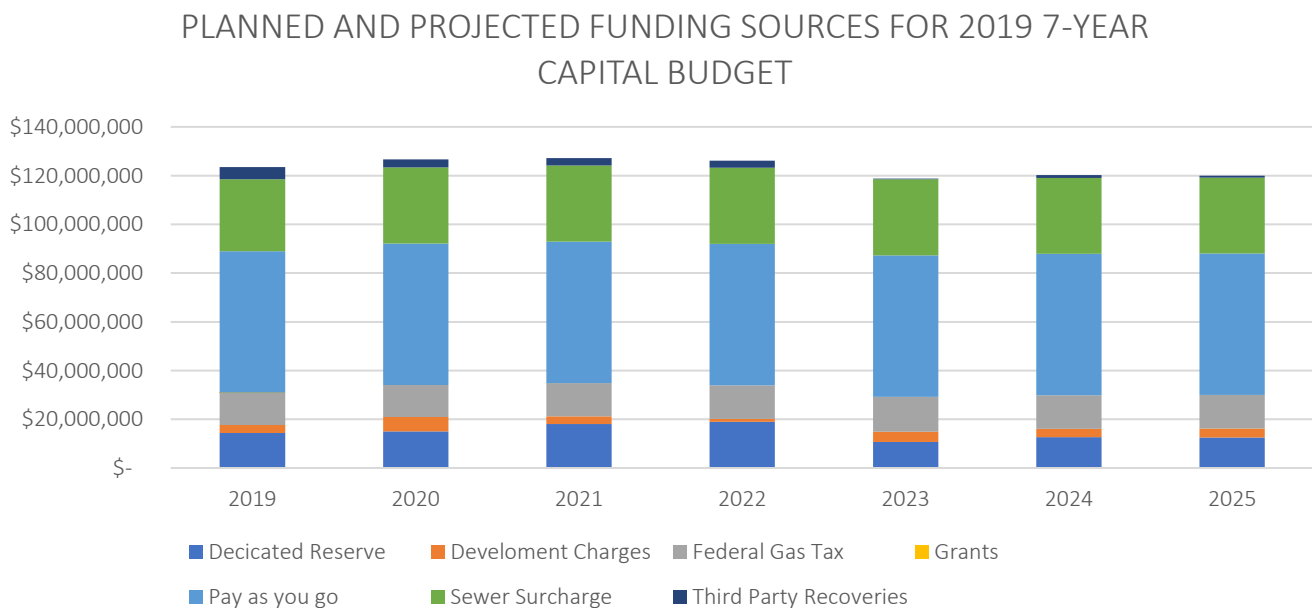
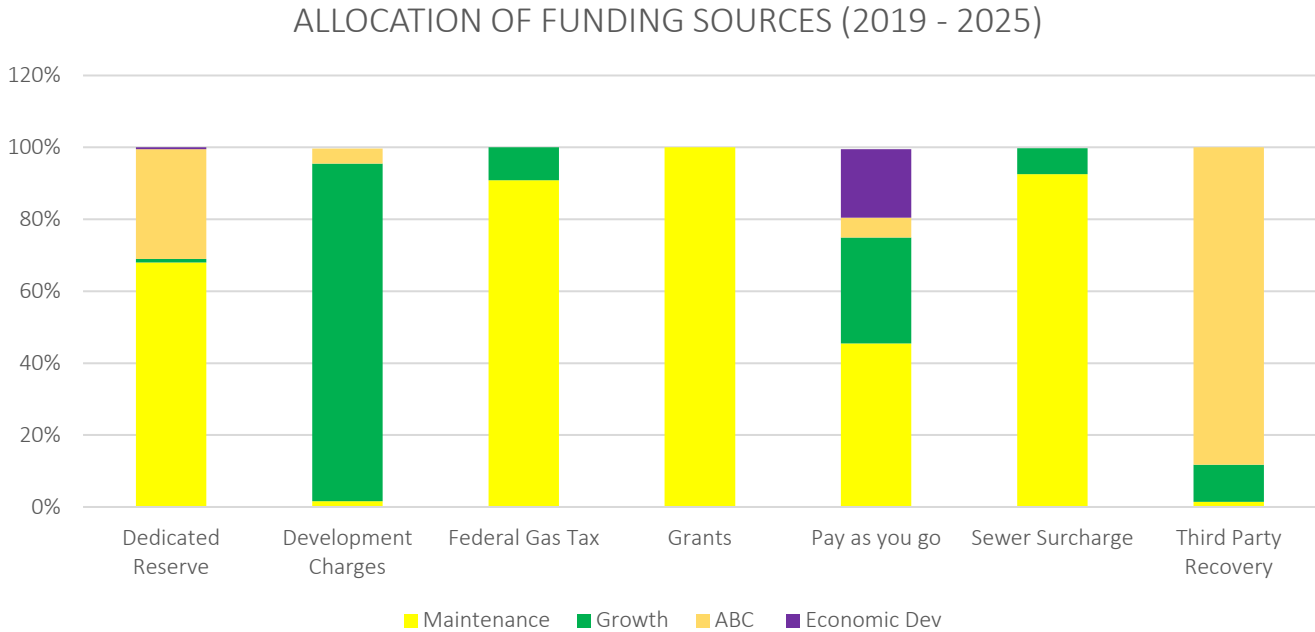


TABLE 6-5—PLANNED AND PROJECTED FUNDING SOURCES FOR CAPITAL 2019 – 2025 (000'S)

	2019	2020	2021	2022	2023	2024	2025
Dedicated Reserve	\$ 14,355	\$ 15,025	\$ 18,101	\$ 18,961	\$ 10,702	\$ 12,689	\$ 12,570
Development Charges	\$ 3,335	\$ 5,855	\$ 3,040	\$ 1,240	\$ 4,150	\$ 3,400	\$ 3,600
Federal Gas Tax	\$ 13,177	\$ 13,176	\$ 13,776	\$ 13,776	\$ 14,375	\$ 13,776	\$ 13,776
Grants	\$ 22	\$	\$	\$	\$	\$	\$
Pay-as-you-Go	\$ 58,074	\$ 58,054	\$ 58,055	\$ 58,054	\$ 58,055	\$ 58,054	\$ 58,054
Sewer Surcharge	\$ 29,575	\$ 31,263	\$ 31,188	\$ 31,187	\$ 31,187	\$ 31,188	\$ 31,188
Third Party Recoveries	\$ 4,979	\$ 3,262	\$ 3,043	\$ 2,854	\$ 355	\$ 1,140	\$ 780
Total	\$123,517	\$126,635	\$127,203	\$126,072	\$118,825	\$120,248	\$119,969

Pay-as-you-go and Sewer Surcharge are the largest funding sources for the City's Capital Budget. As can be seen Figure 6-9 below, approximately 19% of Pay-as-You-Go funding is allocated to Economic Development type initiatives which include but is not limited to projects such as various planning and growth studies, theming and branding, tourism and investments such as Paul Martin Building and the Hospital. Another 29% is allocated to projects deemed as growth, meaning the addition of new assets and or the expansion of existing ones to provide enhanced services. The growth category includes investments in projects such as expansion of roads (i.e. Cabana, Riverside Vista), investment in new attributes for parks (i.e. splash pad, trails, washrooms, Peche Island) as well as investments in projects such as cycling infrastructure, street and alley lighting and various studies. In many cases, projects can be a combination of growth and maintenance and as such project funding is split between these two categories to capture the true nature of the total investment. Also of note, is that the majority of funding for Agencies, Boards and Commissions (ABC) is either third party recoveries, particularly for the Airport which is now funded through their dividends, as well as dedicated reserves, as is the case for Windsor Police Services. These are recent changes over the past 2 years have allowed for the reallocation of Pay-as-you-go funding previously allocated to these organizations to be redistributed to additional City priorities.

FIGURE 6-9—ALLOCATION OF FUNDING SOURCES 2019-2025

6.5 The Infrastructure Gap

The 2013 AMP provided a very basic definition of the Infrastructure Gap for the City. It was simply the total replacement cost value of the assets in a Very Poor condition, with some basic projections on the deterioration of those assets over 10 years versus estimated funding amounts to determine if the gap would grow or shrink. In 2013 the total replacement cost of assets in Very Poor condition was \$375M or 7% and as per this report that amount is reduced to \$336M or 5.5%. This is a very positive direction for the City and is a function of several key factors:

1. There has been increased investment in the reconstruction and replacement of several facilities over this time frame, as well as the introduction of new facilities. In addition, the condition assessment project has provided information at the subcategory level for the facilities which has provided favourable results on the overall condition of the facilities. While this does not mean additional investment to sustain these assets over the next 20 years is not required, it does position the City to focus on rehabilitation and maintenance activities which are at a lower cost than complete reconstruction.
2. The condition assessment project for the sewer network also resulted in more positive condition ratings than what was estimated in 2013. 2013 had less than 20% of the network with objective ratings and for this AMP that percentage is over 60%. The largest shift is from the Fair condition rating category to Good. This also provides additional opportunities for monitoring and proactive maintenance and rehabilitation options to extend the life of these assets at a much lower cost than replacement. As previously noted, the Sewer Master Plan, due in late 2019, is likely to inform the major reconstruction projects required, with the maintenance and rehabilitation activities helping to sustain the balance of the network.
3. The condition assessment for the Lou Romano Water Reclamation Plant also provided greater detail on the condition of the assets of the plant at a lower level helping to separate out the conditions more accurately. As with facilities, these assets require ongoing maintenance, particularly preventative maintenance, to sustain their operations.
4. Investment in the replacement of 28 playground structures, re-lamping of all streetlights as well as redirecting funding from the sale of Canderel to the rehabilitation needs of the 2

remaining parking garages all assisted in addressing assets which would have added to the Very Poor condition value.

5. There has also been an increase in funding to the Capital budget through increases in transfers from operating budget to Pay-as-You-Go, as well as grant funding initiatives.

All these improvements in the data and investment in assets has resulted in the high-level positive changes as well as more accurate and reliable information for this AMP.

This AMP is focused on continuing to ensure the assets included in the report are able to be sustained at current service levels. While there have been many improvements creating an overall positive change, not all the individual asset categories display these same positive trends. An example of this is the road network (including ROW paved alleys), which in 2013 had \$140M in Very Poor condition (7%) and in this AMP that amount is now \$159M (8%). When you also consider the roads in Poor condition, which also means they are past rehabilitation and require reconstruction, these amounts increase to \$340M (18%) in 2013 and \$391M (19%) in 2018. While the percentage of the network Very Poor/Poor condition has not significantly increased, the dollar value has increased by \$19M for Very Poor and \$51M for Very Poor and Poor. These assets can no longer benefit from preventative maintenance and or rehabilitation work, which would have costed substantially less than reconstruction. By example the cost to mill and pave a road is $\frac{1}{4}$ of the cost to reconstruct it. As the assets in this condition are beyond rehabilitation, the ability to manage the network to avoid further deterioration of other road segments is important to avoid higher than necessary costs to manage the road network. To implement appropriate preventative maintenance and rehabilitation methods to achieve this requires an increase to the annual road funding.

Another asset category which has not seen positive changes are the Park assets. While significant investment has been made in the growth of these assets, the volume of funding for maintenance and rehabilitation has been significantly lower. In 2013, the AMP stated the assets in the Parks category had \$11.7M in Very Poor condition (10%) and in this report that amount is \$18.7M (21%), a substantial increase in replacement cost and the percentage of this asset category. For many of the assets in this category, once they reach Very Poor condition there is a strong possibility they will need to be taken out of service. As with all assets, the cost to maintain and rehabilitate them to extend their life is also a lower cost than replacement and is often also the least disruptive to the service the assets provide.

This AMP is focused on determining the annual funding level required to sustain these assets going forward. This ensures consideration of the annual funding required to appropriately apply maintenance, rehabilitation, replacement and reconstruction activities which extend the life of the assets and manage the number of assets in the Very Poor category. Each asset category has been considered with the best available information at the time of this report, and considering the following:

- Appropriate maintenance and rehabilitation activities which can be enhanced to extend the useful life;
- The risk associated with running them to failure;
- Average annual capital funding from 2013 to 2018;
- Average annual capital funding from 2019 to 2025, based on the 2019 7-year approved capital budget,
- Average annual needs for maintenance, rehabilitation and reconstruction / replacement
- Funding shortfall between average annual funding and average required funding,
- Various means of funding the shortfall including but not limited to energy savings, grants, user fees and or dedicated tax levy,
- For roads and facilities defining the priority of how to address the asset categories based on risk

The result is that this AMP defines the City's Infrastructure Gap as the shortfall between required annual needs to sustain current service levels over the next 20 years and the average annual funding levels projected based on the 2019 7-year capital budget. Table 6-6 below provides a summary of the results by asset type, and the overall infrastructure gap of approximately \$34M annually. It should be noted that this amount is based on the best available information at the time and is subject to change based on new, more objective condition data, impacts of climate change, unexpected external factors such as tariffs, exchange

rates, vendor support termination, technology changes and other factors not able to be foreseen or forecasted.

TABLE 6-6—PROJECTED ANNUAL SHORTFALL IN FUNDING FOR SUSTAINING CURRENT SERVICES LEVELS

Transportation Assets	Annual Funding Need	Average Annual funding (2019 to 2025)	Annual Shortfall in Funding
Roads and Alleys	\$ 37,000,000	\$ 18,949,757	\$ 18,050,243
Sidewalks	\$ 1,500,000	\$ 1,171,428	\$ 328,572
Streetlights	\$ 1,366,584	\$ 317,428	\$ 1,049,156
Traffic Signals	\$ 2,000,000	\$ 1,116,285	\$ 883,715
Total Transportation	\$ 41,866,584	\$ 21,554,898	\$ 20,311,686
Park Assets	Annual Funding Need	Average Annual funding (2019 to 2025)	Shortfall in Funding
Playgrounds	\$ 2,553,640	\$ 1,051,428	\$ 1,502,212
Various Park Assets	\$ 3,540,349	\$ 2,810,142	\$ 730,207
Riverfront Shore line	\$ 592,000	\$ 578,571	\$ 13,429
Trees	\$ 2,080,000	\$ 785,857	\$ 1,294,143
Total Park	\$ 8,765,989	\$ 5,225,998	\$ 3,539,991
Environmental Protection	Annual Funding Need	Average Annual funding (2019 to 2025)	Shortfall in Funding
Plants and Pumps*	\$ 5,436,131	\$ 4,867,745	\$ 568,386
Total Environmental Protection	\$ 5,436,131	\$ 4,867,745	\$ 568,386
Facilities, Fleet & Other Assets	Annual Funding Need	Average Annual funding (2019 to 2025)	Shortfall in Funding
Corporate Equipment	\$ 1,705,184	\$ 661,985	\$ 1,043,199
Corporate Facilities	\$ 11,821,549	\$ 4,231,374	\$ 7,590,175
Business Solutions	\$ 2,000,000	\$ 1,323,813	\$ 676,187
Total Facilities, Fleet and Other	\$ 15,526,733	\$ 6,217,172	\$ 9,309,561
Total Shortfall in Annual Funding	\$ 71,595,437	\$ 37,865,813	\$ 33,729,624

*The shortfall in funding for the Plants and Pumps is related to the annual contribution to the reserve fund rather than the capital budget as the reserve fund is used for all capital projects for these assets.

There are several assets which have sufficient annual funding to address their annual needs and as such no additional funding is identified. The list of these assets along with comments regarding their funding levels is in Table 6-7 below.

TABLE 6-7—ASSETS NOT RECOMMENDED FOR INCREASED FUNDING

Assets Not Recommended for Funding increase at this time.	Explanation
Parking Garage and Equipment	As previously stated, the 2 garages are receiving significant investment to address several of the challenges. Once this is completed, projections for the Parking Reserve fund are deemed sufficient to continue to sustain these assets.
Structures	Annual investments in structures has increased over the past 5 years resulting in positive shifts in this asset category. The projected funding from 2019 to 2025 is deemed sufficient to continue to apply various maintenance and rehabilitation activities to sustain these assets. As the cost for major rehabilitation and or reconstruction can be significant the condition assessments of these assets will help to gage over the next five years if any major concerns are starting to be presented which may or may not impact funding levels.
Sanitary and Wastewater Collection	The increase in Sewer Surcharge funding as well as the data from the zoom camera inspection has positioned these assets to have more targeted maintenance and rehabilitation. As previously stated, any reconstruction of these assets will likely be driven by the Sewer Master Plan which is due in late 2019. Funding associated with the plan will be addressed at that time, and future AMP will be informed by that information. Based on these factors Administration is not presenting any recommendations on additional funding levels in the AMP for these assets.
Corporate Fleet	The Corporate Fleet program has been in place for several years and is an example of how asset management processes can create stability in service levels and funding as well as reduce risk. Currently the reserve is sufficient to address replacement needs. As commented in previous sections this may change over the course of the next 5 years as exchange and tariffs may adversely impact the reserve at levels higher than anticipated. Administration will continue to monitor the situation, and should it exceed planned forecasts the Fleet Division will bring a separate report to Council for consideration. Administration is also seeking grant funding to address a service enhancement for these assets to electric vehicles. This in turn could result in a need for higher levels of funding for those replacements as well as the shop, however since they are a result of service enhancements, they will be brought forward separately for Council to consider.
Infrastructure Operations – IT (hardware and personal computing)	The reserve for technology infrastructure and personal computing is sufficient to continue to manage these assets. New innovations in cloud computing is also leveraged when appropriate to avoid costly systems managed by the City. While all of these are positive steps there is a caution that these assets can become obsolete long before they fail. These assets are difficult to speculate given the ever-changing advancements in technology, need for continuous improvement in monitoring and managing security as well as increased amounts of data. Administration is not recommending additional funding for these assets at this time, however should factors outside of our control introduce the need to replace these assets sooner than expected a separate report will be brought to Council from the Information Technology department.

Transit Windsor	The annual replacement of 8 buses a year to reduce the average life of the fleet to 12 years was initially underfunded. This challenge was mitigated by using the Public Transit Infrastructure Funding grant to purchase 24 buses (4 years worth) and is future mitigated by the submission of an additional 16 buses (2 years worth) to the Investing in Canada Infrastructure Plan - Public Transit. There remains sufficient funding in the ICIP - Public Transit grant to replace another 7 years worth of buses. It should be noted that TW is also in the midst of finalizing their Transit Windsor Service Delivery review, which will include expanded networks, in addition to the current expanded networks into LaSalle and possibly Leamington. As such the plan developed in 2015 may change as the type and number of buses could change, and those changes may be fully or partially funded through the ICIP - Public Transit grant. As such Administration is not recommending any additional funding for these assets until the Service Delivery review report is finalized and approved.
Parks Equipment	A reserve has been established since 2013 and has assisted in addressing the annual funding challenges for these assets. Based on current funding levels, including the increase recommended in the 2019 operational budget, this reserve has sufficient funding to continue to address the replacement of existing equipment.

6.5.1 Transportation Service Assets

TABLE 6-8— PROJECTED ANNUAL SHORTFALL IN FUNDING FOR SUSTAINING CURRENT SERVICES LEVELS – TRANSPORTATION ASSETS

Transportation Assets	Annual Funding Need	Average Annual funding (2019 to 2025)	Annual Shortfall in Funding
Roads and Alleys	\$ 37,000,000	\$ 18,949,757	\$ 18,050,243
Sidewalks	\$ 1,500,000	\$ 1,171,428	\$ 328,572
Streetlights	\$ 1,366,584	\$ 317,428	\$ 1,049,156
Traffic Signals	\$ 2,000,000	\$ 1,116,285	\$ 883,715
Structures			
Noise Barriers			\$ 0
Parking Garage & Equipment			\$ 0
Total Transportation			\$ 20,311,686

Transportation Services

Assets included in the Transportation Services category are: roads, paved alleys (ROW), sidewalks, structures (bridges), traffic signals, street lights, noise barriers and parking garages.

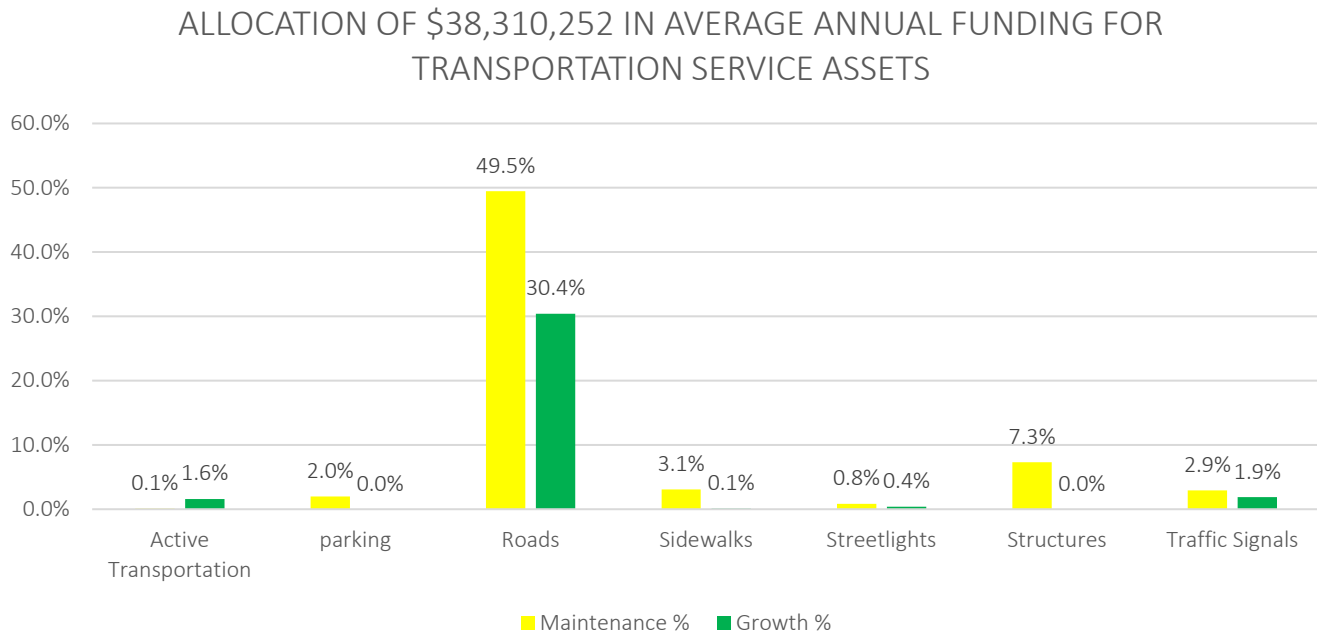
The single largest asset in this category is roads. Although Federal Gas Tax is largely dedicated to this category our funding from the federal government decreased in 2014 as well as in 2019 and 2020. The proposed one-time Federal Gas Tax funding in 2019 will assist in mitigating the risk associated with the 2019 and 2020 decrease, however as of this report the federal budget has not been approved and the funding is not guaranteed.

It should also be noted that the value of the transportation assets in Fair condition in 2018 is \$777.4M, which is \$335M more than both Very Poor and Poor combined. As this category begins to age, it is likely to put pressure on the funding requirements. Implementing various asset management strategies that extend the life of these assets, and slow the rate of decline, will help mitigate this risk.

The average annual allocation for all Transportation assets based on the 2019 7-year capital budget is \$38,310,252 and as per Figure 6-10 below, the distribution of funding is largely allocated to roads. Of this

annual average approximately \$13.2M is allocated to projects which are service enhancements and/or growth and \$25.1M is to maintain current service levels.

FIGURE 6-10— ALLOCATION OF AVERAGE ANNUAL FUNDING FOR TRANSPORTATION ASSETS 2019-2025



Roads and Paved Alleys (ROW)

Administration reported in 2015, via report S40/2015, the annual funding required to sustain the road network at current LOS would require approximately \$37M in annual funding. As noted in that report approximately 20% of the road network was in Very Poor or Poor condition. Through the use of the modelling software, myPredictor from Assetic, Administration was able to take the current condition data of the road network, along with the various activities to extend the life of the roads (including the cost), model the various deterioration and improvements, apply tolerances to required activities based on the risk of the road classification and run scenarios on the condition of the road network over the next 20 years based on various funding levels, including a modest 2% inflation. The results of this work can be seen in Figure 6-11, projections based on current annual funding levels (\$21M) and Figure 6-12, which is current average annual funding plus an increase equal to approximately 1% tax levy every year for 4 years (\$37). The results of 2015 remain applicable as there has been only a minimal reduction of 6kms in Very Poor or Poor condition.

The annual average funding to sustain the network at current service levels (\$37M) would be directed to preventative maintenance, rehabilitation and reconstruction of the road network. This funding does not consider additional costs for the expansion of these roads nor the addition of attributes, such as cycling facilities. Funding for such initiatives would be considered growth and service enhancement in nature and should be funded from those sources rather than reducing the funding for the sustainability of what currently exists.

The average annual funding from 2019 to 2025 for maintaining the road network is \$18.9M, a slight decline from 2015. It should be noted however the overall investment in roads is an annual average of \$30.5M, including \$11.6M for growth type road work. This is a significant increase when compared to the 2013 to 2018 average funding of \$20M for maintaining and \$4.2M for growth. This increased investment in growth and enhancements can be seen by the number of significant projects such as Riverside Vista, Cabana, Banwell and several others with funding in the 2019 Capital Budget. While these are positive investments, the ability to fund them can often come at the expense of reducing funding for maintaining the existing assets and contributes to the reduction in the average annual funding for these projects when comparing 2015 to the 2019 7-year average.

In terms of kms, the current number of kms in Very Poor and Poor condition is 196.82kms and in 20 years, based on current annual funding levels of \$21M, it would increase to 358.49km. Taking the current replacement cost of the roads which make up the 358.49kms and applying a 2% CPI over the next 20 years the replacement cost of those is estimated at \$1.15B. Average annual funding levels of \$37M would result in 148.01kms in the Very Poor and Poor category, slightly better than current levels, however given the extended timelines factors such as inflation, which may be higher than projected reducing the purchasing power of these funds and the amount of work which can be completed. Procurement methods listed in Section 5 will be utilized to help mitigate the risk of declining purchasing power. It should also be noted that the slight bump in condition in year 5 for both scenarios is consistent with the data we are seeing. There has been marginal improvement in the overall network reducing the Very Poor and Poor from 196.82 kms (20%) to 190.6 kms (18%). While this is positive when reading this information, the year 10 results should be considered as well. It is over the next 5 years where the slide on deterioration based on current funding levels starts to become a larger challenge to manage and recover from.

FIGURE 6-11— 20 YEAR PROJECTIONS FOR ROAD NETWORK BASED ON AVERAGE ANNUAL FUNDING OF \$21M

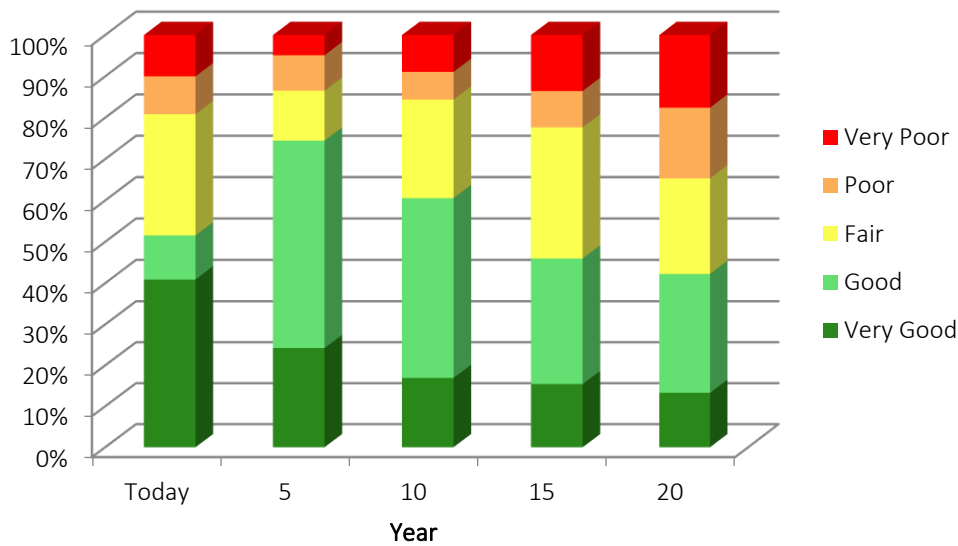
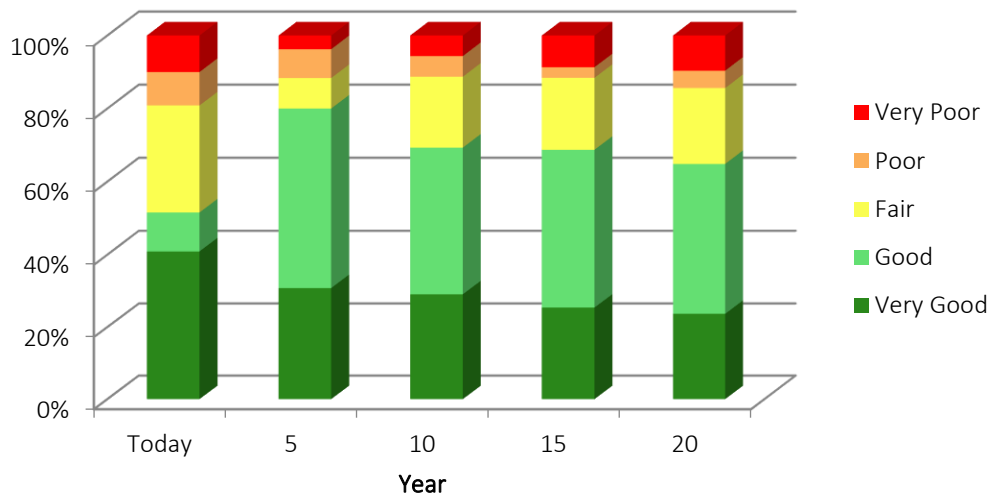


FIGURE 6-12— 20 YEAR PROJECTIONS FOR ROAD NETWORK BASED ON INCREASE TO \$37M IN AVERAGE ANNUAL FUNDING

Based on the 7-year average annual funding for road maintenance at \$18.9M an additional \$18.1M would be needed annually to achieve the \$37M annual target. It should also be noted that the selection of road projects should adhere to the principles and strategies identified in Section 5.5.1.1 for prioritizing to optimize use of the funding and manage risk.

Structures

The City had an average annual funding of \$1,833,000 in the 2013 to 2018 timeframe for structures. The 2019 to 2025 projected average annual funding is \$2,804,714, an average increase of \$1M annually. Based on the critical nature of these assets as well as the significant cost associated with rehabilitation activities, this amount is deemed to be sufficient for the on-going preventative maintenance and rehabilitation. These assets will be revisited in the 2023 AMP to determine if adjustments to funding levels are required.

Sidewalks

The City's sidewalk network had an average annual funding of \$725,000 in the 2013 to 2018 timeframe. This was an increase from previous funding levels for the sidewalk network and helped to improve the overall position of the network. As with the road network in 2015, the myPredictor modelling software was used to determine annual funding levels required to sustain the sidewalk network at current service levels. The annual funding was determined to be \$1.5M. Based on funding levels over the next 7 years, there is an average annual funding of \$1,171,428 to maintain the sidewalk network. This results in a shortfall of average annual funding of \$328,572 for the sidewalk network.

Streetlights

The 2013 AMP did not include these assets due to the limited information available. By the end of 2017, all the HPS cobra head streetlights were converted to a LED streetlight fixture. As part of the project, the design and installation captured all relevant information regarding the fixture. However, the asset information regarding condition of poles, all associated wiring, decorative fixtures and pole bases remain limited. While the data is still not as comprehensive as needed for proper planning these are significant assets which need to be included in the overall inventory.

The entire Street Light inventory is valued at \$40,997,539 with \$29,108,253, or 71% of the total value deemed in Very Good, Good or Fair condition. The estimated annual funding required for these assets is \$1,366,584, which is based on the total replacement cost value of the assets, \$40,997,539 divided by 30, and the design life average of the assets. In using this basic approach, the average annual funding shortfall for these assets is \$1,049,156 as the average current funding over the next 7 years is \$317,428. The funding shortfall for these assets is deemed less certain than the recommendations for roads and sidewalks given

they are pooled assets and there is currently no condition assessment data for them. Administration does have concerns regarding these assets, especially wiring and poles as many are very old and certain areas are already known to be a concern, such as the pole bases along EC Row. In addition, the availability of some streetlight parts, especially for the decorative HPS fixtures, are becoming eliminated from production in favour of newer technology (LED retrofit kits).

Traffic Signals

The City has seen a significant decline in the condition and level of service of Traffic Signals across the network which presents a major risk to the City and its citizens due to the shortfall in maintenance and replacement funding. In 2013, 33% of the signals were in Poor condition, and by 2018 this number has increased to 64% of signals being in Poor condition. It should be noted that Traffic Signals are not permitted by legislation to be in Very Poor condition as that definition for Traffic Signals can only mean complete failure and inoperable. As such the use of Poor for these assets should be considered the worst condition a functional system can be in, resulting in higher maintenance costs to keep them operational, and noting that complete failure will require immediate replacement.

Traffic lights are programmed to fail into a default flashing red model turning a junction into a 4-way stop. For a local road this is a significant inconvenience and disruption to road travel. Should this happen at a major junction on an arterial or collector road there is a major disruption to traffic flow in that part of the City.

There is currently \$14M in Traffic Signals in Poor condition which represents 184 intersections. The 2013 to 2018 funding for these assets is \$891,667, with \$416,667 being allocated to address existing systems and \$475,000 to service enhancements to existing signals when replaced and or additional signalized intersections. The average cost to replace a signalized intersection is approximately \$77,000 which based on \$461,667 annually would mean 6 units could be replaced each year. A very simple view would mean it would take approximately 30 years to replace the 184 intersections currently in Poor condition based on existing funding levels. This does not consider the fact that those intersections in Fair condition will age and become Poor, nor does it consider that the average cost of \$77,000 is likely to go up due to inflation over that time.

This challenge is compounded by the fact that the traffic signal system requires several other assets, most of which are buried, to run the system. These include assets such as fibre, PVC conduit, detector stations and other assets which total \$24,080,917 in replacement value. Some of these assets also date back to the 1990s and in a few cases the 1980s. It is not clear what condition they are actually in as there is no process in place to assess the condition aside from age. They do however factor into the concern associated with existing funding levels and further Administrations recommendation to start increasing funding for these assets to reduce the number of assets in Poor condition. The ability to obtain condition information on these supporting assets for the traffic signal system is part of the noted improvements for the 2023 AMP.

As these assets are vital to traffic flow and if they reach the point of failure would require immediate replacement it was deemed necessary to consider increased funding for the replacement of these assets to mitigate the risk of failure and unplanned expenditures.

Based on the deterioration of these assets over the next 20 years an average allocation of \$2M per year would be more appropriate to address these assets ensuring their viability over the next 20 years. The current funding projected for the next 7 years is an average annual amount of \$1,116,285, creating an annual shortfall of \$1,883,719.

Noise Barrier and Parking Garage

As stated in Table 6-8 the Parking Garage and Equipment challenges with funding shortfalls have recently been resolved. In 2018 the sale of the Canderel building resulted in significant funding being directed to address infrastructure challenges and enhancements in the 2 remaining parking garage structures. The Corporate LED relighting program helped to fund a portion of the lighting retrofit requirements as well. This has resulted in the reserve fund for these assets to not have to absorb those costs. Based on the current projected revenues for this reserve coupled with the work which needs to continue to maintain the garages

and parking equipment no additional funding is required at this time to sustain these assets at current service levels.

The noise barriers do not have sufficient information or processes for condition assessment to provide a reasonable recommendation on funding levels required to sustain these assets.

6.5.2 Parks

TABLE 6-9— PROJECTED ANNUAL SHORTFALL IN FUNDING FOR SUSTAINING CURRENT SERVICES LEVELS – PARKS ASSETS

Park Assets	Annual Funding Need	Average Annual funding (2019 to 2025)	Shortfall in Funding
Playgrounds	\$ 2,553,640	\$ 1,051,428	\$ 1,502,212
Various Park Assets	\$ 3,540,349	\$ 2,810,142	\$ 730,207
Riverfront Shorewall	\$ 592,000	\$ 578,571	\$ 13,429
Trees	\$ 2,080,000	\$ 785,857	\$ 1,294,143
Parks Equipment			\$ 0
Total Park			\$ 3,539,991

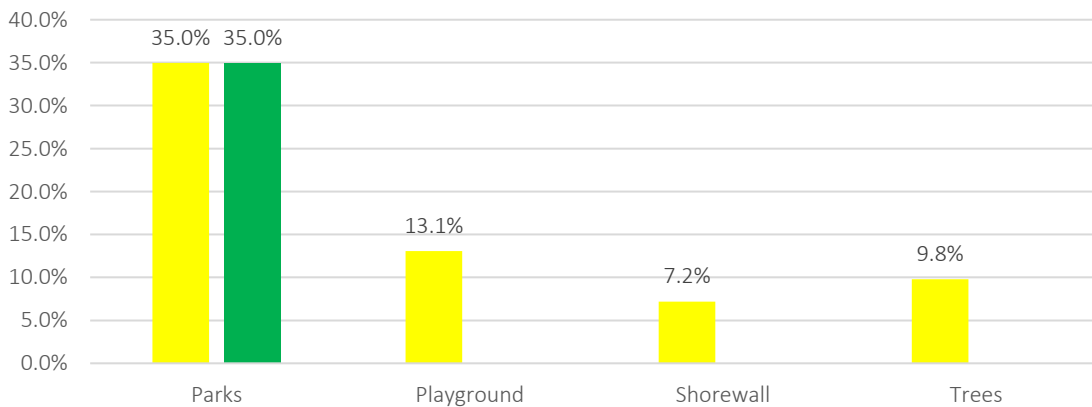
Park Assets

Assets included in this category are playgrounds, spray pads, fountains, trails, sports fields, pedestrian bridges, parking lots, parks equipment, riverfront shoreline and trees. There are several other assets in our park system, however the assets identified for this AMP are those which are also considered Tangible Capital Assets. As part of the work to be completed for the next AMP it will be determined what if any additional Park assets, listed in Appendix E, should be included in the 2023 AMP. The requirements for Tangible Capital Asset reporting and O.Reg 588/17 will be further explored to understand those requirements which may influence this direction.

From a capital budget perspective an average annual allocation to park assets in the 2019 7-year capital budget is \$8,035,897. Approximately 35% or \$2.8M of this amount is focused on growth and or enhancements to our park system, which in turn increases maintenance and rehabilitation costs to sustain these assets. The average annual allocation to maintain current service levels is approximately \$5.2M.

FIGURE 6-13— ALLOCATION OF AVERAGE ANNUAL FUNDING FOR PARK ASSETS 2019 - 2025

ALLOCATION OF \$8,035,897 IN AVERAGE ANNUAL FUNDING FOR PARK ASSETS



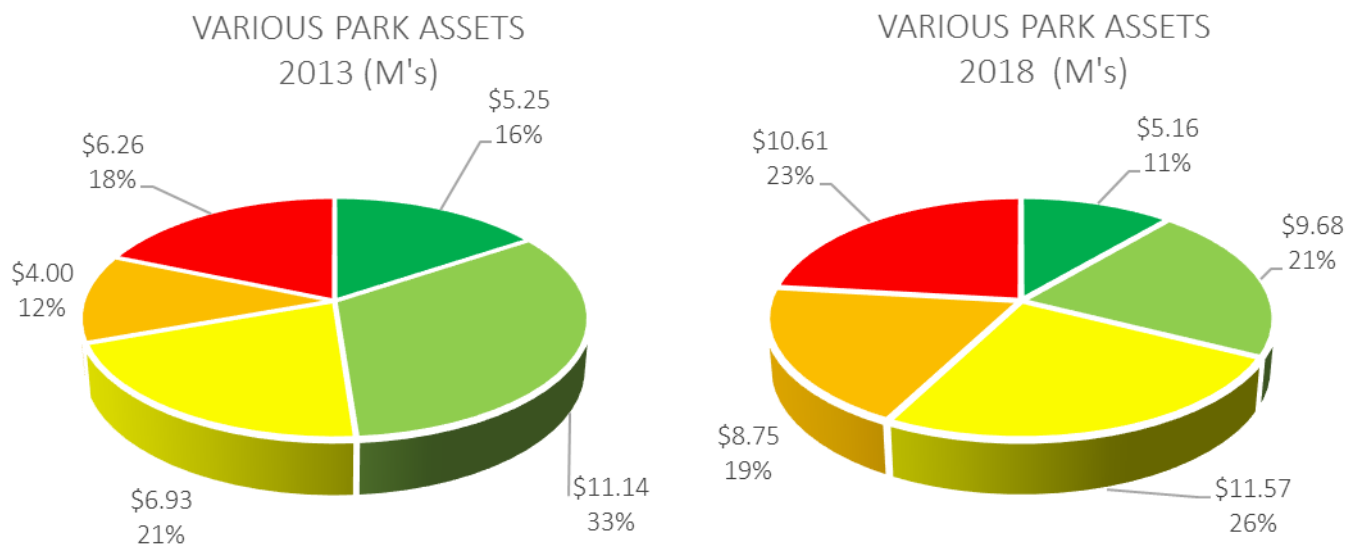
Playgrounds

These assets are inspected to ensure they comply with CSA standards. While every effort is made to address any issues to continue to meet CSA standards, at some point the issues exceed the maintenance or rehabilitation efforts and they must be removed from service. To sustain current LOS for these assets funding is required to replace them. The annual amount is estimated at \$2.5M, approximately \$1.45M higher than current annual funding levels. An added challenge is that there tends to be a bulk of playgrounds installed at a time and therefore a bulk of them may need replacement all at once. The 28 playgrounds identified in 2017 and 12 currently under review are examples of this. An increase in the annual funding will ensure the current 12 playgrounds are replaced in a timely fashion as they come to end of life and are removed from service. Ideally over the next 5 years the increase in annual funding can be reviewed and considered if it is more appropriate to set up a reserve so that funding is available when it needs to be drawn upon, particularly if there will be several years in which no playgrounds reach end of life, but a bulk replacement may be on the horizon. Planned funding will avoid redirecting funding from other project initiatives and or leaving some parks without a playground.

Various Park Assets

The assets included in this category are fountains, parking lots, pedestrian bridges, sports field, spray pads and trails.

FIGURE 6-14— VARIOUS PARKS ASSETS CONDITION RATINGS 2013 VS 2018



From 2013 to 2018 there was a decline in the overall condition of these assets. To minimize any further decline in condition, an increase to the annual funding is needed to support appropriate preventative maintenance and rehabilitation methods.

The annual estimated required funding is \$3.54M which is approximately \$730,207 higher per year than current funding levels. The funding shortfall for these assets is deemed less certain than the recommendations for other assets given a large portion of these assets are pooled assets and there is currently no objective condition assessment data for them.

The annual funding request does not consider additional costs for the upgrade and/or expansion of these assets nor the addition of attributes such as irrigation system and permeable pavement. Funding for these would be considered growth and service enhancements and should be funded from those sources rather than reducing the funding for the sustainability of what currently exists.

Riverfront Parks Shorewall

In 2013 88% of these assets are in a Good to Very Good condition. Based on the 2019 figures supplied as part of a shorewall assessment report prepared by an engineering firm, 93% of the Parks shorewalls are assessed as Good with 1% assessed in a Poor condition. This shift can be attributed to the use of objective condition ratings rather than the subjective ratings used previously. Although this is good news, to minimize any future decline in condition for shorewalls, an increase to the annual funding is being requested to support appropriate preventative maintenance and rehabilitation methods.

Based on funding levels over the next 7 years the average annual funding amount allocated to the Parks shorewall is \$592,000. Taking into consideration the current annual funding levels, a \$13,429 shortfall results. The requested annual funding is meant to make repairs to extend the shorewall's useful life. As noted in Section 4, there is a section of the land East of Caron Pumping Station which has been sectioned off. While the original concern was the shorewall failing, condition assessments have been completed and do not indicate the shorewall is the issue. The area was built on top of a pier and which condition assessments must be completed to determine if this is the cause of the erosion in the area, as well as costs and recommendations to repair. While the shorewall itself is fine, the land may have unique issues and require repairs, which given the proximity to the shorewall may dictate improvements to the shorewall as well. The cost, impact and severity of the situation is unknown and therefore not quantified. This is also unique in that the issue is the land not the shorewall and not something which could have been predicted.

The Parks shorewalls have a long useful life (50-75 years) and they must withstand the changes in climate, including more frequent and severe storms and rising water levels.

Trees

The Parks department maintains over 70,000 trees along the Right of Way and an additional 30,000 shade trees in our Parks. This does not include our natural area parks such as Black Oak Heritage Park or Peche Island, nor does it include privately owned trees. Every year the City adds to its tree inventory. A cautionary estimate of \$50,000,000 to replace the number of trees in our inventory (ROW and parks) has been put forth until further information is gathered. The Forestry division is currently working on inventorying the trees in the ROW and parks, which in turn will provide more specific details on each tree including replacement cost. The Forestry division will report any new information and include this in the next AMP in 2023.

The focus of this AMP is the annual cost to maintain the tree inventory through a 7-year tree trimming program. This program has been presented to City Council previously and is identified as the key to maintain this asset. It is critical that tree maintenance be performed on a regular basis as regularly maintained trees lead to optimal health and longevity and reduce the risk of damage claims to private property. Preventative maintenance should result in a significant reduction of service requests, which continues to be the highest volume of 311 issues and reduce damage claims.

Based on funding levels over the next 7 years the average annual funding amount allocated to tree maintenance is \$785,857. The annual estimated cost of a 7-year tree trimming program is \$2.08M. This results in an average annual shortfall in funding of about \$1.3M and prevents the City from implementing the program. As such, as we continue to address backlogs in cutting requests, a new set of requests start to repopulate it resulting in an endless cycle and continued challenges in meeting service levels.

Parks Equipment

Since 2013 there has been a fundamental change in addressing the Parks Equipment. The same methodology used to manage the Corporate Fleet system was applied to the parks equipment. Operation budget transfers to the Parks Equipment reserve have been established, as have the replacement schedules and average annual funding requirements for the reserve to have sufficient funding to replace assets when required. This has resolved the challenges with these assets and based on current reserve and funding projections, these assets can be sustained at current service levels.

6.5.3 Environmental Protection—Storm Water and Wastewater

TABLE 6-10— PROJECTED ANNUAL SHORTFALL IN FUNDING FOR SUSTAINING CURRENT SERVICES LEVELS – ENVIRONMENTAL PROTECTION

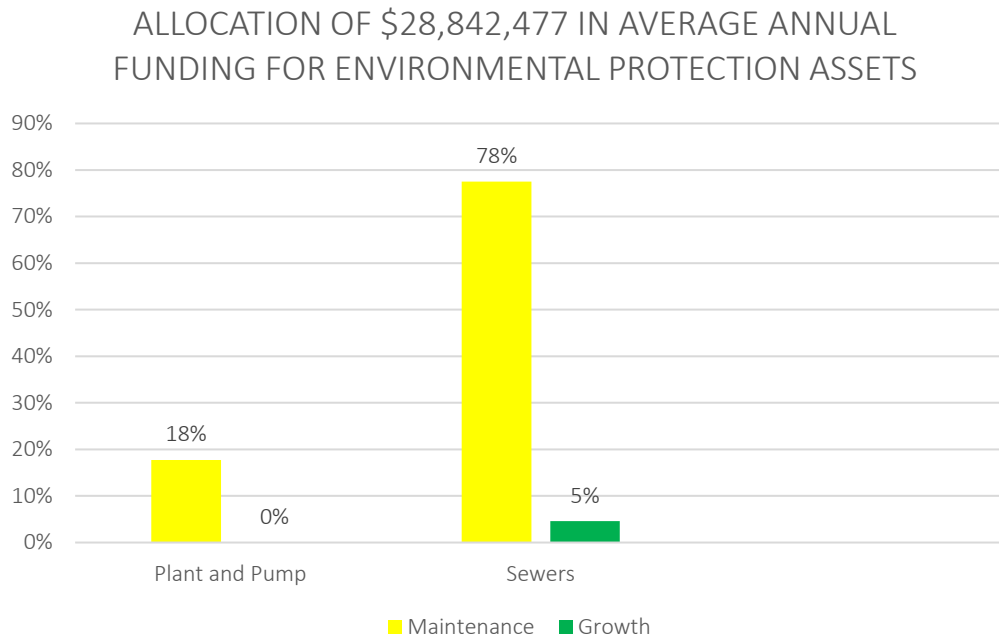
Environmental Protection	Annual Funding Need	Average Annual funding (2019 to 2025)	Shortfall in Funding
Storm and Sanitary Sewer Network			\$ 0
Pollution Control - Plants and Pumps*	\$ 5,436,131	\$ 4,867,745	\$ 568,386
Total Environmental Protection			\$ 568,386

6.5.3.1 Environmental Protection

Assets included in this category are all assets which are associated with the collection, transmission, treatment, retention, infiltration or disposal of waste and / or storm sewer, and are identified as part of the City Tangible Capital Assets. These include assets such as the pipe networks, pump stations, municipal drains

and water treatment plants. Of the average annual funding of \$28.8M approximately \$27.5M is allocated to the maintenance needs of these assets.

FIGURE 6-15— ALLOCATION OF AVERAGE ANNUAL FUNDING FOR ENVIRONMENTAL PROTECTION ASSETS 2019-2025



Storm and Sanitary Sewer Network

The 2013 AMP identified the need to increase the percentage of pipe segments with objective condition ratings to properly assess these assets. In subsequent years, new cost-effective sewer inspection technology coupled with grant funding was identified and implemented resulting in over 75% of the network having objective condition ratings as of March 2019. The results reaffirmed the subjective condition rating for several assets and also resulted in better condition rating for many of the subjective rating results which were previously deemed to be in Fair condition. This information also provides more clarity on the actual state of the assets so that appropriate mitigating strategies can be applied and programs such as cutting, flushing and relining can now be more targeted programs.

In addition to this focus, the new sewer inspection technology's ability to provide near real-time data is allowing for the deployment of proactive maintenance and emergency repair activity. As a result, not only are these O&M activities prolonging useful life but also identifying areas for rehabilitation programs. New programs such Infill and Infiltration (INI) studies are also underway using condition as well as data from other inspection programs to determine additional maintenance opportunities. Lastly, this data is being utilized in the Sewer Master Plan to drive modelling scenarios and resulting sewer O&M and reconstruction programs for the next 20 years providing further guidance in developing mitigation strategies to specific areas susceptible to flooding and/or are now undersized due to development in those areas.

The Sewer Master Plan will provide the required direction relative to the City's sewer network. It is recognized that there will likely be many sewer replacement projects which will not be included in the AMP and will still require funding. Until the Sewer Master Plan is understood and that information vetted against other parameters and data to determine funding levels for the balance of the work needed, recommendations are not included in this AMP.

The continual increases to investments in the sewer network, including the most recent increase to Sewer Surcharge funding, Federal and Municipal funding for the \$89.1M DMAF project and funding from CWWF for an additional \$12M in sewer work have all been positive influences for these assets. Funding has already started to be allocated for implementation of the recommendations in the Sewer Master Plan and those results and recommendations will inform the next AMP.

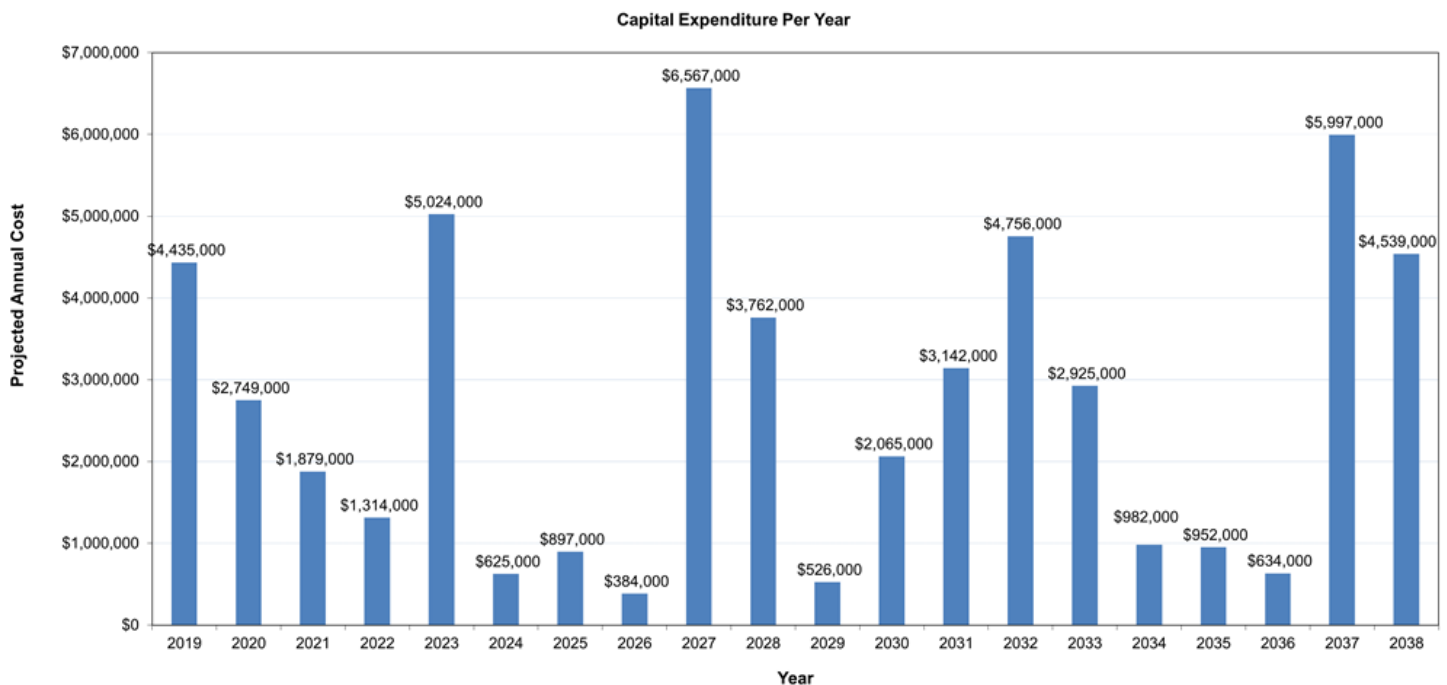
Pollution Control - Plants and Pump Stations

The City owns and operates 2 water reclamation plants and 45 pump stations, which includes the Retention Treatment Basin (RTB). These are very large facilities accounting for \$1.2B of the City’s total \$6.1B in assets and they also provide services to neighbouring communities.

Financial projections in this section of the AMP simply reflect what is required to maintain existing assets at a base level. It is the minimum funding required to maintain assets at an acceptable level of service. Working within current funding levels, the City has to continuously prioritize expenditures between all of these investment drivers. However, moving forward the objective is to ensure that there is an increased focus on asset renewal needs.

Figure 6-16 outlines in detail the annual maintenance funding requirements projected over a 20-year period. These recommendations were based on an analysis of the Lou Romano Water Reclamation Plant (LRWRP) by a third-party engineering consultant and simply reflect the base maintenance program requirements to continue to achieve an acceptable level of service. The minimum funding required to simply maintain the LRWRP, over the next 20 years, at an acceptable level of service is over \$54 Million.

FIGURE 6-16— 20-YEAR POLLUTION CONTROL EXPENDITURE MODEL

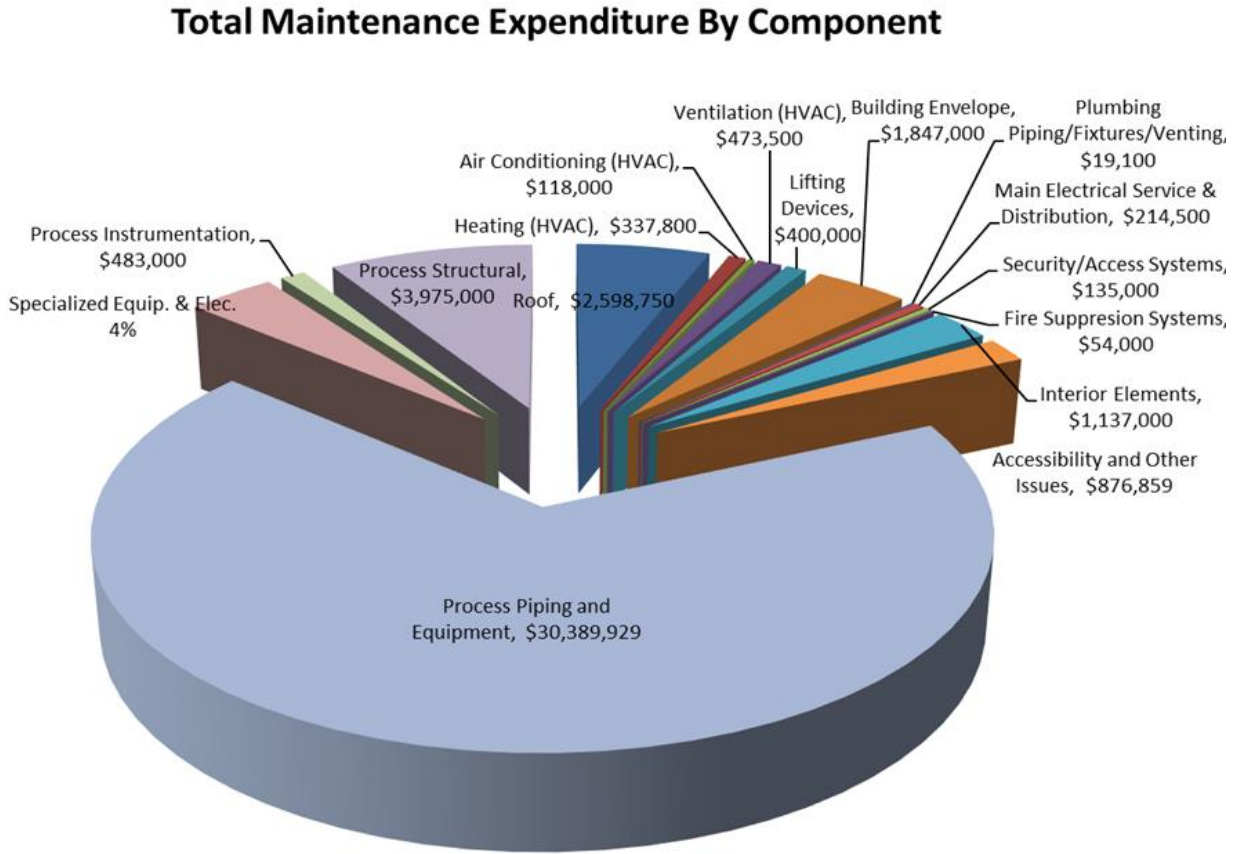


This calculation however, does not consider the many variables discussed in other sections of this AMP. These projections assume that each and every facility and processing component will actually perform to the very end of its expected useful life. As has been stated previously, recent trends are showing that large facility components are degrading faster than what is expected and therefore premature replacement and increased maintenance requirements will be a reality for many systems. The analysis also assumes that when maintenance or rehabilitation is performed, components and process equipment are replaced on a like-for-like basis. Experience shows however that when facility components are repaired or replaced, they are often upgraded to the most recent, advanced and/or most efficient version at an increased financial burden.

Figure 6-17 below provides a high-level overview of the \$54 Million 20-year funding requirement broken down by the critical facility components and systems. These specific requirements were the result of detailed facility component inspections by a third-party consulting engineer. The funding requirements were their professional judgement alone and based on what one should realistically experience in terms of system degradation during the normal operation of the various facilities and processes inspected. Once again, it is important to note that these expenditures are for the Lou Romano Water Reclamation Plant alone. The remaining plant and 45 pump stations are currently in the process of condition assessments. For purposes of this AMP the \$54M over 20 years for LRWRP was doubled and deemed to be a reasonable estimate of what is likely

needed for these remaining assets. This results in an average annual funding to the reserve of \$5.4M as being deemed appropriate for sustaining these assets at current service levels. It is expected the Sewer Master Plan and other current studies will likely result in recommendations for growth and or enhancements to these assets and the cost associated with those activities will be addressed in those reports and recommendations.

FIGURE 6-17— POLLUTION CONTROL MAINTENANCE EXPENDITURE BY COMPONENT



6.5.4 Facilities, Fleet and Other Assets

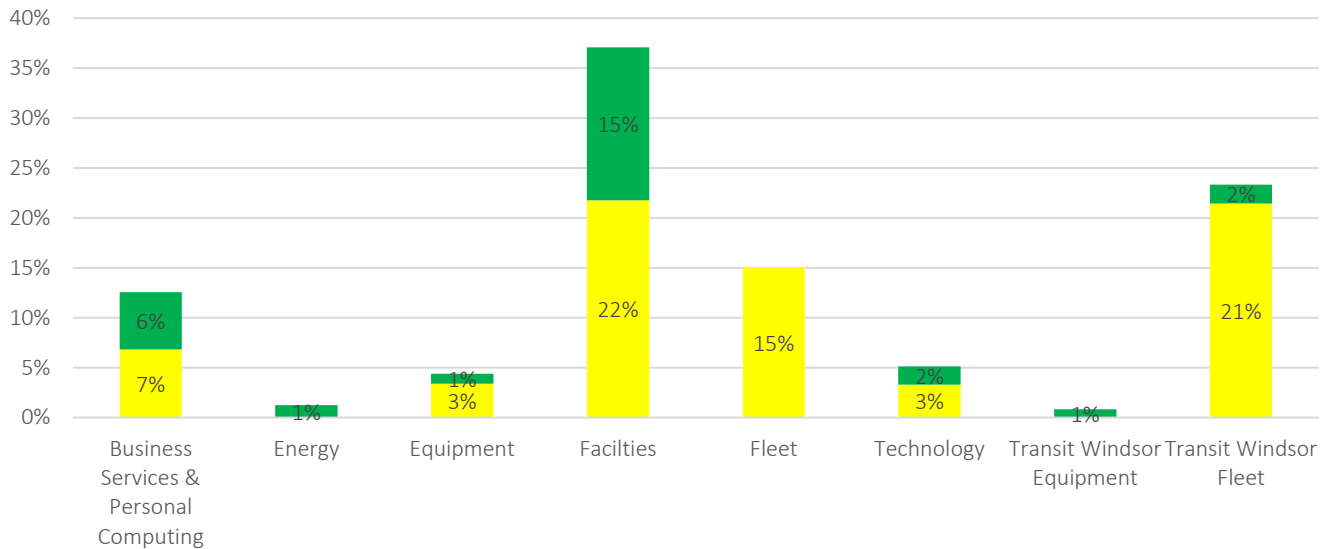
TABLE 6-11— PROJECTED ANNUAL SHORTFALL IN FUNDING FOR SUSTAINING CURRENT SERVICES LEVELS – FACILITIES, FLEET, AND OTHER ASSETS

Facilities, Fleet & Other Assets	Annual Funding Need	Average Annual funding (2019 to 2025)	Shortfall in Funding
Corporate Equipment	\$ 1,705,184	\$ 661,985	\$ 1,043,199
Corporate Facilities	\$ 11,821,549	\$ 4,231,374	\$ 7,590,175
Business Solutions & Personal Computing	\$ 2,000,000	\$ 1,323,813	\$ 676,187
Corporate Fleet			\$ 0
Infrastructure Operations - IT			\$ 0
Transit Windsor			\$ 0
Total Facilities, Fleet and Other			\$ 9,309,561

This category captures the balance of assets reported in this AMP which includes; corporate facilities; TW, Corporate Fleet, IT business solutions and the various equipment utilized throughout the City. There is an average of \$19.4M in annual funding for these assets, of which approximately \$14M is allocated to maintenance of existing assets. For facilities specifically, the average annual funding is \$7.2M of which \$4.2M is for maintenance and \$3M for service enhancements and growth.

FIGURE 6-18— ALLOCATION OF AVERAGE ANNUAL FUNDING FOR FACILITIES, FLEET AND OTHER ASSETS 2019-2025

ALLOCATION OF \$19,440,250 IN AVERAGE ANNUAL FUNDING FOR FACILITY, FLEET AND OTHER ASSETS



Corporate Equipment

This assets category is a mix of equipment used throughout the City many of which have no reserves to fund and often are pool type assets due to the low cost per item, though by volume they can be quite costly. While their overall value is quite minimal there is an on-going struggle to find funding to replace these assets when required. This entire asset class should be reviewed and a program similar to the Fleet replacement and reserve be created. Such a program would help to ensure a reserve is in place for timely replacements, and any new equipment would need to be funded both in capital and have a corresponding operational budget requirement to fund the reserve. Based on the equipment listed in our TCA database, which is not an exhaustive list of the assets which likely fit in this category, there is an average annual shortfall in funding of approximately \$1M.

6.5.4.2 Corporate Facilities

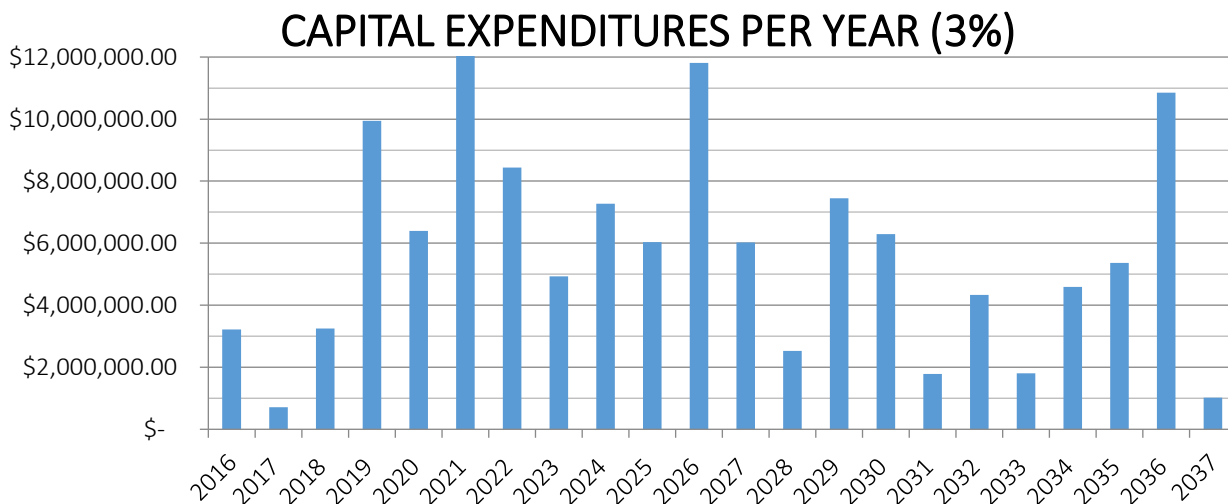
Since the 2013 AMP several investments have been made in facilities, specifically in the construction of new facilities. The average annual expenditure from 2013 to 2018 for facility maintenance was \$3.5M and for growth and service enhancements the average was \$14M. This is not unexpected due to the new fire stations, expansion at WFCU, Art Gallery and Museum, completion of Windsor International Aquatics and Training Center and 350 City Hall Square. These are also some of the reasons the overall facilities portfolio has greatly improved since 2013. The challenge with facilities, particularly those with complex systems, is that annual preventive maintenance and planned rehabilitation is key to sustaining them in proper operating condition.

The funding from 2019 to 2025 moves more towards a 60/40 split for maintenance vs growth and service enhancements, however the \$4.2M in average annual level of maintenance funding is substantially less than what is needed to sustain the assets at current service levels.

In 2015 the City commenced the implementation of the new Facilities Condition Inspection program with the tendering of a contract to inspect the City's most prominent and integral buildings. The initiation of this project was the result of the continued development of the Corporate Asset Management program and in alignment with City Council's desire for a 20- year community vision. The results of this program are to provide the City with a long-term in-depth analysis of the capital and operating needs of the Facilities portfolio over a 20-year period.

As a result of the first two phases of the facility inspection program, a detailed 20-year financial maintenance plan was developed. This analysis provides a long-term maintenance framework for the major building components of the Corporate Facilities portfolio. It must be noted the financial expenditures outlined in the following charts are only for the 71 facilities that were a part of the first two phases of the inspection program. Therefore, the actual 20-year financial requirement for the entire building portfolio will certainly be even higher and any significant deviation from the proposed plan would likely lead to an increase to the Corporate infrastructure deficit. It must also be noted that the financial framework outlined in the following analysis is strictly the requirement to maintain current facilities at an acceptable level of service. The projections, in their entirety, are for maintenance programs and do not take into account any growth or enhancement projects. Lastly, the operating and financial commitment for the operation of older facilities and the building of new facilities will likely be greater than the given projections due to new and more exacting standards and regulations within which modern facilities must operate.

FIGURE 6-19— 20-YEAR FACILITIES EXPENDITURE MODEL WITH 3% INFLATION FACTOR

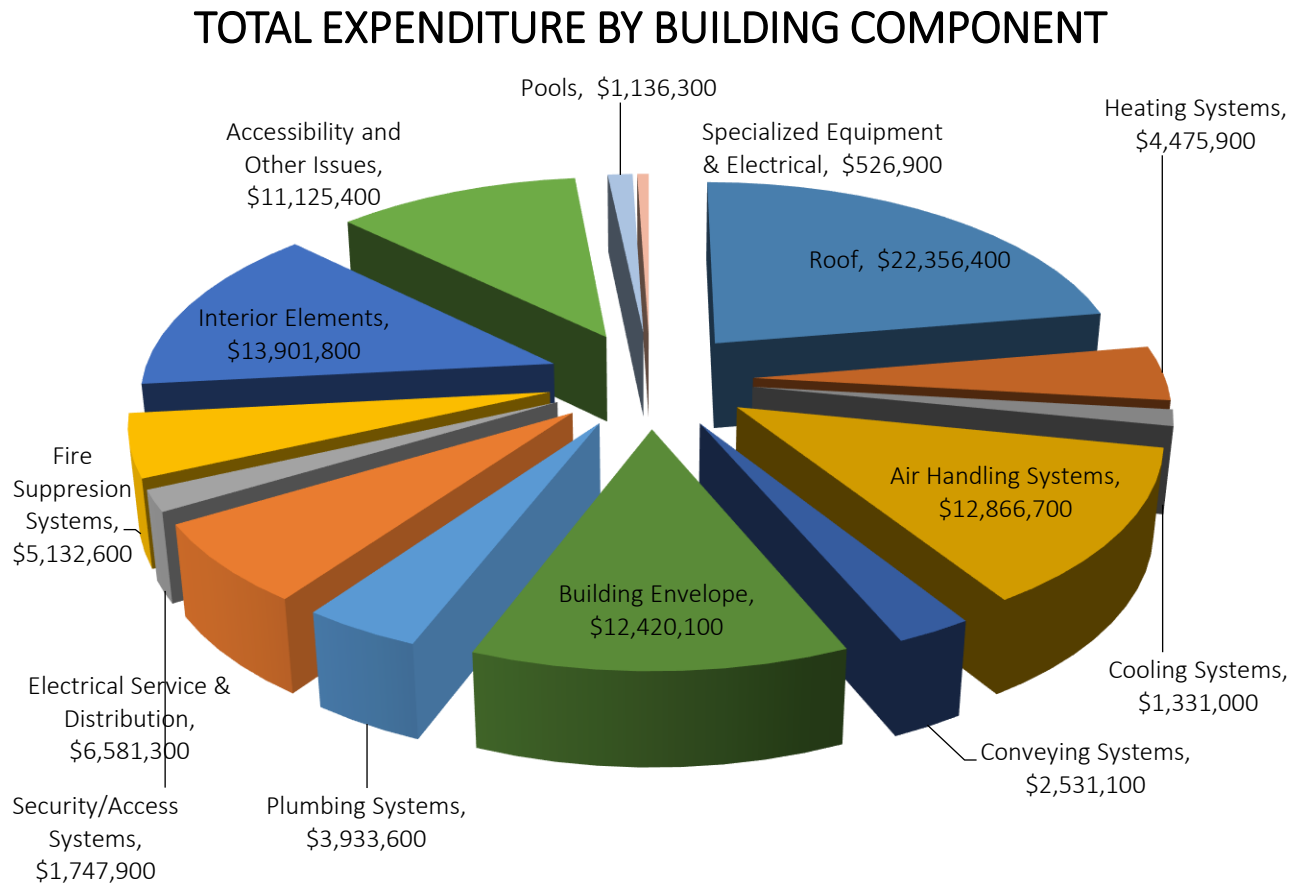


When a 3% annual inflation factor is applied to the original 20-year maintenance projections, the projected total funding requirements actually escalates to a point in excess of \$127 Million. On an annual basis, this equates to an average of approximately \$6.35 Million to simply maintain the 71 facilities that were a part of the first 2 phases of the Condition Inspection Program. This therefore excludes the other 46% (by replacement cost) of the Corporate Facilities portfolio's needs and assumes that the building components and systems will in fact reach the end of their expected life without requiring premature replacement or maintenance intervention.

In order to include the potential costs associated with the remaining facilities an averaging was used and resulted in an average annual need of \$11,821,549 to ensure proper preventative maintenance and rehabilitation activities can be excuted to sustain these assets at current levels of service. This results in an annual shortfall of \$7,590,175 given the current annual average of \$4,231,374.

Capital Maintenance Requirement by Facility Component

Figure 6-20 below, provides a high-level overview of the \$127 Million 20-year funding requirement broken down by the critical facility components and systems. These specific requirements were the result of detailed facility component inspections by a third-party facility consulting engineer. The funding requirements were their professional judgements alone and based on what one should realistically experience in terms of system degradation during the normal operation of the various facilities inspected.

FIGURE 6-20— 20-YEAR CAPITAL MAINTENANCE REQUIREMENT BY BUILDING COMPONENT (\$)

Upon detailed analysis, there were 8 main facility components that comprised the greater majority of the long-term maintenance needs. The roof program, not unexpectedly, requires the most maintenance funding in the coming years followed by building interiors, air-handling systems, building shell/envelope, accessibility & others (includes facility grounds/sitework), electrical service and fire suppression systems.

Once again, these projected requirements assume that specific components will actually perform as expected to the end of their useful life. In some building categories such as roof systems, the City has seen examples of premature degradation and or maintenance and replacement requirements that were more expensive than originally anticipated.

What these figures show in all reality, is the need to develop specific system inspection and maintenance programs as well as funding/reserve models to deal with the intricacies of operating this very integral asset base.

6.5.4.3 Business Solutions

As previously indicated, the reserve for personal computing assets is sufficient to continue to manage these assets. The City is faced with two business solutions, which are critical operations, and require upgrade or replacement. These are the AMANDA Tax system, which the vendor has advised will no longer be supported within 2 years, as well as the PeopleSoft system, which has been in operation since 2003 without significant upgrades. Third party support services were engaged in 2013 to allow the City to continue use of this system without the need to migrate to a newer version. While these 2 systems are of immediate priority there are several other systems, outlined in Section 3, which require upgrades and or replacement to be supported by the vendor and or keep up with technology changes, security requirements and or improved processes. The landscape of technology is always changing and at a rate faster than any other asset. There is continual need to implement solutions to streamline processes and provide data faster and more efficiently for decision

making. Sustaining business solutions for support and advancement is critical to many operations at the City. Current funding levels are not sufficient to support the upgrade and / or replacement of these assets. An additional investment of approximately \$676K annual would help to address these needs as they occur. The funding is also likely better allocated to a reserve which can be used as the needs arise. The tax module situation is a good example of an unexpected change in the vendor's product and or support resulting in a need to fund approximately \$2.9M to replace the system. In the absence of a reserve to fund such a situation, other projects in the capital budget were postponed or funding reduced to accommodate this need. Establishment of a reserve with guidelines on use will help to ensure these solutions are sustained without impact to other areas.

6.5.4.4 Infrastructure Operations – Hardware and Personal Computing

As previously indicated, the reserve for technology infrastructure is sufficient to continue to manage these assets. In addition, assets under management are continuously upgraded where possible to extend their useful life. Situations that will challenge the financial outlook will be obsolescence and new technology advancements. With respect to technological advancement, desired LOS can dictate the City's IT landscape. Cloud services and subscription-based software will need to be considered in the near future as a consequence of increase LOS. While the Cloud services provide for software solutions the real value in their use is the reduction of back end servers and systems to manage the data and applications. This will have an impact on the decision-making process as well as the governance, policies, and business case modeling within IT.

6.5.4.5 Corporate Fleet Services Infrastructure Deficit

Assets included in this category are: corporate fleet, small fire vehicles and fuel sites. The business processes in place to manage these assets continues to prove successful in ensuring the assets are sustained at current LOS. Any new assets requested are funded as growth in the Capital Budget and a corresponding increase to the Fleet Reserve is required at the same time. By these two events being linked, decisions on growth or enhanced services immediately provide Council with information on the total cost of these assets and the funding is built into the base. This is a fundamental reason why this program has been and continues to be successful.

The average annual funding to replace these assets in the 2019 – 2025 timeframe is approximately \$2.9M, funded completely from the reserve. The reserve is monitored on a regular basis and remains viable at current funding levels. It should be noted the City selects vehicles which meet function and certain funding levels. As the market for vehicles transitions, the City may need to revisit our funding model to reflect those changes as well.

Transit Windsor

In 2015 Administration completed a life cycle costing report regarding TW's fleet. The recommendation was to bring the average life of the fleet down to 12 years. In doing so, there was a projected annual savings of \$900,000 to the operational budget. At the time the cost of a bus was \$470,000 and ridership had been at stable levels for several years, and all within Windsor. The program called for an annual replacement of 8 buses over several years to achieve the 12-year average. The introduction of the Public Transit Infrastructure Fund (PTIF) in 2016 created the opportunity to fund the replacement of 3 years worth of buses (24 in total) leveraging the grant funding for 50% of the cost.

At the start of this AMP the results of 2015 were continuing to be considered for recommendations and work was completed to assess the assets based on changes since 2015. By March of 2019 it became apparent there are several changes and activities in place which give pause to using the 2015 updated information. TW has experienced significant shifts in many factors used in the 2015 report, including but not limited to: regional sites including LaSalle and Leamington, increased ridership as a result of students at St. Clair College and the University as well as a per bus cost leap from \$470,000 to \$680,000. TW is also in the midst of completing a Service Delivery review, which is expected to result in recommended changes to routes, use of mixed fleet models, additional regional opportunities and on-demand type service. While the report is still in development, Administration recognizes that it and will likely void and replace the recommendations from 2015. TW's Service Delivery report should be the basis for any annual funding levels requirements for these assets, understanding it will address current needs, growth and service enhancements. The report will also

include clarity on the annual funding levels to sustain those recommendations from an operational and capital standpoint for the life of the assets.

6.6 Strategies for Addressing Funding Shortfalls

6.6.1 Asset Management Strategies

As identified in Table 6-6 the annual funding shortfall to maintain the City's assets identified in the AMP is \$33,759,624. This additional funding is needed to sustain existing assets and current service levels and to adopt the asset management practices and strategies as outlined in Section 5.

There are several examples of asset management activities by asset types in Section 5. These programs can help to maintain assets at current LOS and in fall into one of the following strategies:

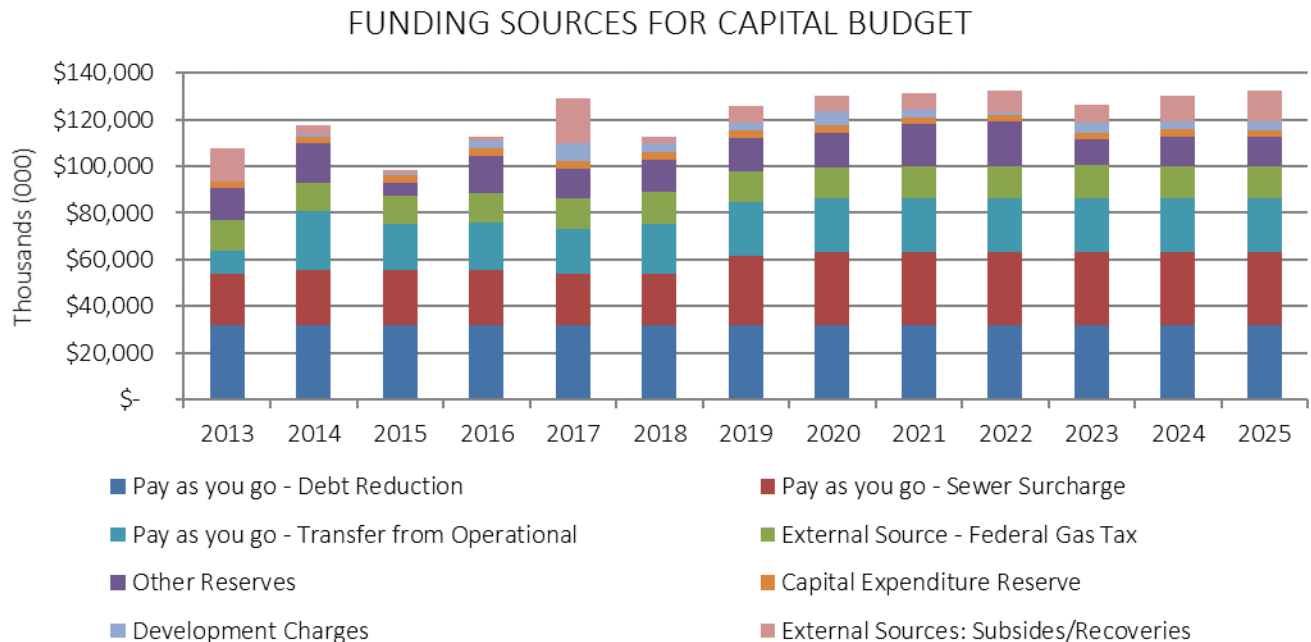
- Prioritization based on risk associated with asset failure and consideration of assets which can run to failure,
- Rationalization of assets where there may currently be two assets in Very Poor condition which could be replaced by one, thereby significantly reducing the total replacement cost,
- Continued activities to obtain better condition and performance data on our assets and to gather this data at a more granular level enabling us to better estimate which elements within the asset are actually in Very Poor condition,
- Introduction of more preventive maintenance approaches which if applied at the correct point in an asset's lifecycle, these approaches can slow down the deterioration process and therefore lessen the deterioration of the assets. Selection of optimum maintenance activities should be made on a lowest whole life cost basis. By adopting a more proactive approach to the management of its assets, the City will realize significant cost savings over the useful life of these assets.

6.6.2 Funding Options

The City of Windsor's current credit rating, as provided by Moody's Investor Services, is an AA credit rating. As noted within the Moody credit rating report, this is a reflection of the city's "prudent debt management *and conservative fiscal planning.*"

Currently the planned funding sources for the Capital Budget are further detailed in Figure 6-21 below. It should be noted that grant funding for Disaster Mitigation and Adaptation Funding (DMAF) of \$32.1M from 2019 to 2028 as well as \$106.1M from 2019 to 2027 from the Investing in Canada Infrastructure Program (ICIP) – Public Transit, and one-time Federal Gas Tax funding of \$13.4M are not included in these numbers. These grants were in process and not confirmed during the 2019 budget deliberations and some are still pending confirmation. Grants do, however, form one of the funding options cited in this section.

FIGURE 6-21—TOTAL CAPITAL BUDGET BY FUNDING SOURCE – 2013-2025



The chart shows a noted increase in Sewer Surcharge funding starting in 2019, and reflective of Council's recent approval of an increase to Sewer Surcharge which resulted in an additional \$9.3M for capital of which over \$6M is allocated for project work. There is also a noted steady increase in PAYG – Transfer from Operational. There was a significant increase of \$10M annually starting in 2014 and over the past several years Administration has recommended a modest increase in the transfer from operating to help offset challenges with inflationary pressures. Lastly, while the Federal Gas Tax amount is a slight reduction in 2019 and 2020 it does increase again in 2021 through 2025, and at levels higher than the 2013 to 2018 period.

Other positive comments on the funding are:

- Sustainable funding for storm water and wastewater, by means of sewer surcharge, has established increased funding levels.
- Administration is currently completing a Storm Water Financing study to determine if implementation of such a funding program would be of benefit.
- External funding has started to trend up for two main reasons. Windsor Airport and Windsor Police are now funding their initiatives through means other than Pay-as-you-go. For the Airport it is their reserves which are being issued as dividends to the City to fund their projects and for Police an increase to their reserve contribution in 2019 resulted in their ability to fund their projects through that reserve, except for a couple of minor projects.
- In 2017 the City formalized a grant division within Asset Planning with a goal of leveraging as much grant funding as possible to offset City costs for projects. As of April 2019, over \$60M in grant funding has been obtained to help fund over 60 projects in the City's capital program. Generally, these grants are awarded post budget approvals and therefore are not as clearly identified in the capital budget unless they span several years, as will be the case for DMAF and ICIP.
- Energy related projects are funded by the savings and or revenues generated by projects, in addition to grant incentives. The savings or revenue is used to pay back the initial capital investment for those projects. To date nearly \$18.7M in energy project costs, excluding the Streetlight conversion to LED, has been funded in this manner avoiding any displacement of capital funding from other projects to implement these projects.

Despite the positive trends from the sound financial strategy decisions made over the last decade by City Council. Windsor, as with all other cities in Ontario and Canada, continues to struggle with infrastructure

deficits. This underlines the need for sustainable, predictable, and ongoing funding as well as continued help from the senior levels of government who have access to a much broader array of revenue streams. While Administration will continue to pursue grant funding opportunities these programs are often one-time funding, very specific on the type of projects and often not predictable. The City has several funding alternatives available to help address the annual funding shortfall, including energy savings and revenue which are new opportunities.

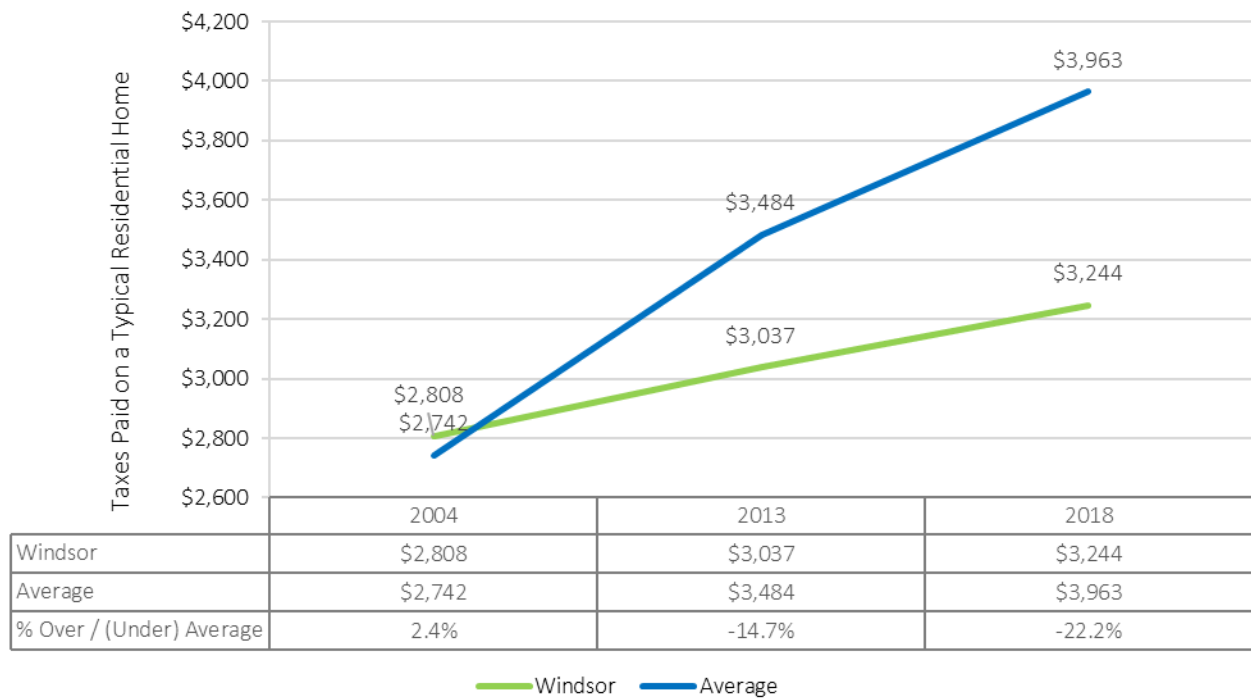
6.6.2.1 Pay-As-You-Go

This amount has increased from a level of \$21M in 2003 to \$44.5M in 2013 and as of 2019 \$58.5M.

As can be seen from Figure 6-22, the City’s prudent stance on taxes over the last several years continues to keep our average property tax amount below the average. This approach has not come at the expense of the City’s contributions to the capital budget. It should be noted that reductions in the Property Tax Levy were not achieved through reductions in transfers to capital. In 2014 there was an increase to capital of \$10M annually and over the past few years modest increases in property taxes, which are at or below inflation, have been approved and have included additional increases in transfers to capital funding resulting in the current average annual PAYG funding of \$58.5M.

FIGURE 6-22—BMA CONSULTING COMPARISON OF PROPERTY TAX RATES OF WINDSOR IN COMPARISON WITH OTHER CITIES

Taxes Paid on a Typical Residential Home – 2004 and 2018 vs. 2013
2018 BMA Study, Municipalities with Population > 100,000



6.6.2.2 User Fees

User fees, such as transit fees, entry fees for recreation centers etc, are another source of revenue which can help the City increase its pay-as-you-go funding of capital projects. This funding source has to be used judiciously as significant increase in user fees can disproportionately affect lower income residents and lead to inequality and social exclusion. User fees also need to take into account the competitiveness with surrounding municipalities. Currently the City has some user fees that fund capital reserves that in turn fund capital maintenance or replacement of assets. While this is a funding source option, it is not recommended in this report. It is recommended that as the various master plans and service delivery review reports are

developed user fees are considered as an opportunity to fund a portion of the on-going maintenance and rehabilitation costs where appropriate.

6.6.2.3 Reserves and Reserve Funds

The City has corporate Reserves and Reserve Funds that are used to fund the City's capital program. Funding for these reserves is obtained from various sources with the three primary sources being:

- Capital reserves
- Development charges reserves
- Other reserves

The annual reserve transfers from the operating budget are based on forecasting the financial requirements to sustain reserve balances at target levels sufficient to address asset replacement costs in the future. This includes taking into account the inherent uncertainties associated with future capital funding requirements. Reserve transfers are evaluated on an annual basis to ensure that funds are allocated to reserves and meet future capital requirements while at the same time minimize the impact on the operating budgets, which are the source of the reserve fund payments.

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

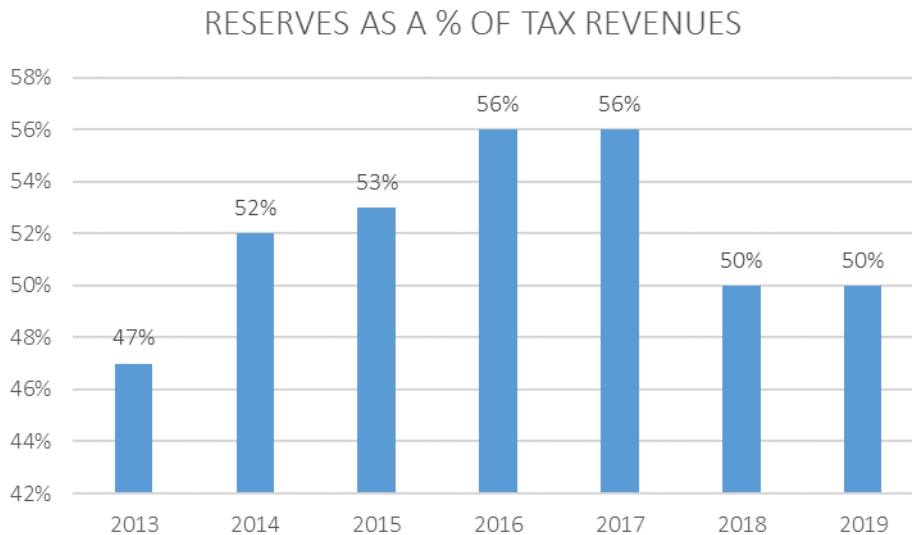
- The ability to stabilize tax rates when dealing with variable and sometimes uncontrollable factors
- Financing one-time or short-term investments
- Accumulating the funding for significant future infrastructure investments
- Managing the use of debt
- Normalizing infrastructure funding requirements

The success of reserves is evident by the assets which do not require additional funding, a result of having sustainable reserves in place. In just 5 years the parks equipment deficit has been turned around to a sustainable model based on the introduction of reserve funding. Many of the assets which require additional funding are recommended to be set up as reserves to ensure that as funding is required it is available without compromising previously identified capital projects and/or pushing out work until point of failure.

The City of Windsor's Reserves balances as a percentage of tax revenues, while still below many of our peers, have grown from 23% to 49% since 2006. The increased use of reserves as a capital funding source is a potential option for partially addressing the Infrastructure Deficit.

Factors that the City should take into account when determining the future capital reserve requirements include:

- Breadth of services provided
- Age and condition of infrastructure
- Use and level of debt
- Economic conditions and outlook
- Internal reserve and debt policies

FIGURE 6-23—BMA STUDY FOR ONTARIO MUNICIPALITIES, RESERVES AS A % OF TAX REVENUES

6.6.2.4 Sewer Surcharge

This funding is dedicated to address all storm and wastewater needs for the City. While the funding cannot directly be used to reconstruct roads, and roads which must be removed and then reconstructed to access the pipes are considered part of the cost of the sewer projects. On average approximately 30% of sewer surcharge funding is allocated for this and as a result has improved the local roads over the past 5 years as more sewer work has been completed. During the 2019 budget deliberations, Council approved an increase to the sewer surcharge funding which has resulted in an annual increase of approximately \$9.6M to the capital budget. The allocation of this funding is to address basement flooding subsidy program, inflationary adjustments as well as \$6M annually for the implementation of recommendations in the pending Sewer Master Plan.

6.6.2.5 Energy Savings and Revenue

The Asset Planning Division includes an Energy Management team. Starting in 2014 the work accomplished by this team migrated from just utility consumption and invoice monitoring to leveraging the information for opportunities to reduce consumption and or generate revenue from projects. As reported in the 2019 Corporate Energy Management Plan presented to Council June 17, 2019, as of 2018 approximately \$5.52M in savings and or revenue has been generated because of these projects. As previously noted, these projects are funded through the annual savings and or revenue to avoid displacement of other projects to accommodate them. Approximately \$750,000 in savings and revenues, once the project is fully funded, are already approved to redirect funding to reserves for facilities, parking, pollution control and energy. There is an opportunity to leverage additional savings and revenue of \$1,258,000 expected to be available over the 2020 to 2025 timeframe as projects become fully funded, to offset some of the annual average shortfall in funding. Additional savings of approximately \$1M related to Sewer Surcharge utility costs for the plants and pumps is also recommended to be redirected to fund the shortfall in this reserve. These particular savings are related to reductions in energy costs for specific Classes and therefore subject change which is outside the City's control. There is an opportunity to redirect the savings annual to the Pollution Control reserve until such time as a change takes place and the funding needs to be redirected back to the utility costs for these assets.

6.6.2.6 External Sources

Debt Funding

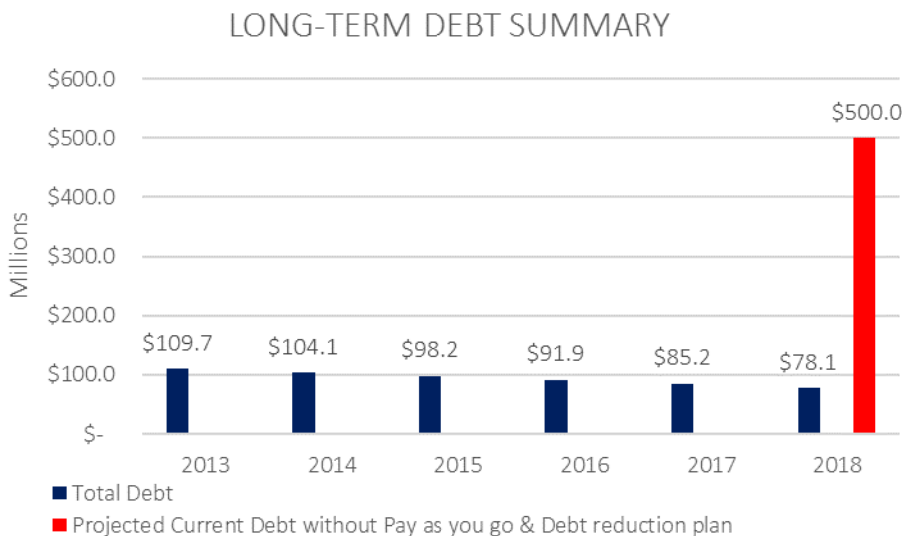
The Province sets a debt-capacity guideline for municipalities which is currently 25% of the individual municipality's revenues. The City operates a prudent debt reduction strategy where the aim is to reduce debt and re-invest the debt charges for the purpose of increased pay-as-you-go funding of capital projects. Windsor's Debt to Reserves Ratio is currently at approximately the median. As debt continues to decrease, it

will free up more funds to invest in the City's infrastructure. The City's preferred methodology is to continue to reduce debt and re-invest the debt charges into additional capital projects funding. Nonetheless, all potential funding sources will be considered where appropriate.

The City of Windsor's debt profile has improved significantly since the implementation of its debt reduction strategy, as shown in the Figure 6-23 above.

Since 2002, the issuance of debentures has no longer been a preferred option for the City. The City has chosen to fund nearly all of its major capital works via pay-as-you-go funding, reserves, grants and subsidies. The only significant exception was approximately \$40 million of debt issued to help fund the \$110 million upgrade and expansion of the Lou Romano Water Reclamation Plant. This debt management strategy has allowed the City to manage and significantly reduce its debt levels. Evidence of the success of this strategy can be seen in Figure 6-24, showing the current projected debt at \$500M had we continued issuing debt.

FIGURE 6-24—LONG-TERM DEBT SUMMARY (000,000)



This strategy has allowed the City to re-invest interest savings in the pay-as-you-go funding of capital projects. This funding source has increased from \$21 million in 2003 to \$58.5 million currently.

Grants and Subsidies

Grants from the Provincial or Federal government are also used to finance capital with such ongoing funding agreements as Gas Tax revenue. However, many grants are a result of stimulus or other one-time funding that may be more difficult to forecast. Generally grants are included in the budget forecast when confirmed.

Grants and subsidies have proven to be invaluable with regard to infrastructure sustainability and growth for the City, and Windsor's past innovative approaches in combining this funding source with other funding sources has been particularly successful.

The City will continue to pursue grants and subsidies where possible, however this is not a source of funding that can be easily forecast and therefore cannot be relied upon when assessing options for addressing the Infrastructure Deficit. There are two grants which Administration has included in this report as they are predictable and over several years, DMAF with \$32.1M in funding from 2019 to 2028 and ICIP – Public Transit with \$106.1M.

As previously noted, municipalities will require ongoing, predictable and sustainable funding help from senior levels of government if they are to successfully deal with the infrastructure deficits that are currently prevalent.

Development Charges

Development Charges (DCs) are collected by the City from developers under the City's DC Bylaw. DC's are used to finance the development (growth) share of the capital program and are stored in designated DC reserve funds until they can be used to pay for growth-related infrastructure as prescribed in the City's DC Bylaw. Projections relating to DC revenues are based on DC rates and the projected growth in residential and non-residential units.

The City of Windsor has an existing supply of serviced lands available for future residential, commercial and industrial uses which are expected to meet the projected need over the next 5 years. Additionally, though the economy has started to improve and is becoming more diversified, significant population and job growth is not projected for the City over the AMP period. Therefore, DC's are not considered to be a significant source of funding that could be relied upon to meaningfully address the infrastructure gap.

There is also recent changes to the DC program being introduced in Bill 108 which are expected to have a significant impact on how and when DC's are collected. DC's are also related to the sustainability of growth, rather than existing assets. As this AMP is focused on funding required to sustain our assets at current service levels DC's are not a funding source which can be leveraged.

Public Private Partnerships (P3)

Public Private Partnerships are a capital project delivery method whereby a public entity, such as the City, partners with a private entity for the purpose of delivering public infrastructure. Typically this involves the use of a design build team, a maintenance firm and a lending firm. The private entity will then design, build, finance, maintain and/or operate the facility for a set number of years, agreeing to meet specified performance criteria set forth by the City, in exchange for lease payments or some other compensation. At the end of the specified period the asset or facility would then be returned to the City.

This source of funding will continue to be considered for appropriate projects as Council looks to address its infrastructure funding requirements.

Public / Public Partnerships

These types of partnerships are capital projects delivery methods whereby two or more public entities co-operate for the purpose of delivering public infrastructure. The City has successfully engaged in this practice in the past on a number of projects. Examples would be with the Town of LaSalle for the expansion of the Lou Romano Water Reclamation Plant and introduction of a LaSalle bus service through TW, as well as the recent introduction of transit service to Leamington.

The City will continue to explore avenues for these types of partnerships that provide significant benefits and cost savings to all partners.

6.6.3 Recommended Funding to Address Annual Shortfall

This report and the recommendations are predicated upon several fundamental factors:

- The average annual funding from 2019 to 2025 categorized as maintenance for the various assets will remain as currently defined,
- The additional annual funding levels required, if approved, will be added to the average annual funding amount for maintaining existing assets to ensure current LOS are sustained,
- Reallocation of annual maintenance funding will solely be to address the various asset needs and will not include costs for growth or service enhancements to these assets,
- Growth or service enhancements for assets will be funded from the average annual funding identified as growth,
- The selection of projects will be based on the various prioritization, risk and asset management strategies outlined in the AMP such as the ones for facilities and pollution control as well as the guidelines outlined for the road network.

Should any of these factors change, it is not likely the increased funding will help sustain the assets in current service levels.

The City invested an average of \$73.6M annually for maintenance projects from 2013 to 2018 and \$37.4M on growth, service enhancements, economic development and ABC's. When looking at the 2019 to 2025 timeframe these averages are \$77.6M and \$45.4M respectively. Despite these investments the City's assets continue to deteriorate and often require reports to Council outside of the budget process to redirect funding from projects to address immediate needs resulting from assets failures. Extensive data, condition assessments and modeling were completed to provide the best information available at this time to determine an annual funding level to mitigate these situations. While this may not completely resolve 100% of the situations, it should provide for a significant improvement in reducing such instances and to ensure assets are maintained at lower levels of cost while maximizing their life expectancy. A planned incremental increase to the recommended funding levels will help to build out the capital program appropriately to maximize annual funding, provide opportunity for industry to also react to the increase investment opportunities, provide predictable and stable funding, thereby also helping to minimize price increases generally associated with one-time significant funding peaks and allow time for the Sewer Master Plan and Sandwich South Growth Study to be completed and the impacts of them considered in the capital programs and funding allocations.

As previously stated, the annual average funding shortfall is \$34M. In terms of a dedicated tax levy it would mean a 2.03% tax increase every year for 4 years. This is a substantial amount and is largely a result of annual funding shortfall for 2 major assets which make up 76% of the increase, roads (\$18M) and facilities (\$7.59M).

While the shortfall is based on the 2019 7-year capital budget projections, Administration has also considered what additional funding investment recently made which reduce this amount. Table 6-12 outlines several funding sources already approved which reduce the shortfall. There are several energy projects which will be fully funded over the next several years. Not all of those savings or revenues have recommendations on how they should be used once the capital projects are fully funded. Administration is recommending that such savings be redirected to the Pollution Control and Corporate Facilities Maintenance Reserves to further reduce the average annual shortfall in funding and provide for strong reserves needed to manage these assets over the long term.

TABLE 6-12— FUNDING SOURCES TO REDUCE AVERAGE ANNUAL SHORTFALL

Funding Sources Options	Annual Amount	Allocation
Approved Investments to Reduce Annual Shortfall		
Transfer of PAYG savings and revenue from Energy initiatives (already approved)	\$ 314,000	Transfer to Corporate Facilities Maintenance Reserve
30% of sewer surcharge increase of \$6M for work, which is generally attributable to roads	\$ 1,800,000	Allocated based on projects in capital budget
Average annual allocation of DMAF funding for road work	\$ 1,400,000	Allocated to the DMAF road projects
Total Investments	\$ 3,514,000	
Recommended Additional Investments to Reduce Annual Shortfall		
Transfer of Sewer Surcharge Savings from Energy initiatives	\$ 569,000	Transfer to Pollution Control Reserve
Additional transfer of PAYG savings and revenue from Energy initiatives anticipated to be released over next 5 years	\$ 1,086,000	Transfer to Corporate Facilities Maintenance Reserve
Total Funding Options to Reduce Annual Shortfall	\$ 5,169,000	

Should these suggestions be adopted the funding shortfall would be reduced to approximately \$28.8M. Over a 4-year timeframe it would add approximately \$7,100,000 (or a 1.71% increase) annually to the property tax levy for a 4-year cumulative total of \$28,400,000 in funding towards the maintenance of existing assets. Conversely, if funded over 6 years it would add approximately \$4,800,000 (or a 1.16% increase) annually for

a cumulative total of \$28,800,000. These amounts would be added to the current base investment which is an average of \$77.6M, gradually increasing the annual investment amount to the projected required annual amount of \$111.5M. The property tax rate % increases noted are based on the current total property tax levy of \$414.4 million; the % rate increase would be expected to decline in future years as the total tax levy experiences inflationary increases.

6.7 Estimated Service Enhancement, Growth, Economic Development and ABC's

While this report is focused on the funding levels required to sustain our existing assets, it is fully recognized that a municipality must continue to invest in new assets, enhance existing assets, fund ABC's and/or invest in economic development type projects. Based on the 2019 7-year capital budget the average annual funding allocated to projects of this nature is \$45.37M.

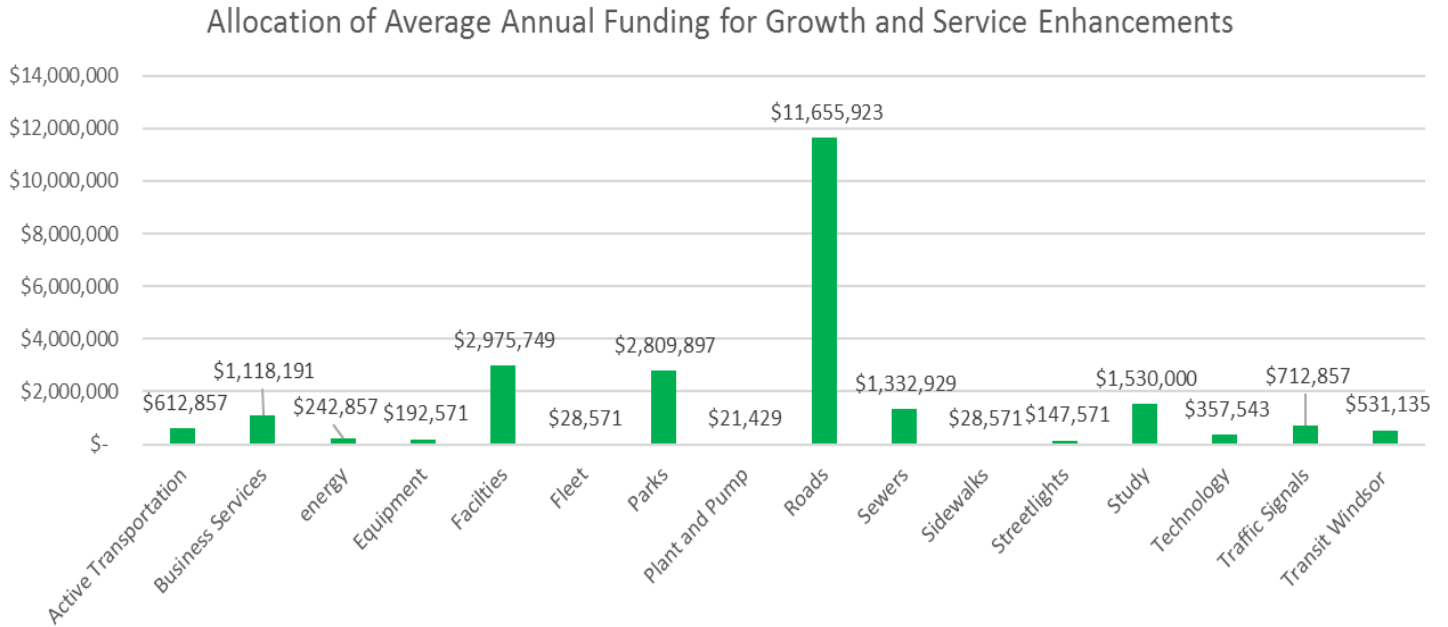
Table 6-13 below reflects the portion of the \$45.37M used for the average annual funding of \$24.3M for growth and service enhancement type projects. The City's Pay-as-you-go funding makes up most of the funding for these projects. These investments are allocated across the various assets as can be seen in Figure 6-25 below.

The most significant investment in growth continues to be the road network, where major expansions and enhanced features for projects such as Cabana, Walker Road, Riverside Vista, Banwell and other similar projects are partially funded. This average annual amount has increased substantially as the previous average from 2013 to 2018 was \$4.2M and is now reported at \$11.7M. This is the reason why more of them can be funded. Many of these projects are defined as a mix of growth and maintenance as the roads previously existed and required work. As noted above, approximately \$7.5M of the annual \$18.9M for road maintenance was allocated to fund the maintenance portion of these projects resulting in total average annual funding of \$19.15M for these types of projects.

TABLE 6-13— ALLOCATION OF FUNDING BY TYPE FOR GROWTH AND SERVICE ENHANCEMENT PROJECTS

Funding Source - Growth	2019	2020	2021	2022	2023	2024	2025
Dedicated Reserve		\$ 525,000	\$ 487,500				
Development Charges	\$ 3,025,325	\$ 5,570,000	\$ 2,795,000	\$ 1,020,000	\$ 4,020,000	\$ 3,245,250	\$ 3,445,000
Federal Gas Tax	\$ 415,000	\$ 687,750	\$ 1,408,500	\$ 1,250,000	\$ 500,000	\$ 2,734,000	\$ 1,734,000
Grants							
Pay as you go	\$ 20,171,671	\$ 15,392,070	\$ 22,721,425	\$ 14,984,584	\$ 13,274,389	\$ 15,400,523	\$ 17,862,644
Sewer Surcharge	\$ 2,150,000	\$ 2,700,287	\$ 4,689,226	\$ 1,747,345	\$ 401,095	\$ 2,714,367	\$ 1,326,466
Third Party Recovery	\$ 150,000	\$ 350,000	\$ 280,720	\$ 200,000	\$ 50,000	\$ 405,720	\$ 255,720
	\$ 25,911,996	\$ 25,225,107	\$ 32,382,371	\$ 19,201,929	\$ 18,245,484	\$ 24,499,860	\$ 24,623,830

FIGURE 6-25— ALLOCATION OF AVERAGE ANNUAL FUNDING FOR GROWTH AND SERVICES ENHANCEMENTS (2019-2025)



Growth and service enhancement projects are necessary and should continue to be funded. Should the average annual allocation of \$11.6M be deemed for road growth and enhancements this will help to address the projects sited in this category. A caution on all growth and service enhancements is that as the City provides for these new assets and enhanced services and features, they require on-going maintenance and rehabilitation. Shortfalls in annual funding provided in this report does not consider the impact growth will have. It is recommended that growth and service enhancement projects provide Council with Whole Life Cycle costing information so that as Council considers these investments they can do so with a full understanding of the cost, and ideally consider any increases to operational or capital funding to support their implementations are also approved in conjunction with the capital project costs.

Table 6-14 below shows the portion of the \$45.37M allocated as the average annual investment of \$21.07M for Economic Development and ABC investments in the 2019 7-year capital budget. As previously noted the use of dividends from Windsor Airport for their capital projects, noted as Third Party recoveries, as well as Windsor Police using their dedicated reserve for most of their projects assists in reducing the use of City funding, which is mainly Pay-as-you-go, for such initiatives. Most investments for Economic Development type activities are primarily funded via Pay-as-you-go, as these funds are available without restrictions on these types of projects, unlike the majority of our other funding sources.

TABLE 6-14— ALLOCATION OF FUNDING BY TYPE FOR ECONOMIC DEVELOPMENT AND ABC PROJECTS

Funding Source - ABC	2019	2020	2021	2022	2023	2024	2025
Dedicated Reserve	\$ 3,373,000	\$ 3,178,000	\$ 7,448,000	\$ 7,503,000	\$ 2,793,000	\$ 3,613,000	\$ 3,268,000
Development Charges	\$ 175,000	\$ 150,000	\$ 150,000	\$ 125,000	\$ 125,000	\$ 150,000	\$ 150,000
Federal Gas Tax							
Grants							
Pay as you go	\$ 10,665,616	\$ 4,109,384	\$ 1,121,838	\$ 5,062,680	\$ 1,383,752	\$ 46,000	\$ 46,000
Sewer Surcharge			\$ 220,000	\$ 150,000	\$ 95,000		
Third Party Recovery	\$ 4,811,000	\$ 2,900,000	\$ 2,663,136	\$ 2,629,333	\$ 280,000	\$ 710,000	\$ 500,000
	\$ 19,024,616	\$ 10,337,384	\$ 11,602,974	\$ 15,470,013	\$ 4,676,752	\$ 4,519,000	\$ 3,964,000
Funding Source - Ec Dev	2019	2020	2021	2022	2023	2024	2025
Dedicated Reserve				\$ 550,000			
Development Charges	\$ 40,000	\$ 40,000					
Federal Gas Tax							
Grants							
Pay as you go	\$ 4,600,000	\$ 14,173,616	\$ 6,166,000	\$ 6,810,000	\$ 16,206,540	\$ 12,527,540	\$ 16,820,304
Sewer Surcharge							
Third Party Recovery							
	\$ 4,640,000	\$ 14,213,616	\$ 6,166,000	\$ 7,360,000	\$ 16,206,540	\$ 12,527,540	\$ 16,820,304

This approach to the increase will allow for the capital programs to be developed over several years. It will also not compromise funding allocated for growth, service enhancement, ABC's and economic development type projects. As previously stated, a City must be able to fund projects and initiatives which continue to grow the City and provide additional services and opportunity for economic development. A targeted approach to separating the Capital budget into Maintenance funding projects from these initiatives will structure the budget for a continued annually allocated of approximately \$45.37M. Table 6-15 below outlines the average annual funding source amounts. While the reserves, sewer surcharge and development charges are dependent upon the type of projects, therefore subject to higher or lower on average, the Pay-as-you-go and Federal Gas Tax allocations can be defined as expected contributions towards these types of projects. Although Federal Gas Tax does have some restrictions recent amendments to the list of viable projects has created the opportunity for use on several other projects allowing this flexibility in dedicating a portion of the annual amount to growth and or service enhancement type projects for City assets.

TABLE 6-15— FUNDING SOURCES FOR AVERAGE ANNUAL GROWTH, SERVICE ENHANCEMENTS, ABC'S AND ECONOMIC DEVELOPMENT

Funding Source	Annual Average	Percentage
Dedicated Reserve	\$ 4,676,929	10%
Development Charges	\$ 3,460,796	8%
Federal Gas Tax	\$ 1,247,036	3%
Grants	\$ -	0%
Pay as you go	\$ 31,363,797	69%
Sewer Surcharge	\$ 2,313,398	5%
Third Party Recovery	\$ 2,312,233	5%
	\$ 45,374,188	100%

6.8 Summary

While this AMP sets out funding levels to sustain our assets at current LOS it will provide a visible improvement to how our assets are managed as these investments proceed. The increase in road maintenance funding to an annual average of \$37M will help fund the average annual requirement of \$13M toward major growth and maintenance type road projects such as Riverside Vista, Provincial, North Talbot and several others. It will do so without reducing the investment in other roads across the City which will see a noted increase in funding annually to complete work on several large arterial, collector and EC Row sections of road in need for repair and rehabilitation. It will also fund preventative maintenance programs such as crack seal and panel repairs to slow the deterioration of our roads. Playgrounds will be scheduled and planned for replacement such that when they come to end of life they are removed and replaced rather than leaving the space vacant awaiting funding. There will be less impact to other projects in the capital budget having to be pushed out or cancelled due to resolve to immediate asset failure priorities. This will also help to stabilize the investment amounts in growth, service enhancements and economic development type projects to avoid situations such as the marina's failed docks where funding from enhancements to the Central Riverfront needed to be redirected for this immediate need.

Often investments in current assets tend to be challenging, as they generally do not create something new to offer which can be celebrated and recognized. The lack of investment however, can and has, created the exact opposite, negative attention. Playgrounds are removed and there is no funding to replace them, marina's are closed, more roads continue to make the top list of bad roads reported by CAA, bridges are closed or collapsed, volumes of untreated sanitary water returning to the river and lakes increases, sections of a Riverwalk are closed due to issues with shorewall stability, pools are closed because dehumidification systems failed, tree trimming requests are continually on the top of the 311 call list.

The extent of the negativity is usually dependant on the issue and how many people are affected. As more assets provide lower and lower LOS it challenges investments in other opportunities when people are frustrated with the level of service they see declining for assets they already use. It also costs more to replace assets. Some asset failures may be a significant or critical risk to the City, whereas some may result in extended periods of time with the assets out of service and our community questions why this is happening. Windsor is no different than any other municipality, we are all faced with these challenges. Ironically if proper funding is in place there is limited recognition because these assets would be expected to continue to provide services the community has come to expect; it is only when they fail that they receive attention, and it is never positive.

6.9 Data Gaps and Recommendations

Extensive work has been done to continue to break down the Capital Budget into more detail for clarity on the type of investments, funding allocations and assets being invested in. There is a high degree of confidence on the data provided for this report. This has resulted in the favourable data confidence changes noted below in figure 6-26 and 6-27.

Administration does see further opportunity in this area for the next AMP. Implementation of solutions to build the capital budget at the asset level will help capture the various assets investments for larger projects. This will also provide benefit to the annual financial statement process to capture and report on changes to the Tangible Capital Asset Data.

FIGURE 6-26—CURRENT FINANCIAL DATA CONFIDENCE RATING FROM 2013-2018

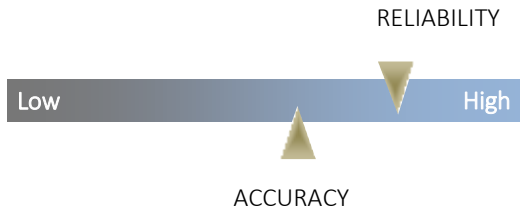
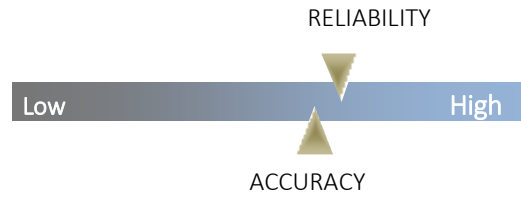


FIGURE 6-27—CURRENT CONFIDENCE RATING FROM 2019-2025

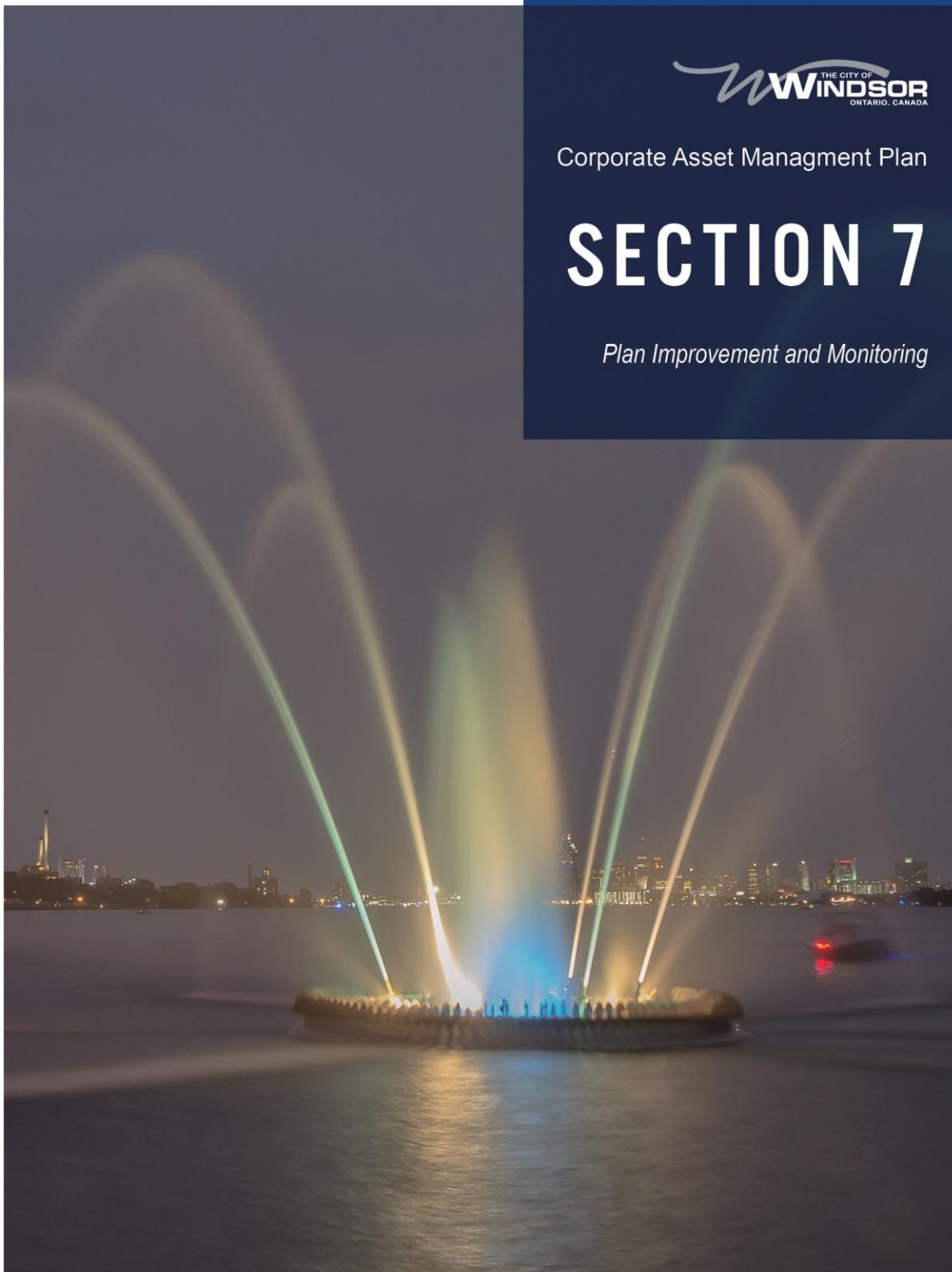




Corporate Asset Management Plan

SECTION 7

Plan Improvement and Monitoring



AMP Improvement and Monitoring

This section outlines the improvement and monitoring program to enhance future revisions of this plan and the associated asset management strategies and financial projections.

7.1 Improvement Plan

This asset management improvement plan was generated from a combination of the following:

- Review of actions taken since the development of the last Asset Management Plan in 2013
- Areas for improvement identified during the development of this Asset Management Plan (2018)
- Review of Ontario Regulation 588/17

The status update of the 2013 infrastructure and asset management improvement plan tasks are shown in Table 7-1. Future direction and resource commitment to be directed by Asset Planning Steering Committee.

TABLE 7-1—2013 IMPROVEMENT PLAN: STATUS UPDATE

Task No.	Task	Status	Additional Comments
1	Update and revise the AMP to reflect changes in the asset portfolio and business practices	Completed	2018 AMP
2	Develop Corporate Level of Service practices— corporate template, procedure and process	Completed	Completed: 2014
3	Level of Service development for— roadways and parks	Completed for roadways	Project initiative currently being managed by Asset Planning to develop LOS for Parks
4	Develop Corporate Life Cycle Costing practice—template, procedures and policy	Completed	<ul style="list-style-type: none"> – City Council approval obtained in Feb 2019 – Roll out plan being implemented
5	Develop a Business Process Master Plan for each Service Area.	Ongoing	Began with the development and implementation of the AM Policy and Framework which has led to asset specific projects of process improvement and/or creation. (example: Parks asset planning process initiative)
6	Develop Asset Management Plans for each Service Area	Completed	<ul style="list-style-type: none"> – Section 3-5 developed for Transportation and Facilities which are appendices in this report. Changes to approved capital budget 2019 impacted section 6 for these documents such that they were no longer reflective of the data used when developed. 2018 work plan to revisit value for full AMPs for specific assets or solely sections 3 through 5 as appendices to AMP
7	Develop a Business Case Evaluation Framework	Completed	<ul style="list-style-type: none"> – City Council approval obtained in Feb 2019 – Implementation being rolled out
8	Develop a more robust approach to investment prioritization within and across Service Areas	Completed	Business Case Evaluation, Whole Life-Cycle Costing, and Triple Bottom Line Plus framework adopted by City Council (CR35/2019 with respect to C11/2019)
9	Asset Data: Develop a Corporate data improvement plan, including establishing evaluation policies and schedules for all asset groups, for the collection of 100% objective or engineering based data	Ongoing	Completed for: <ul style="list-style-type: none"> – sewers through zoom camera inspection technology – 71 facilities – Pollution Control – Shorewall – Some outfalls and Trunk sewers

	Review CCTV program and identify areas of opportunity to expand objective data for high risk and challenging sewers to review providing better information for planning and funding needs, i.e. trunk and forced mains.	In Progress	<ul style="list-style-type: none"> Zoom camera inspection technology project has created a process for obtaining condition rating and a sustainable zoom inspection program Revised CCTV and maintenance programs are currently under review
	Develop a comprehensive plan for the management of parks asset data including but not limited to condition ratings and replacement cost data for all Parks Services assets	In Progress	<ul style="list-style-type: none"> 12 targeted Parks assets identified along with corresponding attributes
	Develop and implement a comprehensive plan to break down facility data in TCA to major components, with condition and replacement cost at those levels and tying back to Facility 360.	Cancelled	Project deemed not value-added. Cancelled with Council approval in 2015
	Develop and implement a comprehensive plan to disaggregate sidewalk assets in TCA to align with Hansen data.	Completed	
	Support Antero upgrade to ensure future alignment with AMP development at operational and corporate level	Completed	
	Develop strategy and approach to address various assets out of scope for first version of AMP	Completed	Progressive adaptation as new regulatory requirements are rolled out. Met 2021 O. Reg 588/17 requirements in 2018 AMP. Remainder of regulation part of next work plan in Table 7.3
	Update Hansen with new subjective ratings	Completed	Many subjective ratings have been replaced with objective ratings through the Zoom camera inspection program
10	Utilize City Wide Capital Budgeting and Planning tools to link capital budget requests and approvals to associated assets	Assigned to 2018 work plan	
11	Develop Project Delivery & Project Management Guidelines	Reassigned	CAO office took lead and implemented a corporate wide process and guidelines
12	Establish a suite of Asset Management procedures and guidelines that will guide and standardize the practice of asset management across the City	Completed	<ul style="list-style-type: none"> Asset Management Policy and Framework completed LOS????
13	Development of a Risk Assessment Tool.	Completed	

7.2 AMP Review and Monitoring

7.2.1 AMP Review

Once adopted, this AMP will become the City of Windsor's plan for the effective and efficient management of its assets. It has been developed to, as a minimum, meet the 2019-2021 Ontario Regulation 588/17 requirements for core assets. This AMP will remain current until replaced in 2023.

This Asset Management Plan is a living document which is relevant and integral to the daily Asset Management activities at the City. To ensure the AMP remains useful and relevant, the following improvement and monitoring activities are to be undertaken:

- Formal adoption of the AMP by Council
- Review and formal adoption of LOS (next phase of the Asset Management work plan), as per O.Reg 588/17 2023 and potentially 2024 requirements.

- The AMP, as a whole, is expected to be updated and communicated to Council every 5 years.
- Quality assurance audits of asset management information to ensure the integrity and cost effectiveness of data collected.

7.2.2 Lessons Learned

Documentation of challenges and reflection points will be performed on an on-going basis throughout the planning and implementation of the Asset Management Plan process. Information captured will be reviewed and used as part of our commitment to expanding our knowledge and learning from our experiences to improve our overall asset management strategy. Priority has been defined as follows: High = involves regulatory requirements, no sufficient work around can accommodate, Medium = there may be a regulatory requirement however a work around is applicable, Low = not regulatory requirement, does not affect day-to-day operations, viewed as an improvement or enhancement, where no priority exists the statement reflects positive changes noted and no action required

The following represents lessons learned during the development of the 2018 AMP

TABLE 7-2—LESSONS LEARNED AND RECOMMENDED ACTIONS

	Lessons Learned	Priority*	Category	Recommended Action
1	Not all City owned assets are reflected in the TCA database. Predefined dollar thresholds and asset owner criteria (assets owned by ABCs such as artifacts) prevent the TCA database from being all encompassing.	Medium	TCA	Determination if this is a significant issue for the regulation is to be considered with the project that will determine how the requirements for 2023/2024 will be met.
2	Some assets with subjective ratings would benefit from developing objective rating processes.	Low	Condition Assessment Program	AMP has defined the approach used for subjective ratings. There is a significantly smaller volume of these types of ratings in this AMP when compared to 2013. Work plan in Table 7.3 includes revisiting which subjectively rated assets should migrate to an objective rating process.
3	Discrepancies have been identified when comparing TCA asset inventory with actual inventory. Generally, these are related to timing differences between TCA and sub-systems. They can also be related to linear assets separated into smaller segments and/or lack of communication on changes to assets.	Low	TCA	Work plan in Table 7.3 includes a project to mitigate these risks. The AMP ensured final asset values reflected actual information by resolving these matters for this report.
4	Cultural shift with engagement of Asset Planning has been recognized and proving beneficial in rolling out Asset Management procedures.		Asset Planning	Continued engagement and governance
5	Parks will benefit from the implementation of a process and system for management data collection, work orders, and inspection processes to improve data confidence.	Medium	Data Management	This project is in progress as indicated in the Table 7.3
6	Documenting the process involved in updating the Asset Management Plan requires further development as preparation is made to accommodate future legislative requirements and possible use of consultative services	Medium	Process and Procedure	Process and procedural documentation to be created by Asset Planning as indicated in Table 7.3

7	Continued role out of Levels of Service (LOS) and Risk Assessment for remaining assets.	Medium	Asset Management Tools	Included in Table 7.3
8	Corporate leadership across the organization continues to empower and engage staff in the various asset management process and improvement activities		Change Management	Continue to foster engagement from upper levels of management through steering committees and periodic updates as a means of articulating the City's advancement in adopting the asset management philosophy
9	Capital budgeting and planning would benefit from being developed at the individual asset level to improve clarity on funding for asset types as well as the management of TCA data.	Medium	Capital Budget and Planning	Implementation of capital planning software is needed and included in Table 7.3
10	In some cases, replacement costs contained in the TCA database have not been updated to reflect current costs.	Low	TCA	This represents a small subset of assets. The larger assets, such as roads and sewers are annually tested and remain immaterially different. Those assets with significant changes will be updated in TCA to reflect more current replacement cost values
11	Knowledge transfer from existing/retiring employees is critical as new employees are faced with steep learning curves when knowledge is inaccessible or limited.	Low	Knowledge Transfer	Programs such as succession planning and talent management are opportunities for the departments to leverage as they see fit.
12	While there has been a significant shift in awareness and understanding of asset management, it would be of benefit to consider development of an internal corporate asset management orientation.	Low	Change Management	While AM is included in financial training, and training for the specific processes are developed the division will review if specific orientation information on the program on the whole is of value
13	The Asset Coordinator has played an active role as a subject matter expert in championing efforts to align data sources and implementing asset management philosophies, framework and tools.		Change Management	Continue to collaborate with departments
14	A single Corporate Asset Management Plan can provide a tactical plan for managing the service level of assets and the impact on infrastructure. The council report will serve as an executive summary of the AMP for city council	Low	Asset Planning	Asset Coordinators will consolidate all information, data and analysis into one all encompassing AMP and provide guidance to any consultative efforts for messaging, tone and structure. Consideration of the need to create section 3-5 in more detailed fashion as appendices, as was done for Transportation and Facilities in this AMP will be reviewed for value
15	Internal vetting by asset stakeholders of third-party condition assessment for validity proved beneficial.	Low	Condition Assessment Program	This process should continue for future third-party condition assessments

7.2.3 AMP Monitoring

The following work plan has been developed as a proactive measure to move forward efforts in meeting regulatory requirements, application of asset management policies and framework, and process and procedural improvements. With an understanding of operational and monetary resource constraints, items that require regulatory compliance will take precedence. Not all projects in this list may be completed by 2023 and some may be cancelled if upon further detailed assessment do not provide value for the investment.

TABLE 7-3—WORK PLAN

Task No.	Task	Required Resources	Responsibility
1	Identify, define, document, and implement LOS and Risk for remaining assets	Internal	Asset Planning
2	Focus efforts in creating a single AMP which will provide an executive summary for City Council in future Council Reports	Internal/External	Asset Planning
3	Implement council approved Asset Management tools (Whole Life-cycle Costing, Triple Bottom Line Plus, and Business Case Evaluation) for projects as identified by the Asset Planning Steering Committee	Internal	Asset Planning
4	Work with departments to identify which subjectively rated assets require formal objective condition rating process and seek to define and implement. This could involve use of third-party services	Internal/External	Asset Planning/ Various Departments
5	Development of process to annually review asset sub-systems and TCA data. Process to include identification of gaps in current process to ensure better alignment between the two systems going forward	Internal/External	Asset Planning/ Various Departments
6	Implementation of balance of Asset Manager Software of automation of LOS, Risk, and deterioration models as well as the Capital Budgeting and Planning software. This will improve efficiency of data gathering for asset management plan as well as capital budgeting and TCA data management	Internal/External	Asset Planning/ Capital Budget & Planning/ Various Departments
7	Develop and implement a project plan based on 2023/2024 regulation requirements. This includes but is not limited to 10-year funding numbers, costs to meet Proposed Levels of Service, expansion of growth needs based on results of various plans identified in Section 2 of this AMP	Internal	Asset Planning/Various Departments/Steering Committee/Appropriate ABCs
8	Implementation of Parks asset and work order system	Internal/External	Asset Planning/Parks
9	Development of a process to determine proposed LOS for assets as well as public engagement as required for O.Reg 588/17	Internal/External	Asset Planning/Steering Committee

Future iterations of the above work plan will be driven by the monitoring and review of the following:

- Compliance with legislative requirements
- Quality of Services Delivery –100% compliance with service targets or targets exceeded.
- Capital project delivery outputs delivered to schedule (or better) and on budget (or better)
- Operational and maintenance budgets met (or better)
- Quality of Risk Management—No events occurring outside the risk profile.
- Benchmarking with comparable City's—Maintain performance

7.2.4 Accomplishments

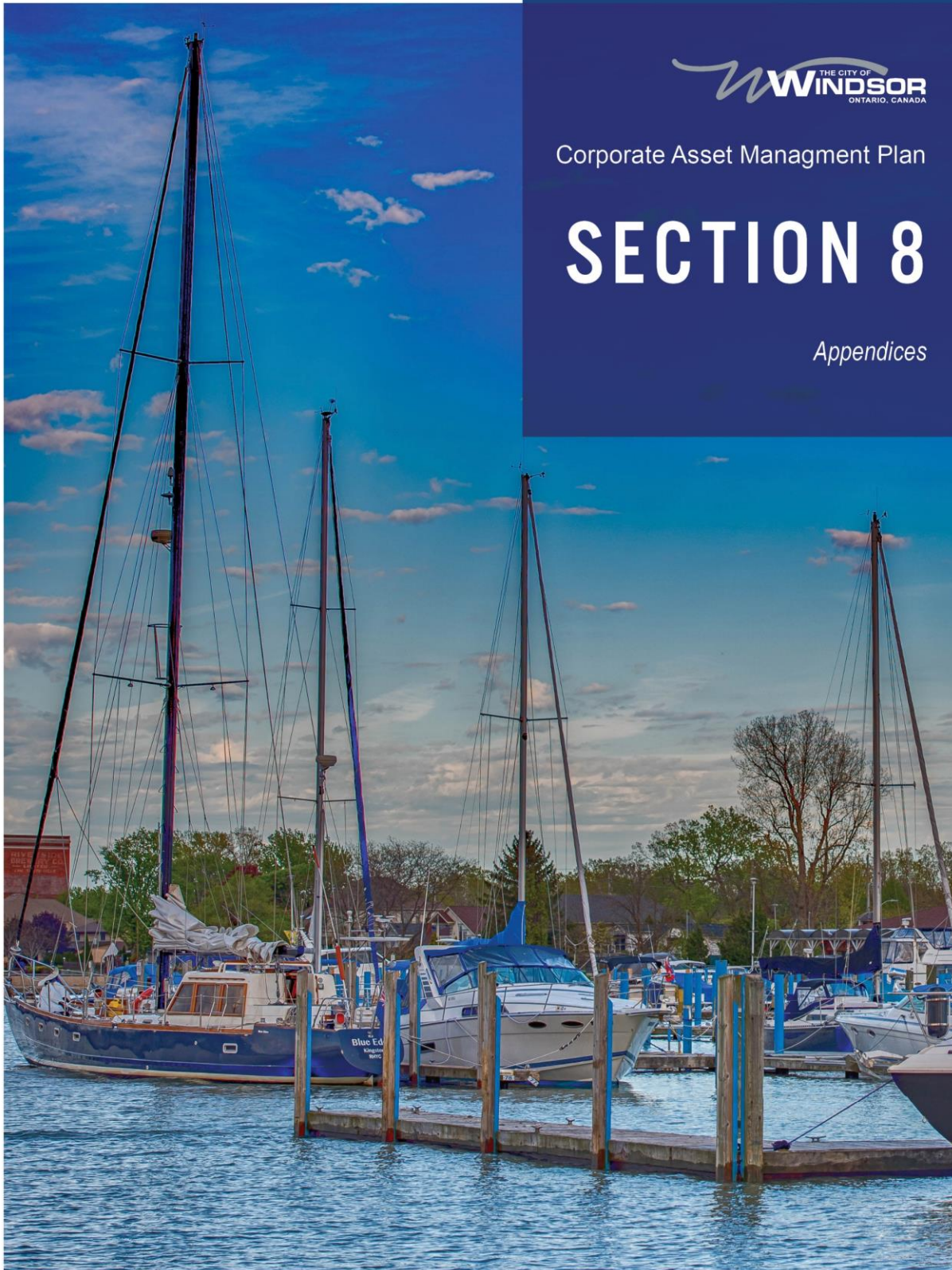
Since the development of the 2013 AMP, notable accomplishments have been made that brought forth the acceptance, approval, and implementation of Asset Management Planning throughout the organization. The following is a description of those accomplishments

1. City council approval of the Asset Management Policy and Framework
2. Development of a Corporate Level of Service (LOS) and Risk Matrix for departmental asset planning and asset management related projects
3. Executed departmental asset management self-assessment to establish an acceptable baseline and identify gaps.
4. Development and City Council approval of Business Case Evaluation Guidelines, Whole Life-Cycle Costing (WLC) and Triple Bottom Line Plus framework as corporate approved asset management tools
5. Expanded the level of detail required for facility condition assessment, capturing facility subcomponents for a more robust evaluation
6. Created and implemented a procedure for using zoom camera inspection technology in capturing objective sewer condition ratings
7. Development, implementation and ongoing monitoring of the grant process. This assisted in formulating the procedure for applying, acquiring, and managing grant funding in supporting capital expenditures
8. Continuous development, support, and education of Asset Management philosophy has assisted in driving change to business processes and procedures. As a result, departmental staff are considering impacts to asset management planning by creating best practices and involving Asset Planning Department
9. Supplemented City funding for project initiatives by successfully acquiring over \$59 million in grant funding since the 2013 AMP
10. City council exposure to asset management principals and policies has provided guidance into establishing reserves for asset maintenance, repair, and rehabilitation.
11. Successful implementation of energy efficient projects such as Soar Photovoltaic technology, LED lighting and Combined Heat and Power systems have resulted in reduction of operating costs and revenue generation.
12. Process improvements achieved through purchasing by-law amendments to stream-line the grant process by using Delegation of Authority (DOA)

7.2.5 Achieving Requirements of Ontario Regulation 488/17

The Ontario Regulation 588/17 that falls under the Infrastructure for Jobs and Prosperity Act 2015 has been extensively analyzed during the development of this Asset Management Plan (AMP) to ensure compliance with the required strategic policies as well as the development and implementation of the AMP. As previously indicated, various milestones were achieved through various projects since 2013 and this AMP to achieve

compliance with July 1, 2019 and 2021 requirements. As such this AMP will remain current until the planned update in 2023.



Corporate Asset Management Plan

SECTION 8

Appendices

APPENDIX A

Condition Definition and Mapping

Asset Management Plan Development
State of the Infrastructure Report

Mapping of Current Condition Ratings to new Corporate Condition Rating Categories

Road Pavement

Asset: **Road Pavement**

Current Condition Rating Categories		
Category	Definition	Numeric Rating
		From To
Adequate Roads: Greater than 10 Years	Roads which will need repair in a greater than 10 year timeframe. Roads that are in adequate pavement condition.	1 4
6-10 Year Deficient	Roads that will need repair in 6 to 10 years. Generally, selective crack sealing should be done if funding is made available. Isolated base repairs and mill & pave may also be performed.	5 9
1-5 Year Deficient	Roads that will need repair within 1 to 5 years. Typically a mill and pave should be completed.	10 19
NOW Deficient Roads	Roads that are in the worst pavement condition and need immediate repair. Typically roads in the "Now Deficient" category are not good candidates for mill and pave rehabilitation and therefore require full reconstruction.	20 100

Mapping of CURRENT to NEW SOI CORPORATE	
Proposed Mapping of Numeric Rating	
From	To
1	2
3	4
5	19
20	30
31	100

NEW State of the Infrastructure Corporate Asset Condition Categories	
Category	Definition (Canadian Infrastructure Report Card)
Very Good: Fit for the future	The infrastructure in the system or network is generally in very good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.
Good: Adequate for now	The infrastructure in the system or network is in good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.
Fair: Requires attention	The infrastructure in the system or network is in fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.
Poor: At risk	The infrastructure in the system or network is in poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.
Very poor: Unfit for sustained service	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service.

NOTE: For MPMP, OMBI, and corp KPI annual reporting purposes, Road Adequacy (ie. roads in good to very good condition) has been historically reported using the Adequate Roads (ie. Greater than 10 Year) Category.
 For Budget purposes, the NOW Deficient road category is used.
 Gravel roads included & assumed to be NOW Deficient.

Asset Management Plan Development
State of the Infrastructure Report

Mapping of Current Condition Ratings to new Corporate Condition Rating Categories

Asset: **Alley Pavement**

Alley Pavement

Current Condition Rating Categories			
Category	Definition	Numeric Rating	
		From	To
Adequate: Greater than 10 Years	Alleys which will need repair in a greater than 10 year timeframe. Alleys that are in adequate pavement condition.	1	4
6-10 Year Deficient	Alleys that will need repair in 6 to 10 years. Generally, selective crack sealing should be done if funding is made available. Isolated base repairs and mill & pave may also be performed.	5	9
1-5 Year Deficient	Alleys that will need repair within 1 to 5 years. Typically a mill and pave should be completed.	10	19
NOW Deficient	Alleys that are in the worst pavement condition and need immediate repair. Typically alleys in the "Now Deficient" category are not good candidates for mill and pave rehabilitation and therefore require full reconstruction.	20	100

Mapping of CURRENT to NEW SOI CORPORATE		
Proposed Mapping of Numeric Rating		
	From	To
	1	2
	3	4
	5	19
	20	30
	31	100

NEW State of the Infrastructure Corporate Asset Condition Categories	
Category	Definition (Canadian Infrastructure Report Card)
Very Good: Fit for the future	The infrastructure in the system or network is generally in very good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.
Good: Adequate for now	The infrastructure in the system or network is in good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.
Fair: Requires attention	The infrastructure in the system or network is in fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.
Poor: At risk	The infrastructure in the system or network is in poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.
Very poor: Unfit for sustained service	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service.

Note: Mapping and rating cut offs are consistent with mapping used for Road Pavements
 Excludes gravel alleys (not rated).

Asset Management Plan Development
State of the Infrastructure Report

Mapping of Current Condition Ratings to new Corporate Condition Rating Categories

Asset: **Bridges**

(includes culverts with a greater than 3m span)

Bridges
 (includes culverts with a greater than 3m span)

Current Condition Rating Categories			
Category	Definition	Numeric Rating	
		From	To
Excellent	Primary and secondary components are showing no signs of distress. Very minor maintenance needs only. Reported as our Bridge Adequacy for MPMP & OMBI. See definition in NOTES.	90	100
Good	Primary and/or secondary components are showing minimal signs of distress. Minor maintenance needs and possibly rehabilitation of some primary and/or secondary elements may be suggested.	80	89.9
Fair	Primary and/or secondary components are showing minimal to severe distresses which could include the need for condition surveys and major rehabilitation on some scale.	70	79.9
Poor	Primary and/or secondary components are showing severe to critical distresses which could include the need for condition surveys, major rehabilitation on some scale, or removal and replacement of structure. Primary and/or secondary components are showing critical distresses which could include the need for condition surveys, major rehabilitation on some scale, removal and replacement of structure, or closure. Structure is in a state which may pose hazards to traffic or pedestrian traffic.	1	69.9

Mapping of CURRENT to NEW SOI CORPORATE		
Proposed Mapping of Numeric Rating		
	From	To
	90	100
	80	89.9
	70	79.9
	60	69.9
	1	59.9

NEW State of the Infrastructure Corporate Asset Condition Categories	
Category	Definition (Canadian Infrastructure Report Card)
Very Good: Fit for the future	The infrastructure in the system or network is generally in very good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.
Good: Adequate for now	The infrastructure in the system or network is in good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.
Fair: Requires attention	The infrastructure in the system or network is in fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.
Poor: At risk	The infrastructure in the system or network is in poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.
Very poor: Unfit for sustained service	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service.

NOTES:

- For MPMP & OMBI, the percent of bridges & culverts in good to very good condition is generally reported each year as the current system **Excellent** category. MPMP definition for Bridge Adequacy is defined as "A bridge or culvert is rated as good to very good if distress to primary components is minimal, requiring only maintenance."
- Overall Condition ratings are based on an internally developed calculation in the Hansen database. They are not based on OGRA's MDW software. The overall rating is a numeric calculated rating from 1-100. (The higher the value the better the overall rating.) The numeric value is then categorized by ranges into the overall categories above (i.e. Exc, Good, Fair, Poor).
- OSIM only rates elements into 4 categories (Excellent, Good, Fair, Poor).
- Issues with the various uses of the same terminology for various rating systems, definitions, and reporting purposes.

Asset Management Plan Development
State of the Infrastructure Report

Mapping of Current Condition Ratings to new Corporate Condition Rating Categories

Sidewalks (right-of-way only)

Asset: **Sidewalks (right-of-way only)**
 ie. Does not include sidewalks located at city facilities and in recreational areas

Current Condition Rating Categories	
Category	Definition Definition/Guideline
Excellent	10% or less of the sidewalk length is affected by deficiencies < = 10% deficient
Good	11% to 25% of the sidewalk length is affected by deficiencies 11% to 25% Deficient
Fair	26% to 45% of the sidewalk length is affected by deficiencies 26% to 45% Deficient
Poor	46% or more of the sidewalk length is affected by deficiencies 46% to 100% Deficient

Mapping of CURRENT to NEW SOI CORPORATE	
Proposed Mapping of Subjective Rating Definition/Guideline	
< = 10% deficient	
11% to 25% Deficient	
26% to 45% Deficient	
46% to 100% Deficient AND Pedestrian Traffic = Low	
46% to 100% Deficient AND Pedestrian Traffic = Medium & High	

NEW State of the Infrastructure Corporate Asset Condition Categories	
Category	Definition (Canadian Infrastructure Report Card)
Very Good: Fit for the future	The infrastructure in the system or network is generally in very good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.
Good: Adequate for now	The infrastructure in the system or network is in good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.
Fair: Requires attention	The infrastructure in the system or network is in fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.
Poor: At risk	The infrastructure in the system or network is in poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.
Very poor: Unfit for sustained service	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service.

NOTES: A formula generated numeric rating scale is not used. The ratings are subjective following the guidelines provided.
 A Very Poor category is not used in inspections. The use of Pedestrian Traffic levels is suggested for the further breakdown for Corp SOI purposes and is a measure of Risk.

Asset Management Plan Development
State of the Infrastructure Report

Confirmed by: Phong Nguy and Ian Day - PW Operations March 2018

Mapping of Current Condition Ratings to new Corporate Condition Rating Categories

Storm and Sanitary Sewers

Asset: **Storm and Sanitary Sewers**

* Subjective ratings are applied to sewers for which there is no CCTV or ZOOM rating. How subjective ratings were applied is noted below

Objective CCTV and ZOOM Rating Mapping

NEW State of the Infrastructure Corporate Asset Condition Categories		Subjective Ratings
Category	Definition (Canadian Infrastructure Report Card)	
Very Good: Fit for the future	The infrastructure in the system or network is generally in very good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.	High Density Polyethylene - any year
Good: Adequate for now	The infrastructure in the system or network is in good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.	PVC, Asbestos Cement, Polyethylen, UR, Concrete - all those post 1970
Fair: Requires attention	The infrastructure in the system or network is in fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.	Brick, Concrete - all those pre 1970
Poor: At risk	The infrastructure in the system or network is in poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.	Iron, Clay, Big O - any year
Very poor: Unfit for sustained service	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service.	CSP - any year

Service Rating	0	1	2	3	4	5
Structural Rating						
0	Very Good	Very Good	Good	Fair	Poor	Very Poor
1	Very Good	Very Good	Good	Fair	Poor	Very Poor
2	Good	Good	Good	Fair	Poor	Very Poor
3	Fair	Fair	Fair	Fair	Poor	Very Poor
4	Poor	Poor	Poor	Poor	Poor	Very Poor
5	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor

Changes approved by P. Nguy and I. Day March 2018

Asset Management Plan Development
State of the Infrastructure Report

Mapping of Current Condition Ratings to new Corporate Condition Rating Categories

Asset: **All Other Assets**

* Subjective ratings were applied to all sewers for which there was no CCTV rating. How subjective ratings were applied is noted below

NEW State of the Infrastructure Corporate Asset Condition Categories		Subjective Ratings
Category	Definition (Canadian Infrastructure Report Card)	
Very Good: Fit for the future	The infrastructure in the system or network is generally in very good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.	Greater than 80% remaining useful life - then reviewed by asset experts for validation and or correction based on actual asset performance, inspections where appropriate, reactive maintenance and other available information
Good: Adequate for now	The infrastructure in the system or network is in good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.	60 - 79.9% remaining useful life - then reviewed by asset experts for validation and or correction based on actual asset performance, inspections where appropriate, reactive maintenance and other available information
Fair: Requires attention	The infrastructure in the system or network is in fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.	40 - 59.9% remaining useful life - then reviewed by asset experts for validation and or correction based on actual asset performance, inspections where appropriate, reactive maintenance and other available information
Poor: At risk	The infrastructure in the system or network is in poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.	20 - 39.9% remaining useful life - then reviewed by asset experts for validation and or correction based on actual asset performance, inspections where appropriate, reactive maintenance and other available information
Very poor: Unfit for sustained service	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service.	Less than 20% remaining useful life - then reviewed by asset experts for validation and or correction based on actual asset performance, inspections where appropriate, reactive maintenance and other available information

APPENDIX B

Ontario Regulation 588/17

ONTARIO REGULATION 588/17

made under the

INFRASTRUCTURE FOR JOBS AND PROSPERITY ACT, 2015

Made: December 13, 2017

Filed: December 27, 2017

Published on e-Laws: December 27, 2017

Printed in *The Ontario Gazette*: January 13, 2018

ASSET MANAGEMENT PLANNING FOR MUNICIPAL INFRASTRUCTURE

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COMMENCEMENT

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INTERPRETATION AND APPLICATION

Definitions

1. (1) In this Regulation,

“asset category” means a category of municipal infrastructure assets that is,

- (a) an aggregate of assets described in each of clauses (a) to (e) of the definition of core municipal infrastructure asset, or
- (b) composed of any other aggregate of municipal infrastructure assets that provide the same type of service; (“catégorie de biens”)

“core municipal infrastructure asset” means any municipal infrastructure asset that is a,

- (a) water asset that relates to the collection, production, treatment, storage, supply or distribution of water,
- (b) wastewater asset that relates to the collection, transmission, treatment or disposal of wastewater, including any wastewater asset that from time to time manages stormwater,
- (c) stormwater management asset that relates to the collection, transmission, treatment, retention, infiltration, control or disposal of stormwater,
- (d) road, or
- (e) bridge or culvert; (“bien d’infrastructure municipale essentiel”)

“ecological functions” has the same meaning as in Ontario Regulation 140/02 (Oak Ridges Moraine Conservation Plan) made under the *Oak Ridges Moraine Conservation Act, 2001*; (“fonctions écologiques”)

“green infrastructure asset” means an infrastructure asset consisting of natural or human-made elements that provide ecological and hydrological functions and processes and includes natural heritage features and systems, parklands,

stormwater management systems, street trees, urban forests, natural channels, permeable surfaces and green roofs; (“bien d’infrastructure verte”)

“hydrological functions” has the same meaning as in Ontario Regulation 140/02; (“fonctions hydrologiques”)

“joint municipal water board” means a joint board established in accordance with a transfer order made under the *Municipal Water and Sewage Transfer Act, 1997*; (“conseil mixte de gestion municipale des eaux”)

“lifecycle activities” means activities undertaken with respect to a municipal infrastructure asset over its service life, including constructing, maintaining, renewing, operating and decommissioning, and all engineering and design work associated with those activities; (“activités relatives au cycle de vie”)

“municipal infrastructure asset” means an infrastructure asset, including a green infrastructure asset, directly owned by a municipality or included on the consolidated financial statements of a municipality, but does not include an infrastructure asset that is managed by a joint municipal water board; (“bien d’infrastructure municipale”)

“municipality” has the same meaning as in the *Municipal Act, 2001*; (“municipalité”)

“operating costs” means the aggregate of costs, including energy costs, of operating a municipal infrastructure asset over its service life; (“frais d’exploitation”)

“service life” means the total period during which a municipal infrastructure asset is in use or is available to be used; (“durée de vie”)

“significant operating costs” means, where the operating costs with respect to all municipal infrastructure assets within an asset category are in excess of a threshold amount set by the municipality, the total amount of those operating costs. (“frais d’exploitation importants”)

(2) In Tables 1 and 2,

“connection-days” means the number of properties connected to a municipal system that are affected by a service issue, multiplied by the number of days on which those properties are affected by the service issue. (“jours-branchements”)

(3) In Table 4,

“arterial roads” means Class 1 and Class 2 highways as determined under the Table to section 1 of Ontario Regulation 239/02 (Minimum Maintenance Standards for Municipal Highways) made under the *Municipal Act, 2001*; (“artères”)

“collector roads” means Class 3 and Class 4 highways as determined under the Table to section 1 of Ontario Regulation 239/02; (“routes collectrices”)

“lane-kilometre” means a kilometre-long segment of roadway that is a single lane in width; (“kilomètre de voie”)

“local roads” means Class 5 and Class 6 highways as determined under the Table to section 1 of Ontario Regulation 239/02. (“routes locales”)

(4) In Table 5,

“Ontario Structure Inspection Manual” means the Ontario Structure Inspection Manual (OSIM), published by the Ministry of Transportation and dated October 2000 (revised November 2003 and April 2008) and available on a Government of Ontario website; (“manuel d’inspection des structures de l’Ontario”)

“structural culvert” has the meaning set out for “culvert (structural)” in the Ontario Structure Inspection Manual. (“ponceau structurel”)

Application

2. For the purposes of section 6 of the Act, every municipality is prescribed as a broader public sector entity to which that section applies.

STRATEGIC ASSET MANAGEMENT POLICIES

Strategic asset management policy

3. (1) Every municipality shall prepare a strategic asset management policy that includes the following:

1. Any of the municipality’s goals, policies or plans that are supported by its asset management plan.
2. The process by which the asset management plan is to be considered in the development of the municipality’s budget or of any long-term financial plans of the municipality that take into account municipal infrastructure assets.
3. The municipality’s approach to continuous improvement and adoption of appropriate practices regarding asset management planning.
4. The principles to be followed by the municipality in its asset management planning, which must include the principles set out in section 3 of the Act.

5. The municipality's commitment to consider, as part of its asset management planning,
 - i. the actions that may be required to address the vulnerabilities that may be caused by climate change to the municipality's infrastructure assets, in respect of such matters as,
 - A. operations, such as increased maintenance schedules,
 - B. levels of service, and
 - C. lifecycle management,
 - ii. the anticipated costs that could arise from the vulnerabilities described in subparagraph i,
 - iii. adaptation opportunities that may be undertaken to manage the vulnerabilities described in subparagraph i,
 - iv. mitigation approaches to climate change, such as greenhouse gas emission reduction goals and targets, and
 - v. disaster planning and contingency funding.
6. A process to ensure that the municipality's asset management planning is aligned with any of the following financial plans:
 - i. Financial plans related to the municipality's water assets including any financial plans prepared under the *Safe Drinking Water Act, 2002*.
 - ii. Financial plans related to the municipality's wastewater assets.
7. A process to ensure that the municipality's asset management planning is aligned with Ontario's land-use planning framework, including any relevant policy statements issued under subsection 3 (1) of the *Planning Act*, any provincial plans as defined in the *Planning Act* and the municipality's official plan.
8. An explanation of the capitalization thresholds used to determine which assets are to be included in the municipality's asset management plan and how the thresholds compare to those in the municipality's tangible capital asset policy, if it has one.
9. The municipality's commitment to coordinate planning for asset management, where municipal infrastructure assets connect or are interrelated with those of its upper-tier municipality, neighbouring municipalities or jointly-owned municipal bodies.
10. The persons responsible for the municipality's asset management planning, including the executive lead.
11. An explanation of the municipal council's involvement in the municipality's asset management planning.
12. The municipality's commitment to provide opportunities for municipal residents and other interested parties to provide input into the municipality's asset management planning.

(2) For the purposes of this section,

"capitalization threshold" is the value of a municipal infrastructure asset at or above which a municipality will capitalize the value of it and below which it will expense the value of it. ("seuil de capitalisation")

Update of asset management policy

4. Every municipality shall prepare its first strategic asset management policy by July 1, 2019 and shall review and, if necessary, update it at least every five years.

ASSET MANAGEMENT PLANS

Asset management plans, current levels of service

5. (1) Every municipality shall prepare an asset management plan in respect of its core municipal infrastructure assets by July 1, 2021, and in respect of all of its other municipal infrastructure assets by July 1, 2023.

(2) A municipality's asset management plan must include the following:

1. For each asset category, the current levels of service being provided, determined in accordance with the following qualitative descriptions and technical metrics and based on data from at most the two calendar years prior to the year in which all information required under this section is included in the asset management plan:
 - i. With respect to core municipal infrastructure assets, the qualitative descriptions set out in Column 2 and the technical metrics set out in Column 3 of Table 1, 2, 3, 4 or 5, as the case may be.
 - ii. With respect to all other municipal infrastructure assets, the qualitative descriptions and technical metrics established by the municipality.
2. The current performance of each asset category, determined in accordance with the performance measures established by the municipality, such as those that would measure energy usage and operating efficiency, and based on data from

at most two calendar years prior to the year in which all information required under this section is included in the asset management plan.

3. For each asset category,
 - i. a summary of the assets in the category,
 - ii. the replacement cost of the assets in the category,
 - iii. the average age of the assets in the category, determined by assessing the average age of the components of the assets,
 - iv. the information available on the condition of the assets in the category, and
 - v. a description of the municipality's approach to assessing the condition of the assets in the category, based on recognized and generally accepted good engineering practices where appropriate.
4. For each asset category, the lifecycle activities that would need to be undertaken to maintain the current levels of service as described in paragraph 1 for each of the 10 years following the year for which the current levels of service under paragraph 1 are determined and the costs of providing those activities based on an assessment of the following:
 - i. The full lifecycle of the assets.
 - ii. The options for which lifecycle activities could potentially be undertaken to maintain the current levels of service.
 - iii. The risks associated with the options referred to in subparagraph ii.
 - iv. The lifecycle activities referred to in subparagraph ii that can be undertaken for the lowest cost to maintain the current levels of service.
5. For municipalities with a population of less than 25,000, as reported by Statistics Canada in the most recent official census, the following:
 - i. A description of assumptions regarding future changes in population or economic activity.
 - ii. How the assumptions referred to in subparagraph i relate to the information required by paragraph 4.
6. For municipalities with a population of 25,000 or more, as reported by Statistics Canada in the most recent official census, the following:
 - i. With respect to municipalities in the Greater Golden Horseshoe growth plan area, if the population and employment forecasts for the municipality are set out in Schedule 3 or 7 to the 2017 Growth Plan, those forecasts.
 - ii. With respect to lower-tier municipalities in the Greater Golden Horseshoe growth plan area, if the population and employment forecasts for the municipality are not set out in Schedule 7 to the 2017 Growth Plan, the portion of the forecasts allocated to the lower-tier municipality in the official plan of the upper-tier municipality of which it is a part.
 - iii. With respect to upper-tier municipalities or single-tier municipalities outside of the Greater Golden Horseshoe growth plan area, the population and employment forecasts for the municipality that are set out in its official plan.
 - iv. With respect to lower-tier municipalities outside of the Greater Golden Horseshoe growth plan area, the population and employment forecasts for the lower-tier municipality that are set out in the official plan of the upper-tier municipality of which it is a part.
 - v. If, with respect to any municipality referred to in subparagraph iii or iv, the population and employment forecasts for the municipality cannot be determined as set out in those subparagraphs, a description of assumptions regarding future changes in population or economic activity.
 - vi. For each of the 10 years following the year for which the current levels of service under paragraph 1 are determined, the estimated capital expenditures and significant operating costs related to the lifecycle activities required to maintain the current levels of service in order to accommodate projected increases in demand caused by growth, including estimated capital expenditures and significant operating costs related to new construction or to upgrading of existing municipal infrastructure assets.

(3) Every asset management plan must indicate how all background information and reports upon which the information required by paragraph 3 of subsection (2) is based will be made available to the public.

(4) In this section,

“2017 Growth Plan” means the Growth Plan for the Greater Golden Horseshoe, 2017 that was approved under subsection 7

(6) of the *Places to Grow Act, 2005* on May 16, 2017 and came into effect on July 1, 2017; (“Plan de croissance de 2017”)

“Greater Golden Horseshoe growth plan area” means the area designated by section 2 of Ontario Regulation 416/05 (Growth Plan Areas) made under the *Places to Grow Act, 2005*. (“zone de croissance planifiée de la région élargie du Golden Horseshoe”)

Asset management plans, proposed levels of service

6. (1) Subject to subsection (2), by July 1, 2024, every asset management plan prepared under section 5 must include the following additional information:

1. For each asset category, the levels of service that the municipality proposes to provide for each of the 10 years following the year in which all information required under section 5 and this section is included in the asset management plan, determined in accordance with the following qualitative descriptions and technical metrics:
 - i. With respect to core municipal infrastructure assets, the qualitative descriptions set out in Column 2 and the technical metrics set out in Column 3 of Table 1, 2, 3, 4 or 5, as the case may be.
 - ii. With respect to all other municipal infrastructure assets, the qualitative descriptions and technical metrics established by the municipality.
2. An explanation of why the proposed levels of service under paragraph 1 are appropriate for the municipality, based on an assessment of the following:
 - i. The options for the proposed levels of service and the risks associated with those options to the long term sustainability of the municipality.
 - ii. How the proposed levels of service differ from the current levels of service set out under paragraph 1 of subsection 5 (2).
 - iii. Whether the proposed levels of service are achievable.
 - iv. The municipality’s ability to afford the proposed levels of service.
3. The proposed performance of each asset category for each year of the 10-year period referred to in paragraph 1, determined in accordance with the performance measures established by the municipality, such as those that would measure energy usage and operating efficiency.
4. A lifecycle management and financial strategy that sets out the following information with respect to the assets in each asset category for the 10-year period referred to in paragraph 1:
 - i. An identification of the lifecycle activities that would need to be undertaken to provide the proposed levels of service described in paragraph 1, based on an assessment of the following:
 - A. The full lifecycle of the assets.
 - B. The options for which lifecycle activities could potentially be undertaken to achieve the proposed levels of service.
 - C. The risks associated with the options referred to in sub-subparagraph B.
 - D. The lifecycle activities referred to in sub-subparagraph B that can be undertaken for the lowest cost to achieve the proposed levels of service.
 - ii. An estimate of the annual costs for each of the 10 years of undertaking the lifecycle activities identified in subparagraph i, separated into capital expenditures and significant operating costs.
 - iii. An identification of the annual funding projected to be available to undertake lifecycle activities and an explanation of the options examined by the municipality to maximize the funding projected to be available.
 - iv. If, based on the funding projected to be available, the municipality identifies a funding shortfall for the lifecycle activities identified in subparagraph i,
 - A. an identification of the lifecycle activities, whether set out in subparagraph i or otherwise, that the municipality will undertake, and
 - B. if applicable, an explanation of how the municipality will manage the risks associated with not undertaking any of the lifecycle activities identified in subparagraph i.
5. For municipalities with a population of less than 25,000, as reported by Statistics Canada in the most recent official census, a discussion of how the assumptions regarding future changes in population and economic activity, set out in subparagraph 5 i of subsection 5 (2), informed the preparation of the lifecycle management and financial strategy referred to in paragraph 4 of this subsection.
6. For municipalities with a population of 25,000 or more, as reported by Statistics Canada in the most recent official census,

- i. the estimated capital expenditures and significant operating costs to achieve the proposed levels of service as described in paragraph 1 in order to accommodate projected increases in demand caused by population and employment growth, as set out in the forecasts or assumptions referred to in paragraph 6 of subsection 5 (2), including estimated capital expenditures and significant operating costs related to new construction or to upgrading of existing municipal infrastructure assets,
- ii. the funding projected to be available, by source, as a result of increased population and economic activity, and
- iii. an overview of the risks associated with implementation of the asset management plan and any actions that would be proposed in response to those risks.

7. An explanation of any other key assumptions underlying the plan that have not previously been explained.

(2) With respect to an asset management plan prepared under section 5 on or before July 1, 2021, if the additional information required under this section is not included before July 1, 2023, the municipality shall, before including the additional information, update the current levels of service set out under paragraph 1 of subsection 5 (2) and the current performance measures set out under paragraph 2 of subsection 5 (2) based on data from the two most recent calendar years.

Update of asset management plans

7. (1) Every municipality shall review and update its asset management plan at least five years after the year in which the plan is completed under section 6 and at least every five years thereafter.

(2) The updated asset management plan must comply with the requirements set out under paragraphs 1, 2 and 3 and subparagraphs 5 i and 6 i, ii, iii, iv and v of subsection 5 (2), subsection 5 (3) and paragraphs 1 to 7 of subsection 6 (1).

Endorsement and approval required

8. Every asset management plan prepared under section 5 or 6, or updated under section 7, must be,

- (a) endorsed by the executive lead of the municipality; and
- (b) approved by a resolution passed by the municipal council.

Annual review of asset management planning progress

9. (1) Every municipal council shall conduct an annual review of its asset management progress on or before July 1 in each year, starting the year after the municipality’s asset management plan is completed under section 6.

- (2) The annual review must address,
 - (a) the municipality’s progress in implementing its asset management plan;
 - (b) any factors impeding the municipality’s ability to implement its asset management plan; and
 - (c) a strategy to address the factors described in clause (b).

Public availability

10. Every municipality shall post its current strategic asset management policy and asset management plan on a website that is available to the public, and shall provide a copy of the policy and plan to any person who requests it.

TABLE 1
WATER ASSETS

Column 1 Service attribute	Column 2 Community levels of service (qualitative descriptions)	Column 3 Technical levels of service (technical metrics)
Scope	1. Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system. 2. Description, which may include maps, of the user groups or areas of the municipality that have fire flow.	1. Percentage of properties connected to the municipal water system. 2. Percentage of properties where fire flow is available.
Reliability	Description of boil water advisories and service interruptions.	1. The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system. 2. The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system.

TABLE 2
WASTEWATER ASSETS

Column 1	Column 2	Column 3
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Service attribute	Community levels of service (qualitative descriptions)	Technical levels of service (technical metrics)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system.	Percentage of properties connected to the municipal wastewater system.
Reliability	<ol style="list-style-type: none"> 1. Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes. 2. Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches. 3. Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes. 4. Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described in paragraph 3. 5. Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system. 	<ol style="list-style-type: none"> 1. The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system. 2. The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system. 3. The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.

TABLE 3
STORMWATER MANAGEMENT ASSETS

Column 1 Service attribute	Column 2 Community levels of service (qualitative descriptions)	Column 3 Technical levels of service (technical metrics)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system.	<ol style="list-style-type: none"> 1. Percentage of properties in municipality resilient to a 100-year storm. 2. Percentage of the municipal stormwater management system resilient to a 5-year storm.

TABLE 4
ROADS

Column 1 Service attribute	Column 2 Community levels of service (qualitative descriptions)	Column 3 Technical levels of service (technical metrics)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity.	Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality.
Quality	Description or images that illustrate the different levels of road class pavement condition.	<ol style="list-style-type: none"> 1. For paved roads in the municipality, the average pavement condition index value. 2. For unpaved roads in the municipality, the average surface condition (e.g. excellent, good, fair or poor).

TABLE 5
BRIDGES AND CULVERTS

Column 1 Service attribute	Column 2 Community levels of service (qualitative descriptions)	Column 3 Technical levels of service (technical metrics)
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	Percentage of bridges in the municipality with loading or dimensional restrictions.
Quality	<ol style="list-style-type: none"> 1. Description or images of the condition of bridges and how this would affect use of the bridges. 2. Description or images of the condition of culverts and how this would affect use of the culverts. 	<ol style="list-style-type: none"> 1. For bridges in the municipality, the average bridge condition index value. 2. For structural culverts in the municipality, the average bridge condition index value.

COMMENCEMENT

Commencement

11. This Regulation comes into force on the later of January 1, 2018 and the day it is filed.

APPENDIX C

Ontario Regulation 588/17 Policy and AMP Requirements

APPENDIX C - Ontario Regulation 588/17

Section 3 to 4 - compliance reference the City's Asset Management Policy and AM Philosophy and Framework

O. Reg. Section	O. Reg. Description	AM Policy Section	AM Philosophy and Framework Section	Comment
Section 3: Strategic asset management policy				
3.1	Every municipality shall prepare a strategic asset management policy that includes the following			Refer to the subsets of section 3 below
3.1.1	Any of the municipality's goals, policies or plans that are supported by its asset management plan.	2 & 3		
3.1.2	The process by which the asset management plan is to be considered in the development of the municipality's budget or of any long-term financial plans of the municipality that take into account municipal infrastructure assets.	4.1.1.3	3.2.3	
3.1.3	The municipality's approach to continuous improvement and adoption of appropriate practices regarding asset management planning.	5.1.6, 5.1.7, 5.1.8		
3.1.4	The principles to be followed by the municipality in its asset management planning, which must include the principles set out in section 3 of the Act.	5.2.7	1.2 & 3.5.2	
3.1.5	The municipality's commitment to consider, as part of its asset management planning,			Refer to the subsets of section 3.1.5 below
3.1.5.i	the actions that may be required to address the vulnerabilities that may be caused by climate change to the municipality's infrastructure assets, in respect of such matters as,	1.2.6 & 5.1.10	2.1, 3.2.4, 2.4, 3.2.1, 3.3.2, 3.3.4, 3.3.5, 3.4.3, 3.4.4 3.4.5, & 3.5	
3.1.5.i.A	operations, such as increased maintenance schedules,	1.2.6 & 5.1.10	2.1, 2.4, 3.2.1, 3.2.4, 3.3.2, 3.3.5, 3.4.2, 3.4.3, 3.4.4 & 3.5	
3.1.5.i.B	levels of service, and	1.2.6 & 5.1.10	2.1, 2.4, 3.2.1, 3.2.4, 3.3.2, 3.3.5, 3.4.2, 3.4.3, 3.4.4 & 3.5	
3.1.5.i.C	lifecycle management,	1.2.6 & 5.1.10	2.1, 2.4, 3.2.1, 3.2.4, 3.3.2, 3.3.5, 3.4.2, 3.4.3, 3.4.4 & 3.5	
3.1.5.ii	the anticipated costs that could arise from the vulnerabilities described in subparagraph i,	1.2.6 & 5.1.10	2.1, 2.4, 3.2.1, 3.2.4, 3.3.2, 3.3.5, 3.4.2, 3.4.3, 3.4.4 & 3.5	
3.1.5.iii	adaptation opportunities that may be undertaken to manage the vulnerabilities described in subparagraph i,	1.2.6 & 5.1.10	2.1, 2.4, 3.2.1, 3.2.4, 3.3.2, 3.3.5, 3.4.2, 3.4.3, 3.4.4 & 3.5	
3.1.5.iv	mitigation approaches to climate change, such as greenhouse gas emission reduction goals and targets, and	1.2.6 & 5.1.10	2.1, 2.4, 3.2.1, 3.2.4, 3.3.2, 3.3.5, 3.4.2, 3.4.3, 3.4.4 & 3.5	
3.1.5.v	disaster planning and contingency funding.	1.2.6 & 5.1.10	2.1, 2.4, 3.2.1, 3.2.4, 3.3.2, 3.3.5, 3.4.2, 3.4.3, 3.4.4 & 3.5	
3.1.6	A process to ensure that the municipality's asset management planning is aligned with any of the following financial plans:	3.2	3.2.3	
3.1.6.i	Financial plans related to the municipality's water assets including any financial plans prepared under the <i>Safe Drinking Water Act, 2002</i> .	N/A	N/A	Not applicable to City of Windsor. These asset are the responsibility of the Windsor Utilities Commission (WUC)
3.1.6.ii	Financial plans related to the municipality's wastewater assets.	3.2	3.2.3	

APPENDIX C - Ontario Regulation 588/17

Section 3 to 4 - compliance reference the City's Asset Management Policy and AM Philosophy and Framework

O. Reg. Section	O. Reg. Description	AM Policy Section	AM Philosophy and Framework Section	Comment
3.1.7	A process to ensure that the municipality's asset management planning is aligned with Ontario's land-use planning framework, including any relevant policy statements issued under subsection 3 (1) of the <i>Planning Act</i> , any provincial plans as defined in the <i>Planning Act</i> and the municipality's official plan.	5.1.2 & 5.2.7		
3.1.8	An explanation of the capitalization thresholds used to determine which assets are to be included in the municipality's asset management plan and how the thresholds compare to those in the municipality's tangible capital asset policy, if it has one.		5.1.4	Reference document 5.1.11
3.1.9	The municipality's commitment to coordinate planning for asset management, where municipal infrastructure assets connect or are interrelated with those of its upper-tier municipality, neighbouring municipalities or jointly-owned municipal bodies.	1.2.1, 1.2.3 & 5.1.2		
3.1.10	The persons responsible for the municipality's asset management planning, including the executive lead.	4.1.2, 4.1.3 & 4.1.4	5	
3.1.11	An explanation of the municipal council's involvement in the municipality's asset management planning.	4.1.1		
3.1.12	The municipality's commitment to provide opportunities for municipal residents and other interested parties to provide input into the municipality's asset management planning.	5.1.5	3.5.1	Informed by other processes, by other assets. Includes public engagements by other projects
Section 4: Update of asset management policy				
4.1	Every municipality shall prepare its first strategic asset management policy by July 1, 2019 and shall review and, if necessary, update it at least every five years.	4.1.2.1		The latest version of the City's Asset Management Policy was approved by Council in 2017

APPENDIX C - Ontario Regulation 588/17

Section 5 to 10 - compliance references the City's 2018/19 Asset Management Plan

O. Reg. 588/17 Section		Core Asset **	Non Core Assets	Comment
Section 5: Asset Management Plans				
Asset management plans, current levels of service				
5.1	Every municipality shall prepare an asset management plan in respect of its core municipal infrastructure assets by July 1, 2021, and in respect of all of its other municipal infrastructure assets by July 1, 2023.	Refer to the sections below	Refer to the sections below	
5.2	A municipality's asset management plan must include the following:	Refer to the sections below	Refer to the sections below	
5.2.1	For each asset category, the current levels of service being provided, determined in accordance with the following qualitative descriptions and technical metrics and based on data from at most the two calendar years prior to the year in which all information required under this section is included in the asset management plan:	Refer to the subsection of section 5.2 below	Refer to the subsection of section 5.2 below	
5.2.1.i	With respect to core municipal infrastructure assets, the qualitative descriptions set out in Column 2 and the technical metrics set out in Column 3 of Table 1, 2, 3, 4 or 5, as the case may be.	Section 4.2.2.1 and 4.2.4.1 and Appendix Di	N/A	Requirement only for core assets. Water assets are the responsibility
5.2.1.ii	With respect to all other municipal infrastructure assets, the qualitative descriptions and technical metrics established by the municipality.	N/A	Some information for non core assets outlined in Section 4 of 2018/19 AMP however the timeline to meet this requirement for all other non core assets is July 1, 2023.	Requirement only for non core assets
5.2.2	The current performance of each asset category, determined in accordance with the performance measures established by the municipality, such as those that would measure energy usage and operating efficiency, and based on data from at most two calendar years prior to the year in which all information required under this section is included in the asset management plan.	Section 4 including 4.2.1, 4.2.2 and 4.2.4 of the 2018/19 AMP	Some information for non core assets outlined in Section 4 of 2018/19 AMP however the timeline to meet this requirement for all other non core assets is July 1, 2023.	
5.2.3	For each asset category,	Refer to subsections outlined below	Refer to subsections outlined below	
5.2.3.i	a summary of the assets in the category,	Section 1.2 and 2.5 including 2.5.1 and 2.5.2 of the 2018/19 AMP	Section 1.2 and 2.5 including 2.5.3 of the 2018/19 AMP for some non core assets	
5.2.3.ii	the replacement cost of the assets in the category,	FIGURE 1-1, Section 3 including FIGURE 3-1 and 3.3.5 of the 2018/19 AMP provides this information as well its found throughout the AMP in various sections	For some non core assets FIGURE 1-1 and Section 3 including FIGURE 3-1 in 2018/19 AMP provides this information as well it's found throughout the AMP in various sections	
5.2.3.iii	the average age of the assets in the category, determined by assessing the average age of the components of the assets,	Table 3-7, 3-8 and 3-9 and sections 3.2.1 and 3.2.2 of the 2018/19 AMP	Table 3-10 of the 2018/19 AMP for some non core assets	
5.2.3.iv	the information available on the condition of the assets in the category, and	FIGURE 1-1, Section 3 including FIGURE 3-1 and 3.3.5 of the 2018/19 AMP provides this information as well its found throughout the AMP in various sections	For some non core assets FIGURE 1-1 and Section 3 including FIGURE 3-1 in 2018/19 AMP provides this information as well it's found throughout the AMP in various sections	
5.2.4.v	a description of the municipality's approach to assessing the condition of the assets in the category, based on recognized and generally accepted good engineering practices where appropriate.	Section 3.1, Appendix A and in some cases the sections of the 2018/19 AMP outlined in 5.2.3.ii found above for core asset	Section 3.1, Appendix A and in some cases the sections of the 2018/19 AMP outlined in 5.2.3.ii found above for the non core assets	
5.2.4	For each asset category, the lifecycle activities that would need to be undertaken to maintain the current levels of service as described in paragraph 1 for each of the 10 years following the year for which the current levels of service under paragraph 1 are determined and the costs of providing those activities based on an assessment of the following:	Refer to the sections below	Refer to the sections below	

APPENDIX C - Ontario Regulation 588/17

Section 5 to 10 - compliance references the City's 2018/19 Asset Management Plan

O. Reg. 588/17 Section		Core Asset **	Non Core Assets	Comment
5.2.4.i	The full lifecycle of the assets.	Referenced in Section 5 of the 2018/19 AMP	Not required to be met for non core assets in the 2018/19 AMP. The timeline to meet this requirement for all other non core assets is July 1, 2023.	The modelling tool, Assetic has been used to generate life cycle and level of service scenarios for sewer and road assets. Bridges and culverts have a regular maintenance and inspection process which provides the necessary information to support the life cycle of these assets
5.2.4.ii	The options for which lifecycle activities could potentially be undertaken to maintain the current levels of service.	Referenced in Section 5 of the 2018/19 AMP	Not required to be met for non core assets in the 2018/19 AMP. The timeline to meet this requirement for all other non core assets is July 1, 2023.	The intent is to extend the life of core asset by performing regular inspection and addressing any issues by utilizing rehabilitation and repair techniques whose costs are a cost effective option when compared to replacing the asset. For example lining sewer pipes rather than replacing them
5.2.4.iii	The risks associated with the options referred to in subparagraph ii.	Referenced in Section 5 of the 2018/19 AMP	Not required to be met for non core assets in the 2018/19 AMP. The timeline to meet this requirement for all other non core assets is July 1, 2023.	
5.2.4.iv	The lifecycle activities referred to in subparagraph ii that can be undertaken for the lowest cost to maintain the current levels of service.	Referenced in Section 5 of the 2018/19 AMP	Not required to be met for non core assets in the 2018/19 AMP. The timeline to meet this requirement for all other non core assets is July 1, 2023.	The key for the City is determining the most cost effective blend of planned and unplanned maintenance including regularly scheduled inspection and maintenance, rehabilitation and other unexpected events. The is evident when the City couples road and sewer work to minimize costs and minimize the impact to the public. Having sufficient funding readily available to perform these activities is essential
5.2.5	For municipalities with a population of less than 25,000, as reported by Statistics Canada in the most recent official census, the following:	N/A	N/A	Our population is greater than 25,000
5.2.5.i	A description of assumptions regarding future changes in population or economic activity.	N/A	N/A	Our population is greater than 25,000
5.2.5.ii	How the assumptions referred to in subparagraph i relate to the information required by paragraph 4.	N/A	N/A	Our population is greater than 25,000
5.2.6	For municipalities with a population of 25,000 or more, as reported by Statistics Canada in the most recent official census, the following:	Refer to the subsets of section 5.2.6 below	Refer to the subsets of section 5.2.6 below	
5.2.6.i	With respect to municipalities in the Greater Golden Horseshoe growth plan area, if the population and employment forecasts for the municipality are set out in Schedule 3 or 7 to the 2017 Growth Plan, those forecasts.	N/A	N/A	We're not in the Greater Golden Horseshoe growth plan area
5.2.6.ii	With respect to lower-tier municipalities in the Greater Golden Horseshoe growth plan area, if the population and employment forecasts for the municipality are not set out in Schedule 7 to the 2017 Growth Plan, the portion of the forecasts allocated to the lower-tier municipality in the official plan of the upper-tier municipality of which it is a part.	N/A	N/A	We're not in the Greater Golden Horseshoe growth plan area

APPENDIX C - Ontario Regulation 588/17

Section 5 to 10 - compliance references the City's 2018/19 Asset Management Plan

O. Reg. 588/17 Section		Core Asset **	Non Core Assets	Comment
5.2.6.iii	With respect to upper-tier municipalities or single-tier municipalities outside of the Greater Golden Horseshoe growth plan area, the population and employment forecasts for the municipality that are set out in its official plan.	Section 5.3 of the 2018/19 AMP provides this information	Section 5.3 of the 2018/19 AMP provides this information	
5.2.6.iv	With respect to lower-tier municipalities outside of the Greater Golden Horseshoe growth plan area, the population and employment forecasts for the lower-tier municipality that are set out in the official plan of the upper-tier municipality of which it is a part.	N/A	N/A	We're not a lower-tier municipality outside of the Greater Golden Horseshoe growth plan area
5.2.6.v	If, with respect to any municipality referred to in subparagraph iii or iv, the population and employment forecasts for the municipality cannot be determined as set out in those subparagraphs, a description of assumptions regarding future changes in population or economic activity.	N/A	N/A	Addressed in subparagraph iii
5.2.6.vi	For each of the 10 years following the year for which the current levels of service under paragraph 1 are determined, the estimated capital expenditures and significant operating costs related to the lifecycle activities required to maintain the current levels of service in order to accommodate projected increases in demand caused by growth, including estimated capital expenditures and significant operating costs related to new construction or to upgrading of existing municipal infrastructure assets.	Section 6 of 2018/19 AMP for each asset	Section 6 of 2018/19 AMP for those non core assets in 2018/19 AMP	
5.3	(3) Every asset management plan must indicate how all background information and reports upon which the information required by paragraph 3 of subsection (2) is based will be made available to the public.	Section 3 of 2018/19 AMP for each asset	Section 3 of 2018/19 AMP for some non core assets	
5.4	(4) In this section,	N/A	N/A	We're not in the Greater Golden Horseshoe growth plan area
	"2017 Growth Plan" means the Growth Plan for the Greater Golden Horseshoe, 2017 that was approved under subsection 7 (6) of the <i>Places to Grow Act, 2005</i> on May 16, 2017 and came into effect on July 1, 2017; ("Plan de croissance de 2017")	N/A	N/A	We're not in the Greater Golden Horseshoe growth plan area
	"Greater Golden Horseshoe growth plan area" means the area designated by section 2 of Ontario Regulation 416/05 (Growth Plan Areas) made under the <i>Places to Grow Act, 2005</i> . ("zone de croissance planifiée de la région élargie du Golden Horseshoe")	N/A	N/A	We're not in the Greater Golden Horseshoe growth plan area
Section 6: Asset management plans, proposed levels of service - 2024		Applicable for AMP to be approved by City Council on or before July 1, 2024		
Section 7: Update of asset management plans				
7.1	Every municipality shall review and update its asset management plan at least five years after the year in which the plan is completed under section 6 and at least every five years thereafter.			Not applicable until after 2023-2024 AMP is approved
7.2	The updated asset management plan must comply with the requirements set out under paragraphs 1, 2 and 3 and subparagraphs 5 i and 6 i, ii, iii, iv and v of subsection 5 (2), subsection 5 (3) and paragraphs 1 to 7 of subsection 6 (1).			Not applicable until after 2023-2024 AMP is approved
Section 8: Endorsement and approval required				
8.1	Every asset management plan prepared under section 5 or 6, or updated under section 7, must be,			Refer to the subsections below

APPENDIX C - Ontario Regulation 588/17

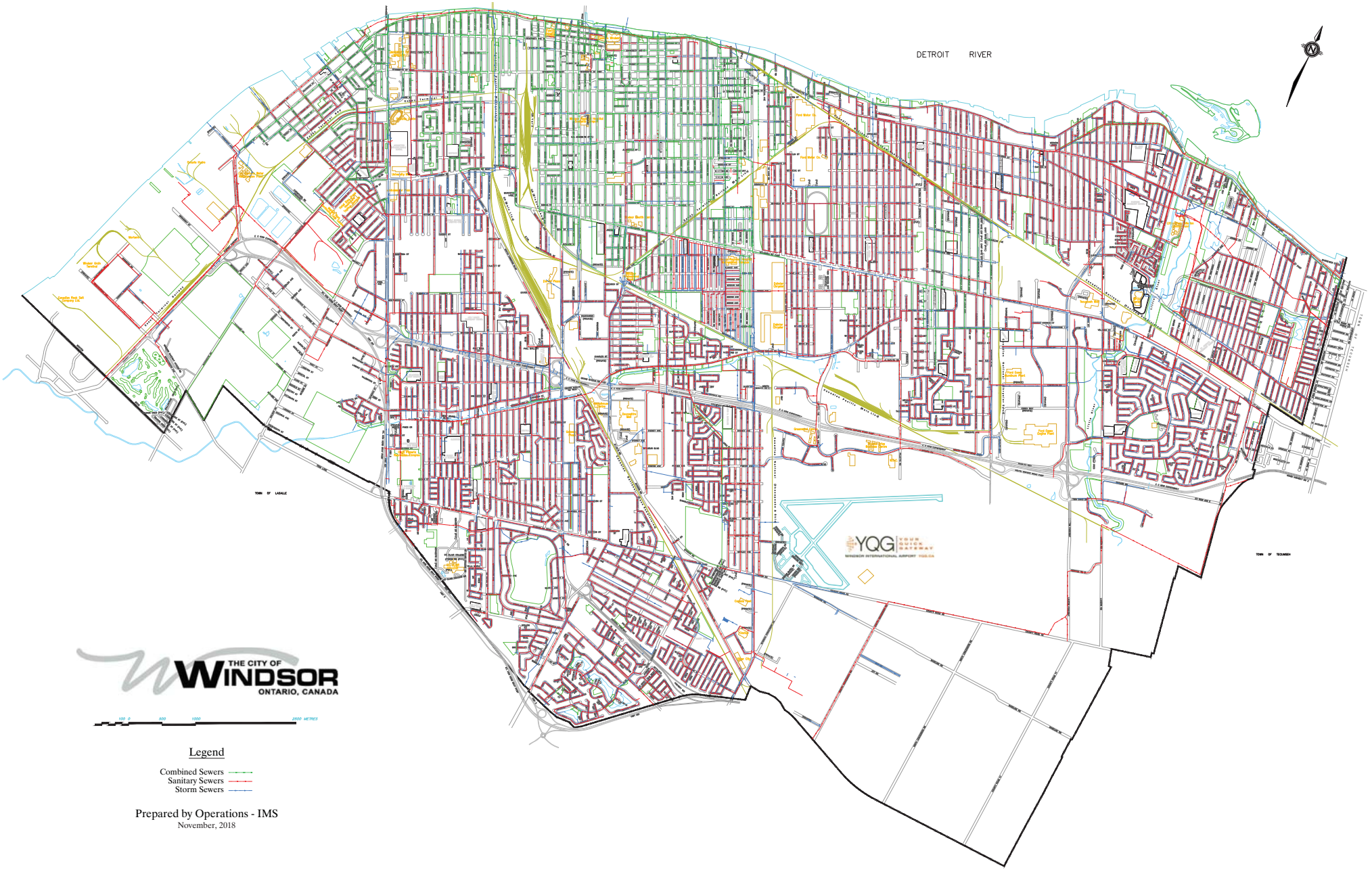
Section 5 to 10 - compliance references the City's 2018/19 Asset Management Plan

O. Reg. 588/17 Section		Core Asset **	Non Core Assets	Comment
8.1.a	endorsed by the executive lead of the municipality; and	2018/19 AMP is reviewed by Asset Planning Steering Committee before being presented to City Council for approval		
8.1.b	approved by a resolution passed by the municipal council.	Not applicable until after 2023-2024 AMP is approved		
Section 9: Annual review of asset management planning progress				
9.1	Every municipal council shall conduct an annual review of its asset management progress on or before July 1 in each year, starting the year after the municipality's asset management plan is completed under section 6.	This requirement will be met after the 2023 AMP is approved on or before July 1, 2024		
9.2	The annual review must address,	Refer to the subsections below		
9.2.a	the municipality's progress in implementing its asset management plan;	This requirement will be met after the 2023 AMP is approved on or before July 1, 2024		
9.2.b	any factors impeding the municipality's ability to implement its asset management plan; and	This requirement will be met after the 2023 AMP is approved on or before July 1, 2024		
9.2.c	a strategy to address the factors described in clause (b).	This requirement will be met after the 2023 AMP is approved on or before July 1, 2024		
Section 10: Public availability				
10	Every municipality shall post its current strategic asset management policy and asset management plan on a website that is available to the public, and shall provide a copy of the policy and plan to any person who requests it.	The City's Asset Management Policy and Framework and the latest City Council approved AMPs are posted on the City website. Revised versions will be posted once approved by Council		

*** *Water assets aren't owned by the Corporation of the City of Windsor*

APPENDIX Di and Dii

Ontario Regulation 588/17 – Table 2, 3 and 4 maps



DETROIT RIVER

NEW 17 LOCAL

YQG
YORK REGIONAL GOVERNMENT
YORK REGIONAL POLICE
YORK REGIONAL FIRE



Legend









- Combined Sewers ————
- Sanitary Sewers ————
- Storm Sewers ————

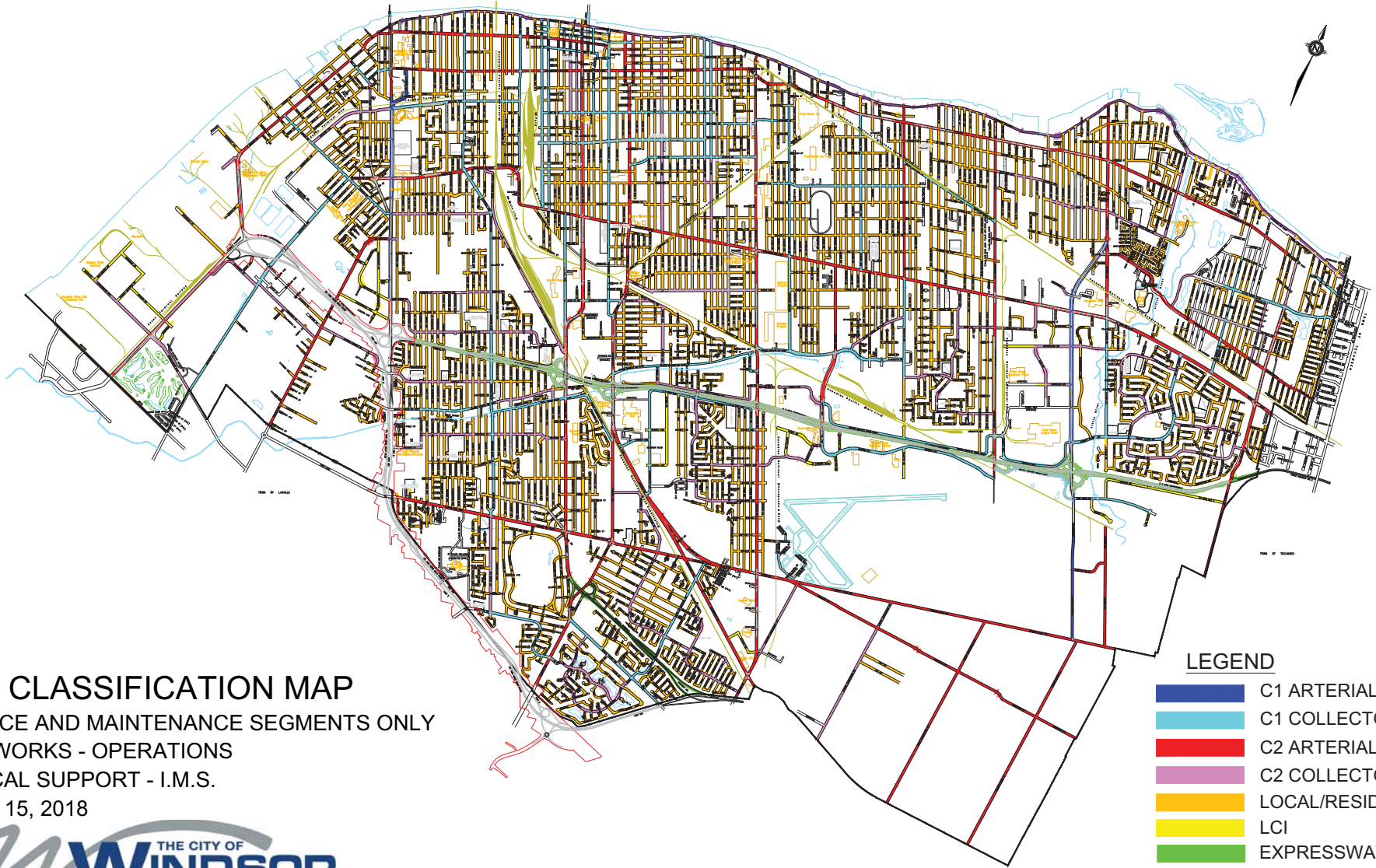
Prepared by Operations - IMS
November, 2018

ROAD CLASSIFICATION MAP
IN SERVICE AND MAINTENANCE SEGMENTS ONLY
PUBLIC WORKS - OPERATIONS
TECHNICAL SUPPORT - I.M.S.
AUGUST 15, 2018



LEGEND

-  C1 ARTERIAL
-  C1 COLLECTOR
-  C2 ARTERIAL
-  C2 COLLECTOR
-  LOCAL/RESIDENTIAL
-  LCI
-  EXPRESSWAY
-  SCENIC PARKWAY



APPENDIX E

Parks Asset Listing

APPENDIX E - PARKS ASSET LISTING

**** This listing may not be not be reflective of all Parks Asset that are currently in service

General Asset	Asset Detail	Notes (size, material)
Parking	handicap access	
Fencing Perimeter	Chain link	
	Wood	
	Locked Gate	
	Wrought Iron	
Accesibility	Sidewalk at Road	
	Path to Park Items	
	Walkway Path	asphalt
	Multi-Purpose Trail	
	Bench pad w/ curb stop	Concrete pad w/ concrete or rubber curb stop
	Picnic table	PE Metal
	Bench	PE Metal - colour for visually impaired (ie. Alexander)
	Playunit - swing	
	Other	
Bollard	Standard	metal, concrete, composite, wood
	Collapsable	
Lighting	Light Standard	
	Decorative Lighting	
	Other	
Signs	Buckle Up (pic)	
	Bump Ahead (pic)	
	Caution, Vehicle Entering & Leaving	
	Crimestopper	
	Field Closed For Maintenance	
	Fire Route	
	First Aid	
	Forest Regeneration Area	
	Gates Will be Locked	
	Information Light-up sign	
	Keep dogs on leash	
	Lane Tow Away Zone	
	Light up Message Board	
	Natural Area	
	No Adult Hardball	
	No Ball Playing	
	No Dogs Allowed	
	No Dumping	
	No Golfing	
	No Idling	
	No Littering	
	No Parking	
	No Parking, Emergency Exit	
	No Parking, Emergency Vehicle	
	No Parking, Handi Permit	
	No Skateboarding	
	No Smoking	
	No Stopping, Fire Route	
	No Tobogganing	
	No vehicular traffic, Ped. Allowed	
	No vehicle permitted	
	One Way (direction arrow)	
	Park Curfew	
	Park Name	
	Park Pride... Graffiti Free....	
	Park Watch	
	Parking For Park Users Only	
	Premises Under Video Surveillance	
	Prevent Theft from Autos	
	Please On The Trail Show Courtesy	
	Private Property CofW, No Parking Nov.1-Apr.1	
	Stop Sign - Octogon	

APPENDIX E - PARKS ASSET LISTING

**** This listing may not be not be reflective of all Parks Asset that are currently in service

General Asset	Asset Detail	Notes (size, material)
	Stop Sign - Rectangle	
	Stop, No Motorized Vehicles Beyond this Point...	
	This Facility Under Video Surveillance	
	Tobogganing Hill (w. Directional Arrow)	
	Tow Away Zone	
	Trail Temporarily Closed	
	Vehicle Parking <3000kg	
	Washroom Closed	
	Washroom Use Permitted to Special Events...	
	Welcome, Play Safe	
	Windsor Trail	
Building and Structures	Washroom	
	Change Room	
	Concession	
	Pergola	
	Gazeebo	
	Picnic Pavillion / Shelter	
	Brick Building	
	Block Building	
	Pedestrian Bridge	
	Fieldhouse	
	Storage	
	Parks Maintenance	
	Poolhouse	
	Mill	
	Water Fountain	
Seating	Bench	
	Players Bench (for sports)	
	Bleacher	
	Picnic Table	
Playground	Large Play Equipment	
	Medium Play Equipment	
	Small Play Equipment	
Spraypad	Spraypad	
	Chain Link Fence Perimeter	
Baseball	Chain Link Fence Backstop	
	Chain Link Fence Perimeter	
	Infield - Grass	
	Batting Cage	Chain Link Fence, netting, etc
	Practice mounds	clay foundation, Washington mix
	Pratice mound bench	
	Pitching mound	clay foundation, Washington mix
	Pitching plate	concrete base, removable w/pegs
	Bases	hard bases - concrete base w/ anchor sleeve soft bases - anchor pegs
	Bleachers	wood, metal
	Hose (water access)	
	Dugout	concrete or earth surface, roofed shelter
	Players Bench	
	Night Lighting	
	Scorekeepers Table	
	Scoreboard - Light up	
	Scoreboard - Manual	
	Speakers	
	Diamond without backstop	
	Chain Link Fence Perimeter area	
	Irrigation	
Basketball	Chain Link Fence Perimeter	
	Court	
	Hoop	
Football	Field	

APPENDIX E - PARKS ASSET LISTING

**** This listing may not be reflective of all Parks Asset that are currently in service

General Asset	Asset Detail	Notes (size, material)
	Goal	
	Night Lights	
	Players Bench	
	Bleachers	wood, metal
Outdoor Ice Rink	Nets	
	Board	
	Caution, Zamboni Entrance	
Skating Park	Ramps	
	Quarter / Half Pipe	
	Ledge	
	Grindrail	
	Skateboarding Info signs	
	Surface	
	Other	
Soccer	Field	
	Goal	inground or portatable - posts, nets, anchors
	Players Bench	metal, wood
	Referee / Official Bench	(ie McHugh), metal
	Irrigation	
	Chain Link Fence Perimeter	
	Bleachers	wood, metal
	Field Lights	
Cricket	Field	grass
	Pitch	astroturf, wood plate
	Bleachers	
Swimming Pool	Chain Link Fence perimeter	
	Pool	
	waterslide	
	Danger, Unauthorized Entry or Swimming is Prohibited	
	Lifeguard	
	No Breath Holding	
	No Diving	
	Pool Parking Only	
Tennis	Chain Link Fence Perimeter	
	Court	
	Nets	
	Tennis Info	
Volleyball	Court	sand
Ultimate Frisbee		
Miscellaneous	Garbage	steel drum, silo, decorative metal or wood
	Recycle	silo, Herby, multi
	Cigarette Ashtray	
	Drinking Fountain	
	Water Bottle Refill Station	
	BBQ	
	Bike Rack	
	Bike Service Station	
	Bike Air pumps	
	Flag Pole	
	Life Preserver	
	Planters	
	Water Sampling Wells	
	Methane Vent Stack	
	Boulder	
	green cylindrical storage locker	*Most removed, existing - Riverdale, Roseville
OTHER	Statue	
	Monument	
	Sculptures	
	Ping Pong table	
	Chess table	
Dog Park	Chain Link Fence Perimeter	

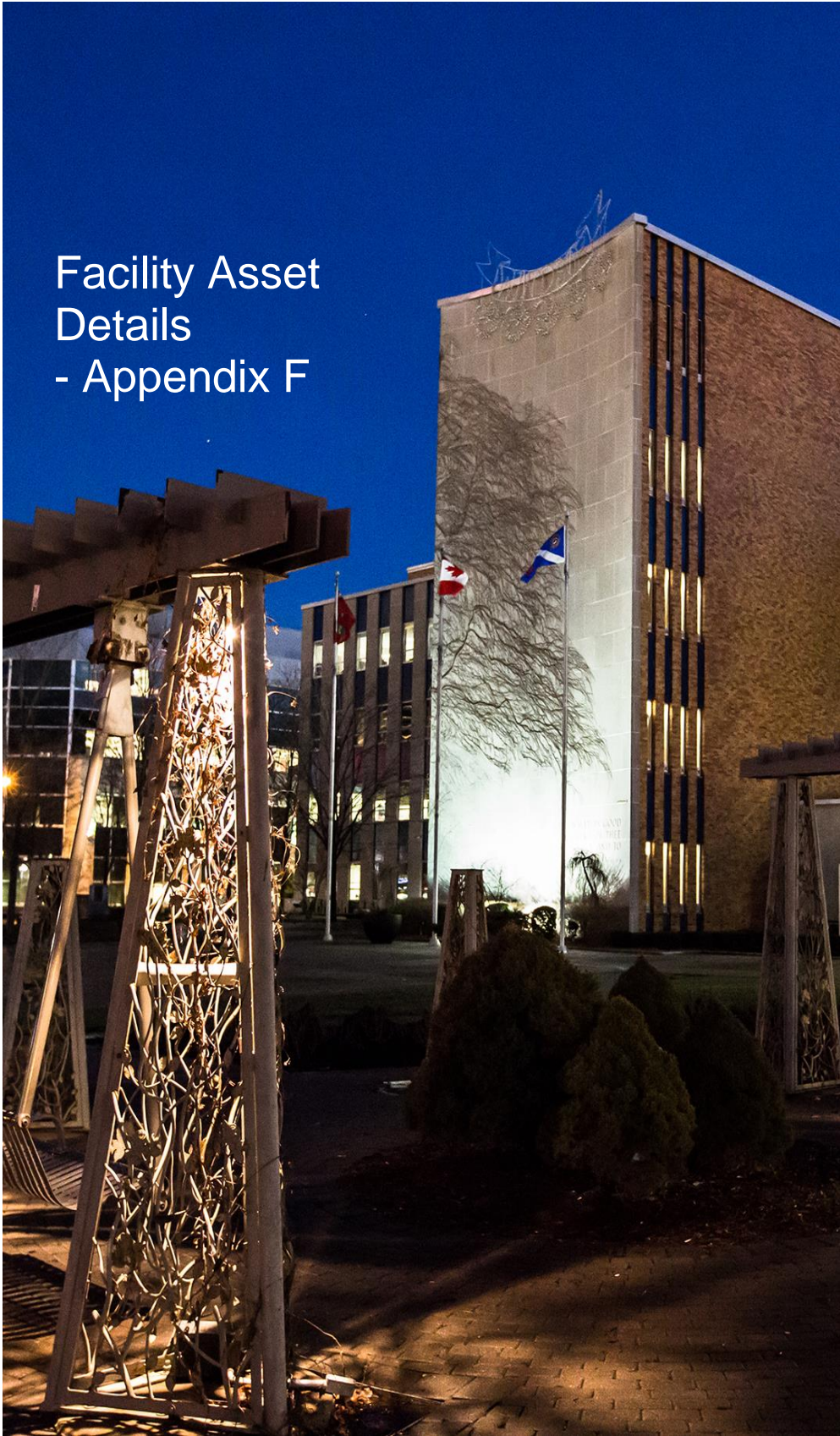
APPENDIX E - PARKS ASSET LISTING

**** This listing may not be not be reflective of all Parks Asset that are currently in service

General Asset	Asset Detail	Notes (size, material)
	Absolutely No Pet Toys In Park Due to Choking Hazard	
	Dog Park Rules	
	Pitbulls must be Muzzled	
	Please Clean Up After Your Dog	
Water Front	Danger Deep Water	
	Danger, Do Not Swim in this Area	
	Danger Thin Ice	
	Emergency Phone	
	Fine For Mis-Use of Life Preserver	
	Fishing Allowed	
	Lifeguard Sign	
	Life Preserver	
	No Diving	
	No Lifeguard	
	Swim At Own Risk	
	Swimming & Fishing Prohibited	
	Use of Dock Restricted to Boat Owners Only	
	Chain Link Fence at lake storm inlet	
	Pedestrian Bridge	
	Chain Link Fence around drain	
other	Dangerous Area, Keep Out	located at outlet

APPENDIX F
Facility Assets

Facility Asset
Details
- Appendix F



Section 1
State of
Local
Infrastructure

Section 2
Levels of
Service

Section 3
Asset
Management
Strategy

Acknowledgements

The development of this document was a significant corporate wide initiative and involved the various committees and committee members identified below.

Asset Planning Steering Committee:

Joe Mancina, Mark Winterton, Harry Turnbull, Shelby Askin-Hager, Thom Hunt, Tom Graziano, Dwayne Dawson, Jan Wilson

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Gabe Taba, Melissa Osborne

Facility Condition Assessment Consultants:

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**Section 1
State of Local
Infrastructure**

State of Local Infrastructure

1.1 Asset Inventory

The Corporation of the City of Windsor owns and operates a sizable portfolio of assets that span several service areas. This AMP covers the assets which are aligned to the City's Facilities Operations Department.

The Corporate Facilities Management service area encompasses a very wide network of diverse buildings and structures and is therefore quite unique in its purpose and function. Because every facility is different in its operating and maintenance requirements, Corporate Facilities cannot take a one-size-fits-all methodology in its operational approach and long-term forecasting. Whether analyzing the prospects and feasibility of a new build or planning for the rehabilitation of an older facility, a proper working plan, condition assessment, project analysis and business case are required to ensure all of the required community needs are taken into account while still following established industry construction and maintenance standards. Therefore, the ongoing asset condition data program and long-term operational analysis being developed is critical in allowing and ensuring the City is making decisions using proper whole life-cycle costing analytics and asset management principles.

The City of Windsor's Corporate Facilities Operations include a vast array of assets across several facility types, some of which include multi-use recreation; recreation, park, police, environmental, transitional, administrative, parking and operations yards. The Corporate Facilities listing also includes several facilities owned by the City but managed by an agency, board and/or commission as they operate and provide services out of these locations. The Facilities Department also offers inspection, maintenance and other services to various departments and agencies. The roof inspection program for example is a service provided to all corporately affiliated buildings, despite the fact that many buildings don't fall within the ownership of the Facilities Department.

Ultimately, the Facilities Department's primary objective is to properly maintain the City's entire portfolio of buildings in the most efficient and effective manner possible while delivering an acceptable level of service to the community. The City of Windsor's Facility asset inventory is continuously aging and deteriorating. Therefore, it is critical to provide the resources necessary to effectively operate and maintain each facility in an acceptable condition. The Department has also continuously taken ownership of new facilities and assets, some of which have significant operating ramifications, without the corresponding maintenance support (both financial and human resources) that reflect the true nature of the long-term facilities' needs. Along with this, ever increasing regulatory standards for social and safety requirements are placing both technical and financial pressure on old and new buildings within the Facility portfolio. However, many positive steps have been taken in recent years to help address some of the primary operational needs of the Facilities Department and in support of the long-term Corporate vision statements and objectives. The ongoing Facility Condition Assessment program and the continuous implementation of sound Asset Management principles and practices will not only help to continuously maintain the Corporation's significant portfolio of facility assets but also potentially provide a means for better predicting the required/scheduled maintenance on a particular facility. Thereby, reducing the need for significant repair and maintenance work and the corresponding service interruptions for the community. This should lead to reduced wait times for services in Corporate facilities and drive an overall better level of service.

The Corporation is developing a whole life costing approach to decision making and a future goal is to move towards complete life cycle costing to better understand of the cause and effect of various facility component decisions. This includes implementing a robust Condition Inspection Program that would analyze facilities at a system level, enabling the Corporation to more adeptly manage their operations and maintenance program.

The reporting of Facilities assets in the City's 2018 Asset Management Plan serves to meet the requirements of Ontario's new Regulation 588/17. Although this requirement was not due to be met until

2023, the significance of the Facilities asset portfolio combined with recent and significant progress in asset management projects within the department allowed for this critical reporting to be completed before the expected regulatory implementation date.

As the AMP is being written in 2018, the data used for this report is 2017-year end data.

The Tangible Capital Asset (TCA) value of Facilities assets is \$828,746,845 based primarily on 2017 replacement cost data combined with up to date capitalized costs for several current construction projects. Table 1-1 provides a high-level overview of the Facilities asset inventory included within the scope of the 2018 AMP.

TABLE 1-1—INVENTORY OF FACILITIES ASSETS

Asset Type		Inventory 2017	Size (Approx.) ft ²
Facilities			
Total Facilities		170	2,702,303
Category	Administrative	5	510,207
	Library	9	152,237
	Recreation	25	280,555
	Transit	2	141,500
	Operations Yard	20	272,995
	Long-Term Care	1	176,528
	Parks	64	165,989
	Heritage	6	57,115
	Recreation/Culture	1	77,500
	Golf	5	46,150
	Airport	5	64,800
	Fire	9	90,364
	Multi-Use Recreation	4	472,400
	Police	5	148,456
Other	8	45,507	

**The data provided in this chart is a point in time inventory from the 360Facility database. This data is not completely reflected in TCA database for replacement cost purposes as certain facilities may have not met the TCA cost threshold or there may be projects still in progress which haven't yet been capitalized (ex. New City Hall is not captured under ft² values).*

Compared to the prior Corporate Asset Management Plans developed in 2013, there is a notable increase in square footage and replacement cost of Facilities assets found in this updated version (2018) of the AMP. This is due to several factors including the Facilities department absorbing several buildings into their portfolio and the new development of multiple prominent corporately managed facilities including the downtown Aquatic Centre, South Windsor Arena Expansion, East Windsor aquatic development at the WFCU Centre and multiple fire halls and libraries.

When looking to the replacement cost of the Facilities portfolio, it becomes clearer that the primary driver in the increase in corporate building infrastructure can be found in the Recreation area and specifically the major aquatic and arena/convention spaces referenced previously. In fact, over \$94 Million of the replacement cost increase can be allocated to the new development of major recreational facilities. In providing these services to the community however, there will be a future need for increased capital and operating resources to properly maintain these facilities to regulatory standards and at an acceptable level of service.

The City is moving towards a whole life costing approach to decision making for all asset categories, however this is not currently utilized in all cases and sufficient data is not available to enable a full analysis of the root causes of failures. A future goal is to work towards complete life cycle costing and to

have a better understanding of failure modes for the Facilities portfolio. This would include implementing changes to the Condition Inspection Program for all component levels which will enable a move from a “Reactive” to a “Proactive” model. As part of the Facilities Inspection Program overhaul, assessments and project business cases are now analyzed based on building sub-component systems rather than at an entire facility level, which lacked the necessary data required for sound decision-making. Table 1-2 outlines the new Facility sub-component classification:

TABLE 1-2—FACILITY COMPONENT SYSTEM ANALYSIS

Revised Building Condition Analysis Program		
All Facilities		
Major Categories		
Component	1	Roof: Bitumen (tar/asphalt), shingles/metal (if not flat roof), ballast/gravel, caps/vents/protrusions, flashing
	2	Heating Systems: Boilers, furnaces and heat pumps including building system controls
	3	Cooling Systems: Chillers, traditional air conditioning units and heat exchangers
	4	Air Handling Systems: RTU’s, fans/blowers, elements, filters, dampers etc.
	5	Elevators/Conveying Systems: All hardware and lift mechanisms
	6	Building Envelope: Exterior doors/windows/openings, foundations/footings/structure, building exterior (brick, aluminum/metal cladding, concrete, stucco etc.),
	7	Plumbing Piping/Fixtures/Venting: Water consuming fixtures (toilets, tubs, faucets etc.), delivery & drainage piping (only that which is readily visible including backflow preventers), non-water consuming equipment (water treatment/filters etc.) & energy consuming equipment (pumps, heaters, hot water tanks etc.)
	8	Main Electrical Service & Distribution: Lighting systems including emergency lighting and controls, main electrical service (main shutoff, switchgear/distribution boards, busbars, transformers, etc.), and electrical distribution (wiring, panels, breakers/disconnects etc.)
	9	Security/Access Systems: Card/key/swipe systems and CCTV systems
	10	Fire Suppression Systems: Sprinkler systems (piping, heads, valves etc.) & fire alarm systems
Other (Minor) Categories		
Component	11	Interior Finishes: Drywall, floors and ceilings. Flooring in each facility must be identified by type (i.e. Ceramic/vinyl tile, carpet, etc.) and provided a condition score
	12	Accessibility and Other Issues: A catch-all category for Proponent to outline any and all possible concerns or deficiencies for each facility and recommend possible long-term solutions (i.e. railing height, barrier free washrooms etc.) & building site work including parking lots, garages, catch basins, walkways/paths/sidewalks, landscaping etc. (Any deficiencies to be documented including photographs)
	13	Pools: Liners, pumps & other equipment in buildings which house pool facilities
	14	Specialized Equipment & Electrical: Special lighting equipment (eg. theatre lighting) in only those facilities which house such equipment

Implementation of the new Facilities Condition Inspection project began in 2015 with tendering of a contract to inspect the Corporation’s most prominent and integral buildings in alignment with the recently developed sub-component framework. Over the two years that followed, 71 of the City’s most integral facilities were inspected based on their current condition as well as projected capital needs over a 20-year horizon (in alignment with City Council’s desire for a 20-year vision). The focus of the initial phases of the condition program were on the larger recreation, administrative, operations, fire hall and library buildings as this represented a large proportion of the Corporate operating and maintenance needs as well as the largest percentage of the Facilities portfolio replacement cost.

The initial results and output of this program can be found in various sections in the AMP as a significant proportion of the Corporate Facilities portfolio can now be analyzed based on building component systems and programs as opposed to a simple high-level view of the facility as a whole.

Given that the age of facilities as a whole as well as their component systems can often be used as a subjective gage for approximate replacement needs, the province of Ontario requires the reporting of such statistics as part of their new O.Reg 588/17. Table 1-3 outlines the average age of the Corporation's facilities by category.

TABLE 1-3—AVERAGE AGE OF FACILITIES BY CATEGORY

Asset Type		Inventory 2017	*Average Age
Facilities			
Total Facilities		170	28.5
Category	Administrative	5	20.8
	Library	9	30.4
	Recreation	25	22.6
	Transit	2	19.7
	Operations Yard	20	28.9
	Long-Term Care	1	11.5
	Parks	64	32.2
	Heritage	6	107.3
	Recreation/Culture	1	5.5
	Golf	5	25.9
	Airport	5	14.8
	Fire	9	20.1
	Multi-Use Recreation	4	24.8
	Police	5	20
Other/Transitional	8	43.5	

* Provided to meet requirements of O.Reg 588/17. Average age refers to the date a building was in service. Although additions and maintenance work are often completed on facilities bringing certain components or systems up to date, the overall facility is given an age that reflects the date the primary facility was put into service.

1.2 Asset Valuation

Based on the asset inventory data that was compiled, a valuation was undertaken based on the 2017 replacement cost of each asset type. The asset valuations were based on data in our Tangible Capital Asset system. The population of the TCA system was part of the PSAB financial reporting requirements. This required local government to present information about the complete stock of their tangible capital assets and amortization in the summary financial statements. The City needed to complete this work by January 1, 2009. The replacement cost values are recalculated on an annual basis, using consumer based indices appropriate for each of the asset types. The replacement costs are also randomly selected on occasion to compare current pricing for a replaced asset to replacement cost estimates. This provides a secondary check that replacement cost estimates are reasonable. The 2017 replacement costs, used in our financial reporting, have been utilized for all assets covered within the 2018 AMP.

It also must be noted that the following conditions apply to the asset replacement values captured in the TCA database:

- All replacement costs are based on the cost to replace the asset with the exact same asset and;
- There is no growth, technology change, enhancement assumptions included in those costs.

As such, these costs should be viewed with caution as a project to replace an asset may differ greatly depending on the type of work and classification of facility. This AMP is focused on the cost required to merely sustain our existing Facilities assets at the same level of service over the next 20 years without consideration for service enhancements.

1.2.1 Facilities Valuation

The 2017 replacement cost value of the City's Facilities asset portfolio is \$828,746,845, an increase of \$173,033,050 since 2012. The Facilities asset base includes all facilities owned and managed by the Corporation including fire halls, libraries, golf facilities and airport buildings. This is consistent with the reporting found in the original version of the AMP in 2013. It must also be stated that the replacement costs referred to in this AMP refer specifically to 2017 replacement costs and not the expected replacement costs at the end of a particular facility's useful life. For example, the replacement cost allocated to the Huron Lodge in the 2013 AMP was \$41,612,536 based on the value of direct replacement of that particular facility if it needed to be replaced in that particular year. However, based on the expected useful life of the facility, at the time it is due to be replaced, the expected replacement cost is actually projected to be closer to \$100,000,000. In fact, the replacement cost of the entire Facilities portfolio could potentially be significantly more than the 2017 reported value should each facility be replaced with a similar asset at the end of its useful life. This underlies the importance of long-term financial and operations planning and the requirement for a reasonable Facilities Reserve to be established.

It must also be noted that the current actual cost to replace specific facilities will likely be higher than the value projected in the TCA database utilized for financial purposes. Many variables can affect this valuation and many factors cannot be accurately reflected using available decision-making tools. Construction costs have steadily increased and are very much influenced by the supply and demand of materials and available human/worker resources. The critical need to design, build and maintain facilities to new and ever more stringent regulations and standards has added a significant financial and resource burden to new builds and maintenance alike. And replacement of a Corporate facility with a new asset rarely equates to a direct replacement of equal scope and value. New facilities are often larger, more accommodating and technologically and mechanically advanced than the older buildings they replaced. Although it is agreed that these new amenities are critical to the health, well-being and overall enjoyment of the community as a whole, they add significantly to the financial and human resource demand and cannot be accurately reflected in the current replacement cost. This must also be accompanied with appropriate operating and maintenance resources should the City wish to continue to deliver the services at an appropriate and expected level.

Facility asset data is managed and maintained in the *360Facility* CMMS database by the Technical Support Coordinator in the Facilities Operations Department. An up to date inventory of all facility assets including asset description and size is tracked to the CMMS database. Work orders pertaining to all Facilities operations and maintenance is also administered and tracked within *360Facility*. The Facilities Department also monitors all asset components and building systems requiring regular maintenance as part of their regulatory requirements.

Generally speaking, the larger and higher profile facilities absorb the majority of the Facilities Department's attention in terms of operating and maintenance practices and consequently the resources during the implementation of the condition assessment program. Huron Lodge, prominent recreational/destination facilities, critical operations buildings, fire halls, libraries and community centric administrative buildings are deemed critical to the general operation of the City and therefore inherently assume a higher profile and carry a higher risk. For this reason, as stated previously, these facilities have been the focus of the Corporate inspection program in an effort to accumulate valuable third-party expert advice on long-term maintenance expectations. Objective condition ratings are sought for all such critical buildings with the remaining facilities receiving a subjective rating based on age, expected useful life and expert internal knowledge of particular buildings. In all cases, ratings are mapped to the AMP Condition Rating categories of Very Good, Good, Fair, Poor and Very Poor, the details for which can be found in Table 1-5 below.

The table below outlines the 2017 Facility inventory and replacement values for all building classifications:

TABLE 1-4—FACILITIES ASSET VALUATION

Asset Type		2017 Inventory	2017 Valuation
Facilities			
Total Facilities		170	\$828,746,845
Category	Administrative	5	\$143,571,335
	Library	9	\$10,889,732
	Recreation	25	\$220,636,276
	Transit	2	\$40,403,897
	Operations Yard	20	\$23,701,605
	Long-Term Care	1	\$45,995,686
	Parks	64	\$36,273,517
	Heritage	7	\$9,022,000
	Recreation/Culture	1	\$5,163,985
	Golf	5	\$22,070,356
	Airport	5	\$53,601,947
	Fire	9	\$40,174,467
	Multi-Use Recreation	4	\$117,473,868
	Police	5	\$29,927,317
Other/Transitional	8	\$29,840,857	

1.3 Asset Useful Life

The determination of the lifespan of an asset for Tangible Capital Asset (TCA) financial reporting purposes was a combination of the useful life and design life of a specific asset. In many cases however the percentage of useful life “consumed” may not be the most suitable indicator of current asset condition. Facilities for example typically undergo a continual maintenance and rehabilitation process and hence age may not be the most suitable indicator to use for asset management planning. Facility sub-components also don’t always deteriorate along a predictable degradation curve as many building components simply work effectively for a period of time, and then fail without warning. As such, in many cases asset useful life needs to be augmented with other information such as actual asset condition rating, history of asset upgrades, and expert judgment.

It should be noted that estimated useful lives, based purely on age, can sometimes provide a misleading view of the replacement timing for the assets. In many cases assets that are properly constructed and maintained may outlive their estimated useful life and continue providing valued service. In other cases, due to poor workmanship and lack of proactive maintenance, assets may fail before they fulfill their estimated useful life.

The City of Windsor has utilized objective condition ratings for the 71 facilities currently assessed within the on-going Corporate Facility Condition Project. A hybrid approach that relies on asset age, assumed useful life, and expert judgment to evaluate the condition state has been used for the balance of the Facility assets.

1.4 Asset Condition

Section 1.4 of this AMP provides an overall analysis of the condition of the Corporation's Facility asset portfolio covered by this plan based on their 2017 replacement values. Given the uniqueness of the City of Windsor's Facility Condition Program, this section will be different than the previous AMP (2013) in that there will be 2 primary sections. The first section will focus on the facilities that were rated subjectively as per the guidelines used to rate all facilities in the previous AMP. The second section will utilize data obtained through the recent Facility Condition Assessment project and will therefore provide condition data based on a much more detailed and service level-oriented analysis of building components and systems. The goal is to eventually be able to provide detailed condition assessment data on all the facilities within the Corporate portfolio.

FIGURE 1-1—2013 - 2018 FACILITY ASSET CONDITION COMPARISON

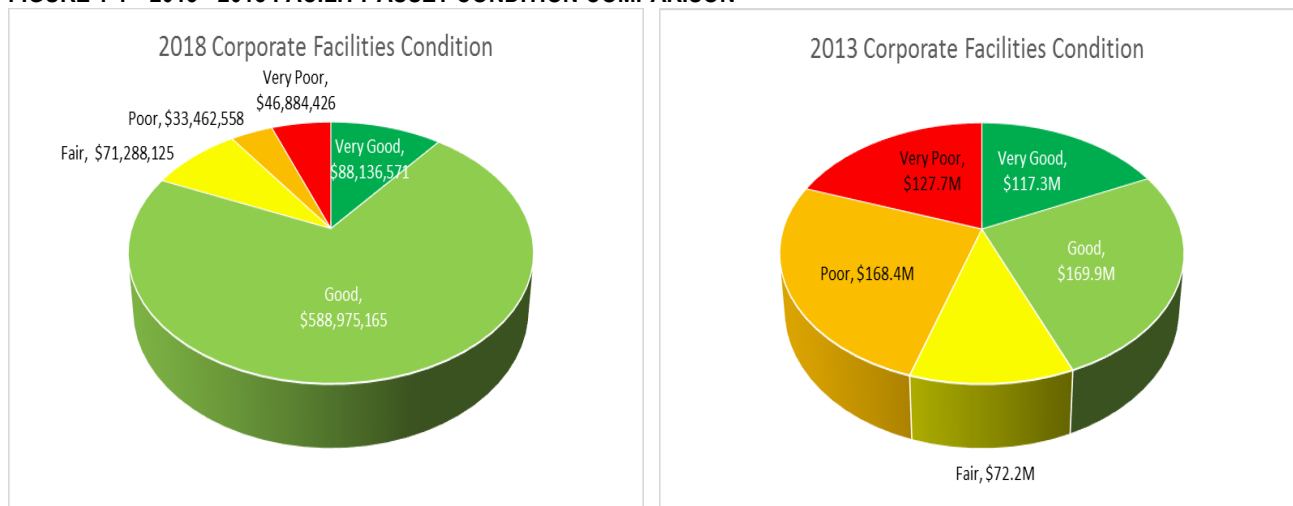


Figure 1-1 details the comparison between 2013's facility AMP report and 2018's updated facility assessment. As outlined previously, the Corporation's facility condition assessment program was established in 2015 and began the era of assessing City of Windsor facilities on a detailed sub-component asset level. For purposes of asset condition reporting, the 2018 facility AMP utilizes third-party objective condition data combined with subjective ratings for those facilities that were not yet inspected within the Corporate assessment program. In 2013, facility condition data was derived entirely with subjective information and based primarily on an age and internal knowledge and understanding of facility operations.

Several primary distinctions between 2013 and 2018 asset data must be understood in order to fully and properly comprehend the current state of the facility asset portfolio. Following the release of the City's 2013 Asset Management Plan and within the development cycle of the 2018 AMP, the City has disposed of several older, very poor buildings and added multiple large, high profile facilities which contributed greatly to the variance in the respective asset portfolio rankings. In fact, a significant percentage of the facilities in the 2018 AMP's Good and Very Good condition threshold can be attributed to several large recreational developments new to the Corporation in the past few years. Although these buildings are early in their expected lifecycle, they represent a significant operating and maintenance risk due to their unique character and the nature of their operations. The 2013 condition rankings were also completely based on subjective feedback and each building was analyzed at an overall facility level. This meant that a single significant component in Poor or Very Poor condition could affect the ranking and reporting of the entire facility in the 2013 AMP. In 2018, recent objective condition information at the building sub-component level allows for more accurate reporting and mitigates the affect a poor facility component has on the entire rating. Therefore, the percentage of Poor and Very Poor rankings in 2013 was

reflective of the fact that there was yet a sufficient and reliable means to report facility data with any level of detail and structure.

1.4.1 Corporate Facility Asset Condition – Ratings Overview

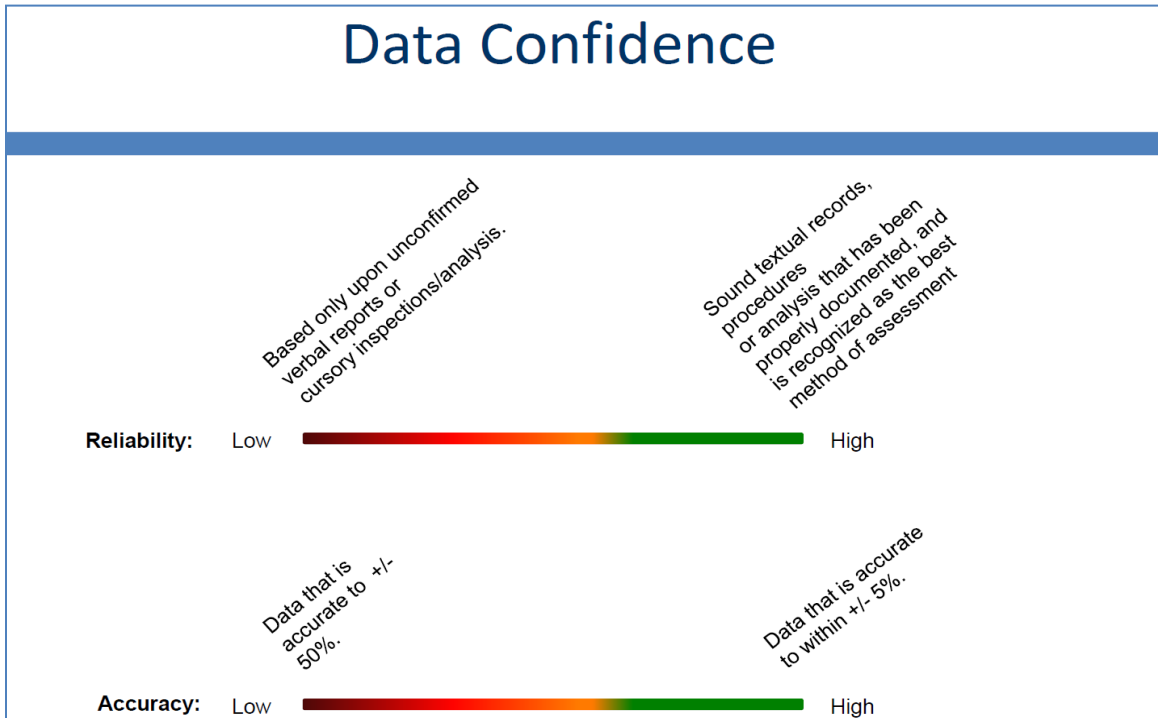
For the subjective facilities ratings assessment, a five-point rating scale has been utilized which aligns with those measures employed by the National Infrastructure Report Card produced by the Federation of Canadian Municipalities (FCM), Canadian Society of Civil Engineers (CSCE), and CCA. In addition to providing a sound basis for assessment, this could allow for high-level benchmarking against other municipalities across Canada. The ratings range utilizes a numerical scale from 1 to 5 as described in Table 1-5 below which reflects each particular asset group's observed physical condition.

TABLE 1-5—ASSET CONDITION RATING SCALE SUMMARY

1	Very Good	The infrastructure in the system or network is generally in Very Good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.
2	Good	The infrastructure in the system or network is in Good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.
3	Fair	The infrastructure in the system or network is in Fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.
4	Poor	The infrastructure in the system or network is in Poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.
5	Very Poor	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service.

Along with providing a condition rating for each asset category within the Facilities portfolio, a data confidence metric was utilized to provide the end user with a certain context when evaluating the output of the condition ratings system. This data confidence measure takes into consideration both the expected reliability and accuracy of the condition data as detailed in figure 1-2 below.

FIGURE 1-2—DATA CONFIDENCE – RELIABILITY AND ACCURACY LEVELS

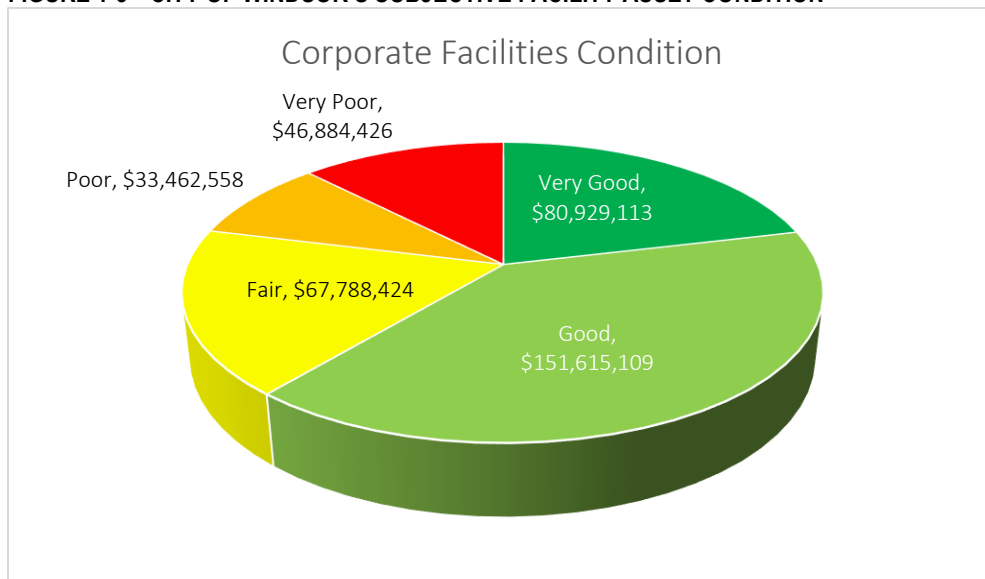


For each following section of the Facilities condition analysis, the end user will be provided an idea of both the method as well as reliability and accuracy of the current methodology utilized to obtain asset performance data.

1.4.2 Facility Asset Condition Review

Figure 1-3 provides an overall view of the condition of all Corporate facilities that were not a part of the initial phases of the Facility Condition Assessment Program.

FIGURE 1-3—CITY OF WINDSOR’S SUBJECTIVE FACILITY ASSET CONDITION



As one can see, approximately 61% (by replacement value) of the Facilities portfolio that were subjectively rated fall within a Very Good to Good condition rating. This leaves approximately 39% of the Facilities portfolio in a Fair to Very Poor state and this represents the likely group of buildings that will be dealt with in terms of required maintenance and rehabilitation over the next AMP cycle. This means approximately \$148 Million worth of Corporate Facilities will likely require significant maintenance in the near term in order to continue to operate and provide an acceptable level of service to the community.

Figure 1-4 also draws one other significant caveat that requires mention in order to provide perspective to the overall subjective condition context. Of the entire \$380,679,630 replacement value of the facilities that were subjectively rated, approximately \$232 Million falls within the Very Good and Good categories representing 61% of the network, as mentioned previously. This appears to show that the majority of facilities are in Good condition and the network is in reasonable order requiring little maintenance for the foreseeable future. It should be noted however that of the \$232 Million in facilities that appear to be in Good condition, over \$94 Million are comprised of only 3 new facilities that in and of themselves will require ongoing maintenance due to the type of facility and nature of service they provide. This means that 40% of the Good and Very Good rating is comprised of a few higher maintenance facilities and the approximately 100 remaining facilities absorb the majority of the Fair, Poor and Very Poor rankings. In fact, if the 3 large new recreational facilities were eliminated from the condition equation, 52% of the facilities would be categorized in Fair to Very Poor condition and only 48% of the facilities would be considered in a Good or Very Good state. This further denotes the importance of establishing a reasonable Corporate Facilities reserve as a mitigating tool for significant expected future maintenance and rehabilitation needs. This does not speak to the fact that funding is also required for specific aesthetic components of a facility that may appear to be in Fair condition but don't necessarily reflect the service level desired of Corporate Facilities as the public face of the Corporation.

1.4.3 Corporate Facilities Asset Condition

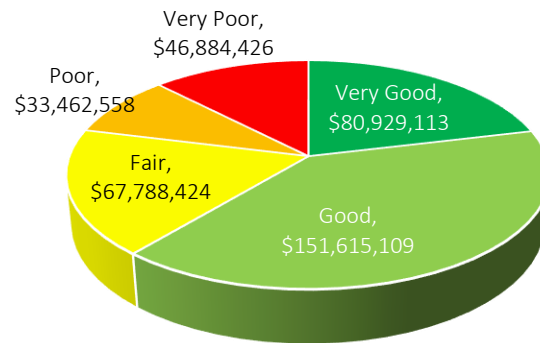
Summary of Facility Asset Subjective Condition Ratings

Corporate Facilities	Corporate Replacement Value: \$828.7M	Replacement Value of Subjective Facilities: \$380.6M
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Approximately 61% of the City's Corporate Facilities Portfolio are in Good to Very Good condition with the remainder approaching the end of their expected useful lives. The facilities in this section of the AMP have not been assessed under the Corporate Condition Assessment Program and are therefore subjectively rated based on sound internal knowledge, experience and data. It would be prudent to eventually include these facilities as part of a future phase of the Condition Program in order to allow for the same detailed needs analysis of each facility's component and system requirements. In order to sustain the current level of service, increased funding has been required and will continue to be required to maintain the existing building stock. Over the coming years, it is expected that many of the facilities in Fair or worse condition will experience noticeable signs of deterioration that will require significant maintenance funding in order to prevent them from further degrading. Several of the newer high value facilities that are in the Good and Very Good category offer special amenities and services that require specialized equipment and systems that are known to require greater maintenance, further necessitating the need for a more robust funding formula and the establishment of a maintenance reserve.



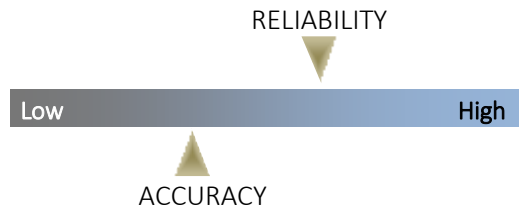
Corporate Facilities Condition

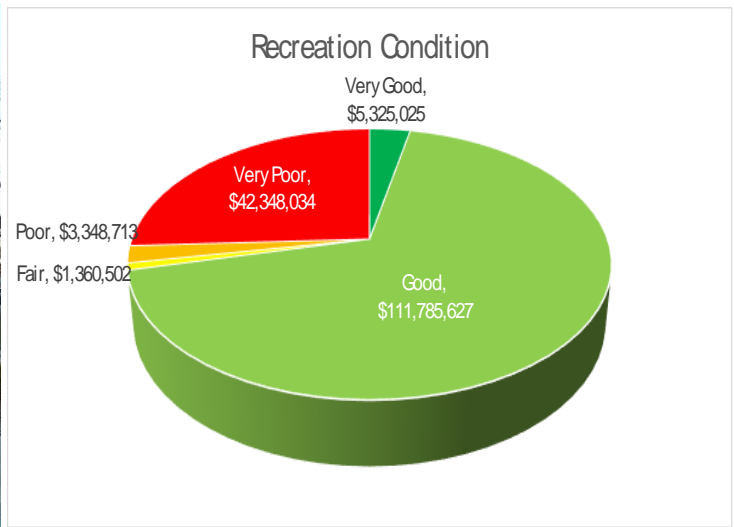
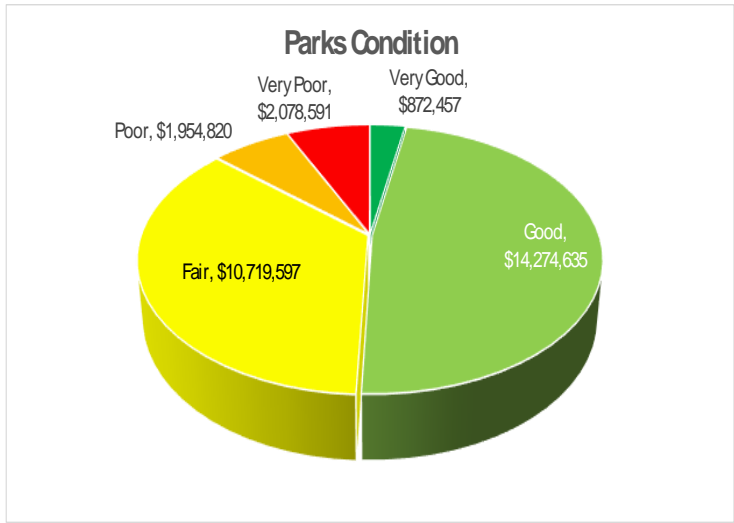


Overall Condition = Good

Data Confidence:

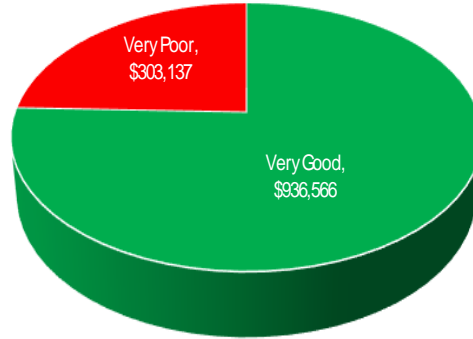
Implementing 360Facility CMMS to manage and maintain the asset data, including reactive and preventative maintenance work orders, provides more reliability on information. The accuracy remains below average as the information currently available is at the building level and condition information is subjective. As detailed previously, these Corporate Facilities should ultimately be inspected through the Condition Assessment Program. Breaking down each facility into major components against which replacement costs and condition are applied will provide a more accurate metric in which to identify what system in a building needs to be addressed. Currently, the overall building condition assumes the rating is applicable to the entire facility and as such, limited reliability should be placed on the information. In addition, replacement costs are based on the entire building often leading to an unreliable valuation of the cost of assets in any given rating category. Inventory has been verified through our TCA database, and with 360Facility CMMS data. Valuations are based on 2017 replacement costs from the TCA database combined with WIP reporting for newer projects. Condition and investment forecasts for these assets are based on sound engineering practices and analysis combined with expert opinion.



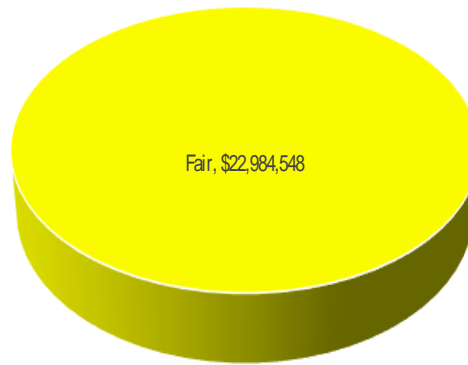




Operations Condition



Police Condition



Golf Condition

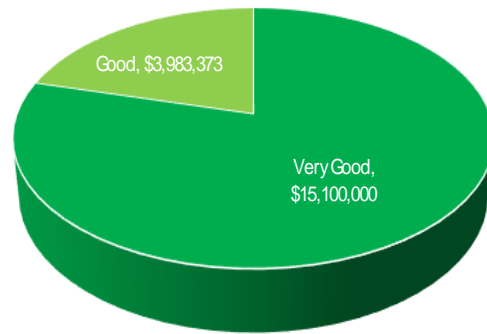




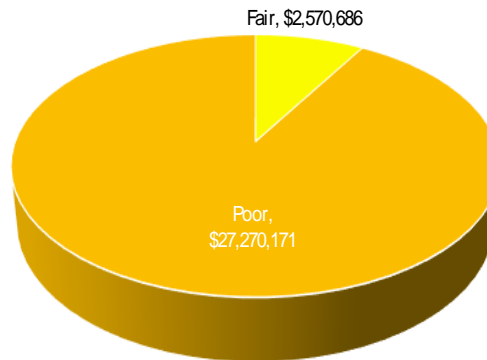
Administrative Condition



Fire Condition



Transitional Condition



Summary of Facility Asset Objective Condition Ratings

Corporate Facilities	Corporate Replacement Value: \$828.7M	Replacement Value of Condition Assessment Facilities: \$448.1M
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Implementation of the new Facilities Condition Inspection project began in 2015 with the intent to inspect the Corporation's most prominent and integral buildings. Over the two years that followed, 71 of the City's most integral facilities were inspected based on their current condition and each facility report was given an overall high-level rating. The focus of the initial phases of the condition program were on the larger recreation, administrative, operations, fire hall and library buildings as this represented a large proportion of the Corporate operating and maintenance needs as well as the largest percentage of the Facilities portfolio replacement cost. The primary facilities that make up the first 2 phases of the assessment program represent over 54% of the entire Corporate building asset base. Although the Corporate Condition Assessment Program was initially developed in order to analyze facilities at a sub-component level, having the engineering consultant provide a single high-level rating helps satisfy certain reporting criteria which seeks to understand the general condition of the City's facility portfolio. It should be clarified that the single facility rating is made up of many sub-ratings and therefore a final condition of Very Good or Good does not necessarily mean that there are not building components in a Poor condition. It also must be stated that many of the condition graphs/pies in the following section are comprised of only 1 or 2 facilities and therefore an entire graph with a single rating can be expected.



Overall Condition = Good

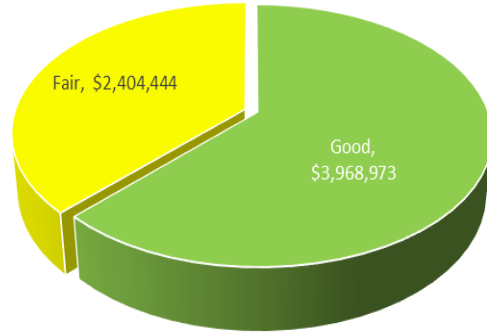
Data Confidence:

Utilizing the 360Facility CMMS to manage and maintain the Corporate Facilities network asset data, including reactive and preventative maintenance work orders, intrinsically provides a level of reliability for information. With the recent implementation of the new Facility Condition Assessment Program and the collection of expert information on each facility's overall condition, the reliability of the data in this section of the AMP is classified as High. The data accuracy is above average as it is the outcome of an in-depth engineering condition study. However, it is not considered High as the total building condition referenced in this section is a high-level indicator and therefore doesn't reflect the minor components which often have different ratings than the overall building ranking. The following data has been collected through an intensive multi-year inspection project and is the work of independent third-party facility consulting engineers working in collaboration with City of Windsor staff. Condition and investment forecasts for these assets are therefore based on sound, widely accepted engineering practices and analysis.

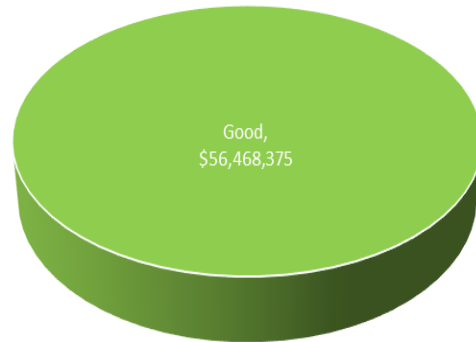




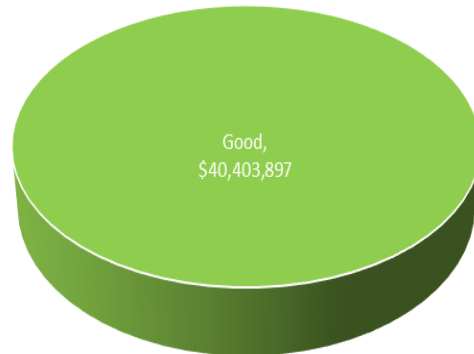
Parks Condition



Recreation Condition

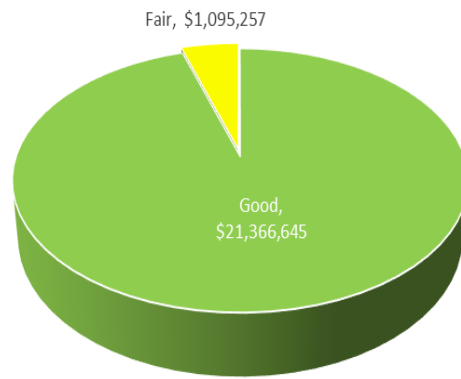


Transit Condition

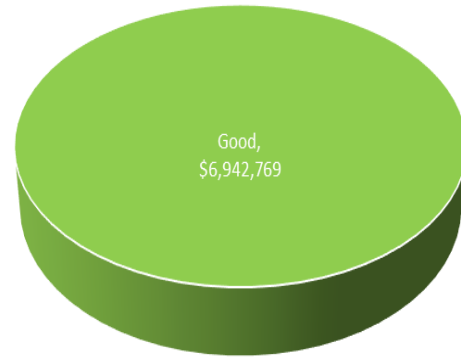




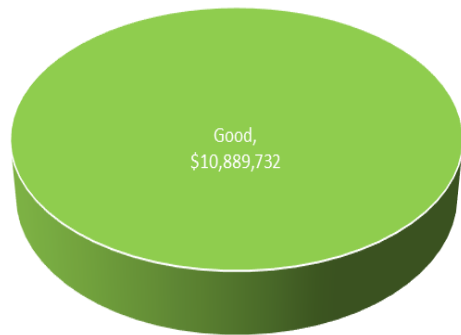
Operations Condition



Police Condition

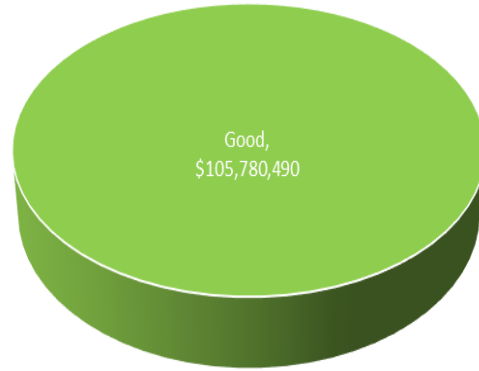


Library Condition

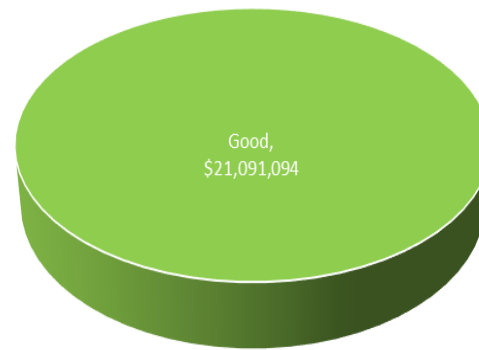




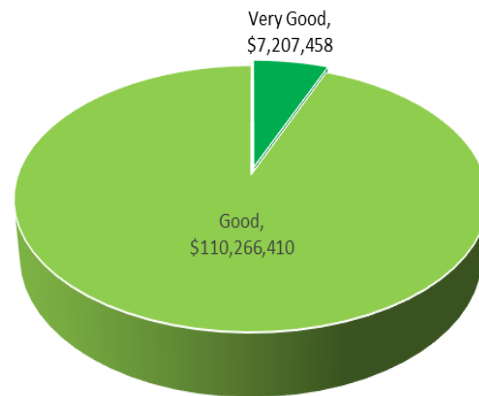
Administrative Condition



Fire Condition

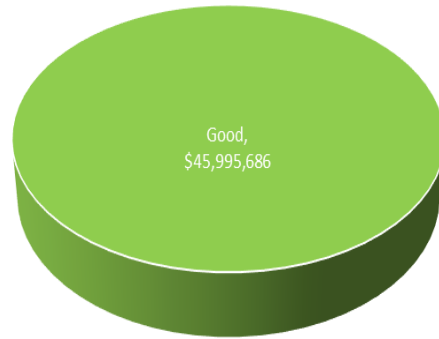


Multi-Use Recreation Condition

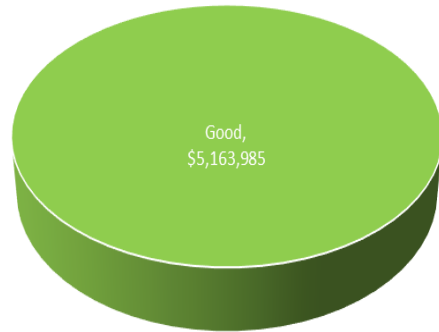




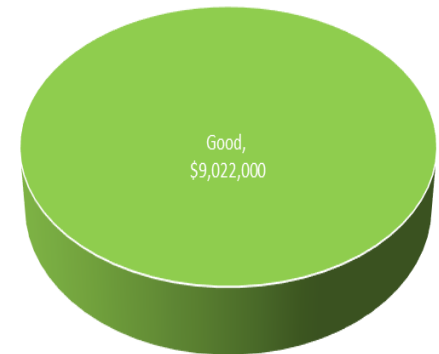
Long-Term Care Condition



Recreation/Culture Condition



Heritage Condition



It must be stated that the ratings for each condition pie in this section are a rounded-up average of sub-components within each facility inspected by the consultant. Therefore, observing a condition pie that displays an entirely Good rating does not necessarily mean that there were no Fair or Poor components within a particular facility or facility sub-system. In fact, there are Fair and Poor components in almost every category. However, upon averaging each small component within a particular system and then subsequently rounding up to achieve a singular high-level rating, the overall condition reported often appears better than what was actually observed across all components during the field inspections. The surest measure of Facility component needs remains the 20-year capital maintenance expenditure plan proposed by the Corporate Condition Assessment Consultant as detailed in the Financial Strategy of Section of the AMP.

In several categories there were also only 1 or 2 facilities that contribute data to the entire chart. Therefore it is expected, as observed above, that there would be a single rating (ex. Good) within many of the condition graphs.

Summary of Facility Asset Condition by Building Component

Corporate Facilities	Corporate Replacement Value: \$828.7M	Replacement Value of Condition Assessment Facilities: \$448.1M
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Implementation of the new Facilities Condition Inspection project began in 2015 with the intent to inspect the Corporation's most prominent and integral buildings in alignment with the recently developed sub-component framework. Over the two years that followed, 71 of the City's most integral facilities were inspected based on their current condition and with an eye on their projected capital maintenance needs over a 20-year horizon (corresponding with City Council's desire for a 20-year vision). The focus of the initial phases of the condition program were on the larger recreation, administrative, operations, fire hall and library buildings as this represented a large proportion of the Corporate operating and maintenance needs as well as the largest percentage of the Facilities portfolio replacement cost. The primary facilities that make up the first 2 phases of the assessment program represent over 54% of the entire Corporate building asset base. The initial results and output of this program are summarized below and exemplify how a significant proportion of the Corporate Facilities portfolio can now be analyzed based on building component systems and programs as opposed to a simple high-level view of the facility as a whole. The data below is also based on the expected capital repairs over a 20-year period and not total replacement costs for the whole network. The replacement cost of each network sub-category would be much higher than the financials shown in the graphs below.



Overall Condition = Good

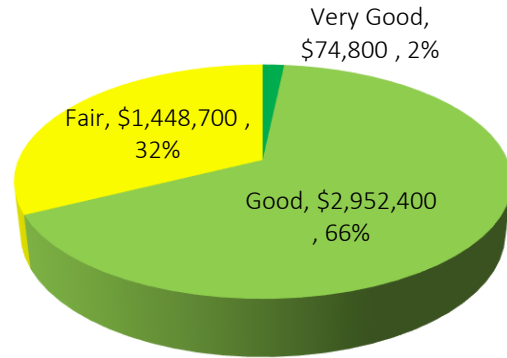
Data Confidence:

Utilizing the 360Facility CMMS to manage and maintain Facility's asset data, including reactive and preventative maintenance work orders, intrinsically provides a level of reliability for information. With the recent implementation of the new Facility Condition Assessment Program and the collection of expert information on the components and systems of some of the Corporation's most integral buildings, the accuracy and reliability of the data in this section of the AMP is classified as High. Breaking down each facility into major components against which replacement costs and condition are applied provide a much more accurate metric in which to identify what system in a building may need to be addressed. Up to this point, the overall building condition assumed a rating was applicable to the entire facility and as such, limited reliability would be placed on the information. In addition, replacement costs were based on the entire building often leading to an unreliable valuation of the cost of assets in any given rating category. The replacement cost data collected as part of the new program is a detailed breakdown of the exact replacement needs for each facility system and therefore can be relied upon as a detailed roadmap for a proper capital maintenance funding program. The following data has been collected through an intensive multi-year inspection project and is the work of independent third-party facility consulting engineers working in collaboration with City of Windsor staff. Condition and investment forecasts for these assets are therefore based on sound, widely accepted engineering practices and analysis.

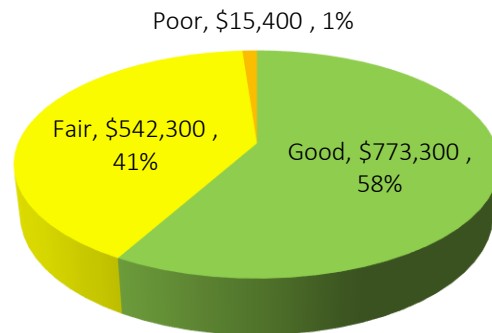




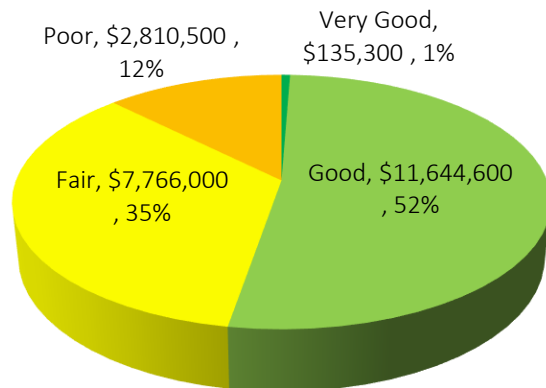
Corporate Heating System Condition



Corporate Cooling System Condition



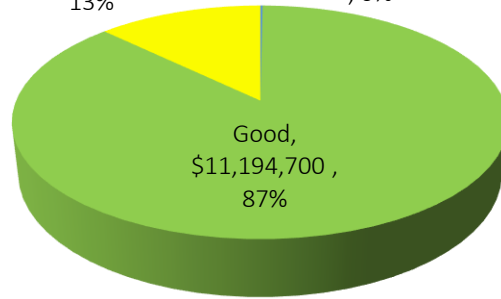
Corporate Roof Condition





Corporate Air-Handling Condition

Fair, \$1,648,900 , 13% Very Good, \$23,100 , 0%



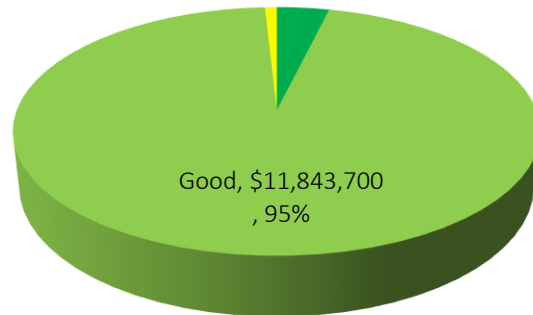
Corporate Conveying Condition

Very Good, \$11,000 , 0%



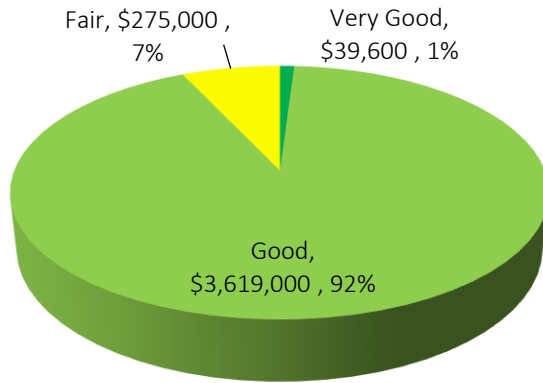
Building Envelope Condition

Fair, \$106,700 , 1% Very Good, \$469,700 , 4%

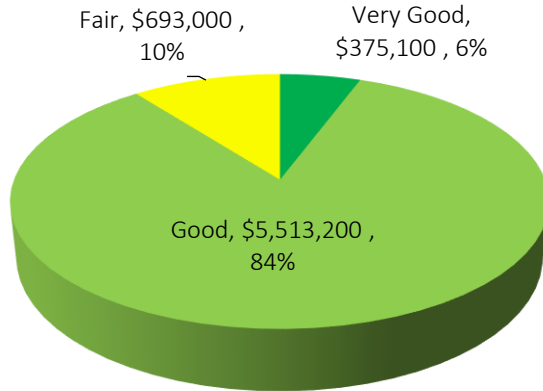




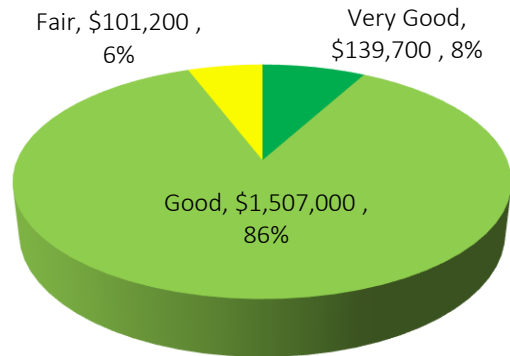
Plumbing Systems Condition

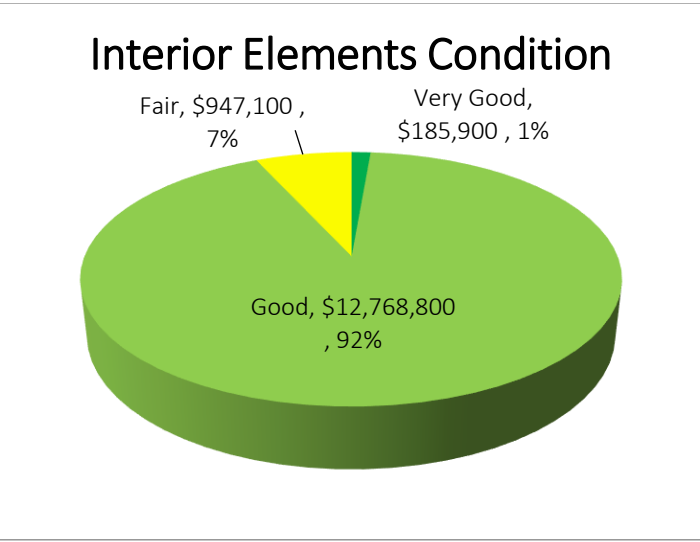
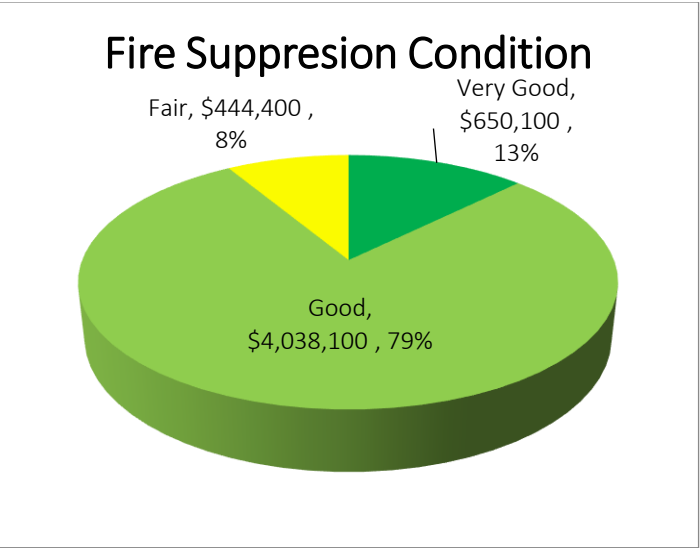


Electrical Service Condition



Security/Access Systems Condition







Pools Condition



Specialized Equipment



The condition ratings displayed in the section above outline the extent to which the objective Condition Assessment Program transformed the way in which the Corporation understands and analyzes building maintenance needs.

In the 2013 AMP it was reported that high-level whole facility subjective condition ratings were utilized in the absence of a deeper understanding of building component and system needs. Although whole facility rankings are a widely accepted and understood methodology for reporting large portfolio assets, it has several obvious drawbacks. The most glaring of which is the effect a single perceived negative building issue has on the overall ranking of a facility. In previous reported assessments, a roof in Poor condition would necessitate the downgrading of the entire facility often leading to a misleading overall portfolio rating.

With the new condition assessment program, the Corporation can objectively assess the true maintenance needs of a particular facility leading to a maintenance plan that can be dialed in to provide resources where they are most needed. The City also gets a truly detailed condition assessment where each system stands alone and is not affected by other sub-systems within the same facility. It is important to note however that the overall funding needs of the Facilities maintenance program have not decreased with a new understanding of the facility component requirements. In fact, although the facility component ratings appear to show the majority of building systems are in Good condition, the projected maintenance needs during the course of the study period (20 years) for the first 71 facilities alone are

expected to be well in excess of \$125 Million. This is simply the requirement for the maintenance of current facilities exclusively and does not take into account the funding needs for growth projects and facility enhancements. The unique nature of facility components and recent trends also show that specific systems often function perfectly well until they simply stop working. Therefore certain components that appear to be in Good condition don't necessarily follow a simple degradation curve and often slide quickly from a Good or Fair condition into a condition of immediate need. As stated previously, the corporation is also seeing many cases of premature degradation of facility components which simply can't be captured effectively in a long-term condition program plan. Systems and components often appear to be functional and operating as needed until a point in which they begin to degrade rapidly. Therefore, even systems deemed to be in Good condition may need significant attention within a few years and certainly before the next AMP would be reported. Also misleading within the condition pies above, is the actual maintenance need of newer facilities that skew the condition ratings to a Good or Very Good status but don't account for the true operating and maintenance needs that begin upon commissioning and extend through the entire useful life. A new facility, of which there are many within the Corporation, receives a Very Good or Good rating by the simple fact that they are new. However the condition charts don't capture the expected almost immediate needs of newer high profile facilities. The Corporation is developing a whole lifecycle costing approach to new development which aims to capture the true nature of a particular asset and its corresponding financial (operating and maintenance) needs and such a methodology would account for the fact that even new assets require a significant financial commitment in order to function effectively. New assets (growth) should most assuredly be accompanied with an immediate supporting financial commitment/reserve to support the operating and maintenance needs that are becoming ever more important during the early stages in a facility's lifecycle. Ultimately all assets, and especially new ones, would have a corresponding long-term whole-life maintenance and financial plan that would allow for the establishment of a potential reserve to accommodate for the financial needs of a particular facility at all stages of its expected useful life.

It must also be reiterated, as stated in the previous section, that the ratings for each condition pie in this section are a rounded-up average of lower-level components assessed by the facility consultant. Therefore, observing a condition pie that displays an entirely Good rating does not mean that there were no Fair or Poor components within a particular facility or facility sub-system. There were in fact observed Fair and Poor components in almost every category however upon averaging each component within a particular system and then subsequently rounding up to achieve a singular high-level rating, the overall condition reported often appears higher than what was actually observed across all components during the field inspections. Once again, the surest measure of Facility component needs remains the 20-year capital maintenance expenditure plan proposed by the Corporate Condition Assessment Consultant as detailed in the Financial Strategy of the AMP.



Section 2
Levels of
Service

Levels of Service – Ensuring Current LOS is Maintained

2.1 Services and Key Performance Indicators

2.1.1 Scope of Services

This very critical infrastructure enables various City departments to deliver much needed services to the residents of the municipality as well as provide a safe and welcoming environment for members of the community to gather. Corporate facilities, whether recreation or administrative buildings, are often viewed as the face of the City by members of the public and as such, demand a high level of care, performance and monitoring.

- The primary purpose of the Facilities Department is to properly manage, maintain and acquire buildings and facilities for the use of all City departments, outside agencies and the general public. Key Performance Indicators

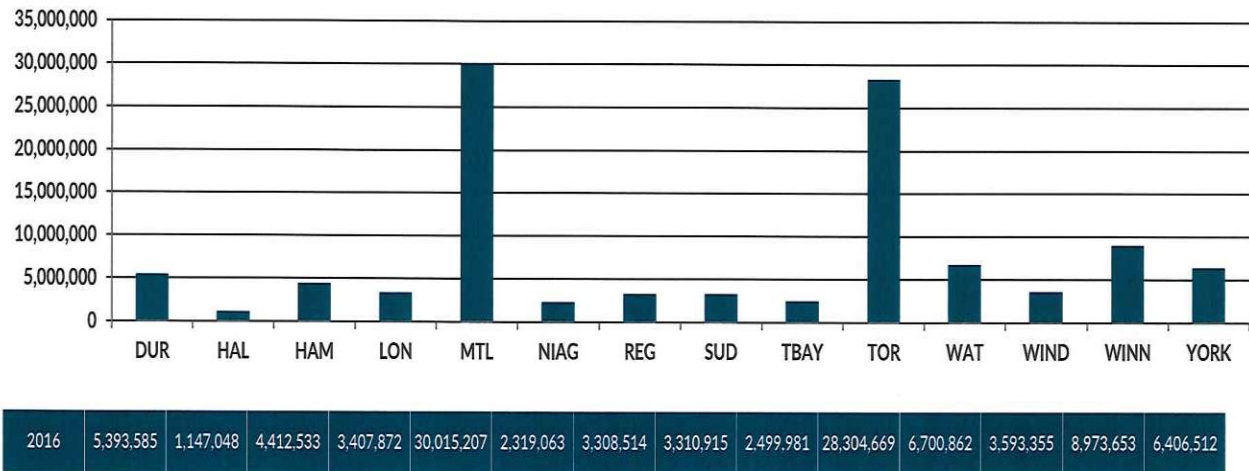
TABLE 2-1—CORPORATE FACILITIES MANAGEMENT PROPOSED KEY ANNUAL PERFORMANCE INDICATORS

Performance Indicators			
LOS Attribute	LOS Attribute Description	Program/Service Description	Metric
Safe	Services are delivered such that they minimize health, safety and security risks	Facilities are maintained in Good condition such that failures are minimized	Physical / Structural Condition Score (scale to be determined)
Reliable	Services are predictable and continuous	Facilities are maintained in Good condition to enable reliable / continuous provision of services	Percent of facilities where the Physical Condition is Rated as Fair, Good or Very Good
		Facilities are maintained in Good condition to enable reliable / continuous provision of services	Facility Condition Index (FCI) (A percentage based on current renewal needs over current replacement cost)
Sustainable	Services preserve and protect the natural and heritage environment	Facilities are managed and maintained in ways that preserve & protect the natural environment	Future OMBI/MBNCanada metric
Available	Services of sufficient capacity are convenient and accessible to the entire community	Facilities are of sufficient capacity and are convenient and accessible to the entire community	Future OMBI/MBNCanada metric
Cost Effective	Services are provided at the lowest possible cost for both current and future customers, for a required level of service, and are affordable	Facilities are managed at the lowest possible cost for the required levels of service	% of work order costs reconciled with costs in financial system
		Facilities are managed at the lowest possible cost for the required levels of service	Total Maintenance Costs divided by Total Replacement Value of facility
		Facilities are managed at the lowest possible cost for the required levels of service	Ratio of # of PM work orders vs total work orders
		Facilities are managed at the lowest possible cost for the required levels of service	Total Custodial labour and benefits Costs per square foot

Performance Indicators			
LOS Attribute	LOS Attribute Description	Program/Service Description	Metric
Responsive	Opportunities for community involvement in decision making are provided; and customers are treated fairly and consistently, within acceptable timeframes, demonstrating respect, empathy and integrity	Customer service requests for facility (asset) maintenance services are completed within a reasonable timeframe	m2 (sq. ft.) of facilities managed per maintenance labour full-time equivalent [FTE] (not including event services)
		Customer service requests for facility (asset) maintenance services are completed within a reasonable timeframe	m2 (sq. ft.) of facilities managed per custodial labour full-time equivalent [FTE] (not including hours spent on event services)
		Customer service requests for facility (asset) maintenance services are completed within a reasonable timeframe	% of maintenance hours spent on event services [as % of total full-time hours]
		Customer service requests for facility (asset) maintenance services are completed within a reasonable timeframe	% of custodial hours spent on event services [as % of total full-time hours]
		Customer service requests for facility (asset) maintenance services are completed within a reasonable timeframe	Average number of days to complete a work order
		Customer service requests for facility (asset) maintenance services are completed within a reasonable timeframe	% of work orders completed compared to total number of work orders
		Customer service requests for facility (asset) maintenance services are completed within a reasonable timeframe	

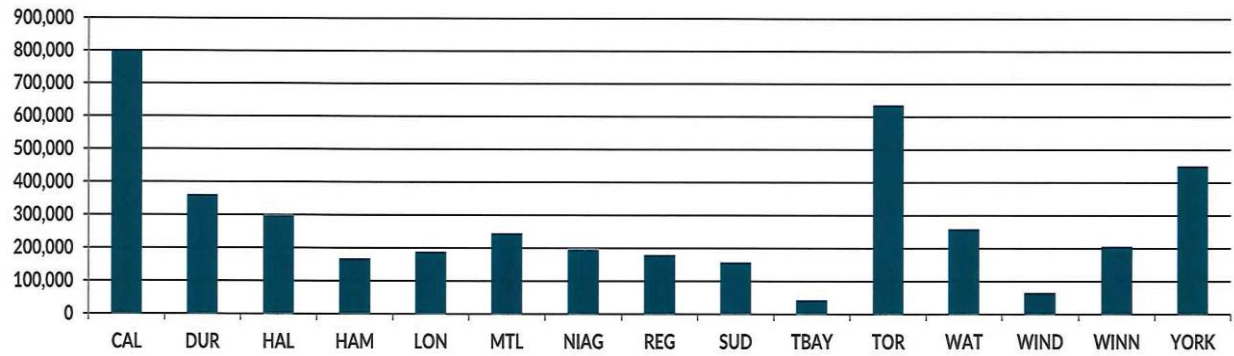
2.1.1.1 Key OMBI/MBNCanada Facility Benchmarking Indicators

FIGURE 2-2—GROSS SQUARE FOOTAGE – ALL BUILDINGS OWNED AND LEASED BY MUNICIPALITY



Source: FCLT805 (Statistic)

FIGURE 2-3—GROSS SQUARE FOOTAGE – HEADQUARTERS ONLY

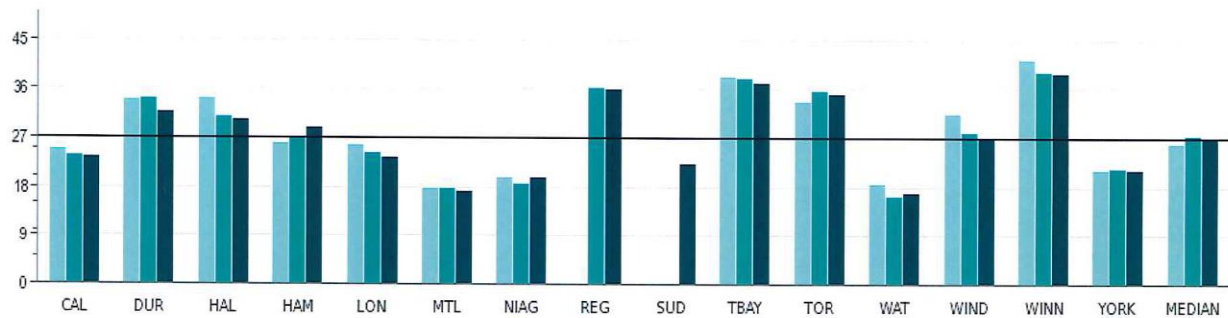


2016	802,590	361,441	297,812	167,995	188,200	245,562	195,310	179,566	157,308	43,500	636,215	259,593	66,300	206,572	452,226
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Source: FCLT820 (Statistic)

FIGURE 2-4—TOTAL EQUIVALENT KWH ENERGY CONSUMPTION PER HEADQUARTERS PER SQUARE FOOT

Energy consumption includes both electricity and natural gas consumption.



2014	25.1	34.1	34.3	26.1	25.8	17.8	20.0	N/A	N/A	38.5	33.9	18.6	31.5	41.6	21.3	26.1
2015	23.8	34.4	30.9	27.4	24.3	17.8	18.6	36.3	N/A	38.2	35.9	16.3	28.0	39.3	21.5	27.7
2016	23.7	31.9	30.5	28.9	23.6	17.3	20.0	36.0	22.5	37.2	35.2	17.1	27.1	39.0	21.3	27.1

Source: FCLT240 (Efficiency)

FIGURE 2-5—TOTAL COST OF FACILITY OPERATIONS FOR HEADQUARTER BUILDING PER SQUARE FOOT

Generally, all facility operating costs include four cost categories: internal and external facility repairs & maintenance, custodial, utilities and security costs.



Source: FCLT335T (Efficiency)

2.1.2 Level of Service Summary Overview

An assessment of the current condition of the Facility asset base along with a summary view on the associated LOS being delivered, is shown in Tables 2-2 and 2-3 below. Also shown are projections of the risk profile of the assets along with the expected service trend. These trends are based on the current state of the asset base combined with the expected levels of funding over the next 20 years i.e. assuming that the future spending will be comparable with current funding levels. The trends shown reflect that many assets are nearing the end of their useful lives and that maintaining funding at current levels will likely not be sufficient to hold service levels at their current level. Windsor is not unique as the situation is pervasive across the province and indeed the country.

TABLE 2-2—LEGEND OF TREND DESCRIPTIONS






SYMBOL	TREND	DESCRIPTION
	Negative Upward Trend	An upward trend represents a negative outcome for the City of Windsor e.g. higher risk to service delivery
	Positive Upward Trend	An upward trend represents a positive outcome for the City of Windsor e.g. improving LOS
	Negative Downward Trend	A downward trend represents a negative outcome for the City of Windsor e.g. declining LOS
	Positive Downward Trend	A downward trend for this category to service delivery represents a positive outcome for the City of Windsor e.g. lower risk to service delivery
	Consistent/ Stable Trend	No anticipated changes noted at this time

TABLE 2-3—OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS













Potential Facilities LOS Trends					
Service Area	Condition	Service Levels	Risk to Service Delivery	Projected Service Levels	Data Confidence
Facilities (2013 AMP Report)					<p style="text-align: center;">RELIABILITY</p>  <p style="text-align: center;">ACCURACY</p> 
Facilities (2018 AMP Report)					<p style="text-align: center;">RELIABILITY</p>  <p style="text-align: center;">ACCURACY</p> 

Table 2-3 represents an interesting reality for the Corporation’s Facilities Department. The reliability and accuracy of facilities data is much higher than in previous years due to the ongoing Facility Condition Assessment Program and the data being produced as a result. When looking at the Facilities portfolio as a whole, it appears that the overall condition of the asset base has stabilized from its previous downward trend. While this may appear to be true on the surface, much of the “overall” condition improvement is due to several very large new facilities being built in the past 5 or 6 years. There is however, the reality that much of the remaining Facility stock outside of the several large recreation and administrative buildings recently built have seen little maintenance investment and is therefore still posing a significant LOS risk to the Corporation. It also must be stated that over the next 10 years, many of the new facilities will begin to degrade and will likely not be able to maintain expected levels of service at current levels of

funding. Compounding the issue is the fact that several critical facility components within the portfolio as a whole, and observed on new buildings more regularly, have been experiencing premature degradation and significant maintenance requirements.

The LOS picture and the City's ability to deliver even minimum expected service levels to the community is further impacted by the diverse asset base within the portfolio. While funding is based on general expected expenditure guidelines and projected on the entire asset base, specific categories of facilities, such as heritage buildings, have shown the drastic need for an improved formula. Heritage, and other significant "recreation and cultural" buildings, are often seen as the face of a City and reflect to those in the community and abroad the incredible history and values held prominent by the Corporation. Accordingly, the financial and human resources required to maintain even basic levels of service in these facilities can often be far greater than expected and planned for. Other prominent and critical facilities such as Huron Lodge serve a vital role in the health and well-being of the community as a whole and particularly to a vulnerable population. The risk associated with the loss of service or even a minor service disruption at a long-term care home would be grave at worst and a public relations issue at the very least. Recent trends show the maintenance and capital repairs for all such facilities referenced above is far greater than anticipated and certainly greater than the current funding levels will allow. Heritage and cultural buildings as well as Care Homes by their very nature will require many services that are considered "specialized" and often come with significant cost implications and maintenance delays. There is also an inherent risk that goes far beyond simple safety, insurance and cost parameters and touches on the very real possibility of losing historical, social and health hubs held dear by the community. Without the appropriate funding levels required to maintain these important facilities, and with large recreational facilities soon to see degradation, future expected levels of service can be expected to decline.

2.2 Current Risk Practices

Risk analysis plays an important role in establishing asset criticality and prioritizing resource allocations. The process involves understanding how an asset or service may fail in the context of meeting the established levels of service, how frequently and/or likely it might be that it fails, and how critical that failure might be to the City. The results of the risk analysis help to identify areas of high risk or concern and are a key input to the renewal planning and capital projects budgeting process. In addition, the Consequence of Failure component (or asset Criticality) of the Risk equation is a key input in the development of preventive maintenance programs. This process follows a typical recommended risk analysis framework, incorporating a probability of failure (5 point scale), multiplied by the consequence of failure (5 point scale) to determine an overall risk score. The consequence of failure considers different areas such as damage and liability, operational impact, and regulations and reputational impacts. The framework also includes provisions for developing mitigation strategies that will ultimately inform business planning decisions at the service area level. Figure 2-6 below outlines the Corporate Risk Matrix utilized across all major asset categories.

FIGURE 2-6—CITY OF WINDSOR CORPORATE RISK MATRIX

Likelihood	5 Certain					
	4 Likely					
	3 Possible					
	2 Unlikely					
	1 Improbable / Rare					
		1 Insignificant	2 Minor	3 Moderate	4 Major	5 Severe
		Consequence				

The corporate risk assessment tool will continue to be developed for the Facilities department and will follow the template of the Building Condition Assessment Program and its breakdown of building sub-systems. One critical element unique to the facilities template is that buildings have been shown to display a risk profile not just at one level (i.e. building component), but also along facility type or “use”. A first review of the template when applied to facilities found that Huron Lodge would have a much higher risk profile than an administrative or storage building. At the component level, an elevated risk consequence score was observed in four critical facility component areas: structural roof and building envelope, fire suppression systems, air-handling and ventilation equipment and main electrical systems. As such, one of the Facilities Departments primary objectives moving forward is to establish a financial reserve that will feed new inspection and maintenance programs for these critical building systems and components.

TABLE 2-4—OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS

	Roof / Building Envelope (leak)	Roof / Building Envelope (Structural)	Heating Systems	Cooling Systems	Air Handling (ventilation, humidity control)	Air Handling (ventilation, humidity control) - Huron Lodge	Elevators	Plumbing (piping/fixtures/venting)	Main Electrical Distribution	Building Automation Systems	Fire Suppression / Detection Systems	Flooring/Stairs/ Interiors
Consequence Score	1.64	3.55	1.45	1.45	1.45	1.82	1.36	1.18	1.73	1.18	2.36	1.45
Maximum Risk Score	33%	71%	29%	29%	29%	36%	27%	24%	35%	24%	47%	29%
Maximum Risk Rating	Moderate	Critical	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Significant	Moderate

QxP%	1%- 15%	Low
	16%- 36%	Moderate
	37%- 64%	Significant
	65%+	Critical

FIGURE 2-7—OVERALL SUMMARY OF SERVICE AREA CURRENT AND PROJECTED LOS

Likelihood	5 Certain	398,200		2,777,500		
	4 Likely	19,372,100	1,610,400	7,195,100		
	3 Possible	18,431,600	1,534,500	7,573,500		
	2 Unlikely	9,182,800	585,200	4,417,600		
	1 Improbable / Rare	12,404,700	1,402,500	392,700		
		1 Insignificant	2 Minor	3 Moderate	4 Major	5 Severe
		Consequence				

Risk Levels	
Extreme	
High	
Moderate	
Low	
Insignificant	

As one can see, Table 2-4 outlines several major facility categories that display an elevated risk profile, most notably the structural roof and building envelope as well as the fire suppression sub-components. Although Air Handling equipment and Main Building Electrical are technically classified as a moderate risk, they display a risk profile that is just below the significant rating and therefore still requires increased attention and risk mitigation strategies in order to ensure an acceptable level of service is maintained.

Figure 2-7 takes the risk analysis one step further and combines the likelihood of a maintenance event occurring across the facility asset portfolio. The likelihood scenario was generated from the Facility Condition Consultant's projected maintenance and replacement schedules and utilizes the costs associated with the expected capital required to perform such work. Therefore, Figure 2-7 details the projected capital maintenance costs tied up within each of the different risk rankings. It must be stated however that because the risk cost is based on the condition assessment project analysis, it only contains the cost associated with the first 71 facilities that have been a part of the condition assessment program thus far. And because the initial risk framework did not incorporate certain special sections of the condition assessment reports (such as sitework, pool infrastructure and special equipment), the costs displayed in the chart are even further below what the consultants have projected for facility maintenance needs over the next 20 years. In all reality, the values in Figure 2-7 could very likely be near double what is currently shown if the entire facility assessment program was complete and incorporated all Corporately owned facility assets.



**Section 3
Asset
Management
Strategy**

Asset Management Strategy

3.1 Asset Management Strategy and Lifecycle Planning

3.1.1 Asset Management Strategies

The Corporate Facilities Management Service Area encompasses a very wide network of diverse buildings and structures and is therefore quite unique in its purpose and function. Because every facility is different in its operating and maintenance requirements, Corporate Facilities cannot take a one-size-fits-all approach to its asset management program. Whether analyzing the prospects and feasibility of a new development or planning for the rehabilitation of an older facility, a detailed strategy is required that ensures all of the required community needs are taken into account while still following established industry construction and maintenance standards. The following is an outline of the many programs and strategies the Facilities Department requires funding for in order to maintain the Corporation's asset base in a reasonable state of repair.

- An improved Roof Inspection program that enhances the detailed inspection cycle to cover every roof at least once per year. Roofing systems are one of the main building components that are regularly seeing premature degradation and a more robust inspection and maintenance program would significantly reduce the number of unplanned repairs and replacements. This would require a funding enhancement for both the operational positions and the actual maintenance work.
- A more robust roof maintenance cycle that would enhance the standard cycle for clearing clogged drains and other minor maintenance required.
- A minor program to inspect and analyze electrical panels utilizing thermal scans for all, or at the very least, the high voltage systems. There is currently no such program or plan in place.
- The development of an electrical panel ARC flash ratings system that would require an engineering study to be done to rate all panels for appropriate Personal Protective Equipment and safe work distances.
- The expansion of automated Building Automation Systems (BAS) for easier control and increased energy savings.
- The funding of a staff member to provide analytics of facility data from the 360Facility work order system. This staff member would provide much needed on-time data output that would ultimately be utilized to help find improvements, establish trends and uncover cost savings and efficiencies.
- Funding resources for the expansion of the 360Facility CMMS for additional asset information and tracking for all Corporate Facilities and the creation of automated preventative maintenance work orders that ensure manufacturer's recommended maintenance is being completed.
- The establishment of a backflow prevention program for Corporate facilities that will allow for initial installs, maintenance of existing components and the replacement of aging valves.
- Accessibility audits and assessments for all Corporate facilities that would allow for the alignment of strategies to current and expected future requirements.
- The establishment of a reserve or consistent funding mechanism to maintain and improve the overall aesthetic of significant Corporate facilities as they are often viewed as the face of the City to residents and visitors alike.
- An on-going Building Condition Assessments Program funding stream that would allow for a regular condition inspection cycle as well as the procurement of proper assessments on a project or as needed basis.
- An established program with sustainable funding for City owned transitional properties (eg. tax arrears) in order to provide grass cutting, boarding up and other repairs and risk mitigation measures that are currently not allocated as part of the Facilities Departments budget.
- The development of standard specifications for a multitude of maintenance practices.
- The development of standard specifications for various facility installations.
- Standardize fire alarm systems.
- Standardize intrusion alarm systems.

- The formation of a security division to ensure the protection of critical assets.
- The establishment of a minor card access program to increased card access at sites and replace difficult to track keys.
- A minor funded demolition program to dispose of facilities that are condemned and/or are not worth the associated repair costs.
- The establishment of funding for minor mobile hardware solutions that would enhance the productivity of field maintenance staff.

3.1.2 Facility Lifecycle Operating and Maintenance Planning

With the new condition assessment program, the Corporation can objectively assess the true maintenance needs of a particular facility leading to an operating and maintenance plan that can be dialed in to provide resources where they are most needed.

It is important to note however that the overall funding needs of the Facilities maintenance program have not decreased with a new understanding of the facility component requirements. In fact, although the facility component ratings appear to show the majority of building systems are in Good condition, the projected maintenance needs during the course of the study period (20 years) for the first 71 facilities alone are expected to be well in excess of \$125 Million. This is simply the requirement to maintain the Corporation's current facilities stock and does not take into account the funding needs for growth projects and facility enhancements.

The unique nature of facility components and recent trends also show that specific systems often function perfectly well until they simply stop working. Therefore certain components that appear to be in Good condition don't necessarily follow a simple degradation curve and often slide quickly from a Good or Fair condition into a condition of immediate need. As stated previously, the corporation is also seeing many cases of premature degradation of facility components which simply can't be captured effectively in a long-term condition program plan. Systems and components often appear to be functional and operating as needed until a point in which they begin to degrade rapidly. Therefore, even systems that are new and/or deemed to be in Good condition may need significant attention within a few years and certainly before the next AMP would be reported.

The Corporation is developing a whole lifecycle costing approach to new development which aims to capture the true nature of a particular facility asset and its corresponding financial (operating and maintenance) needs and such a methodology would account for the fact that even new assets require a significant financial commitment in order to function effectively. New assets (growth) should most assuredly be accompanied with an immediate supporting financial commitment/reserve to support the operating and maintenance needs that are becoming ever more important during the early stages in a facility's lifecycle. Ultimately all assets, and especially new ones, would have a corresponding long-term whole-life maintenance and financial plan that would allow for the establishment of a potential reserve to accommodate for the financial needs of a particular facility at all stages of its expected useful life.

APPENDIX G

Transportation Assets

Transportation Asset Details - Appendix G

Section 0
Acronyms,
Abbreviations &
Definitions

Section 1
State of Local
Infrastructure

Section 2
Levels of Service

Section 3
Asset Management
Strategy

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**Section 1
State of Local
Infrastructure**

State of Local Infrastructure

1.1 Asset Inventory

The Corporation of the City of Windsor owns and operates a sizable portfolio of assets that span several service areas. This AMP covers the assets which are aligned to the City's Transportation Services and are under the direct control of the City. It excludes services administered by Agencies, Boards and Commission, as detailed in Section 1.2. Regulation 588/17 requires an asset management plan for all road, storm and sanitary sewers as well as bridges to be completed by 2021. The City's 2018 Asset Management Plan will serve to meet these obligations and the 2023 AMP will then complete requirements for the balance of assets which is required by 2023.

As the report is being written in 2018 the data used for this report is 2018-year end data.

The Tangible Capital Asset value of Transportation Assets, based on 2018 replacement cost data, is \$2,693,781,679 for the assets covered by this Plan, which are identified in Section 1.2. The roadway and structure assets make up approximately 90% of the total City's Transportation assets defined in this plan. Figure 3-1 provides a high-level overview of the roads and structures inventory included within the scope of the Transportation Assets AMP and as compared to asset levels in 2013.

FIGURE 1-1—INVENTORY OF REG588/17 REQUIRED TRANSPORTATION ASSETS (ROADS, STRUCTURES)

Asset Type		Inventory 2018	Inventory 2013
Roadways			
Roads and Paved Alleys		1,148,558 m	1,156,294 m
Structures	Bridges and subway	61	61
	Major Culverts (> 3 m)	11	8
	Pedestrian Bridge (ROW only)	5	6

There has been a minor drop of road assets, which is in large part due to sections of the network given to the Ministry of Transportation for the Herb Gray Parkway project. There has also been a minor increase of 3 major culverts and a reduction of one pedestrian bridge (in the ROW).

Several other assets fall into the Transportation Service category for the City as well, including sidewalks, traffic signals, noise barriers, parking garages and street lights.

In comparison to the two required asset categories for Reg588/17, those being roadways and structures, the total replacement value of the other assets is approximately 10% of the total value of the City's transportation assets identified in this report and is estimated at \$253,449,739. While they make up only 10% of the assets identified in this plan they are material to the City and require capital and operational funding to sustain and develop them to meet service level expectations. To provide a more comprehensive view of the City's transportation assets we have included the assets for all City services which are reported in our financials under PSAB 3150 requirements. Going forward, reports will continue to work with the operational areas to refine and improve asset reporting and data management to improve and expand the information in the corporation's asset management plans.

1.2 Roadways (including paved Alleys)

The City's roadway network has slightly decreased in length since 2013 because of sections given to the Ministry for the construction of the Herb Gray Parkway. The overall network since 2003 has and continues to be around 18 to 20% of the total network being in Poor or Very Poor condition. The City's Roadways are made up of the following road classifications:

FIGURE 1-2—ROADWAY CLASSIFICATIONS

Characteristic	Expressways	Class I Arterial Roads	Class II Arterial Roads	Class I Collector Roads	Class II Collector Roads	Scenic Drives	Local Roads - Residential and Industrial
Motor vehicle traffic volume	High - Control Access Highways	High - Control Access Highways	High - Control Access Highways	Moderate	Moderate	Low to moderate	Low
Minimum right-of-way width	100	46	42	28	26	24	20
New connections permissions	New interchanges shall only be permitted with Class I Arterial Roads and Class II Arterial Roads, Expressways or Provincial Highways	New interchanges shall only be permitted with Provincial Highways, Expressways, Class I Arterial Roads, Class II Arterial Roads or Class I Collector Roads	New intersections shall not be permitted with Provincial Highways; new intersections with local roads shall be discouraged	New intersections shall not be permitted with Provincial Highways and Expressways	New intersections shall not be permitted with Provincial Highways, Expressways and Class I Arterial Roads	New intersections shall not be permitted with Provincial Highways, Expressways and Class I Arterial Roads	New intersections shall not be permitted with Provincial Highways, Expressways, Class I Arterial Roads and Class II Arterial Roads
Property access	Direct property access shall not be permitted	Direct property access shall not be permitted	Direct property access will be discouraged where other alternatives exist	Direct property access may be permitted with some controls	Direct property access may be permitted with some controls	Direct property access may be permitted with some controls	Direct property access may be permitted with some controls
On Street Parking	Not permitted	Not permitted	May be removed to facilitate installation of turn lanes	May be removed to facilitate installation of turn lanes	May be permitted	Not permitted	May be permitted
Accommodation of cyclists	Cyclists prohibited	May be permitted	May be permitted	May be permitted	May be permitted	May be permitted	May be permitted
Other	Access shall only be facilitated through interchanges or partial interchanges	N/A	N/A	N/A	N/A	All-way stops shall not be permitted. Municipal streetscape design of the Scenic Drive shall be guided by the urban design policies in this Official Plan.	N/A
Examples	EC Row Expressway	Huron Church, Lauzon	Jefferson, Cabana	Erie, Pilette, Dougall	Norfolk, Parent	Riverside Drive	McKay, Arthur, Deziel

The roads with the most significant volume of traffic are, Expressway, Arterial, Scenic Parkway and Collectors. The risk of failure on these roads poses a Significant risk to the Corporation, with the Expressway posing the highest risk to the Corporation should it fail. While these roads make up only 33% of the total length of roads in Windsor, the replacement costs associated with them \$1,225,469,368 or 61%

of the entire road network replacement cost. These roads are costlier to repair and replace given their size as well as type and volume of traffic, which results in significant detours.

The ability to address these roads when they are in a Fair condition to extend their useful life by completing rehabilitation work reduces the duration of time for construction and is about ¼ less in cost than full reconstruction. The volume of traffic on these roads also results in them being the most impactful impression about Windsor roads. The 2018 CAA report on roads notes Windsor as having 3 of the 4 worst local roads. The 2018 report highlights Huron Church, Tecumseh Road East and Seminole, arterial and collector road classifications as the 3 of the top 4 worst local roads in Southwest Ontario, *reference June 8, 2018 The Windsor Star "CAA list of four local roads worst in Southwest"*. These are some of the reasons these roads are recommended to be addressed ahead of any other road classifications.

1.3 Structures

The Structures inventory includes bridges, subways, culverts over a 3m span, and pedestrian bridges in the right of way. In the 2013 AMP, subjective condition ratings based on age were applied to this asset category. In 2018 the objective condition ratings determined based on the Ontario Structure Inspection Manual (OSIM), which is required to be used under ONT Reg 472/10, were used for these assets. The change in condition rating approach, as well as the investment made in bridge rehabilitations over the past 5 years, have resulted in a positive change in this asset category. There are 61 bridge and subway structures, 5 pedestrian bridges (ROW) and 11 culverts over a 3m span. The 2018 replacement cost for these assets totals \$379,325,747 and makes up 14% of the total Transportation asset inventory. Timely maintenance and rehabilitation efforts help to extend the life of these assets and is critical to ensure they can remain in service. These assets pose a critical risk to the Corporation should they fail and as such will be taken out of service should their condition result in a probable failure.

1.4 Sidewalks

The sidewalk network is approximately 939 kms throughout the City and valued at \$121,042,994. These assets provide a safe means of walking throughout the City along our roadways. Approximately 87% of the sidewalks throughout the City are in Very Good or Good condition, this is a marginal improvement from 2013 results. There are 116.5kms (12%) of sidewalks in Fair condition and 10kms (1%) in Very Poor or Poor condition. As the sidewalks continue to age, the ability to address those segments in Fair condition, prior to complete deterioration, will help to maintain the expected average of 85% of overall network in the Very Good / Good condition.

1.5 Other Transportation Assets

1.5.1 Street Lights

In the 2013 AMP Street Lights were not quantified as they were in the process gathering inventory data for potential re-lamping to LED. The conversion to LED has been completed. While there is still some challenge in properly identifying these assets, we have worked with finance and engineering to provide information on these assets in 2018. The lights included are all in Rights of Way (ROW). The significant investment in the LED conversion has reduced the City's annual electrical costs for these assets which was then used to fund the re-lamping capital investment. As a result, most of the network has been replaced since 2013 resulting in a very favourable condition rating for these assets. What remains in Very Poor condition are some of the poles which require replacement.

1.5.2 Traffic Signals

In 2013 33% of the City's signalized intersections were in Poor condition and were valued at \$6.7M in replacement cost. The total traffic signal inventory in 2013 was valued at \$20.2M. Investment in traffic signals has been approximately \$416,000 annually for rehabilitation and replacement. This amount is lower than required to address these aging assets.

The 2018 value of signalized intersections is \$21M. The percentage in Poor condition has grown to 65% and is valued at \$14M in replacement cost. It should be noted that signalized intersections are not able to be deemed to be in Very Poor condition as this would mean the unit has failed and is unable to function. This should not reduce the concern regarding the volume of these assets in Poor condition and that it has more than double in the last 5 years. While Traffic has been able to keep these older systems functional it is more than likely there will come a time when that is not possible, creating risk to the City by having non-functional intersections, as well as creating unplanned priority requests for funding to address failed systems. The 2018 AMP includes recommended funding levels to address this concern prior to the events occurring.

1.5.3 Parking Garages

In 2013 the City owned and operated 3 parking garage structures. In 2018 the Canderel parking garage was sold leaving the Goyeau and Pelissier garages. There has also been investment in the Pelissier garage which has improved the overall condition of the asset. The 2018 replacement cost of the 2 remaining parking garages and associated equipment is valued at \$48,625,331.

1.5.4 Noise Barriers

The noise barriers along E.C.Row Expressway are included as part of the City's inventory in the 2013 AMP. There is minimal maintenance on these assets and currently no objective condition rating associated with them. While in 2013 the overall condition was Good and Very Good, the subjective rating based on site visits in 2018 suggests the conditions are all in a Fair status. Had the condition been based on remaining useful life of the asset, over 90% would be deemed as Very Poor. As age was not deemed to be an accurate reflection of the condition of these assets, the subjective rating based on visual inspection of Fair has been applied to all segments. These assets provide a buffer to residents of the sound on the expressway as well as a deterrent to inappropriately accessing or crossing the expressway.

1.6 Asset Valuation

Based on the asset inventory data that was compiled, a valuation was undertaken based on the 2018 opening replacement cost of each asset type. The assets valuations were based on data in our Tangible Capital Asset system. The population of the Tangible Capital Asset system was part of the PSAB financial reporting requirements. This required local government to present information about the complete stock of their tangible capital assets and amortization in the summary financial statements. The City needed to complete this work by January 1, 2009. The replacement cost values are recalculated on an annual basis, using Consumer based indices appropriate for each of the asset types. The replacement costs are also randomly selected on occasion to compare current pricing for a replaced asset to replacement cost estimates. This provides a secondary check that replacement cost estimates are reasonable. The 2018 opening replacement costs, used in our financial reporting, have been utilized for all assets covered within the 2018 AMP.

Since the efforts of Operations, Engineering and Finance staff were used in 2007 to determine reasonable replacement costs for linear assets, our experience has shown that approximately 80% of the replacement project cost for these assets have been within a reasonable range of the original replacement cost. Despite this confirmation that generally the replacement costs being used in this report are reasonable, the following should be noted

- All replacement costs are based on the cost to replace the asset with the exact same asset and;
- There is no growth, technology change, enhancement assumptions included in those costs.

As such these costs should be viewed with caution as a project to replace an asset may differ greatly, as has been seen in around 20% of the situations. Variables such as expansion of roads, change in material used, inclusion of bike lanes and other factors are considered service enhancements and or growth, and not considered in replacement costs nor in this AMP. This AMP is focused on the cost required to merely sustain our existing transportation assets at the same level of service over the next 20 years without consideration for service enhancements. Those costs can be funded from growth / enhanced service funding, which is articulated in Section 6.

1.6.1 Roadways Valuation

The 2018 opening replacement cost value of the City's extensive road network is \$2,061,006,000, an increase of \$165,824,814 since 2013, despite a reduction in the total lane kms. The Roads asset base includes all municipal roads and paved alleys. Provincial freeways pass through Windsor but fall under the ownership and control of the Province and therefore are not included within this plan. Paved alleys are also included in this total cost at a replacement cost value of \$42,815,008.

Road classifications include Arterial (A1 and A2), Collector (C1 and C2), Expressways, Local Residential, Local Commercial/Industrial, and Scenic Parkways. These assets include road base, drainage, pavement, curb and gutter and islands. Paved alleys are also included in the AMP's road inventory listing.

All critical data regarding asset details on roads is managed and maintained in the *Hansen* CMMS database by the Technical Support Infrastructure Management System team of the Public Works Operations Department. Objective pavement condition data is maintained for each road segment in *Hansen* CMMS. On an annual basis, City staff performs pavement inspections of the road segments that have been identified and scheduled for inspection for that given year. A road segment is scheduled for inspection on a frequency range from a maximum of once every year to a minimum of once in a 7-year period based on set criteria which, includes last inspection date, age of current pavement, road classification, and current condition rating.

Generally speaking, the higher the traffic volumes and the worse the pavement condition, the more frequent the inspections on a road segment. Alley segments are scheduled for inspection on a lesser frequency because of the lower traffic volume. Pavement inspections are performed in a structured

manner and are based on industry principles. Pavement inspection data is then used to generate a numeric condition rating of the overall performance of the pavement. The numeric road condition rating (calculated in the *Hansen CMMS*) is derived from road pavement inspections using an objective structured formula-based approach to minimize subjective data influence. Road condition ratings are also updated following the completion of road rehabilitation / reconstruction projects and new construction projects as information becomes available. The numeric condition ratings are used routinely by Public Works for the purposes of rehabilitation, reconstruction, and maintenance planning and in budget planning. These numeric condition ratings have been mapped to the Corporate AMP Condition Rating categories of Very Good, Good, Fair, Poor and Very Poor, the details for which can be found in Appendix A – Condition Rating Approach.

The table below compares the 2013 to 2018 inventory and replacement values for the various road classifications and paved alleys.

FIGURE 1-2—ROADWAYS ASSET VALUATION

Asset Type			2013 AMP	2018 AMP	2013 Replacement Value	2018 Replacement Value
			(m)	(m)	(\$K)	(\$K)
Roadways	Roads	C1 Arterial	13,098	9,847	\$ 112,399	\$ 80,920
		C1 Collector	99,415	96,504	\$ 171,380	\$ 183,109
		C2 Arterial	127,969	126,141	\$ 492,187	\$ 593,772
		C2 Collector	71,976	78,530	\$ 115,719	\$ 133,326
		Local Residential	668,313	668,259	\$ 702,078	\$ 768,209
		Local Commercial / Industrial	14,675	17,315	\$ 19,694	\$ 24,513
		Scenic Parkway	15,989	16,046	\$ 22,997	\$ 35,644
		Expressway	65,842	56,275	\$ 219,070	\$ 198,698
	Alleys	Paved Alleys	79,017	79,643	\$ 39,659	\$ 42,815
TOTAL			1,156,294	1,148,558.42	\$ 1,895,181	\$ 2,061,006

1.6.2 Structures Valuation

Assets falling under the Structures category are broken out based on their primary purpose. Bridges and major culverts are classified as vehicle crossing structures and pedestrian bridges are major pedestrian crossings at highways or waterways. Subways are structures that support vehicle movement under railways. Bridges and major culverts are inspected and assessed according to Ontario Structures Inspection Manual (OSIM) and maintained accordingly. The remaining structures are assessed and renewed on a planned basis according to the findings of engineering studies and expert opinion. All bridges which reside in parks are included in the Park Asset Inventory report.

FIGURE 1-3—STRUCTURES ASSET VALUATION

Asset Type	Asset	Inventory 2013	Inventory 2018	Unit	Replacement Cost 2013	Replacement Cost 2018
Structures	Bridges and Subway	61	61	Ea.	\$316,664,090	\$359,479,153
	Major Culverts (> 3m id)	8	11	Ea.	\$4,309,324	\$7,631,397
	Pedestrian Bridges (ROW)	6	5	Ea.	\$11,375,183	\$12,215,197
TOTAL					\$332,348,597	\$379,325,747

1.6.3 Sidewalks

Sidewalks over the past 5 years have increased in replacement cost value as can be seen in Figure 3-6. Sidewalks are generally concrete, however some sections are brick.

FIGURE 1-6—SIDEWALK ASSET VALUATION

Asset Category	Replacement Cost 2013	Replacement Cost 2018
Sidewalks	\$114,364,450	\$121,042,990

1.6.4 Other Asset Classes

The Transportation AMP includes other assets such as noise barriers, street lights, traffic signals and parking garages. Below is a brief summary of the assets in this category showing the 2013 vs 2018 replacement cost value attributed to them.

The significant change with Parking Garages and Equipment is the sale of the Canderal parking garage. While the final transaction was completed mid 2018 the asset is not longer part of the City's inventory and therefore taken out of the AMP. Also of note, the traffic signal inventory only reflects the signalized intersections. There are additional assets associated with traffic signals, including but not limited to PVC conduit, fibre and RTMS detectors which have an estimated replacement cost value of \$24,080,917. As these assets are currently pooled and we are not able to provide condition data, they are only referenced in this section for purposes of disclosure given their cost. For the 2023 AMP Asset Planning will work with Traffic to obtain more detailed information on these assets for inclusion in the report.

FIGURE 1-7—ASSET VALUE OF OTHER TRANSPORTATION ASSETS

Asset Category	Replacement Cost 2013	Replacement Cost 2018
Noise Barrier	\$10,666,548	\$12,693,679
Street Lighting	N/A	\$40,997,539
Traffic Signals	\$20,221,528	\$22,177,958
Parking Garages & equipment	\$83,730,622	\$48,625,331

1.7 Asset Useful Life

The determination of life of an asset for TCA purposes was a combination of useful life and design life. In many cases the percentage of useful life consumed may not be the most suitable indicator of current asset condition. Infrastructure assets in particular undergo a continual process of repair, rehabilitation and refurbishment in order to maintain their intended purpose. For example, roads, sidewalks and bridges typically undergo a continual maintenance and rehabilitation process and hence age may not be the most suitable indicator to use for asset management planning. As such, in many cases asset useful life needs to be augmented with other information such as actual asset condition rating, history of asset upgrades, and expert judgment.

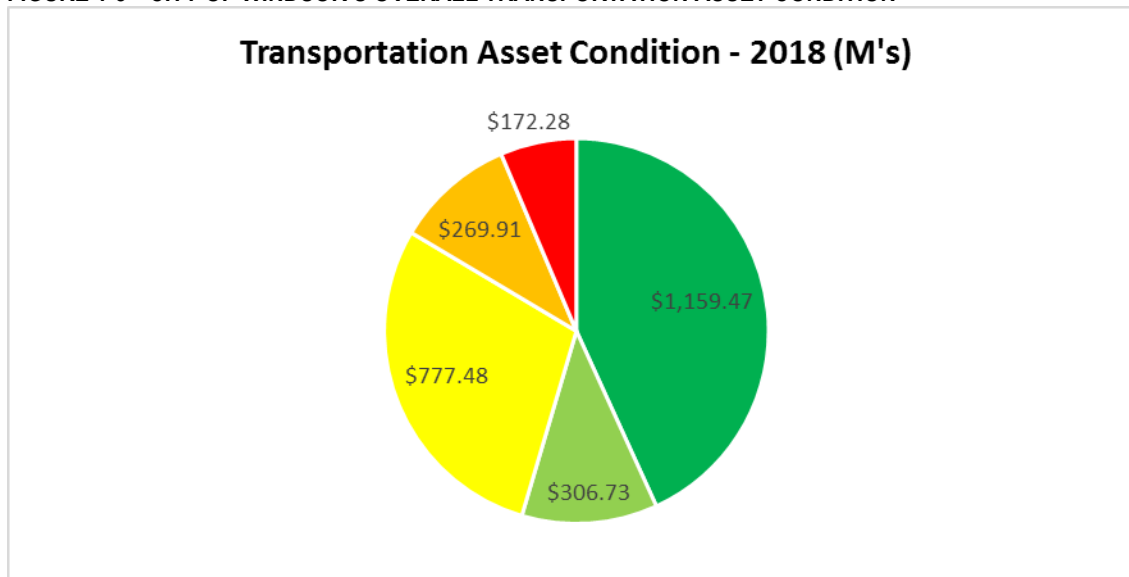
It should be noted that estimated useful lives, based purely on age, can sometimes provide a misleading view of the replacement timing for the assets. In many cases assets that are properly constructed and maintained may outlive their estimated useful life and continue providing valued service. In other cases, due to poor workmanship and lack of proactive maintenance, assets may fail before they fulfill their estimated useful life.

The City of Windsor has utilized objective condition ratings for the roadways, structures and sidewalks. A hybrid approach that relies on asset age, assumed useful life, and expert judgment to evaluate the condition state has been used for the balance of the transportation assets. A comprehensive matrix of all asset condition definitions and assumptions are provided in Appendix A.

1.8 Asset Condition

Figure 3-8 gives an overall view of the condition of the City's transportation assets covered by this plan, based on their 2018 replacement values, of \$2,685,869,441.

FIGURE 1-8—CITY OF WINDSOR'S OVERALL TRANSPORTATION ASSET CONDITION



A five-point rating scale has been used which aligns with that employed by the Canadian Infrastructure Report Card produced by the Federation of Canadian Municipalities (FCM), Canadian Society of Civil Engineers (CSCE), Canadian Public Works Association (CPWA) and Canadian Construction Association (CCA). In addition to providing a sound basis for assessment, this will allow for future high-level benchmarking against other municipalities across Canada. Ratings range from 1 to 5, as described in Figure 3-9 below, reflecting each asset group's physical condition. Please note the comprehensive matrix of all asset condition definitions for all asset classes and assumptions are provided in Appendix A.

FIGURE 1-4—ASSET CONDITION GRADE SUMMARY

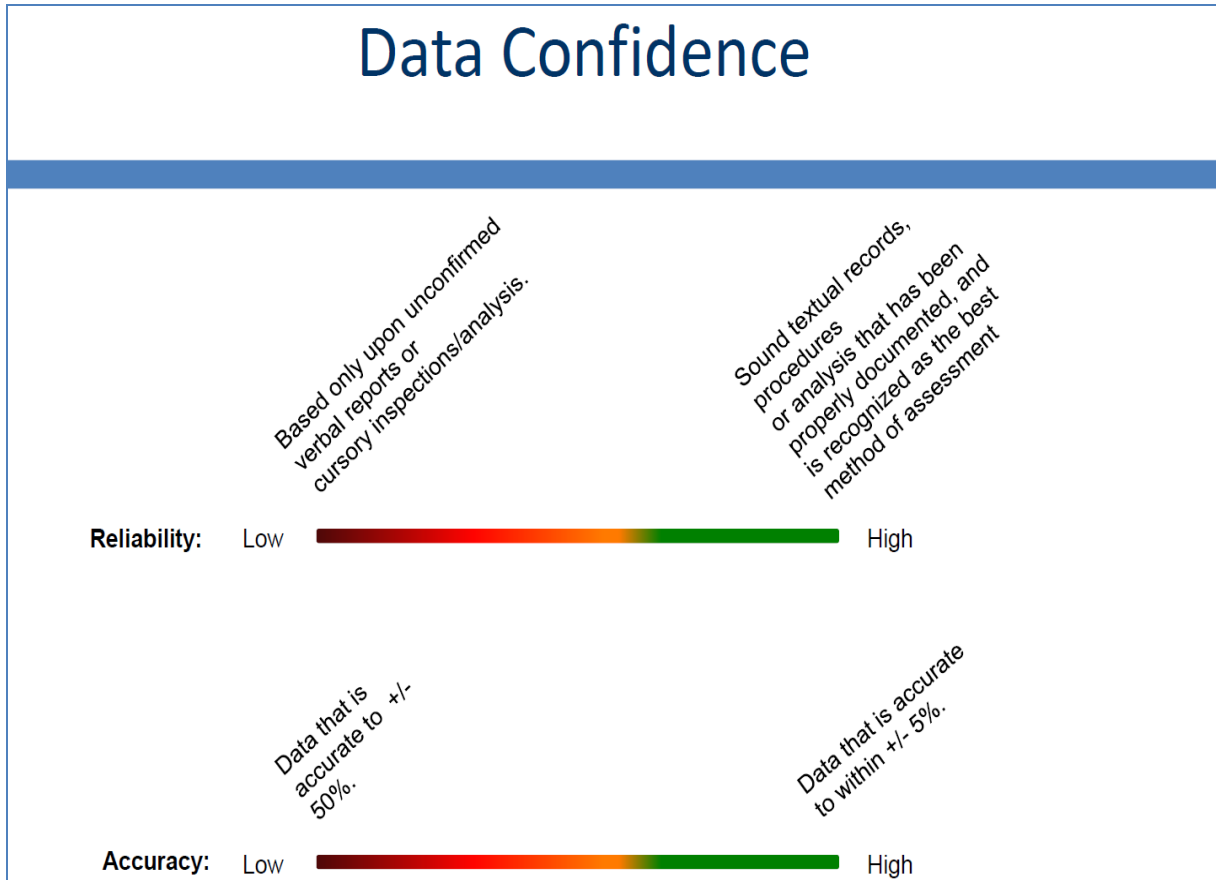
1	Very Good	The infrastructure in the system or network is generally in Very Good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.
2	Good	The infrastructure in the system or network is in Good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.
3	Fair	The infrastructure in the system or network is in Fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.
4	Poor	The infrastructure in the system or network is in Poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.
5	Very Poor	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service.

The following section provides a high-level overview of the condition of each asset class included within the scope of the City's 2018 Transportation AMP. Asset classes within this section of the AMP have been categorized according to the City of Windsor Corporate Asset Hierarchy.

Generally, replacement values have been used to enable the condition grades to be rolled up and summarized at the Service Area level. For the road, alley and sidewalk networks it was determined that the use of linear meters in each condition grading would be a more accurate reflection of the true overall condition of these particular asset classes.

An assessment has been made of the data confidence for data used for each of the asset classes. Data Confidence takes into consideration the reliability and the accuracy of the data as detailed in Figure 3-10.

FIGURE 1-50—DATA CONFIDENCE – RELIABILITY AND ACCURACY LEVELS

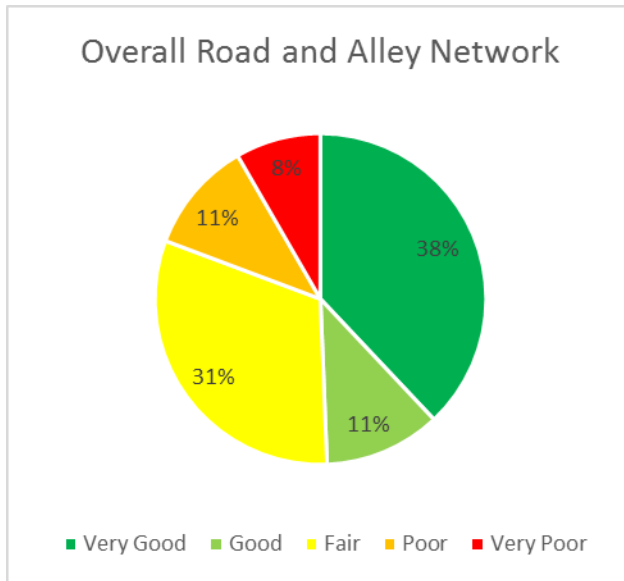


1.8.1 Transportation Services Asset Condition

1.8.1.1 Road and Paved Alley Summary Asset Condition Levels

Road and Paved Alleys	Replacement Value: \$2.06B
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Approximately 80% of the city's roads and alleys are in Fair to Very Good condition, with the remainder approaching the end of their expected useful lives. The city's transportation assets have sustained this overall condition rating since 2005. To sustain this level of service, increased funding has been required over the years, and to continue to sustain it will require additional investment to address the cost increases due to inflation as well as address the sections in Fair condition as soon as possible to extend their useful life at a cost which is less that what is required at the Poor and Very Poor stage.


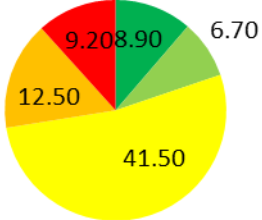
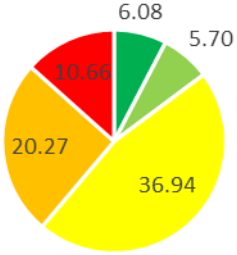

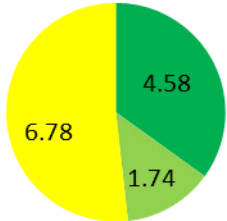
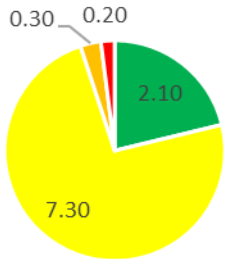

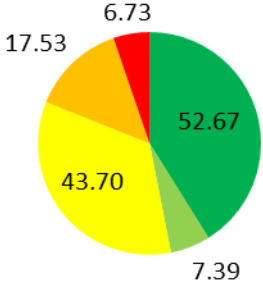
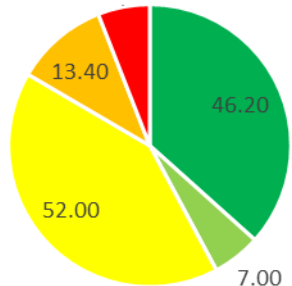


Overall Condition = Good

Data Confidence:

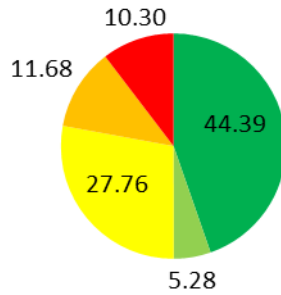
Data reliability for road and alley, are rated as high. Inventory has been verified through our TCA database and backed up with Hansen CMMS data. Alleys which are unpaved are excluded from the AMP. Valuation is based on 2018 replacement costs from our TCA database. Condition and investment forecasts for these assets are also based on good engineering practices and analysis as well as expert opinion. Overall road and alley condition accuracy is rated high as it is derived from road pavement inspections using an objective structured formula-based approach to minimize subjective data influence.



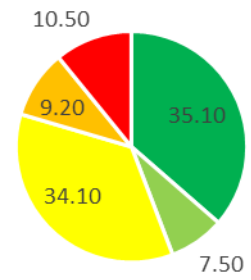
	<p style="text-align: center;">Alleys (kms) 2013</p> 	<p style="text-align: center;">Alleys (kms) 2018</p> 
	<p style="text-align: center;">Arterial C1 (kms) 2013</p> 	<p style="text-align: center;">Arterial C1 (kms) 2018</p> 
	<p style="text-align: center;">Arterial C2 (kms) 2013</p> 	<p style="text-align: center;">Arterial C2 (kms) 2018</p> 



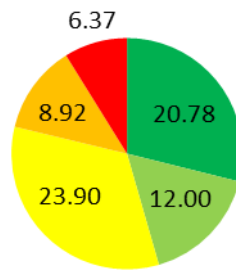
**Collector C1
(kms) 2013**



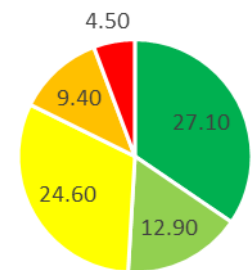
**Collector C1
(kms) 2018**



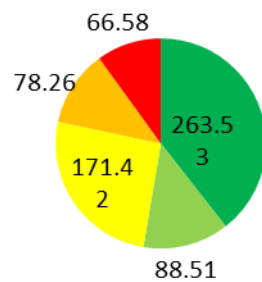
**Collector C2
(kms) 2013**



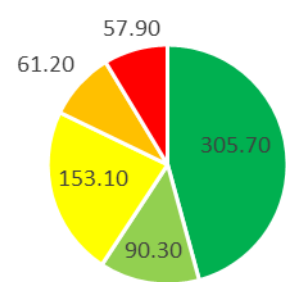
**Collector C2
(kms) 2018**



**Local Residential
(kms) 2013**

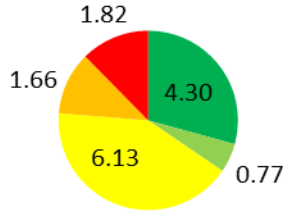


**Local Residential
(kms) 2018**

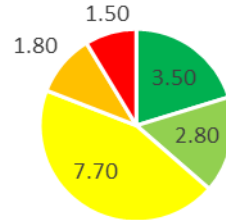




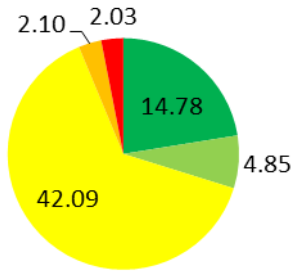
Local Industrial & Commercial (kms) 2013



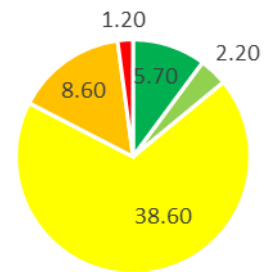
Local Commercial & Industrial (kms) 2018



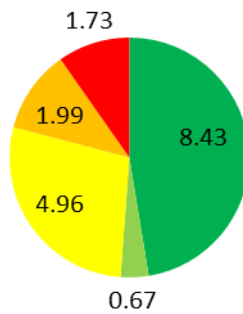
Expressway (kms) 2013



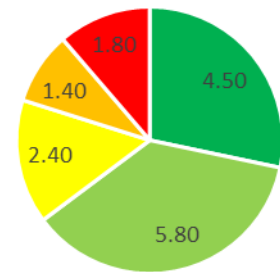
Expressway (kms) 2018



Scenic Parkway (kms) 2013



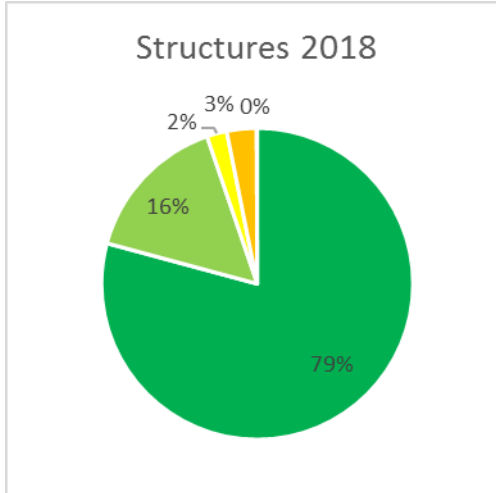
Scenic Parkway (kms) 2018



1.8.1.2 Structures Asset Condition Levels

Bridges, Subways, Pedestrian bridges & Culverts >3m	Replacement Value: \$379M	
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Approximately 95% of the city's structures are in Good to Very Good condition. There is one subway and one culvert which are in Poor condition and one smaller size bridge in Very Poor condition. These assets are already undergoing work to remediate the concern. These assets are governed by Ont Reg 472/10 and as a result must be addressed when OSIM ratings deem a failure causing a Poor rating. The ongoing funding of these assets to maintain them in Good condition avoids large and unexpected funding requirements and sustains them so they can remain in service.



Overall Condition = Very Good

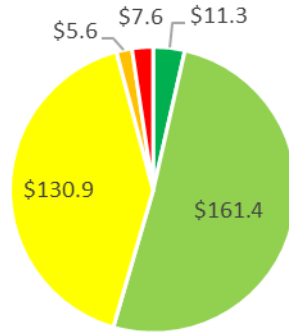
Data Confidence:

Data reliability for structures is rated as high. Inventory has been verified through our TCA database and backed up with Hansen CMMS data. Valuation is based on 2018 replacement costs from our TCA database. Condition and investment forecasts for these assets are also based on good engineering practices and analysis as well as compliance with OSIM inspection protocols and processes. Overall, the structure condition accuracy is rated high as it is derived from expert inspectors using an objective structured formula-based approach defined by the Province to minimize subjective data influence.

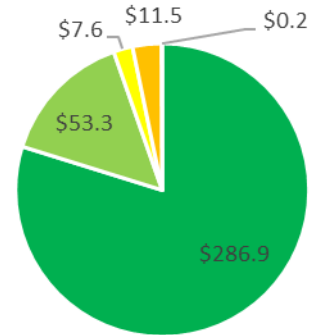




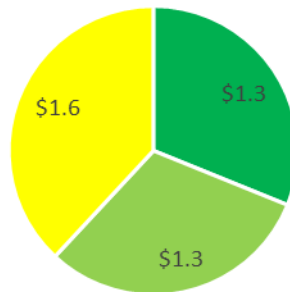
**Bridge & Subway
(M's) 2013**



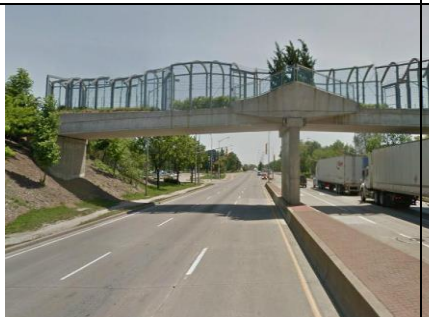
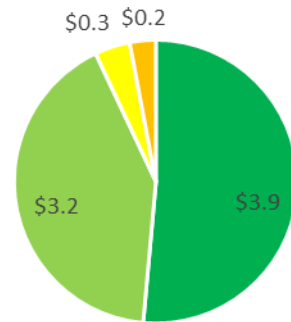
**Bridge & Subway
(M's) 2018**



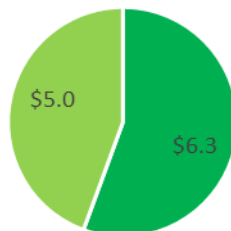
**Culverts (M's)
2013**



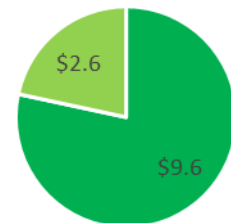
**Culverts (M's)
2018**



**Pedestrian
Bridges (M's)
2013**



**Pedestrian
Bridges (M's)
2018**



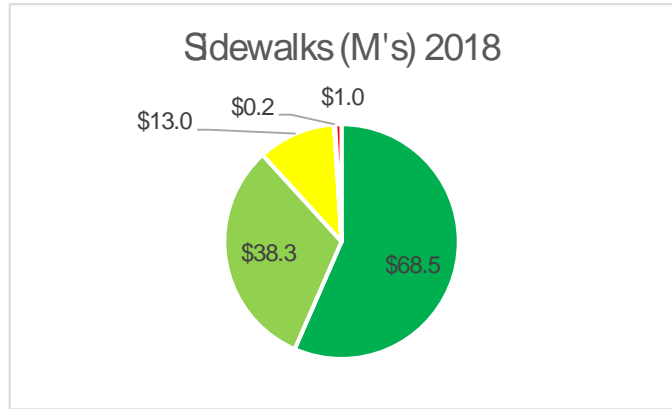
1.8.1.3 Sidewalk Asset Condition Levels

Sidewalks	Replacement Value: \$121 (m)
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Approximately 83% of the city's other transportation assets are in Fair to Very Good condition, with the remainder approaching the end of their expected useful lives, indicating a need for investment in the short to medium term. The city's transportation assets are overall in Good condition, indicating that they are meeting current needs but are aging and may require attention.



Overall Condition = Good

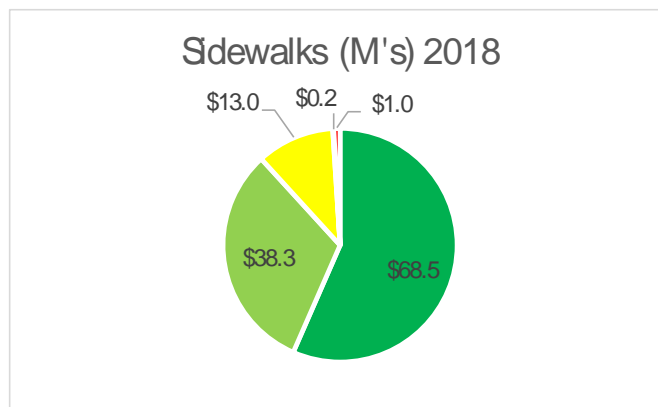
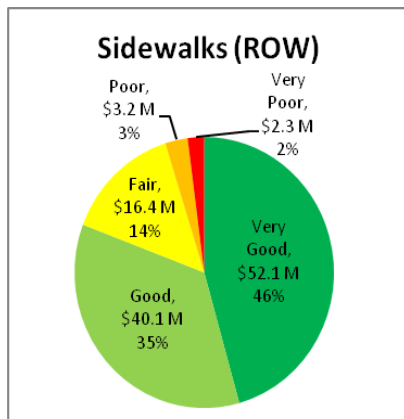


Data Confidence:

Data reliability for these assets is high. Sidewalks are maintained in Hansen by the IMS division of PW. In addition, there is an objective condition inspection program in place for the sidewalks which puts great reliability and accuracy on the condition of these assets.



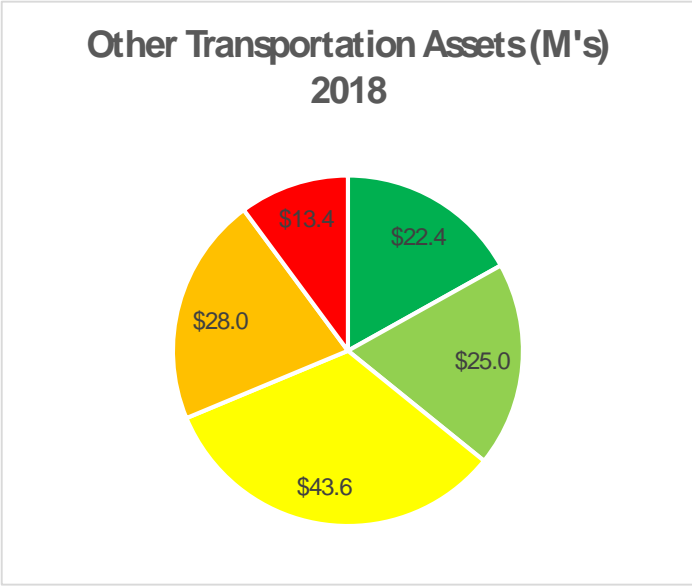
As can be seen below, the changes in the sidewalk assets from 2013 to 2018 has improved. There was additional funding put in place over this timeframe to address the backlog of needs for this asset.



1.8.1.4 Other Transportation Asset Condition Levels

Noise Barrier, Signals, Street lights & Parking garage	Replacement Value: \$132M	
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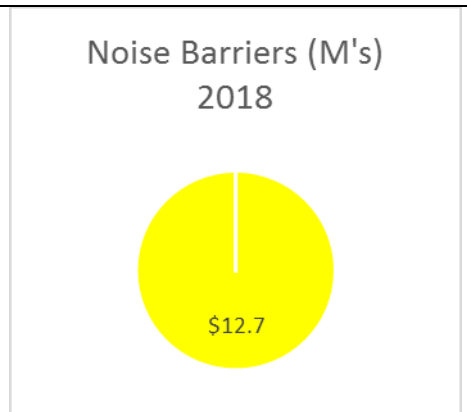
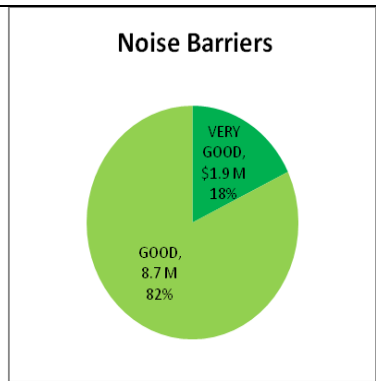
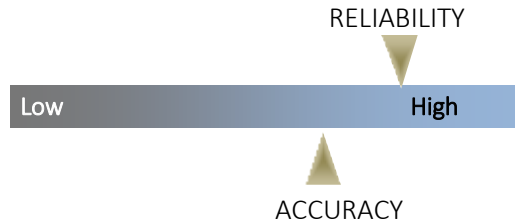
Approximately 68% of the city's other transportation assets are in Fair to Very Good condition, with the remainder approaching the end of their expected useful lives, indicating a need for investment in the short to medium term. The city's transportation assets are overall in Fair condition, indicating that they are meeting current needs but are aging and may require attention.


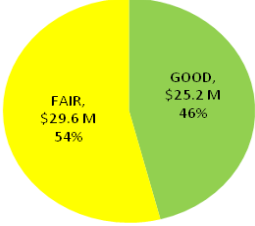
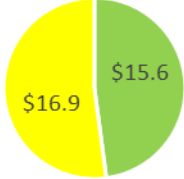

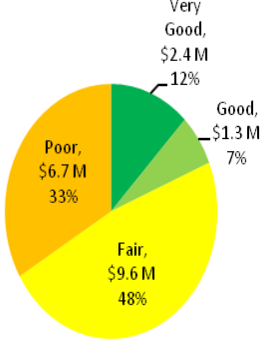
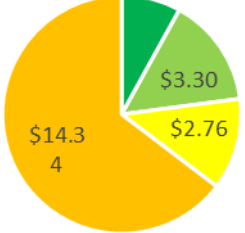
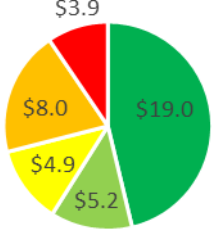


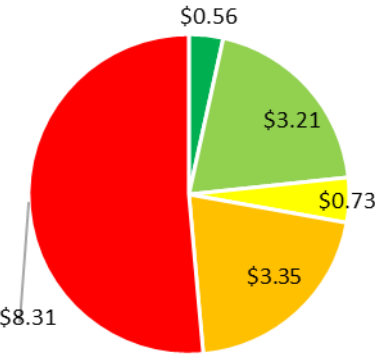
Overall Condition = Good

68% Data Confidence:

Data reliability for these other assets is medium. While there is a solid inventory of our traffic signal, the other attributes associated with them, and valued at over \$20M, is less reliable and based mostly on TCA pools of these assets. The condition ratings are based on age, expert opinion and volume of maintenance efforts and as such are deemed medium to high in reliability for the intersections themselves. The balance of the assets in the category are based on TCA data and subjective expert opinion. Where the age overstated the deterioration of the asset the subjective expert opinion was used. While the data is not as reliable as sidewalks there is a fair degree of confidence in the expert opinions as they deal with the assets on a routine basis and are close to the maintenance activities required to sustain them.



	<p>Parking Garages</p>  <table border="1"> <thead> <tr> <th>Condition</th> <th>Value (M)</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>FAIR</td> <td>\$29.6 M</td> <td>54%</td> </tr> <tr> <td>GOOD</td> <td>\$25.2 M</td> <td>46%</td> </tr> </tbody> </table>	Condition	Value (M)	Percentage	FAIR	\$29.6 M	54%	GOOD	\$25.2 M	46%	<p>Parking Garage (M's) 2018</p>  <table border="1"> <thead> <tr> <th>Value (M)</th> </tr> </thead> <tbody> <tr> <td>\$16.9</td> </tr> <tr> <td>\$15.6</td> </tr> </tbody> </table>	Value (M)	\$16.9	\$15.6								
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\$3.30																						
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\$1.78																						
<p>Street light</p>	<p>N/A</p>	<p>Street Lights (M's) 2018</p>  <table border="1"> <thead> <tr> <th>Value (M)</th> </tr> </thead> <tbody> <tr> <td>\$19.0</td> </tr> <tr> <td>\$8.0</td> </tr> <tr> <td>\$5.2</td> </tr> <tr> <td>\$4.9</td> </tr> <tr> <td>\$3.9</td> </tr> </tbody> </table>	Value (M)	\$19.0	\$8.0	\$5.2	\$4.9	\$3.9														
Value (M)																						
\$19.0																						
\$8.0																						
\$5.2																						
\$4.9																						
\$3.9																						

Parking Equipment	N/A	<p>Parking Equipment 2018 (M)</p>  <table border="1"><thead><tr><th>Category</th><th>Value (M)</th></tr></thead><tbody><tr><td>Red</td><td>\$8.31</td></tr><tr><td>Yellow</td><td>\$3.35</td></tr><tr><td>Green</td><td>\$3.21</td></tr><tr><td>Light Yellow</td><td>\$0.73</td></tr><tr><td>Dark Green</td><td>\$0.56</td></tr></tbody></table>	Category	Value (M)	Red	\$8.31	Yellow	\$3.35	Green	\$3.21	Light Yellow	\$0.73	Dark Green	\$0.56
Category	Value (M)													
Red	\$8.31													
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Section 2
Levels of Service

Levels of Service – Ensuring Current LOS is Maintained

2.1 Transportation Performance Measures and Targets

An assessment of the current condition of the asset base along with a summary view on the associated LOS being delivered across Transportation is included in this section. Also shown are projections of the risk profile of the assets along with expected service trend.







This AMP reports on LOS measures from 2014 and 2018 data, utilizing various sources from across the City. Trends are evaluated based on the difference between these two data sets, as well as staff knowledge of activities in the interim years and projected future alterations to the assets. For measures where the interim years could be significant, notes are included in the measures comment section.

2.1.1 Road Services

As per O. Reg. 588/17, Appendix D includes a map of the City noting the different road classifications throughout. Additional explanation of the various road classifications is noted in Section 1 and their associated Levels of Service are identified in this section.


2.1.1.1 Expressway

The Expressway is a major central expressway/highway, representing 5% of the entire municipal roads network by kms and 10% based on replacement cost. It connects the eastern-most and western-most regions of the City while providing access to the City's primary Arterial network including Huron Church Road which feeds Southwestern Ontario's largest international border crossing.

Transportation – Roads - Expressway						
Applied LOS Attributes and Service Objective Description						
2. Reliable = The road network is maintained in Good condition to enable reliable / continuous provision of services						
3. Suitable = The road network condition enables intended functions (vehicle mobility)						
Ref #	Metric	Measurement	2014 Year End Stats	2018 Year End Stats	Trend	Target
R-2A	Percent of Lane KM where condition is rated as Good to Very Good.	% of roads with condition rating Good or Very Good (as % of length)	29.43%	16.06%		It should be noted 69% of EC Row is deemed in Fair condition. The target is to ensure 100% of the network is either Very Good, Good or Fair.
R-2B	Total lane KM in Poor and Very poor condition (now deficient).	Lane KM	5.39	13.97		0 is the target for this measurement to mitigate risk as well as cost.
R-2C	Percent of road reconstructed annually.	Lane KM of road base rebuilt annually / total lane KM	0%	0%		Target is 0 for full reconstruction of EC Row as reconstruction means the road condition is Poor or Very Poor.
R-2D	Percent of road mill and pave work renewed annually by road classification and based on road segment length.	Lane KM of road surface renewed annually / total lane KM	0%	0%		This target is suggested to be revisited in 2023 AMP once current issues with Poor and Very Poor sections are resolved so that annual renewals can be established.
R-2D	Percent of concrete panel repair annually by road classification and based on road segment length.	Lane KM of road surface renewed annually / total lane KM				This target is not relevant for EC Row therefore no stats exist.
Sui-3A	Weighted average pavement condition rating based on length for the functional road classifications.	Score out of 100 (1 is best) Windsor in-house metric	9.423	12.107		<15
Source	Hansen, IMS Year End Reports, IMS Year Rehab Reports, 2014 and 2018 Road Needs Study		Data Confidence	 <p>RELIABILITY</p> <p>Low High</p> <p>ACCURACY</p>		







Administration is currently reviewing the immediate reconstruction and rehabilitation needs for EC Row to bring the current Levels of Service more in line with past LOS and by doing so reducing the risk to the City.

TABLE 2-1 EXPRESSWAY SERVICE TREND OVERVIEW AND COMMENTS


Service Trend Overview	Comments and Proposed Strategy
 <p>Expressway Service Levels in DECLINE, presenting a negative outcome for the City of Windsor</p>	<p><u>Comments</u></p> <p>While some additional funding was secured for Transportation & Roads in recent budget years, the funding was not directed towards the Expressway roads, where 0% of roads were reconstructed, renewed, or repaired during the 2014 to 2018 period, including 2015 and 2016. Maintenance work has been done on Bridges that are part of the Expressway as Bridge work has taken precedence, however that work is categorized under Bridges. In 2018 there has been some reconstruction work done on the Expressway, but the year end figures have not be included in this AMP.</p> <p>The deterioration of the Expressway happens more rapidly than other types of roads. This is directly attributed to the speed, volume and heavy loaded vehicles which use this road. As a result, Expressway road conditions have declined materially since 2014 with the percent of roads rated Good or Very Good condition declining 45% from 29.43% of roads to 16.06% in 2018, and the weighted average pavement condition decreasing from 9.423 to 12.107 (where 1 is best). Total lane KMs in poor or very poor condition has increased as well from 5.39 to 13.97, a 159% increase. While some of these sections are on and off ramps, the overall expressway roads condition could decline quickly in future years given the declining proportion of Good or Very Good condition roads.</p> <p><u>Target</u></p> <p>Currently there are few targets for expressway road maintenance, where only weighted average pavement condition and total lanes rated Poor or Very Poor having targets (and this target is currently not being met at 13.97 KM compared to target of 0 KM).</p> <p>As there is a significant risk associated with the failure of the Expressway, both in terms of likelihood of an adverse event and the consequences to the City, the Expressway should be maintained at a Fair condition, and the target of having 0 lane KMs being in Poor or Very Poor condition should be met. Creating and encouraging proactive maintenance targets could help reduce long-term maintenance costs, such as focusing on addressing sections in Fair condition as soon as possible to extend their useful life at a cost which is less than what is required at the Poor and Very Poor stage.</p>

2.1.1.2 Arterial – Class 1 & 2 (including Riverside)

Arterial roads are high capacity and volume roads. The main purpose of an arterial road is to provide access from collector roads to highways or expressways and or between urban centres.







Transportation – Roads - Arterial						
Applied LOS Attributes and Service Objective Description						
2. Reliable = The road network is maintained in Good condition to enable reliable / continuous provision of services						
3. Suitable = The road network condition enables intended functions (vehicle mobility)						
Ref #	Metric	Measurement	2014 Year End Stats	2018 Year End Stats	Trend	Target
R-2A	Percent of lane KM where condition is rated as Good to Very Good.	% of roads	51.86%	42.96%		52%
R-2C	Percent of road reconstructed annually.	Lane KM of road base rebuilt annually / total lane KM	0.02%	0.92%		0.05% Similar to Expressway ideally these roads are addressed at rehabilitation and not reconstruction.
R-2D	Percent of road mill and pave work renewed annually by road classification and based on road segment length.	Lane KM of road surface renewed annually / total lane KM	0.21%	2.01%		Increased mill and pave work will help to address road needs prior to reconstruction.
R-2D	Percent of concrete panel repair annually by road classification and based on road segment length.	Lane KM of road surface renewed annually / total lane KM	0.14%	0%		
Sui-3A	Weighted average pavement condition rating based on length for the functional road classifications.	Score out of 100 (1 is best) Windsor in-house metric	9.098	9.181		<20
Source	Hansen, IMS Year End Reports, IMS Year Rehab Reports, 2014 and 2018 Road Needs Study		Data Confidence			

ARTERIAL ROADS SERVICE TREND OVERVIEW AND COMMENTS


Service Trend Overview	Comments and Proposed Strategy
 <p>Arterial Roads Service Levels in DECLINE, presenting a negative outcome for the City of Windsor</p>	<p>Comments</p> <p>Additional funding secured for Transportation & Roads has been directed towards arterial roads as compared to 2014, with more roads as a percentage of the total being reconstructed, renewed, and repaired. Maintenance activities have focused on larger maintenance projects (reconstruction and renewals) that result in a significant improvement in road condition, as compared to panel repairs. There are several major arterial projects which have been started since 2013 including Walker Rd and Cabana. These projects have not been just to replace the existing road, they required enhancements to the roads, including expansion of them.</p> <p>This funding has not been sufficient to maintain the overall arterial roads in the same condition as 2014. Arterial roads in Good or Very Good condition have declined by 17% since 2014 from 51.86% to 42.96% in 2018 and the weighted average pavement condition has decreased from 9.098 to 9.181 (where 1 is best). As roads deteriorate at an increasing pace as they decline in condition, the overall arterial roads condition could decline quickly in future years given the declining proportion of Good or Very Good condition roads.</p> <p>Grant funding for a large section of Huron Line has been awarded and work will commence in 2019, as such the results of these works are not reflected in this report.</p> <p>Target</p> <p>Currently the pavement condition target is the only target for arterial roads, where this only gives an indication of the overall average road condition, which is a limited measure that does not encourage the most effective use of department resources.</p> <p>Creating and encouraging proactive maintenance targets could help reduce long-term maintenance costs, such as focusing on addressing sections in fair condition as soon as possible to extend their useful life at a cost which is less than what is required at the Poor and Very Poor stage. Expanded use of crack seal and or panel repairs are examples of these opportunities. As current funding levels are not sufficient, these programs are not as widely used as they could be and would be with approval of the requested funding increase.</p>

2.1.1.3 Collector

Collector Roads have a lower capacity than arterial roads, and their main purpose is to move traffic from local roads to arterial roads.





Transportation – Roads - Collector						
Applied LOS Attributes and Service Objective Description						
2. Reliable = The road network is maintained in Good condition to enable reliable / continuous provision of services						
3. Suitable = The road network condition enables intended functions (vehicle mobility)						
Ref #	Metric	Measurement	2014 Year End Stats	2018 Year End Stats	Trend	Target
R-2A	Percent of lane KM where condition is rated as Good to Very Good.	% of roads with condition rating Good or Very Good (as % of length)	50.10%	45.67%		Sustain at 50%
R-2C	Percent of road reconstructed annually.	Lane KM of road base rebuilt annually / total lane KM	0.02%	0.50%		Ideally these roads are addressed in a timely fashion such that rehabilitation work is increasing, resulting in fewer reconstruction being necessary.
R-2D	Percent of road mill and pave work renewed annually by road classification and based on road segment length.	Lane KM of road surface renewed annually / total lane KM	0.13%	2.00%		Positive shift in investment for these assets to extend life and at a lower cost.
R-2D	Percent of concrete panel repair annually by road classification and based on road segment length.	Lane KM of road surface renewed annually / total lane KM	0.00%	0.24%		Positive shift in investment for these assets to extend life and at a lower cost.
Sui-3A	Weighted average pavement condition rating based on length for the functional road classifications.	Score out of 100 (1 is best) in-house metric	11.200	11.128		<20
Source	Hansen, IMS Year End Reports, IMS Year Rehab Reports, 2014 Road Needs Study		Data Confidence			




COLLECTOR ROADS SERVICE TREND OVERVIEW AND COMMENTS

Service Trend Overview	Comments and Proposed Strategy
 <p>Collector Roads Service Levels in DECLINE, presenting a negative outcome for the City of Windsor</p>	<p>Comments</p> <p>Additional funding secured for Transportation & Roads has been directed towards collector roads as compared to 2014. Similar to arterial roads, maintenance activities have focused on larger maintenance projects (reconstruction and renewals) that result in a significant improvement in road condition, as compared to panel repairs.</p> <p>However, this funding has not been enough to maintain collector roads in the same condition as 2014. Collector roads in Good or Very Good condition have declined by 9% since 2014 from 50.10% to 45.67% in 2018, while the weighted average pavement condition rating has remained stable. As roads deteriorate at an increasing pace as they decline in condition, the overall collector roads condition could decline quickly in future years given the declining proportion of Good or Very Good condition roads.</p> <p>Target</p> <p>Currently the pavement condition target is the only target for collector roads, where this only gives an indication of the overall average road condition, which is a limited measure that does not encourage the most effective use of department resources.</p> <p>Creating and encouraging proactive maintenance targets could potentially reduce long-term maintenance costs, such as addressing sections in Fair condition as soon as possible to extend their useful life at a cost which is less than what is required at the Poor and Very Poor stage.</p>


2.1.1.4 Local

Local Roads are lower traffic volume and speed and provide access to residential properties. They can also provide access to industrial or commercial areas as well.

Transportation – Roads - Local						
Applied LOS Attributes and Service Objective Description						
2. Reliable = The road network is maintained in Good condition to enable reliable / continuous provision of services						
3. Suitable = The road network condition enables intended functions (vehicle mobility)						
Ref #	Metric	Measurement	2014 Year End Stats	2018 Year End Stats	Trend	Target
R-2A	Percent of lane KM where condition is rated as Good to Very Good.	% of roads with condition rating Good or Very Good (as % of length)	54.93%	57.27%		Positive trend up although target would be to sustain at 55%
R-2C	Percent of road reconstructed annually.	Lane KM of road base rebuilt annually / total lane KM	0.02%	0.91%		
R-2D	Percent of road mill and pave work renewed annually by road classification and based on road segment length.	Lane KM of road surface renewed annually / total lane KM	0.85%	0.76%		
R-2D	Percent of concrete panel repair annually by road classification	Lane KM of road surface renewed annually / total	0.09%	0.06%		

	and based on road segment length.	lane KM.				
Sui-3A	Local Roads - Weighted average pavement condition rating based on length for the functional road classifications.	Score out of 100 (1 is best), Windsor in-house metric	11.320	9.825		<40
Sui-3A	Alleys - Weighted average pavement condition rating based on length for the functional road classifications	Score out of 100 (1 is best), Windsor in-house metric	8.621	17.770		<40
Source	Hansen, IMS Year End Reports, IMS Year Rehab Reports, 2014 Road Needs Study		Data Confidence			

LOCAL ROADS SERVICE TREND OVERVIEW AND COMMENTS






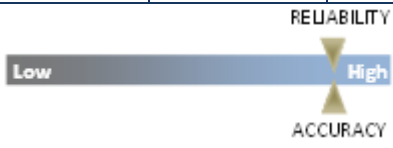
Service Trend Overview	Comments and Proposed Strategy
 <p>Local Roads Service Levels have IMPROVED, presenting a positive outcome for the City of Windsor</p>	<p>Comments</p> <p>Local road maintenance has occurred at a relatively stable level, with renewals and repair levels similar to 2014 while reconstructions have increased.</p> <p>Funding levels have been sufficient to slightly improve local roads to better average condition as compared to 2014 from 11.320 to 9.825 (where 1 is best) and to maintain a higher proportion of roads in Good or Very Good condition, while alleys have deteriorated with the weighted average pavement condition increasing from 8.621 to 17.770.</p> <p>Target</p> <p>Currently the pavement condition target is the only target for local roads, where this only gives an indication of the overall average road condition, which is a limited measure that does not encourage the most effective use of department resources.</p> <p>Creating and encouraging proactive maintenance targets could potentially reduce long-term maintenance costs, such as addressing sections in Fair condition as soon as possible to extend their useful life at a cost which is less than what is required at the Poor and Very Poor stage.</p> <p>As there is a low risk of failure of local roads and alleys, both in terms of likelihood of an adverse event and the consequences to the City, other higher risks assets like expressway roads should be prioritized.</p>

2.1.1.5 Scenic Parkway


The City has one Scenic Parkway, which is Riverside Drive. While we distinguish it as scenic, it exhibits the same factors as a Collector.

It should be noted that the Riverside Vista project has started in recent years and includes the reconstruction and expansion of this road. The project is significant and as of the date for this report, January 2018, no road reconstruction was reported as complete. The 2023 AMP will speak to the impact

the Riverside Vista project will have on this road category. The project, when completed, will address the entire length of the road, including service and growth enhancements. This will take several years and significant funding to complete and is not about sustaining the current level of service but rather enhancing it. Administration will be in a better position in 2023 to speak to targets to sustain the reconstructed road.


Transportation – Roads – Scenic Parkway						
Applied LOS Attributes and Service Objective Description						
2. Reliable = The road network is maintained in Good condition to enable reliable / continuous provision of services						
3. Suitable = The road network condition enables intended functions (vehicle mobility)						
Ref #	Metric	Measurement	2014 Year End Stats	2018 Year End Stats	Trend	Target
R-2A	Percent of lane KM where condition is rated as Good to Very Good.	% of roads with condition rating Good or Very Good (as % of length)	47.45%	38.12%		
R-2C	Percent of road reconstructed annually.	Lane KM of road base rebuilt annually / total lane KM	0%	0%		
R-2D	Percent of road mill and pave work renewed annually by road classification and based on road segment length.	Lane KM of road surface renewed annually / total lane KM	0%	0%		
R-2D	Percent of concrete panel repair annually by road classification and based on road segment length.	Lane KM of road surface renewed annually / total lane KM	0%	0%		
Sui-3A	Weighted average pavement condition rating based on length for the functional road classifications.	Score out of 100 (1 is best), Windsor in-house metric	9.450	11.976		
Source	Hansen, IMS Year End Reports, IMS Year Rehab Reports, 2014 Road Needs Study.		Data Confidence	 <p>RELIABILITY</p> <p>Low High</p> <p>ACCURACY</p>		




SCENIC PARKWAY SERVICE TREND OVERVIEW AND COMMENTS

Service Trend Overview	Comments and Proposed Strategy
 <p>Scenic Parkway Service Levels as of this report are trending down however as per the comments this is quickly changing and as such the overall trend is noted as favourable to reflect the investment made even though the timing of construction did not fit with this report.</p>	<p>Comments</p> <p>The Scenic Parkway classification refers to one road in Windsor, Riverside Drive. This road has received sizable investment in the Riverside Vista project, which consists of 8 major phases, many of which have sub-phases. This work is inclusive of storm and sanitary, water and road work as well as several utility moves and land acquisitions. While this AMP is not able to reflect the investment as only a single phase was completed as of data capture, it should be noted that funding extends out to Phase 2B as of the 2018 6-year capital budget.</p> <p>Scenic Parkway road conditions have declined materially since 2014 with the percent of roads rated Good or Very Good declining 20% from 47.45% to 38.12% in 2018 and the weighted average pavement condition decreasing from 9.450 to 11.976 (where 1 is best). Roads deteriorate at an increasing pace as they decline in condition, the overall collector roads condition could decline quickly in future years given the declining proportion of Good or Very Good condition roads.</p> <p>Target</p> <p>Once completed the Riverside Vista project will not only improve the overall roadway, it will address several buried assets and expand the existing roadway. The current target is therefore silent for this classification as the target is to complete the entire Riverside Vista project, which will take several years improving the roadway each year as phases are completed.</p> <p>As funding to address these major projects is limited and there are several significant projects which Riverside Vista will need to compete with to complete all 8 phases, Administration has included a recommendation to fund the significant service enhancement and growth road projects.</p>


2.1.1.6 General Roads Maintenance Measures

There are several maintenance processes which help to extend the life of a road. There are other programs such as pothole patching, which are more reactionary and have less ability to extend the life of the road as they are very temporary solutions.














Transportation – Roads – General Measures						
Applied LOS Attributes and Service Objective Description						
2. Reliable = The road network is maintained in Good condition to enable reliable / continuous provision of services						
4. Sustainable = The road network is managed and maintained in ways that preserve & protect the natural environment						
5. Available = The road network is of sufficient capacity and is convenient and accessible to the entire community						
6. Cost Effective = The road network is managed at the lowest possible cost for the required levels of service						
Ref #	Metric	Measurement	2014 Year End Stats	2018 Year End Stats	Trend	Target
R-2E	In-Service lane KMs which have crack seal work based on the road segment length.	Lane KM	24.7	16.495		

C-6B	"Preventative Maintenance road costs per network in-service paved lane KM (Crack seal, small road repair).	Cost per in-service paved lane KM.	\$163.68	\$243.51		
C-6C	Reactive maintenance road costs (pothole patching).	Cost per network in-service paved lane KM.	\$508.58	\$466.40		
Source	Hansen, IMS Year End Reports, Peoplesoft and Asset Planning Citywide TCA		Data Confidence			

GENERAL ROADS SERVICE TREND OVERVIEW AND COMMENTS


Service Trend Overview	Comments and Proposed Strategy
 <p>Not enough data yet, presenting a negative outcome for the City of Windsor</p>	<p>Comments</p> <p>Crack seal is a very common application which is applied to asphalt roads to seal cracks. This reduces further damage to the road base and surface from water (including snow) and slows the deterioration of the condition.</p> <p>Panel repairs are a common program for concrete roads. Concrete roads generally first show signs of failure at the seam where two concrete panels meet, and the road starts to break in those areas. If addressed in time, a section of each panel is cut out where the road is starting to fail and a new piece of concrete is poured. There are also other programs which can be used to seal the seams in concrete roads.</p> <p>The City of Windsor uses a variety of these applications. Expanding these programs will help extend the life of our roads even longer and at a much lower cost than mill and pave and certainly reconstruction. It is Administration’s intention that if the requested funding is approved, these programs will be expanded as well to extend the life and reduce the total cost of maintaining the road network.</p> <p>Target</p> <p>Additional funding to address the road network would allow for such programs to be expanded. Expansion of these programs has several benefits; they will help to preserve the asset longer so that rehabilitation and reconstruction is prolonged; bulk investments in such programs creates higher volumes and planned projects, which tends to result in lower pricing.</p>

2.1.1.7 Reports and Litigation Roads Measures

Transportation – Roads – Reports and Litigation						
Applied LOS Attributes and Service Objective Description						
3. Suitable = The road network condition enables intended functions (vehicle mobility)						
7. Responsive = Roads-related service requests are investigated within a reasonable timeframe						
Ref #	Metric	Measurement	2014 Year End Stats	2018 Year End Stats	Trend	Target
Sui-3B	Number of service requests related to road maintenance	# of requests	446	459		
Sui-3C	Number of service requests related to shoulders	# of requests	64	76		
Sui-3D	Number of service requests related to road cave-ins	# of requests	111	103		
Sui-3E	Number of service requests related to curbs	# of requests	84	95		
Sui-3F	Number of service requests related to utility damage	# of requests	15	77		
Sui-3G	Number of service requests related to potholes	# of requests	1,454	1,177		
Sui-3H	Number of claims for road conditions per lane KM per year	Total annual claims / total lane KM	0.002	.06		
Re-7A	Response time to road maintenance service requests	Average # of days	10.26	10.89		<20
Re-7B	Response time to shoulder service requests	Average # of days	14.30	15.29		<20
Re-7C	Response time to road cave-in service requests	Average # of days	39.07	16.43		<5
Re-7D	Response time to curb service request	Average # of days	23.26	11.35		<20
Re-7E	Response time to utility damage service request	Average # of days	12.25	6.87		<10
Re-7F	Response time to pothole service requests	Average # of days	3.57	2.69		<5

<p>Source</p>	<p>Hansen, IMS Year End Reports, PW Operations 311 Summary Reports</p>	<p>Data Confidence</p>	
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REPORTS AND LITIGATION SERVICE TREND OVERVIEW AND COMMENTS






<p>Service Trend Overview</p>	<p>Comments and Proposed Strategy</p>
 <p>Reports and Litigation indicate Service Levels in DECLINE, presenting a negative outcome for the City of Windsor</p>	<p><u>Comments</u></p> <p>The data indicates a generally increasing number of requests. While number of service requests related to road maintenance and cave-ins was relatively flat as compared to 2014 (<10% change), requests related to shoulders, curbs, and utility damage increased significantly (19%, 13%, and 413% respectively). Requests related to potholes did improve, declining by 19% as compared to 2014.</p> <p>Response times to service requests improved overall. Although response times to road maintenance and shoulder service requests increased by 6% and 7%, respectively, as compared to 2014, response times to cave-in, curb service, utility damage, and pothole requests declined significantly (25-58%).</p> <p>Although response times have improved, higher overall requests indicate a decline in the overall level of service and a reactive rather than proactive response to maintenance. Faster response times to requests could also be masking a higher number of issues, as faster response times could reduce the number of duplicate requests for the same issue. However, this cannot be confirmed by the data provided.</p> <p><u>Target</u></p> <p>Windsor has implemented targets for response times to requests ranging from 5-20 days. There has been a significant improvement overall with all but one measure meeting current targets (response time to road cave-in service request) as compared to 3 in 2014.</p> <p>There are currently no targets for the number of any type of service request.</p> <p>While addressing constituent requests is important, efforts to repair roads already in Poor condition rather than focusing on maintenance while in better condition results in higher cost repairs that are less durable, leading to higher overall maintenance costs and more frequent maintenance.</p>


2.1.1.8 Ontario Regulation 588/17 TLOS Compliance Measures

Ontario Regulation 588/17 TLOS Compliance Measures - Roads		
Service Attribute	Community Levels of Service (qualitative descriptions)	Technical Levels of Service (technical metrics)
Scope	For description, map of road network, and its level of connectivity see Appendix D	<p>Arterial Roads</p> <p>C1 Arterial 9.847 KM + C2 Arterial <u>126.141 KM</u> Total 135.988 KM Divided By Municipal Land Area 146.9 sq. KM Value 0.926</p> <p>Collector Roads</p> <p>C1 Collector 96.504 KM + C2 Collector <u>78.530 KM</u> Total 175.034 KM Divided By Municipal Land Area 146.9 sq. KM Value 1.192</p> <p>Local Roads</p> <p>Local Residential 668.259 KM Local Commercial/Ind. <u>17.315 KM</u> Total 685.574 KM Divided By Municipal Land Area 146.9 sq. KM Value 4.667</p> <p>Defined as: Number of lane-kilometres as a proportion of square kilometres of land area of the municipality.</p>
Quality	For road class pavement condition descriptions and images see Appendix A	<p>Paved Road Average Pavement Condition Index Values</p> <p>Arterial Roads: 9.181 Collector Roads: 11.128 Local Roads: 9.825 Alleys: 17.770 (not specifically called for in Regulation, however included in case it was implied)</p>

2.1.2 Structures (Bridges and Culverts)

It should be noted that structures are defined as Bridges which support vehicle traffic within the Right of Way, subways (where vehicle traffic goes under the structure), and culverts which are greater than a 3m span. The City also has pedestrian bridges within the parks system and those assets are reported in the Corporate AMP as part of the Parks asset listing.











Transportation – Roads - Expressway						
Applied LOS Attributes and Service Objective Description – aligns with ref number - #a						
1. Safe = Bridges and culverts are in Good condition such that failures are minimized						
2. Reliable = Bridges and culverts are maintained in Good condition to enable reliable / continuous provision of services						
Ref #	Metric	Measurement	2014 Year End Stats	2018 Year End Stats	Trend	Target
S-1A	Public Works overall number of bridges in Poor or Very Poor condition	Overall structure score of 1-69.9 or less	2	2		0
R-2F	Bridges - Percentage of bridges and culverts based on replacement costs where condition is rated as Good to Very Good (80-100)	Percentage as a function of current replacement cost	86%	94.63%		
R-2F	Pedestrian Bridges - Percentage of bridges and culverts based on replacement costs where condition is rated as Good to Very Good (80-100)	Percentage as a function of current replacement cost	100%	100%		100%
R-2F	Culverts - Percentage of bridges and culverts based on replacement costs where condition is rated as Good to Very Good (80-100)	Percentage as a function of current replacement cost	98%	93%		
Source	Hansen, Asset Planning Citywide TCA		Data Confidence			

Service Trend Overview	Comments and Proposed Strategy
 <p>Structures including vehicle and pedestrian bridges, subways and culverts (>3m span)</p>	<p><u>Comments</u></p> <p>Although the 2014 to 2018 stats show there remains two bridges/subways in Poor or Very Poor condition it should be highlighted that in 2013 the AMP noted there were 9 bridges in Poor or Very Poor condition. Significant investment has been made over the last 5 years to reduce this risk. This explains why the percentage of bridges/subways in Very Good or Good condition as a function of replacement cost has increased as well.</p> <p>It should also be noted that one of the Poor or Very Poor condition bridge/subway is the Wyandotte / Via subway was funded in 2017 to address the deficiencies, however at the time of this report the completion of the project and updated condition assessments were not available.</p> <p><u>Target</u></p> <p>As it relates to assets in this category it is necessary to ensure they are addressed immediately if they exhibit any failures. These assets are highly regulated and condition inspections must be completed every 2 years. Funding over the past 5 years has been directed to these assets and the improvements from this investment are evident. The target for these assets should continue to be sustaining them at Very Good or Good conditions and addressing any failure points immediately to avoid further deterioration.</p>

2.1.2.1 Ontario Regulation 588/17 TLOS Compliance Measures

Ontario Regulation 588/17 TLOS Compliance Measures - Bridges and Culverts																				
Service Attribute	Community Levels of Service (qualitative descriptions)	Technical Levels of Service (technical metrics)																		
Scope	Description of traffic: Traffic supported by municipal bridges is general public and commercial duty which includes heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, and cyclists.	Percentage of bridges in the municipality that have loading restrictions: 0% (No bridges in the municipality have loading restrictions)																		
Quality	<p>Bridges and culverts are rated from "Poor" to "Very Good" with current ratings as follows:</p> <p>Bridges:</p> <table> <tr> <td>Very Good</td> <td>68% of total network (rounded)</td> </tr> <tr> <td>Good</td> <td>23%</td> </tr> <tr> <td>Fair</td> <td>6%</td> </tr> <tr> <td>Poor</td> <td>2%</td> </tr> <tr> <td>Very Poor</td> <td>2%</td> </tr> </table> <p>Culverts:</p> <table> <tr> <td>Very Good</td> <td>55% of total network (rounded)</td> </tr> <tr> <td>Good</td> <td>27%</td> </tr> <tr> <td>Fair</td> <td>9%</td> </tr> <tr> <td>Poor</td> <td>9%</td> </tr> </table> <p>Condition ratings for bridges and culverts adhere to strict OSIM requirements and are therefore inspected and maintained to strict standards. All bridges and culverts in the municipality are open to traffic both vehicular and pedestrian. Assets deemed in Poor to Very Poor condition often may only have a single component of the larger "whole" asset in a poor condition which reflects on the entire asset condition rating. The asset however is typically considered structurally sound.</p> <p>Bridges and culverts in Poor to Very Poor condition are often subject to inspections from third party engineers/consultants to ensure safe operation and delivery of expected levels of service.</p>	Very Good	68% of total network (rounded)	Good	23%	Fair	6%	Poor	2%	Very Poor	2%	Very Good	55% of total network (rounded)	Good	27%	Fair	9%	Poor	9%	<p>-Average municipal bridge condition index: 91.02 which can be translated into a corporate condition rating of "Very Good".</p> <p>-Average municipal culvert condition index: 89.80 which can be translated into a corporate condition rating of "Good".</p>
Very Good	68% of total network (rounded)																			
Good	23%																			
Fair	6%																			
Poor	2%																			
Very Poor	2%																			
Very Good	55% of total network (rounded)																			
Good	27%																			
Fair	9%																			
Poor	9%																			

2.1.3 Sidewalk Services

Transportation – Sidewalks						
Applied LOS Attributes and Service Objective Description – aligns with ref number - #a						
1. Safe - Sidewalks are maintained in Good condition such that trips and falls are minimized						
2. Reliable - Sidewalks are maintained in Good condition to enable reliable / continuous provision of services						
3. Suitable = Sidewalks condition enables intended functions (pedestrian & other mobility)						
4. Available = The sidewalk network is of sufficient capacity and is convenient and accessible to the entire community						
6. Responsive = Sidewalk-related service requests are investigated within a reasonable timeframe						
Ref #	Metric	Measurement	2014 Year End Stats	2018 Year End Stats	Trend	Target
S-1A	Sidewalk condition score - Excellent	Percentage	52.54%	53.14%		
	Sidewalk condition score – Good	Percentage	30.72%	33.33%		
	Sidewalk condition score – Fair	Percentage	14.93%	12.29%		
	Sidewalk condition score – Poor and Very Poor	Percentage	1.81%	1.24%		
S-1B	Number of litigation claims due to trips and falls	Claims per KM per year	0.006	.037		
R-2A	Percent of sidewalks where condition is rated as Good to Very Good	Percentage of area total	83.26%	86.47%		
R-2B	Percent of sidewalk reconstructed annually	Percentage of total KM of sidewalk	1.44%	0.83%		There was significant investment in sidewalks in 2014.
Sui-3B	Number of service requests related to sidewalk construction & repairs	# of requests	446	314		
A-5A	Percentage of the length of road segments with sidewalk – Expressway	Percentage of total length of road type	0%	0%		
A-5A	Percentage of the length of road segments with sidewalk – Arterial	Percentage of total length of road type	72.19%	72.15%		

A-5A	Percentage of the length of road segments with sidewalk – Collector	Percentage of total length of road type	79.18%	80.21%		
A-5A	Percentage of the length of road segments with sidewalk – Local	Percentage of total length of road type	52.66%	53.91%		
A-5A	Percentage of the length of road segments with sidewalk – S Parkway	Percentage of total length of road type	90.18%	90.16%		
Re-7A	Average # of days to respond to sidewalks construction and repair service requests	# of days	22.77	19.03		20
Source	Hansen, PW Operations 311 Summary Reports, Streets with Sidewalks Report		Data Confidence			

Service Trend Overview	Comments and Proposed Strategy
<p>Sidewalks</p>	<p>Comments</p> <p>The trend for sidewalks remains fairly consistent when compared to the 2014 LOS stats. The additional investment made over the 2013 to 2018 timeframe has been able to keep these assets at consistent service levels.</p> <p>Target</p> <p>The condition ratings from the 2013 AMP compared to this AMP reflects improvements in the overall condition of these assets. This trend started to take shape in 2014 when additional funding was directed to improve these assets, and as a result the steady state of condition from 2014 to 2018 is the target moving forward.</p>

2.1.4 Other Transportation Assets

Level of Service measures have not been specifically developed for the balance of the Transportation Assets, those being Parking Garages, Traffic Signals, Noise Barriers and Street lights. Despite not having specific LOS measures it should be noted that there are risks, particularly for the traffic signals should they fail. It would not be an option to not replace a full failed traffic signal or street light without risk. As a result, unplanned expenditure requests or deferring or cancelling other planned projects would be needed to bring the assets back online. Administration has included in this report funding levels which would ensure replacement of these assets prior to failure to avoid these risks.



**Section 3
Asset Management
Strategy**

Asset Strategy for Transportation

3.1 Asset Strategy for Transportation

The Transportation asset group incorporates many different types of assets ranging from roads and sidewalks to traffic signals, bridges and major culverts. In order to properly manage and maintain such varied services, comprehensive asset management strategies have been established and are in use but are also being evaluated for improvement. The objective is to outline and establish a set of planned actions, based on best practice that will enable our assets to provide an agreed upon and sustainable level of service to the citizens of Windsor, while managing risk at the lowest lifecycle cost.

The focus for the next 4 years of investment is on maintaining our existing assets and halting the decline in service levels. There are defined roadways which are planned for Growth and or Enhanced Services. This means the road will be expanded either for additional vehicle traffic and or alternative modes of transportation as well as impacting underground assets such as water, storm and sanitary pipes. Some of these projects have already completed Environmental Assessments (EA) and need to commence within the next 5 to 10 years so they do not expire. Growth over the 4-year period is expected to be focused on the previously identified projects funded in the Capital Budget as either committed or approved in principle funding.

The construction of these projects will also address the condition challenges with any of these roads as they are existing roads which will be expanded for vehicle and alternative transportation options such as bikeways. Many of the projects also address underground assets at the same time including sewer and water. The cost of these projects is significant and should be planned and funded outside of the regular road rehabilitation and maintenance program as the ability to fund them generally results in a reduction of funding to address the balance of the network. This creates a challenge in ensuring the sustainability of the overall network at a reasonable cost.

3.1.1 Roads Strategy

The Roads network represents the most significant portion of the City's Transportation infrastructure and, as a result has received the most attention and analysis for the 2018 AMP.

3.1.1.1 Projected decline of the City's Roads network

If there are no increases in funding for the rehabilitation and reconstruction of our existing road network, it will continue to fail at a rate which exceeds current levels. We can expect our current figure of nearly 20% of the network being identified as "Poor" or "Very Poor" to increase to over 30% within 20 years. Not only will this create a reduced level of service for our road network, it will increase risk to the City as there will be more Arterial, Collector and EC Row classifications, which are of significant risk to the City in a Very Poor condition. It will also create a significant financial challenge in trying to resolve the problem. Figure 3-1 and 3-2 below graphically show the deterioration in the network.

FIGURE 3-1—CURRENT ROAD NETWORK CONDITION AT YEAR 2015.

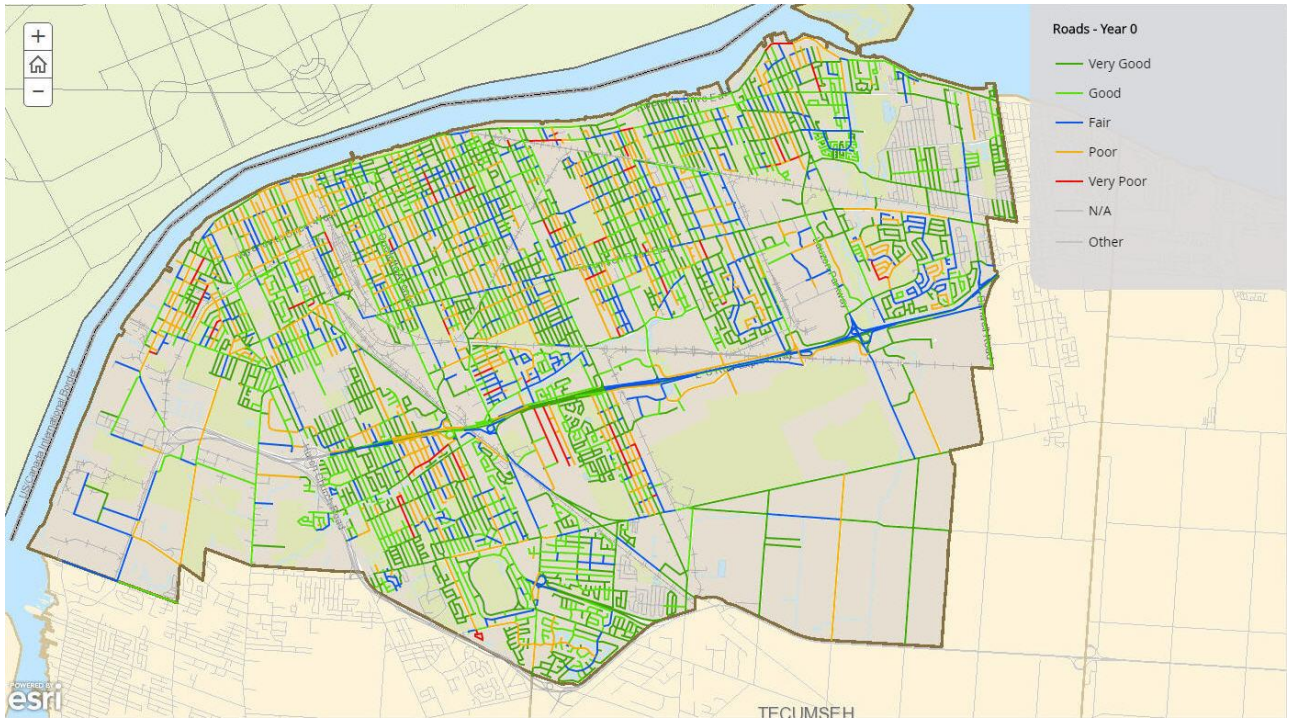
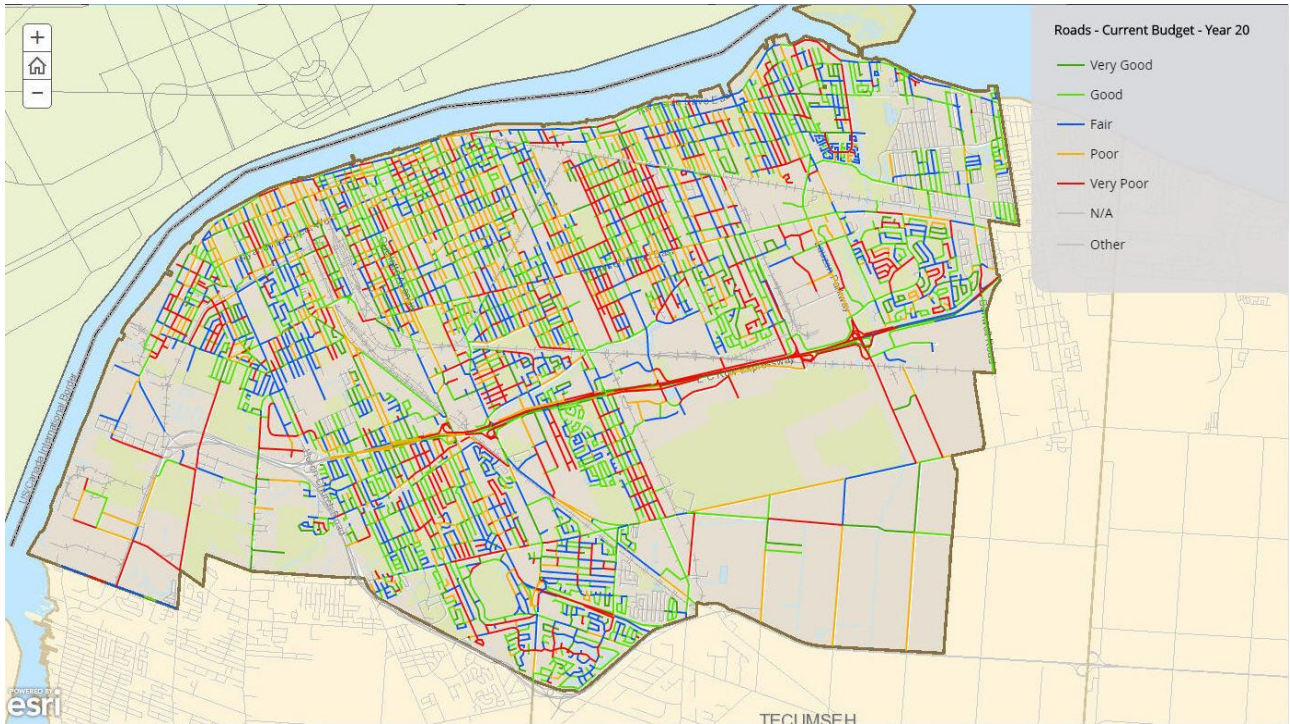


FIGURE 3-2—FORECAST ROAD NETWORK CONDITION IN 2035 BASED ON CURRENT ROADS FUNDING



The ability to have an impact on the deterioration trend requires a prompt response. As stated in the 2015 report to Council, 5 years may not have a significant slide of assets to a Poor or Very Poor condition, however some slide has been seen, particularly with the arterial, collector and expressway.

The longer we delay increases to specifically address the existing roadways and prioritize based on risk, the more challenging financially it will be to recover from the volume of assets which are declining.

In 2015, Administration put forward an analysis that highlighted the projected decline of the roads network and need for increased funding to manage service levels (Report S40/2015, Clerk File SW2015). More details on this analysis are provided below. The analysis was accompanied by a proposal to introduce an annual 0.5% levy each year for the next 20 years to correct the decline in the road network and produce a healthy road network by 2035, significantly reducing the percentage of roads in Poor and Very Poor condition. Council voted to decline the proposal pending the 2018 AMP to provide a more informed funding needed for all assets.

Since 2015 Council has allocated \$20.4M in Enhanced Capital Budget funding to roads. While these funds were not purely for maintenance of existing roads or selected based on risk, they did provide for additional funding to the overall road network in the absence of a dedicated increase. This solved the challenges for the projects put forward. But as explained to Council in the 2015 report, given the scale of the asset base, current rate of deterioration and decline in level of service, sustained long-term funding to address the City's road network is needed.

The problem posed to Council in 2015 has not gone away, and the investment principles that were proposed to Council in 2015 as recommendations are now being reinstated with some adjustments as requirements to maintain our current level of service rather than improve it and alignment with the premise outline in Ontario Regulation 588/17.

3.1.1.2 Scenario modelling to support levy

Due to the complexity of the data involved, the City utilized their advanced asset management information systems to run simulations and scenarios to compare different investment approaches for the roads network. The Assetic myPredictor system is a prediction modelling and decision support tool for long-term planning of infrastructure assets. It enables organizations to optimize service level outcomes and capital and maintenance expenditure. Industry-specific algorithms accurately predict the future behavior of assets given available funding levels and enable scenario comparison to aid decision making. The City used inspection data from the road network, at the lowest level of observations (alligator cracking etc.) and mapped the observations to the 1 to 5 scale in myPredictor. The entire road network and condition data was uploaded into the system and mapped to the various condition results. Various programs used to maintain the road network were developed, as well as the cost and impact each program would have on the condition of the road. Deterioration models were then reviewed and applied as well as various funding models.

Administration developed four (4) scenarios based on different funding levels to show what the road network is likely to look like in 20 years based on investment options. An overview of the results is provided below.

Km of Road in Poor and Very Poor Condition		2015	Year 20
Funding Model	Description		
Model 1	Historic Funding Level	196.82	358.49
Model 2	1% levy each year for 4 years	196.82	148.01
Model 3	0.5% levy each year for 20 years	196.82	73.42
Model 4	1% levy year one, then 0.25% levy each year for 10 years, then 0.75% each year for 10 years	196.82	115.61

As explained above, sustaining funding for roads at the current level over the next 20 years (Model 1) results in a significant reduction in the level of service of our roadway network as well as an increased risk. Model 3 was proposed to Council in 2015 but pending the need to consider funding levels required to sustain all City assets, not just roadways, Council directed Administration to return with a report on the full set of assets. In addition, Model 3 proposed an increased level of service for the road network over 20 years. To provide a more balanced and financially responsible recommendation this AMP is developed to clarify funding levels required to sustain all assets at current service levels. Any enhancements to specific assets can then be looked at individually without adverse impact to the overall asset inventories sustainability.

The investment strategy therefore proposed in this AMP follows the outcome seen by Model 2. As with all assets this AMP the focus is on identifying funding levels to simply sustain current levels of service over the next 20 years. Model 2, 1% levy each year for 4 years, represented an approximate increase of \$16M added to the current annual average amount spent on roadways. This was the amount required to approximately maintain the same percentage of the road network in poor or very poor condition (18-20%) with a modest inflation rate of 2%, maintaining the City’s level of service, with the added value of integrated risk-based decisions. As explained in the next section, integrating the different levels of risk across the road network into the decision-making process will result in the Expressway being held at a higher level of service, and better condition, than other parts of the roads network as that road represents to the City, the highest consequence in the event of a failure.

3.1.1.3 Integrating Risk into Roads Planning

While assessing level of service, the City also considered risks through a structured risk assessment approach for each asset class, using the City’s Standard Risk Assessment Tool. This has been another significant development by the City since the first AMP in 2013. The tool is based on global ISO 31000 Risk Management principles and is an aid for service providers and project managers to manage the risks that have an impact on their objectives. Risks are quantified through the below equation, with scaled metrics provided for each variable to support consistent risk evaluation across the City.

$$\text{Risk Score} = \text{Probability of Failure} * \text{Consequence of Failure}$$

The Risk Assessment Tool walks the user through a 5 step process, as illustrated in Table 5-2 below, to identify risks, assess their risk level, evaluate the risks, and identify what further actions are required to treat the risk to a risk level that can be tolerated by stakeholders.

TABLE 3-1—EXTRACT OF THE CITY’S RISK ASSESSMENT TOOL

1	<p>Risk Identification: The first step with any risk assessment is to clearly indicate your service or project objectives...If a risk does not prevent you from achieving your objective then it is not a risk to that service or project...Once the risk and their associated objectives are defined, categorize its Risk Type. There are 8 available Risk Types that are defined on the "Risk Types" tab.</p>
2	<p>Risk Analysis: The second step to the risk assessment is to analyze each risk. Begin by identifying the existing key controls &/or strategies that mitigate each risk. Considering all the information captured on each risk, score each risk for impact and likelihood on a scale from 1 to 5 (decimals are permitted)...Risk Level will then be calculated as likelihood X consequence, and represented as a percentage. The Risk Level will be categorized based on the scoring range chart.</p>
3	<p>Risk Evaluation: The risk evaluation step helps state the risk tolerance level for each risk. Two questions are asked of the stakeholders: 1) What Risk Level is the Corporation willing to consider acceptable. 2) Based on the current Risk Level can the risk be tolerated? If yes, then indicate "Tolerate" under the Risk Treatment section. Monitor the risk periodically to check that the Risk Level has not changed and if it has, then is it still within tolerance. If no, then treat the risk.</p>

- Risk Treatment:** Record your primary risk treatment, and then provide further details on how the risk will be treated (I.e. mitigation strategy, status (*if monitoring*), triggers etc.) and who is responsible for managing the risk (I.e. Risk Owner). Risk Levels of "high" or "critical" require a treatment plan. For more complex risks (I.e. those that require multiple risk treatments), the "*Risk Treatment Plan*" tab can assist with developing an effective risk treatment plan.

Monitoring & Key Risk Indicators:

After conducting a risk assessment, risks and their mitigation plans should be monitored and reviewed on a periodic basis. Update the status of mitigation strategies as they are implemented; and move them under the "Significant Controls or Mitigating Strategies" column as they are completed. Re-evaluate the risk to determine if the risk level has changed.

- Additionally, key risk indicators or KRI's may assist Risk Owners to know when a risk is on the rise or decline. The "*KRI Monitor*" tab is a convenient location for KRI information to be stored. KRI tolerance levels are determined and matched up against KRI actual values. They can potentially become a "trigger" indicator for a mitigating response identified in a Risk Detail Report.

The corporate risk template and policy, as approved by Council April 2015 CR 17656, was used as the foundation for development of the risk associated with the assets. This part of the project also included participation from members of the CAO's office who oversee the Corporate Risk Policy. Several assets were assessed against the template for probability of occurrence and consequence of failure.

Since the first AMP in 2013, the City has made significant steps forward with their Risk Framework across the City, demonstrating an advancement in asset management practice. A risk assessment was conducted on the City's road network, taking account of consequence of failure to the City and services based on set criteria, and probability of failure based on the condition of the assets. The output of the risk assessment is presented in Table 3-2 below.

TABLE 3-2—ROAD CLASSIFICATION CONSEQUENCE OF FAILURE SCORES

	Expressway	Arterial - Class 1 & 2, including Riverside	Collector - Class 1 & 2	Local	Gravel Alleys	Paved Alleys
Risk Score (out of 5)	3.18	2.82	2.18	1.82	1.27	1.36

The Expressway was evaluated as the highest risk road asset, unsurprising as a failure in this road has a significant consequence to the City, which when coupled with segments of the road being in poor and very poor condition poses a serious concern. The same logic applies to the Arterial and Collector roads but to a lesser degree than the Expressway. Local roads are important to the City and its citizens, however when compared against the major roads and considering investment requirements, they should be positioned with lower risk assets.

The importance and benefit of this risk analysis to the City is that it adds an extra dimension to our decision-making framework, supporting more effective decisions to be made for the benefit of services. Integrating risk into the City's road investment strategy will result in higher risk assets like the Expressway and Arterial roads being prioritized over lower risk assets.

The modelling outlined in Section 3.1.1.2 above, is programmed to take account of this risk analysis in the financial calculations.

3.1.1.4 Road intervention timing

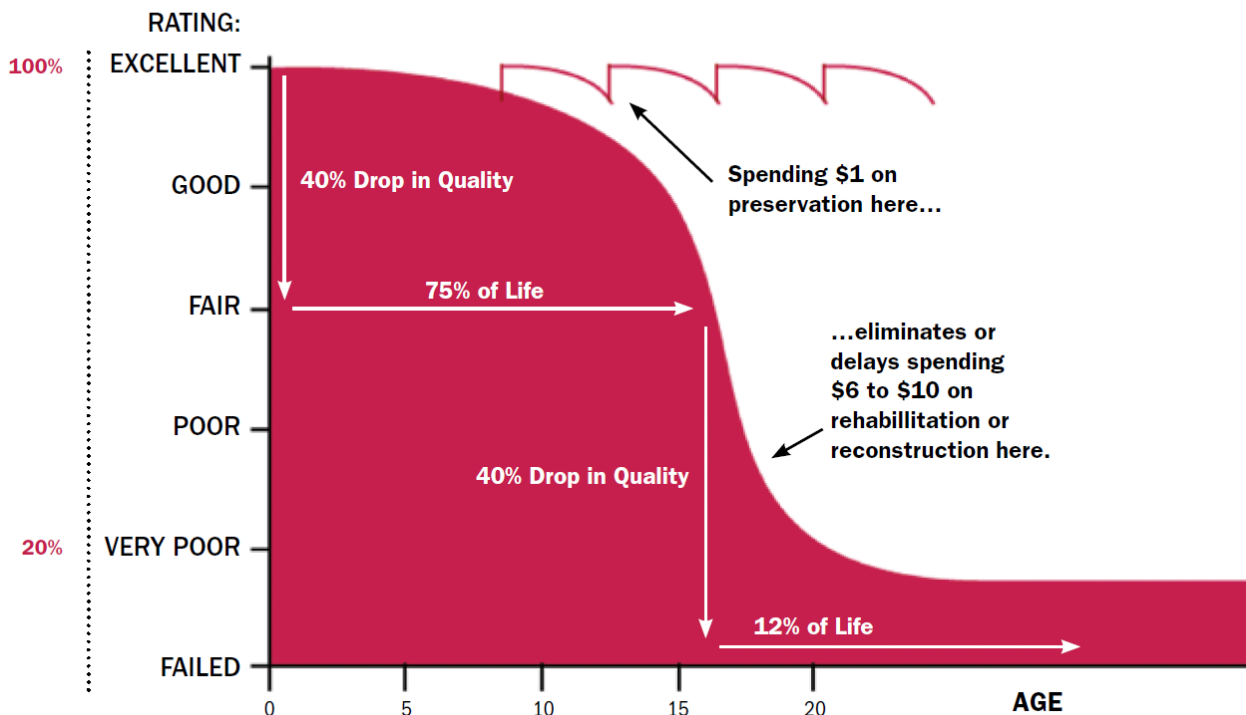
In terms of timing for an intervention and repair on a road, catching a deteriorating road in Fair condition and doing a rehabilitation project is significantly lower, ¼ of the cost, compared to the cost to reconstruct a road when it reaches the Poor and Very Poor conditions.

A substantial cost savings can be realized when proactive intervention is undertaken before the road deteriorates below a certain rating threshold. Proactive intervention is much less expensive compared to only performing maintenance and rehabilitation once noticeable degradation of the road becomes apparent.

“For example, Figure 3-1 demonstrates that when roads, as is typical for many assets, are allowed to deteriorate below a Fair condition rating, the rate of deterioration and reinvestment costs both increase substantially. Investing in preventive maintenance and regular repair will prolong the asset service life, avoiding premature and costly reconstruction and service disruption”. Source: Canadian Infrastructure Report Card 2016.

FIGURE 3-1—SAMPLE ASSET DETERIORATION CURVE AND INTERVENTION FOR ROADS. SOURCE: CANADIAN INFRASTRUCTURE REPORT CARD 2016.

Figure 6: Example of asset deterioration curve (Roads)



Case Study – timing of road rehabilitation

As an example, based on 2018 AMP there is an estimated \$373.5M in Poor and Very Poor roads, meaning they are past the point of being able to be rehabilitated, or mill and paved, to extend their useful life. Once a road goes beyond a rating of Fair, the base or foundation of the road is compromised, such that any work like mill and pave would not yield good results. A mill and pave done at the Fair condition

stage should extend the life of a road by 10 to 15 years. If the base is compromised, then a mill and pave is likely to only improve the road for 3 years maximum. As such, the results do not provide for the best results for the funding spent, and creates a situation where a road, which was a good candidate for a mill and pave was not done and could then deteriorate and require a full reconstruction. The cost difference between the two methods is significant with a mill and pave costing approximately \$40/sm and reconstruction \$180/sm. As such, 1km of road mill and paved would be approximately \$600,000 where as a reconstruction would be \$2.7M.

The current LOS is trending down / declining. To maintain it at the current level we need to increase funding. The increase is recommended to be 1% a year for 4 years which is an average annual increase of \$4,000,000 each year for 4 years, resulting in \$16M being added to current funding levels for roads after 4 years. If we let it continue to decline by only funding at our historical budget efforts, our network is expected to reach approximately 30% of the network in Poor or Very Poor condition, which is 11% more what the current percentage is.

As previously stated, the current replacement cost associated with our Poor and Very Poor network in 2018 is estimated at \$373.5M and represents 19% of the total kms of roads for the City. This amount projected out 20 years at a conservative 2% Construction Price Index would estimate the replacement cost value of those road segments to be \$555M. If we compare that to the roads segments projected to be in Poor and or Very Poor condition after 20 years, based on the simulation results from the modeling system myPredictor for current funding levels, 30% of the total current road network would be in Poor or Very Poor condition. We took that list of road segments, applied their 2018 replacement cost value and then increased it by 2% CPI over 20 years. The replacement cost value of those poor and very poor road segments balloons to \$1.15B, an increase of \$595M, when compared to 19% of the network in Very Poor or Poor condition in 20 years.

Taken in this light, a 1% levy for 4 years to hold the network at no more than 18-20% in Poor or Very Poor condition rather than sliding to approximately 30% is far less than then the additional \$595M to reconstruct these roads. The increase is also spread out over a number of years to support affordability and is considered the lowest lifecycle cost option for the City to maintain LOS.

3.1.1.5 Road rehabilitation options analysis – asphalt vs. concrete

The City has explored the difference between using asphalt and concrete to determine the optimum rehabilitation for Windsor. Whole life cost analysis showed that for a set specification of road, particularly arterial roads with heavy volume and truck traffic, they are best built as concrete. Table 3-3 below shows the outcome of the City's analysis over a 50-year period for a 4-lane, 100m long stretch of road with streetlights, catch basins, traffic signals and sidewalks. While asphalt roads have a lower upfront capital cost, the concrete roads have lower ongoing maintenance and repair costs, resulting in a lower whole life cost for the City. Despite the overall life cycle cost, not all roads should be concrete as the value could be lost, particularly on lower volume and little or no heavy vehicle traffic roads. The cost differentials are considered particularly for higher volume traffic roads as the ability to disrupt traffic for rehabilitation efforts combined with the overall lower life cycle cost are part of the considerations.

TABLE 3-3—ROAD REHABILITYION OPTION ANALYSIS, ASHPALT VS CONCRETE

Comparison of Asphalt and Concrete		
	Asphalt	Concrete
Capital Costs	\$ 149,144	\$ 198,856
Maintenance Treatments		
NPV Without Inflation	\$ 392,764	\$ 256,369
NPV With Inflation	\$ 650,950	\$ 408,705
Total LCC	\$ 800,094	\$ 607,561

The City has also noted that the quality of asphalt has been a concern such that newly constructed roads are showing signs of being 10 years old when they are in fact 2 or 3 years old. The City implemented new standards in tenders and hired a QA position to oversee road construction to assist with this challenge. We continue to do crack sealing in specific areas as well as pothole patching and concrete panel repairs. Additional funding for sustaining the overall network will also allow for expansion of the crack seal program furthering efforts to reduce the deterioration of the road network.

3.1.1.6 Road asset management strategies

The City has the following road asset management strategies in place:

- A road pavement inspection program – each year, pavement inspections are performed on the road segments scheduled. A risk-based approach is used to determine the frequency of inspections on a road segment. A road segment is scheduled for inspection using a range of frequencies from a maximum of once every year to a minimum of once in a 7 year period based on set criteria (e.g. last inspection date, age of current pavement, road classification, and current condition rating). Generally speaking, the higher the traffic volumes and the worse the pavement condition, the more frequent the inspections on a road segment. (Alley segments are scheduled for inspection on a lesser frequency because of the lower traffic volume.) Using a structured objective formula-based approach, the pavement inspection data is then used to generate a numeric condition rating of the overall performance of the pavement. Road condition ratings are also updated following the completion of road rehabilitation/reconstruction projects and new construction projects as information becomes available. The numeric condition ratings are used routinely by City staff for the purposes of rehabilitation, reconstruction, and maintenance planning and in budget planning.
- The computerized Hansen infrastructure management system and database is used to track detailed road asset information, inspections, and also work orders to establish a history of activity over the life of the road asset on a segment by segment basis
- A comprehensive road reconstruction and rehabilitation program is in place
- Where possible, work is not carried out on Roads which are planned to have either sewer or water work in the next 5 years or are part of a larger project in the 5 year Capital Program
- Similarly the City coordinates with Windsor Utilities Commission to align timing between road, sewer and water projects
- The specifications for utility cuts has been enhanced to help maintain the road segment integrity and retain proper condition rating and useful life projections

One of the key future strategies that the City plans to incorporate into the road preventative maintenance program is a comprehensive crack sealing operation. This would be utilized early on in the assets life cycle and would help to extend useful life and maintain a Good condition rating. The City is currently investigating options in this area and expects potential pilot projects to be established in the near future.

The City has also directly tied their road operation and maintenance functions with the capital budget as outlined below:

- Reconstruction
 - Performed when the overall structure of the road has deteriorated to a point where the only economical action is the reconstruction of the entire road structure. Typically roads in the Poor and Very Poor corporate condition categories would require full reconstruction as they are not good candidates for a mill and pave
- Rehabilitation
 - Mill and pave program
 - Roads which are in Fair condition are within 1 to 5 years of becoming deficient and needing additional work to improve them and therefore are candidates for mill and pave.
 - Expanded asphalt method
 - Rural roads that have enough structure to be able to repurpose the base before laying another top coat of asphalt. This is used predominately for very poor category roads where complete rehabilitation is required
- Preventative Maintenance
 - Small road repair
 - Roads which are in Good condition are 6 to 10 years away from becoming deficient and being looked at for this program
 - Will address sections of bad road to improve its life cycle and potentially improve overall condition of road
 - Crack sealing
 - Pilot projects have shown positive results. Additional funding is required to expand this program
 - Pothole patching program
 - Preventative maintenance measure as well as a short-term repair measure; funded through operating budget

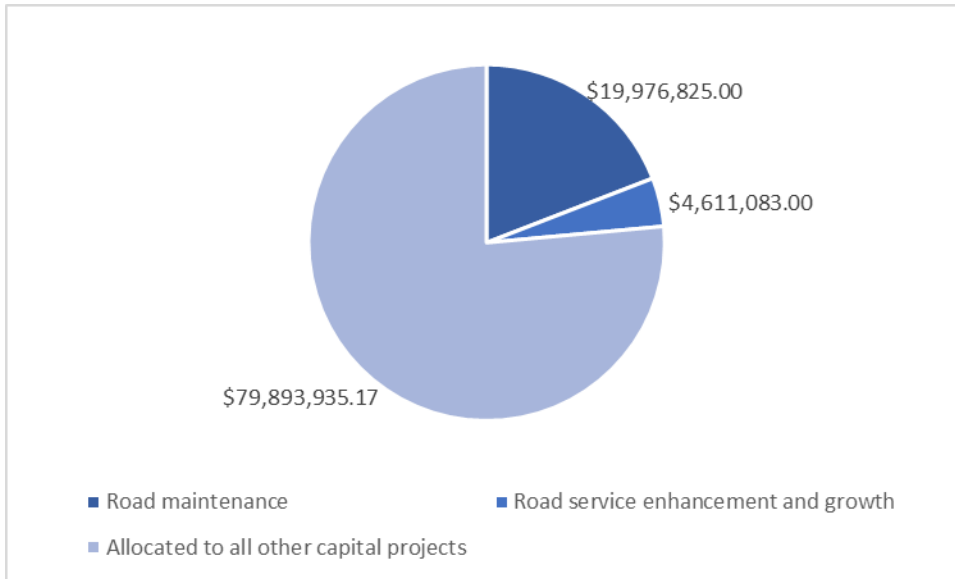
The City also understands and recognizes that there will be significant challenges with the roads asset management program moving forward in the future. Some of those challenges include:

- Trying to avoid roads falling into the Poor and Very Poor corporate condition category, while trying to also address those roads which are already in the Poor and Very Poor corporate condition category.
- EC Row Expressway costs considerably more to maintain than the equivalent length of surface elsewhere in the City, due to the complexity of setting up a construction site for the work and the road requiring a higher condition rating to be maintained than other road types. This is therefore a significant liability and is responsible for higher costs for materials and maintenance
- Coordinating with all utilities which have different needs and timescales for rehabilitation
- Keeping up with technology, methods and materials for both maintenance and replacement

3.1.1.7 Recommended Roads Investment Strategy

As can be seen in Figure 3-2 below, based on Capital Funding approvals from 2013 to 2018 an annual average of \$19.9M is approved for road maintenance, rehabilitation and reconstruction. An additional annual average funding \$4.6M is approved for service enhancements to roads and or growth of the road network. These projects are generally the significant road projects such as Riverside Vista, Cabana, Walker and Banwell, as well as several others. In total approximately 24% of the average annual Capital Budget from 2013 to 2018, \$104,481,843, has being directed to road work.

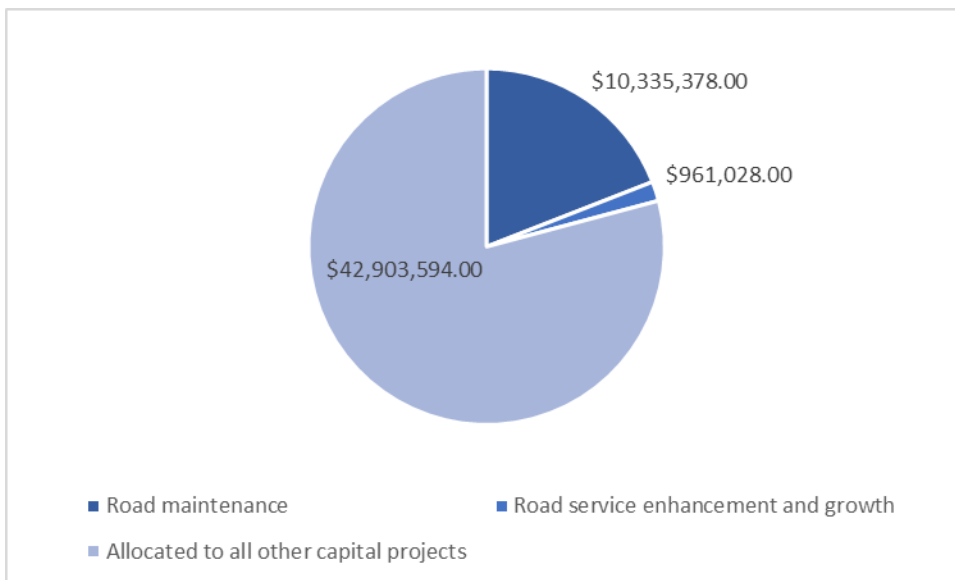
FIGURE 3-2—AVERAGE ANNUAL CAPITAL FUNDING ALLOCATED TO ROADS (2013-2018)



The funding for roads is not exclusively tied to the municipal tax levy. Of the average \$104.4M in annual capital funding from 2013 to 2018 \$54.2M was what is termed Pay as You Go (PAYG) funding and tied to municipal tax funding. The balance of funding is from Federal Gas Tax, Development Charges, Sanitary Sewer Surcharge (only applicable when a road is reconstructed because the sewer beneath the road had to be repaired or replaced causing the road to be removed) and grant funding.

Of the average \$19.9M in road maintenance funding, \$10.3M (52%) was funded with PAYG and for the \$4.6M in service enhancements and growth \$961K (20%) was funded with PAYG. The average annual allocation of PAYG funding to roads is \$11.2M or approximately 21% of the average annual PAYG funding. Figure 3-3 below reflects the road allocation of PAYG.

FIGURE 3-3—AVERAGE PAYG CAPITAL FUNDING ALLOCATED TO ROADS (2013-2018).



The average annual allocation of \$24.5M from 2013 to 2018 is slightly higher than the average noted in a report to Council in November 2015 which reported the average at that time at \$21.5M. This is a positive trend and shows Council's continued efforts to address the deficiencies in the road network. This is a positive investment and has resulted in the total kms in Poor or Very Poor condition dropping from 20% in the 2013 AMP to 18% in 2018 AMP. While this shows positive trends, it is equally important to note that the Replacement Cost of the Very Poor and Poor roads has increased from 17.7% in 2013 AMP to 18.5% in the 2018 AMP. This is important to consider as the road classifications making up the 18% of kms in the Very Poor and Poor condition has shifted more to Expressway and Arterial. While these roads may be less in length the cost of replacement is significantly higher, resulting in the higher percentage of Very Poor and Poor when looking at it as Replacement Cost.

To optimize the funding the same prioritizing modelling applied to the road deterioration model should be implemented as well. The process considered the risk associated with deterioration of the road as well as consideration of mill and pave projects over reconstruction based on condition and risk.

The City's modelling provided analysis to hold current levels of service and avoid a spiraling decline across road classifications. The investment strategy and decision-making guidelines provided below aligns with the modelling activities to help the City reach the goal of stabilizing Roads Level of Service.

Roads Investment Strategy and Decision-Making Directives

1. Shift from a 'worst first' prioritization approach based on condition, to a risk-based prioritization approach where the City's most important assets are given preferential treatment. Best efforts will be made to keep EC Row, Arterial and Collectors from sliding into the reconstruction only category, aiming to have none in Poor or Very Poor condition.

2.

Roads - Order of Priority	
1.	EC Row
2.	Arterial
3.	Collector
4.	Local (industrial, commercial and residential)

3. Continue to work with the Windsor Utilities Commission Roadways to coordinate road, sewer and water network improvement work. Roads which have sewer or water work scheduled to be completed will have priority to maximize benefits of shared capital costs between the City's service areas. This will act as a boost for Local Roads which will get addressed when there is a sewer project or Local improvement which needs to be done and process is in development for this.
4. Consideration for roadways are impacted by legislation, regulations, environmental studies, transportation policies (i.e. Complete Streets) and or traffic studies;
5. The slide of assets from rehabilitation to reconstruction will be managed by;
 - a. Mill and pave will only be done on roads where it will yield 10 – 15 years of added life;
 - b. Local roads will be managed as best as possible recognizing that, based on current funding levels, a percentage of those roads will always be in the Very Poor category. Local Improvement and sewer reconstruction work will also be factored into decisions.

As noted in Section 1, over the past 5 years the Expressway, Arterial and Collector roads have increased in their percentage of Very Poor and Poor sections. As such, any increased funding for road maintenance, based on the directives above which consider risk, would result in these roads being the priority for the additional funding. The additional funding will also avoid the need to defer or cancel other road projects currently approved in principle from 2020 to 2025 to accommodate the immediate and priority needs on the Expressway.

3.1.2 Structures Strategy

The City has the following key asset management strategies in place:

- Structures (i.e. bridges and culverts (over a 3m span)) are inspected every two years in accordance with the Ontario Structure Inspection Manual (OSIM).
- All inspections are in the Infor (*Hansen*) database and work orders are tracked to establish a history of activity over the life of the structure.
- A preventative maintenance strategy is in place, including:
 - The bridge washing program which aims to keep debris from key elements and remove corrosive de-icing chemicals.
 - Recoating of barrier walls to prevent decay and or deterioration
 - Minor maintenance repairs that are identified through the bi-annual inspections
- The City has in place a bridge rehabilitation program. This includes changing from expansion joints to semi integral joints when the design of the bridge allows for it. This extends the life of the joint significantly for older bridges.
- Programs are being developed to improve the overall aesthetics of the City's bridges.
- A prioritized plan is in place for bridge replacement work, so that if further funding becomes available, work can be quickly and efficiently advanced to make the best use of the funds. These plans outline immediate needs based on objective ratings.

3.1.2.1 Structures Rehabilitation Program

The Bridge Rehabilitation Program was created over the 2013 to 2018 period and an average of \$1.83M annually was allocated to this program. The positive affect of this investment is evident by the overall positive change in the condition of these assets. Based on condition assessments, maintenance strategies and deterioration projections, additional funding has been requested and was approved in principle in the 2019 7-year Capital Budget. The average annual funding for this program over the 2020 to 2025 period, is \$2.72M, approximately \$900,000 more annually than the prior 6 years.

Given the criticality of these assets it is suggested that average annual funding levels of \$2.72M remain. Should specific projects not be identified in a given year, a reserve could be set up to hold these funds for future use. Not only do these assets pose a critical risk if they fail, the cost to reconstruct them once failed far exceeds the cost of maintenance and rehabilitation programs which keep them safe, operational and extend the life of the asset.

3.1.2.2 Risk for Structures

As would be expected the consequence of a Bridge, Subway or Culvert (>3m span) failing would put the City at a critical risk. The failure of these assets exceeds even the consequence of failure of EC Row. It is for this reason OSIM is highly prescribed in what must be inspected, what condition they must be in and that these assets are not to deteriorate to a Poor condition. The City has been vigilant in ensuring

proper inspections and maintenance is executed on these assets. Additional funding has been directed to these assets over the past 5 years and significant projects, particularly on the EC Row bridges has been completed. These efforts can be seen by the changes in the condition ratings of these assets since 2013.

	Bridge, Subway or Culvert (>3m)	Pedestrian
Risk Score (out of 5)	3.73	2.36

While the failure of Pedestrian Bridges is not at the same level as vehicle ones these too present a Significant risk if left to fail. These bridges also fall under OSIM regulations. It should be noted that only Pedestrian Bridges in the Right of Way (ROW) are referred to in this report. There are several pedestrian bridges throughout our parks network and those assets are referred to in the Corporate AMP under the Park assets.

3.1.3 Sidewalks Strategy

The City has the following key sidewalk asset management strategies in place:

- A sidewalk inspection program to identify trip hazards and other sidewalk deficiencies in-the-field for repair purposes and to generate overall sidewalk condition ratings which are used by City staff in maintenance, rehabilitation, and budget planning. A risk-based approach is used to establish inspection frequencies for a sidewalk segment based on the pedestrian traffic level and the last recorded condition rating.
- The Infor (*Hansen*) *CMMS* is used to track detailed sidewalk asset information, inspections, and work orders to establish a history of activities over the life of the asset on a segment by segment basis.
- Maintenance and rehabilitation programs including spot repairs, slab replacements, and total reconstruction depending on the type and severity of the deficiencies as well as site and economic considerations. A number of repair methods are used based on industry practices.

3.1.3.1 Sidewalk Projection Results

The average annual capital funding allocation for sidewalks from 2013 to 2018 is approximately \$725,000. This includes a \$1M allocation from the 2014 Enhanced Capital Budget which increased the annual average from \$552,000 to \$725,000. The positive results from this increase in funding can be seen in the overall condition results for sidewalks, based on condition information as well as expected deterioration for sidewalks. At a minimum it is recommended the average annual funding for sidewalks be sustained at \$725,000, however ideally this should be increased to \$1M given the volume of sidewalks in Fair condition so they can be addressed prior to becoming Poor or Very Poor. This would help to sustain the current services levels at less than 2% of the network being in Very Poor or Poor condition. Further analysis will be done for the 2023 AMP to determine if those funding levels will be sufficient going forward.

3.1.3.2 Risk for Sidewalks

The consequence associated with sidewalks is 1.45, meaning that at most they pose a moderate risk to the City at point of failure. When compared to assets such as the Expressway and Bridges this makes sense from a risk score standpoint. It is however understood that they provide valuable services to the community and are expected to be maintained so as to avoid risk of injury and or closure.

	Sidewalks
Risk Score (out of 5)	1.45

3.1.4 Other Transportation Assets Strategy

3.1.4.1 Street Lights

The 2013 AMP was silent on these assets due to the limited information available. While the data is still not as comprehensive as needed for proper planning these are significant assets which need to be included in the overall inventory.

The entire Street Light inventory is valued at \$40,997,539 with \$29,108,253, or 71% of the total value deemed in Very Good, Good or Fair condition. The difficulty in providing further comment on these assets is that they are pooled. This means we included a group of Street Lights which were constructed and installed in a year and put their total value on our financial records, rather than the individual value. There is also no current program in place which provides the City with an understanding of the condition of individual Street Lights, nor condition of a pooled set of Street Lights based on proximity and installation dates. This is something which has been noted as part of the improvement opportunities for the 2023 AMP and may be addressed as final determinations of maintenance for these assets is determined.

What should be highlighted is the recent re-lamping program which converted all Street Lights to LED. This was a very positive step in reducing the annual maintenance and utility costs associated with these assets, as well as providing additional security, safety and visual benefits. The utility savings from this project are being used to fund the capital investment and then build a reserve for future replacement.

3.1.4.2 Traffic Signals

The City has seen a significant decline in the condition and level of service of Traffic Signals across the network which presents a major risk to the City and its citizens due to the shortfall in maintenance and replacement funding. In 2013, 33% of the signals were in Poor condition, and by 2018 this number has increased to 64% of signals being in Poor condition. It should be noted that Traffic Signals are not by legislation permitted to be in Very Poor condition as that definition for Traffic Signals can only mean complete failure and inoperable. As such the use of Poor for these assets should be considered the worst condition a functional system can be in, resulting in higher maintenance costs to keep them operational, and noting that complete failure requiring immediate replacement is possible.

Traffic lights are programmed to fail into a default flashing red model turning a junction into a 4-way stop. For a local road this is a significant inconvenience and disruption to road travel. Should this happen at a major junction on an arterial or collector road there is a major disruption to traffic flow in the part of the City.

There is currently \$14M in Traffic Signals in Poor condition which represents 184 intersections. The current average annual funding from 2013 to 2018 for these assets is \$891,667, with \$461,667 being allocated to address existing systems and \$475,000 to service enhancements to existing signals when replaced and or additional signalized intersections. The average cost to replace a signalized intersection is approximately \$77,000, which based on \$461,667 annually would mean 6 units could be replaced each year. A very simple view would mean it would take approximately 30 years to replace the 184 intersections currently in Poor condition based on existing funding levels. This does not consider the fact that those intersections in Fair condition will age and become Poor, nor does it consider that the average cost of \$77,000 is likely to go up due to inflation over that time. Based on the deterioration of these assets over the next 20 years an average allocation of \$2M per year would be more appropriate to address these assets ensuring their viability over the next 20 years.

This challenge is compounded by the fact that the traffic signal system requires several other assets, most of which are buried, to run the system. These include assets such as fibre, PVC conduit, detector stations and other assets which total \$24,080,917 in replacement value. Some of these assets also date back to the 1990s and in a few cases the 1980s. It is not clear what condition they are actually in as there is no process in place to assess the condition aside from age. They do however factor into the concern associated with existing funding levels and further Administrations recommendation to start increasing funding for these assets to reduce the number of assets in poor condition. The ability to obtain condition information on these supporting assets for the traffic signal system is part of the noted improvements for the 2023 AMP.

As these assets are vital to traffic flow and if they reach the point of failure would require immediate replacement, it was deemed necessary to consider increased funding for the replacement of these assets to mitigate the risk of failure and unplanned expenditures.

3.1.4.3 Parking Garages and Equipment

In the 2013 AMP the City owned and operated 3 Parking Garage structures. In 2018 it was decided to sell one of those structures, Canderel. A portion of the proceeds from the sale of Canderel was allocated to rehabilitate the 2 other structures, Pellisier and Goyeau. Both garages were also identified in the Corporate Energy LED relighting program, which will improve the lighting and reduce the annual utility costs.

There is an Off-Street Parking Reserve which funds the various capital works required to maintain and sustain these assets. While the reserve fund had previously not been sustainable, recent changes to parking fees increased the funding to bring the reserve to a more stable condition. The recent investments in the rehabilitation of both garages also reduced the demands on the reserve by funding these efforts through the proceeds from the sale of Canderel. As a result, the 2018 AMP does not project any concerns with these assets requiring additional funding to sustain them at current services levels. These assets and their reserve will be revisited in 2023.

3.1.4.4 Noise Barriers

Administration was reluctant to include these assets in 2018 given the significant swing in the condition rating since 2013. Neither year, 2013 nor 2018, has been able to provide objective condition data on these assets. The main driver has been the remaining life of the asset based on how long they were designed to last versus how long they have been in service. Although a visual inspection was done to

consider if the age condition was appropriate there is no defined process to inspect them. These assets are also along the Expressway making the ability to inspect them challenging.

Given the basic civil nature of noise barriers and current condition, no significant maintenance or action is expected to be required over the coming years. This will be revisited in the 2023 Transportation AMP and the need to develop a more objective means of assessing the condition included in the improvements for the 2023 AMP.