THE ASSET MANAGEMENT PLAN FOR THE TOWNSHIP SOUTH-WEST OXFORD

2013

THE TOWNSHIP OF SOUTH-WEST OXFORD
312915 DEREHAM LINE
MT. ELGIN, ONTARIO, CANADA
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SUBMITTED AUGUST 2013
BY PUBLIC SECTOR DIGEST
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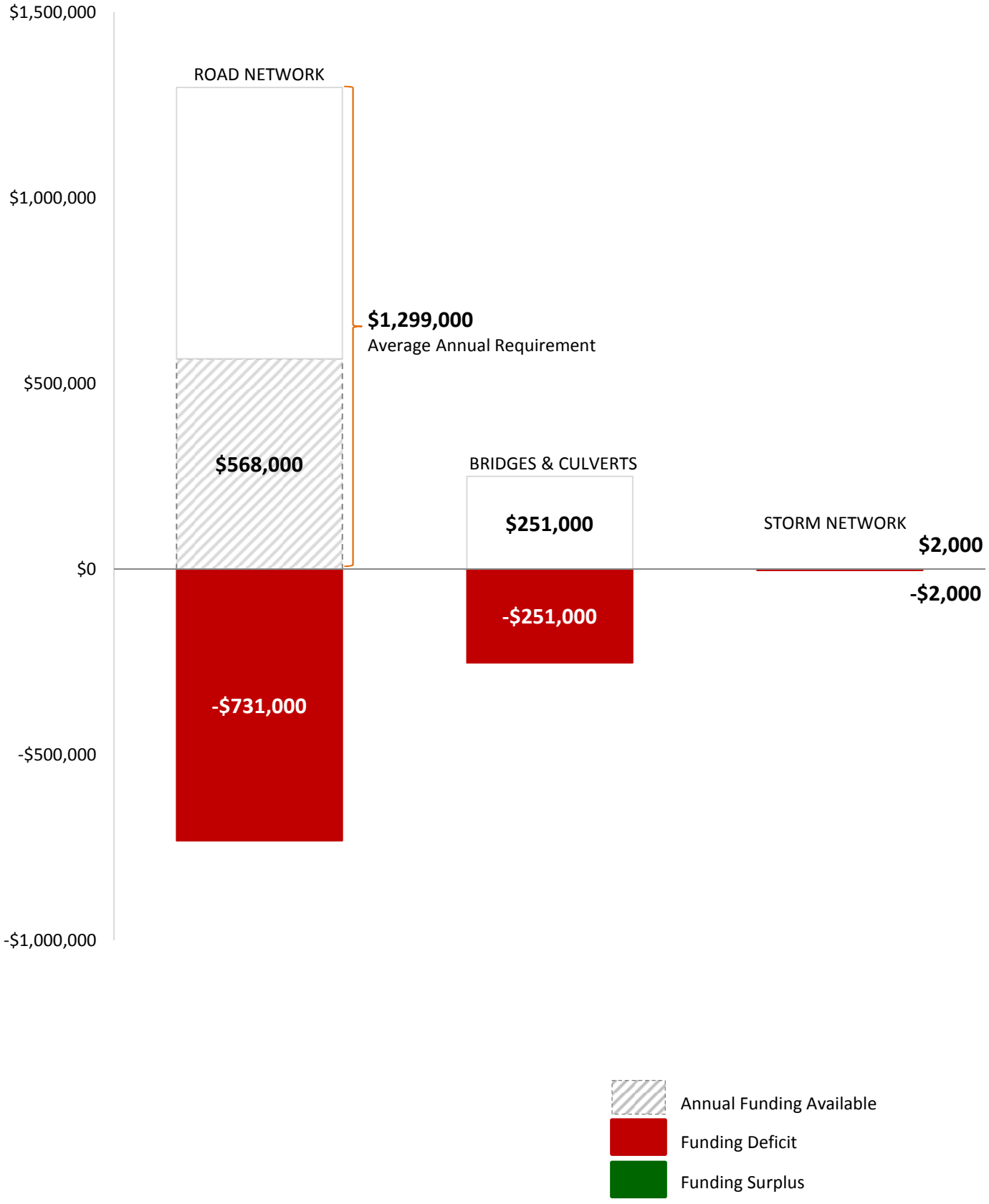
State of the Infrastructure

Township of South-West Oxford



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August 26, 2013

Township of South-West Oxford
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Attention: Diane Larder, Treasurer

We are pleased to submit the 2013 Asset Management Plan (AMP) for the Township of South-West Oxford. This AMP complies with the requirements as outlined within the provincial *Building Together Guide for Municipal Asset Management Plans.* It will serve as a strategic, tactical, and financial document, ensuring the management of the municipal infrastructure follows sound asset management practices and principles, while optimizing available resources and establishing desired levels of service.

The performance of a community's infrastructure provides the foundation for its economic development, competitiveness, prosperity, reputation, and the overall quality of life for its residents. As such, we are appreciative of the Township's decision to entrust us with the strategic direction of its infrastructure and asset management planning, and are confident that this AMP will serve as a valuable tool.

Sincerely,
The Public Sector Digest Inc.

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Table *of* Contents

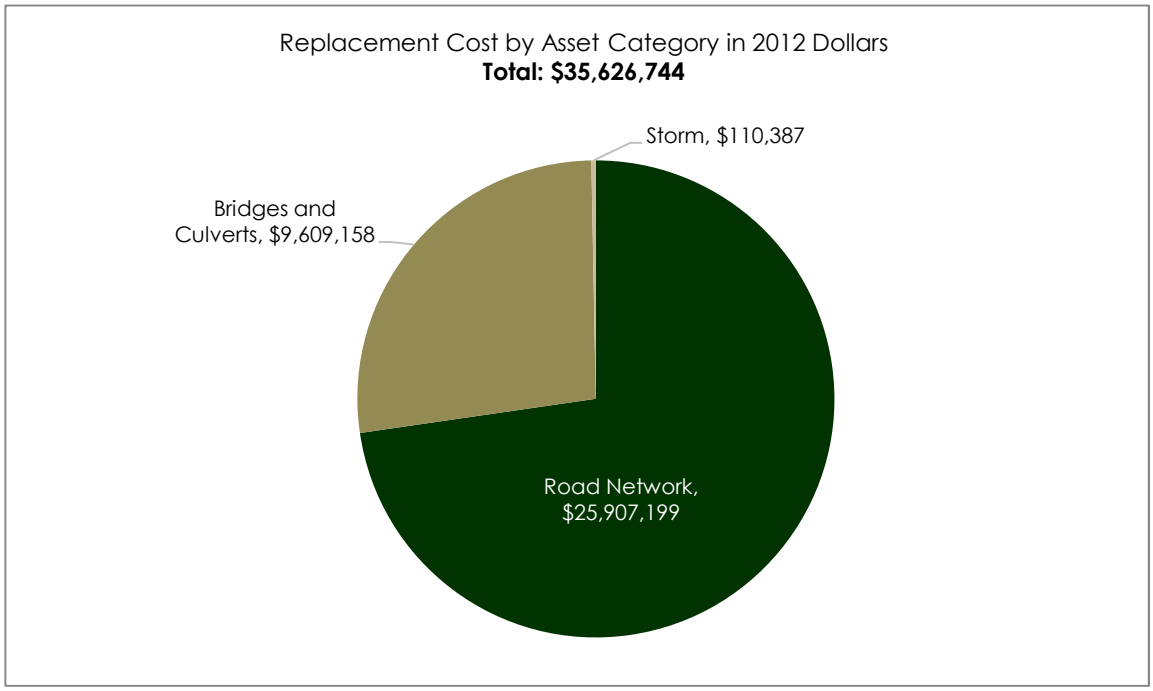
1.0 Executive Summary

The performance of a community's infrastructure provides the foundation for its economic development, competitiveness, prosperity, reputation, and the overall quality of life for its residents. Reliable and well-maintained infrastructure assets are essential for the delivery of critical core services for the citizens of the municipality.

A technically precise and financially rigorous asset management plan, diligently implemented will mean that sufficient investments are made to ensure delivery of sustainable infrastructure services to current and future residents. The plan will also indicate the respective financial obligations required to maintain this delivery at established levels of service.

This Asset Management Plan (AMP) for the Township of South-West Oxford complies with the requirements as outlined within the provincial *Building Together Guide for Municipal Asset Management Plans*. It will serve as a strategic, tactical, and financial document, ensuring the management of the municipal infrastructure follows sound asset management practices and principles, while optimizing available resources and establishing desired levels of service.

Measured in 2012 dollars, the replacement value of the three major asset categories analyzed totaled approximately **$35.6** million for the Township. For the purposes of this AMP, we have excluded the category of gravel roads since gravel roads are a perpetual maintenance asset and end of life replacement calculations do not normally apply.

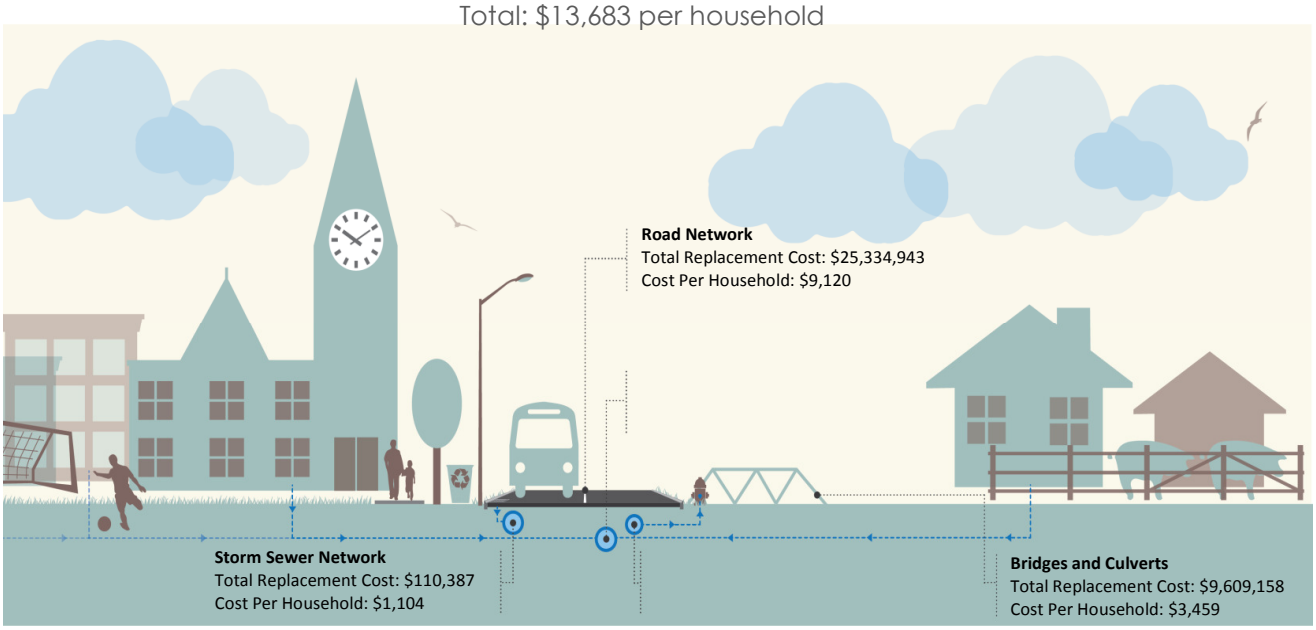


While the Municipality is responsible for the strategic direction, it is the taxpayer that ultimately bears the financial burden. As such, a 'cost per household' (CPH) analysis was conducted for each of the asset categories to determine the financial obligation of each household in sharing the replacement cost of the Municipality's assets. Such a measurement can serve as an excellent communication tool for both the administration and the council in communicating the importance of asset management to the citizen.

The total cost per household across the three asset categories for the Municipality is approximately $13,683. The diagram below shows the breakdown of this figure.

Infrastructure Replacement Cost Per Household

Total: $13,683 per household



In assessing the Municipality's state of the infrastructure, we examined, and graded, both the current condition (Condition vs Performance)of the three asset categories as well as the Municipality's financial capacity to fund the asset's average annual requirement for sustainability (Funding vs Need). We then generated the Municipality's infrastructure report card. The Municipality received an overall, cumulative **GPA of "F"**, receiving an 'F' in each individual asset category.

Based on the age data only, more than 60% of the Municipality's Road Network is in Poor or Critical condition. In establishing field condition assessment programs, from a risk point of view, the Road Network should be a priority for the Township.

More than 96% of the Municipality's Bridge & Culvert Infrastructure are in Critical condition, based on age data. There are significant needs to be addressed within the next five years totaling approximately $6.5 Million for this asset category. Structures are one of the highest liability assets a municipality owns and, therefore, a high priority would be to review current field condition inspections and establish a replacement program based on overall risk.

Lastly, nearly 86% of the Municipality's Storm Infrastructure is in Critical condition, based on age data. This has generated a large backlog of needs requiring over $90,000 in expenditures over the next five years.

In order for an AMP to be effectively put into action, it must be integrated with financial planning and long-term budgeting. We have been asked to develop scenarios that would enable the Township of South-West Oxford to achieve full funding within 5 years or 10 years for the following assets: paved roads; bridges and culverts; sewer network; and transportation network. For each scenario developed, we have included strategies, where applicable, regarding the use of tax revenues, user fee revenues, and reserves.

The average annual investment requirement for paved roads, bridges/culverts, the sewer network and the transportation network is $1,850,000. Annual revenue currently allocated to these assets is $568,000 leaving an annual deficit of $1,282,000. To put it another way, these infrastructure categories are currently funded at 31% of their long-term requirements. South-West Oxford had annual tax revenues of $3,167,000 in 2012. Full funding would require an increase in tax revenue of 41% over time. We recommend a 10 year option. This involves full funding being achieved over 10 years by:

- increasing tax revenues by 4.0% each year for the next 10 years solely for the purpose of phasing in full funding to the four asset categories covered by this AMP
- allocating 100% of the gas tax revenue (currently $230,000) to the roads category
- increasing existing infrastructure budgets by the applicable inflation index on an annual basis

Although this option achieves full funding on an annual basis in 10 years and provides financial sustainability over the period modeled (to 2050), the recommendations do require prioritizing capital projects to fit the resulting annual funding available.

The Township of South-West Oxford has indicated that its long-term goal is to fully fund its infrastructure requirements without further use of debt. As illustrated in this plan, the revenue options available to South-West Oxford allow the Township to meet this goal. As a result, scenarios included in this plan do not include debt financing.

Due to the relatively low level of reserves available for the asset categories covered by this AMP, the scenarios developed in this report do not draw on the above reserves during the phase-in period to full funding. This, coupled with South-West Oxford's judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for emergency situations until reserves are built to desired levels. This will allow the Township of South-West Oxford to address high priority infrastructure investments in the short to medium-term.

2.0 Introduction and Methodology

This Asset Management Plan meets all provincial requirements as outlined within the Ontario Building Together Guide for Municipal Asset Management Plans. As such, the following key sections and content are included:

1. Executive Summary and Introduction
2. State of the Current Infrastructure
3. Desired Levels of Service
4. Asset Management Strategy
5. Financial Strategy

The following asset classes are addressed:

1. **Roads:** Gravel, high and low class bituminous, curbs, entrances, guardrails, sidewalks, street lights
2. **Structures:** Bridges and large culverts with a span greater than 3m
3. **Storm:** Catch basins

Municipalities are encouraged to cover all asset categories in future iterations of the AMP.

This asset management plan will serve as a strategic, tactical, and financial document ensuring the management of the municipal infrastructure follows sound asset management practices and principles, while optimizing available resources and establishing desired levels of service.

At a strategic level, within the State of the Current Infrastructure section, it will identify current and future challenges that should be addressed in order to maintain sustainable infrastructure services on a long-term, life cycle basis.

It will outline a Desired Level of Service (LOS) Framework for each asset category to assist the development and tracking of LOS through performance measures across strategic, financial, tactical, operational, and maintenance activities within the organization.

At a tactical level, within the Asset Management Strategy section, it will develop an implementation process to be applied to the needs-identification and prioritization of renewal, rehabilitation, and maintenance activities, resulting in a 10 year plan that will include growth projections.

At a financial level, within the Financial Strategy section, a strategy will be developed that fully integrates with other sections of this asset management plan, to ensure delivery and optimization of the 10 year infrastructure budget.

Through the development of this plan, all data, analysis, life cycle projections, and budget models will be provided through the Public Sector Digest's CityWide suite of software products. The software and plan will be synchronized, will evolve together, and therefore, will allow for ease of updates, and annual reporting of performance measures and overall results.

This will allow for continuous improvement of the plan and its projections. It is therefore recommended that the plan be revisited and updated on an annual basis, particularly as more detailed information becomes available.

2.1 Importance of Infrastructure

Municipalities throughout Ontario, large and small, own a diverse portfolio of infrastructure assets that in turn provide a varied number of services to their citizens. The infrastructure, in essence, is a conduit for the various public services the municipality provides, e.g.:

- the roads supply a transportation network service
- the water infrastructure supplies a clean drinking water service

- the parks provide a recreation service
- and so on…

A community's prosperity, economic development, competitiveness, image, and overall quality of life are inherently and explicitly tied to the performance of its infrastructure.

2.2 Asset Management Plan (AMP) - Relationship to Strategic Plan

The major benefit of strategic planning is the promotion of strategic thought and action. A strategic plan spells out where an organization wants to go, how it's going to get there, and helps decide how and where to allocate resources, ensuring alignment to the strategic priorities and objectives. It will help identify priorities and guide how municipal tax dollars and revenues are spent into the future.

The strategic plan usually includes a vision and mission statement, and key organizational priorities with alignment to objectives and action plans. Given the growing economic and political significance of infrastructure, the asset management plan will become a central component of most municipal strategic plans, influencing corporate priorities, objectives, and actions.

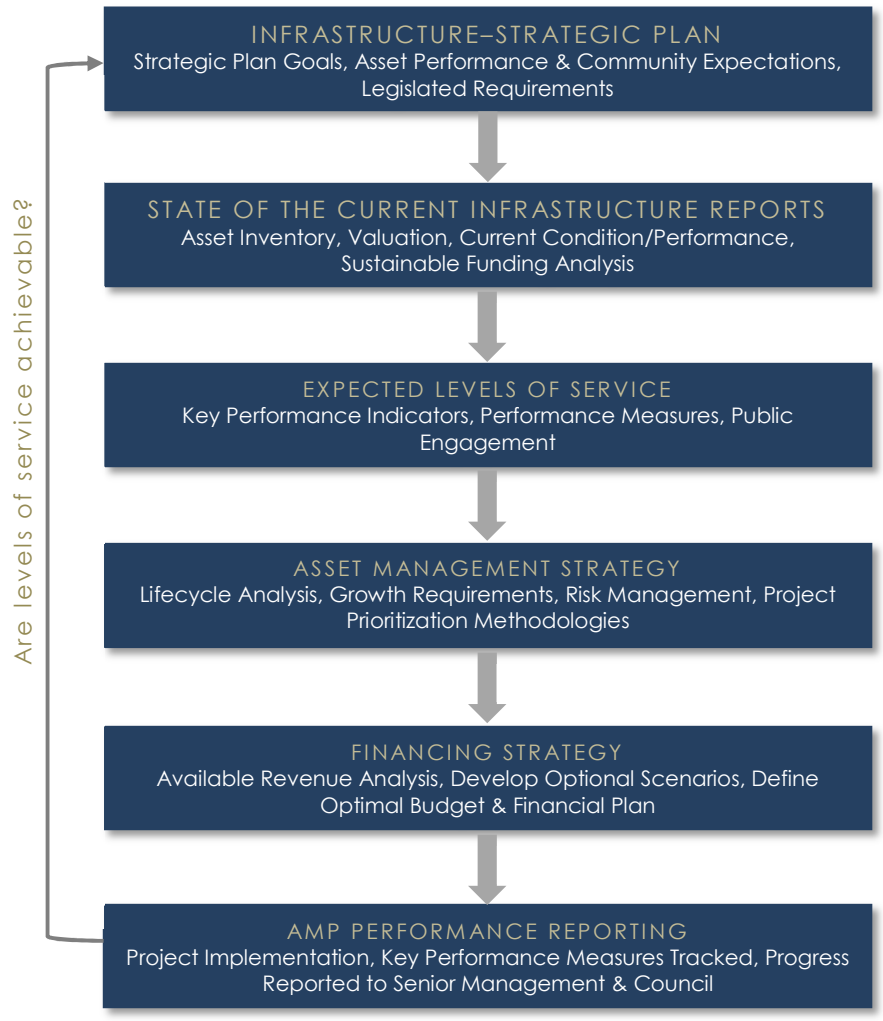
2.3 AMP - Relationship to other Plans

An asset management plan is a key component of the municipality's planning process linking with multiple other corporate plans and documents. For example:

- **The Official Plan** – The AMP should utilize and influence the land use policy directions for long-term growth and development as provided through the Official Plan.
- **Long Term Financial Plan** – The AMP should both utilize and conversely influence the financial forecasts within the long-term financial plan.
- **Capital Budget** – The decision framework and infrastructure needs identified in the AMP form the basis on which future capital budgets are prepared.
- **Infrastructure Master Plans** – The AMP will utilize goals and projections from infrastructure master plans and in turn will influence future master plan recommendations.
- **By-Laws, standards, and policies** – The AMP will influence and utilize policies and by-laws related to infrastructure management practices and standards.
- **Regulations** – The AMP must recognize and abide by industry and senior government regulations.
- **Business Plans** – The service levels, policies, processes, and budgets defined in the AMP are incorporated into business plans as activity budgets, management strategies, and performance measures.

2.4 Purpose and Methodology

The following diagram depicts the approach and methodology, including the key components and links between those components that embody this asset management plan:



It can be seen from the above that a municipality's infrastructure planning starts at the corporate level with ties to the strategic plan, alignment to the community's expectations, and compliance with industry and government regulations.

Then, through the State of the Current Infrastructure analysis' overall asset inventory, valuation, condition and performance are reported. In this initial AMP, due to a lack of current condition data, present performance and condition are estimated by using the current age of the asset in comparison to its overall useful design life. In future updates to this AMP, accuracy of reporting will be significantly increased through the use of holistically captured condition data. Also, a life cycle analysis of needs for each infrastructure class is conducted. This analysis yields the sustainable funding level, compared against actual current funding levels, and determines whether there is a funding surplus or deficit for each infrastructure program. The overall measure of condition and available funding is finally scored for each asset class and presented as a star rating (similar to the hotel star rating) and a letter grade (A-F) within the Infrastructure Report card.

From the lifecycle analysis above, the municipality gains an understanding of the level of service provided today for each infrastructure class and the projected level of service for the future. The next section of the AMP provides a framework for a municipality to develop a Desired Level of Service (or target service level) and develop performance measures to track the year-to-year progress towards this established target level of service.

The Asset Management Strategy then provides a detailed analysis for each infrastructure class. Included in this analysis are best practices and methodologies from within the industry which can guide the overall management of the infrastructure in order to achieve the desired level of service. This section also provides an overview of condition assessment techniques for each asset class; life cycle interventions required, including those interventions that yield the best return on investment; and prioritization techniques, including risk quantification, to determine which priority projects should move forward into the budget first.

The Financing Strategy then fully integrates with the asset management strategy and asset management plan, and provides a financial analysis that optimizes the 10 year infrastructure budget. All revenue sources available are reviewed, such as the tax levy, debt allocations, rates, reserves, grants, gas tax, development charges, etc., and necessary budget allocations are analysed to inform and deliver the infrastructure programs.

Finally, in subsequent updates to this AMP, actual project implementation will be reviewed and measured through the established performance metrics to quantify whether the desired level of service is achieved or achievable for each infrastructure class. If shortfalls in performance are observed, these will be discussed and alternate financial models or service level target adjustments will be presented.

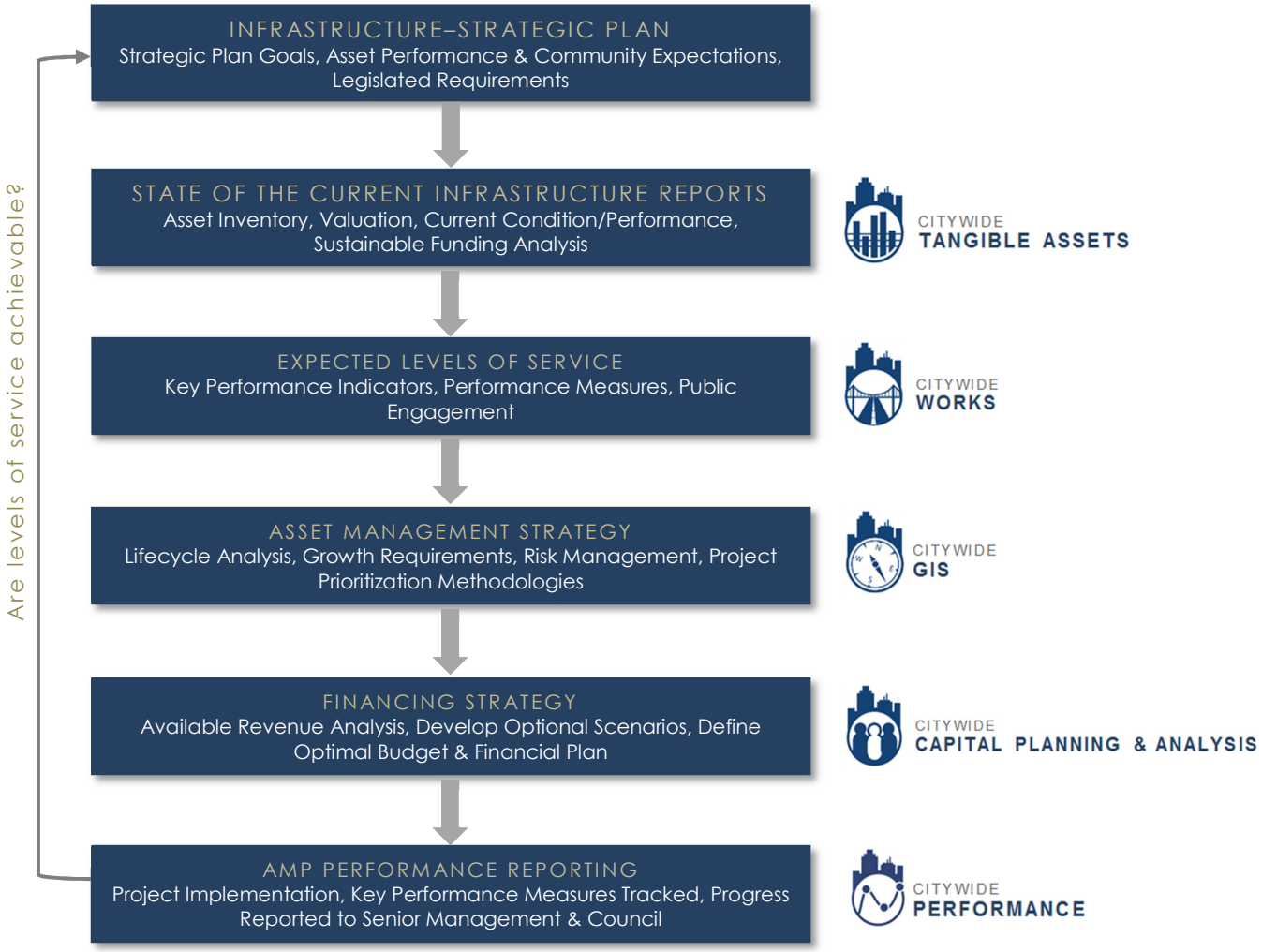
2.5 CityWide Software alignment with AMP

The plan will be built and developed hand in hand with a database of municipal infrastructure information in the CityWide software suite of products. The software will ultimately contain the municipality's asset base, valuation information, life cycle activity predictions, costs for activities, sustainability analysis, project prioritization parameters, key performance indicators and targets, 10 year asset management strategy, and the financial plan to deliver the required infrastructure budget.

The software and plan will be synchronized, and will evolve together year-to-year as more detailed information becomes available. This synchronization will allow for ease of updates, modeling and scenario building, and annual reporting of performance measures and results. This will allow for continuous improvement of the plan and its projections. It is therefore recommended that it is revisited and updated on an annual basis.

The following diagram outlines the various CityWide software products and how they align to the various components of the AMP.

CityWide Software alignment with AMP



3.0 State of the Current Infrastructure

3.1 Objective and Scope

Objective: To identify the state of the Municipality's infrastructure today and the projected state in the future if current funding levels and management practices remain status quo.

The analysis and subsequent communication tools will outline future asset requirements, will start the development of tactical implementation plans, and ultimately assist the organization to provide cost effective sustainable services to the current and future community.

The approach was based on the following key industry "State of the Infrastructure documents":

- Canadian Infrastructure Report Card
- City of Hamilton's State of the Infrastructure reports
- Other Ontario Municipal State of the Infrastructure reports

The above reports are themselves based on established principles found within key, industry best practices documents such as:

- The National Guide for Sustainable Municipal Infrastructure (Canada)
- The International Infrastructure Management Manual (Australia/New Zealand)
- American Society of Civil Engineering Manuals (U.S.A)

Scope: Within this State of the Infrastructure report a high level review will be undertaken for the following asset categories:

1. **Roads:** Gravel, high and low class bituminous, curbs, entrances, guardrails, sidewalks, street lights
2. **Structures:** Bridges and large culverts with a span greater than 3m
3. **Storm Assets:** Catch basins

3.2 Approach

The asset categories above were reviewed at a very high level due to the nature of data and information available. Subsequent detailed reviews of this analysis are recommended on an annual basis, as more detailed conditions assessment information becomes available for each infrastructure program.

3.2.1 Base Data

In order to understand the full inventory of infrastructure assets within South-West Oxford Township, all tangible capital asset data, as collected to meet the PSAB 3150 accounting standard, was loaded into the CityWide Tangible Asset™ software module. This data base now provides a detailed and summarized inventory of assets as used throughout the analysis within this report and the entire Asset Management Plan.

3.2.2 Asset Deterioration Review

Without detailed condition assessment information captured holistically across entire asset networks (e.g., the entire road network), the deterioration review will rely on the 'straight line' amortization schedule approach provided from the accounting data. Although this approach is not as accurate for entire life cycle analysis as the use of detailed condition data, it does provide a reliable benchmark of future requirements. Each asset is analyzed individually. Therefore, while there may be inaccuracies in

the data associated with any given asset, these imprecisions are minimized at the aggregate over entire asset categories. It is a sound approach for a high level review.

3.2.3 Identify Sustainable Investment Requirements

A gap analysis was performed to identify sustainable investment requirements for each asset category. Information on current spending levels and budgets was acquired from the organization, future investment requirements were calculated, and the gap between the two was identified.

The above analysis is performed by using investment and financial planning models, and life cycle costing analysis, embedded within the CityWide software suite of applications.

3.2.4 Asset Rating Criteria

Each asset category will be rated on two key dimensions:

- **Condition versus Performance**: What is the condition of the asset today and how well does it perform its function?
- **Funding versus Need**: Based on the actual investment requirements to ensure replacement of the asset at the right time, versus current spending levels for each asset group.

3.2.5 Infrastructure Report Card

The dimensions above will be based on a simple 1 – 5 star rating system, which will be converted into a letter grading system ranging from A-F. An average of the two ratings will be used to calculate one overall blended rating for each asset category. The outputs for all municipal assets will be consolidated within the CityWide software to produce one overall Infrastructure Report Card showing the current state of the assets and future projections for the Infrastructure.

Grading Scale: Condition vs Performance

What is the condition of the asset today and how well does it perform its function?

Star Rating	Letter Grade	Description
★★★★★	A	Excellent: No noticeable defects
★★★★	B	Good: minor deterioration
★★★	C	Fair: Deterioration evident, function is affected.
★★	D	Poor: Serious deterioration. Function is inadequate.
★	F	Critical: No longer functional. General or complete failure.

Grading Scale: Funding vs Need

Based on the actual investment requirements to ensure replacement of the asset at the right time, versus current spending levels for each asset group.

Star Rating	Letter Grade	Description
★★★★★	A	Excellent: 91 to 100% of need
★★★★	B	Good: 76 to 90% of need
★★★	C	Fair: 61 to 75% of need
★★	D	Poor: 46 – 60% of need
★	F	Critical: under 45% of need

3.2.6 General Methodology and Reporting Approach

The report will be based on the seven key questions of asset management as outlined within the National Guide for Sustainable Municipal Infrastructure:

- What do you own and where is it? (inventory)
- What is it worth? (valuation/replacement cost)
- What is its condition/remaining service life? (function & performance)
- What needs to be done? (maintain, rehabilitate, replace)
- When do you need to do it? (useful life analysis)
- How much will it cost? (investment requirements)
- How do you ensure sustainability? (long-term financial plan)

The above questions will be answered for each individual asset category in the following report sections.

3.3 Road Network

F

INFRASTRUCTURE REPORT CARD GRADE

3.3 Road Network Infrastructure

Note: The financial analysis in this section includes paved roads only. Gravel roads are excluded from the capital replacement analysis, as by nature, they require perpetual maintenance activities and funding.

3.3.1 What do we own?

As shown in the summary table below, the entire network comprises approximately 440 centreline km of road.

Road Network Inventory

Asset Type	Asset Component	Quantity
Roads	Gravel, stone or other loose top	1,444,596m^2
	High class bituminous	55,214m^2
	Low class bituminous	1,074,381.30m^2
	Curbs	8,389m^2
	Entrances	2,125
	Guardrails	96m
	Sidewalks	10,625m^2
	Street Lights	609

The road network data was extracted from the Tangible Capital Asset and G.I.S. modules of the CityWide software suite.

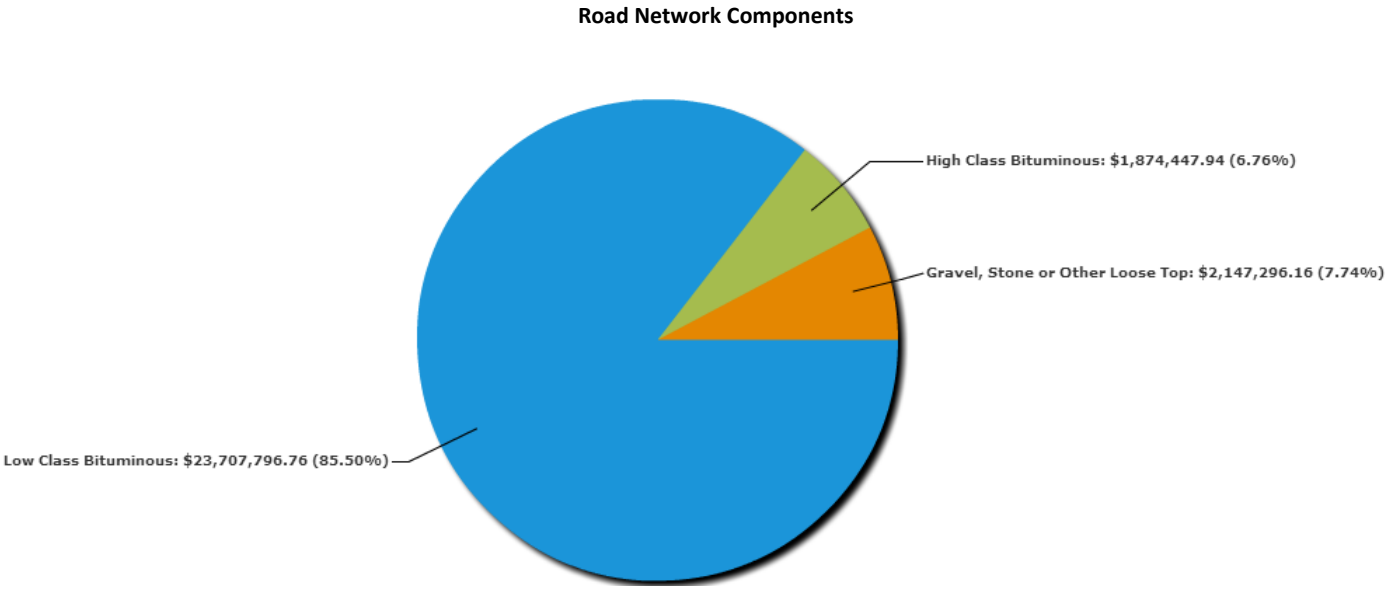
3.3.2 What is it worth?

The estimated replacement value of the road network, in 2012 dollars, is approximately $34.4 million. For the purpose of further analysis, we exclude gravel roads and use $25.3 million as the replacement cost (low and high class bituminous). The cost per household for the road network is $9,120, based on 2,778 households.

Road Network Replacement Value

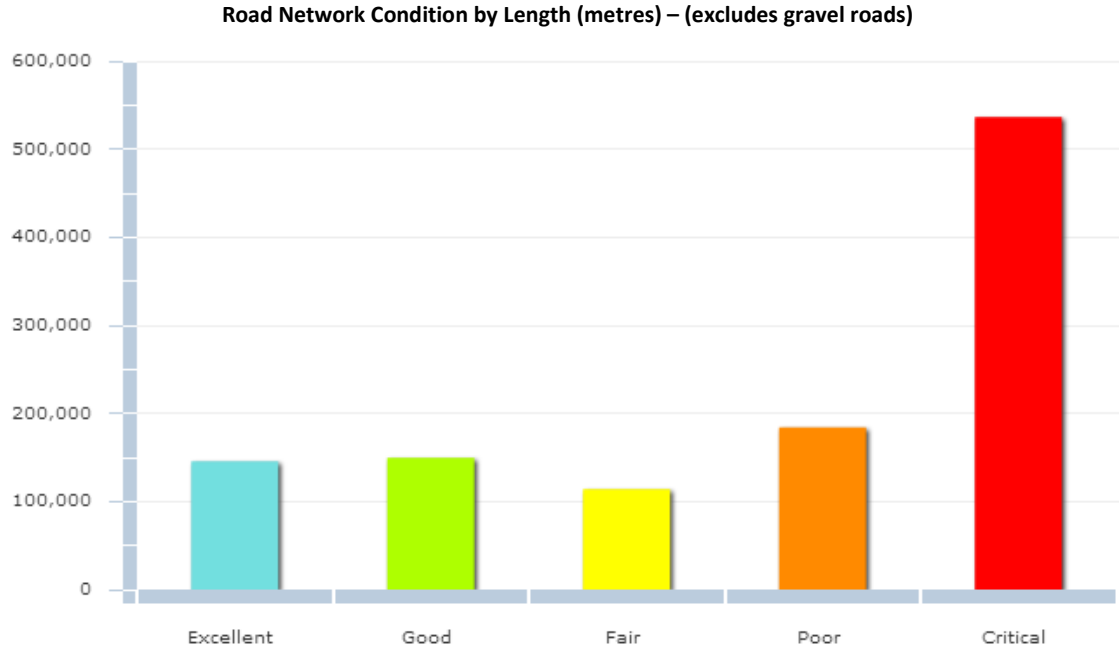
Asset Type	Asset Component	Quantity	2012 Unit Replacement Cost	2012 Overall Replacement Cost
Roads	Gravel, stone or other loose top	1,444,596m^2	CPI Tables	$2,147,296
	High class bituminous	55,214m^2	CPI Tables	$1,874,448
	Low class bituminous	988,655m^2	CPI Tables	$23,460,496
	Curbs	8,389m^2	CPI Tables	$285,032
	Entrances	2,125	CPI Tables	$4,768,672
	Guardrails	96m	CPI Tables	$42,236
	Sidewalks	10,625m^2	CPI Tables	$594,939
	Street Lights (Transportation Network)	524	CPI Tables	$1,272,705
				$34,445,824

The pie chart below provides a breakdown of each of the network components to the overall system value.



3.3.3 What condition is it in?

Nearly 64% of the road network infrastructure is in Poor or Critical condition. Only 26% of the Township's roads assets are in Excellent or Good condition. As such, the municipality received a Condition vs Performance rating of 'D' based on a weighted star rating of 2.3 stars.



The above graph is based on the following criteria:

Excellent: No noticeable defects

Good: Minor deterioration

Fair: Deterioration evident

Poor: Serious deterioration

Critical: General or complete failure

3.3.4 What do we need to do to it?

There are generally four distinct phases in an asset's life cycle that require specific types of attention and lifecycle activity. These are presented at a high level for the road network below. Further detail is provided in the "Asset Management Strategy" section of this AMP.

Addressing Asset Needs

Phase	Lifecycle Activity	Asset Life Stage
Minor maintenance	Activities such as inspections, monitoring, sweeping, winter control, etc.	1st Qtr
Major maintenance	Activities such as repairing pot holes, grinding out roadway rutting, and patching sections of road.	2nd Qtr
Rehabilitation	Rehabilitation activities such as asphalt overlays, mill and paves, etc.	3rd Qtr
Replacement	Full road reconstruction	4th Qtr

3.3.5 When do we need to do it?

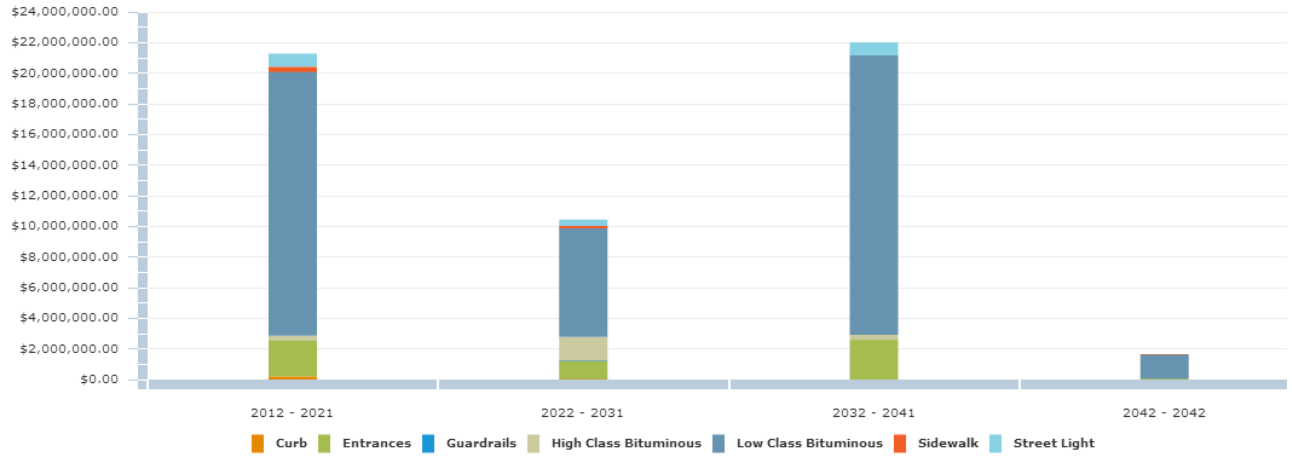
For the purpose of this report, 'useful life' data for each asset class was obtained from the accounting data within the CityWide software database. This proposed useful life is used to determine replacement needs of individual assets. These needs are calculated and quantified in the system as part of the overall financial requirements.

Asset Useful Life in Years

Asset Type	Asset Component	Useful Life (Years)
Roads	Gravel, stone or other loose top	75
	High class bituminous	20
	Low class bituminous	20
	Curbs	30
	Entrances	20
	Guardrails	20
	Sidewalks	30
	Street lights	20

As field condition information becomes available, the data can be loaded into the CityWide system to increase the accuracy of current asset age and, therefore, that of future replacement requirements. The following graph shows the projection of road network replacement costs based on the age of the asset only.

Road Network Replacement Profile (excludes gravel roads)



3.3.6 How much money do we need?

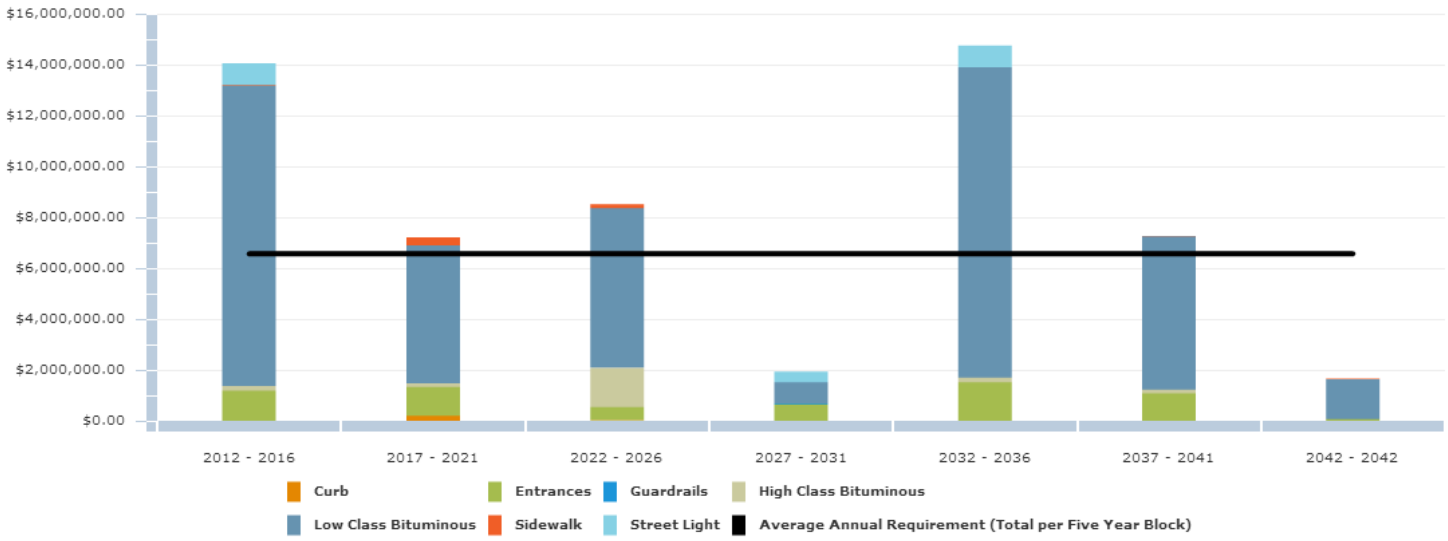
The analysis completed to determine capital revenue requirements was based on the following constraints and assumptions:

1. Replacement costs are based upon the unit costs identified within the "What is it worth" section.
2. The timing for individual road replacement was defined by the replacement year as described in the "When do you need to do it?" section.
3. All values are presented in 2012 dollars.
4. The analysis was run for a 30 year period to ensure all assets went through at least one iteration of replacement, therefore providing a sustainable projection.

3.3.7 How do we reach sustainability?

Based upon the above parameters, the average annual revenue required to sustain South-West Oxford's road network is approximately **$1,299,000**. Based on South-West Oxford's current annual funding of **$568,000**, there is an annual **deficit of $731,000**. Given this deficit, the municipality received a Needs vs Funding rating of 'F' based on a weighted star rating of 1 star. The following graph illustrates the expenditure requirements in five year increments against the sustainable funding threshold line.

Sustainable Funding Requirements (excludes gravel roads)



In conclusion, based on the age data only, there is a significant portion of the road network in Poor and Critical condition and significant expenditures are required within the next five years. In establishing field condition assessment programs, from a risk point of view, the road network should be a priority for the Township. A condition assessment program will aid in prioritizing overall needs for rehabilitation and replacement and will assist with optimizing the long and short term budgets. Further detail is outlined within the "asset management strategy" section of this AMP.

3.3.8 Recommendations

The municipality received an overall rating of 'F' for its road network, calculated from the Condition vs Performance and the Needs vs Funding ratings. Accordingly, we recommend the following:

- A condition assessment program should be established for the entire paved road network to gain a better understanding of current condition and performance as outlined further within the "Asset Management Strategy" section of this AMP.

- As over 50% of the Township's road network is gravel roads, a detailed study should be undertaken to assess the overall maintenance costs of gravel roads and whether there is benefit to converting some gravel roads to paved , or surface treated roads, thereby reducing future costs. This is further outlined within the "Asset Management Strategy" section of this AMP.

- Once the above studies are complete or underway, the condition data should be loaded into the CityWide software and an updated "current state of the infrastructure" analysis should be generated.

- An appropriate % of asset replacement value should be used for operations and maintenance activities on an annual basis. This should be determined through a detailed analysis of O & M activities and be added to future AMP reporting.

- The Infrastructure Report Card should be updated on an annual basis.

3.4 Bridge Infrastructure

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INFRASTRUCTURE REPORT CARD GRADE

3.4 Bridge & Culvert Infrastructure

3.4.1 What do we own?

As shown in the summary table below the Township owns 14 Bridges and 30 large Culverts with a span greater than 3m.

Bridge & Culvert Inventory

Asset Type	Asset Component	Units	Quantity
Bridges	Concrete	14	208.79m
Culverts	Concrete	19	123.60m
	Steel	11	52.95m
	Entrance (Transportation Network)	25	N/A

The bridge and culvert data was extracted from the Tangible Capital Asset and G.I.S. modules of the CityWide software suite.

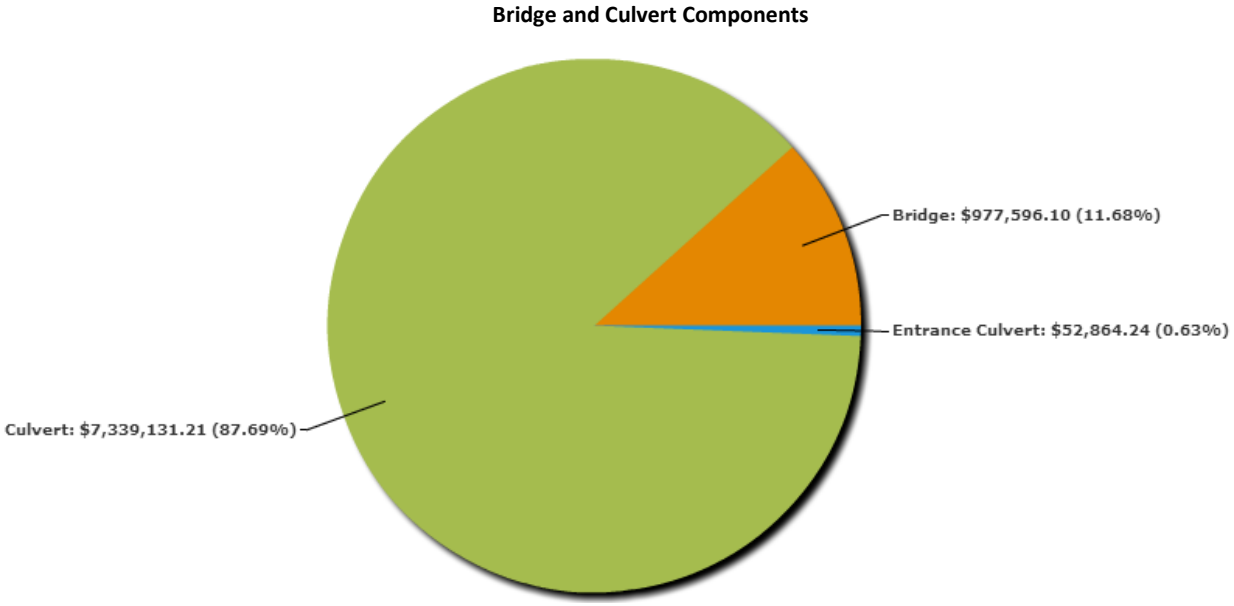
3.4.2 What is it worth?

The estimated replacement value of the bridge and culvert infrastructure, in 2012 dollars, is approximately $9.6 million. The cost per household for the bridge and & culvert infrastructure is $3,459, based on 2,778 households.

Bridge & Culvert Replacement Value

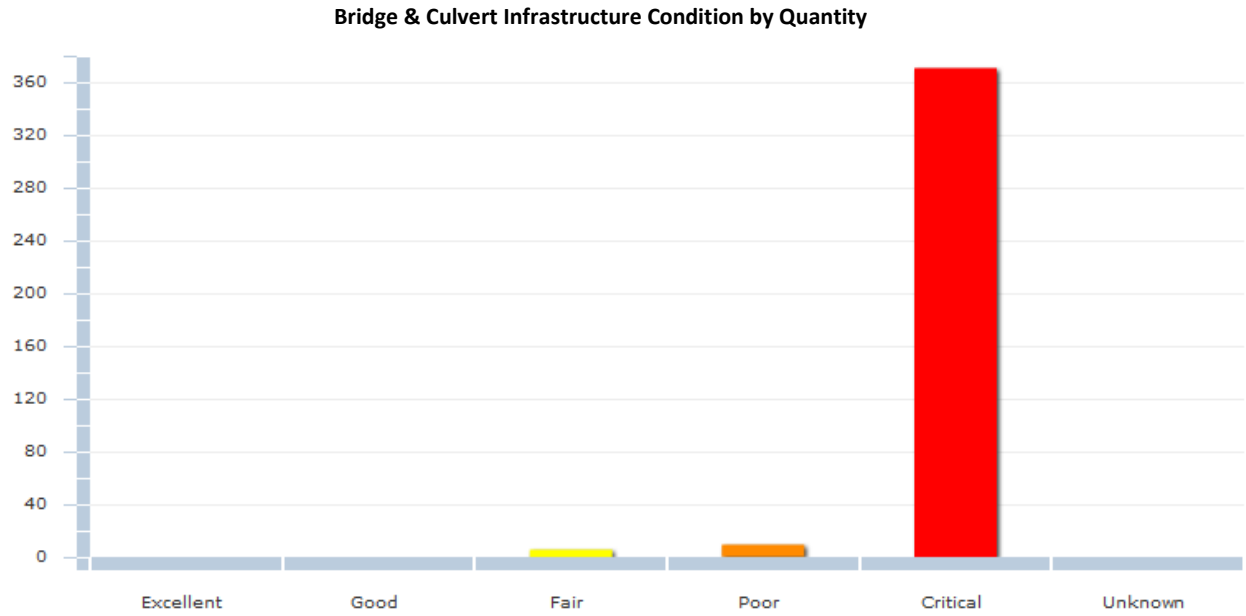
Asset Type	Asset Component	Quantity	Quantity	2012 Unit Replacement Cost	2012 Overall Replacement Cost
Bridges	Concrete	14	208.79m	CPI Tables	$2,181,954
Culverts	Concrete	19	123.60m	CPI Tables	$6,305,266
	Steel	11	52.95m	CPI Tables	$1,069,074
	Entrance	25	N/A	CPI Tables	$52,864
					$9,609,158

The pie chart below provides a breakdown of each of the bridge and culverts components to the overall structures value.



3.4.3 What condition is it in?

Nearly all (96%) of the Township's bridges and culverts are in Critical condition. The Township has no assets in either Good or Excellent Condition. As such, the municipality received a Condition vs Performance rating of 'F' based on a weighted star rating of 1.1 stars.



The above graph is based on the following criteria:

Excellent: No noticeable defects

Good: Minor deterioration

Fair: Deterioration evident

Poor: Serious deterioration

Critical: General or complete failure

3.4.4 What do we need to do to it?

There are generally four distinct phases in an asset's life cycle. These are presented at a high level for the bridge and culvert structures below. Further detail is provided in the "Asset Management Strategy" section of this AMP.

Addressing Asset Needs

Phase	Lifecycle Activity	Asset Life Stage
Minor Maintenance	Activities such as inspections, monitoring, sweeping, winter control, etc.	1st Qtr
Major Maintenance	Activities such as repairs to cracked or spalled concrete, damaged expansion joints, bent or damaged railings, etc.	2nd Qtr
Rehabilitation	Rehabilitation events such as structural reinforcement of structural elements, deck replacements, etc.	3rd Qtr
Replacement	Full structure reconstruction	4th Qtr

3.4.5 When do we need to do it?

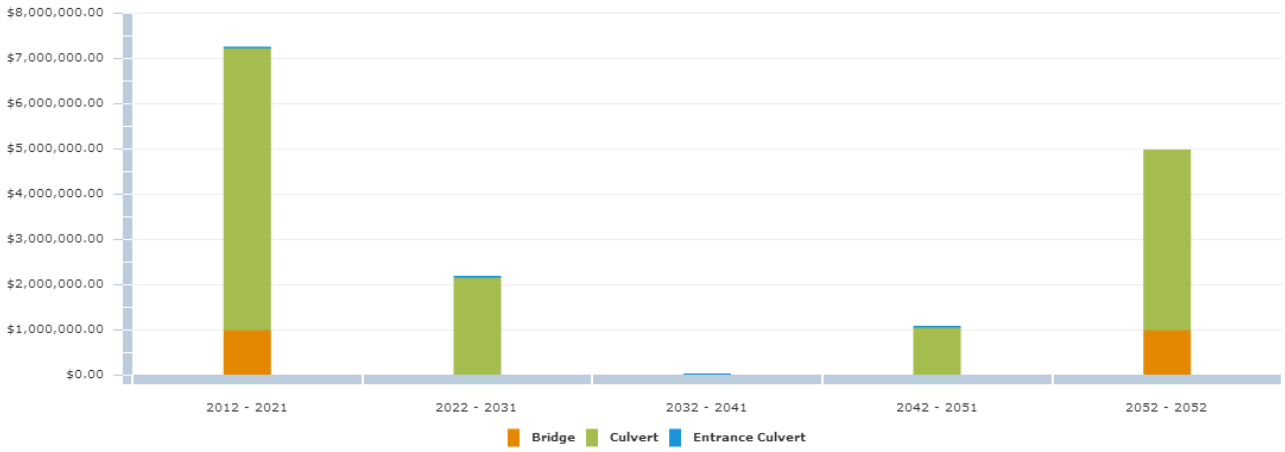
For the purpose of this report, 'useful life' data for each asset class was obtained from the accounting data within the CityWide software database. This proposed useful life is used to determine replacement needs of individual assets, which are calculated in the system as part of the overall financial requirements.

Asset Useful Life in Years

Asset Type	Asset Component	Useful Life (Years)
Bridges	Concrete	40
Culverts	Concrete	40
	Steel	15
	Entrance	15

As field condition information becomes available in time, the data should be loaded into the CityWide system in order to have an increasingly more accurate picture of current asset age and, therefore, future replacement requirements. The following graph shows the current projection of structure replacements based on the age of the asset only.

Structures Replacement Profile



3.4.6 How much money do we need?

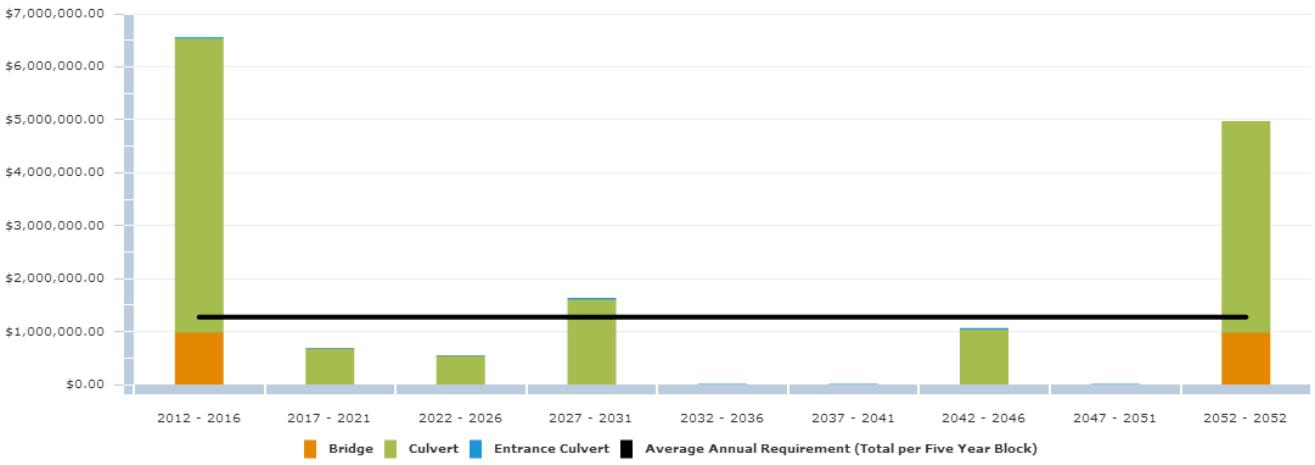
The analysis completed to determine capital revenue requirements was based on the following constraints and assumptions:

1. Replacement costs are based upon the "What is it worth" section above.
2. The timing for individual structure replacement was defined by the replacement year as described in the "When do you need to do it?" section above.
3. All values are presented in 2012 dollars.
4. The analysis was run for a 40 year period to ensure all assets cycled through at least one iteration of replacement, therefore providing a sustainable projection.

3.4.7 How do we reach sustainability?

Based upon the above assumptions, the average annual revenue required to sustain South-West Oxford's bridge and culvert structures is **$251,000**. Based on South-West Oxford's current annual funding of **$0**, there is an annual **deficit of $251,000**. Given this deficit, the municipality received a Needs vs Funding rating of 'F' based on a weighted star rating of 0 stars. The following graph presents five year blocks of expenditure requirements against the sustainable funding threshold line.

Sustainable Revenue Requirement



In conclusion, based on the age data only, there is a significant portion of bridges and large culverts in Critical condition or at the end of their useful life expectation. There are significant needs to be addressed within the next 5 years totaling approximately $6.5 Million. Structures are one of the highest liability assets a municipality owns and therefore a high priority would be to review current field condition inspections and establish a replacement program based on overall risk. A full analysis of field condition will aid in prioritizing overall needs for rehabilitation and replacement and will assist with optimizing the long and short term budgets. Further detail is outlined within the "asset management strategy" section of this AMP.

3.4.8 Recommendations

The municipality received an overall rating of 'F' for its Bridge & Culvert infrastructure, calculated from the Condition vs Performance and the Needs vs Funding ratings. Accordingly, we recommend the following:

- A biennial OSIM condition assessment program should be established, if not already in place, for the bridge and culverts with a span greater than 3m as outlined further within the "Asset Management Strategy" section of this AMP.
- From the above inspections the condition data should be loaded into the CityWide software and an updated "current state of the infrastructure" analysis should be generated.
- An appropriate % of asset replacement value should be used for operations and maintenance activities on an annual basis. This should be determined through a detailed analysis of O & M activities and be added to future AMP reporting.
- The Infrastructure Report Card should be updated on an annual basis.

3.5 Storm Infrastructure

F

INFRASTRUCTURE REPORT CARD GRADE

3.5 Storm Infrastructure

3.5.1 What do we own?

The inventory components of the Storm Sewer Collection system are outlined in the table below.

Storm Inventory		
Asset Type	Asset Component	Quantity
Storm	Catch Basins	235

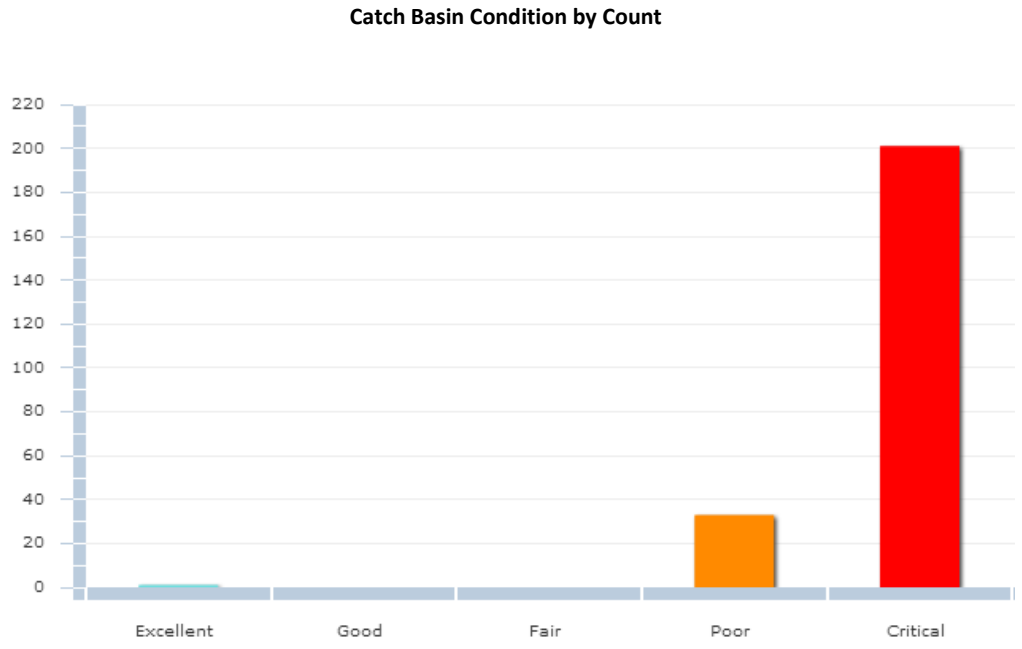
3.5.2 What is it worth?

The estimated replacement value of the storm infrastructure, in 2012 dollars, is approximately $110,387. The cost per household for the storm infrastructure is $1,104, based on 100 homes.

Storm Replacement Value				
Asset Type	Asset Component	Quantity	2012 Unit Replacement Cost	2012 Overall Replacement Cost
Storm	Catch Basins	235	CPI Table	$110,387
				$110,387

3.5.3 What condition is it in?

With nearly all (99.5%) of the storm infrastructure in Critical or Poor condition, the municipality received a Condition vs Performance rating of 'F' based on a weighted star rating of 1.2 stars.



The above graph is based on the following criteria:

Excellent: No noticeable defects

Good: Minor deterioration

Fair: Deterioration evident

Poor: Serious deterioration

Critical: General or complete failure

3.5.4 What do we need to do to it?

There are generally four distinct phases in an assets life cycle. These are presented at a high level for the storm distribution network below. Further detail is provided in the "Asset Management Strategy" section of this AMP.

Addressing Asset Needs

Phase	Lifecycle Activity	Asset Age
Minor Maintenance	Activities such as inspections, monitoring	1st Qtr
Major Maintenance	Activities such as general repairs	2nd Qtr
Rehabilitation	General Rehabilitation	3rd Qtr
Replacement	Full Replacements	4th Qtr

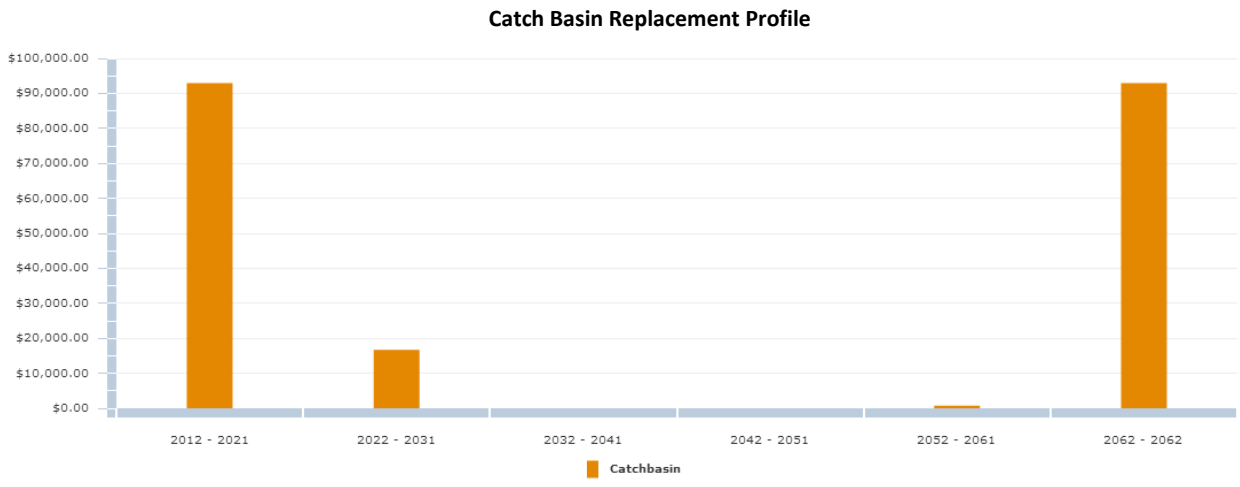
3.5.5 When do we need to do it?

For the purpose of this report "useful life" data for each asset class was obtained from the accounting data within the CityWide software database. This proposed useful life is used to determine replacement needs of individual assets, which are calculated in the system as part of the overall financial requirements.

Asset Useful Life

Asset Type	Asset Component	Useful Life (Years)
Storm	Catch Basin	50

As field condition information becomes available in time, the data should be loaded into the CityWide system in order to increasingly have a more accurate picture of current asset performance age and, therefore, future replacement requirements. The following graph shows the current projection of catch basin replacements based on the age of the asset only.



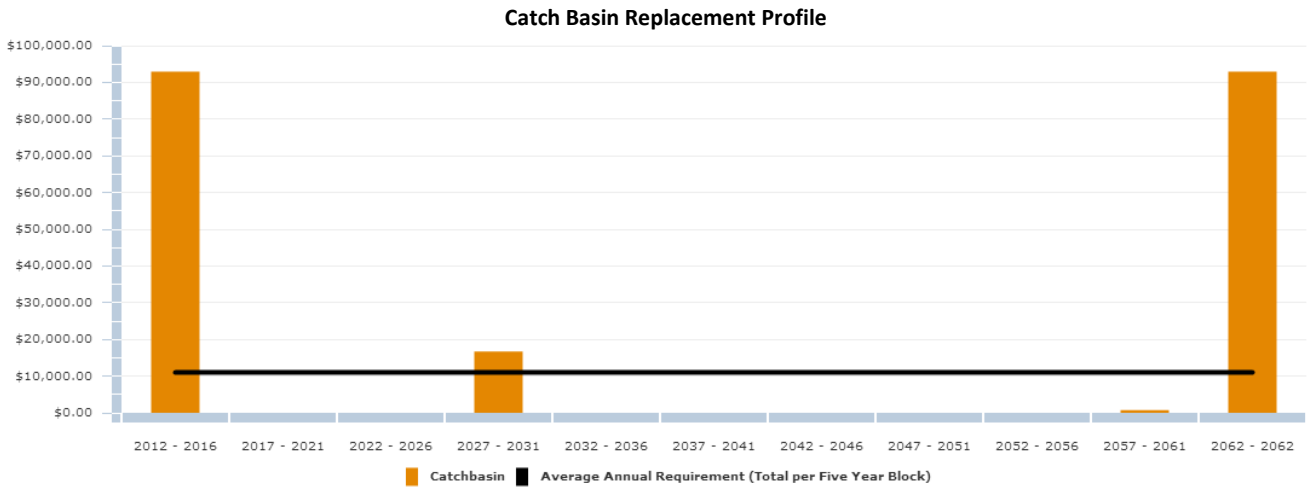
3.5.6 How much money do we need?

The analysis completed to determine capital revenue requirements was based on the following assumptions:

1. Replacement costs are based upon the unit costs identified within the "What is it worth" section above.
2. The timing for individual catch basin replacement was defined by the replacement year as described in the "When do you need to do it?" section above.
3. All values are presented in 2012 dollars.
4. The analysis was run for a 50 year period to ensure all assets went through one iteration of replacement, therefore providing a sustainable projection.

3.5.7 How do we reach sustainability?

Based upon the above assumptions the average annual revenue required to sustain South-West Oxford's Storm network is **$2,000**. Based on South-West Oxford's current annual funding of **$0**, there is an annual **deficit of $2,000**. Given this deficit, the municipality received a Needs vs Performance rating of 'F' based on a weighted star rating of 0 stars. The following graph presents five year blocks of expenditure requirements against the sustainable funding threshold line.



In conclusion, South-West Oxford's catch basin inventory, based on age data only, has a significant amount of assets in Critical condition. This has generated a large back log of needs requiring over $90,000 in expenditures over the next 5 years. A condition assessment program will aid in a better understanding of field condition, therefore prioritizing overall needs for rehabilitation and replacement, and optimizing the long term budget.

3.5.8 Recommendations

The municipality received an overall rating of 'F' for its Storm sewer infrastructure, calculated from the Condition vs Performance and the Needs vs Funding ratings. Accordingly, we recommend the following:

- A condition assessment program should be established for the catch basin assets to gain a better understanding of current condition and performance, to mitigate risk, and optimize future expenditures.
- Once the above study is complete or underway, the condition data should be loaded into the CityWide software and an updated "current state of the infrastructure" analysis should be generated.

- An appropriate % of asset replacement value should be used for operations and maintenance activities on an annual basis. This should be determined through a detailed analysis of O & M activities and be added to future AMP reporting.

- The Infrastructure Report Card should be updated on an annual basis.

4.0 Infrastructure Report Card

F	Infrastructure Report Card The Township of South-West Oxford

Each asset category was rated on two key, equally weighted (50/50)dimensions: **Condition vs Performance**, and **Needs vs Funding**.

See the "***What condition is it in***?" section for each asset category for its star rating on the Condition vs Performance dimension.

See the "***How do we reach sustainability***?" section for each asset category for its star rating on the Needs vs Funding dimension.

The 'Overall Rating' below is the average of the two star ratings converted to letter grades.

ASSET CATEGORY	OVERALL RATING	COMMENTS
Road Network	F	Nearly 63% of the road network infrastructure is in Poor or Critical condition. Only 26% of the Township's roads assets are in Excellent or Good condition. As such, the municipality received a Condition vs Performance rating of 'D' based on a weighted star rating of 2.3 stars. Further, the average annual revenue required to sustain South-West Oxford's road network is approximately **$1,299,000**. Based on South-West Oxford's current annual funding of **$568,000**, there is an annual **deficit of $731,000**.
Bridge & Culvert Infrastructure	F	Nearly all (96%) of the Township's bridges and culverts are in Critical condition. The Township has no assets in either Good or Excellent Condition. As such, the municipality received a Condition vs Performance rating of 'F' based on a weighted star rating of 1.1 stars. Further, the average annual revenue required to sustain South-West Oxford's bridge and culvert structures is **$251,000**. Based on South-West Oxford's current annual funding of **$0**, there is an annual **deficit of $251,000**.
Storm Sewer Network (Catch Basin only)	F	With more than 85% of the Storm infrastructure in Critical condition, the municipality received a Condition vs Performance rating of 'F' based on a weighted star rating of 1.2 stars. Further, the average annual revenue required to sustain South-West Oxford's Storm network is **$2,000**. Based on South-West Oxford's current annual funding of **$0**, there is an annual **deficit of $2,000**.

5.0 Desired Levels of Service

Desired levels of service are high level indicators, comprising many factors, as listed below, that establish defined quality thresholds at which municipal services should be supplied to the community. They support the organisation's strategic goals and are based on customer expectations, statutory requirements, standards, and the financial capacity of the municipality to deliver those levels of service.

Levels of Service are used:

- to inform customers of the proposed type and level of service to be offered;
- to identify the costs and benefits of the services offered;
- to assess suitability, affordability and equity of the services offered;
- as a measure of the effectiveness of the asset management plan
- as a focus for the AM strategies developed to deliver the required level of service

In order for a municipality to establish a desired level of service, it will be important to review the key factors involved in the delivery of that service, and the interactions between those factors. In addition, it will be important to establish some key performance metrics and track them over an annual cycle to gain a better understanding of the current level of service supplied.

Within this first Asset Management Plan, key factors affecting level of service will be outlined below and some key performance indicators for each asset type will be outlined for further review. This will provide a framework and starting point from which the municipality can determine future desired levels of service for each infrastructure class.

5.1 Key factors that influence a level of service:

- Strategic and Corporate Goals
- Legislative Requirements
- Expected Asset Performance
- Community Expectations
- Availability of Finances

5.1.1 Strategic and Corporate Goals

Infrastructure levels of service can be influenced by strategic and corporate goals. Strategic plans spell out where an organization wants to go, how it's going to get there, and helps decide how and where to allocate resources, ensuring alignment to the strategic priorities and objectives. It will help identify priorities and guide how municipal tax dollars and revenues are spent into the future. The level of importance that a community's vision is dependent upon infrastructure, will ultimately affect the levels of service provided or those levels that it ultimately aspires to deliver.

5.1.2 Legislative Requirements

Infrastructure levels of service are directly influenced by many legislative and regulatory requirements. For instance, the Safe Drinking Water Act, the Minimum Maintenance Standards for municipal highways, building codes, and the Accessibility for Ontarians with Disabilities Act are all legislative requirements that prevent levels of service from declining below a certain standard.

5.1.3 Expected Asset Performance

A level of service will be affected by current asset condition, and performance and limitations in regards to safety, capacity, and the ability to meet regulatory and environmental requirements. In addition, the design life of the asset, the maintenance items required, the rehabilitation or replacement schedule of the asset, and the total costs, are all critical factors that will affect the level of service that can be provided.

5.1.4 Community Expectations

Levels of services are directly related to the expectations that the general public has from the infrastructure. For example, the public will have a qualitative opinion on what an acceptable road looks like, and a quantitative one on how long it should take to travel between two locations. Infrastructure costs are projected to increase dramatically in the future, therefore it is essential that the public is not only consulted, but also be educated, and ultimately make choices with respect to the service levels that they wish to pay for.

5.1.5 Availability of Finances

Availability of finances will ultimately control all aspects of a desired level of service. Ideally, these funds must be sufficient to achieve corporate goals, meet legislative requirements, address an asset's life cycle needs, and meet community expectations. Levels of service will be dictated by availability of funds or elected officials' ability to increase funds, or the community's willingness to pay.

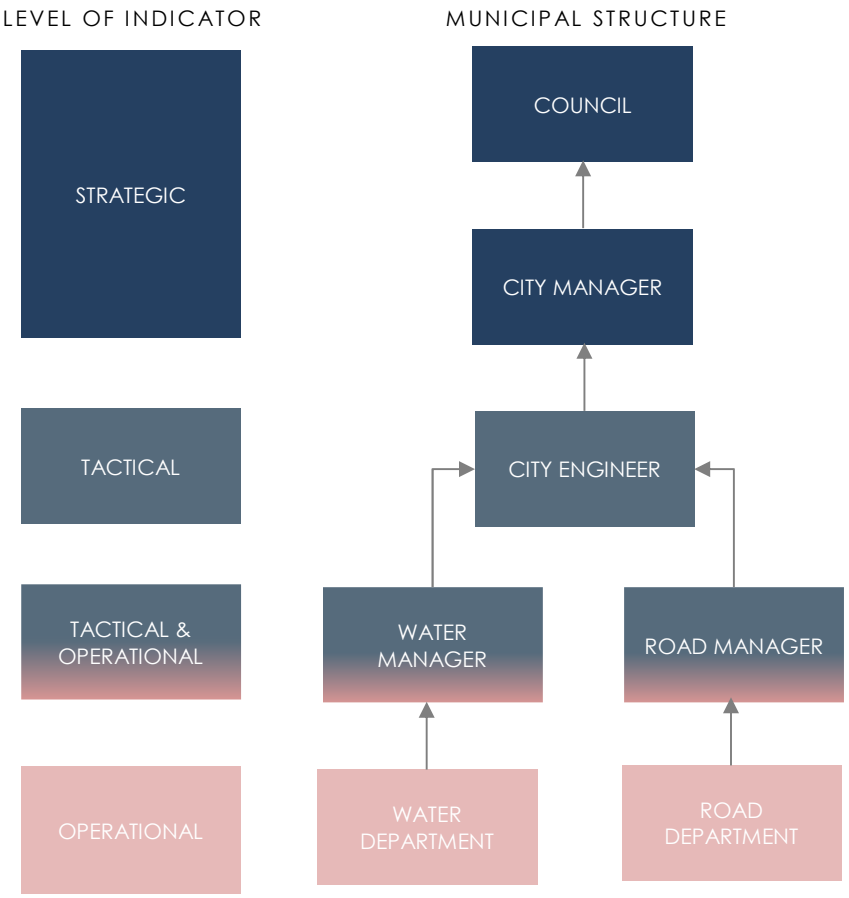
5.2 Key Performance Indicators

Performance measures or key performance indicators (KPIs) that track levels of service should be specific, measurable, achievable, relevant, and timebound (SMART). Many good performance measures can be established and tracked through the CityWide suite of software products. In this way, through automation, results can be reviewed on an annual basis and adjustments can be made to the overall asset management plan, including the desired level of service targets.

In establishing measures, a good rule of thumb to remember is that maintenance activities ensure the performance of an asset and prevent premature aging, whereas rehab activities extend the life of an asset. Replacement activities, by definition, renew the life of an asset. In addition, these activities are constrained by resource availability (in particular, finances) and strategic plan objectives. Therefore, performance measures should not just be established for operating and maintenance activities, but also for the strategic, financial, and tactical levels of the asset management program. This will assist all levels of program delivery to review their performance as part of the overall level of service provided.

This is a very similar approach to the "balanced score card" methodology, in which financial and non-financial measures are established and reviewed to determine whether current performance meets expectations. The "balanced score card", by design, links day to day operations activities to tactical and strategic priorities in order to achieve an overall goal, or in this case, a desired level of service.

The structure of accountability and level of indicator with this type of process is represented in the following table, modified from the InfraGuide's best practice document, "Developing Indicators and Benchmarks" published in April 2003.



As a note, a caution should be raised over developing too many performance indicators that may result in data overload and lack of clarity. It is better to develop a select few that focus in on the targets of the asset management plan.

Outlined below for each infrastructure class is a suggested service description, suggested service scope, and suggested performance indicators. These should be reviewed and updated in each iteration of the AMP.

5.3 Transportation Services

5.3.1 Service Description

The Township's transportation network is comprised of paved and gravel roads, 14 bridges, 30 large culverts and the associated curbs, lane markings, sidewalks and street lights. Together, the above infrastructure enables the township to deliver transportation and pedestrian facility services and give people a range of options for moving about in a safe and efficient manner.

5.3.2 Scope of Services

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

5.3.3 Performance Indicators (reported annually)

Performance Indicators (reported annually)	
Strategic Indicators	■ percentage of total reinvestment compared to asset replacement value ■ completion of strategic plan objectives (related to transportation)
Financial Indicators	■ annual revenues compared to annual expenditures ■ annual replacement value depreciation compared to annual expenditures ■ total cost of borrowing compared to total cost of service ■ revenue required to maintain annual network growth
Tactical Indicators	■ percentage of road network rehabilitated/reconstructed ■ value of bridge/large culvert structures rehabilitated or reconstructed ■ overall road condition index as a percentage of desired condition index ■ overall bridge condition index as a percentage of desired condition index ■ annual adjustment in condition indexes ■ annual percentage of network growth ■ percent of paved road lane km where the condition is rated Poor or Critical ■ number of bridge/large culvert structures where the condition is rated Poor or Critical ■ percentage of road network replacement value spent on operations and maintenance ■ percentage of bridge/large culvert structures replacement value spent on operations and maintenance
Operational Indicators	■ percentage of road network inspected within last 5 years ■ percentage of bridge/large culvert structures inspected within last two years ■ operating costs for paved roads per lane km ■ operating costs for gravel roads per lane km ■ operating costs for bridge/large culvert structures per square metre ■ number of customer requests received annually ■ percentage of customer requests responded to within 24 hours

6.0 Asset Management Strategy

6.1 Objective

To outline and establish a set of planned actions, based on best practice, that will enable the assets to provide a desired and sustainable level of service, while managing risk, at the lowest life cycle cost.

The Asset Management Strategy will develop an implementation process that can be applied to the needs identification and prioritization of renewal, rehabilitation, and maintenance activities. This will assist in the production of a 10 year plan, including growth projections, to ensure the best overall health and performance of the municipality's infrastructure.

This section includes an overview of condition assessment techniques for each asset class; the life cycle interventions required, including interventions with the best ROI; and prioritization techniques, including risk, to determine which priority projects should move forward into the budget first.

6.2 Non-Infrastructure Solutions and Requirements

The Township should explore, as requested through the provincial requirements, which non-infrastructure solutions should be incorporated into the budgets for the road and bridge infrastructure programs. Non- Infrastructure solutions are such items as studies, policies, condition assessments, consultation exercises, etc., that could potentially extend the life of assets or lower total asset program costs in the future.

Typical solutions for a municipality include linking the asset management plan to the strategic plan, growth and demand management studies, infrastructure master plans, better integrated infrastructure and land use planning, public consultation on levels of service, and condition assessment programs. As part of future asset management plans, a review of these requirements should take place, and a portion of the capital budget should be dedicated for these items in each programs budget.

It is recommended, under this category of solutions, that the Township implement holistic condition assessment programs for their assets. This will lead to higher understanding of infrastructure needs, enhanced budget prioritization methodologies, and a clearer path of what is required to achieve sustainable infrastructure programs.

6.3 Condition Assessment Programs

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

Some benefits of holistic condition assessment programs within the overall asset management process are listed below:

- Understanding of overall network condition leads to better management practices
- Allows for the establishment of rehabilitation programs
- Prevents future failures and provides liability protection
- Potential reduction in operation/maintenance costs
- Accurate current asset valuation

- Allows for the establishment of risk assessment programs
- Establishes proactive repair schedules and preventive maintenance programs
- Avoids unnecessary expenditures
- Extends asset service life therefore improving level of service
- Improves financial transparency and accountability
- Enables accurate asset reporting which, in turn, enables better decision-making

Condition assessment can involve different forms of analysis such as subjective opinion, 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, Critical) is used. This will be a less expensive approach when applied to thousands of assets, yet will still provide up to date information, and will allow for detailed assessment or follow up inspections on those assets captured as Poor or Critical condition later.

The following section outlines condition assessment programs available for road and bridge assets that would be useful for the Township.

6.3.1 Pavement Network Inspections

Typical industry pavement inspections are performed by consulting firms using specialised assessment vehicles equipped with various electronic sensors and data capture equipment. The vehicles will drive the entire road network and typically collect two different types of inspection data – surface distress data and roughness data.

Surface distress data involves the collection of multiple industry standard surface distresses, which are captured either electronically, using sensing detection equipment mounted on the van, or visually, by the van's inspection crew. Examples of surface distresses are:

- For asphalt surfaces - Alligator Cracking/Distortion/Excessive Crown/Flushing/Longitudinal Cracking/Map Cracking/Patching/Edge Cracking/Potholes/Ravelling/Rippling/Transverse Cracking/Wheel Track Rutting

- For concrete surfaces - Coarse Aggregate Loss/Corner 'C' and 'D' Cracking/Distortion/Joint Faulting/Joint Sealant Loss/Joint Spalling/Linear Cracking/Patching/Polishing/ Potholes/Ravelling/Scaling/Transverse Cracking

Roughness data capture involves the measurement of the roughness of the road, measured by lasers that are mounted on the inspection van's bumper, calibrated to an international roughness index.

Most firms will deliver this data to the client in a database format complete with engineering algorithms and weighting factors to produce an overall condition index for each segment of roadway. This type of scoring database is ideal for upload into the CityWide software database, in order to tag each road with a present condition and then further life cycle analysis to determine what activity should be done to which road, in what timeframe, and to calculate the cost for the work will be completed within the CityWide system.

The above process is an excellent way to capture road condition as the inspection trucks will provide detailed surface and roughness data for each road segment, and often include video or street imagery.

Another option for a cursory level of condition assessment is for municipal road crews to perform simple windshield surveys as part of their regular patrol. Many municipalities have created data collection inspection forms to assist this process and to standardize what presence of defects would constitute a Good, Fair, Poor or Critical score. Lacking any other data for the complete road network this can still be seen as a good method and will assist greatly with the overall management of the road network. The CityWide Works software has a road patrol component built in that could capture this type of

inspection data during road patrols in the field, enabling later analysis of rehabilitation and replacement needs for budget development.

It is recommended that the Township establish a pavement condition assessment program and that a portion of capital funding is dedicated to this.

6.3.2 Bridge & Culvert (greater than 3m) Inspections

Ontario municipalities are mandated by the Ministry of Transportation to inspect all structures that have a span of 3 metres or more, according to the OSIM (Ontario Structure Inspection Manual). At present, in the Township, there are 47 structures that meet this criteria.

Structure inspections must be performed by, or under the guidance of, a structural engineer, must be performed on a biennial basis (once every two years), and include such information as structure type, number of spans, span lengths, other key attribute data, detailed photo images, and structure element by element inspection, rating and recommendations for repair, rehabilitation and replacement.

The best approach to develop a 10 year needs list for the Township's relatively small structure port-folio would be to have the structural engineer who performs the inspections to develop a maintenance requirements report, and rehabilitation and replacement requirements report as part of the overall assignment. In addition to refine the overall needs requirements the structural engineer should identify those structures that will require more detailed investigations and non-destructive testing techniques. Examples of these investigations are:

- Detailed Deck Condition Survey
- Non-destructive Delamination Survey of Asphalt Covered Decks
- Substructure Condition Survey
- Detailed Coating Condition Survey
- Underwater investigation
- Fatigue investigation
- Structure evaluation

Through the OSIM recommendations and additional detailed investigations a 10 year need list will be developed for the Township's bridges. It is recommended, if not in place already, that the township engage in an active biennial OSIM inspection program with additional detailed investigations as required and that a portion of the capital budget is dedicated to this.

The 10 year needs list developed could then be further prioritized using risk management techniques to better allocate resources. Also, the results of the OSIM inspection for each structure, whether BCI (bridge condition index) or general condition (Good, Fair, Poor, Critical) should be entered into the CityWide software to update results and analysis for the development of the budget.

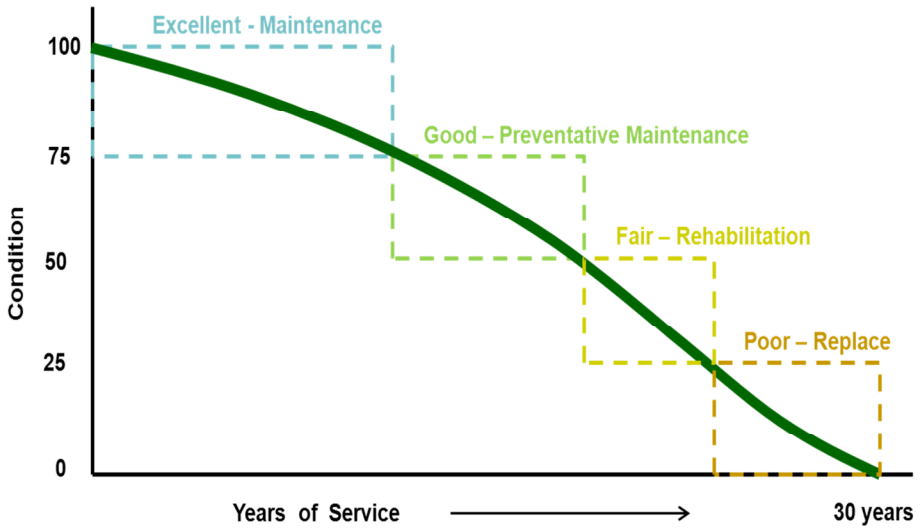
6.4 AM Strategy – Life Cycle Analysis Framework

An industry review was conducted to determine which life cycle activities can be applied at the appropriate time in an asset's life, to provide the greatest additional life at the lowest cost. In the asset management industry, this is simply put as doing the right thing to the right asset at the right time. If these techniques are applied across entire asset networks or portfolios (e.g. the entire road network), the Township could gain the best overall asset condition while expending the lowest total cost for those programs.

6.4.1 Paved Roads

The following analysis has been conducted at a fairly high level, using industry standard activities and costs for paved roads. With future updates of this Asset Management Strategy, the Township may wish to run the same analysis with a detailed review of Township activities used for roads and the associated local costs for those work activities. All of this information can be input into the CityWide software suite in order to perform updated financial analysis as more detailed information becomes available.

The following diagram depicts a general deterioration profile of a road with a 30 year life.



As shown above, during the road's life cycle there are various windows available for work activity that will maintain or extend the life of the asset. These windows are: maintenance; preventative maintenance; rehabilitation; and replacement or reconstruction.

The windows or thresholds for when certain work activities should be applied to also coincide approximately with the condition state of the asset as shown below:

Asset Condition and Related Work Activity: Paved Roads

Condition	Condition Range	Work Activity
Excellent condition (Maintenance only phase)	100-76	■ Maintenance only
Good Condition (Preventative maintenance phase)	75 - 51	■ Crack Sealing ■ Emulsions
Fair Condition (Rehabilitation phase)	50 -26	■ Resurface - Mill & Pave ■ Resurface - Asphalt Overlay ■ Single & Double Surface Treatment (for rural roads)
Poor Condition (Reconstruction phase)	25 - 1	■ Reconstruct - Pulverize and Pave ■ Reconstruct - Full surface and base reconstruction
Critical Condition (Reconstruction phase)	0	■ Critical includes assets beyond their useful lives which make up the backlog. They require the same interventions as the "Poor" category above.

With future updates of this Asset Management Strategy the Township may wish to review the above condition ranges and thresholds for when certain types of work activity occur, and adjust to better suit the Township's work program. Also note: when adjusting these thresholds, it actually adjusts the level of service provided and ultimately changes the amount of money required. These threshold and condition ranges can be easily updated with the CityWide software suite and an updated financial analysis can be calculated. These adjustments will be an important component of future Asset Management Plans, as the Province requires each municipality to present various management options within the financing plan.

The table below outlines the costs for various road activities, the added life obtained for each, the condition range at which they should be applied, and the cost of one year added life for each (cost of activity/added life) in order to present an apples to apples comparison.

Road lifecycle Activity Options

Treatment	Average Unit Cost (Per Sq. M)	Added Life (Years)	Condition Range	Cost Of Activity/Added Life
Urban Reconstruction	$205	30	25 - 0	$6.83
Urban Resurfacing	$84	15	50 - 26	$5.60
Rural Reconstruction	$135	30	25 - 0	$4.50
Rural Resurfacing	$40	15	50 - 26	$2.67
Double Surface Treatment	$25	10	50 - 26	$2.50
Routing & Crack Sealing (P.M.)	$2	3	75 - 51	$0.67

As can be seen in the table above, preventative maintenance activities such as routing and crack sealing have the lowest associated cost (per sq. m) in order to obtain one year of added life. Of course, preventative maintenance activities can only be applied to a road at a relatively early point in the life cycle. It is recommended that the Township engage in an active preventative maintenance program for all paved roads and that a portion of the maintenance budget is allocated to this.

Also, rehabilitation activities, such as urban and rural resurfacing or double surface treatments (tar and chip) for rural roads have a lower cost to obtain each year of added life than full reconstruction activities. It is recommended, if not in place already, that the municipality engages in an active rehabilitation program for urban and rural paved roads and that a portion of the capital budget is dedicated to this.

Of course, in order to implement the above programs it will be important to also establish a general condition score for each road segment, established through standard condition assessment protocols as previously described.

It is important to note that a "worst first" budget approach, whereby no life cycle activities other than reconstruction at the end of a roads life are applied, will result in the most costly method of managing a road network overall.

6.4.2 Gravel Roadways

As reported in the State of the Infrastructure section, over 50% of South-West Oxford's road network comprises gravel roads. The life cycle activities required for these roads are quite different from paved roads. Gravel roads require a cycle of perpetual maintenance, including general re-grading, reshaping of the crown and cross section, gravel spot and section replacement, dust abatement and ditch clearing and cleaning.

Gravel roads can require frequent maintenance, especially after wet periods and when accommodating increased traffic. Wheel motion shoves material to the outside (as well as in-between travelled lanes), leading to rutting, reduced water-runoff, and eventual road destruction if unchecked. This deterioration process is prevented if interrupted early enough, simple re-grading is sufficient, with material being pushed back into the proper profile.

As a high proportion of gravel roads can have a significant impact on the maintenance budget, it is recommended that with further updates of this asset management plan the Township study the traffic volumes and maintenance requirements in more detail for its gravel road network.

Similar studies elsewhere have found converting certain roadways to paved roads can be very cost beneficial especially if frequent maintenance is required due to higher traffic volumes. Roads within the gravel network should be ranked and rated using the following criteria:

- Usage - traffic volumes and type of traffic
- Functional importance of the roadway
- Known safety issues
- Frequency of maintenance and overall expenditures required.

Through the above type of analysis, a program could be introduced to convert certain gravel roadways into paved roads, reducing overall costs, and be brought forward into the long range budget.

6.4.4 Bridges & Culverts (greater than 3m span)

The best approach to develop a 10 year needs list for the Township's relatively small structure port-folio would be to have the structural engineer who performs the inspections to develop a maintenance requirements report, a rehabilitation and replacement requirements report and identify additional

detailed inspections as required. This approach is described in more detail within the "Bridge & Culvert (greater than 3m) Inspections" section above.

6.5 Growth and Demand

Typically, a municipality will have specific plans associated with population growth. It is essential that the asset management strategy should address not only the existing infrastructure, as above, but must include the impact of projected growth on defined project schedules and funding requirements. Projects would include the funding of the construction of new infrastructure, and/or the expansion of existing infrastructure to meet new demands. The Township should enter these projects into the CityWide software in order to be included within the short and long term budgets as required.

6.6 Project Prioritization

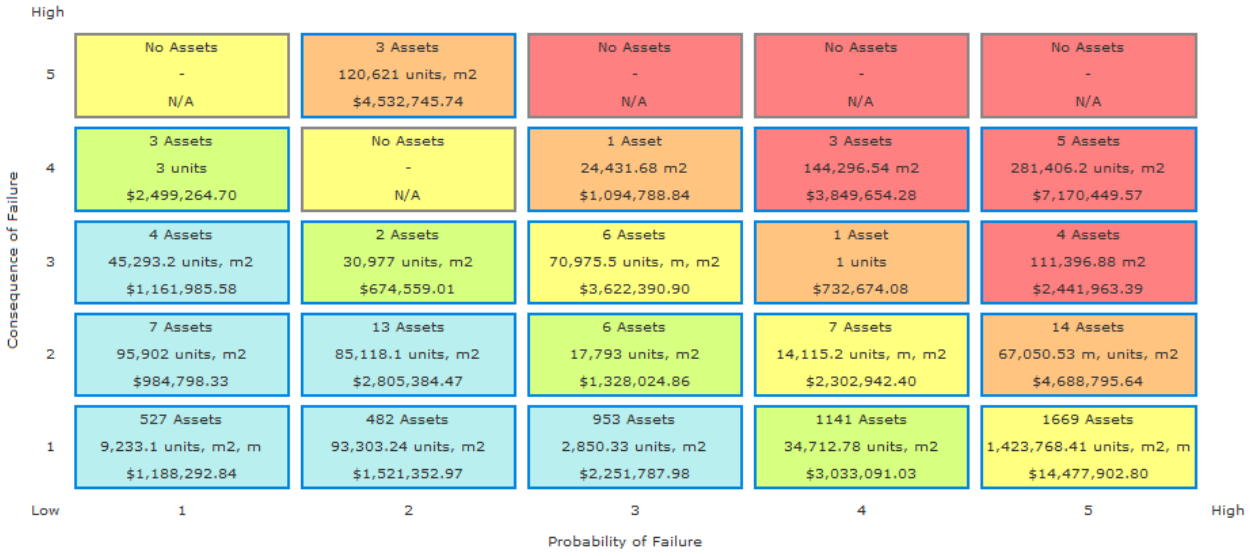
The above techniques and processes when established for the road and bridge programs will supply a significant listing of potential projects. Typically, the infrastructure needs will exceed available resources and therefore project prioritization parameters must be developed to ensure the right projects come forward into the short and long range budgets. An important method of project prioritization is to rank each project, or each piece of infrastructure, on the basis of how much risk it represents to the organization.

6.6.1 Risk Matrix and Scoring Methodology

Risk within the infrastructure industry is often defined as the probability (likelihood) of failure multiplied by the consequence of that failure.

Risk = Likelihood of Failure x Consequence of Failure

The likelihood of failure relates to the current condition state of each asset, whether they are in Excellent, Good, Fair, Poor or Critical condition, as this is a good indicator regarding their future risk of failure. The consequence of failure relates to the magnitude, or overall effect, that an asset's failure will cause. For instance, a small diameter water main break in a sub division may cause a few customers to have no water service for a few hours, whereby a large trunk water main break outside a hospital could have disastrous effects and would be a front page news item. The following grid represents the scoring matrix for risk:



All of the Township's assets analysed within this Asset Management Plan have been given both a likelihood of failure score (ranging from 1 to 5, with 1 indicating a low probability of failure)and a consequence of failure score within the CityWide software.

The following risk scores have been developed at a high level for each asset class within the CityWide software system. It is recommended that the Township undertake a detailed study to develop a more tailored suite of risk scores, particularly in regards to the consequence of failure, and that this be updated within the CityWide software with future updates to this Asset Management Plan.

The current scores that will determine budget prioritization currently within the system are as follows:

All assets:
The Likelihood of Failure score is based on the condition of the assets.

Likelihood of Failure: **All Assets**	
Asset condition	Likelihood of failure
Excellent condition	score of 1
Good condition	score of 2
Fair condition	score of 3
Poor condition	score of 4
Critical condition	score of 5

Bridges (based on valuation):
The consequence of failure score for this initial AMP is based upon the replacement value of the structure. The higher the value, the larger the structure (most likely), and therefore, the higher the consequential risk of failure:

Consequence of Failure: **Bridges**	
Replacement Value	Consequence of failure
Up to $100k	score of 1
$101 to $200K	score of 2
$201 to $300k	score of 3
301 to $400K	score of 4
$400k and over	score of 5

Roads (based on classification):
The consequence of failure score for this initial AMP is based upon the road classification as this will reflect traffic volumes and number of people affected.

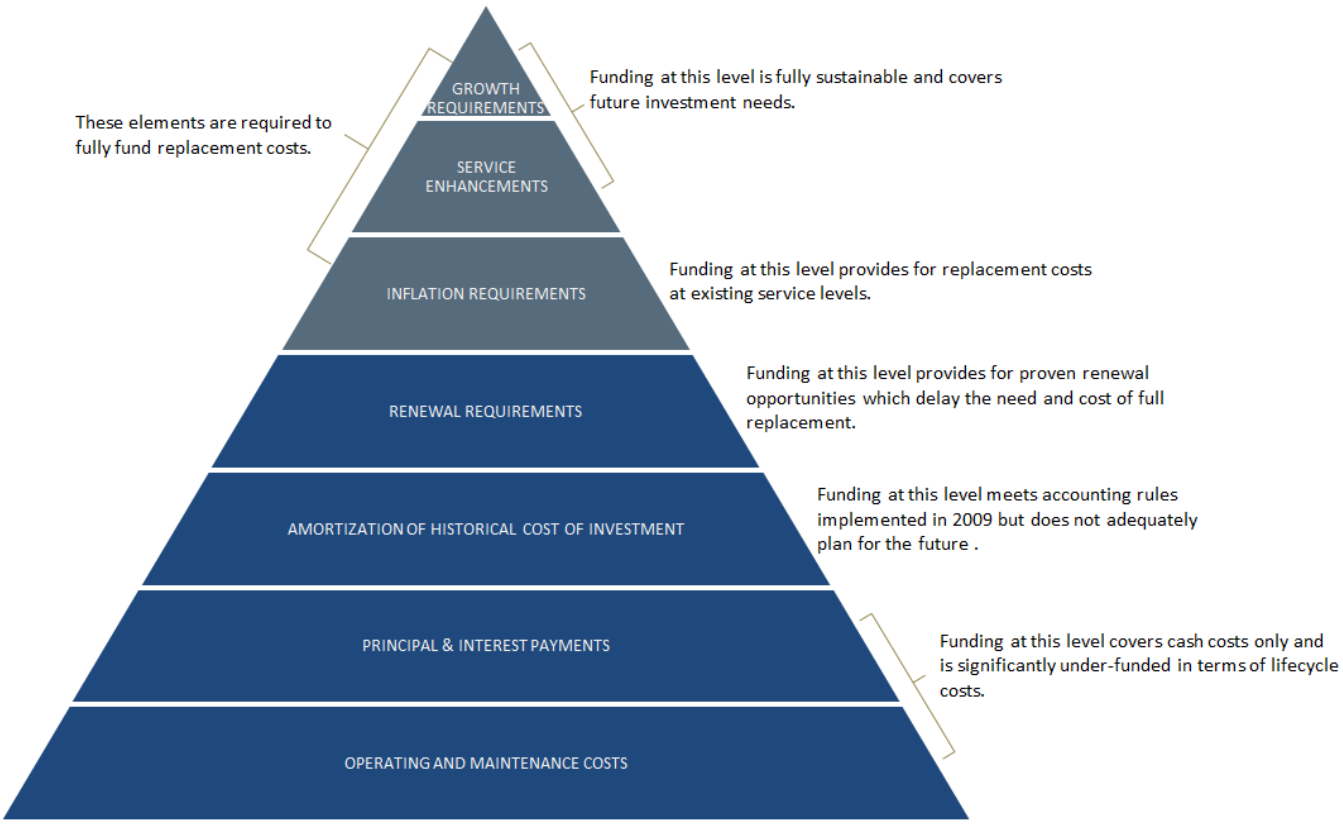
Consequence of Failure: **Roads**	
Road Classification	Consequence of failure
Gravel	score of 1
Low class bituminous	score of 3
High class bituminous	score of 5

7.0 Financial Strategy

7.1 General overview of financial plan requirements

In order for an AMP to be effectively put into action, it must be integrated with financial planning and long-term budgeting. The development of a comprehensive financial plan will allow South-West Oxford Township to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service and projected growth requirements.

The following pyramid depicts the various cost elements and resulting funding levels that should be incorporated into AMP's that are based on best practices.



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

a) the financial requirements (as documented in the SOTI section of this report) for:
- existing assets
- existing service levels
- requirements of contemplated changes in service levels (none identified for this plan)
- requirements of anticipated growth (none identified for this plan)

b) use of traditional sources of municipal funds:
- tax levies
- user fees
- reserves
- debt (no additional debt required for this AMP)
- development charges (not applicable)

c) use of non-traditional sources of municipal funds:
- reallocated budgets (not required for this AMP)
- partnerships (not applicable)
- procurement methods (no changes recommended)

d) use of senior government funds:
- gas tax
- grants (not included in this plan due to Provincial requirements for firm commitments)

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

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

This AMP includes recommendations that avoid long-term funding deficits.

7.2 Financial information relating to the Township of South-West Oxford's AMP

7.2.1 Funding objective

We have been asked to develop scenarios that would enable the Township of South-West Oxford to achieve full funding within 5 years or 10 years for the following assets:

a) paved roads; bridges and culverts; sewer network; transportation network

For each scenario developed we have included strategies, where applicable, regarding the use of tax revenues, user fee revenues and reserves.

Note: For the purposes of this AMP, we have excluded the category of gravel roads since gravel roads are a perpetual maintenance asset and end of life replacement calculations do not normally apply. If gravel roads are maintained properly they, in essence, could last forever.

7.3 Tax funded assets

7.3.1 Current funding position

Tables 1 and 2 outline, by asset category, the Township of South-West Oxford's average annual asset investment requirements, current funding positions and funding increases required to achieve full funding on assets traditionally funded by taxes.

Table 1. Summary of Infrastructure Requirements & Current Funding Available

Asset Category	Average Annual Investment Required	2012 Annual Funding Available				Annual Deficit
		Taxes	Gas Tax	Other	Total	
Roads	$1,299,000	$338,000	$230,000	0	$568,000	$731,000
Bridges & Culverts	$251,000	0	0	0	0	$251,000
Sewer Network	$2,000	0	0	0	0	$2,000
Transportation Network	$298,000	0	0	0	0	$298,000
Total	**$1,850,000**	**$338,000**	**$230,000**	**0**	**$568,000**	**$1,282,000**

7.3.2. Recommendations for full funding

The average annual investment requirement for paved roads, bridges/culverts, the sewer network and the transportation network is $1,850,000. Annual revenue currently allocated to these assets is $568,000 leaving an annual deficit of $1,282,000. To put it another way, these infrastructure categories are currently funded at 31% of their long-term requirements.

South-West Oxford had annual tax revenues of $3,167,000 in 2012. As illustrated in table 2, full funding would require an increase in tax revenue of 41% over time.

Table 2 … Overview of Revenue Requirements for Full Funding

Asset Category	Tax Increase Required for Full Funding
Roads	23.1%
Bridges & Culverts	7.9%
Sewer Network	0.1%
Transportation Network	9.4%
Total	**40.5%**

Through table 3, we have expanded the above scenarios to outline two options:

Table 3 … Revenue Options for Full Funding

	Tax Revenues	
	5 Years	10 Years
Annual tax increases required	8.0%	4.0%

We recommend the 10 year option in table 3. This involves full funding being achieved over 10 years by:

a) increasing tax revenues by 4.0% each year for the next 10 years solely for the purpose of phasing in full funding to the four asset categories covered by this AMP
a) allocating 100% of the gas tax revenue (currently $230,000) to the roads category
b) increasing existing infrastructure budgets by the applicable inflation index on an annual basis

Although this option achieves full funding on an annual basis in 10 years and provides financial sustainability over the period modeled (to 2050), the recommendations do require prioritizing capital projects to fit the resulting annual funding available. For example, as of 2013, age based data shows a pent up investment demand of $6,609,000 for bridges/culverts, $10,152,000 for paved roads, $93,000 for the sewer network and $1,790,000 for the transportation network. Prioritizing these and future projects will require the age based data to be replaced by condition based data.

7.5 Use of debt

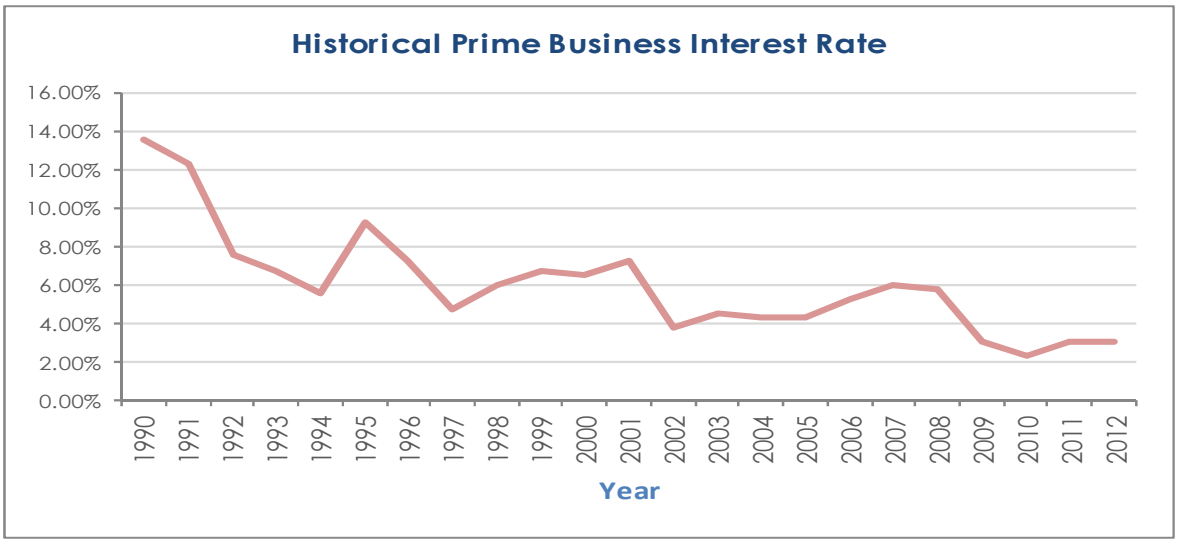
For reference purposes, table 4 outlines the premium paid on a project if financed by debt. For example, a $1M project financed at 3.0%[1] over 15 years would result in a 26% premium or $260,000 of increased costs due to interest payments. For simplicity, the table does not take into account the time value of money or the effect of inflation on delayed projects.

Table 4. Total Interest Paid as a % of Project Costs

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

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

[1] Current municipal Infrastructure Ontario rates for 15 year money is 3.2%.



As illustrated in table 4, a change in 15 year rates from 3% to 6% would change the premium from 26% to 54%. Such a change would have a significant impact on a financial plan.

Tables 5 and 6 outline how the Township of South-West Oxford has historically used debt for investing in the asset categories as listed. In terms of overall debt capacity, South-West Oxford currently has $212,000 of total outstanding debt and $340,000 of total annual principal and interest payments. These principal and interest payments are well within its provincially prescribed annual maximum of $921,461.

Table 5. Overview of Use of Debt

Asset Category	Current Debt Outstanding	Use Of Debt In Last Five Years				
		2008	2009	2010	2011	2012
Roads	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0
Sewer Network	$212,000	0	0	0	$444,000	0
Transportation Network	0	0	0	0	0	0
Total	**$212,000**	**0**	**0**	**0**	**$444,000**	**0**

Table 6. Overview of Debt Costs

Asset Category	Principal & Interest Payments In Next Five Years				
	2013	2014	2015	2016	2017
Roads	$233,000	$229,000	$225,000	$221,000	$216,000
Bridges & Culverts	0	0	0	0	0
Sewer Network	$65,000	$62,000	$57,000	$41,000	$4,000
Transportation Network	$42,000	$42,000	$41,000	$40,000	$39,000
Total	**$340,000**	**$333,000**	**$323,000**	**$302,000**	**$259,000**

The Township of South-West Oxford has indicated that its long-term goal is to fully fund its infrastructure requirements without further use of debt. As illustrated in this plan, the revenue options available to

South-West Oxford allow the Township to meet this goal. As a result, scenarios included in this plan do not include debt financing.

7.6 Use of reserves

7.6.1 Available reserves

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

- the ability to stabilize tax rates when dealing with variable and sometimes uncontrollable factors
- financing one-time or short-term investments
- accumulating the funding for significant future infrastructure investments
- managing the use of debt
- normalizing infrastructure funding requirements

By infrastructure category, table 7 outlines the details of the reserves currently available to the Township of South-West Oxford.

Table 7. Summary of Reserves Available

Asset Category	Balance at January 1, 2013
Roads	$106,000
Bridges and Culverts	0
Sewer Network	0
Transportation Network	0
Total	**$106,000**

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

- breadth of services provided
- age and condition of infrastructure
- use and level of debt
- economic conditions and outlook
- internal reserve and debt policies.

Due to the relatively low level of reserves available for the asset categories covered by this AMP, the scenarios developed in this report do not draw on the above reserves during the phase-in period to full funding. This, coupled with South-West Oxford's judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for emergency situations until reserves are built to desired levels. This will allow the Township of South-West Oxford to address high priority infrastructure investments in the short to medium-term.

7.6.2 Recommendation

As the Township of South-West Oxford updates its AMP and expands it to include other asset categories, that future planning should include determining what its long-term reserve balance requirements are and a plan to achieve such balances in the long-term.

8.0 Appendix A: Report Card Calculations

Key Calculations

1. "Weighted, unadjusted star rating":

(% of assets in given condition) x (potential star rating)

2. "Adjusted star rating"

(weighted, unadjsted star rating) x (% of total replacement value)

3. "Overall Rating"

$$\frac{\textit{(Condition vs Performance star rating)} + \textit{(Needs vs Funding star rating)}}{2}$$

Grade Cuttoffs	
1. Conditions vs Performance	
Letter Grade	Star Rating
F	0
D	2
D+	2.5
C	2.9
C+	3.5
B	3.9
B+	4.5
A	4.9
A	5

2. Funding vs Need		
Funding %	Star rating	Grade
0.0%	0	F
25.0%	1	F
46.0%	1.9	D
61.0%	2.9	C
76.0%	3.9	B
91.0%	4.9	A
100.0%	5	A

Road Network Infrastructure: Township of South-West Oxford

1. Condition vs Performance

Total category replacement value	$25,334,944.00	Segment replacement value	$25,334,944.00	% of total replacement value	100.0%

Segment(s)/ Components	Condition	Letter grade	Potential star rating	Quantity (m.sq) in given condition	% of assets in given condition	Weighted, unadjusted star rating	Adjusted star rating	Letter grade
High class bituminous, low class bituminous (excludes gravel roads)	Excellent	A	5	145,674.30	12.9%	0.64	2.3	D
	Good	B	4	149,611.44	13.2%	0.53		
	Fair	C	3	114,012.68	10.1%	0.30		
	Poor	D	2	184,153.54	16.3%	0.33		
	Critical	F	1	536,143.34	47.5%	0.47		
			Totals	**1,129,595.30**	**100%**	**2.3**		

2. Needs vs Funding

Average annual investment required	2013 funding available	Funding percentage	Deficit/Surplus			Star rating	Letter grade
$1,299,000.00	$568,000.00	43.7%	-$731,000.00			1.0	F

3. Overall Rating

Condition vs Performance star rating	Needs vs Funding star rating	Average star rating	Overall letter grade
2.3	1.0	1.6	F

Bridge & Culvert Infrastructure: Township of South-West Oxford

1. Condition vs Performance

Total category replacement value	$9,609,158.00	Segment replacement value	$9,609,158.00	% of total replacement value	100.0%

Segment(s)/ Components	Condition	Letter grade	Potential star rating	Quantity (m)	% of assets in given condition	Weighted, unadjusted star rating	Adjusted star rating	Letter grade
Bridges and Culverts (concrete and steel)	Excellent	A	5	0.0	0.0%	0.00	1.1	F
	Good	B	4	0.0	0.0%	0.00		
	Fair	C	3	5.5	1.4%	0.04		
	Poor	D	2	9.2	2.4%	0.05		
	Critical	F	1	370.6	96.2%	0.96		
			Totals	**385.3**	**100%**	**1.1**		

2. Needs vs Funding

Average annual investment required	2013 funding available	Funding percentage	Deficit/Surplus			Star rating	Letter grade
$251,000.00	$0.00	0.0%	-$251,000.00			0.0	F

3. Overall Rating

Condition vs Performance star rating	Needs vs Funding star rating	Average star rating	Overall letter grade
1.1	0.0	0.5	F

Storm Infrastructure: Township of South-West Oxford

1. Condition vs Performance

Total category replacement value	$110,387.00	Segment replacement value	$110,387.00	% of total replacement value	100.0%

Segment(s)/ Components	Condition	Letter grade	Potential star rating	Units	% of assets in given condition	Weighted, unadjusted star rating	Adjusted star rating	Letter grade
Catch basins	Excellent	A	5	1	0.4%	0.02	1.16	F
	Good	B	4	0	0.0%	0.00		
	Fair	C	3	0	0.0%	0.00		
	Poor	D	2	33	14.0%	0.28		
	Critical	F	1	201	85.5%	0.86		
			Totals	**235**	**100%**	**1.16**		

2. Needs vs Funding

Average annual investment required	2013 funding available	Funding percentage	Deficit/Surplus			Star rating	Letter grade
$2,000.00	$0.00	0.0%	-$2,000.00			0.0	F

3. Overall Rating

Condition vs Performance star rating	Needs vs Funding star rating	Average star rating	Overall letter grade
1.2	0.0	0.6	F

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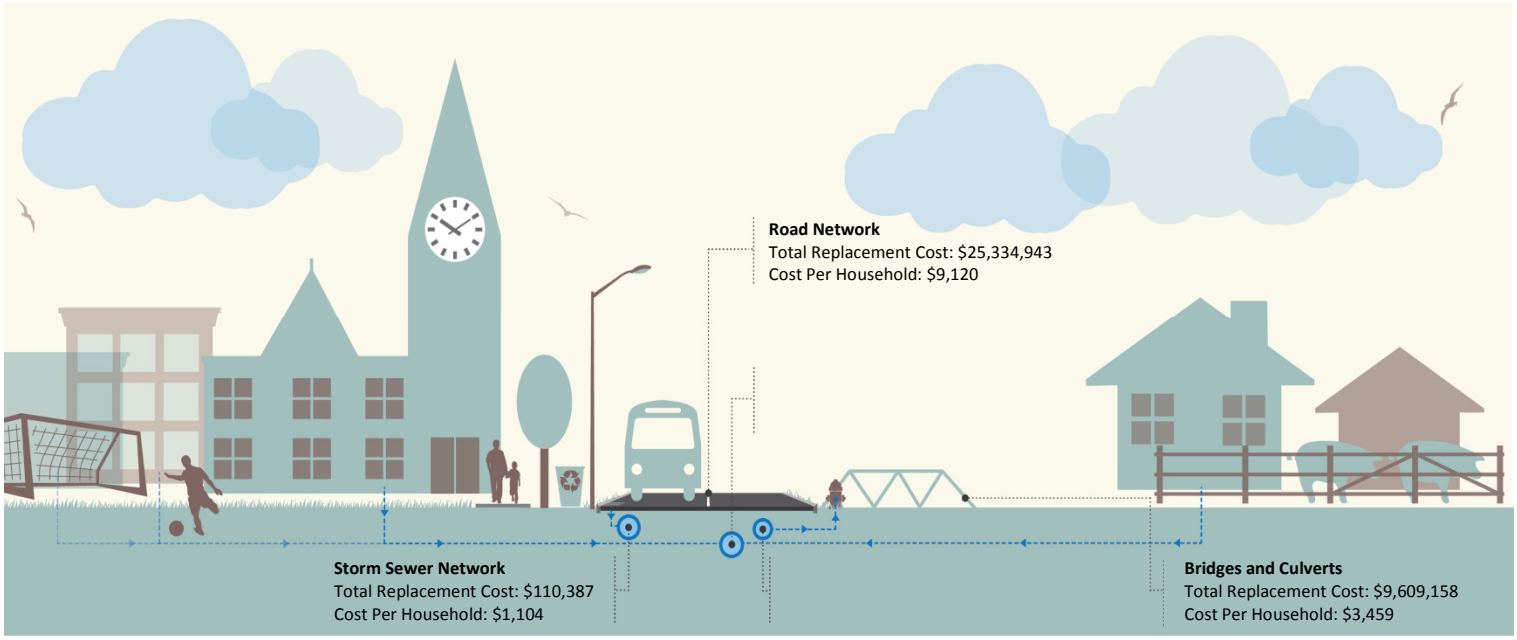
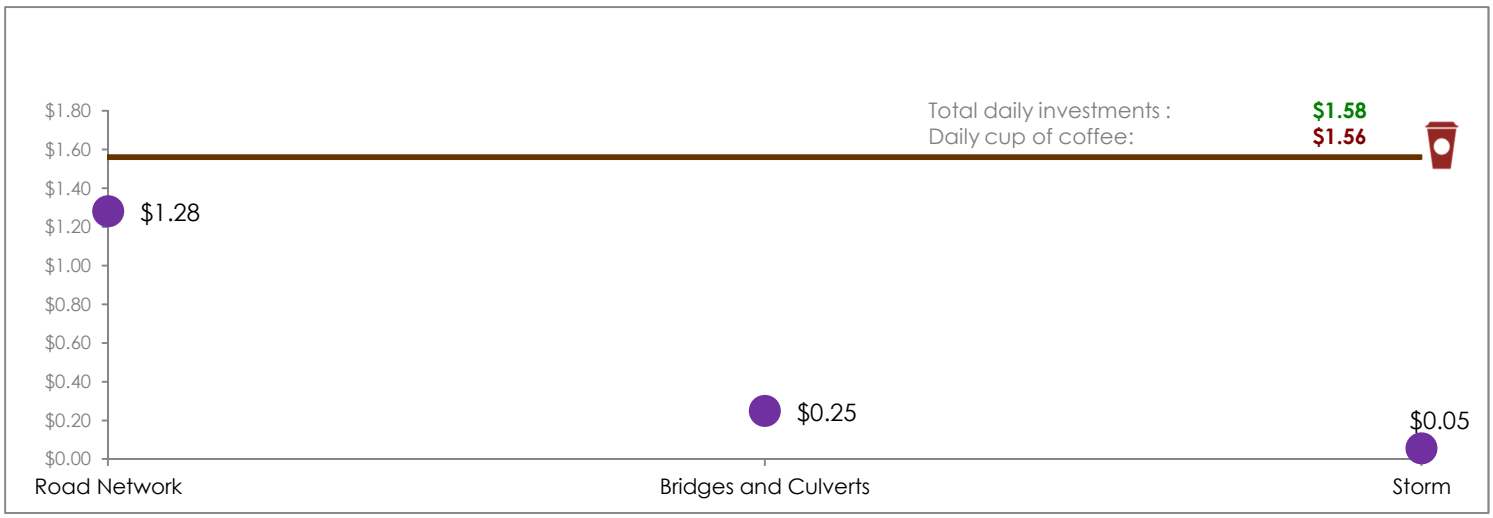
Infrastructure Replacement Cost Per Household

Total: $13,683 per household



Average Daily Investment Required per Household for Infrastructure Sustainability



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INTELLIGENCE FOR THE PUBLIC SECTOR

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