Infrastructure Solutions Inc

• On Budget - On Time •

Asset Management Plan

Township of Casey

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1 EXECUTIVE SUMMARY

The Province of Ontario, through its MIII Capital program, has provided funding designed to help municipalities address necessary road, bridge, and other priority projects identified through the assembly of an Asset Management Plan. This program is the second phase of the Province's Municipal Infrastructure Strategy which aims to:

- Further strengthen municipal asset management practices;
- Support the most critical roads, bridges,; and
- Provide funding to municipalities that are unable to undertake projects without provincial support.

Infrastructure Solutions (Engineering) Inc. based its Asset Management Plan on all asset types and their current replacement costs. Asset lifespans, condition and project requirements were determined by engineering assessments, and degradation curves (not accounting depreciation rates determined within the PSAB 3150 exercise). Where condition assessments were unavailable, ISI applied an age-based analysis.

By replacement value, 88% of the Townships assets are in roads, bridges and culverts, with bridges and culverts with the greatest value at 67%. Through its comprehensive analysis of all asset types, ISI calculated the Township's infrastructure deficit, defined as the added investment that would be required to maintain a Township's infrastructure at appropriate service levels and in a good state of repair. The Township has an infrastructure deficit of approximately $665,000 in 2013 which will climb substantially in 2014 and 2015. The Township of Casey's 2013 infrastructure deficit is determined to be $ 1,800 per person, serious for a small community and growing rapidly.

By our calculations, the average annual capital requirement is $611,275 over the next ten years and the current contribution to the capital program is approximately $93,842 resulting in a large infrastructure funding gap which will continue to grow without corrective action. As highlighted in the Report Card within, the Township's major linear asset, its bridges, are generally in poor condition and will require substantial work in the next ten years. Roads are in fair condition. The Township is not alone in facing an infrastructure deficit, and is similar to many Townships in Ontario.

Significant benefits could be gained by adhering to the tenets of an Asset Management Plan. We quote Gordon Sparks, Ph.D., P.Eng., and Professor of Civil Engineering University of Saskatchewan who states that "managing existing, capital intensive, public sector infrastructure asset such as roads, bridges, sewer and water systems, buildings, etc. could provide very significant benefits (i.e. 20 – 40% reductions in life cycle costs) associated with managing the maintenance of public sector infrastructure It is recognized that finding and operating in this "sweet spot" is no easy task and it is advocated that to do so successfully will require public sector agencies to abandon traditional departmental and professional silos and develop multidisciplinary, cross functional teams that can effectively exploit the collective wisdom of all. This includes politicians, chief administrative officers, chief financial officers, planners, accountants, engineers and others."

The optimal outcome involves doing the right thing, at the right time, consistently. In the case of managing existing infrastructure, doing the right thing, at the right time, involves knowing and actually doing the most cost-effective maintenance, repair, rehabilitation or replacement activity at the right time throughout the entire life cycle of the asset. The process for prioritizing, establishing levels of service and operating performance indicators are defined in this report and attached Appendices.

Asset management is a philosophy and may require a significant change in organizational culture. The State of the Infrastructure Report (SOTI), Capital Plan, financial projections and recommendations within this Asset Management Plan will provide Township staff with critical information and analytical tools to begin the education/communication process for the Township's asset management strategy.

2 SOTI REPORT

2.1 HISTORICAL OVERVIEW

All of the World's urban cities and municipalities are underpinned by a vast network of roads, water supply, sewage, drainage, power supply, flood protection, recreational and real estate assets. These assets, predominantly managed by local governments, constitute a major investment over many generations and represent the world's largest portfolio of assets.

In Canada, we are in a deficit. It is the deficit that involves the deterioration of our infrastructure, the roads and bridges we drive on, the water treatment facilities we depend on for clean drinking water, and the sewer systems that take away tainted water. Most Canadian municipalities are struggling to maintain existing infrastructure under current tax and rate levels. They continue to deal with new reporting responsibilities and expenses downloaded by both the Province and Federal Government. At the same time, municipalities are facing a growing need to maintain and renew aged and decaying infrastructure, without the tax base to do so. In 1962, 22 cents of every dollar was spent on infrastructure by the Government of Canada and by 2002, only 12 cents. Public infrastructure has suffered from decades of extensive neglect and overuse. In Canada, it is currently estimated that the average infrastructure deficit is in excess of $ 10,000 for every man, woman and child. Much of this infrastructure deficit is found in the major urban centers, but the deficit will double over the next 10 years as projects undertaken in the 1950's and 1960's reach their projected lifespan.

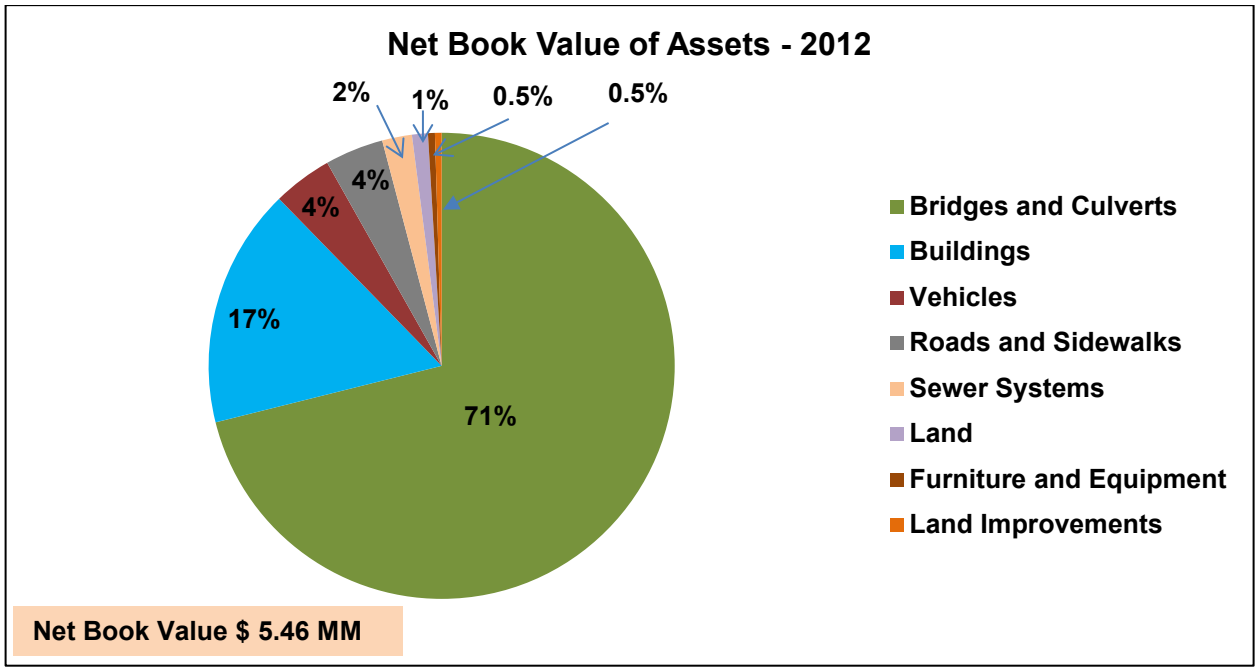
This State of the Infrastructure (SOTI) assessment is based on an analysis of the replacement, rehabilitation, and maintenance requirements of the Township's asset inventory and its current condition. We include a Report Card on the current state of the major linear assets within the Township. The Capital Plan provides both a high-level assessment of projected Capital expenses and a detailed future project by project costing for the Township's review and confirmation. Our objective is to give the Township the analytical tools and information necessary to implement a comprehensive and cohesive asset management program.

Asset management is a philosophy and may require a significant change in organizational culture, as well as at the community and political levels. This change will not occur overnight; however, the State of the Infrastructure Report, Capital Plan, financial projections and detailed recommendations will provide Township staff with critical information and analytical tools begin the education/communication process for the Township's asset management strategy. The document

was written in plain language, with explanatory text; it is a communication document, which is based upon proven engineering and carefully calculated financial assumptions.

2.2 DATA ACCUMULATION AND VERIFICATION

The first step in the analysis of the Township's asset inventory was to gather geometric and condition assessment data, where available, and upload all asset types from the Township's PSAB excel spreadsheets into Ontario Good Roads Association's asset management application, Municipal DataWorks. This upload included all data pertaining to the lifespan and depreciated historical value of the assets. Once the upload was complete, ISI used Municipal DataWorks to create the Township's PSAB's reports and verify our results against the Financial Statements prepared by the Township's auditor. This verification established that no assets were missing from data provided by the Township, that the financial statements were correct, and determined that we accurately uploaded the entire asset inventory into Municipal DataWorks.



Assets Type	NBV of Assets
Bridges and Culverts	$3,880,963
Buildings	$906,939
Vehicles	$224,580
Roads and Sidewalks	$221,719
Sewer Systems	$112,870
Land	$60,132
Furniture and Equipment	$26,086
Land Improvements	$25,171
Total	**$5,458,460**

2.3 STATE OF THE INFRASTRUCTURE REPORT (SOTI)

Infrastructure Solutions has been contracted to assist the Township of Casey in analyzing the State of the Infrastructure (SOTI) and the assembly of a Capital Plan as the initial components of a comprehensive Asset Management Plan. We have determined that the Township has a significant backlog of assets in need of betterment or replacement.

Dealing with aging infrastructure requires that the Township assess long-term capital project requirements and establish the funding of high-priority projects in an efficient, timely and cost-effective manner. With our engineering analysis and project identification, the Township can monitor, track and manage infrastructure assets to ensure that policy makers obtain sufficient funding in order to maintain, at minimum, and potentially enhance future service levels. Through capital budgeting, the Township of Casey can plan the future operating budget expenses and reserve funds to manage its financial position over a long term period. Capital planning also provides the core information needed for implementing the Council's planning and fiscal policies.

The Report Card produced within the SOTI has been developed to provide an easily understood reference that can be regularly updated to document investment gaps and progress the Township is making towards sustainability. The SOTI and associated analysis are strategic documents that identify trends and highlight possible issues involved in delivering services and maintaining the assets for those services. The SOTI will also assist in the development of more detailed tactical and operational plans aimed at identifying expenditures needed to provide service in a cost-effective, sustainable manner.

Encapsulated within this report ISI presents the Township's State of the Infrastructure report (SOTI), and a description of our methodology. The final Capital Plan contains a more detailed asset data and calculation process. All source information is readily available within the Municipal DataWorks software application for verification of asset conditions and lifespans by individual asset or by asset type and contain all data available and provided by the Township including asset location, a segmenting of linear assets into manageable lengths, asset ID's, geometrics of the asset (length, width and other appropriate dimensions). The comprehensive asset inventory in the Municipal DataWorks application includes PSAB data, the year constructed/purchased, estimated useful life, general description of asset, and other asset specific geometrics.

The direction of this project was influenced by the Township's requirement for Asset Management Plan and the work of the National Guide for Sustainable Municipal Infrastructure. In November 2003, the National Guide to Sustainable Municipal Infrastructure published a Best Practice for Municipal Infrastructure Asset Management. It stated that the framework for an asset management plan can be described in terms of seven questions:

1. What do you have and where is it? (Inventory and Location)
2. What is it worth? (Costs/Replacement Rates)
3. What is its condition and expected remaining service life? (Condition and Capability Analysis)
4. What is the service level expectation and what needs to be done? (Capital & Operating Plans)
5. When do you need to do it? (Capital and Operating Plans)
6. How much will it cost and what is the level of risk? (Short/Long-term Financial Plan)
7. How do you ensure long-term affordability? (Short- and Long-term Financial Plan)

This report answers these questions.

2.4 INVENTORY AND THE VALUATION OF ASSETS

The aim of this section of the report is to provide an overview of the State of the Infrastructure (SOTI) by an analysis of the available data on the condition and/or age of the Township's assets. The MIII SOTI requirements are restricted to linear assets only, however, ISI has included other critical asset types in its analysis for the Township's review. The grouping of these assets and asset replacements were taken from the PSAB files provided by the Township, and the current replacement value of the assets is comprised of these factors:

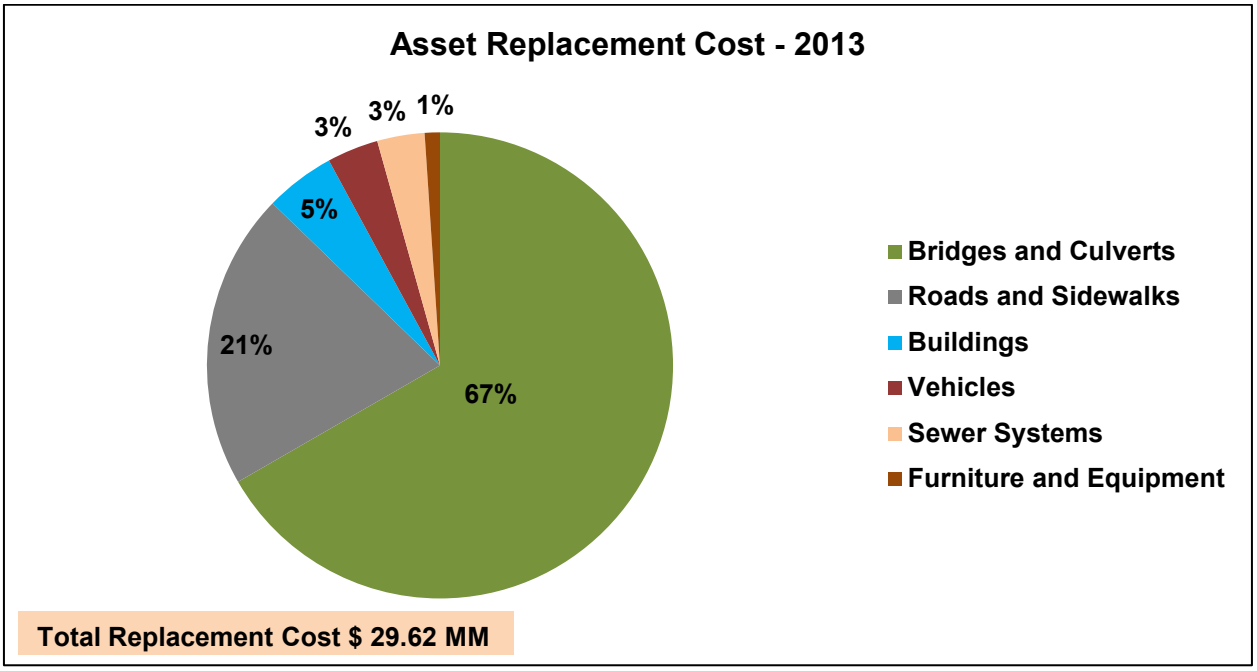
- Value of all the existing the assets.
- New assets acquired prior to 2013.
- Adjustments in unit costs based on improved knowledge and inflationary impacts

For the purpose of the SOTI report, we have developed a report card for your linear assets as follows:

- **Bridges** - Bridges
- **Roads and Sidewalks** - Paved, surface treated, gravel and dirt roads and sidewalks
- **Sewer Systems** – Sewerline (waste water) and Sewerline (Storm) etc.

Other asset types that have not been included in the SOTI report but have been dealt with in the Capital Plan:

- **Buildings** - Belonging to various departments
- **Vehicles** - Belonging to fire, roads and recreation department and categorized as licensed and unlicensed vehicles
- **Small Culverts**
- **Furniture and Equipment** - Furniture belonging to administration, roads and recreation department. Equipment belonging to the fire and roads departments.



Assets Type	Replacement Cost
Bridges and Culverts	$19,747,851
Roads and Sidewalks	$6,090,650
Buildings	$1,437,601
Vehicles	$1,055,632
Sewer Systems	$974,030
Furniture and Equipment	$311,576
Total	**$29,617,340**

2.4.1 BRIDGES

This group comprises:

- Bridges - There are 8 bridges in the inventory

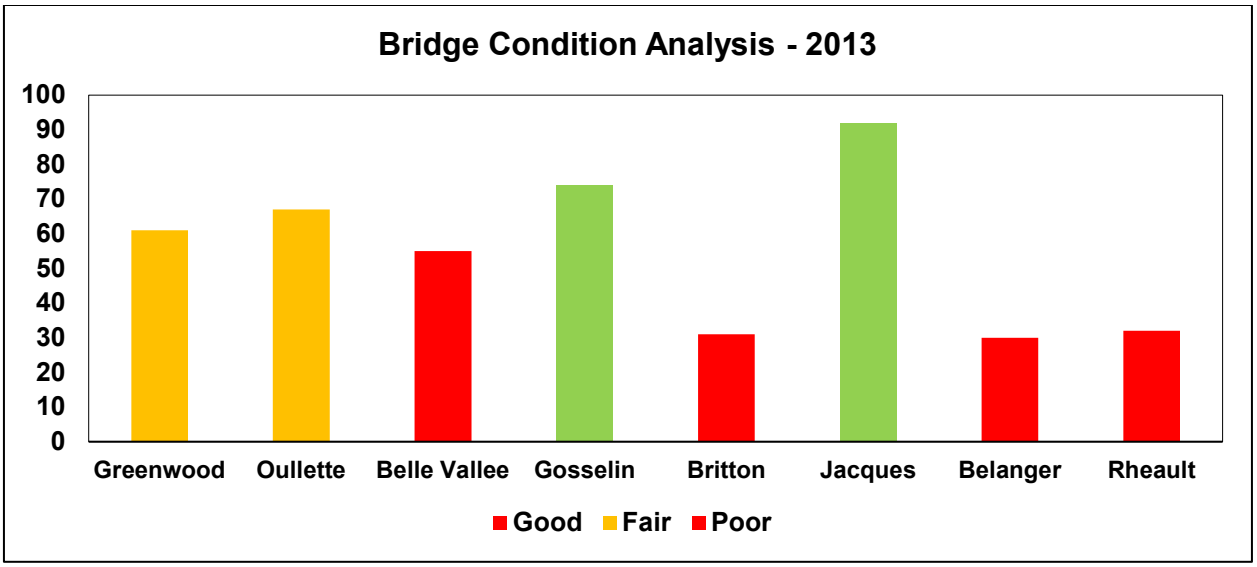
The most current bridge inspection was completed by the Township in 2011 and the bridge inventory is a mix of steel and Bailey bridges. There are a number of common defects with the bridges including the need for a replacement of railing system, piles repair, reface abutments, replacement of cross-bracing and expansion joints, rock protection at embankments, and replacement of posts. The table below highlights the work that needs to be performed immediately or in the next 10 years:

Bridge Name	Reconstruction Year
Belanger Bridge	2015
Britton Bridge	2018
Rheault Bridge	2020

Bridges Condition Index

Condition assessment was provided to ISI by the Township, and was uploaded into Municipal DataWorks. Municipal DataWorks calculates the Bridge Condition Index based on the consultant's report and condition assessments. Deterioration curves were used to determine the 2013 condition of these assets. The MTO Bridge Condition Index rating is provided by the Ontario Ministry of Transportation which describes maintenance requirements within each range as follows:

Good: BCI Range 70 - 100: It is usually not required to perform any maintenance work within the next five years
Fair: BCI Range 60 - 69: Maintenance work is usually required within the next five years
Poor: BCI Less than 60: Maintenance work is usually required within one year

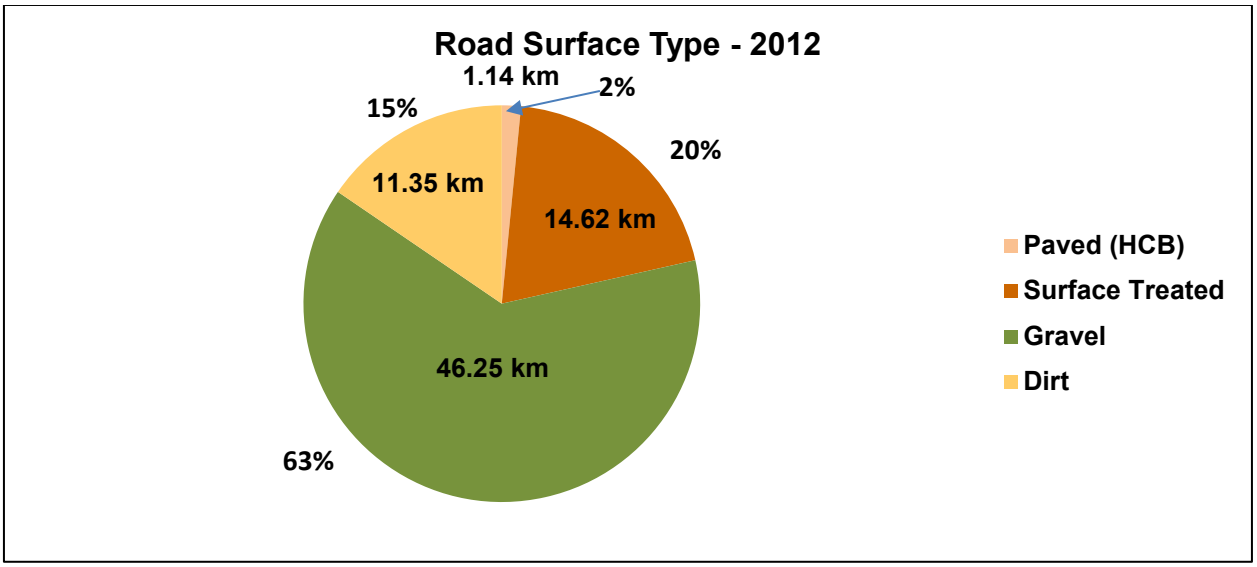


2.4.2 ROADS

The Township of Casey has a total of 73.36 km's of roads. The following summarizes the road surface types within the Township.

Road Surface Type:

Road Surface Type	Length (km's)	%
Paved (HCB)	1.14	2%
Surface Treated	14.62	20%
Gravel	46.25	63%
Dirt	11.35	15%

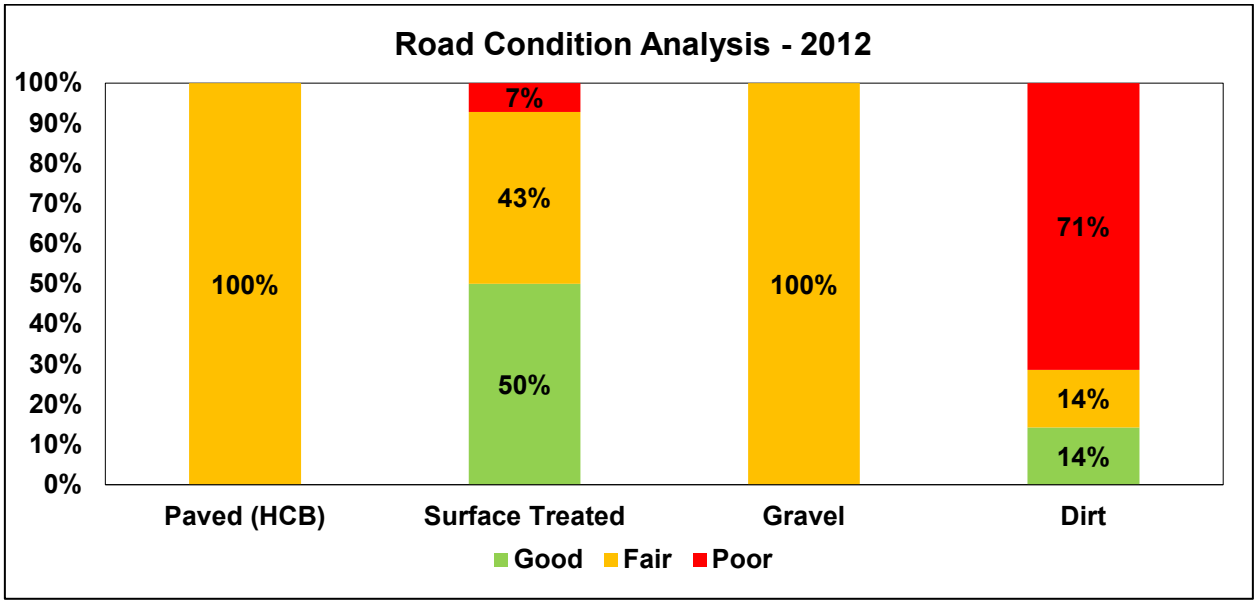


Condition-Based Analysis for Roads

The Township has paved, surface treated, gravel and dirt roads. The state of infrastructure for roads is done based upon condition based analysis with conditions provided by the Township for each type of road. The paved roads are in fair condition, the surface treated roads are generally in good condition with all the gravel roads are in fair condition and the dirt roads are mostly in poor condition. The strategies for rehabilitation/reconstruction are outlined in the Capital Planning Module.

Road Average Condition:

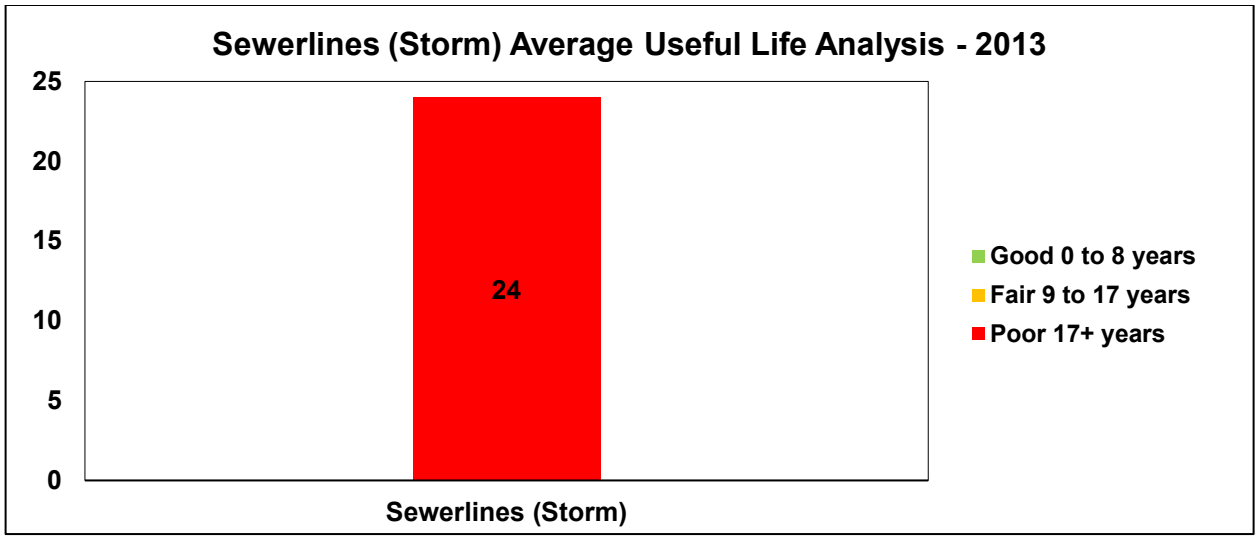
Road Surface Type	Average Condition Rating
Paved (HCB)	7
Surface Treated	7
Gravel	7
Dirt	4

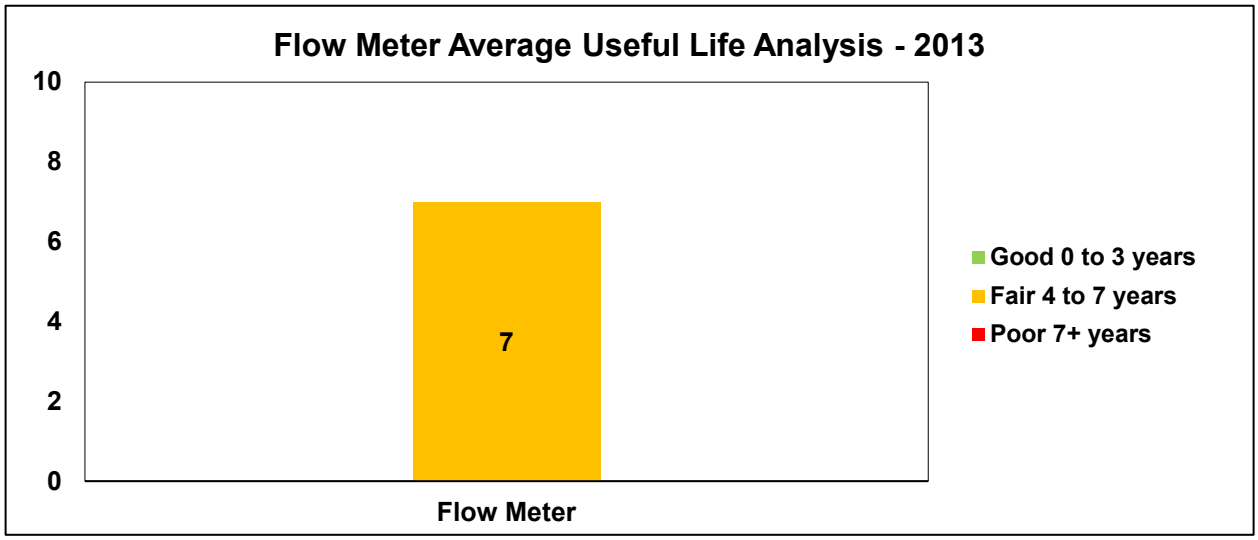


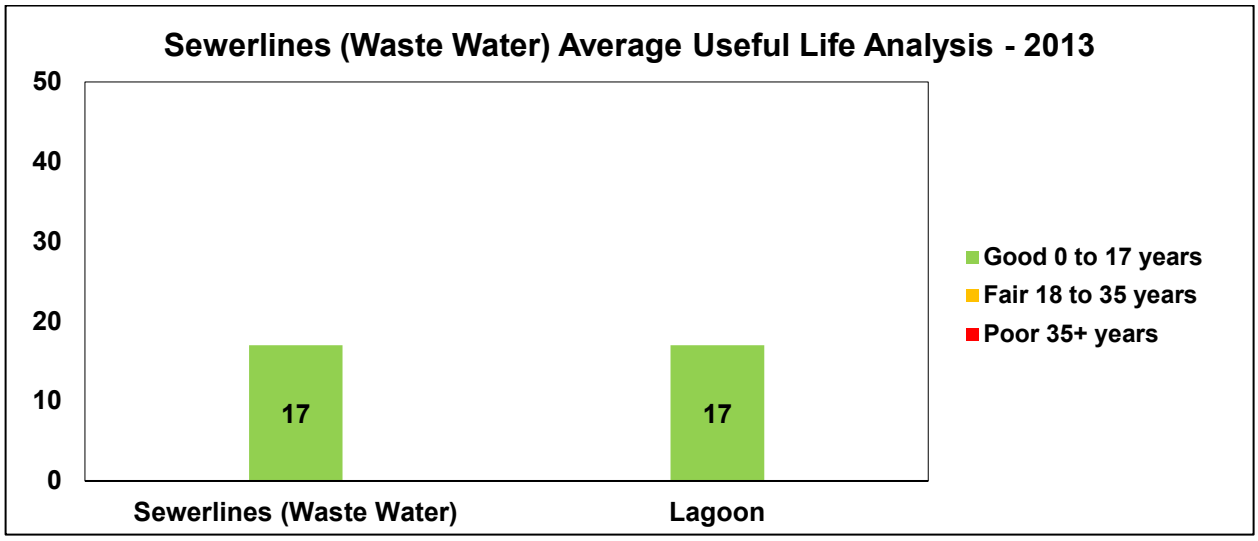
2.4.3 SEWER NETWORK

- Sewerlines (Storm)
- Sewerlines (Waste Water) – consists of Flow Meter, Lagoon and Sewerlines (Waste Water)

An age-based analysis is done on the sewer assets due to non-availability of conditions. The calculations, undertaken in this circumstance, were to determine the remaining life of the asset on age-based analysis with pre-defined criteria. Age-based condition assessment has **the least level of confidence to determine the current State of Infrastructure.** The graphs below show the age-based analysis for each asset mentioned above.


Sewerlines (Storm) Average Useful Life Analysis - 2013
25
20
15
10
5
0
24
Sewerlines (Storm)
Good 0 to 8 years
Fair 9 to 17 years
Poor 17+ years


Flow Meter Average Useful Life Analysis - 2013
10
8
6
4
2
0
7
Flow Meter
Good 0 to 3 years
Fair 4 to 7 years
Poor 7+ years


Sewerlines (Waste Water) Average Useful Life Analysis - 2013
50
40
30
20
10
0
17
17
Sewerlines (Waste Water)
Lagoon
Good 0 to 17 years
Fair 18 to 35 years
Poor 35+ years

2.5 LINEAR ASSET CONDITION RATING REPORT CARD

Asset Group	Overall Condition Rating	Condition Rating		Range	Comments
Bridges	**C**	A	Good	70 to 100	Condition rating based on bridge inspection reports
		B	Fair	60 to 69	
		C	Poor	0 to 59	
Road Network	**B**	A	Good	8 to 10	Condition rating based on Ride Comfort Rating (RCR)
		B	Fair	5 to 7	
		C	Poor	0 to 4	
Sewer Network	**B**	A	Good	Different ranges based upon total useful life for each asset type	Condition rating based on age-based analysis
		B	Fair		
		C	Poor		

2.6 SOTI CONCLUSION

As highlighted in the Report Card above, the current state of the linear infrastructure, based on available condition rating and age analysis, presents a picture of the Township's linear assets.

The roads are reported in fair condition. The condition analysis according to surface type is as follows:

- Paved (HCB) roads are in fair condition
- Surface treated are in fair and good condition
- Gravel roads are in fair condition
- Dirt roads are generally in poor condition

The bridges are reported in poor condition. The Sewer Network is reported in fair condition.

The overall or average non-critical state of the linear infrastructure at the Township of Casey, is in line with the condition of a vast majority of municipalities in this Province. The Township should continue to be proactive in their strategies, so as to extend asset useful life and avoid major rehabilitation/reconstruction or replacement costs.

3 CAPITAL PLAN

3.1 BACKGROUND

Managing the Township's capital assets requires an assessment of the long-term capital project requirements and the establishment of the funding for high-priority projects in an efficient, timely and cost-effective manner. As a result of this analysis, the Township will be able to more effectively monitor, track and manage infrastructure assets, to ensure that policy makers obtain sufficient funding in order to maintain, at minimum, and potentially enhance future service levels. Through capital planning, the Township of Casey can plan the future operating budget expenses and reserve funds to manage the financial position over a long term period. Capital planning also provides the core information needed for implementing the Council's planning and fiscal policies.

Support has been provided by the Province of Ontario through its MIII Capital program, designed to help municipalities address necessary road, bridge, and other priority projects identified through their asset management plans. This program is the second phase of the Province's recently released Municipal Infrastructure Strategy which aims to:

- Further strengthen municipal asset management practices;
- Support the most critical roads, bridges, and drainage projects; and
- Provide funding to municipalities that are unable to undertake projects without provincial support.

The Provincial strategy relies heavily on the requirement for municipalities to demonstrate how proposed projects fit within an asset management plan, which is a key component to ensuring infrastructure sustainability. An Asset Management Plan provides many benefits including:

- A systematic evaluation of all potential projects at the same time.
- The ability to stabilize debt and consolidate projects to reduce borrowing costs.
- To serve as a public relations and economic development tool.
- A focus on preserving a municipal government's infrastructure while ensuring the efficient use of public funds.
- An opportunity to foster cooperation among departments and an ability to inform other units of government of the Township's priorities.

3.2 OVERVIEW

The Capital Plan, an integral part of an Asset Management Plan, is a blueprint for planning a community's capital expenditures and is one of the most important responsibilities of local government officials. It coordinates community planning, financial capacity and physical development. It is a tool to assess the long-term capital project requirements of a Township to establish funding of high-priority projects in a timely and cost-effective fashion. The development of a Capital Plan is intended to ensure that policy makers are responsible to residents and businesses of the community with respect to the expenditure of public funds. It also promotes the provision of continuous efficient services. This plan identifies and describes capital projects, the years in which funding each project is likely to occur and the method of funding. While a Capital Plan may be designed to forecast any period of time, it generally extends beyond the current operating cycle and usually covers a five to ten year time frame. The Township of Casey has requested a 10 year Capital Plan.

The Capital Plan provides a detailed understanding of anticipated investments into tangible capital assets. These assets include basic facilities, services and installations needed for the functioning of the community. The development of a CIP that will insure sound fiscal and capital planning requires effective leadership and the involvement and cooperation of all municipal departments. A complete, properly developed CIP has the following benefits:

- Facilitates coordination between capital needs and the operating budgets
- Enhances the community's credit rating, control of its tax rate, and avoids sudden changes in its debt service requirements
- Identifies the most economical means of financing capital projects
- Increases opportunities for obtaining federal and provincial aid
- Relates public facilities to other public and private development and redevelopment policies and plans
- Focuses attention on community objectives and fiscal capacity
- Keeps the public informed about future needs and projects
- Encourages careful project planning and design to avoid costly mistakes and help a community reach desired goals

A municipal government must take care of two key responsibilities in managing its infrastructure:

- The first major responsibility is the maintenance and repair of existing infrastructure. Given the high cost to replace linear assets and the fact that they are essential to providing programs and services to the public, it is extremely important that regular maintenance and periodic refurbishments be done to keep facilities and other assets in good working condition for as long as possible.
- The second major responsibility that municipal governments have is to plan and construct new community infrastructure. This involves several steps including deciding what services are to be provided, identifying community needs, careful planning, determining priority investments, figuring out how to finance projects and good management to ensure projects are completed on time and on budget.

Typically, a municipal government manages many diverse assets. Each asset type is considered a “capital” asset if it has the following characteristics:

- It is held for the purposes of delivering a program or service or to produce something
- It is to be used on a continuing basis and is not intended for sale
- It has a life expectancy of greater than one year
- It has as a value greater than a certain minimum threshold (as established in the TCA policy)

Common examples, such as roads, buildings and equipment, all meet these criteria and are considered capital assets from a planning and financial perspective. Other types of expenses, such as salaries, purchased services (e.g. janitorial), consumable items (coffee, office supplies etc.) or regular maintenance, do not meet these criteria and are categorized as expenses. These types of expenditures are paid for from operations budgets.

Local governments can make significant capital expenditures, sometimes undertaking projects without first analyzing the impact such expenditures may have on future operations and expenditures for other important capital projects. A Capital Plan is intended to assist municipalities in making choices about which projects should be implemented, how they should be financed and

when, to establish priorities for its spending on services, while controlling the ultimate impact on the tax rate or user fees. It also provides a mechanism for controlling future debt levels, thereby ensuring that a reasonable amount of financial flexibility is maintained.

Although the Capital Plan is generally maintained separately from the operating budget, they do work in unison since the debt charges on funds borrowed for capital expenditures become expense items in the annual operating budget. In addition, operating and maintenance costs of capital assets have an impact on the operating budget. In order to have a realistic, workable Capital Plan, therefore, it is necessary to estimate the effect that debt service and operating costs will have on future tax rates. In this way, non-essential capital expenditures will not be undertaken at the expense of pending essential capital projects and the Township or commission will thus be in a better position to control future debt levels.

To determine how much money should be allocated to existing infrastructure, the following factors need to be considered:

- **Inventory** – keep an up-to-date inventory of all physical assets that the municipal government owns or manages including fixed assets (buildings, facilities, etc.) and mobile assets (heavy equipment, trucks, smaller equipment.)
- **Condition rating** – complete an assessment of the condition of each significant asset and determine what needs to be repaired and when.
- **Upgrades** – existing facilities may need to be upgraded to meet new standards or legislative requirements or to meet increasing demands due to population growth or new programming.
- **What does the community need for new infrastructure?** This can be a tricky subject to resolve as a Council and community residents may have very different opinions about what the community needs most. This stage of the process requires community consultation which can include meetings, surveys etc. One approach is to organize needs starting with the basics (survival, safety, and shelter) and moving to more advanced needs (recreation, social / cultural, leisure). Once an initial list of potential projects is identified, it can be further refined on the basis of urgency:
- **Immediate or short term** – these are needs that won't wait such as water shortages, equipment breakdowns etc.
- **Predictable growth** – these are needs driven by population growth and increasing demands on infrastructure that will need to be addressed in the next few years. Examples include housing supply, water treatment and delivery capacity, need for expanded recreation facilities etc.
- **Future** – these are long term needs that will occur in the next 20 years, often as a result of priorities established in other community plans (Strategic Plan, Recreation Plan, Land Use Plan etc.). An example may be the development of new residential lots or the refurbishment or replacement of an old building.

3.3 METHODOLOGY

The Township of Casey Capital Plan addresses infrastructure deficiencies and future capital expenditures. It includes existing service infrastructure not meeting engineering standards, the cost of renovation or replacement of infrastructure which has exceeded its service life and which as a consequence, is not meeting required service standards. Provision is required to renovate or replace infrastructure constructed previously, when it reaches the end of its service life. These costs do not include on-going operational and regular maintenance (which typically represent the greatest cost component of a facility's service life, for example). Unless informed by the Township, requirements such as investments required to support industrial, commercial and residential development in accordance with the growth projections required to serve the community and social needs as well as supply the increasing population and to service to the boundaries of new subdivisions have not been analyzed.

The Township's Capital Plan includes:

- Development of parameters for each asset class
- Development of rehabilitation and replacement unit costs
- Identifying the asset types to be included in the Capital Plan
- Determining and confirming the components of each asset class
- Identification of services to be provided and the capital expenditures to be incurred
- Determination of secondary cost estimates of capital expenditures (consideration of such cost elements as land, architect/engineering fees, construction, legal fees, taxes, etc.) The non-rebatable portion of HST at 1.76% has been applied, for example.
- Determination of the time periods over which the asset is to be constructed or acquired and the costs prorated accordingly

The Municipal DataWork's Capital Infrastructure Planning (CIP) module allows municipalities to plan necessary rehabilitation work on the right asset at the right time. The CIP module also allows municipalities to produce a Capital Expenditure Plan for all asset types included in the Casey MDW asset repository. The CIP allows different work or renewal strategies to be selected for each asset type or category.

The trigger for a strategy within the Municipal DataWork's capital planning tool can be age-based or condition-based. For the most part, age-based triggers were used for this study, although condition-based recommendations from Road Needs and Bridge studies were incorporated in our report. The Capital Planning parameters, subsequent to the timeline within the road needs studies were condition-based on degradation curves developed by OGRA and the Ministry of Transportation, as defined within a Road Strategy document earlier circulated to the Township for its review and attached as Appendix C to the Asset Management Plan report.

The Life Expectancy parameters, the estimated useful life or number of years before an asset needs to be replaced, were provided by the Township. The Age Trigger Point, the number of years after initial installation that the renewal strategy is triggered or the rehabilitation work is to take place, were thoroughly researched, based on engineering principles and established standards. Also, the Life Expectancy Gain, the number of years that the useful life of the asset is extended, were based on engineering principles and established standards.

All analysis to measure the impact of this Capital Plan on future operating budgets will be considered in the final report taking into consideration. The capital costs required for each year were determined using MDW's Capital Investment Plan (CIP) module.

The methodology used for building this Capital Plan was to:

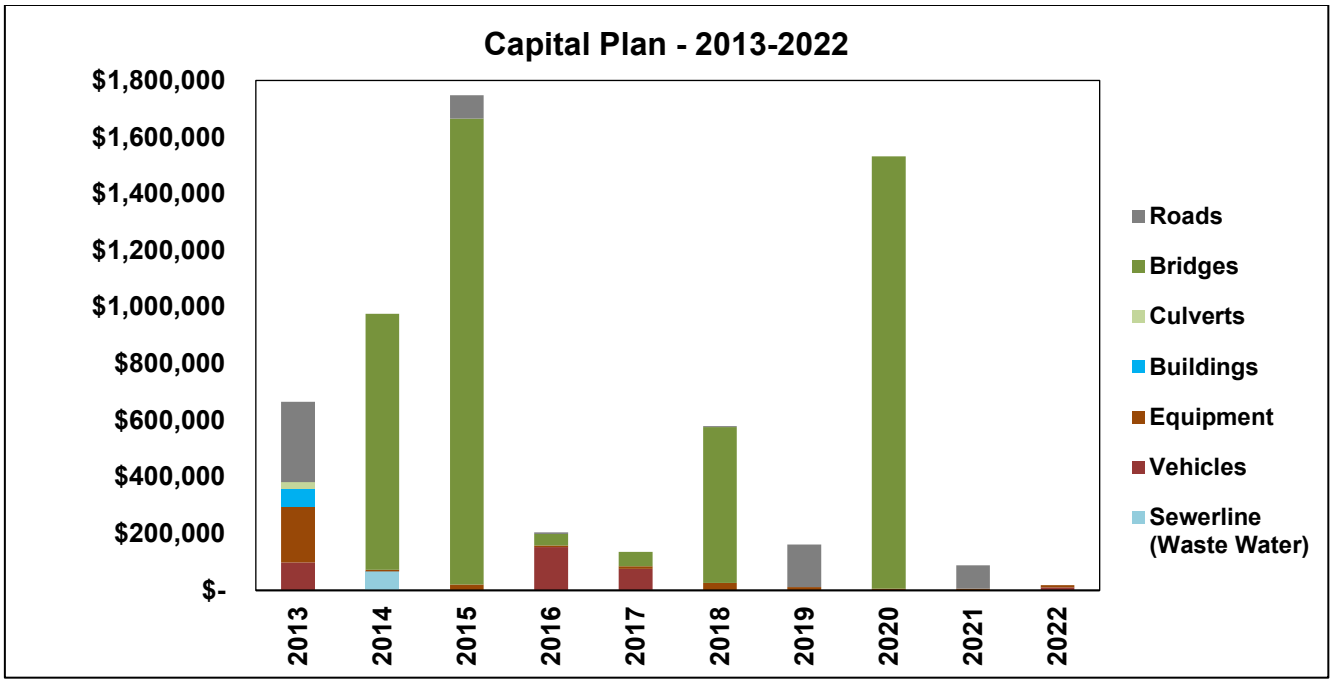
1) Use the tools within MDW for error checking and data gap analysis
2) Determine the "unconstrained" rate of capital expenditure (assuming an unlimited budget). A constrained rate of capital expenditure will be provided in the final report.
3) Identify the Township's current infrastructure deficit.
4) Determine the Township's future capital requirements using MDW's Capital Investment Plan (CIP) module
5) Prepare a report detailing the capital required for each asset class based on current rehabilitation and replacement unit costs
6) Establish the cost of maintaining existing infrastructure while addressing the infrastructure deficit.

3.4 RESULTS

The Township of Casey's infrastructure deficit is determined to be approximately $1,800 per person (2013 figure), is well below the national average but serious for a small Township. The greatest concern for the Township is in preparing for the expense associated with upcoming bridge repairs. The deficit is in dealing with the roads infrastructure and equipment expenses. Like most other local governments in this province, the Township of Casey will struggle with aging infrastructure and constrained budgets.

Upon completion of the collection of all the pertinent data, the capital plan was generated using MDW's Capital Investment Plan (CIP) module. A 10 Year Capital Plan, broken down by asset class for the years 2013 to 2022, was developed. Inflation will be incorporated in the financial analysis. The results are as follows:

Timeframe	Year	Total Capital Projects *(Incl.PST)*
Year 2013-2022	2013	$665,337
	2014	$976,563
	2015	$1,748,393
	2016	$204,580
	2017	$135,850
	2018	$579,585
	2019	$162,285
	2020	$1,532,506
	2021	$88,824
	2022	$18,826
Total		**$6,112,746**

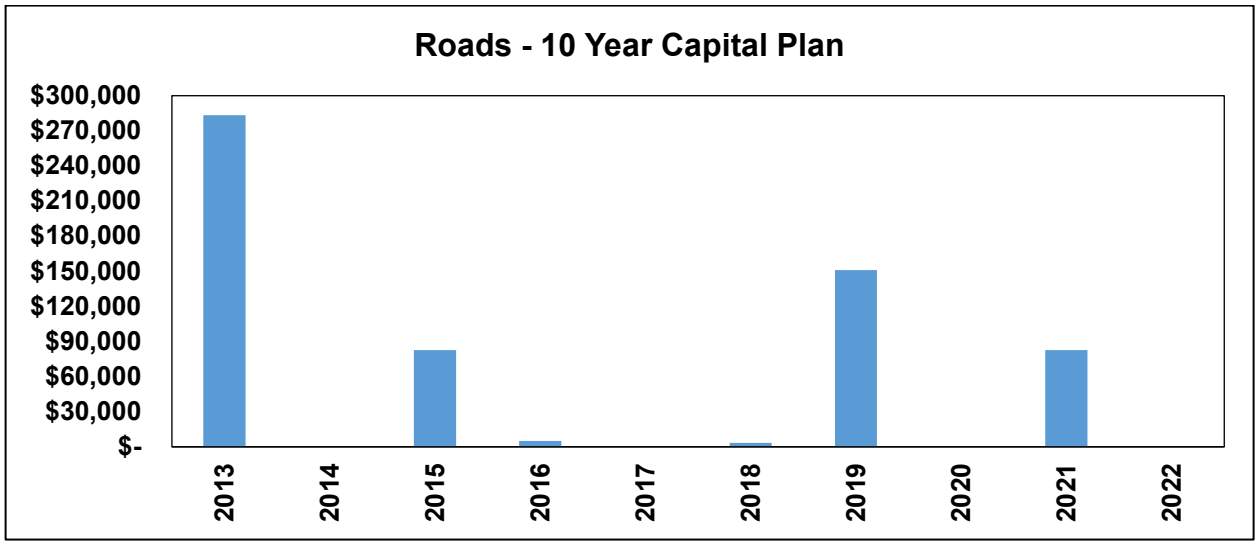


A detailed, project-by-project breakdown of this final Capital Plan and all proposed or study recommended projects are included in the detail capital project list in Appendix A.

3.5 BREAKDOWN BY ASSET TYPES

3.5.1 ROADS

The road replacement costs are based on the data provided by the Township that has been indexed to 2013 based on our "Municipal Cost Index". ISI used numerous deterioration curves for the various roads. ISI also used the general OGRA road management strategy and the gravel/dirt road expenses are treated as operating expenses and not included the Capital Plan expenses.



LIFECYCLE ACTIVITIES – LOOSETOP (UNPAVED)

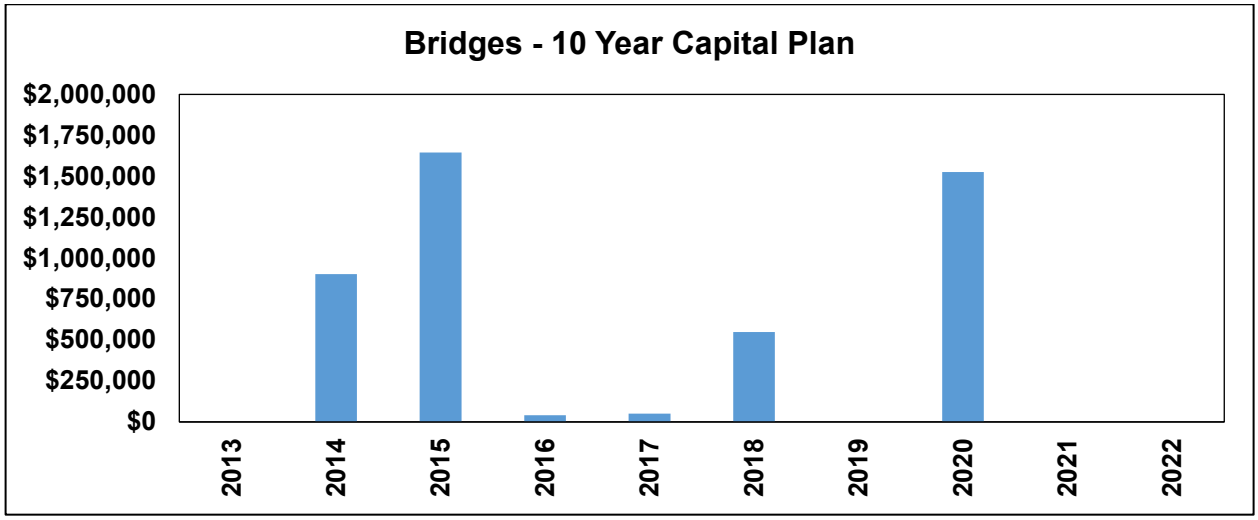
We are only dealing with surface treated and paved (HCB) roads in your Capital Plan. Gravel and dirt road expenses are being captured in your operating expenses. Inserting them into your Capital Plan would be a redundant entry. Our only concern is that you establish whether you are allocating sufficient funds in your Operating Budget to cover the gravel road expenses.

The OGRA strategy for gravel roads is to re-gravel roads 75 mm every 3 to 5 years depending on the AADT. Every Township we work with does annual maintenance rather than a 5 year resurfacing to 75 mm Granular A. For local/rural roads this would mean that the Township should set aside approximately $ 5,000 per kilometer of gravel road in the Township per year.

Timing	Activity	Activity Quantity		
		Class of Road		
		4	5	6
Annual	Grading Dust suppression Ditching Culvert cleaning Safety devices	8 x per year 4t per kilometer 1 x per year as required	6 x per year 4t per kilometer 1 x per year as required	6 x per year 4t per kilometer 1 x per year as required
3 years	75mm Granular A	All roads	All roads	
5 years	75mm Granular A			All roads
6 years	75mm Granular A Spot repairs Drainage replacement	All roads 10% 12%	All roads 10% 12%	
10 years	75mm Granular A Spot repairs Drainage replacement			All roads 10% 12%

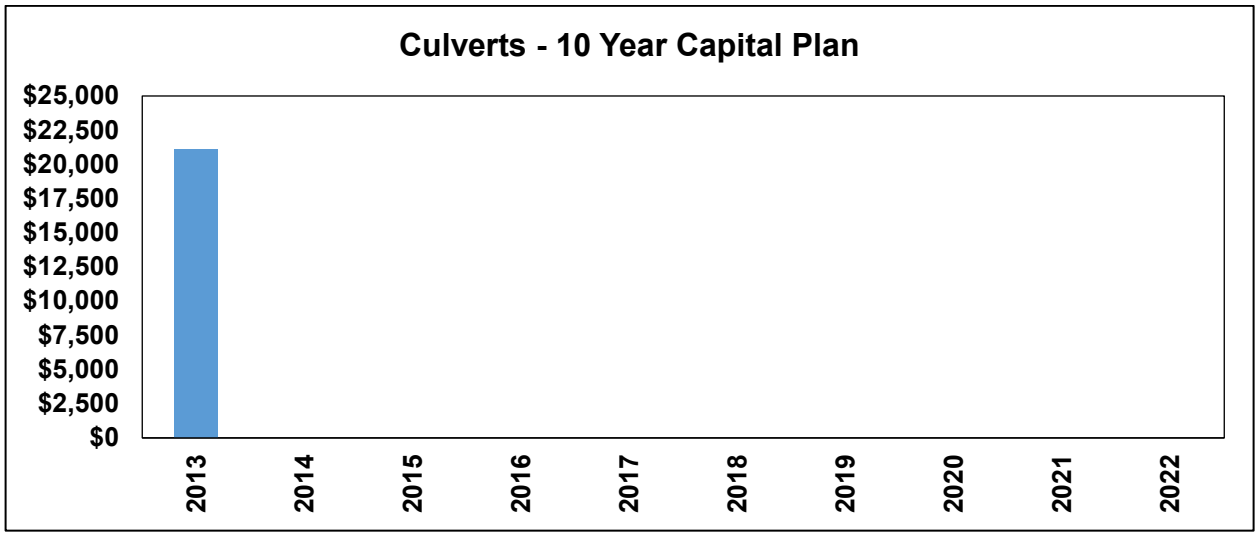
3.5.2 BRIDGES

The replacement cost is based on the Township's inspection report – 2011 and on the replacement cost 2008 given in the PSAB file (Casey AMP 2010), provided by the Township of Casey that have been indexed based on the "Municipal Cost Index". Condition assessment was provided to ISI by the Township, and was uploaded into Municipal DataWorks. Municipal DataWorks calculates the Bridge Condition Index based on the consultant's report and condition assessments.



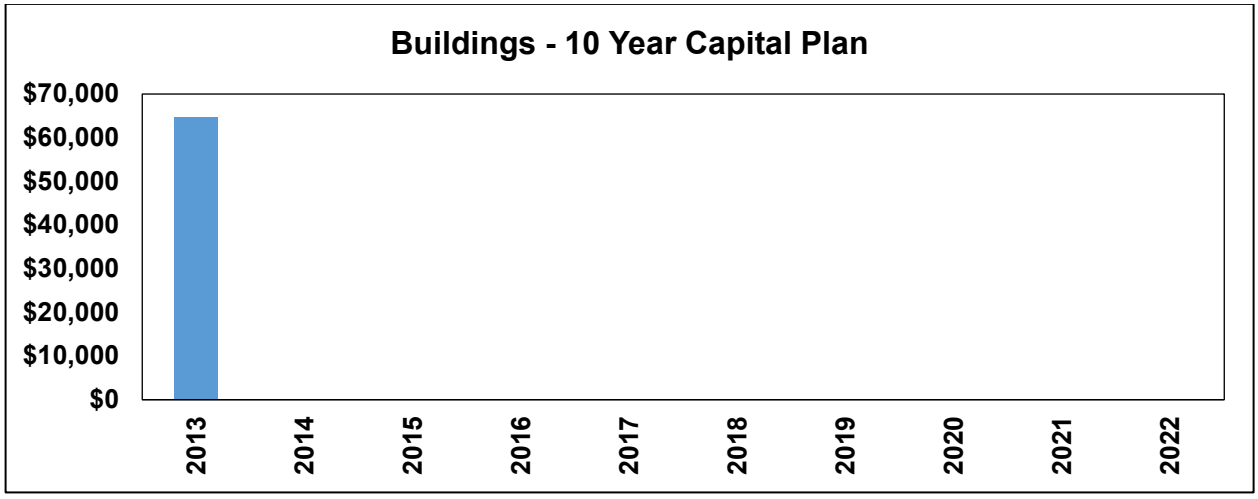
3.5.3 CULVERTS

The replacement cost for crossing and entrance culverts is based on the average of the replacement cost 2008 given in the PSAB file (Casey AMP 2010), provided by the Township. For multiplate culverts, individual values taken from the replacement cost 2008 given in the PSAB file (Casey AMP 2010), provided by the Township. These values have been indexed based on the "Municipal Cost Index".



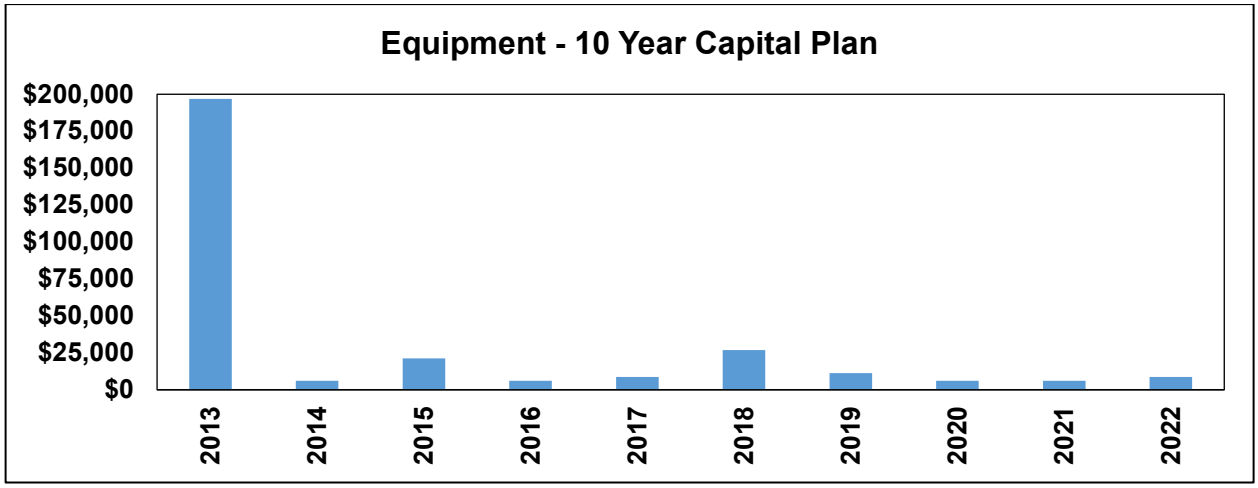
3.5.4 BUILDINGS

The replacement cost for buildings has been taken from the insurance document and the (Casey AMP 2010), provided by the Township of Casey, which have been indexed based on the "Municipal Cost Index".



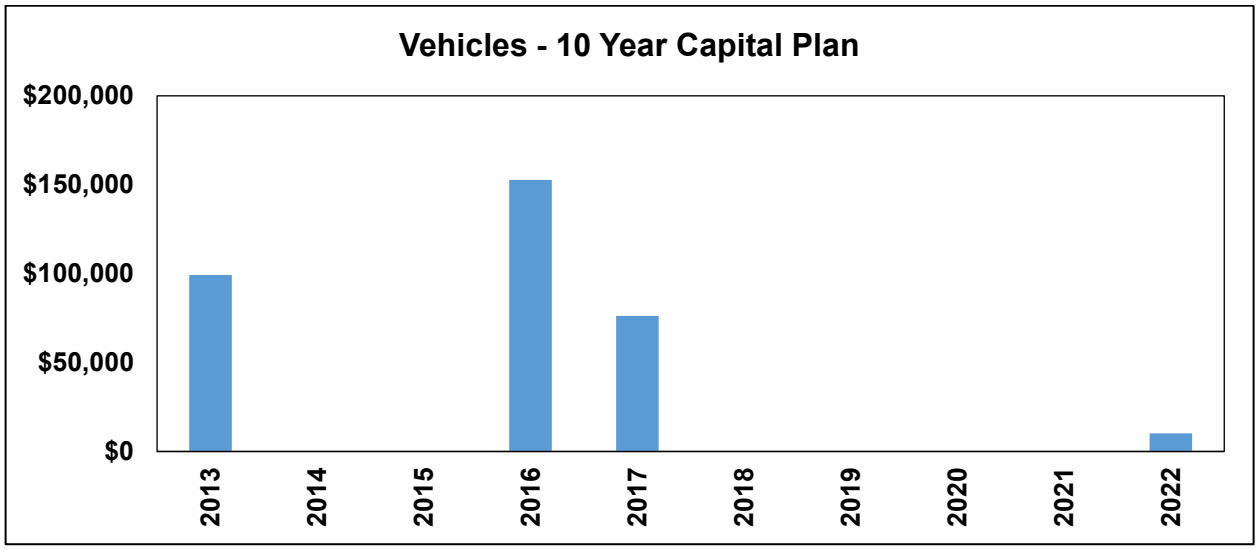
3.5.5 EQUIPMENT

The replacement cost for the equipment has been provided by the Township until 2008 in the PSAB file Casey AMP 2010, indexed based on the "Municipal Cost Index" to 2013. Further review and discussion with the Township is required to ascertain the accuracy of the Township's equipment requirements.



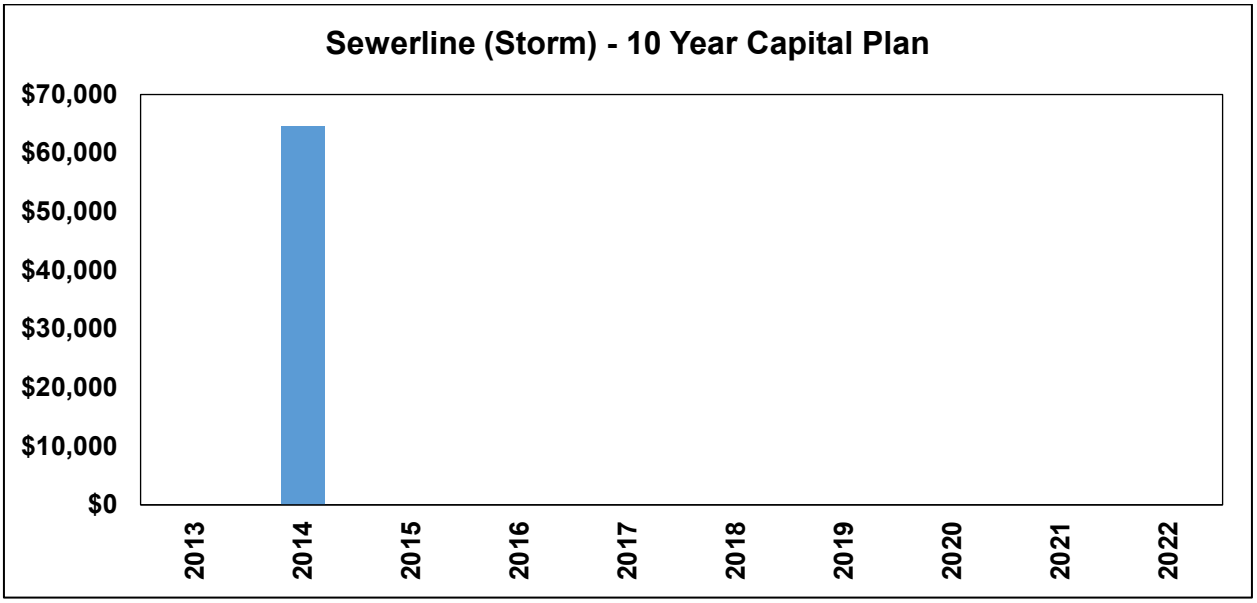
3.5.6 VEHICLES

The replacement cost for vehicles is provided by the Township Casey (2008 Replacement Cost), that have been indexed based on the "Municipal Cost Index". If the vehicles were not insured, historical costs have indexed based on "Consumer Price Index" and the "Municipal Cost Index" depending on the years of vehicle purchased. Further review and discussion with the Township is required to ascertain the accuracy of the Township's vehicle requirements.



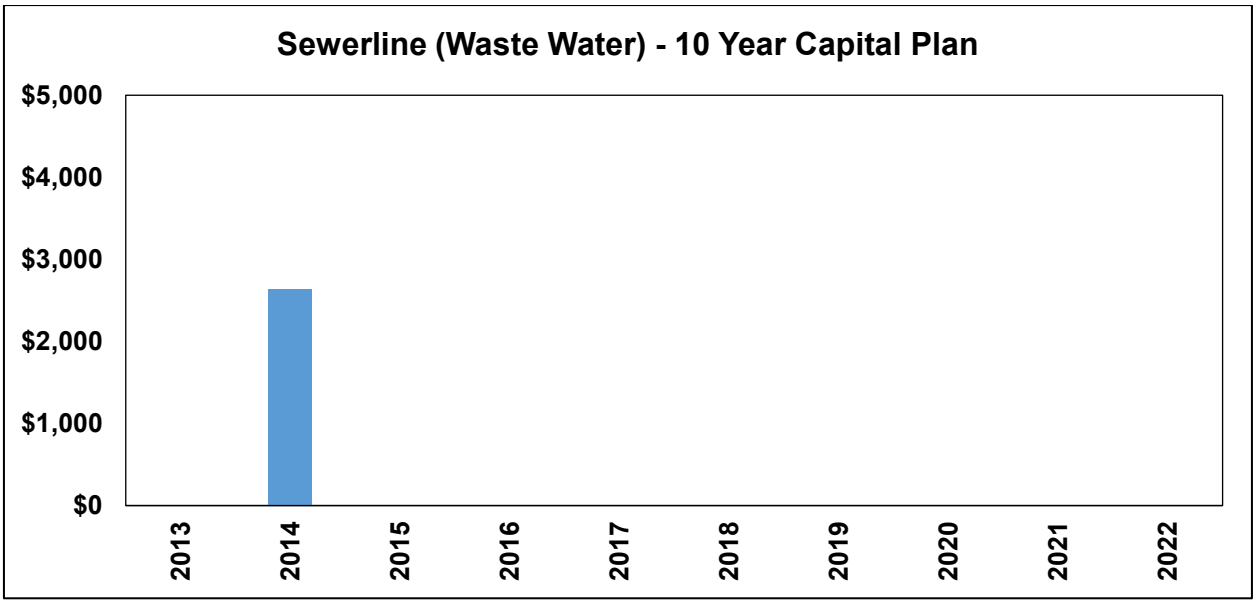
3.5.7 SEWERLINE (STORM)

The replacement cost for sewerline (storm) is taken from the PSAB file (Casey AMP 2010), provided by the Township of Casey, that have been indexed based on the "Municipal Cost Index".



3.5.8 SEWERLINE (WASTE WATER)

The replacement cost for sewerline (waste water) is taken from the PSAB file (Casey AMP 2010), provided by the Township of Casey, that have been indexed based on the "Municipal Cost Index".



4 LEVELS OF SERVICE

4.1 OVERVIEW

Levels of Service (LOS) are statements of service performance delivery. LOS is established based on Council direction, the needs or wants of the community as well as legislative and regulatory requirements. This report includes Operating Performance Indicators (OPI's) for current levels of service. Through the ongoing Asset Management process LOS will be further defined for the Township, the Township's assets, and the community. All are interconnected.

There is likely further effort required by the Township to address and formally define levels of service from a customer perspective. Asset management, at its root, is really about balancing between the full life cycle costs of various services and the levels of service being provided. It is about knowing what levels of service customers expect and what they are willing to pay. The level of service is a reflection of the quality, function and capacity of the services being provided. As a Township, you might consider:

- The level of service you are currently providing to users
- The annual cost to continue to provide the current level of service
- How the current level of service is expected to change in the future given current funding levels
- If you are meeting the level of service expectations of your users given the costs to provide current, increased or decreased levels of service

Many municipalities cannot currently answer these questions, although many are working towards this goal. If you can't answer questions about the current, future and desired levels of service (with associated costs), then it will be difficult to understand the financial implications of owning the asset going forward. The levels of service that you provide as a Township directly impact many parts of asset management including both life cycle costs and risk management.

As a rough generalization, the higher the level of service provided, the higher the life cycle costs of providing that service. Levels of service drive the expected treatments in the management of infrastructure. Customer levels of service outline the overall quality, function, capacity and safety of the service being provided. Technical levels of service outline the operating, maintenance, rehabilitation, renewal and upgrade activities expected to occur within the Township. When practicing asset management it is important to first document the current level of service being provided. As asset management becomes more established within your Township, levels of service may be set through consultation with the community. However, it is critical that prior to consulting with the public, the current levels of service along with associated life cycle costs are understood.

It is also important to discuss how various levels of service may have different risks associated with them. These risks may play an important role in determining if certain levels of service are acceptable. As with all economic analysis, a sensitivity analysis should be carried out on those parameters which are more likely to be beyond the control of the organization, such as market forces affecting the opportunity cost of capital, community expectations/perception on risk and factors in the long-term, health and safety effects, community economic effects, environmental and social effects, feasibility including public support and the Township's readiness.

4.2 METHODOLOGY

The implementation of a formal Maintenance Management System (MMS), among many other items, measures the response time, lag time, total time to resolution, resources involved, and communication logs for all issues identified internally and by customers. Going forward, this type of information not only provides the basis of resource and program management decisions, but is key information that will provide council and the public with the service level information in relation to the cost of service. Historically a significant portion of activities have been provided at a 'best we can do with what we have' basis. Through a review of design guidelines, and metrics being captured by the MMS, the Township of Casey can re-orientate service delivery that is driven by service level expectations that incorporate Level of Service factors.

To assist in better establishing Levels of Service, the Township should also consider collecting technical performance measures need to provide information on:

- the types of failure
- the number of customers affected
- the duration and severity of the failure

This kind of technical performance measurement and monitoring is undertaken to support decision-making by the asset managers within an organization. It addresses issues for consideration in effective management of the assets, such as:

- Assessing the effectiveness of the operational, maintenance and capital works program
- Review and refinement of maintenance and rehabilitation strategies and standards
- Assistance in strategic decision-making through definition of remaining life, based on the measure being assessed e.g. capacity of a pipe versus demand.

Benchmarking and other comparison management techniques are used both internally and for external regulation and monitoring, to assess the performance of infrastructure groups and asset owners. Each Township needs to consider developing rating systems to judge the assets from both a Township's perspective with the values that it brings to the organization, and also from a user's or regulator's perspective, in terms of the functionality, suitability, cost and service performance of the asset.

4.3 LEVELS OF SERVICE PROCESS

Some Levels of Service (LOS) for the Township can be attained through documents developed in the industry and by internally focusing on technical requirements that meet generally expected levels of operation and safety:

- Provincial Minimum Maintenance Standards (MMS) for roads, sidewalks, and street lighting
- Drinking Water Quality Management System (DWQMS)
- Engineering Standards Manuals

Operating Performance Indicators – These are the main activities within each operating budget cost center. These activities (OPI's) link directly to the level of service provided by the Township.

The OPI's also include maintenance tasks that help extend asset life. A good balance between asset replacement through capital funding and ongoing maintenance provides the best-cost efficiency and service productivity. Please refer to Appendix D.

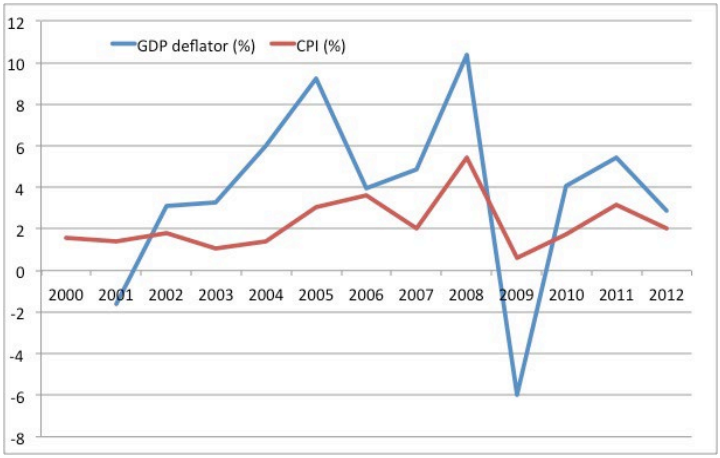
5 FINANCIAL PROJECTIONS

Our approach to building an Asset Management Plan is interactive. We prefer to build consensus with you at every step along the way. Our first steps in Financial Forecasting include compounding/inflating historical costs to Present Value (2012/13) number and then further compounding/inflating these numbers to meet future requirements. To maximize the accuracy of our projections, we have developed a comprehensive "*Municipal Cost Index (MCI)".* To further fine-tune our projections, we do a micro analysis of your geographic region.

Our basic assumptions and calculations, included within this document, are key to the planning process and serve as the base for the forecasting and predicting your future budgetary requirements and needs. As a part of our commitment of involving you in the process to build customized Asset Management Plans, we would request that you review this document and provide any comments or thoughts on our approach to your financial projections.

5.1 CONSUMER PRICE INDEX: OUR PERSPECTIVE

A price index measures the change in the costs of purchasing a fixed basket of goods and services in the current period, compared to a base period, typically month-over month or year-over-year. The most widely applied measure of inflation/price index is the Consumer Price Index (CPI). Given its pervasive use in setting cost-of-living adjustments, it can be the appropriate metric when calculating the rate of consumer inflation at the national level. Major components within the CPI include housing, food, and transportation.



Source: www.marketmonetarist.com

Extending the use of the CPI into discussions about the appropriate level of tax and fee rate increases becomes problematic, however, because a government's actual experience with inflation can differ greatly from the CPI. This is because the largest expenditures for governments are typically labor, materials, and contractual services — different factors than those found in the CPI. Spending patterns that are different than those of other economic sectors. A price index that does not reflect the municipal purchasing structure does not truly reflect changes in the cost experience, and thus the purchasing power, of local governments. For instance, the CPI reflects household spending patterns that focus on shelter (27.7 percent of the Statistics Canada CPI basket), transportation (19.5 percent), food (15.5 percent), and recreation (12.9 percent) — none of which registers as leading purchase categories for local governments.

There are two main parts to the MCI calculation: the weightings of the expenditure categories (showing the relative importance of items in the index), and the inflation factor used for each component. The inflation factors for expected price changes are based on economic data from two main sources, the Conference Board of Canada (CBOC) and Statistics Canada. The key issue is to match an appropriate inflator from these external sources to the types of expenditures in each budget category. MCI can be used in the following ways:

- To measure the increase in overall municipal expenditures attributed to inflation;
- To allow managers to more closely monitor the increase in spending by expenditure category, thus making inflationary price increases or decreases more visible;
- To provide an indication of the historical, current, and future direction of prices relative to municipal expenditures;
- To explain increased expenditures attributed to inflation when submitting annual budgets.

5.2 MUNICIPAL COST INDEX

Municipal Cost Index (MCI), entails both inflationary and non-inflationary components along with their Weight and Inflators. MCI has been created in such a way that it focuses on the overall yearly impacts of basket of goods that our clients has maximum exposure to and represents the operational/working capital needs on an ongoing basis. MCI will be used to a part of the assumptions in the following calculations:

- Municipal Cost Index is used an integral part of Capital Planning and served as the base for inflating/compounding historical costs to Present Value
- Financial Forecasting Municipal Cost Index will be used as an compounding/inflation factor till 2013 financial year and then the compounding/inflationary factor will be based upon the reliable research reports like RBC, TD, Scotia Bank, Stats Canada to predict rest of the years (basis Inflation rate, GDP growth rate, Population, Risk Free Rate, Market Premium Rate etc. will be considered for a constant growth rate)
- Break down of revenue and expenditure and predicting the sources of funds and expenses

Extending the use of the CPI into discussions about the appropriate level of tax and fee rate increases becomes problematic, however, because a government's actual experience with inflation can differ greatly from the CPI. This is because the largest expenditures for governments are typically labor, materials, and contractual services — different factors than those found in the CPI. Spending patterns that are different than those of other economic sectors. A price index that does not reflect the municipal purchasing structure does not truly

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- To provide an indication of the historical, current, and future direction of prices relative to municipal expenditures;
- To explain increased expenditures attributed to inflation when submitting annual budgets.

Please refer to Appendix E for our Municipal Cost Index calculations.

5.3 FINANCIAL STRATEGY ASSUMPTIONS

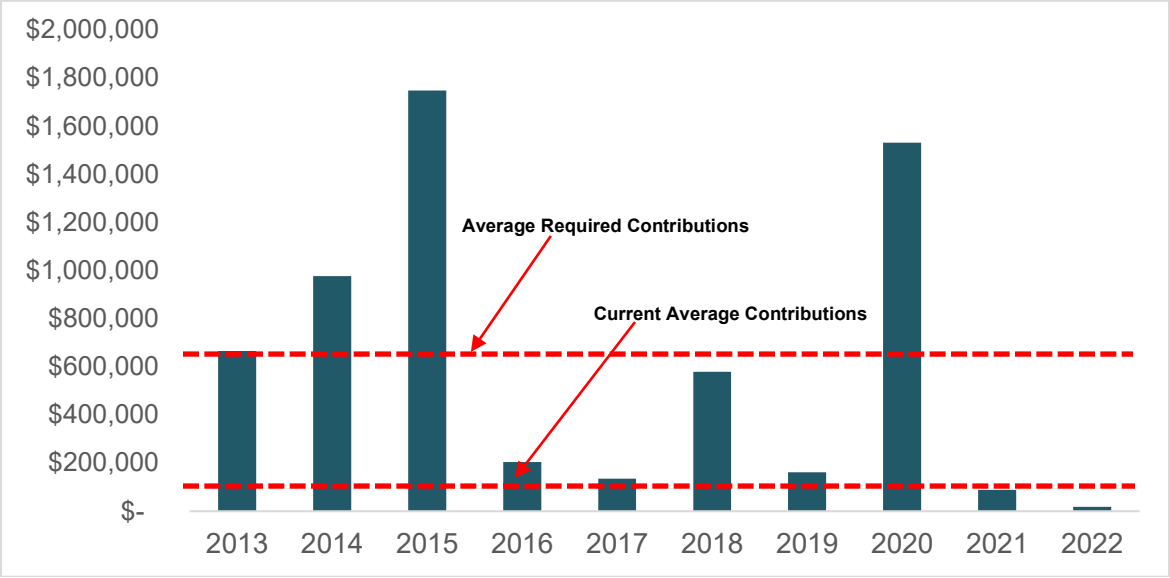
The following summarizes the key assumptions used in the preparation of the financial strategy for the Township:

- 2.3% annual operating income increase (taxation, base scenario)
- 2% annual increase in User fees and 1% increase in other revenues
- 2% annual operating expenditure increase
- 2% annual increase in capital replacement costs
- Existing funding sources, as identified in the 2012 FIR
- Existing Gas Tax Revenue of $35,400 annually (not inflated)
- No growth related capital has been included in analysis as the financial strategy relates to the replacement of existing assets.
- Capital replacement needs as identified in the previous section of this report

It is important to keep in mind that assumptions may significantly change over time. In addition, capital replacement cost estimates may vary from current projections. As such, there is a need to continually monitor the financial strategy.

5.4 FUNDING REQUIREMENTS

As illustrated below, the existing contributions are below the amount required to fund tax related capital assets over the next 10 years. For tax supported services, the average annual replacement requirement is $611,275 and the existing contributions to the capital program are approximately $93,842 resulting in a large infrastructure funding gap. Strategies to close/reduce the gap will be discussed in the next section of the report.



5.5 STRATEGIES TO ADDRESS THE INFRASTRUCTURE GAP

Financial sustainability requires that a Township ensure that there are sufficient resources to support the delivery of services for which the Township bears responsibility. Given the need and benefit for further infrastructure investment in order to protect, sustain, and maximize the use of Casey's infrastructure assets, a number of options and strategies have been considered.

5.5.1 STRATEGY 1: SPECIAL INFRASTRUCTURE LEVY

An option that could be implemented is to establish a special infrastructure levy for the replacement of existing infrastructure. For example, a special infrastructure annual levy increase of 2% would generate sufficient revenues to reduce the tax related infrastructure gap going beyond 10 years. Township should continue using additional funds through an infrastructure levy to create reserves to sustain infrastructure and service levels. These contributions would be dedicated to the replacement of existing reserves. An increase of an additional 2% annually will increase the funds available over the 10 year period by approximately $233,295. This reflects the significant power of compounding.

- In year one, the additional 2% special levy would generate an additional $4,347.
- In year 10, with an assumed 2% special infrastructure levy, this would generate an additional $50,771.

The following table is provided for illustrated purposes to help explain the significant potential through a modest levy increase to address the tax infrastructure gap:

2% Infrastructure Levy	
2014	$ 4,347
2015	$ 8,981
2016	$ 13,916
2017	$ 19,169
2018	$ 24,754
2019	$ 30,689
2020	$ 36,991
2021	$ 43,678
2022	$ 50,771
Total Income	***$ 233,295***
Average Income	***$ 25,922***

5.5.2 STRATEGY 2: RETHINKING INFRASTRUCTURE

There is the potential to reduce infrastructure costs by determining the most cost-effective options for all capital programs for new or rehabilitated infrastructure by pursuing life cycle costing analysis, which was discussed earlier in the report. Further, as indicated previously, the timing to replace assets is based on the analysis undertaken using theoretical assumptions in some cases. Due to the funds available, there will be a need to identify where the replacement of some assets may be deferred. A strategy frequently used by municipalities is to establish priorities based on funds available and to gradually increase contributions to reserves. Many municipalities develop rehabilitation and replacement programs on a system wide program basis versus annual project by project basis. This will allow for improved prioritization and co-ordination of required works.

5.5.3 STRATEGY 3: STRATEGIC USE OF DEBT

Due to the backlog in the tax supported programs, there is a need to examine the cost/benefit of addressing these needs through the issuance of debt. Using debt strategically can provide capital funding flexibility by allowing certain infrastructure to be built and used before sufficient revenue has accumulated to offset the needed investment. Debt is frequently issued and considered a standard practice in municipalities for capital projects that are long term in nature and that benefit future taxpayers, thereby spreading the costs across future years. As such, debt promotes inter-generational equity in that infrastructure is paid for by those who use it. The Township currently has no debt outstanding. With favorable interest rates and significant backlog, the Township may wish to consider the need to issue debt to expedite capital replacement. Infrastructure Ontario interest rates at the time of this report are as follows:

- 10 year – 3.11%
- 15 year – 3.62%
- 20 year – 3.93%

For example, if the Township were to issue $1 million in debt to address a portion of the backlog deemed to be highest priority that was beyond reserve availability, the debt payments would be approximately $88,000 (assuming 15 year term).

A debt management policy improves the quality of decisions, identifies policy goals and demonstrates a commitment to long-term financial planning, including a multi-year plan. Adherence to a debt management plan signals to rating agencies and capital markets that the

Township is well managed and is well positioned to meet its obligations in a timely manner. The Province regulates the amount of debt municipalities issue by setting an annual repayment limit for each Township (25% of a Township's own source revenues). Based on our experience, municipalities typically establish thresholds below the Provincial limit to take into consideration taxpayer affordability and to ensure flexibility.

In addition to a debt guideline, monitoring also becomes important when considering the idea of the increased use of debt as a funding source to ensure that it is being used in a fiscally responsible manner. Government Finance Officers Association recommends that municipalities adopt policies that specify appropriate uses for debt.

The following strategies are recommended to determine the most appropriate time to issue debt:

- Debt will be proportionate to the Township's tax base and will not put an excessive burden on operating expenditures.
- Outstanding and planned debt levels will not exceed an amount that can be supported by the existing and projected tax revenue base. Debt policies will focus on:
    - projected debt requirement
    - limits and benchmarks
    - term and structure of debt
    - use of reserves to offset debt issuance
- Long term debt for the replacement and refurbishment of existing capital assets will be reduced and a planned process will be developed whereby an annual contribution will be made to meet lifecycle needs of all assets.

The following policies are recommended to manage debt within the Township:

- Tax Debt Charges as a percentage of Tax Own Source Revenues will not exceed 10%
- Long term debt financing will be restricted to specific project types:
    - Increased/new services to residents for new initiatives
    - New, non-recurring infrastructure requirements
    - Projects which are supported by a business plan that show revenues will cover capital and interest costs
    - Projects where the cost of deferring expenditures exceeds debt servicing costs
    - Project costs not recovered from Development Charges
    - Projects tied to third party matching funding

  (Note: These restrictions may have to be phased in to meet short term budget challenges.)
- The length of the term of debt will not exceed the useful life of the underlying asset.
- The Township will monitor and report on all forms of debt annually

5.5.4 STRATEGY 4: USE OF GRANTS

It is well established that the condition of Canada's municipal infrastructure is one of the keys to underpinning, maintaining and enhancing Canada's economic productivity and competitiveness. It is therefore clearly in the national and provincial interests for the federal and provincial government to institute permanent and sustainable infrastructure funding. It is anticipated that additional sources of funds may be forthcoming. Along with the strategic use of debt, Township can also apply for the grants available from the provincial and federal government. Backlog created through the tax supported programs, there is a need to assess it

through cost/benefit of addressing these needs through grants. There are various sources for the funding:

- The **Gas Tax Fund** ($21.8 billion)
- An incremental **Goods and Services Tax Rebate** for Municipalities ($10.4 billion)
- A new **Building Canada Fund** with two components:
  - A $4-billion, merit-based, National Infrastructure Component
  - A $10-billion Provincial-Territorial Infrastructure Component
- An additional $1.25 billion in funding for **P3 Canada**, which will continue to be administered by PPP Canada Inc.

6 RECOMMENDATIONS

6.1 SOTI RECOMMENDATIONS

The SOTI/Capital Plan identifies a number of asset-specific recommendations. However, there are six recurring recommendations that should be addressed in future strategic asset management initiatives:

1. Develop, through more detailed analysis, a plan for allocating the additional funds to the operating and/or capital budgets, as required, in order to successfully develop, implement, and maintain the required asset management plans;
2. Develop a policy and implement a strategy to reach long term sustainable funding for each of the assets covered in this SOTI Report;
3. Implement a comprehensive budget structure along service delivery lines, so that service managers can adequately know what the true total cost of their service is (including asset management, operations, capital, and borrowing costs).
4. Review the selection and use of rehabilitation strategies on life-cycle costing and on a return-on-investment (ROI) basis.
5. Review operating and maintenance practices balancing least life-cycle cost against level of service and risk exposure, on a business-case basis using InfraGuide Best Practices and other industry sources;
6. Provide regular updates to the SOTI Report Card and Analysis

6.2 CAPITAL PLAN RECOMMENDATIONS

1) That asset condition assessment of capital assets should be considered wherever feasible. The application of a standard life expectancy of an asset reflects a financial approach (PSAB 3150). Age-based condition assessment has **the least level of confidence for building a capital plan**.
2) That the Township of Casey could consider releasing a policy defining its strategy and intention as it pertains to the infrastructure deficit, including communications to the general public.
3) That the Township address their infrastructure deficit.
4) That the Township proactively define organizational responsibilities to maintain the asset inventory including proposed and actual project cost information, updating the data as assets are acquired or betterments are added to existing assets and projects are started

and completed. In this manner, the accuracy of future Capital Plan will increase over time.

5) That the Township consider establishing as policy the following principles, that it be:
    a) **Customer Focused:** To have clearly defined Levels of Service and applying asset management practices to maintain the confidence of residents in how the Township of Casey assets are managed.
    b) **Forward Looking**: To make the appropriate decisions and provisions to better enable its assets to meet future challenges, including changing demographics and populations, customer expectations, legislative requirements, technological and environmental factors.
    c) **Service Focused**: To consider all the assets in a service context and taking into account their interrelationships as opposed to optimizing individual assets in isolation.
    d) **Risk-based**: To manage the asset risk associated with attaining the agreed levels of service by focusing resources, expenditures, and priorities based upon risk assessments and the corresponding cost/benefit recognizing that public safety is the priority.
    e) **Value-Based/Affordable**: To choose practices, interventions and operations that aim at reducing the life cycle cost of asset ownership, while satisfying agreed levels of service. Decisions are based on balancing service levels, risks, and costs.
    f) **Holistic**: To take a comprehensive approach that looks at the “big picture” and considers the combined impact of managing all aspects of the asset life cycle.
    g) **Systematic**: To adopt a formal, consistent, repeatable approach to the management of its assets that will ensure services are provided in the most effective manner.
6) **Innovative**: To continually improve its asset management approach, by driving innovation in the development of tools, practices, and solutions. To meet the goals and objectives of this policy, senior management could consider:
    a) The creation and maintenance of a Comprehensive Asset Management (CAM) governance structure to lead the development of AM tools and practices and to oversee their application across the organization.
    b) Adopt a Comprehensive Asset Management Strategy (AMS) to:
        - Establish, document and continually adhere to industry recognized asset management protocols;
        - Develop asset management knowledge and competencies aligned with recognized competency frameworks;
        - Entrench lifecycle costing when evaluating competing asset investment needs across the Township assets;
        - Monitor the performance of the assets and track the effectiveness of AM practices with a view to continuous improvement;
        - Where practical, strive to go beyond minimum legislative requirements as an enabler to make the Township of Casey assets more resilient to changing social, environmental and economic conditions.
        - **Establish a capital projects prioritization matrix, as per Appendix C**

6.3 LEVEL OF SERVICE RECOMMENDATIONS

1. We recommend that the Township incorporate a Level of Service analysis prior to resolving the infrastructure deficit in order to maximize the impact of their capital investments and impact of their capital investments with the objective to
    - Refine levels of service that balance customer expectations with risk, affordability and timing constraints as it pertains to the Township's unique requirements;
    - Adopt risk-based decision-making processes that consider the likelihood of asset failure and the consequence of a failure with regards to impacts on safety and levels of service;
2. To assist in better establishing Levels of Service, the Township should consider collecting technical performance measures need to provide information on:
    - the types of failure
    - the number of customers affected
    - the duration and severity of the failure
3. To support decision-making for effective management of the assets, the Township should consider technical performance measurement and monitoring, undertaken by the Township such as:
    a) Assessing the effectiveness of the operational, maintenance and capital works program
    b) Review and refinement of maintenance and rehabilitation strategies and standards
    c) Assistance in strategic decision-making through definition of remaining life, based on the measure being assessed
4. **The Township should use the Appendix D to review and establish reasonable Levels of Service for the community.**

6.4 FINANCIAL STRATEGY RECOMMENDATIONS

It is well recognized that a Financial Strategy to support the asset management plan is a dynamic document that should be updated and re-evaluated on an ongoing basis. The Township should give due consideration to the following points:

- The Township has insufficient funds from existing sources to proactively manage its infrastructure and will need to prioritize its requirements to maximizing the impact of existing financial resources.
- The Township needs to be proactive in reviewing and capitalizing on the upcoming Province and Federal contributions to the infrastructure deficit to ensure maximum benefit for the Township. It should seek government grants to be able to undertake the capital projects outlined in the Asset Management Plan and deal with its growing infrastructure deficit
- The Township needs to be proactive in reviewing funding options including Infrastructure Ontario Lending Policies, Private Public Partnerships, user fees and other funding options to have understanding of financing options, should the need arise.
- The Township has a rapidly growing infrastructure deficit which is serious, considering its population and tax base. A special infrastructure levy will help the Township to reduce the gap over time and should be taken into consideration. In the event that the

Township implements an infrastructure levy, a percentage of the additional funds should be transferred into a reserve so that the Township has some flexibility to prioritize and sustain future infrastructure and service level requirements

- The Township needs to embrace the principles of Asset Management to formulate assumptions, projections and strategies going forward. The Plan should be modified on an ongoing basis based on changes in the municipal environment
- The Township should track and build awareness of the results of its projections on current operating and capital spending and funding levels with the objective of fine tuning the forecasting process
- The Township should continue analysis and examination of key financial goals and strategies that guide future priorities and expenditure

7 CONCLUSION

As a general comment, the Township of Casey is well run but hampered by limited revenue and extensive infrastructure to maintain, primarily its bridges. ISI worked with staff who were knowledgeable and committed. The information we received was, by in large, accurate and well organized. The overall state of the linear infrastructure at the Township of Casey is in line with the vast majority of smaller rural municipalities in this Province.

As highlighted in the Report Card, the current state of the linear infrastructure, based on available condition rating and age analysis, presents a picture of the Township's linear assets to be in need of substantial work. The Township should continue to be proactive to extend asset useful life and avoid major rehabilitation/reconstruction or replacement costs.

It is highly recommended that the Township of Casey embrace the principles of Asset Management. Managing existing infrastructure, doing the right thing, at the right time, involves knowing and actually doing the most cost-effective maintenance, repair, rehabilitation or replacement activity at the right time throughout the entire life cycle of the asset. Beyond cost savings, assets need to be viewed in terms of their ability to enhance quality, function, capacity and safety of the service being provided.

The process of implementing Asset Management is rife with challenge. It requires clear direction from Council. It requires significant cross-departmental cooperation. It requires the allocating of time, energy, and resource to assume new responsibilities. It requires consultation with the community. It requires working with constrained budgets to balance priorities. Because infrastructure management deals with assets that have long lifespans, it may take years before a substantial financial return on investment (ROI) becomes apparent. Still, managing existing, capital intensive, public sector infrastructure asset could provide very significant benefits (i.e. 20 – 40% reductions in life cycle costs).

Finally, the Township will likely be faced with difficult decisions over the next years, and the infrastructure deficit continues to widen. The council should put together a public communication program to engage the community in discussing the true cost of services and the assets required to provide those services. Develop and implement service levels that are in line with public expectations and willingness to pay.

We appreciate having been awarded the contract to build your Asset Management Plan and trust that this work is the beginning of a long and positive relationship with Casey. Infrastructure

Solutions Engineering provides Strategic Plans, condition assessments, financial analysis, and a wide range consulting and engineering services. Please consider us a resource.

APPENDIX A - DETAILED LIST OF CAPITAL PROJECTS

Please click on the hyperlink below for your 10 year list of Capital Projects:

Appendix A - Detailed List of Capital Projects

APPENDIX B – ASSET USEFUL LIFE

Departments	Assets	Useful Life as per CIP	Source
Transportation Network	**Road Section**		
	LCB	50/60 (Total Reconstruction)	ISI Infrastructure
	Gravel	(Recurrent Resurfacing)	ISI Infrastructure
Structures	**Culvert**	50	ISI Infrastructure
	Bridges	Varied	ISI Infrastructure
Facility	**Building**	50	ISI Infrastructure
Equipment	**Equipment**	Varies	As per the TCA Policy
Fleet	**Vehicle**	Varies	As per the TCA Policy

APPENDIX C – CAPITAL PLAN PRIORITIZATION MATRIX

	Definition	Maximum Points	Percentage Weightage
Goals/Objectives	**Extent to which project meets goals & objectives of the Township's council**	**25**	**15.9**
Safety	Extent to which project eliminates, prevents, or reduces an immediate hazard to safety	14	8.9
Mandates	Extent to which project helps council meet existing or new mandates	13	8.3
Timing/Linkages	Extent to which is project is timely, a continuation of project currently underway, related to other high priority projects etc.	12	7.6
Economic Impact	Extent to which project enhances economic development in township or directly/indirectly adds to tax base	11	7
Efficiencies	Extent to which project contributes to savings in township's operating/capital expending	10	6.4
Maintain Current Level of Service	Extent to which project is necessary for township to continue to provide one or more services at current standards	9	5.7
Improving Access	Extent to which project improves citizen access to current services	8	5.1
Service Improvement	Extent to which project improves the quality of exiting services	7	4.5
Service Addition	Extent to which project increases the quantity of exiting services	3	1.9
Operating Budget Impact	Projects that lower future operating expenses receive a positive score, ranging from 0 to 15. Projects that have no effect on operating expenses receive a score of 0. Projects that increase operating expenses score anywhere from 0 to -15	0-15, 0, 0-(15)	9.5
Community Support	Extent to which project has broad and/or strong support from the community	10	6.4
Financing	Extent to which project can be financed with non-general fund revenue sources	15	9.5
Timeliness of Submission	Extent to which project request is submitted in a timely way	5	3.2
		142	**100**

APPENDIX D - OPERATING PERFORMANCE INDICATORS

Service	Operating Performance Indicators (OPI)	Current Performance	Target Performance	Projected Timeline to Achieve Target	External Factors Affecting Service Levels
ROADS					
Examples for Roads below:					
Road Maintenance & Repairs	Complete approximately X work orders per year for service requests including pot hole repair, minor asphalt patching, alley maintenance, sightline improvement, MVA clean-up.	1500	500	3 Years	
Brushing and Roadside Mowing	Complete approximately X km's of brushing on roadsides annually.	N/A	50 km	2 Years	
	Complete roadside mowing X times annually	2	3	3 years	
Road Construction	Roads Total Re-Constructed and Surface Treated __km's - Annual Average	3.5	20	2 Years	
	Roads Recapped ____km's - Annual Average	8	30	2 Years	
	Gravel Roads Surface Treated ___km's - Annual Average	3.5	20	2 Years	
Curbing/Shoulders	Annual repair, by August, of all curbing damage in previous winter.	September	July	1 Year	
Signs	Annual inspection and maintenance of all X stop signs.	1225	1225	Timeline Achieved	
Signs Street Marking	Annual inspection of crosswalk, pedestrian, school and playground signs and beacons.	September	July	1 Year	
	Annual Upgrade of X signs to diamond grade	12	25	1 Year	
	Annual repaint of all X km of directional centre lines.	13	20	1 Year	
Street Marking Bridge Maintenance	Annual repaint of all X km of trim line.	3	10	1 Year	
	Annual painting, prior to _____ of all street markings.	September	July	1 Year	

	Engineering inspection of bridges and completion of repairs as recommended	2 years	2 years	Timeline Achieved	
Snow and Ice Control	Major roads including emergency routes during winter events.	16 Hours	16 Hours	Timeline Achieved	
Snow and Ice Control	Residential areas – through roads first then cul-de-sacs and dead ends.	16 Hours	16 Hours	Timeline Achieved	
	Residential areas will be ploughed and maintained within 96 hours unless snow and icy conditions return crews back to major roads.	16 Hours	16 Hours	Timeline Achieved	
VEHICLES - FLEET					
Examples for Vehicles below:					
Fleet Maintenance	Undertake preventative maintenance and repairs to meet industry standards for safety and operation.	Daily	Daily	Timeline Achieved	
	Maintain fleet availability at X%.	80	100	3 Years	
Small Equipment	Inventory, maintain and repair X pieces of small equipment for use by all departments.	40	40	Timeline Achieved	
Preventative Maintenance Services	X units inspected every X months to maintain safety and fleet efficiency.	32 Units every 250 Hours	32 Units every 250 Hours	Timeline Achieved	
Leases	Lease vehicles for summer projects and operations.	1 Tractor for Roadside Mowing	None	2 Years	
Communications	License, repair and purchase fleet and handheld communications to maintain dependable operation	Annual	Annual	Timeline Achieved	

DRAINAGE					
Examples for Drainage below:					
Flushing	Annual flushing of X km of the X km storm system				
Video Inspections	Annual video inspection of X km of the storm system.				
Manholes / Cleanouts	Install and repair manholes and cleanouts.				
Catch Basins	Annual inspection and cleaning of all X catch basins				
Detention Systems	Annual inspection of all X detention systems.				
Inlet / Outlet Structures	As needed Inspect and clean all critical inlet and outlet structures and service before, during and post-storm events.				
	Annual inspection and maintenance of approximately X inlet and outlet structures.				
Ditch Cleaning	Annual inspection of all X km of ditch and clean as needed.				
Culverts	Repair driveway and road crossing culverts as assigned through work orders.				
Service Call-outs	Provide 24/7 on call coverage for sewer and drainage emergency response.				

APPENDIX E – MUNICIPAL COST INDEX

MCI(Region 4)								
COMPONENTS	Weights	Inflators for Each Component						
		2006	2007	2008	2009	2010	2011	2012
Wages and Salaries and Benefi	28%		2%			-4%	3%	
Interest on Long Term Debt	1%							
Materials	28%		9%	2%	-3%	5%	0%	
Contracted Services	13%		-4%					
Rents and Financial Expenses	0%			-1%				
External Transfers	20%							
Amortization	10%					-4%	18%	
Average MCI	**2.65%**							

Notes:

- Municipal Cost Index, is calculated to better represent the municipal purchasing power and cost experience, so ISI will use 2.65% as the compounding/inflationary factor up until 2013
- Municipal Cost Index represents the basket of goods and services which is consumed/used by municipalities and represents the operational/working capital needs on an on-going basis
- Assigned weights represents the percentage of services/goods consumed out of total spend
- Inflators represent the year on year changes in the components
- Component's weight and inflators, sum all represents the overall cost experience for the municipalities/region as compared to CPI
- MCI is created as to minimize the variation/deviations of cost/purchasing experience in the region
- The source of Municipal Cost Index are the Financial Statements for your specific region
- Outliers have been removed from the data for Municipal Cost Index calculation to average out/standardized data

APPENDIX F – ROAD MANAGEMENT STRATEGY

Road Management

Infrastructure Solutions Inc. is incorporating a road management strategy in your Asset Management Plan. Our primary tool for this analysis is the Capital Planning Module (CIP) built into Municipal Data Work's (MDW). MDW tracks and costs the various road maintenance, rehabilitation and construction strategies over your road network's life-cycle. This strategy forms the major component of the Capital Plan which, in turn, serves as one of the core components of the Asset Management Plan. This document does not deal specifically with your Township but does outline our approach to analyzing your road network to provide you with insight and ask for your concurrence.

The Relevance of a Road Management Plan

The deterioration curve below demonstrates the need for implementing a road management plan. It involves mapping a road section over the course of its life-cycle to determine where age and condition intersect to create a trigger point for action. A comprehensive road management plan will establish the most cost effective approach and associated benefits (level of service, safety, extended life of the asset) associated with timely corrective action.

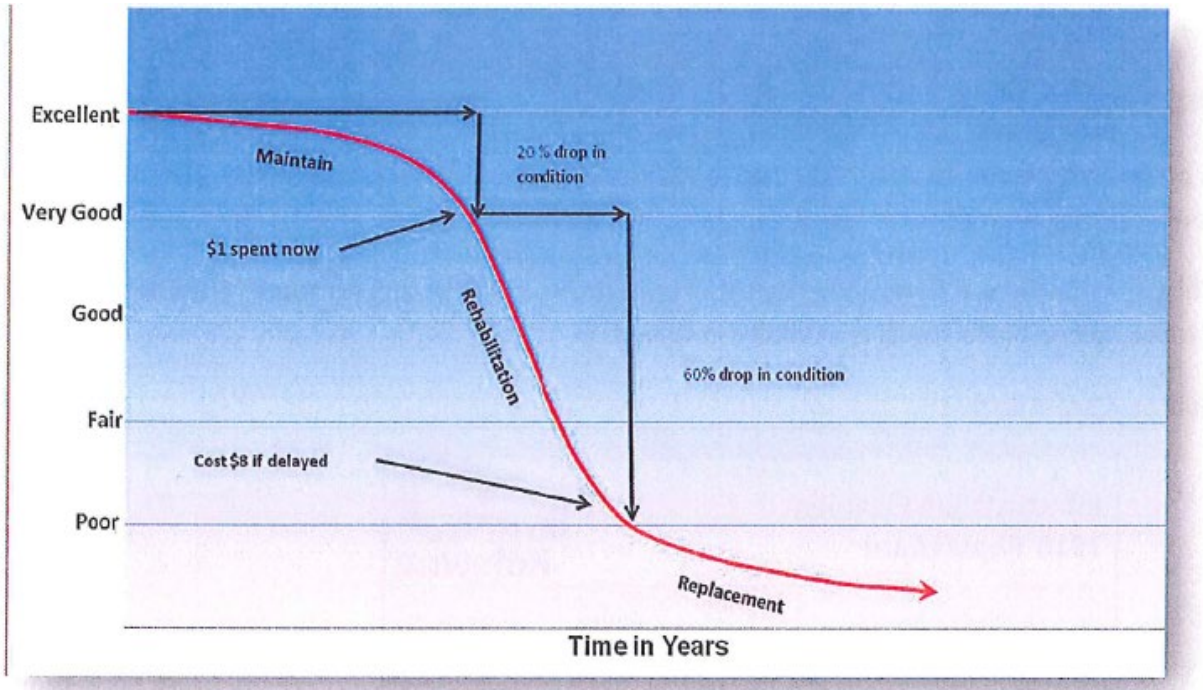
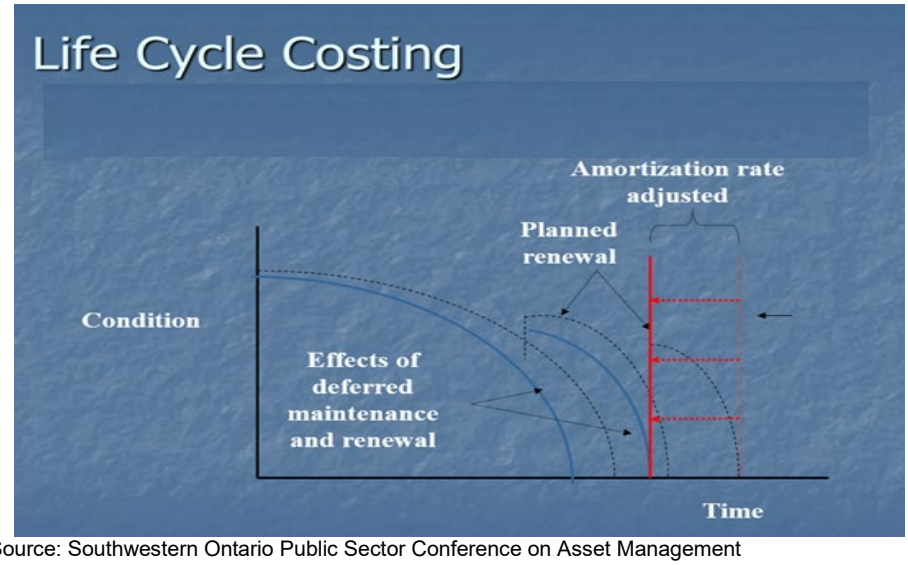


Figure 1: Typical Deterioration Curve

Life-Cycle Costing

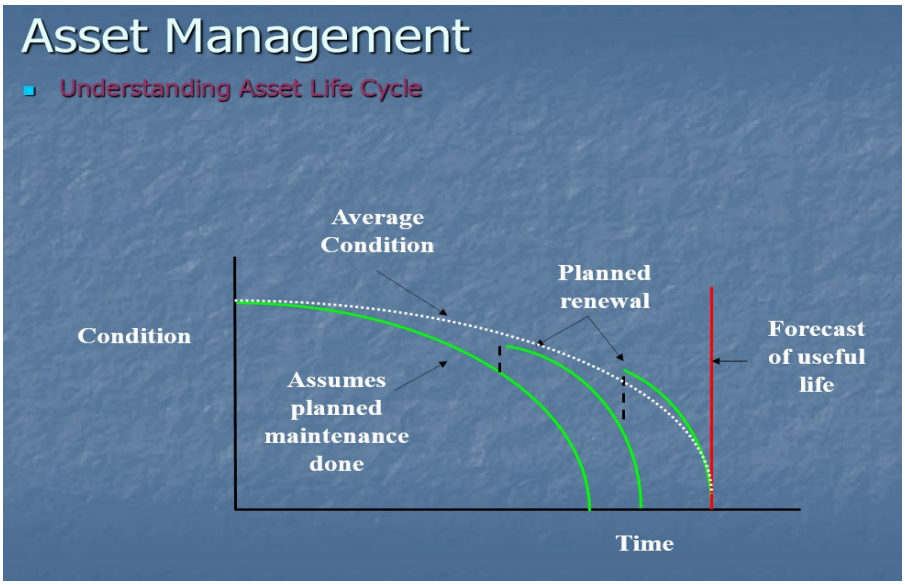
Effective life-cycle costing will optimize scarce financial resources by prolonging roads service life, while maintaining safe and secure levels of service. Our Capital Plan provides a detailed description of a road's life-cycle costs including operation, maintenance, renewal and replacement. While our final Capital Plan will assume unlimited funding, the final road strategy will recommend treatment strategies according to the service level balanced with the availability of funding.

Figure 2 - Life-Cycle Costing



Source: Southwestern Ontario Public Sector Conference on Asset Management

Figure 2-3: Asset Management



Source: Southwestern Ontario Public Sector Conference on Asset Management

Road Treatment Strategies

The options for road preservation treatments involve a wide range of applications, grouped into four major categories:

1. **Preventative Maintenance Treatments** – These are low cost maintenance treatments applied to preserve, retard future deterioration, and maintain or improve the functional condition of road surfaces without significantly increasing structural strength. These treatments could be applied to a road surface over its entire service life.

2. **Surface Treatments** – These include surface seals and treatment applied to address surface deficiencies such as general raveling, segregation, or fatigue cracking distresses. These treatments could be applied to mid-life pavements to retard future surface or structural deterioration.

3. **Rehabilitation Treatments** – These are rehabilitation treatments such as structural overlays or mill and inlay treatments applied to increase structural capacity and restore serviceability. These treatments could be applied to mid-life and late-life pavements and could be major or minor depending on the percentage of base repair required.

4. **Reconstruction Treatment** – This high cost treatment would be used as a rehabilitation strategy under the circumstances where the existing pavement has completely failed. In this case, the original roadbed may be the cause of reduced serviceability. Excessive maintenance cost and other rehabilitation treatment may provide only very short term solution and a reconstruction of the entire road would be more feasible.

5. Road Condition Assessment

The basis of implementing a road management plan is having a clear understanding of the state and condition of your network. There are several methods of establishing condition assessment depending on the level and scope of information needed to be collected. Generally, road condition assessments will provide a rating scheme (usually from 0-10 or 0-100), reflecting the degree of road or pavement degradation, where, under the RCR or PCI rating system, zero indicates the end-of service and 10 or 100 would indicate a newly constructed road.

Road Needs Studies

The purpose of a Road Needs Study requires a qualified engineer to provide an analysis of the overall condition of the road system, including such factors as road condition ratings, traffic counts analysis for road classification, road condition description and geometry, repair/reconstruction strategies and priorities etc. The study would also provide statistical information on the road system.

Visual Inspection

Visual inspection involves the evaluation of surface cracks and other physical deficiencies within road system to determine the condition rating of the roads. It requires a qualified engineer to measure and evaluate the type and extent of deterioration to rate the roads, such as the PCR (Pavement Condition Rating) as per MTO (SP024) or the PCI (Pavement Condition Index).

Ride Comfort Rating (RCR)

This involves driving along a road length or network at the posted speed while recording the level of discomfort due to the degree of roughness. It is the least expensive option for assessing road conditions and would be usually carried out by the public works department.

Age-based Condition Reporting

Where a Township chooses not to undertake a road condition assessment by any of the aforementioned processes, ISI has the capability to model road condition maintenance and renewal strategies using engineering deterioration curves determined by road age. This is the least accurate method for determining a road's condition and recommended strategies.

Infrastructure Solutions Approach

Road Maintenance, Rehabilitation and Reconstruction Strategy

Infrastructure Solutions Inc., will generate a final Capital Plan formulated on the above pavement strategies modelled in MDW for all road types. We have also developed a capital plan forecasting module, utilizing cost indices unique to each regional Township in Ontario.

Based on MTO guidelines, Infrastructure Solutions Inc., has selected the use of the following road and pavement condition triggers to formulate maintenance, rehabilitation and reconstruction strategies in the MDW capital planning module. In the table below, the RCR triggers are shown. MDW can accommodate various rating schemes such as PCI, which is out of 100. However, even if PCI is used, the same trigger pattern ranges (0-20, 30-40, etc.) and the associated strategies at each trigger, will be employed. For HCB roads, the following triggers and maintenance, rehabilitation and reconstruction strategies apply:

Condition Assessment Ratings (HCB)

Condition	Ratings Trigger (RCR)	Road Preservation/Reconstruction Strategie
EXCELLENT	9 – 10	Preventative Maintenance Treatments *(i.e. crack repairs)*
GOOD	7 - 8	Minor-Low Cost Spot Repairs *(i.e. 10% spot base repairs)*
FAIR	5 - 6	Minor-Low Cost Rehabilitation (resurfacing with 20% spot base repairs)
POOR	3 - 4	Major-High Cost Rehabilitation *(resurfacing with 50% base repairs)*
VERY POOR	0 - 2	Total Road Reconstruction *(100% of surface and base)*

LCB roads require regular resurfacing, with spot base repairs, as the road reaches a lower condition ratings as shown in the table below:

Condition Assessment Ratings – LCB (Surface Treated)

Condition	Ratings Trigger (RCR)	Road Preservation/Reconstruction Strategies
EXCELLENT	9 – 10	Single Surface Treatment
GOOD	7 - 8	Single Surface Treatment *(Spot base repairs 10%)*
FAIR	5 - 6	Single Surface Treatment *(Spot base repairs 15%)*
POOR	3 - 4	Single Surface Treatment *(Spot base repairs 20%)*
VERY POOR	0 - 2	Total Road Reconstruction *(100% of surface and base)*

The remaining service life of gravel roads is determined by the gravel thickness. A properly maintained unsealed gravel road theoretically has an indefinite service life. Cyclical maintenance through re-graveling the surface and spot base repairs can therefore prolong the life of the road for many decades, not requiring

reconstruction. The cyclical maintenance/rehabilitation of gravel roads is shown below; such maintenance enables the roads to remain in excellent/good condition:

Condition Assessment Ratings - Gravel		
Condition	**Ratings Trigger (RCR)**	**Road Preservation/Reconstruction Strategie**
EXCELLENT	9 – 10	Preventative Maintenance Treatments *(Resurfacing: 75mm Granular A)*
GOOD	7 - 8	Preventative Maintenance Treatments *(Resurfacing: 75mm Granular A)*
FAIR	5 - 6	Preventative Maintenance Treatments *(Resurfacing: 75mm Granular A and 10% spot base repairs)*
POOR	3 - 4	Preventative Maintenance Treatments *(Resurfacing: 75mm Granular A and 10% spot base repairs)*
VERY POOR	0 - 2	Preventative Maintenance Treatments *(Resurfacing: 75mm Granular A and 20% spot base repairs)*

Using information collected from the road condition assessment report, an inventory is created with road service life and other road attributes potentially including annual average daily traffic (AADT) counts, if available. From our consultations, along with applying MTO and OGRA guidelines, ISI has determined the following service life for the different road types:

Road Design and Functional Class		
Type	AADT	Service Life
Urban (HCB)	>3000	30-40
Semi-Urban (HCB)	<3000 - >1000	40
Urban (LCB) and (HCB)	<1000 - >400	50
Rural (LCB) and (HCB)	< 400	60
Gravel	< 1000	Unlimited
Dirt	< 1000	Unlimited

Where AADT information and/or information on rural/urban classification is not available, we assume a service life of 60 years for both LCB and HCB roads.

HCB Road Treatment

For road treatment described as a single lift, we assume a 50 mm layer of HCB for rural and urban roads. Major rehabilitation would involve two 50 mm lifts and 50% spot base repairs.

LCB (Surfaced Treated) Road Treatment

A single surface treatment is applied for all trigger points except reconstruction where double surface treatment would be applied.

Performance Prediction Curves

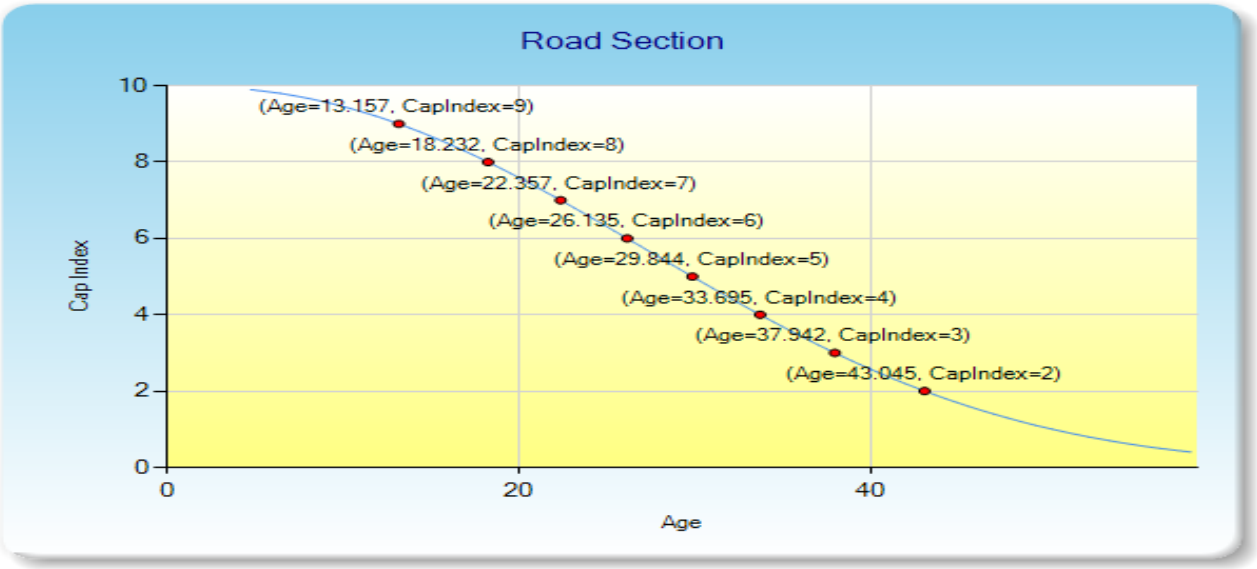
The screenshots provided in Figures 4-7 following, are taken from the MDW Capital Planning Module and are for demonstrative purposes only. The vertical axis is the condition rating, and the horizontal axis reflects the age of the road. The capitalization indices (CapIndex/CapIndices) are points along the deterioration curve corresponding to specific road treatments at condition/age intercepts. These indices are trigger points for maintenance/rehabilitation/reconstruction activities with their associated life expectancy gain.

The Capital Planning module within MDW uses these trigger points to generate the type of repairs required and the associated costs. Road construction costs are entered into the system based on either cost per km or cost per square meter (see Fig. 6). ISI always establishes current treatment costs by gathering recent invoices from our client, neighboring municipalities, or by direct contact with local contractors.

Sources

- Ministry of Transportation's (MTO) Inventory Manual for Municipal Roads (1991).
- Ontario Good Roads Association (OGRA) publication; "A Guide to Road and Bridge Asset Management Plan Development, June 2011.
- Ministry of Infrastructure's "Guide for Municipal Asset Management Plans".
- Ministry of Transportation's (MTO SP-24) Manual for Condition Rating of Flexible Pavements 1989, and Pavement Condition Index (PAV-86-02), 1986.
- InfraGuide, National Research Council of Canada

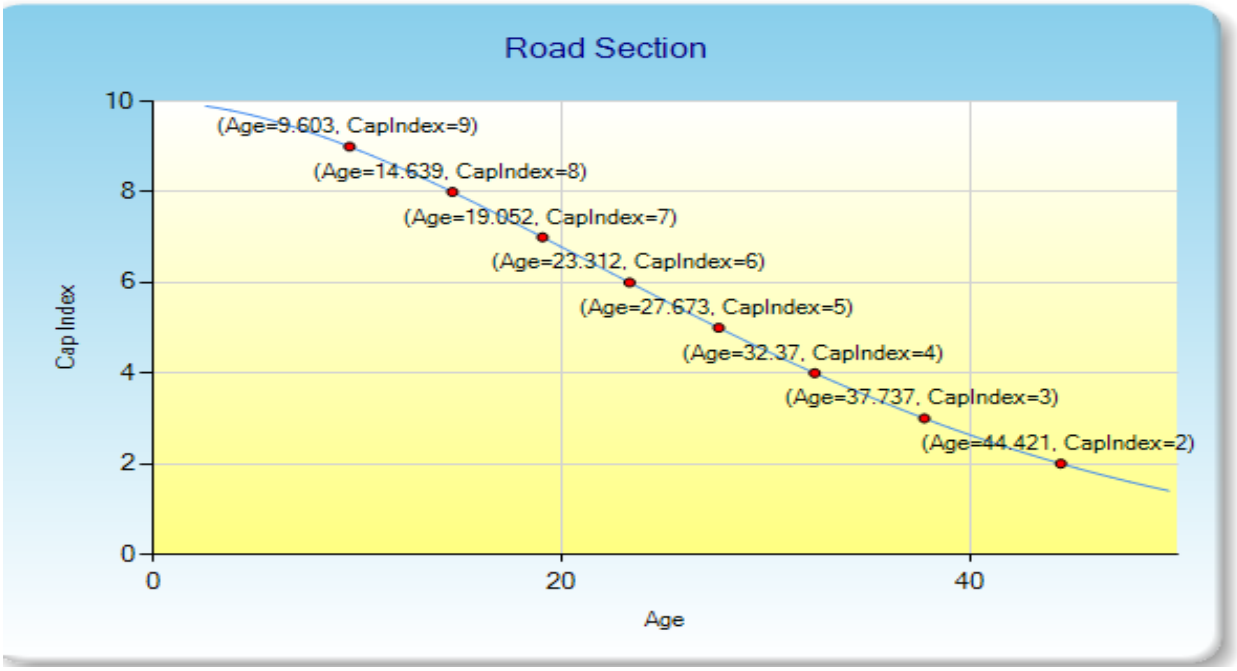
Figure 5 - (MDW Screenshot): Low Class Bituminous (Surface Treated) Roads



Curve Parameter Setting

Description	Min Value	Max Value	Value
Beta	1	3	1.78
Eta	0	50	34
Gamma	0	0	0

Refresh Chart Close



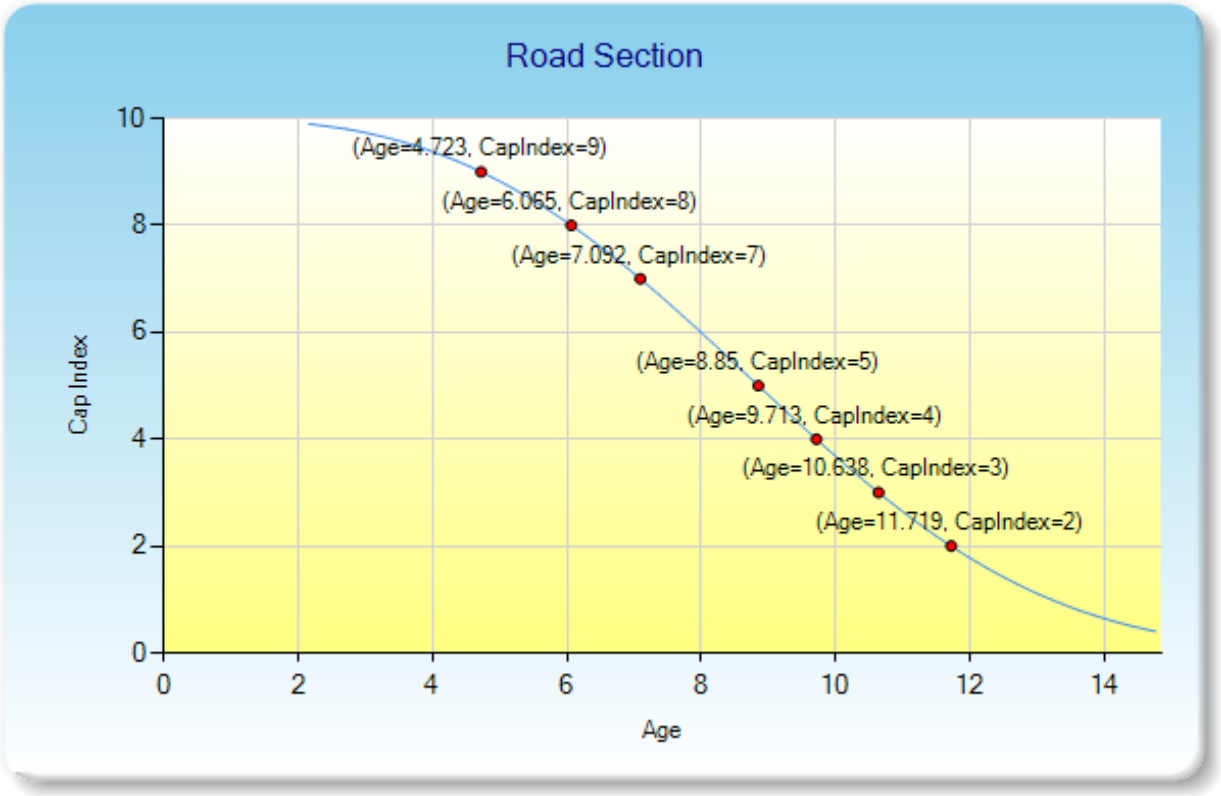
2 - Road Section: Capital Plan Code=st - (Number of Assets: 3)

Curve Type: S Curve Formula
Name: Road Section * View Chart
CAP Index Type: Ride Comfort Rating *
CAP Index Maximum Value: 10
Life Expectancy: 50
Last Modified Date: 8/6/2013
Modified By: Nadeem Haque

Add Curve

Cap Index	Renewal Strategy	Life Expectancy Gain	Unit Cost ($)	Units	Dimensions 1
2	Reconstructed	50	63402.94	km	Sort by Dimensions 1
3	Single Surface Treatment	5	11546.62	km	Length (km)
4	Single Surface Treatment	6	11546.62	km	Length (km)
5	Single Surface Treatment	7	11546.62	km	Length (km)
6	Single Surface Treatment	7	11546.62	km	Length (km)
7	Single Surface Treatment	7	11546.62	km	Length (km)
8	Single Surface Treatment	7	11546.62	km	Length (km)
9	Single Surface Treatment	7	11546.62	km	Length (km)

Figure 6 - (MDW Screenshot): Gravel Roads



3 - Road Section: Useful Life=15 - (Number of Assets: 25)

Curve Type: S Curve Formula
Name: Road Section
View Chart
CAP Index Type: Ride Comfort Rating
CAP Index Maximum Value: 10
Life Expectancy: 15
Last Modified Date: 8/6/2013
Modified By: Nadeem Haque

Add Curve

Cap Index	Renewal Strategy	Life Expectancy Gain	Unit Cost ($)	Units	Dimensions 1
2	Maintenance Year	10	70000.00	km	Length (km)
3	Maintenance Year	10	60000.00	km	Length (km)
4	Maintenance Year	10	60000.00	km	Length (km)
5	Maintenance Year	10	60000.00	km	Length (km)
7	Maintenance Year	10	48288.63	km	Length (km)
8	Maintenance Year	10	48288.63	km	Length (km)
9	Maintenance Year	10	48288.63	km	Length (km)

Figure 7 - (MDW Screenshot): Dirt Roads

2 - Road Section: Useful Life=10 - (Number of Assets: 6)

Curve Type: S Curve Formula
Name: Road Section * View Chart
CAP Index Type: Ride Comfort Rating *
CAP Index Maximum Value: 10
Life Expectancy: 10
Last Modified Date: 7/22/2013
Modified By: Nadeem Haque

Add Curve

Cap Index	Renewal Strategy	Life Expectancy Gain	Unit Cost ($)
1 *	Rehabilitation *	10 *	5362.23 *

Tables: Ontario Good Roads Pavement Reservation Matrix

Lifecycle Activities – Flexible (Asphalt-HCB) Pavement	Activity	Activity Quantity					
		Class of Road					
		1	2	3	4	5	6
Annual	Potholes	0.5t/ln km	0.5t/ln km	0.5t/ln km	0.5t/ln km	0.5t/ln km	0.5t/ln km
	Shoulder grading	6x per year	6x per year	6x per year	2x per year	2x per year	NA
	Washout Repair	10t/year	10t/year	10t/year	10t/year	10t/year	10t/year
	Culvert Cleaning	1x per year	1x per year	1x per year	1x per year	1x per year	1x per year
	Cleaning MH, CB	1x per year	1x per year	1x per year	1x per year	1x per year	1x per year
	Cleaning C&G	1x per year	1x per year	2x / month (summer)	2x / month (summer)	1x / month (summer)	1x per year
				as required	as required	as required	
	Safety devices	as required	as required				as required
3 years	Crack seal	All roads	All roads	All roads	Roads with >400 AADT	Roads with >400 AADT	
5 years	Crack seal				Roads with <400 AADT	Roads with <400 AADT	All roads
8 years	Spot base repairs	10% of system	10% of system	10% of system	10% of system	10% of system	10% of system
15 years	50mm resurfacing	All roads	All roads	All roads	Roads with >400 AADT	Roads with >400 AADT	
18 years	Crack seal	All roads	All roads	All roads	Roads with >400 AADT	Roads with >400 AADT	
25 years	Spot base repairs	20% of system	20% of system	20% of system	20% of system	20% of system	N/A
	50mm resurfacing	all roads	all roads	all roads	all roads	all roads	
							all roads
28 years	Crack seal	all roads	all roads	all roads	Roads with >400 AADT	Roads with >400 AADT	
30 years	Crack seal				Roads with <400 AADT	Roads with <400 AADT	all roads
35 years	50mm resurfacing			Roads with <4000	Roads with >400 AADT	Roads with >400 AADT	
	reconstruct	all roads	all roads	Roads with >4000			
	Storm sewer repl.	35%	35%	35%			
	Open ditch repl.	70%	70%	70%			
38 years	Crack seal			Roads with <4000	Roads with >400 AADT	Roads with >400 AADT	
40 years	Spot base repairs				20%	20%	20%
	50mm resurfacing				Roads with <400 AADT	Roads with <400 AADT	all roads
50 years	reconstruct			Roads with <4000	Roads with >400 AADT	Roads with >400 AADT	

	Storm sewer repl.			50%	50%	50%	
	Open ditch repl.			100%	100%	100%	
60 years	reconstruct				Roads with <400 AADT	Roads with <400 AADT	all roads
	Storm sewer repl.				50%	50%	50%
	Open ditch repl.				100%	100%	100%

Lifecycle Activities – Low Class Bituminous (Surface Treated)

Timing	Activity	Activity Quantity		
		Class of Road		
		4	5	6
Annual	Potholes	0.5t/ln km	0.5t/ln km	0.5t/ln km
	Washout Repair	10t/year	10t/year	10t/year
	Culvert Cleaning	1x per year	1x per year	1x per year
	Safety devices	as required	as required	as required
3, 13, 23, 33. 43 years	Single surface treatment	All roads <1000AADT	All roads <1000AADT	
5,15,25,35, 45,55 years	Single surface treatment			All roads
8, 18,28 years	Single surface treatment	All roads <1000AADT	All roads <1000AADT	
	Spot Base Repairs	10% of system	10% of system	
10,20,30,50 years	Single surface treatment			All roads
	Spot Base Repairs			10% of system
38 years	Pulverize & double surface treat	All roads <1000AADT	All roads <1000AADT	
	Drainage replacement	70% of system	70% of system	
40 years	Pulverize & single surface treat			All roads
	Drainage replacement			70% of system
50 years	Reconstruct	All roads <1000AADT	All roads <1000AADT	
	Drainage replacement	100% of system	100% of system	
60 years	Reconstruct			All roads
	Drainage replacement			100% of system