To: Council in Committee of the Whole
From: Jag Sharma, City Manager, Office of the City Manager
Report Number: CM-16-35
Date of Report: December 2, 2016
Date of Meeting: December 9, 2016
Subject: Oshawa Asset Management Plan
File: A-1600

1.0 Purpose

The purpose of this report is to present the Oshawa Asset Management Plan for Council endorsement.

2.0 Recommendation

It is recommended to City Council:

That the Oshawa Asset Management Plan dated December 2016, as set out in Attachment 1 to Report CM-16-35 dated December 2, 2016 be endorsed.

3.0 Executive Summary

Not applicable.

4.0 Input From Other Sources

The Corporate Leadership Team has had input into this report and Attachment 1.

5.0 Analysis

Oshawa responsibly manages its assets, but historically assets have been managed by Departments. The City has made strides towards a more corporate or whole lifecycle approach but has significant opportunity to improve. The Province has provided a Building Together Guide for Municipal Asset Management Plans that addresses how municipalities are to manage their assets and put in place an asset management integrated business approach. The Guide supports the legislative and regulatory requirement for all municipalities to have an Asset Management Plan (A.M.P.) in place by year-end 2016 in order to remain eligible for federal gas tax funding.
The Oshawa A.M.P., found in Attachment 1, reports on capital asset classes, their condition and value, and speaks to the connection to levels of service and need for a financing strategy.

Asset management will serve as an important input to the City's Financial Strategy, which in turn contains many strategies that directly or indirectly relate to asset management. One, in particular, calls for the completion of an A.M.P. In addition, consistent with the Financial Strategy, the A.M.P. recognizes that the City only partially satisfies capital infrastructure needs. As a result and as practicable, the establishment of a 1% tax levy contribution dedicated to infrastructure financing, is an important step in the right direction and as such has been recommended in the 2017 budget.

This new approach to municipal asset management has changed and will continue to change how Oshawa is planning, managing and financing its capital assets. This is not unexpected given aging municipal infrastructure is increasing operating, maintenance, renewal and replacement costs, along with the demand from municipalities for senior government infrastructure funding.

To ensure public funds are invested wisely, the Province is looking to maximize the benefits of infrastructure investment, manage risk related to capital assets and ensure satisfactory levels of service for the public. It is anticipated that the Province will use A.M.P.s to aid their decisions around the distribution of infrastructure funding.

Similar to other municipalities, asset management has been and will continue to be a multi-year journey for the City of Oshawa. The goal is to continue to enable safe and reliable infrastructure in order to provide the desired level of service in a sustainable way, while managing risk, at the lowest lifecycle cost. To ensure success, the City will need to:

- commit the necessary resources
- work collaboratively across Departments
- take a corporate perspective
- continue to build the asset registry
- gather more and better data regarding asset condition
- calculate asset replacement cost
- link assets to service levels
- establish an asset database
- modify asset management policies, procedures and practices
- look to more innovative investment strategy options
- work to build a clear understanding, and value, of asset management amongst staff, Council and the community.

The Oshawa A.M.P. is the City’s first plan of this nature. It is a living document, which is based on currently available information with improvements expected in future updates. As the City’s asset management capability improves, the City will gain an enhanced ability to make informed decisions, and be able to clearly support requests for senior government infrastructure funding. Achieving this will go a long way to support Oshawa as a prosperous, collaborative, vibrant, inclusive and green city where people and businesses are proud to live, work, learn and play.
6.0  Financial Implications

There are no financial implications.

7.0  Relationship to the Oshawa Strategic Plan

This report responds to the two Council-approved principles of sustainability and financial stewardship, which underlie the Oshawa Strategic Plan (O.S.P.), Our Focus, Our Future and the Financial Strategy. It also directly responds to the O.S.P. goal of Economic Prosperity and Financial Stewardship – ensure economic growth and a sound financial future.

Jag Sharma, City Manager,
Office of the City Manager
To enable safe and reliable infrastructure in order to provide the desired level of service in a sustainable way, while managing risk, at the lowest lifecycle cost.
Glossary of Terms

AMP – Asset Management Plan
IoF – Impact of Failure
KPI – Key Performance Indicator
LoF – Likelihood of Failure
LOS – Levels of Service
NPV – Net Present Value
PSAB – Public Sector Accounting Board
Executive Summary

This Asset Management Plan (AMP) fulfills the provincial requirements outlined in the Building Together Guide for Municipal Asset Management Plans.

This AMP supports the City’s corporate strategic direction found in the Oshawa Strategic Plan, the Financial Strategy and the Official Plan. It is a key step to put in place a new, more mature business management framework to:

- collect infrastructure data
- integrate the management of assets across all services and departments
- report on the replacement value, condition and lifecycle costs of assets
- support a long-term approach to operate, maintain, renew, replace and dispose of City assets
- move the City from historical-based budgeting to asset needs budgeting.

Such a framework will help ensure the health and prosperity of the City of Oshawa and its residents, maintain a high quality of life, support evidence-based decision-making, help to manage risk and provide satisfactory levels of service to the public in a sustainable manner.

This AMP includes an analysis and summary of the City’s assets in relation to their condition, lifecycle costs and investment needs to support the services delivered today and into the future. The goal is to enable safe and reliable infrastructure in order to provide the desired level of service in a sustainable way, while managing risk, at the lowest lifecycle cost.

Oshawa, like other municipalities, is facing aging infrastructure with an associated increase in operating, maintenance, renewal and replacement costs, along with the physical and financial impacts of climate change. Building a sound knowledge base across the organization in regard to the need for and the complexity of asset management will serve to integrate the required practices into the overall culture of the City. This will position Oshawa for successfully making more informed decisions about managing its assets. This AMP will also allow the City to optimize available senior government funding as an AMP is a requirement to receive infrastructure funding and it is anticipated that the Province will use AMPs to inform the distribution of funding.

What is Asset Management

Asset management is a process of making the best possible decisions regarding the commissioning, operating, maintaining, renewing, replacing and disposing of infrastructure assets. It is a journey that will be achieved over time.
1. Introduction

1.1 Purpose
This Asset Management Plan (AMP) reports on the state of the City’s assets, how the City manages those assets to satisfy desired service levels and how the City plans to invest in those assets. The AMP is intended to inform the current budget year and the nine-year capital forecast.

This document and the analysis are dynamic and the quality of the content will improve over time as the City’s asset management data and information matures.

The AMP will be updated regularly, and monitored and reported on to Council, as necessary. The result over time will be more comprehensive data, better analysis and, in turn, better decision-making, financial/investment planning and long-term sustainability.

The asset classes and the elements that make up each class included in this AMP are:

- Land
- Land Improvements (Airport runways.taxiways; parking lots; play fields; hard surface courts; splash pads and kms of watercourse improvements)
- Buildings (City and Library)
- Machinery and Equipment (Airport; Operations; Fire; Library; and Parks and Recreation)
- Vehicles
- Furniture (City; and Library pooled resources)
- Linear Assets (kms of roads, sidewalks, storm sewers; streetlights; traffic signals; and bridges/culverts)
- Other Assets (park furniture; shade structures; kms of trails; fountains; fencing; and Library collections)

On a go-forward basis as the AMP is further refined, any uncaptured assets, for example, information technology, would be included. The City will also continue to regularly monitor the current state of its infrastructure to ensure the most up-to-date data. Further, as the City’s asset inventory and condition assessment, and accounting for desired levels of service and

Why Are We Doing Asset Management?
Not only does asset management make good business sense but the following legislation and regulations require municipalities, who want to continue to receive infrastructure funding from senior levels of government, to create an Asset Management Plan.

- Water Opportunities Act, 2010
- Development Charges Act 2016, including regulations
- Infrastructure for Jobs and Prosperity Act, 2015
- Smart Growth for Our Communities Act, 2015

Asset management leading practice includes evidence-based decision-making, transparency, risk management and public engagement.
risk management matures, the City’s asset management analysis and decisions will mature and more significantly advise budgeting and financial planning processes.

1.2 Importance of Infrastructure
The City of Oshawa is responsible for a diverse array of capital assets essential to the delivery of services to residents, businesses and visitors. The commissioning, operation, maintenance, renewal and eventual replacement of such infrastructure has always been and currently is a very important responsibility essential for any successful community. Asset management is vitally important as municipalities address their infrastructure challenges.

1.3 Link to Strategic Documents
Both the Oshawa Strategic Plan and the Financial Strategy respond to the Council-endorsed principles of sustainability and financial stewardship. Oshawa’s AMP supports the Oshawa Strategic Plan, Our Focus, Our Future, 2015-2019 and, in particular, the goal of Economic Prosperity and Financial Stewardship, and the theme of Safe and Reliable Infrastructure. It also supports the Oshawa Financial Strategy, 2016-2019, which contains a number of recommendations that support asset management. The AMP will help the City achieve both principles and improve the information necessary to implement both strategic documents.

The AMP also supports the City’s Official Plan, which sets out land use policy, by helping to facilitate growth and intensification, and support transportation, storm water management and environmental protection.

Finally, the AMP also supports other key documents. For example, the City’s departments undertake annual departmental business plans, which align with the Oshawa Strategic Plan and Financial Strategy. Other high-level documents provide context and perspective to help manage and deliver the City’s assets and services. Some of these key planning documents are:

- Arts, Culture and Heritage Plan
- Customer Service Strategy
- Development Charge Background Study

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What are the Benefits of Asset Management?
The key benefits of asset management include:

- Defined and cost effective levels of service
- Optimized operations and maintenance for reduced life cycle costs
- Reduced risk
- Avoidance of unexpected problems related to City assets
- Evidence-based financial planning guides investment decisions
- Performance-monitoring system
• Downtown Oshawa - Plan 20Twenty
• Economic Development - Sector Analysis and Cluster Development Strategy
• Emergency Master Plan
• Fire Master Plan
• Oshawa Executive Airport Business Plan
• Outdoor Sports Facility Study
• Parks, Recreation and Culture Strategy: Vision 2020
• Parks, Recreation, Library, and Culture Facility Needs Assessment
• Information Technology Strategic Plan
• Integrated Transportation Master Plan/Active Transportation Master Plan

1.4 Asset Management Framework
Asset management activities/initiatives are proposed to occur within the context established by an asset management framework. The development of this AMP is premised on the following vision, mission, goal and objectives:

Vision
To proactively manage Oshawa’s significant and varied assets over their lifecycles in order to maintain service excellence.

Mission
To have corporate asset management become part of the City’s culture through:

• The integration of policy, practices, business processes, data, technology, people and finances.
• The preservation of assets while protecting the environment, and promoting health and safety.
• Financial stewardship that supports evidence-based decision making for operations, maintenance, renewal and replacement of assets.

Goal
To enable safe and reliable infrastructure in order to provide the desired level of service in a sustainable way, while managing risk, at the lowest lifecycle cost.

Objectives
• Foster a whole-of-business asset management framework based on achievable leading industry practices, which supports transparent and evidence-based decision making across all asset classes.
• Establish appropriate levels of service that respond to community needs and desires while minimizing the City’s risk and liability.
- Wise application of limited human and financial resources to ensure long-term financial sustainability of the City’s capital assets.
- Continuous improvement in asset planning and management through performance monitoring.

Figure 1 outlines the City’s proposed asset management process that involves visioning, strategic, tactical and operational stages. The process includes Council direction and community input, guidance provided by corporate strategic documents, development of an AMP, lifecycle management, financial sustainability and demand management, and front-line commissioning, operation, maintenance, renewal, replacement and disposal of assets. Performance monitoring at all stages of the process allows regular reporting.

**Figure 1: Asset Management Process**
1.5 Data Limitations
This AMP satisfies provincial requirements despite its development having faced a number of not unexpected challenges. The limitations faced by the City to be overcome as the asset management journey continues are outlined below.

- Not all capital assets are included in the AMP at this time, however, the local municipal assets emphasized by the Province (roads and bridges) are included.
- Operating and maintenance costs were not incorporated into the asset management analysis.
- Revenues are not incorporated into the asset management analysis.
- BMA condition data was used as the City only has observed condition data for bridges, culverts, buildings, fleet and roads.
- The City does not have levels of service established for all asset classes.
- Asset values remain understated because they are historically-based and do not represent a replacement value.
2. State of the City’s Infrastructure

This section provides an initial asset count for the City, asset valuation using closing book value before amortization and asset condition.

2.1 Asset Inventory and Valuation

Figure 2 is a summary of the City’s asset inventory and value as of year-end 2015.

![Figure 2: Asset Inventory and Value by Asset Class, 2015](image)

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Asset Count</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>577</td>
<td>$133,313,862</td>
</tr>
<tr>
<td>Land Improvements</td>
<td>256</td>
<td>$42,062,945</td>
</tr>
<tr>
<td>Buildings</td>
<td>120</td>
<td>$243,379,005</td>
</tr>
<tr>
<td>Machinery &amp; Equipment</td>
<td>384</td>
<td>$22,088,809</td>
</tr>
<tr>
<td>Vehicles</td>
<td>185</td>
<td>$21,713,287</td>
</tr>
<tr>
<td>Furniture</td>
<td>23 $^2$</td>
<td>$1,956,216</td>
</tr>
<tr>
<td>Linear Assets</td>
<td>37,044</td>
<td>$450,898,814</td>
</tr>
<tr>
<td>Other Assets</td>
<td>10,371</td>
<td>$14,911,664</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$930,324,602</td>
</tr>
</tbody>
</table>

The asset classes used for this AMP are aligned with the financial reporting asset classes. As a starting point, and in the current absence of an alternative source of information, the City utilized PSAB 3150 data as the basis for asset valuation. The total asset value for the City assets included in this first AMP is estimated at $930 million in 2015 dollars. This value is taken directly from the Tangible Capital Asset Continuity Schedule (PSAB-based data), which is part of the City’s financial statements and which represents the historical cost of assets.

The Public Sector Accounting Board (PSAB) established an accounting standard in 2009 that requires municipalities to not only show how much was originally spent on a tangible capital asset, but also how much has been amortized (or depreciated in value) since the construction/acquisition of the asset. This standard known as PSAB 3150 utilizes average ranges to measure the useful life of an asset and a straight-line depreciation, which runs the value of an asset to zero when it reaches the end of its expected life.

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1 2015 Closing Book Value before amortization and excluding work-in progress (WIP) from the 2015 Consolidated Schedule of Tangible Capital Assets

2 The furniture asset class is made up of 23 pooled assets. An asset pool is a grouping of identical, similar or related tangible capital assets that have a lower value per unit than the capitalization threshold and may be material when grouped. Such assets are recorded as a single asset with a combined value.
It is important to note that PSAB data, generated based on straight-line depreciation of an asset, does not reflect true replacement cost of an asset. Nor does PSAB data include fully depreciated assets or assets which have a short life cycle. Due to the absence of any other valuation, the valuation is understated for asset management purposes but is utilized as a starting point. Going forward, replacement cost valuations will more accurately account for all future costs related to the maintenance and rehabilitation of an asset.

### 2.2 Lifecycle Management

Assets need to be managed over their lifetime. Infrastructure assets typically have a maximum service lifetime after which costly capital renewal or replacement can be expected. As a result, it is possible to anticipate waves of capital renewal needs by reviewing the installation year of different asset classes.

Using PSAB-generated information, the City has incurred a gradual increase in capital asset spending due to growth, reinvestment in existing assets and the commissioning of new assets.

Figure 3 presents a 100 plus-year view of the age distribution of City capital assets captured through the PSAB process. Over time, capital infrastructure investment has increased as the City has grown with higher expenditures beginning in the mid-1970’s. There are two notable points of increased spending over the last ten years. A 2006 significant increase in spending was associated with the Amazing Spaces Program, which resulted in the construction/renovation of numerous recreation, culture, community wellness and fire-related facilities. Elevated expenditures in 2010 and 2011 were the result of renovations to City Hall and the Civic Recreation Complex, respectively.
2.3 Asset Condition

The following is a high-level reporting of the condition of the City’s capital asset portfolio using information from the BMA Draft Municipal Study 2016. The BMA indicator provides an estimate of the useful life left in a municipality’s capital assets. Keeping informed of the age and condition of capital assets is important to ensure timely and appropriate investments. BMA calculated the condition of Oshawa’s capital assets using Schedule 51 of the City’s Financial Information Return. The formula used across all assets is:

\[
\frac{\text{Total Accumulated Amortization}}{\text{Total Gross Costs of Capital Assets}}
\]

This ratio shows the value of the tangible capital assets that have been consumed. This ratio seeks to highlight the aged condition of the assets and the potential asset replacement needs. A higher ratio may indicate significant replacement needs. However, if assets are renewed and replaced in accordance with an asset management plan a high ratio should not be a cause for concern. The Ministry of Municipal Affairs and Housing considers a ratio of 25% or under to be relatively new; 26-50% to be moderately new assets; 51-75% to be moderately old assets; and over 75% to be old assets.

Figure 4 shows the Total Asset Consumption Ratio for the City of Oshawa. With a ratio ranging from 35.7% in 2011 to 39.1% in 2015, the City’s capital assets are considered to be moderately new.
Due to differences in asset age, construction, environment, maintenance regimen and other factors, asset condition, even for assets of the same class, do not degrade in the same way or at the same rate. As such, in addition to asset age, observed condition is a necessary indicator of an asset’s remaining life.

It should be noted that where the City takes on or assumes assets as a result of growth, the City practices due diligence, for example, road inspections and use of construction warranties. This ensures that assets that are taken on by the City are of the best quality.

On a go-forward basis, the City will improve upon this BMA asset condition estimate by making use of observed condition data to determine estimated condition. The method used to determine asset condition will vary depending on the type of asset and will involve visual inspections and assessment based on City or industry standards to establish a condition rating index. Condition data will be a critical input to planning asset lifecycle investment strategies to optimize decision-making and support the Financial Strategy.

Currently observed condition data is collected for bridges and culverts, facilities, fleet and roads, and needs to be collected for other asset classes. This step will help ensure the City makes more informed decisions regarding timely treatment interventions.
3. Desired Levels of Service

At the very core of public sector asset management are two fundamental considerations: providing satisfactory levels of service (LOS) to the public and ensuring the sustainability of infrastructure assets over the long term.

Asset management has a service-based focus. This focus leads to the discussion of desired LOS, which are a measure of the quality, quantity and/or reliability of a City service from the perspective of residents, businesses and other customers. Council then establishes quality thresholds at which municipal services should be provided to the community. LOS can also be established by legislation and related regulations. LOS should be measureable so they can be tracked and performance can be determined.

The City of Oshawa is in the business of delivering services at certain LOS, both internally and externally. The delivery of services is made possible, either directly or indirectly, via the assets owned by the City. LOS provided by the City are affected by several factors including:

- legislated requirements
- affordability and fiscal constraints
- internal strategic documents that establish desired outcomes
- Council direction
- leading municipal practice
- climate change impacts
- expected asset performance
- rate of growth
- customer expectations

Understanding the Difference between Data, Information and Records

Data, information and records are important to asset management. What is the difference between the three? Consider your birthday, age and birth certificate. Your birthday is data, your age is information (it needs to be calculated and is always changing) and your birth certificate is a record.

Traditionally municipalities have been very good at keeping records. The challenge is that data and information are necessary for asset management. As a result, the opportunity exists for the City to improve upon its data-collection business practices, thus improving asset management analysis and decisions.

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3 For example, Ontario Regulation 239/02, which sets out minimum maintenance standards for municipal roads; Ontario Structure Inspection Manual (OSIM), which sets the standards for detailed bridge inspections; Water Opportunities Act, 2010, which sets the framework for a performance measurement regime and sustainability for stormwater over the lifetime of the infrastructure assets; and the Accessibility for Ontarians with Disabilities Act, 2005, which develops, implements and enforces accessibility standards.
The Provincial Guide to AMPs, requires municipalities to link the services it provides and the LOS it delivers to risk-based asset management. Two LOS come into play in asset management. The most common is the customer-related LOS provided to residents, businesses and other customers. This LOS is the standard expected of the service being provided. To ensure ease of understanding by taxpayers, such LOS are normally clearly defined, for example:

- **Residential street snow clearing** - The minimum standard to address snow accumulation on a class 4 road (residential) is to provide a centre bare total lane width of at least (5) five metres within 16 hours while not exceeding a snow depth of 8cm.

- **Potholes** - If a pothole on class 4 road (residential) exceeds 1,000 square centimetres and a depth of 8cm the pothole must be repaired within 14 days.

- **Sidewalks** - If a surface discontinuity (trip hazard) on a sidewalk exceeds (2) two centimetres, the minimum standard to treat the surface discontinuity (trip hazard) is within 14 days.

- **Street Sweeping** - The minimum frequency for street sweeping Arterial and Collector roads is once every (6) six weeks.

The second LOS is the technical LOS, which is what an asset is expected to provide in the way of performance. This LOS is of more relevance internally to the City. For example, a stormwater pipe has the capacity to convey a two-year storm. Technical LOS support the delivery of City services.

LOS standards are typically categorized into service attributes shown in Figure 5, which are the basis for understanding the impact of risk on LOS.

**Figure 5: Service Level Attributes**

<table>
<thead>
<tr>
<th>Service Level Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available</td>
<td>Services provided at a level of acceptable capacity, convenience and accessibility for the whole community</td>
</tr>
<tr>
<td>Cost Effective</td>
<td>Services are affordable and provided at the lowest possible cost for both current and future customers</td>
</tr>
<tr>
<td>Reliable</td>
<td>Services provided at a predictable and continuous level</td>
</tr>
<tr>
<td>Responsive</td>
<td>Opportunities for community involvement in decision-making. Customers are dealt with fairly and consistently within acceptable timeframes with respect, empathy and integrity.</td>
</tr>
<tr>
<td>Safe</td>
<td>Services provision that minimizes health, safety and security risks</td>
</tr>
<tr>
<td>Suitable</td>
<td>Services are suitable for the intended function (fit with purpose)</td>
</tr>
<tr>
<td>Green</td>
<td>Services that take into account the natural environment</td>
</tr>
</tbody>
</table>
The City’s practice of collecting, reviewing and using data to support the measurement of current LOS varies per asset class. As greater consistency is developed, the City would benefit from a central LOS database, which would capture key performance indicators (KPIs), targets and actual performance. A KPI is a measure used to track the effectiveness of a service by comparing the actual outcome against a target. Figure 6 shows an example of a KPI for roads for a customer LOS.

Figure 6: Key Performance Indicator for Roads

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain a safe and reliable road network</td>
<td>Customer LOS – % of all roads in good or better condition</td>
<td>80%</td>
<td>73%</td>
</tr>
</tbody>
</table>
4. Asset Management Strategy

The purpose of this section is to establish a set of planned actions to achieve the City’s goal of providing LOS in a sustainable way, while managing risk, at the lowest lifecycle cost.

At the City of Oshawa, asset management begins the moment the City plans for an asset. The City’s approach has evolved over time and is still evolving. However, not unlike other municipalities, Oshawa’s approach remains largely “greatest need first”, which is designed to fix or replace assets in a priority sequence based on the condition and age of the asset. This approach, coupled with aging infrastructure and increasing funding requirements to operate, maintain, renew and replace the City’s assets, generally incurs the highest lifecycle costs. Going forward, the City plans to achieve a more comprehensive and sustainable approach to asset management to improve decision-making, and reduce both risk and cost over the lifecycle of capital assets.

Following is a discussion of activities and practices currently used to assess asset condition, support lifecycle analysis, decide interventions and prioritization, determine risk and inform the City’s capital and operating expenditures, and annual budgeting process.

4.1 Non-Infrastructure Solutions

The following non-infrastructure solutions are in use at the City of Oshawa to help lower costs or extend the life of City assets:

- Oshawa Strategic Plan, Our Focus, Our Future, 2015-2019
- Financial Strategy, 2016-2019
- Official Plan
- Other master plans that provide for the comprehensive future planning of the City’s infrastructure (e.g. Integrated Transportation Master Plan and the Active Transportation Master Plan)
- Use of Lean methodologies to improve efficiencies, effectiveness and control costs at the operational level
- Observed condition assessments (e.g. bridges, culverts, facilities, fleet and roads)
- Public consultation on municipal projects, land use developments and budget priorities
- Use of design standards
- Inspections
- Coordination of efforts between governments and agencies re. timing of construction
- Employee training and education programs
- Ongoing efforts to identify additional funding sources

4.2 Asset Management Activities
Applicable to all asset classes, the City has identified subject matter experts. As well, in an effort to minimize redundancy, the City has identified who is accountable and responsible for the maintenance of assets at the strategic, tactical and operational levels. Figure 7 provides an example of this level of information specific to roads, one of the City’s linear assets.

Figure 7: Asset Managers - Roads

<table>
<thead>
<tr>
<th>Level</th>
<th>Function</th>
<th>Who</th>
<th>What</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic (Long-term)</td>
<td>Set the asset strategy and plans and ensure cost and performance meets the wider business requirements</td>
<td>Director, Engineering Services</td>
<td>Big Picture Growth Plans</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Director, Planning Services</td>
<td></td>
</tr>
<tr>
<td>Tactical (medium-term)</td>
<td>Systematic responders, condition, cost effectiveness, safety, LOS</td>
<td>Engineering Program Technologist</td>
<td>Annual Overlay and Reconstruction</td>
</tr>
<tr>
<td>Operational (short-term)</td>
<td>Responds to operational demands of maintenance (primarily reactive and preventative decisions)</td>
<td>Works Supervisor, Road Maintenance</td>
<td>Reactive daily work and preventative maintenance</td>
</tr>
</tbody>
</table>

The City also currently undertakes various activities to manage assets throughout their lifecycle. A registry of activities by asset class is presented in Figure 8.
### Figure 8: Registry of Oshawa Activities by Asset Class

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings</td>
<td>Master Plan Update, Budgeting/Forecasting, Inspection, Maintenance Renewal, Replacement, Aesthetic Upkeep</td>
</tr>
<tr>
<td>Equipment</td>
<td>Budgeting/Forecasting, Inspection, Maintenance, Renewal, Replacement, Disposal, Periodic Mandatory Commercial Vehicle Inspection</td>
</tr>
<tr>
<td>Vehicles</td>
<td>Master Planning (space planning), Budgeting/Forecasting, Procurement, Aesthetic Upkeep, Maintenance, Ergonomic Assessment, Accessibility Requirements, Customization</td>
</tr>
<tr>
<td>Other Assets</td>
<td>Master Planning, Budgeting/Forecasting, Needs Assessment, Condition Assessment, Daily Operations, Testing and Certification, Planned/Unplanned Maintenance, Renewal, Replacement, Expansion, Disposal</td>
</tr>
</tbody>
</table>
Additional opportunities also exist, including possible procurement methods. These are presented under the following five categories:

**Maintenance**
- More inter-municipal bundling of existing contracted maintenance services

**Renewal/Rehabilitation**
- More inter-municipal bundling of renewal/rehabilitation contracts
- Inter-municipal Alternative Financing and Procurement (AFP)\(^4\)
- Early tender approval for all capital related projects
- Approval of multi-year projects for renewal/rehabilitation contracts
- Increase the use of renewal and rehabilitative strategies over reactive and replacement strategies using lifecycle cost analysis (see Figure 9)

**Replacement**
- More inter-municipal bundling of replacement contracts
- Inter-municipal AFP asset replacement contracts
- Early tender approval for all capital related projects
- Treatment timing and optimization of the investment and coordination of work among asset classes internally and with external agencies

**Expansion**
- Comply with legislation to include all Development Charges Bylaw listed projects into the AMP, including whole lifecycle costing
- Continue to align expansion plans to the City’s Official Plan, Oshawa Strategic Plan and Financial Strategy

**Disposal**
- Analyze entire asset registry for surplus/redundant assets

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\(^4\) Infrastructure Ontario’s Alternative Financing and Procurement (AFP) design-build-finance model takes a lifecycle perspective and builds effective asset management right into the contract.
Predictive modeling can be used to determine which treatment at the most opportune time will yield the best Return on Investment (ROI) extending the service life of an asset.

**Road Example - Pavement Management Systems**

Pavement deterioration is an important factor in evaluating and prioritizing pavement management and preservation projects. Using a deterioration curve based on historical observed condition data, it is possible to predict future condition and evaluate the effect of potential treatments showing the benefit over the asset’s lifecycle. Graphically shown below, it is well worth the City’s time and effort to focus on planned preventative maintenance and rehabilitation. Both activities maintain the road condition and extend the life of the asset vs. reactive responses when road condition worsens, when risk to the City may increase and total reconstruction is necessary.
4.3 Procurement

The By-law provides the authority and guidelines to conduct purchasing transactions to satisfy the needs of the City ensuring fair and open competition and using a variety of source selection methods under varying market conditions. In future, the City should, for example, investigate joint co-operative purchasing with purchasing co-operatives, as well as alternative financing and procurement options with regard to capital purchases.

4.4 Risk Management
The City is currently updating its corporate risk management framework with KPMG, the City’s internal auditor, which will provide guidance and support for risk-based asset management. Infrastructure risk management is the process of identifying and mitigating risks for existing infrastructure that may affect the ongoing delivery of services at specified LOS. Risk management is an integral part of leading-practice lifecycle asset management as it enables fair and equal analysis of different assets with different needs and priorities.

Risks associated with asset management include, for example:

- AMP is not kept up-to-date or followed
- Infrastructure failure and associated liability
- Inadequate funding
- Inadequate or poor quality asset information
- Incorrect assumptions
- Unaware of regulatory requirements or changes
- Climate change
- Growth projections do not meet expectations

Any approach that the City takes to the management and maintenance of its assets involves the acceptance of a level of risk. Rarely, if ever, can an organization mitigate all risks. Risk management entails understanding the risk profile in the asset portfolio and establishing strategies to manage the risk at acceptable levels. It is common for municipalities to keep costs low or constant and unwittingly assume more and more risk over time. Risk assessment is a valuable tool for asset investment prioritization and informed decision-making.
Asset risk arises from the potential of events or failures to occur, and will vary depending on the location, capacity, age and condition of the asset, and other factors. Risk is managed via processes in place that ensure maintenance and renewal intervention occur in an appropriate and timely manner. The calculation of risk exposure is a combination of two factors – likelihood of asset failure and impact of asset failure.

The likelihood of failure is the probability that an asset may fail within a year. Likelihood of failure can be determined based on capacity, efficiency, age, condition and LOS. The City estimates likelihood on a scale of one to five. See Figure 10.

The second factor is the impact of failure on the City, which is the direct and indirect consequence if an asset failure were to occur. The City estimates impact using a one to five scale against a number of criteria including legal, environmental, reputation, health and safety, financial, etc. See Figure 11. Where more than one criterion is applicable to an asset for a particular failure mode, the City will use the highest consequence of failure. This will take into account the greatest impact to the asset.

The two scores are used to derive an overall risk score after accounting for risk mitigation measures already in place, as follows:

\[
\text{Residual Risk Score} = \text{Likelihood Score} \times \text{Impact Score}
\]

The risk score helps to prioritize where and how to focus City resources, including staff time for developing processes, collecting and analyzing data, and/or financial investment in assets and supporting systems. In prioritizing maintenance and renewal projects, generally preventive work should be prioritized over corrective work because preventive action will help delay the need for costly corrective maintenance. This reduces the risk of increased lifecycle costs.

Budgeting constraints must also be taken into consideration when determining what priority projects can be executed in any given year. If funding is limited, the decision regarding which project to undertake should be based on risk of not meeting LOS standards.
FIGURE 10: LIKELIHOOD OF FAILURE

Failure Modes
The manner by which a failure is observed. Generally describes the way the failure occurs and its impact.

LoF
Likelihood of Failure

Capacity
Volume

Efficiency

Mortality
Condition and/or Residual Service Life

Level of Service
Regulatory and/or Community Standard

1
Insufficient

2
Minor

3
Moderate

4
Major

5
Catastrophic

Performance

Maintenance

Age

Condition

General

- Exceeds Current and/or Predicted Demands
  - >20
- No Actions Scheduled
- Asset is almost new
- New or No Measurable Defects
- Meets Requirements

- Meets Current Demands
  - >10%
- Minor Repairs Completed
  - Aesthetics/Practice
  - Schedule Inspection
- 30% Consumed
- Minimal Defects
  - > 10% < 20%
- Minimal Intervention

- At Capacity
- Repair/Rehabilitation
  - Completed
  - Suspect Above Average Problems
  - Schedule Inspections
- 45% Consumed
- Deficient
  - > 20% > 30%
  - Candidate for Forecast
  - Need > 5 years
- Regular/Predicted Intervention

- Demand Exceeds Capacity
- Repair/Rehabilitation
  - Completed
  - Scheduled Maintenance Not Done
  - Inspection/Monitoring Required
- 60% Consumed
- Deficient
  - > 30% < 50%
  - Candidate for Forecast
  - Need < 5 years
- Regular & Unplanned Intervention

- Demand Exceeds Capacity > 15%
- Multiple Repairs/Rehabilitations Completed
  - Amortized Value Close
  - Monitoring Required
- End of Life
  - Obsolescence
- Deficient
  - > 50%
  - Candidate NOW
- Frequent Reactive Intervention
FIGURE 11: IMPACT OF FAILURE

- **IoF Impact of Failure**
  - **Legal & Regulatory Non-Compliance**
  - **Environmental**
  - **Morale**
  - **Reputation & Image**
  - **Health & Safety**
  - **Service Interruption**
  - **Financial**
  - **Organizational Outcomes/Objectives**

- **Insignificant**
  - Breach
  - Objective/Complaint
  - Minor Harm with Investigation
  - Negligent Breach
  - Breach of Good Faith
  - Environmental Damage up to $19,000
  - Non-Media Exposure
  - Negligible Impact
  - First Aid Kit or Equivalent
  - No Material Disruption
  - Little Impact

- **Minor**
  - Breach
  - Objection/Complaint
  - Minor Harm with Investigation
  - Environmental Damage up to $19,000
  - General Morale & Personnel Problems
  - Non-Media Exposure
  - Clear Fault
  - Settled Quickly
  - Negotiable Impact
  - Basic Medical Attention
  - Backlog Cleared < 1 Day
  - Budget Overages
  - Asset Damage < 10% of Replacement Value
  - Minor Delays

- **Moderate**
  - Breach
  - Object & Investigation
  - Disciplinary Action
  - Medium Term Damage
  - Up to $100,000
  - Increased Turnover & Localized Personnel Problems
  - Repeated Non-Media Exposure
  - Slow Resolution
  - Min. Enquiry/Briefing
  - Increased Level of Medical Attention
  - Backlog Cleared by Additional Resources
  - Budget Overages
  - Asset Damage < 25% of Replacement Value
  - Moderate Delays
  - Marginal Under Achievement of Target

- **Major**
  - Breach
  - Gross Negligence
  - Formal Investigation
  - Disciplinary Action
  - Medium Term Damage
  - Up to $500,000
  - Poor Reputation as Employer
  - Widespread Personnel Problems
  - Headline Profile
  - Repeated Exposure
  - At Fault
  - Unresolved Complexities
  - Ministerial Involvement
  - Severe Health Crisis
  - Additional Resources Required
  - Performance Affected
  - Budget Overages
  - Asset Damage < 40% of Replacement Value
  - Major Delays
  - Performance Significantly Under Target

- **Catastrophic**
  - Breach
  - Gross Negligence
  - Prosecution/
  - Disciplinary Action
  - Serious Willful Breach
  - Uncorrected Negligence
  - Prosecution/Fines
  - Ministerial Censure
  - Long Term Damage
  - Up to $1,000,000
  - Loss of Senior or Experienced Staff
  - High Turnover
  - Unable to Attract Talent
  - Maximum High Level Headline Exposure
  - Ministerial Censure
  - Non-Performance
  - Death
  - Non-Performance
  - Budget Overages
  - Asset Damage Exceeds Replacement Value
  - Non-Performance
  - Performance Failure
5. Financing Strategy

Asset management is closely integrated with the City’s Financial Strategy and the annual budgeting process. The City’s Financial Strategy identifies “Infrastructure Investment” as one of five strategic areas.

5.1 Expenditures

The annual capital budget submission to Council, including a nine-year expenditure forecast, is created as a result of extensive analysis of capital infrastructure needs, projects identified by staff using the Capital and Major Initiative Prioritization Model, risk analysis and Council policy. Oshawa revised its Capital and Major Initiative Prioritization Model as part of the 2014 annual budget process. This model is used to objectively evaluate and prioritize projects to ensure the City’s limited financial resources are allocated to the City’s highest priority projects. The model aligns with the City’s strategic goals, risk management framework and sound financial principles. The model includes the following scoring criteria: project category; alignment with the Oshawa Strategic Plan; operating budget impact; risk assessment; financing; cost/benefit; service levels and community/corporate economic impact. The model will be further revised with the completion of this AMP and future updates.

In 2014, the City budgeted $23.7 million for capital. In 2015, it rose to $28.2 million and in 2016 the capital budget was $26.1 million. It is important to note that past investment may not be indicative of the investment incurred in future by asset class. On a go-forward basis, the City will look to capture the expenditure break-down of non-infrastructure solutions and maintenance, renewal, replacement, expansion and disposal activities in the AMP.
5.2 Revenues

Infrastructure service levels must be balanced against the availability of funding. Presently, Oshawa’s infrastructure investment is funded by internal sources for all asset classes (tax-levy dollars, reserves and reserve funds, as well as debt) and external sources (federal and provincial grants, federal gas tax, development charges, as well as user fees). As most funding comes from the community via property taxation, increases must be kept within reasonable levels. For this reason, a long-term outlook is essential including a clear understanding and further development of financial policies that support long-term planning and sustainable funding of the City’s infrastructure.

This issue has recently been clarified by the Association of Municipalities of Ontario (AMO), which, as a result of polling, says that 76% of Ontarians are concerned or somewhat concerned property taxes will not cover the cost of infrastructure while maintaining municipal services. In addition, 90% of Ontarians agree maintaining safe infrastructure is an important priority for their communities. AMO goes on to say that a ten-year projection (2016-2025) of municipal expenditures against inflationary property tax and user fee increases shows there to be an unfunded average annual need of $3.6 billion to fix local infrastructure and provide for municipal operating needs. AMO’s goal is to close the fiscal gap so that all municipalities can benefit from predictable and sustainable revenue to finance the pressing infrastructure and municipal service needs faced by all municipal governments.

The following Figure 12 provides a breakdown of the City’s revenues for year-end 2015, excluding revenues recognized on assumed assets (e.g. roads assumed by the City) and net earnings from the Oshawa Power and Utilities Corporation.

Going forward, the Province, in its Building Together Guide for Municipal Asset Management Plans, is encouraging municipalities to be “open to all available revenue and financing tools and to revisit their policies regarding user fees.” In response, the City will need to give consideration to new user-fee based initiatives. For example, some municipalities have successfully transferred the storm water management function from a property tax funded program to a user based funded program. This funding model allows the municipality to fund a service directly that is typically underfunded.
Figure 12: Oshawa Total Revenues, December 31, 2015
(Source: Consolidated Statement of Operations)

<table>
<thead>
<tr>
<th>Revenues</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property taxation</td>
<td>$121,230,919</td>
</tr>
<tr>
<td>Taxation from other governments</td>
<td>$2,808,481</td>
</tr>
<tr>
<td>User charges</td>
<td>$23,452,220</td>
</tr>
<tr>
<td>Government grants</td>
<td>$999,480</td>
</tr>
<tr>
<td>Contributions from developers - earned</td>
<td>$2,662,355</td>
</tr>
<tr>
<td>Federal gas tax revenue</td>
<td>$3,024,333</td>
</tr>
<tr>
<td>Investment income</td>
<td>$1,667,104</td>
</tr>
<tr>
<td>Penalties and interest on taxes</td>
<td>$1,213,007</td>
</tr>
<tr>
<td>Licenses and permits</td>
<td>$4,416,118</td>
</tr>
<tr>
<td>Fines</td>
<td>$1,138,874</td>
</tr>
<tr>
<td>Other</td>
<td>$8,363,930</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$170,977,246</strong></td>
</tr>
</tbody>
</table>

In accordance with the Financial Strategy, the City will be developing a formal comprehensive reserve fund policy that will be an essential input to the development of a long term financing strategy for the City’s infrastructure renewal forecast..

5.3 Funding Shortfall

Oshawa has a practice of making annual contributions to the capital program for asset replacement. This contribution only partially satisfies capital infrastructure needs. Further, in accordance with the Development Charges Act 1997, Regulation 82/98 as amended in 2015, the City will need to respond to the requirement to demonstrate that all the assets mentioned in the City’s Development Charge Background Study are financially sustainable over their full lifecycle. This will provide an opportunity to better plan for the City’s long-term infrastructure investments.

Improving upon the City’s asset management data base and thereby removing the current reliance on PSAB 3150 data (a backward-looking historical analysis) will allow an accurate reporting of asset replacement costs for future iterations of the AMP.
6. Conclusion

The City proudly manages its assets in a responsible manner. This level of responsibility has been enhanced with the new provincial requirement for municipalities to develop AMPs. Asset management requires a thorough understanding of the characteristics and condition of infrastructure assets, as well as the service levels expected from them. It also involves setting strategic priorities to optimize decision making about when and how to proceed with investments. Finally, it requires the development of a financing strategy, critical to putting the AMP into action.

Not unlike many other municipalities, this is the City’s first AMP. It is a living document, which is based on currently available information with improvements expected in future updates. To maintain existing momentum around asset management, a key focus in the short-term (1-5 years) will be on improving staff, Council and the community’s overall understanding and value of asset management. This will go a long way to incorporating asset management into the City’s culture. Attention will also be given to developing a detailed asset management roadmap, recognizing and responding to the changes required to processes, policies and procedures, building the asset inventory, improving asset management data and information including observed condition data and moving to the calculation of asset replacement cost.

The focus over the long-term (6+ years) will be on engaging the public on the development of LOS, developing related performance measures and creating more specific AMPs per asset class. A full asset management analysis will be completed every five years.

As the City’s asset management capability improves, the City will gain an enhanced ability to make informed decisions, and be able to clearly support requests for senior government infrastructure funding. Achieving this will go a long way to support Oshawa as a prosperous, collaborative, vibrant, inclusive and green city where people and businesses are proud to live, work, learn and play.
7. Recommended Actions

Short-Term (1 - 5 years)

1. Determine and commit the necessary resources, including an internal Executive Sponsor, to develop and implement an asset management roadmap with detailed actions, responsibilities and timelines with the mandate to build the City’s asset management capabilities and improve upon asset management data generation, documentation, monitoring and reporting.

2. Develop and implement a change management framework for implementation across the organization inclusive of Council to further an understanding of the importance of asset management.

3. Continue to ensure asset management is aligned with the implementation of the Financial Strategy.

4. Continue to build the City’s asset registry based on asset classes including assets anticipated as a result of growth/expansion.

5. Move toward the calculation of replacement cost valuation of the City’s assets such as, accounting for inflation, but also changes in construction costs or technology.

6. Establish a system to regularly review and update estimated remaining asset service life based on observed condition data, as well as historical maintenance and renewal information, rather than estimating asset service life.

7. Continue to develop and implement lifecycle operations, maintenance and renewal programs and strategies for asset classes to develop a consistent and proactive approach and incorporate into future investment needs forecasts.

8. Continue work on a work management system, which will improve the City’s information regarding lifecycle costs.

9. Ensure a linked and integrated data system for quality, accurate and consistent data analysis, aggregation and meaningful reporting.

10. Continue the staff-based asset class teams to further collaboration and communication between departments.
11. Ensure alignment of the reporting of assets between the Development Charge Background Study and the AMP, as per the Development Charges Act 1997, Regulation 82/98 as amended in 2015.

12. Ensure the importance and value of the City’s AMP are communicated to the community on an on-going basis as a direct input to the Financial Strategy and annual budgeting process.

13. Ensure asset management including operational and maintenance procedures, asset condition assessment, renewal, disposal and related practices, policies, processes and manuals is considered as part of the electronic content management research in 2017.

14. Further revise the Capital and Major Initiative Prioritization Model as the City’s AMP evolves in order to provide more information for scoring and prioritizing capital projects.

15. Investigate joint co-operative purchasing, as well as alternative financing and procurement options with regard to capital purchases.

16. Further the use of net present value analysis of asset renewal options.

Long-Term (6+ years)

17. Continue to improve the accuracy and replicability of the City’s asset management data.

18. Identify legislated and desired levels of service (LOS) for asset classes and create a central LOS database with appropriate key performance indicators (KPIs).

19. Create more detailed AMPs per asset class based on the evolving City asset registry.