

A black and white photograph of construction workers on a job site. In the foreground, a worker's legs and work boots are visible. In the background, several workers in hard hats and safety gear are working with tools on a paved surface. A large green circle is overlaid on the center of the image, containing the title text. A smaller, lighter green circle is overlaid on the bottom right of the large circle, containing the year.

Strategic Asset Management Plan

2017

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The SAMP plays an important part of the Council-adopted CAM program by communicating to residents and stakeholders the reasons why new assets, or modifications to existing assets, are required.

1.0 Introduction

The concept of asset management at the City of Ottawa has consistently expanded and progressed since its inception in 2001.

In 2010, the City undertook its first detailed assessment to determine at which level industry-recognized asset management leading practices were applied across the organisation. The results pointed to a general awareness of leading practices but not a consistent application across the different business areas.

Based on the findings of this exercise, an Asset Management Roadmap was established to bridge the gap between the current state and the targeted end state for asset management within the City.

Soon after the detailed assessment was completed, a governance structure was established to guide the implementation of the Comprehensive Asset Management (CAM) initiatives and, in 2012, Council adopted the City's first CAM program along with the CAM Policy. With that adoption, Council directed staff to continue to develop practices and processes to improve the quality and transparency of factual information used to inform decision-makers, stakeholders and the public.

The City is now in the midst of a multi-step, multi-year approach to improve its asset management practices and processes. This document is the City's first consolidated Strategic Asset Management Plan (SAMP); it will continue to evolve over time.

1.1 Purpose of Strategic Asset Management Plan (SAMP)



The SAMP plays an important part of the Council-adopted CAM program by communicating to residents and stakeholders the reasons why new assets, or modifications to existing assets, are required. The SAMP also provides further details on why modifications are required, how the City intends on continuing to deliver the services by relying on safe and reliable assets, and how the City intends on funding the required investments in a manner so as to remain financially sustainable.

The City has an array of strategic, long-term planning documents that complement each other and work together to direct Ottawa's future. Some examples include the City's Strategic Plan that outlines Council's priorities, the Corporate Planning Framework that demonstrates the integration of Council's priorities, the Official Plan (OP) which sets the vision for Ottawa's future growth as detailed in such documents as the Transportation Master Plan (TMP), the Infrastructure Master Plan (IMP), the Ottawa Cycling Plan (OCP), and the Ottawa Pedestrian Plan (OPP).



Historically, these master plans have dealt exclusively with future needs without considering their funding requirements, nor the rehabilitation needs for existing infrastructure. The latest version of the Master Plan included a financial sustainability lens that reinforced the holistic approach outlined in the CAM Policy.

The SAMP captures information prepared for various uses, by a number of different groups within

the City, and transforms that information into asset-specific measures or actions that the City is actively taking or pursuing to provide residents, businesses, and visitors the services at levels that correspond to the fees and taxes they pay.

- Demonstrate responsible management of the asset portfolio;
- Communicate and justify funding requirements;
- Demonstrate how Levels of Service (LOS) are being met in an effective and efficient manner;
- Demonstrate that due regard is being given to the long-term stewardship and sustainability of the asset base;
- Demonstrate the commitment that assets will be maintained such that the services are in compliance with regulations; and
- Comply with Ontario's Ministry of Infrastructure requirements as detailed in the 'Guide for Municipal Asset Management Plans'.

1.2 Core Service Areas

The City of Ottawa is a complex service delivery organization with responsibility for managing public assets that support a very large array of different services.

To fulfill its obligations of service delivery to the community, the City must ensure that the assets supporting these services are managed in a way that balances service levels, risk, and affordability. These assets require significant ongoing investment in operation, maintenance, and renewal activities to ensure they are kept safe, structurally sound, and fit-for-purpose to support the delivery of services.

For the purpose of asset management, the City has identified 35 different services provided to residents, businesses, and visitors. These services are well aligned to the provincially defined Financial Information Return (FIR) reporting requirements. The FIR reporting requirements have been established for comparable financial reporting across the province, whereas the services identified below are grouped to facilitate asset management from a service to client perspective.

In 2001, the City of Ottawa was transferred the responsibility for the administration and funding of Social Housing programs and for the on-going integrity of the physical condition of the social housing stock. This portfolio consists of \$3.7 billion (2016 Dollars) in assets and over 20,000 units distributed among 54 housing providers.

The City of Ottawa has 54 social housing providers where Ottawa Community Housing Corporation (OCH) is the largest in Ottawa and the second largest in Ontario. OCH's portfolio consists of units directly funded and administered under operating agreements with the City as well as equity units. It provides nearly 15,000 homes for about 32,000 seniors, parents, children, singles and person with special needs, amounting for \$2.8 billion in assets. The City of Ottawa is the sole shareholder of OCH and it operates at arm's length from the City. It is managed by a Board of Directors consisting of community members and members of City Council.

The other housing providers consist of 33 independent Non-Profit and 20 Co-operative housing providers with social housing programs funded and administered by the City. These housing providers account for \$900 million in assets and over 5,285 units of social housing.

As the City is the sole shareholder of OCH, its physical assets and asset management plan are included as part of this report. As the other housing providers are independent Corporations from the City, their assets are excluded.

In several cases, the services identified in Table 1 below are further subdivided into more specific services but generally rely on similar asset types to support the delivery of that service.

Table 1: List of Service Types and Services

COMMUNITY SERVICES

- Children services
- Family services
- Older adult services
- Community housing
- Social housing
- Emergency shelters
- Community support

EMERGENCY SERVICES

- Fire
- Paramedic
- Police
- Emergency preparedness

ENVIRONMENTAL SERVICES

- Recyclables collection and processing
- Organics collection and processing
- Hazardous waste collection and processing
- Potable water production and distribution
- Waste water collection and treatment
- Storm water and surface water management
- Forestry

RECREATION AND CULTURAL SERVICES

- Libraries
- Outdoor athletic activities
- Outdoor leisure activities
- Indoor athletic activities
- Indoor non-athletic activities
- Public art
- Cultural activities

TRAVEL AND MOBILITY SERVICES

- Pedestrian mobility
- Cyclist mobility
- Vehicle parking and mobility
- Public transit (bus)
- Public transit (train & LRT)
- Para Transpo service

GOVERNMENT SERVICE

- Legislative services
- By-law services
- Administration
- Information Services



1.3 AM Governance and Development of the SAMP

In 2010, the City put in place an Asset Management (AM) governance structure with corporate sponsors and an AM Steering Committee with representation from across the organisation. The SAMP was generated by a working group reporting to the Steering Committee. Figure 1 shows the governance structure in place at the City.

Figure 1: Comprehensive Asset Management Governance Structure



The City has developed a Serviced-based Strategic Asset Management Plan (ServSAMP) framework with the intent of developing ServSAMPs for all identified services as per Table 1, starting in 2016. Accordingly, the corporate level SAMP will ultimately be developed in a layered approach, relying on each individual ServSAMP to convey relevant key initiatives, funding requirements, condition status, changes in approach to operation and maintenance, targeted levels of services, etc.

This SAMP is intended to inform residents, Council and stakeholders on the state of the City’s infrastructure assets, asset management practices, and funding strategies.

1.4 Plan Improvement and Monitoring

The SAMP and supporting ServSAMPs are intended to be “living” documents. The corporate CAM Steering Committee is intended to be the owner of the SAMP document, whereas sub-groups (e.g. Service owners) with specific representation are intended to own each individual ServSAMP.

The review of the corporate SAMP is intended to align with the latest refresh of the Long Range Financial Plan (LRFP) and/or the Master Plans, with the ServSAMP to be refreshed annually through the budget process.

Typically, the City budgets are approved by Council on an annual basis, and include a three year capital forecast for information.

Table 2: Timeframes and Frequency for Review

Document	Frequency
Comprehensive Asset Management Policy	Every 5 years (or as needed)
Long Range Financial Plan (LRFP)	Every Term of Council
Master Plan (Official Plan, Transportation Plan, Infrastructure Plan, Pedestrian Plan, etc...)	Every 4 to 5 years
Strategic Asset Management Plan (SAMP)	Every Term of Council*
State Of Assets Report (SOAR)	Every Term of Council
Service-based Strategic Asset Management Plan (ServSAMP)	Annually
Capital and Operating Budgets	Annually (Multi-year for Rate Program)

* as a minimum but see text in section 1.4 for further details

It should also be noted that any policy or service delivery change will in effect trigger a review of the SAMP and impacted ServSAMPs.

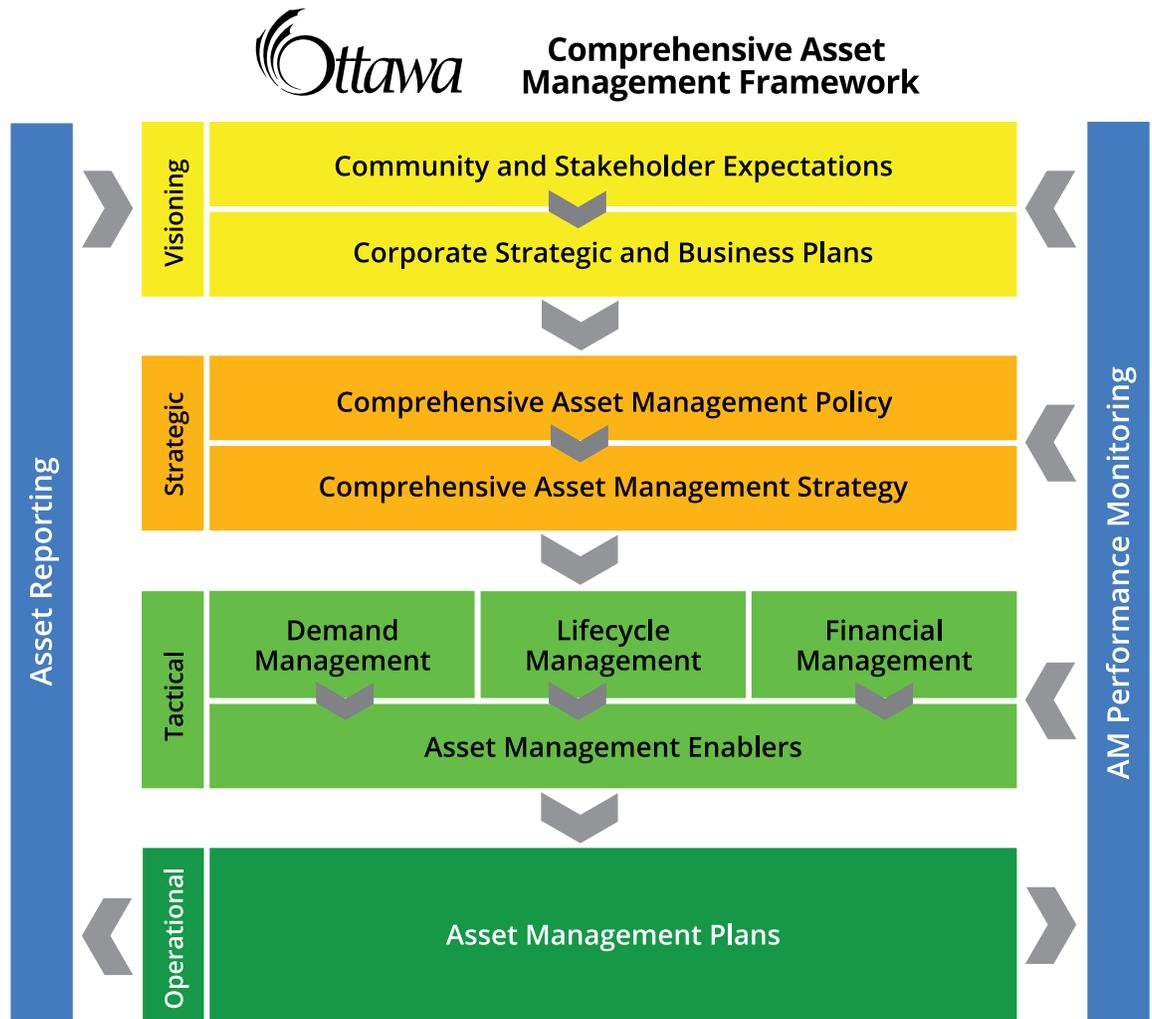
The Comprehensive Asset Management Framework shown in Figure 2, further reinforces this concept of on-going performance monitoring and review for the purpose of adjusting work plans and reporting. The CAM Framework also demonstrates the clear connection between the organisation's objectives and the day-to-day activities that are undertaken, as described in the service-based asset management plans, to deliver services to residents.

The CAM Policy was approved by Council in 2012. It defines Council's expectations on how assets are going to be managed and the principles that need to be applied when managing infrastructure investments decisions.

The CAM Strategy was approved by Senior Management Committee in 2012. It defines how the organisation is going to achieve the objectives outlined in the CAM Policy. It defines the actions that are needed to improve asset management practices and processes across the organisation.

Both the CAM Policy and CAM Strategy are available on the City of Ottawa's web site.

Figure 2: City of Ottawa's Comprehensive Asset Management Framework





Based on the total replacement value of almost \$39 billion, the city manages approximately \$44,000 per person or almost \$105,000 per dwelling of physical public assets.

2.0 State of Assets

As the fourth largest city in Canada (2011 census), the City of Ottawa owns, operates, and maintains an important portfolio of assets.



The information contained in this section of the SAMP is available in further detail in the 2017 State of Assets Report (SOAR).

2.1 Inventory

Table 3 provides the type and quantity of assets that help support the various services provided by the City.

Table 3: 2017 inventory of assets supporting specific services

SERVICE	ASSET TYPE	QUANTITY
Drinking Water	Distribution mains	2,779 km
	Transmission mains	226 km
	Elevated storage tanks	4
	Reservoirs	5
	Pump stations	17
	Communal well systems	5
	Fleet vehicles	195
	Purification plants	2
Wastewater	Sanitary collection sewers	1,648 km
	Combined collection sewers	91 km
	Sanitary trunk sewers	243 km

SERVICE	ASSET TYPE	QUANTITY
Wastewater (cont'd)	Combined trunk sewers	11 km
	Partially separated sewers	645 km
	Forcemains	93 km
	Pump stations	65
	Regulator sites	8
	Lagoons	2
	Odour control facilities	5
	Storage tanks	3
	Flow monitoring stations	23
	Fleet vehicles	123
	Treatment plant	1
Solid Waste	Landfill Admin Building	1
	Recycling & Diversion Centre	1
	Scale House/Entrance	1
	Leachate Pre-Treatment System	1
	Landfill Gas Extraction System	1
	Landfill Gas Power Generation Facility	1
	Leachate System	1
	Stage 1 Cover	1
	Fleet vehicles	112
Stormwater	Collection sewers	2,572 km
	Trunk sewers	168 km
	Forcemains	3 km
	Dry ponds	66
	Wet ponds	92
	Filtration/Infiltration systems	13
	Oil/Grit separators	45
	Pump stations	10
	Culverts (1m to 3m opening)	1,218
	Culverts (opening < 1m)	4,668
Fleet vehicles	30	



SERVICE	ASSET TYPE	QUANTITY
Public transit	Transitway and dedicated lanes	78 km
	Park and Ride lots (city owned)	13
	Bus shelters	1,328
	Bike shelters	45
	Flags (bus stop)	6,200
	Benches	525
	O-Train cars	6 train sets
	Tracks	9 km
	Revenue fleet (conventional buses)	930
	Non-revenue fleet vehicles	289
	ParaTranspo fleet vehicles	82
	Bridges	149
	Bridge culverts	4
	Culverts (<1m to 3m opening)	30
	Retaining walls	97
	Pedestrian walkways	12 km
	Transit Signage	599
	Administrative buildings	2
	Fleet maintenance garage	8
	General garage equipment	110
	Transitway stations	32
	O-Train stations	5
	Park and Ride buildings	1
Garbage and recycling bins	250	
Transitway Street Lights	1,074	
Transportation	Freeway	53 km
	Arterial	1,454 km
	Major Collector	138 km
	Collector	1,271 km
	Local	2,357 km
	Lane	9 km
	Gravel roads (any road class)	564 km
	Bridges	471



SERVICE	ASSET TYPE	QUANTITY
Transportation (cont'd)	Bridge Culverts	186
	Retaining walls	284
	Noise barriers	4 km
	Gateway and Arches	2
	Overhead sign support	49
	Sidewalks	2,003 km
	Crosswalks	5 km
	Pathways	287 km
	Guiderails	150 km
	Parking facility	5
	Pay parking lots	7
	Administrative buildings	1
	Salt domes	40
	Garage/Office	30
	Yards	8
	Storage facilities	24
	Utility facilities	4
	Workshops	6
	Fleet vehicles	942
	Recreation and Culture	Museums
Performing arts centres		2
Historical properties		84
Creative arts building		1
Monuments		9
Community centres		35
Community buildings		39
Arenas		25
Recreation complexes		12
Athletic facilities		3
Curling rinks		2
Marina buildings		3
Boat launch		7



SERVICE	ASSET TYPE	QUANTITY
Recreation and Culture (cont'd)	Outdoor pools	10
	Indoor pools	6
	Change facilities	12
	Wading pools	61
	Splash pads	115
	Playgrounds	636
	Ball diamonds	294
	Sportsfields	37
	Multi-use fields	6
	Soccer fields	314
	Basketball courts	247
	Gazebos	163
	Outdoor rinks	212
	Skateboard parks	16
	Horseshoe pits	8
	Lawnbowling fields	4
	Lawnbowling clubhouses	1
	Outdoor amphitheatre	4
	Bicycle track	2
	Comfort stations	26
	Petanque court	3
	Running track	3
	Fitness trails	5
	Ski hill	1
	Toboggan hills	57
	Field houses	80
	Tennis courts	116
Tennis clubhouses	13	
Site servicing (lighting, paths, etc)	4,589	
General government building	1	
Storage buildings	57	
Utility structures	13	
Fleet vehicles	675	



SERVICE	ASSET TYPE	QUANTITY
Libraries	Library buildings	20
	Archives building	1
	Bookmobile fleet	2
	Support fleet	6
	Automated material handling	1
	Smartbins	224
	RFID Systems	11
	Kiosks	3
Community Services	Long Term Care Buildings	5
	Long Term Care Storage	2
	Day care centres	7
	Social shelter buildings	3
	Fleet vehicles	3
	Cemeteries	9
	Community housing	166
Fire, Paramedic, Police and By-Law	Fire stations	45
	Dispatch Centre	1
	Fire training buildings	1
	Administrative buildings	2
	Storage facilities	1
	Paramedic posts	4
	Police stations	5
	Community police centres	2
	Police support/storage facility	2
	By-Law administrative building	1
	Fire fleet	245
	Paramedic fleet	125
	By-Law Fleet vehicles	154
Corporate Services	General administration facilities	5
	Storage facilities	5
	Service centre buildings	8
	Fleet vehicles	148
Information Technology	Data Centres	514
	Network	269
	Telecom	68
	Desktop devices	7,403
	Mobile devices	7,903
	Office software	11,531
	Business & Enterprise Application	115

2.2 Valuation

Based on the total replacement value of \$42 billion (2017), the City manages approximately \$44,000 per person of physical public assets, or almost \$105,000 per dwelling¹. Table 4 shows the replacement value of the assets supporting different services.

Table 4: 2017 Replacement Values of Assets by Service

SERVICE	ASSETS REPLACEMENT VALUE (2017 \$)
Water	\$ 7,465 M
Wastewater	\$ 7,193 M
Stormwater	\$ 6,296 M
Solid Waste	\$ 59 M
Transit	\$ 1,980 M
Transportation	\$ 12,612 M
Parks, Rec and Culture	\$ 2,232 M
Libraries	\$ 126 M
Social Services	\$ 3,032 M
Fire	\$ 291 M
Paramedic	\$ 44 M
Police	\$ 148 M
Bylaw	\$ 13 M
Corporate Services	\$ 338 M
Information Technology	\$ 123 M
	\$ 41,953 M

The SAMP relies on replacement costs as its basis for valuation of each asset, as determined using data compiled from a bottom-up approach. This approach is preferred for asset management because it depicts a truer picture of the potential value and allows individual attribute (i.e. type, size, etc.) to be captured.

The valuation based on replacement cost is especially useful for assets that have relatively lengthy useful lives like water, wastewater and transportation infrastructure. For assets such as these, the use of the replacement cost is more representative of future needs and more useful for decision-making support compared to historical cost valuation methods, such as net book value, which are used for financial reporting purposes.

The City's Tangible Capital Asset Reporting process generates the financial accounting acquisition and amortization values required for PSAB 3150 reporting. Both valuation methods are derived from the same inventory datasets for their specific intended purposes. However they differ in that for financial statement reporting purposes tangible capital assets are maintained at historical cost; they include all amounts that are directly attributable to acquisition, construction, development, or betterment of an asset at time of ownership. The costs, less residual value, of the tangible capital assets, with the exception of land, are amortized on a straight-line basis over their estimated useful lives which, dependent on the asset, can vary from 5 years for a vehicle to 100 years for water/wastewater linear assets. As mentioned above, replacement values rather than reported asset costs are used for financial planning purposes in order to properly reflect future funding requirements.

¹ Population and number of dwellings per 2011 Statistics Canada census.

2.3 Useful Life



The useful life of an asset is defined as the period over which an asset or component is expected to be available for use by an entity². Given the variety of services provided by the City, the expected useful lives of the assets supporting those services range from a couple of years to several decades. A good understanding of useful lives is required to support long term planning since it may be substantially different for two similar assets that are subject to different environmental

factors and other such variables as different materials or construction methods.

A significant number of assets supporting municipal services are either buried, covered, or not easily accessible for inspection, either because of physical location or capacity to take off-line (e.g. water mains, sewer mains, long term care facilities, etc.). For these types of assets, the remaining useful life provides a good approximation of when, and the nature of the intervention that will be required to keep the asset in a good state of repair and functioning at the intended level. In the absence of factual condition data, remaining useful life is a strong tool to support long term planning.

The City is increasingly capturing factual physical condition data. However, where that information is not available, there is a reliance on remaining useful life to generate long-range plans and in some cases to support inspections of some assets where it is suspected that the actual physical condition does not reflect the remaining useful life.

Typically, the useful life of an asset provides a sense of potential requirement, but prior to renewing or replacing the asset, the condition is confirmed through field inspections and the performance evaluated through consultation with asset stewards and stakeholders. It is also important to note that most assets are not renewed or replaced only on the basis of physical condition but rather by considering performance and functionality.

2.4 Condition

The City's State Of Assets Report (SOAR) established a consistent approach to rating the physical condition of City-owned assets, as shown in Table 5. This approach provides common language in defining the physical condition of assets and is consistent with the Canadian Infrastructure Report Card.

² International Infrastructure Management Manual , 2015, National Asset Management Support Group (NAMS Ltd.), New Zealand

Table 5: Physical Condition Description

RATING	DESCRIPTION
Very Good	Fit for the future Well maintained, good condition, new or recently rehabilitated
Good	Adequate for now Acceptable, generally approaching mid stage of expected service life
Fair	Requires attention Signs of deterioration, some elements exhibit deficiencies
Poor	Increased potential of affecting service Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration
Very Poor	Unfit for sustained service Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable

While the 2016 SOAR identified the overall physical condition of the City's assets to be in fair to good condition, it is important to recognize that continued reinvestment is essential to renew components that are in poor or very poor condition.

Ottawa Community Housing has continued to embrace an asset management planning approach by updating all the Non-Profit and Co-operative housing providers' BCAs and Capital Plans between 2011 and 2014. This data now provides the City with a current and more accurate estimate of the overall capital needs for the entire Ottawa Community Housing (OCH) portfolio projected over the next 30 years.

There is also a need to invest in the large amount of assets that are in fair condition to ensure an extension of the life at the best value for the community. These assets, if left unmanaged, typically enter into a more rapidly deterioration cycle and over a relative short period of time will require substantial investments to bring them back to a functional level. If left unmanaged, it will result in a situation that will become unsustainable.

Figure 3 below, shows a typical deterioration curve to further demonstrate the accentuated rate of deterioration as an asset transitions from good to fair to poor condition.



Figure 3: Schematic of an Asset's Deterioration Over Time

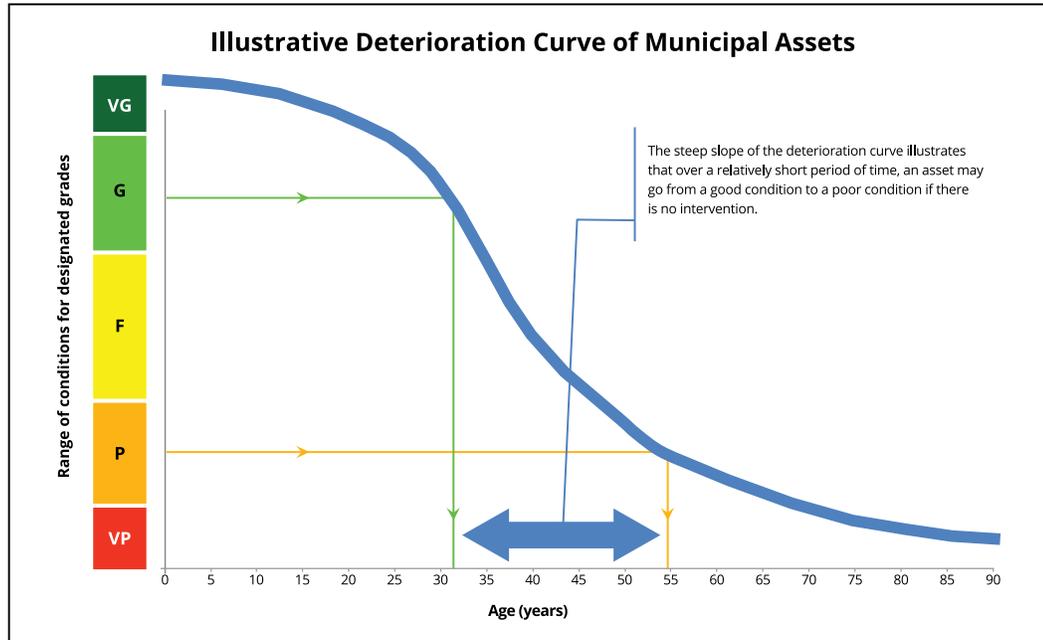


Figure 4 below shows the overall distribution of assets that fall within, below or above a fair physical condition according to their replacement value and provides a high level overview of the general condition of assets supporting different services.

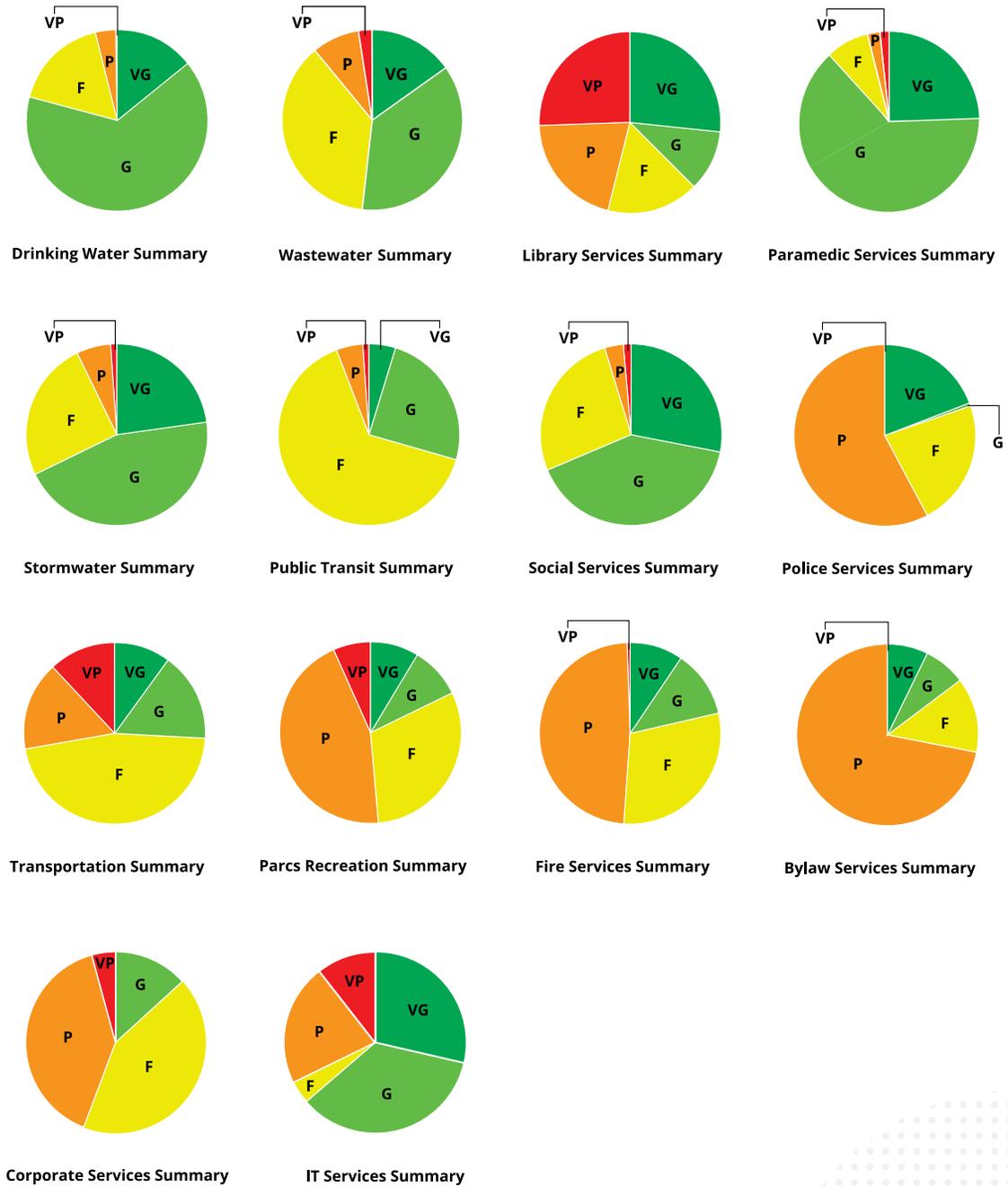
Figure 4: Condition of Assets by Service (Extract From 2017 Soar)

Percentage of Assets in Different Conditions

Service	2017 Status				
	Asset Replacement Value	Overall Average Asset Condition Rating	% of Assets in Poor to Very Poor Condition	% of Assets in Fair Condition	% of Assets in Good to Very Good Condition
Water	\$ 7,465 M	Good-Fair	4 %	17 %	79 %
Wastewater	\$ 7,193 M	Fair-Good	11 %	37 %	52 %
Stormwater	\$ 6,296 M	Good-Fair	7 %	25 %	68 %
Solid Waste	\$ 59 M	Good-VG	6 %	11 %	82 %
Transit	\$ 1,980 M	Fair-Good	6 %	64 %	29 %
Transportation	\$ 12,612 M	Fair	29 %	46 %	25 %
Parks, Rec and Culture	\$ 2,232 M	Fair	51 %	31 %	18 %
Libraries	\$ 126 M	Good	46 %	16 %	38 %
Social Services	\$ 3,032 M	Good-Fair	5 %	27 %	69 %
Fire	\$ 291 M	Fair	48 %	31 %	21 %
Paramedic	\$ 44 M	Good	4 %	6 %	90 %
Bylaw	\$ 13 M	Fair	72 %	13 %	15 %
Police	\$ 148 M	Fair	58 %	23 %	20 %
Corporate Services	\$ 338 M	Fair-Poor	44 %	43 %	13 %
Information Technology	\$ 123 M	Fair	32 %	3 %	65 %
Overall Summary	\$ 41,953 M	Fair-Good	17 % (\$7.1B)	34 % (\$14.4B)	49 % (\$20.5B)

Table 6 below, shows the breakdown of conditions status' per service for the assets that support the delivery of that service. The individual assets that make up that service are itemised in the inventory section covered earlier.

Table 6: Condition Breakdown of Assets by Service



A detailed look at the condition of the assets supporting services across the City shows a healthy distribution of conditions. The City has a large proportion of assets in fair to good to very good condition which is consistent with a sound asset management approach since it is unrealistic to keep all of the assets in good or very good condition and remain financially sustainable.

The challenge is ensuring that assets in poor or very poor condition get the attention they need and are not left to deteriorate to the point where they begin to have significant adverse impacts on levels of service.

Detailed breakdowns of each service are available in the latest State Of Asset Report that can be found on the City's website.

2.5 Inventory Database

Over the years the City has, and continues, to invest significant amounts of time and effort to capture and maintain accurate records on the assets that it owns or leases. The City operates with close to 300 databases, over 225 software applications, and some 10,000 desktop or laptop computers to support the delivery of services to residents, visitors, and businesses.

The Geographic Information System (GIS) program supports a suite of business focussed desktop and web solutions that are utilized by over 3,000 staff to store, maintain and access the inventory for a very large number of municipal infrastructure assets, but other systems are also used.

As it stands, data ownership is maintained on a distributed responsibility basis across various areas, and in many cases, converting that data into meaningful information falls to other groups. Core inventory responsibilities are reasonably well defined, with few overlaps – which are known and being actively refined.

2.5.1 Core Inventory Systems

As stated previously, the City has a large array of assets and corresponding inventories, business applications, and enterprise systems. They can run the gamut from spreadsheets to small database tools, to specialized expert systems, to large multi-faceted integrated enterprise dataset systems. Some of the core systems are shown in table 7 below:



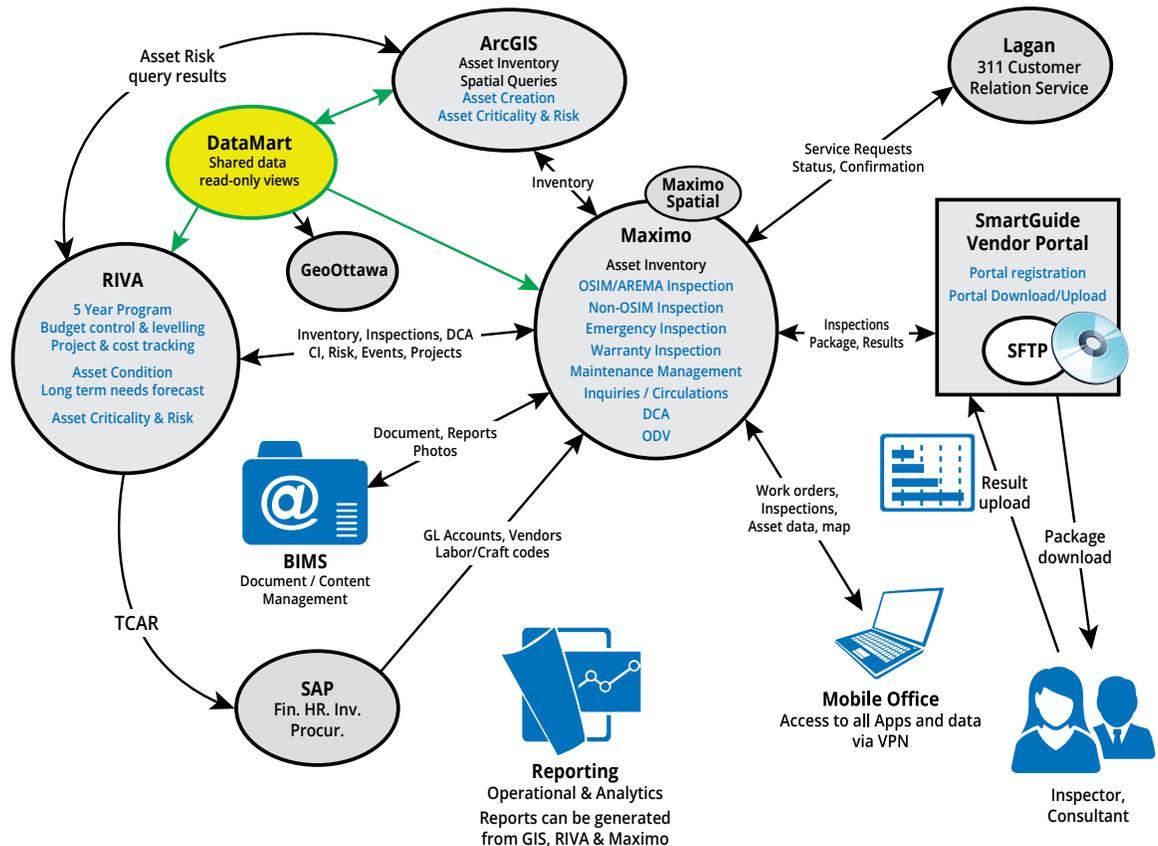
Table 7: Core Inventory and AM Related Systems

SYSTEM	FUNCTIONS
SAPR/3R/s	Accounting and Financial Reporting
SAP AA	Asset Accounting and TCA Reporting
SAP PM	Water Production/Treatments plants, Facilities, Road Maintenance
SAP RE	Land Inventory
M5	Fleet Inventory
ESRI GIS	Sidewalks, Pathways, Sewers, Water, Road networks Inventory
Riva DS	Inventory and needs for Buildings and Parks
Maximo	Work Orders and Service Requests
MAP	Development tracking, road and property inventory support
Asset Planner	Ottawa Community Housing – inventory and needs

While there are a number of core systems in use, the City's approach as upgrades, renewals, and new implementations occur is to integrate systems and leverage the City's enterprise systems to the extent possible. Figure 4 below shows an example of how a number of business specific applications and enterprise applications were brought together and integrated to meet specific business requirements.

Figure 5: Integrated Applications to Provide a Business Solution

EAM – Structures Solution Architecture



The above example is a demonstration of how a recent solution replaced an end of life Work Management/Work order system, with an integrated solution – connecting Maximo CMMS to SAP financials, to ESRI GIS and core inventory, and to Lagan CRM.

The Enterprise Asset Management (EAM) foundation built for the initial requirement has now further been integrated with RIVA Modelling solutions to allow for annual budget preparation and integration with long-range financial forecasting.

The City remains committed to continually seek improvements and efficiencies in inventory solutions.

2.5.2 Data Maintenance

Generally, business area inventories are continually updated to maintain accurate information and the City relies on both reactive and proactive information flows. Through an on-going effort, City staff actively review, validate and update the inventories based on information communicated by field personnel or provided through development or “as-built” drawings. In some cases, the City schedules inspections and inventory validation projects into the annual work plan to either meet regulatory requirement or to supplement identified data gaps. Some examples of condition assessment programs are provided in section 4.3.6.

Information is typically provided, through existing business processes to data stewards in different format. Where electronic copies of plans are provided, employees review the new data against existing information and apply the necessary changes. When hard copies are the only valid source of information, that information is digitised into the existing database.

As the City progresses on improving the quality and confidence of its data, asset information previously contained in non-geospatially referenced repositories is slowly added to the GIS system to increase the end-user’s usability while simultaneously providing an opportunity to “clean” the data for improved quality.

2.6 Assumptions

This document was compiled using condition data from the 2017 SOAR. The underlying assumption is that the conditions of the assets have not changed considerably since the development of that document, and therefore observations and findings are still applicable.

As stated previously, the City has an established Asset Management Roadmap to help guide its progress. The Roadmap identifies several initiatives related to data, asset knowledge, systems and integration. The City currently has ongoing projects to complete a number of initiatives itemised in the AM Roadmap to continue to improve the quality of the data, the related asset knowledge, and the information flow.



2.7 AM related policies, strategies and procedures

Council approved the CAM Program and CAM Policy in 2012. At the same time, Senior Management endorsed the CAM Strategy. These foundational documents have helped staff make progress in the development and implementation of industry recognised asset management practices, and are still contributing to further enhancing other existing practices.

Other relevant guiding documents include:

- Enhanced Risk Management Policy (approved by Council in 2001), which ensures all City employees understand their responsibilities related to risk management and are aware of the process to identify risks, and what must occur once potential risks are identified,
- Fiscal Framework which is a set of overarching principles for responsible financial management. (Corrected for review in 2017)
- Project Management Policy (approved by Council in 2014), which aligns and supports the development and use of business cases and project charters to see projects delivered successfully.
- The water, wastewater, and stormwater rate structure review that was recently approved to introduce fixed fees in the rate to better reflect the costs of these services.





A key objective of Asset Management is to optimize the competing objectives of sustainability, economic prosperity, social diversity, and environmental responsibility, while meeting customer service levels at the lowest life cycle costs.



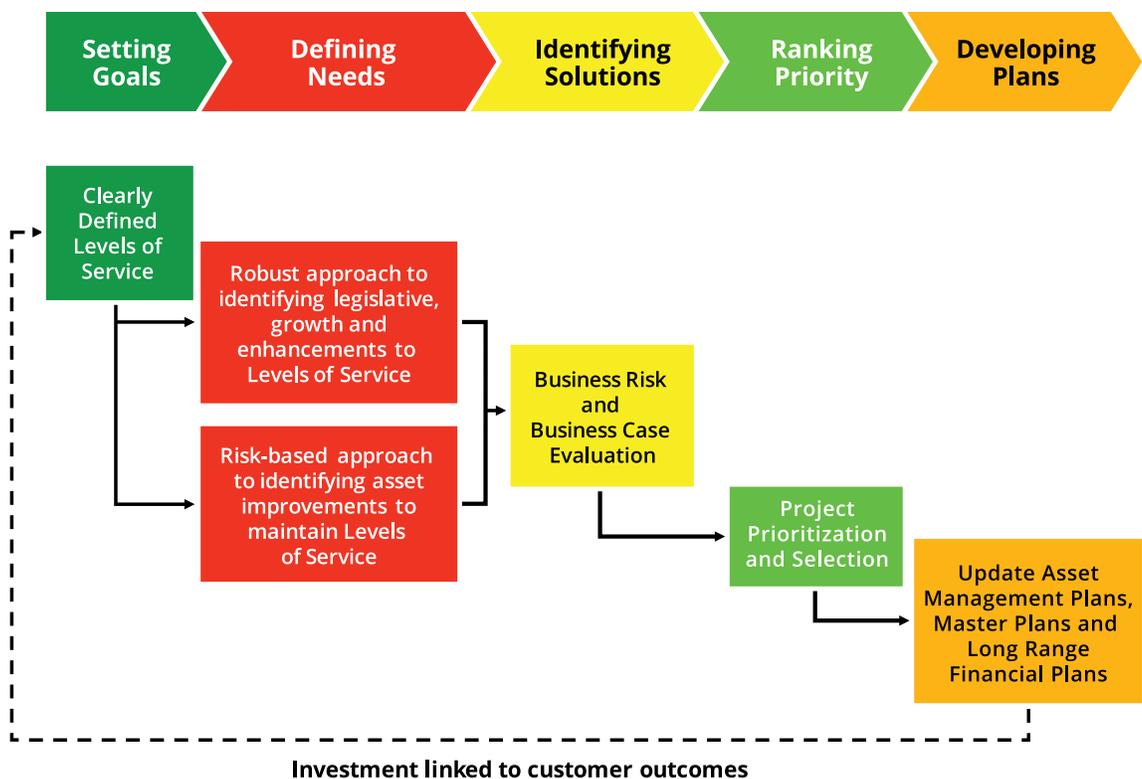
3.0 Levels of Service (LOS)

Assets exist for the purpose of supporting the delivery of the City's services to its customers, both internal and external.

A key objective of Asset Management is to optimize the competing objectives of sustainability, economic prosperity, social diversity, and environmental responsibility, while meeting customer service levels at the lowest life cycle costs.

LOS can be aligned to meet legislated or environmental requirements or to meet the City's service objectives. As shown in Figure 6, having clearly defined LOS forms the basis for defining needs, establishing priorities and identifying investment requirements. Without clearly defined levels of service, there is a risk that investments will not achieve the desired service outcomes.

Figure 6: Linking Investments to Service Outcomes



In 2012, Council adopted an overarching level of service objective to maintain City infrastructure assets in a state of good repair. Associated funding needs were identified in the City Long Range Financial Plan IV, which are further discussed in section 5.

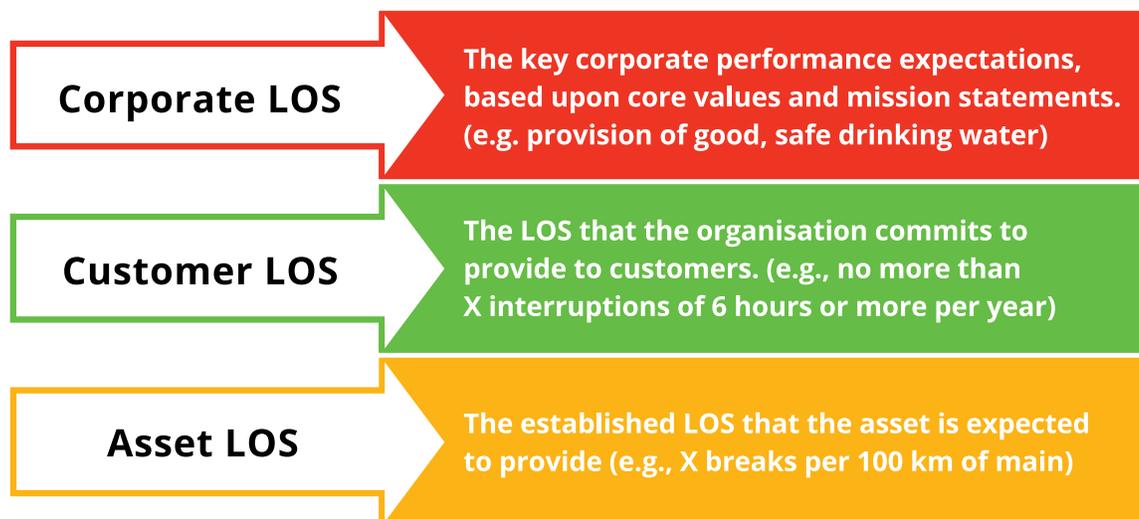
Council approved a 10 Year Housing and Homelessness Plan in 2013 with the priority to ensure City administered affordable housing is maintained in a good state of repair and is well managed.

Through the Comprehensive Asset Management (CAM) assessment undertaken in 2010, thirty-seven different initiatives were itemised to help the City mature its Asset Management practices and processes. These itemised initiatives are the building blocks of the CAM Roadmap that underpins the CAM program at the City. Developing a LOS framework after which LOS can be captured, documented, measured and targeted is one of the initiatives that was identified as a strong requirement to help the CAM program. Given the magnitude of this initiative, the City has thoughtfully approached it and is continually moving forward in advancing it.

3.1 LOS status

LOS can be defined and measured by linking three perspectives for the same service: corporate, customer, and asset. Figure 7 demonstrates the distinction between each perspective for a given service.

Figure 7: Tiered Approach to Document Levels of Service



When establishing LOS, they need to be defined to consider affordability, risk and expectations – both for present and future needs. All of these considerations are examined over the entire life expectancy of the assets required to deliver the service.

3.2 LOS Current Performance

The City is currently in the process of documenting the levels at which services are delivered. Based on the IIMM, the City has started to capture Customer measures (through an internal exercise) using eight core values. These core values are meant to be used as a guide to identify everything that “makes up” a service. The eight identified core values are itemised in Table 8.

Table 8: LOS Core Values

By capturing what customers understand and expect of a given service, the City will be better positioned to determine a clear set of actions to attain or maintain a given level of service.

In identifying the current LOS based on customer perspective, the City can determine, through a cross-referencing exercise, what interventions are required on a specific asset to maintain the target LOS.

CORE VALUES	SAMPLE SERVICE COMPONENTS
Access	<ul style="list-style-type: none"> Sufficient to meet demand Easy to find Adequate parking Barrier free access Easy to get to
Economic	<ul style="list-style-type: none"> Reasonable cost Value for money
Community Involvement	<ul style="list-style-type: none"> Stakeholders involved in planning Neighbours are informed of changes People are consulted and listened to
Customer Service	<ul style="list-style-type: none"> Users are treated in respectful manner Can talk to a human Staff are competent Complaints are resolved quickly and efficiently
Health and Safety	<ul style="list-style-type: none"> Safe to consume Safe to operate or work in the vicinity Purpose built Well lit, acceptable visibility Sufficient and effective enforcement Enough separation of different user
Quality	<ul style="list-style-type: none"> Looks good Feels good Well maintained Fit for purpose Comfortable
Reliability	<ul style="list-style-type: none"> Ready for use when needed Clear rules for all users Fast response No unexpected interruptions
Sustainability	<ul style="list-style-type: none"> Long term plan in place Minimise permanent environmental impact

For example, if the customer perspective identifies that a splash pad should be well maintained, look good and be available for use when needed (items identified through different core values), then the City will be able to identify asset specific criteria like:

- Condition of water jet's piping
- Condition of concrete anti-slip coating
- Water pressure of water jets
- Condition of benches, picnic tables
- Conditions of controls;
- Etc...



As such, linking asset specific measures to the customer perspective measures will help support decision making.

In the absence of this level of rigour, it does not imply that the City does not deliver services to a specified LOS but rather indicates that as part of a more robust AM System, the city is working to formalise and optimise existing processes and procedures. This will improve the documentation supporting the level of interventions undertaken on different assets.

For the most part, the levels at which services are currently delivered to customers and stakeholders is defined through the City's Official Plan, the various Master Plans, legislation, corporate policies, development charges by-law, guidelines, other strategic documents, and available funding.

3.3 LOS trends

As indicated in Section 3.2, there is significant work ongoing at the time of preparing this document to identify current levels at which services are being delivered. Once the current (i.e., baseline) LOS are identified, the City will be in a better position to identify trends.

It should also be noted that the City of Ottawa has some significant initiatives ongoing that will have very important repercussions on customers. The following list is not meant to be an exhaustive list but rather a brief overview of some of the more significant initiatives:

- 2011 – 2012 Council direction to keep the tax supported assets, transit funding supported assets, and water rate funding supported assets in a state of good repair,
- Transformational changes are being implemented at the City with regards to transportation and mobility through Ottawa on the move, the \$2.1 B construction of Phase I of the Confederation Line light rail transit to be in service in 2018. In addition to significant environmental benefits and operational savings, this involves a significant change in Transit assets with longer life cycles which will reduce renewal needs over the long term, and transfer maintenance and renewal responsibilities to the City's private partner RTG.
- A further Phase II of light rail approved in the 2014 Transportation Master Plan which will again have a significant bearing on Transit's asset management plans. Completion of Phase II will increase the rail network nearly 50 kilometers and include 39 stations by 2023. The extensions east, west, and south will leverage existing transit connections bridging the gap to neighbouring communities.
- A dedicated effort consisting of several projects to help improve the quality of the Ottawa River (Ottawa River Action Plan) was initiated in 2009 and continues to positively impact the storm water and surface water management service to the community, including the proposed Combined Sewage Storage Tunnel that will significantly reduce combined sewer overflows to the Ottawa River.
- Flood protection initiatives to reduce the risk of property flooding and sewer backups.
- The Lansdowne Park revitalisation project in the heart of the City to upgrade an aging stadium and associated grounds along the Rideau Canal, registered as a UNESCO World Heritage Site. This revitalisation project, now completed, has and will continue to have a significant impact on a number of City services like culture, mobility, and recreation.
- The Ottawa Art Gallery Expansion and Arts Court Redevelopment Project will fulfill Council's major facilities priority within its Renewed Action Plan for Arts, Heritage and Culture by delivering a new, distinctive, purpose-built facility for the OAG, tripling its current space and providing re-purposed public programming areas of the existing building.



- The Service Ottawa initiative continues to introduce a number of service improvement opportunities that support how residents receive services from the City.



It comes as no surprise that different assets are managed differently. What is more difficult to appreciate is how two similar assets supporting the same service may also be managed differently.

4.0 Asset Management Strategy

Within an organisation, an Asset Management Strategy can be developed either from a system perspective or from a tactical perspective, but both are required to support sound asset management practices.

From a system perspective, the asset management strategy dictates the guiding principles that describe how an organization will adopt an asset management system and incorporate it in its culture. The more detailed strategy expands on the adoption of the asset management system by itemising a series of detailed strategies on how the organization will manage assets.

The CAM Strategy endorsed by Senior Management in 2012 is focused on the system perspective aimed at incorporating an asset management system towards improving services provided to its customers.



The Strategic Asset Management Plan (and more specifically, the service-based asset management plans) is more tactical, linking corporate objectives with day-to-day activities such as inspection, operation, maintenance, repair, and renewal. The more tactical strategies will be part of the individual ServSAMPs.

The Strategic Asset Management Plan provides

an overview of ongoing work to improve existing processes and procedures and improve the transparency and robustness of the decision-making process.

4.1 Objective

The CAM Strategy itemises the following guiding principles, that can be further refined at the tactical level, in the service-based asset management plans:

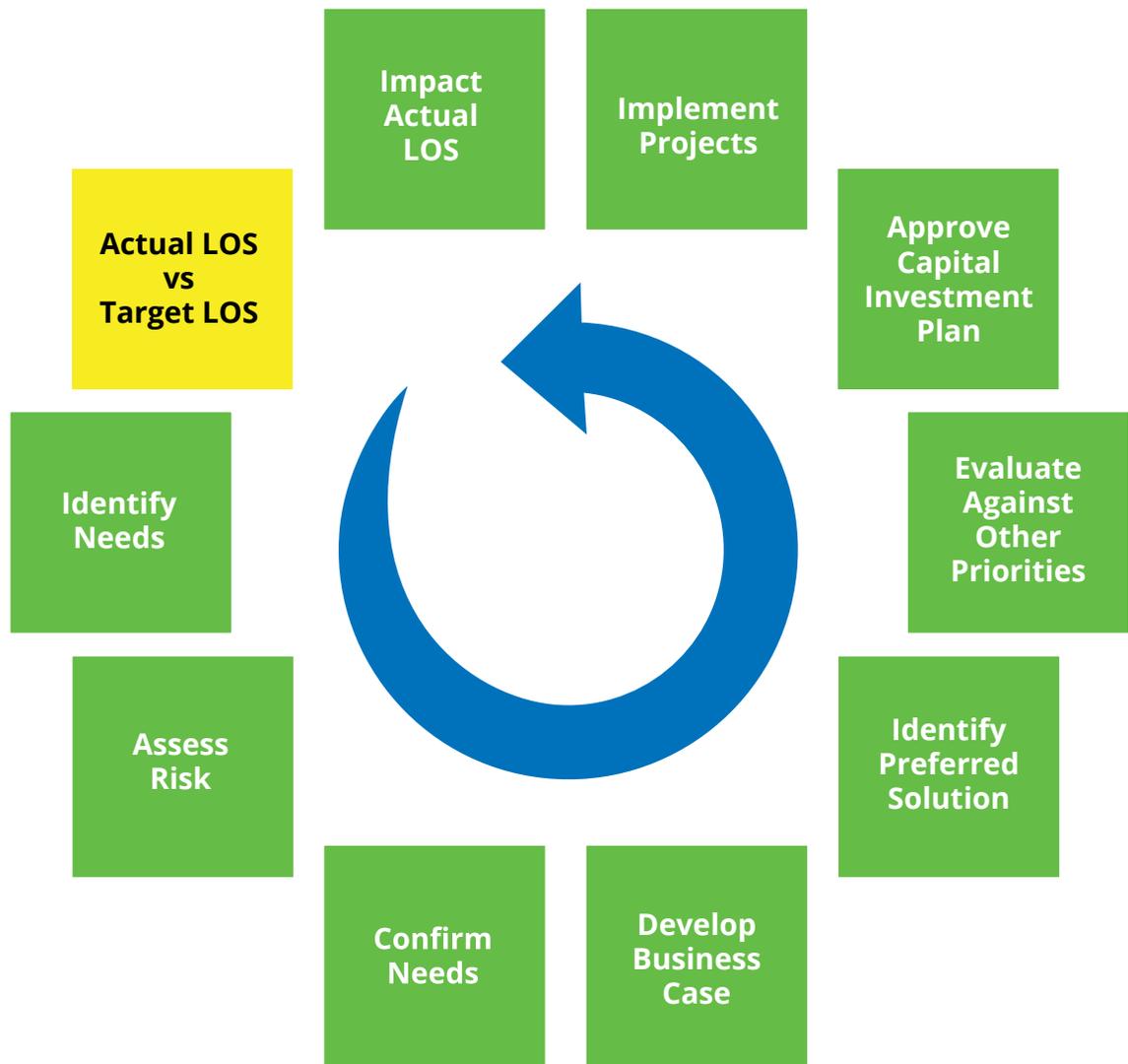
- Developing a **Systematic Approach** to achieve consistency in the application of asset management practices across the organization so everyone is aware of their role and is working towards a common purpose: the delivery of services;
- Establishing **Customer and Asset Levels of Service** so there are reasonable expectations between the service that can be provided, the level that can be afforded and the risk that can be tolerated;

- Using **Criticality and Risk Management** to identify the importance of different assets in supporting the delivery of services, thus providing the ability to take into account the likelihood of asset failure and the associated consequences in terms of impacts on customers and the City's reputation;
- Applying **Asset Life Cycle Planning and Optimization**, notably to long lived assets having service lives lasting several decades, as operating and capital decisions need to be made looking at the lifecycle or whole life of the assets and not simply the initial cost of acquisition;
- Considering **Asset Resiliency** in how assets are planned and built providing an ability to adapt to changing demographics, changing climate, globalization, or evolving technology;
- Seeking **Service Delivery and Funding Opportunities** since how construction services are delivered and the available funding sources have an impact on the quantity and quality of assets being built and acquired;
- Promoting **Resource Management and Development** as many staff have a role to play in the management of the City's assets, be it through planning, finance, engineering, operations and maintenance. The ability to recruit, train and retain staff is an important factor in the management of the City's assets;
- Providing **Asset Reporting** so that asset condition information can be communicated in a meaningful manner reflecting the intended target audience in order to facilitate the ability to make sound investment decisions;
- Having complete and accurate **Asset Data** that provides the ability to support investment decisions and improve monitoring of performance against established levels of service;
- Leveraging and integrating **Technology** by enabling people to perform their tasks in an efficient manner;
- Fostering **Continual Improvement and Innovation** in the management of the City's assets to continue to support the delivery of services to customers; and
- Reporting on **Asset Management Performance Measurement** to confirm that the organization is delivering on its commitments.

Based on these principles, the CAM program is working to implement a more rigorous process to increase the transparency and the consistency of decision making to maintain the assets that support the services delivered by the City. One example of this is depicted in Figure 8 which shows a schematic of the capital investment prioritisation process that is currently being developed for implementation.



Figure 8: Capital Investment Prioritisation Process



The Capital Investment Prioritisation process reinforces the importance of having properly defined, current and desired LOS since the disparity between those will drive future work.

4.2 Strategic Approach to Needs and Programming

In the context of managing the City's assets, the need to focus on taking on only the new infrastructure needed to support smart growth and disposing of existing assets if these can no longer be rationalized, is considered equally important as setting proper funding levels.

Infrastructure expansion needs to be limited as much as possible because every new asset that is added increases the funding challenges related to managing existing assets due to the costs associated with operating, maintaining, rehabilitating and eventually replacing or disposing all new assets.

Even for assets “donated” as part of new development or paid for with development fees, there are ongoing life cycle costs to the City. In short, every time the City assumes ownership of new infrastructure assets, the financial burden of maintaining existing assets increases.

With the adoption of the CAM Strategy, Senior Management agreed to incorporate a “whole of life” costing approach in its decision making processes. To further support this approach, Committee and Council reports include an Asset Management Implications section to increase the awareness of long term implications resulting from investment or asset related decisions.

4.3 Asset Life Cycle Management Strategy

It comes as no surprise that different assets are managed differently. What is more difficult to appreciate is how two similar assets supporting the same service may also be managed differently.



A different strategy may be the result of an identified risk to the service, varying operating conditions, or simply where the asset lies in its expected life cycle. Typically, when an asset is still relatively new or freshly renewed, the interventions consist of monitoring and minor maintenance. Then as it ages and routine maintenance can no longer ensure the provision of the intended service, the types of interventions may

migrate towards more significant maintenance, repairs or even replacement.

The City has an integrated planning framework that is complemented by the CAM framework (see Figure 2), which provides the vehicle to connect corporate level strategic documents and initiatives with tactical and operational AM practices. This ensures awareness and application of good AM practice at all stages of an asset’s life cycle from acquisition to decommission.

4.3.1 Operational & Maintenance Strategies

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

- **Operations:** Activities designed to ensure that assets are used to their full intended potential (e.g., programming of swimming courses with staff reporting asset deficiencies; or on-going water quality testing and flushing of hydrants with staff reporting issues or deficiencies).

- **Maintenance:** Maintenance activities are designed to enable existing assets to operate to their intended service potential over their useful life. (e.g., replacing the water filtration system in a recreation complex to enable programming and making use of indoor pools; or lubricating pumps or replacing motorized parts in the treatment plant to enable the production of potable water). There are two types of maintenance:
 - **Unplanned Maintenance:** Work carried out in response to reported problems (e.g. a reduced performance).
 - **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.

For example, in 2008, Ottawa Community Housing (OCH) completed Building Condition Assessments (BCAs) which identified an estimated \$211.4 million

immediate need in capital repairs. OCH has been a proactive leader in the province in addressing their capital funding shortfall through the creation of their Long Range Financial Strategy (Dec 2013). This report outlined that the 2008 backlog had been reduced to \$145.8 million by 2013 due to operational improvements, on-going annual capital funding provided by the City, capital grants provided by the City, and significant capital grant funding from the provincial and federal governments between 2007 and 2013.

The overall operations and maintenance strategy is intended to maintain the current levels of service and mitigate risk while minimizing cost. Throughout the City, there are varying levels of proactive and reactive maintenance, but this is a target area identified for improvement and will form part of the improvement program in the next version of this SAMP. The CAM Roadmap referenced earlier identifies several initiatives that support the refinement of activities, processes and procedures related to operations and maintenance.

4.3.2 Asset Management Decision Making

Decision making, either within or across service areas, is currently based on a range of approaches founded on the available asset data such as condition and performance assessment information and is supplemented with expert knowledge from City staff and outside agencies.

Part of the planning process involves understanding how investment decisions are linked to the service outcomes. For large value or complex projects, the City has used more advanced approaches with regard to the selection of the appropriate alternatives and solutions.



For example, on complex or sensitive projects that meet certain criteria, the City proceeds with Value Engineering review sessions. These sessions are designed to review the original problem and assess through a detailed process whether the proposed solution is the most satisfactory solution (both for residents and the City) or if changes are required to better address the identified issue.

The decision making process for these larger value projects includes evaluating a broad

range of capital solutions, such as renewal, rehabilitation and replacement options in addition to operational solutions such as enhanced maintenance regimes.

Moving forward, as part of the CAM 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) and Multi Criteria Analysis (MCA), known as the Project Value Assessment (PVA) process consisting of the component 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 Net Present Value (CBA-NPV):** CBA involves identifying the financial impacts of various alternatives within a business case. This includes costing capital and operational activities over the entire analysis period, discounting these to determine their respective present value, with the ultimate goal of assessing which alternative represents the greatest value to the City.
- **Multi-Criteria Analysis (MCA):** The MCA approach typically uses a set of benefit criteria which reflect the strategic objectives of the City. This approach provides an objective guide to help determine which combination of capital projects represent the best overall value based on the level of benefits they provide to the community and other stakeholders.

Through the 2016 budget development process, the City piloted the Project Value Assessment process developed over the last year. The Capital Project Value Assessment exercise consists of evaluating projects through the Cost-Benefit and Multi-Criteria analyses.

The criteria against which projects are assessed are as follows:

Health and Safety	The extent through which a project will reduce the risk of someone (public or staff) being harmed.
Legislative:	The level of effort and timeframe required to comply with a regulatory and/or legislative requirement.
Service:	The extent to which the project sustains City services by maintaining existing assets or through the provision of new assets.
Social:	The extent to which the project preserves or contributes to the visual, recreational, cultural and heritage appeal of the City.
Financial:	The ability to reduce long term costs to the City (i.e. lifecycle costs have been considered).
Environment:	The level to which natural systems are improved or the level to which a negative environmental footprint is reduced.

4.3.2.1 Intervention Strategies

Capital investment decision-making involves both understanding the asset life cycle costs and risks and also determining the best point at which to repair, renew, replace or retire the asset. It also means understanding that in some cases there might be a benefit in proceeding with an intervention to an asset through coordinated works. Life cycle cost analysis is typically used to determine the intervention(s) that represent the lowest life cycle costs.

The following figures are intended to summarize example intervention strategies that are generally appropriate depending on the stage of deterioration, for some key assets based on their condition. The actual selection of the renewal strategy is determined through the analysis of renewal options in order to come up with the preferred intervention.

Figure 9: Intervention Type and Relative Cost Over the Life of a Road

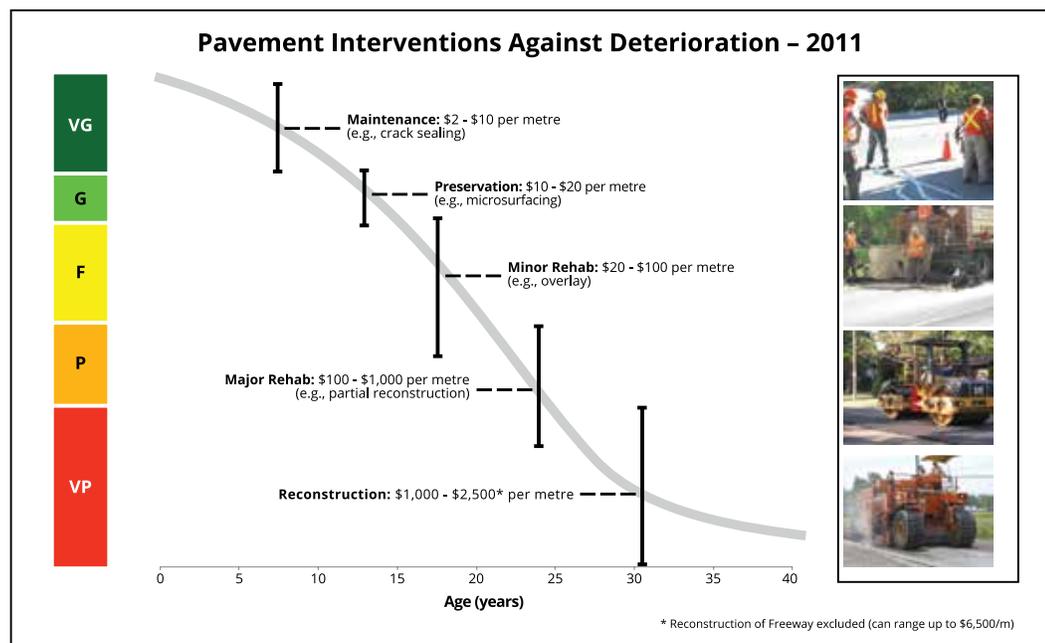


Figure 10: Intervention Type and Relative Cost Over the Life of a Bridge

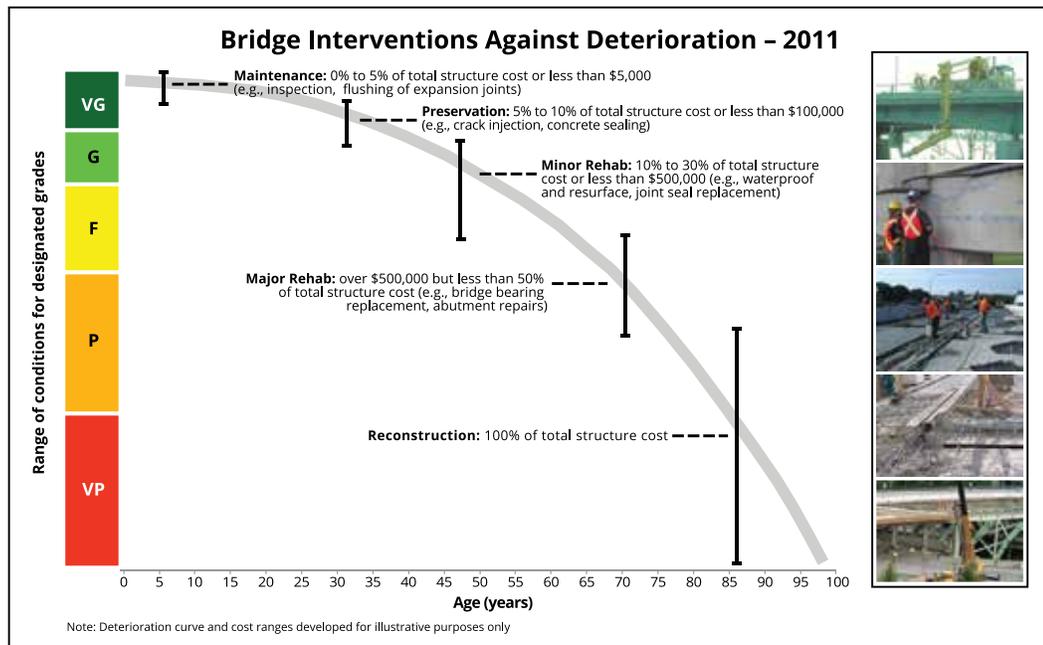


Figure 11: Intervention Type and Relative Cost Over the Life of a Building

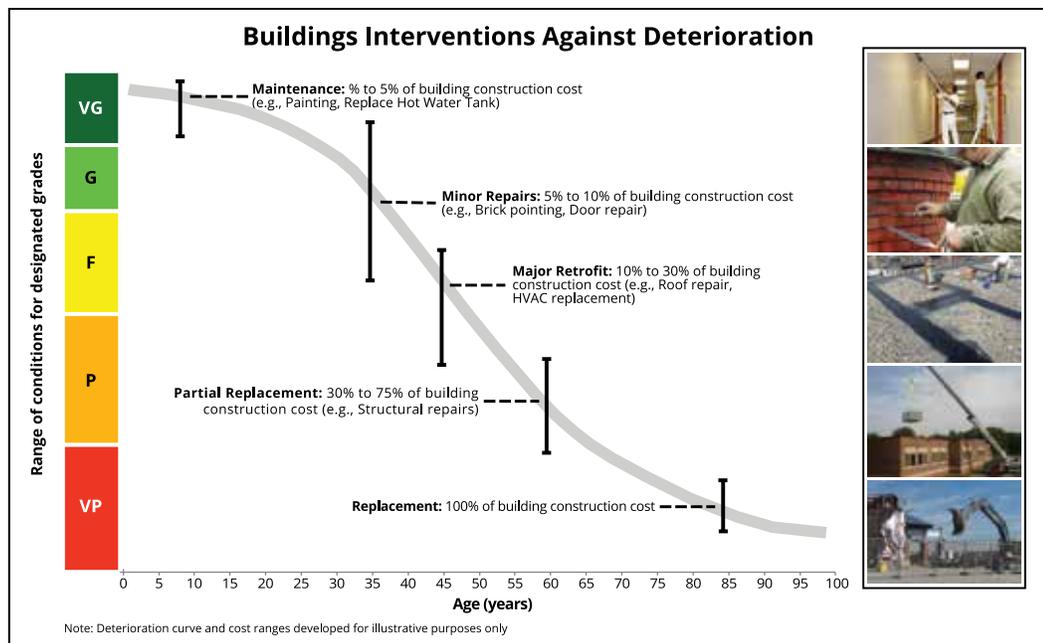


Figure 12: Intervention Type and Relative Cost Over the Life of a Culvert

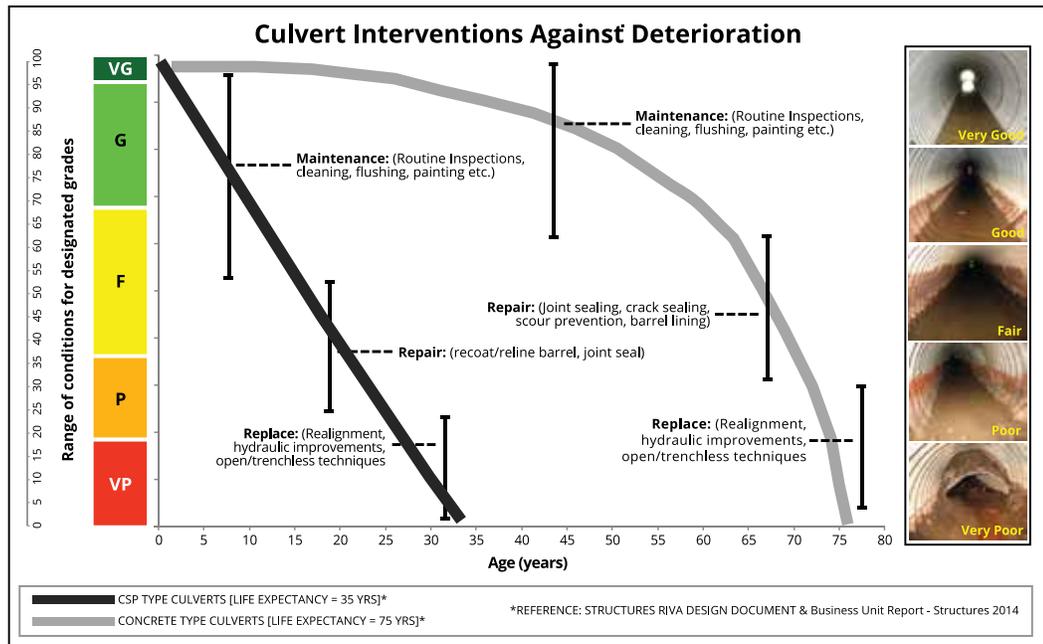


Figure 13: Intervention Type and Relative Cost Over the Life of a Storm Sewer

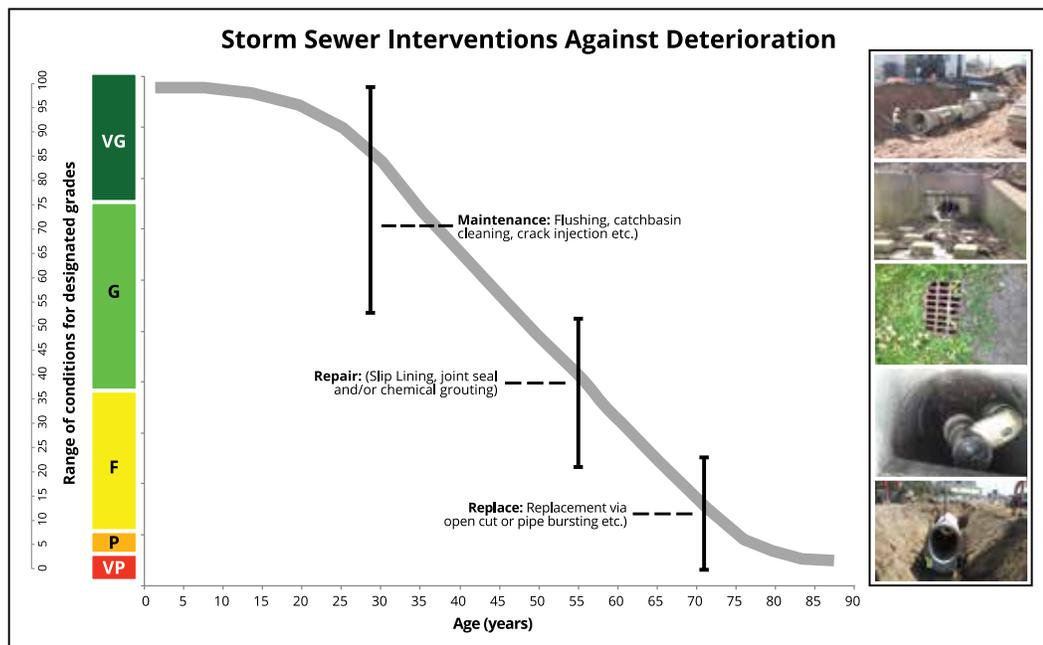


Figure 14: Intervention Type and Relative Cost Over the Life of a Sanitary Sewer

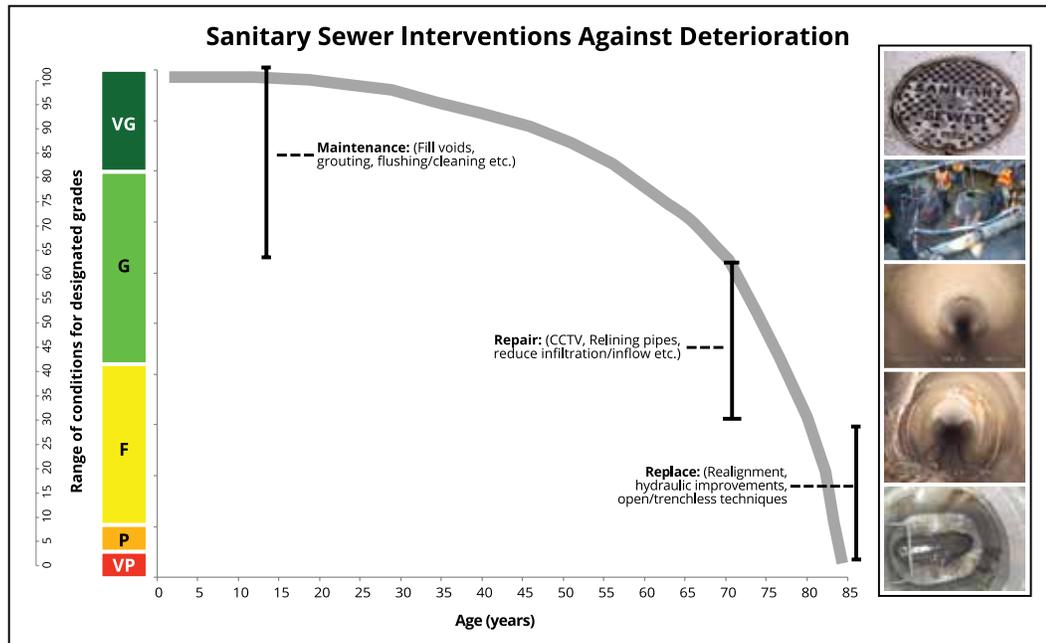
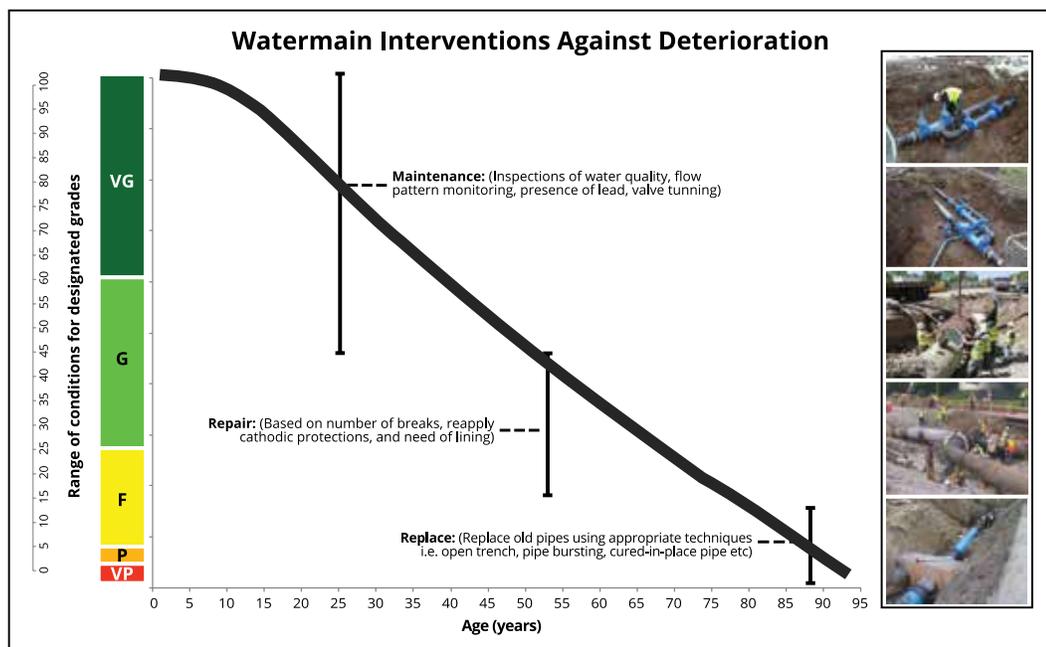


Figure 15: Intervention Type and Relative Cost Over the Life of a Watermain



4.3.2.2 Life Cycle Cost and Value Optimisation

The previous section demonstrated that at any point within the life of an asset, different interventions may be used to maintain or rehabilitate an asset to ensure the service is provided. It is also important to base decision on the entire life of the asset and not only based on where that asset is in its life cycle.

Decisions need to consider the entire life cycle of the proposed asset and all related costs and expenditures. They need to consider the ability of the taxpayer and the ratepayer to pay the cost for the desired level of service, along with the social and environmental impacts. These considerations need to inform asset planning, design, tender specifications, construction materials selection and techniques, operating models, and disposal procedures.

Life Cycle Cost (LCC) and Value Optimisation (VO) refer to the total cost of ownership over the life of an asset. Typical areas of expenditure which are included in calculating the life cycle cost include, planning, design, acquisition, construction, operations, maintenance, renewal and rehabilitation, and replacement or disposal along with all associated costs of financing.

4.3.2.3 Options Analysis

Two approaches can be considered when assessing which investment decisions provide most value:

- Net Present Value (NPV): can be applied when comparing renewal options to see which one yields the lowest cost in terms of present value. The NPV should be applied when considering different pieces of equipment or when comparing renewal strategies.
- Return on Investment (ROI): can be applied to determine the operational benefits in relation to the capital investment requirement.

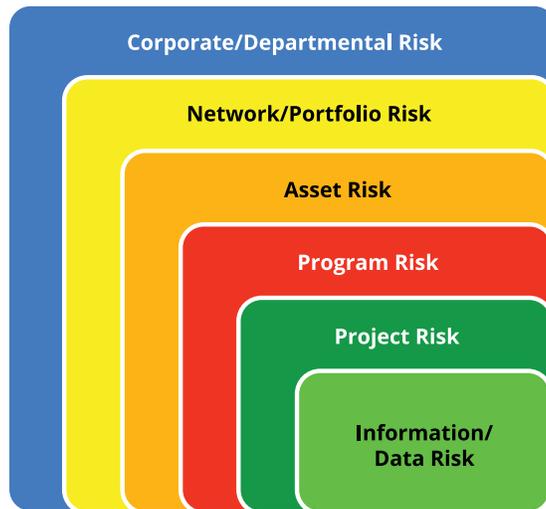
With the adoption of a Project Management Policy in 2014, the City is actively working at incorporating these concepts within the framework of documented business cases for projects and programs.

4.3.3 Ageing Assets Strategy

To maintain levels of service over time and to remain sustainable, not all assets should or can be replaced before reaching the end of their expected service life. In some cases, where an asset is identified as critical to the delivery of a service, it may not reach the end of its expected service life because of a proactive decision to replace it before it deteriorates to a point where failure could be imminent and the consequences significant.

In line with the City's risk framework (Figure 16), a number of asset types have been subject to risk assessments at the network/portfolio level over the last three years, and an important number of assets are undergoing a similar assessment. By the time the ongoing assessments are complete; most assets types will have network level risk related values available for decision-support.

Figure 16: Risk Framework



The risk framework demonstrates that different risks exist at different levels and accordingly, different factors contribute to evaluating those risks. Through the risk assessment process, individual assets are evaluated and as an outcome of the evaluation, these assets are assigned criticality values that provide asset managers a relative importance to each asset as compared to similar assets.

Based on these values, the asset management strategy is potentially very different for the critical assets compared to the non-critical assets. An example of this is the inspection frequency of roadways in City. The freeway and important arterials are subject to a detailed inspection with automated condition data collection on a three-year cycle compared to a five-year cycle for other roads in the network. The Transitway (dedicated bus lanes) are on a two-year cycle to ensure service levels are maintained.

By taking a network/portfolio level assessment approach, it allows to better define the magnitude of asset to be renewed annually while the asset level perspective will define the specific intervention for the asset to be renewed.

4.3.4 Non-Infrastructure Solutions

The City currently adopts a range of non-infrastructure solutions across its service areas. Non-infrastructure solutions include:

- Customer oriented 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 oriented 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).

- Planning initiatives such as Building Better and Smarter Suburbs and the Infrastructure Standards Review
- Enhancements to existing project management and delivery practices

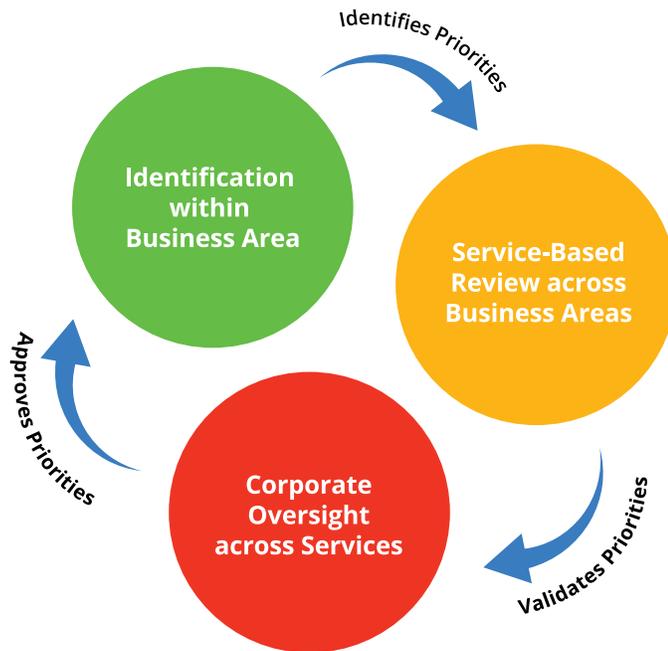


4.3.5 Capital Investment Planning

The City currently identifies future requirements through different means. Projects or needs are typically identified through inspections, as part of a maintenance or operational routine, network level numerical modeling, physical deterioration modeling, through client driven needs, or other strategic initiatives.

The overall capital investment planning process (Figure 17) is structured to develop capital investment plans from a service perspective as opposed to departmental budget allocations. This includes asset assessment; planning; procuring; implementing and commissioning (or bringing into operation) with the focus on delivering the right project, with the right intervention, on the right asset, at the right time.

Figure 17: Capital Investment Planning Process



The aim is that over time all business areas across the City will follow this process to develop a risk-based and service-focused capital investment plan.

Moving forward, this will provide a more consistent approach that will not only enable a more robust prioritisation approach within the business areas, but will also facilitates informed discussions on risks and funding priorities across services. The intent is to target the application of this approach on a more structured manner to support the development of the 2017 annual capital budget.

4.3.6 Condition Assessment Programs

Condition assessments can involve different forms of evaluations such as professional opinion, invasive testing, 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 is a less expensive approach when applied to thousands of assets, yet still provides a sound overview of the City's assets. This approach also allows to narrow the need for detailed assessments or follow-up inspections on those assets identified in a poor or very poor condition, or those assets that have a higher criticality for which a higher level of confidence on the data is required.

In some cases, there are regulated requirements to conduct details condition assessments, such as:

- The inspection of road and pedestrian bridges is subject to Ontario Regulation 104/97 and the Ontario Structures Inspection Manual (OSIM).
- The inspection of railway bridges is subject to Section 11 of the Railway Act.
- The inspection of play structures is subject to CAN/CSA Z614-07.



In some cases, there are areas where condition assessment is not legislated, such as roads but there are “duty of care” requirements such as the Municipal Act that states that “the municipality that has jurisdiction over a highway or bridge shall keep it in a state of repair that is reasonable in the circumstances, including the character and location of the highway or bridge”. The City’s Public Works

Department have developed Maintenance Quality Standards for Roads and these were originally approved by Council in 2003.

Similarly, for sidewalks the municipality is required to complete a visual inspection once per calendar year.

There are no legislative or regulations to guide condition assessment requirements of water and sewer mains but the City has developed practices that it continues to refine. As a rule of thumb, each individual sewer is inspected with closed-circuit television (CCTV) equipment on an approximate 15 year cycle. The yearly assessment of some of the critical water transmission mains in the network is prioritized by staff based on risk and uses evolving technologies such as electromagnetic devices.

As well, buildings are not subject to legislated inspections but different condition audits are typically performed on a 5 to 10 year cycle depending on the facility and its previous condition. It should also be noted that unlike buried pipes, buildings and facilities frequently have operational staff visit or conduct daily work within them and can report issues before a scheduled condition inspection.

4.3.7 Shutdowns, Outage Strategy and Optimisation

Renewal projects have the potential to impact the services being delivered. As part of the capital planning process defining the scope and timing of renewal projects, the City assesses the impacts on the services being delivered and explores opportunities to reduce these impacts. These impact assessments include mobility and traffic, water distribution, wastewater/waste collection as well as impacts to programming and provision of social, cultural and health services.

4.3.7.1 Mobility Impacts

In general, the mobility impacts of a construction project can be mitigated through the development of Traffic Management Plans and provisions with the construction sites. However, the challenge becomes significant when multiple projects compete for the same alternate route corridors.



To manage the mobility impacts from the various construction projects, a Capital Construction Coordination (CCC) Committee was established in 2012 with representatives from across the organisation to oversee traffic and service impacts from the overall planned capital program. External agencies such as the Ministry of Transportation of Ontario, Public Works

and Governmental Services, the National Capital Commission and local utilities are also part of the discussions.

Through the CCC, a request can be made to amend the scope and/or timing of certain projects in order to reduce impacts to manageable levels.

4.3.7.2 Water and Sewer Service Impacts

As with mobility, competing construction projects can also impact the provision of drinking water and wastewater services. When planning water and sewer renewal projects, it is important to understand the impacts these works may have on maintaining services at an acceptable level of risk. This is particularly important for projects that could impact large watermains and collector sewers.

These planned renewal events are coordinated with various Departments to ensure that the impacts are assessed before confirming the scope and timing of the renewal projects. Broader level coordination also takes place as part of the CCC meetings.

4.3.7.3 Facility Shutdowns

During the planning of renewal activities on City facilities, consideration is given to how those activities may potentially impact on service delivery. This is more common for facilities that are used for programming of services, such as a recreational facility, a library, or social services and emergency services. These planned renewal events are therefore coordinated with the client departments to ensure that the programming impacts can be assessed before confirming the scope and timing of the renewal events.

Strategies to mitigate those service impacts include:

- Adjusting the scope of the intended work to include other planned renewal events that are anticipated in a 5-year period in order to avoid multiple facility shutdowns – subject to available funding.
- Phasing planned renewal events such that multiple facilities offering similar services are not impacted at the same time.
- Taking advantage of planned annual maintenance facility shutdowns as these are typically accounted for in the programming of the facilities.

The intent in all cases is to develop a Facility Shutdown Schedule identifying all projects requiring programming changes and having it reviewed and endorsed by the affected client departments.

4.3.7.4 Impacts to Other Services

Some planned construction projects also have indirect impacts on other services. In many cases, the City proactively communicates with local Business Improvement Areas (BIA) or ward councillors to inform local businesses and residents of upcoming service impacts and identify mitigation measures. For some significant projects, the City holds public consultation sessions to ensure that all potentially important impacts are identified and mitigated.

Recently, the City released a tool called GeoOttawa for staff across the corporation to access general asset inventory information. It is an interactive web mapping application that is an internal resource to easily search and display geo-reference and general property-related information throughout the city. It includes such features as a large number of available theme layers (e.g. road information, cycling pathways, community and social services' centres, etc.), aerial photography, Google Street View, and property and park inventory information.

Through this portal, asset data owners and stewards maintain updated, high quality information available and push it to this corporate tool for consumption by others. This enables staff to make use of detailed information without having to worry about duplication, accuracy or storage. Just recently, this platform has been improved to include all forecasted projects to facilitate discussions and evaluate other potential impacts.

4.4 Demand Analysis

The City of Ottawa has a projected growth rate that is expected to increase over the next decade. Even if the rate of growth is not as significant as projected, there will still be an increase in demand for services and an increase in demand for service delivery efficiency.

Like all other major Canadian cities, Ottawa experiences population movement within its boundaries and is also affected by the ever-changing age and social demographic. With a trending towards an older demographic makeup, and population shifts within its boundary, the City continues to need both new infrastructure and more significant maintenance and renewal of existing infrastructure to continue to meet demand.

4.4.1 Asset Rationalisation and Disposal



Given the dynamic environment in which the City operates (i.e., population shifts, changing demographics, evolving health, cultural and recreational programs, etc.), the City has a process in place to evaluate opportunities before decommissioning, retiring or removing assets.

For example, once a city building or facility is identified by a client group as surplus to that group, the property details are

circulated internally to solicit any interest. All submissions with reasonable “Change of Use” opportunities are investigated and a preferred recommendation for a “Property Solution” is established. If the recommended property solution is to retire the building, then a plan is established to move impacted programs or services to a new location.

4.5 Procurement Methodologies

Purchasing authority and practices are outlined in the City's Purchasing By-law, which aims to achieve the best value for money for the City and to establish a competitive process that is open, transparent and fair to all suppliers.

Given the financial value of infrastructure asset acquisitions, procurement requires a competitive bid process involving solicitation documents posted publicly on MERX and/or Ottawa Construction Association (OCA). This may be in the form of a Request for Proposal (RFP) where bidders are asked to propose a solution to solve a problem or meet a requirement. Submissions are then evaluated based on consensus of scores assigned to pre-established weighted criteria which consider the effectiveness of the total proposed solution and bid pricing. In the case of high-profile, high-value projects a two-stage procurement process consisting of a Request for Pre-Qualification (RFQ) and Request for Proposal (RFP) is administered by the City's Supply Branch. An independent Fairness Commissioner will be engaged to monitor and report on the fairness of the competitive procurement process. Additionally, the City's guidelines on accessibility and sustainability related to purchasing decisions must be consulted and considered.

The City has also used a public-private partnership (P3) approach as an alternative means of procuring and financing City projects for infrastructure and or service requirements. A P3 procurement approach must be considered where the City is seeking senior government funding for projects in excess of \$100M. In such cases, the private sector participant assumes the responsibility for financing part or all of the project; the City transfers risks that it would normally assume, based on the private sector participant's ability to better manage those risks; the arrangement extends beyond the initial capital construction of the project (i.e. a concession period for operations and/or maintenance ensues). The Public Private Partnership Policy provides additional information related to the process.

4.6 Risks to the Asset Management Strategy

The City has in place a number of practices and processes to identify, quantify, and mitigate risk and also to elevate opportunities. In assessing and managing risk, the City considers risks at different levels and in varying degrees of details, as demonstrated through the risk framework (Figure 16).

As the City moves forward and generates Service Strategic Asset Management Plans (as detailed previously), the asset management strategy will be in constant evolution. The bottom-up approach that will support the development of the Service Strategic Asset Management Plans will enable operational risks to be elevated to tactical and strategic levels whereas ongoing top-down exercises will continue to guide day-to-day activities.

One of the ongoing initiatives supporting the top-down dissemination of potential service delivery threats is the annual corporate risk assessment exercise. This exercise consists of generating a corporate risk register that is fed by individual departments.

Another example of making use of internal communications to identify and mitigate potential risks are the dedicated sections in all reports to Committee and Council to raise awareness of any potential "Risk Implications" and "Asset Management Implications".

A black and white photograph of a large, modern, circular council chamber. The room features a curved desk with several laptops and microphones. A large screen is visible in the background. The ceiling is high and curved, with a large circular light fixture. A green circular graphic is overlaid on the right side of the image, containing text.

The introduction of tangible capital assets to the financial statements in 2009 has provided the public with a greater appreciation of the magnitude of the stewardship responsibility that Council and management are entrusted with.

5.0 Financing Strategy

The City has made significant efforts to integrate financial planning with asset management planning.

This step is necessary for all municipalities given the significant value and dependency on assets to deliver city services, as well as the increasing maturity of long life assets. With the introduction of tangible capital assets to the financial statements in 2009, the public now gains a greater sense of the degree of the stewardship responsibility that Council and management are entrusted with.

The Fiscal Framework was established in 2007 to serve as the City's high-level roadmap to sustainable finances. It not only shapes financial decisions by setting parameters that define what is affordable for the City, it provides a means of measuring the City's financial condition.

Important guiding principles for asset management are also stated within the Fiscal Framework:

- Capital assets are maintained and/or replaced using models of best economy.
- An objective and transparent asset management framework is used to evaluate asset condition and the corresponding need and priority for maintenance or replacement.
- In years where an asset maintenance gap exists, spending priority is to be given to assets that impact public health, safety and core city operations, and where long-term financial returns are highest.
- Capital assets that the City does not require to meet its current or future program or operational requirements are disposed.

A number of Council-approved plans guided by the Fiscal Framework identify the capital investment required to maintain the City's assets in a state of good repair and the financing strategies for meeting this target.

Plans such as the Long Range Financial Plan IV (LRFP-IV) approved by Council in 2012 – as well as the 2013 updates to the City's Transportation Master Plan, Ottawa Pedestrian Plan and Ottawa Cycling Plan, and the Infrastructure Master Plan – have all given consideration to the affordability of maintaining and growing the City's physical assets.

The Fiscal Framework will be updated by the City within the near future.

5.1 Funding Sources

There are several funding sources for renewal of assets, they include the following:

ASSET CATEGORIES	FUNDING SOURCES
Roads, Bridges, Structures, Parks, Fleet, IT, Other	General Tax Revenues, Rate Revenues for reinstatement of the roads in relation to the Integrated Program
Water, Sewer (pipes, treatment facilities, etc)	Rate revenues
Transit (vehicles, facilities, equipment)	Transit tax levy, federal and provincial gas tax allocations

The LRFP-IV identified a significant increase in the capital needs in comparison to the former LRFP-III of 2007 which influenced the Fiscal Framework. The increase was a result of a variety of factors. Such as new provincial legislation, term of Council initiatives like the Ottawa River Action Plan and Ottawa on the Move, ongoing condition assessments and risk mitigation work which identified additional requirements. As a result, a new financing strategy and timeline were required.

Two LRFP-IV reports were approved by Council in 2012. One report was for tax-supported capital works. The other dealt with water and sewer rate supported programs. Together they provide the strategy changes required for the funding investment to maintain City assets in a state of good repair.

These two reports also address the funding target recommended in the Comprehensive Asset Management (CAM) Program report by speaking to such issues as:

- the “funding gap” between what is budgeted and what is required for the long term stability of the current infrastructure;
- limitations on the use of debt for capital works;
- increasing annual contributions for capital projects; setting contribution levels to the City of Ottawa Endowment Fund and capital projects classified as strategic initiatives;
- directing any future federal or provincial infrastructure funding toward existing asset renewal and transit-related projects included in the Transportation Master Plan.

The LRFP-IV for Tax Supported Programs also detailed a funding strategy for achieving the CAM report recommended investment target for transportation infrastructure, buildings and parks that will allow assets to be maintained in a state of good repair and to address the significant annual gap in funding on the renewal of these assets. The approved funding strategy to address this gap included:

- funding levels in existing capital budget forecasts be maintained;
- additional funding commitment from within Council's tax target, added to support capital asset renewal for existing assets and growth within the asset base;
- additional incremental funding for the renewal program by reallocating funding that was allocated to the capital envelope for strategic initiatives;
- permanent annual funding to be secured from other sources such as senior governments through their Infrastructure Funding plans.

The LRFP-IV for Water and Sewer Rate Supported Programs approved by Council in 2012, included a ten year spending and debt issue plan that allowed for an increase in the maintenance of related assets. Revenue increases from water rates and sewer surcharge rates to support the plan peaked in 2013 and 2014, but were identified to level off at a slightly lower percentage by 2017 and for every year thereafter. The limit on debt was increased relative to the annual water and wastewater budget. At the same time reserve balances were increased to ensure on-year-of-debt servicing is maintained as a balance.

5.2 Expenditure Forecast

There is a ten year asset renewal plan for the City of Ottawa based on the investment strategy approved by Council in the Long Range Financial Plans. Each year, capital budgets are developed to ensure alignment with this overall strategy. The LRFP-IV established a ten year plan starting in 2012 to 2022.

LRFP-V is planned for the first quarter of 2017. This revised plan will reforecast the asset plan for the years 2017 to 2027. Any changes to the current investment requirements and funding

strategies based on this revised LRFP will be reflected in the City's Strategic Asset Management Plan.

Strategic Asset Management Plan 2017

