THE VILLAGE OF OIL SPRINGS

ASSET MANAGEMENT PLAN

2013

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THE ASSET MANAGEMENT PLAN FOR THE VILLAGE OF OIL SPRINGS

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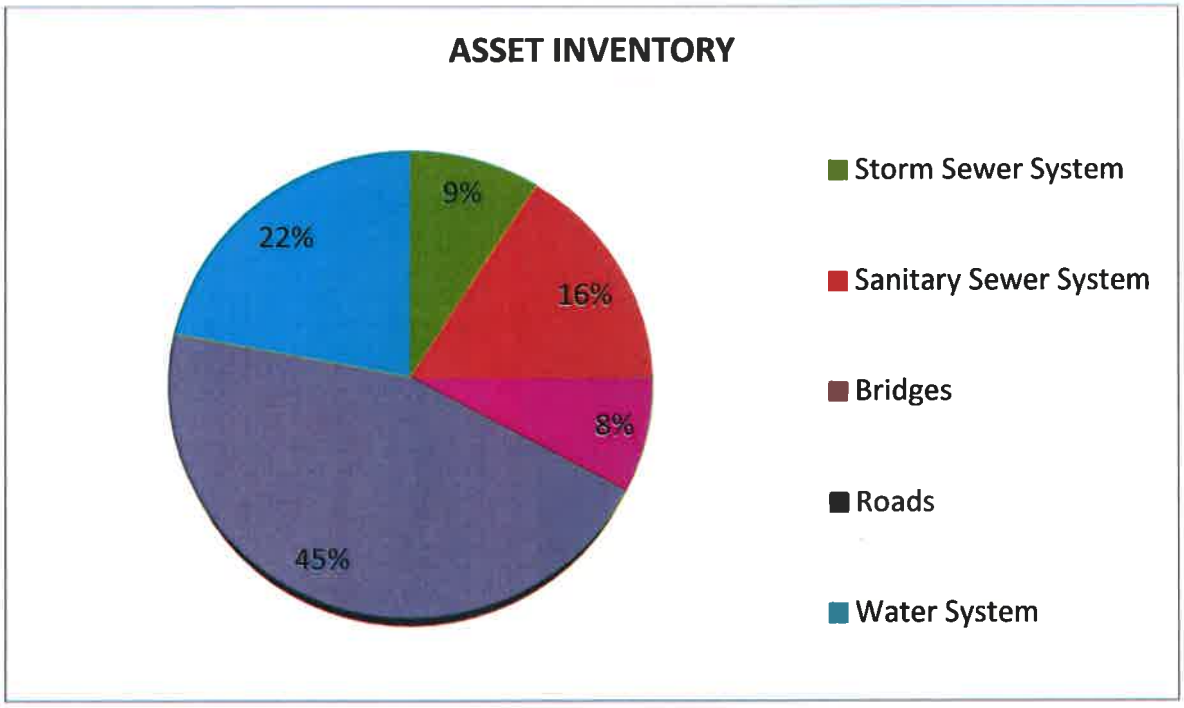
EXECUTIVE SUMMARY

The existing infrastructure in the Village of Oil Springs is ageing yet there is increased demand for improved roads, bridges, sidewalks and sewer and water systems. This demand factors in higher standards, health, environmental and proposed growth. To solve these concerns, we need to change the approach in which we plan, design and maintain this framework.

Long range planning for these resources is not a new approach. It has been utilized for many years and has now emerged into what is generally referred to as an Asset Management Plan. The municipality has surveyed the scope of procedures, technical and economic methods and developed them into an Asset Management Plan.

This Asset Management Plan for the Village of Oil Springs adheres to the requirements defined within the provincial "Building Together Guide for Municipal Asset Management Plans". This plan will provide vital and calculated strategies to establish thorough management methods and principles to ensure the optimum level of success.

The replacement value of the current assets was identified and evaluated to an approximate value of $ 16,693,430.00.



The Asset Management Plan as presented in this report is contained in two segments:

- the first analyses the basic elements of an Asset Management Plan established by leading management methods obtained from other districts, the Federation of Canadian Municipalities and National Research Canada;

- the second segment is an asset management strategy for each asset.

This format was chosen to establish a strategy that could be revised periodically based on changes to management methods, new developments in technology, financial restraints, or the decline in the condition of the asset.

The Asset Management Plan in this report is an organized plan that allows for the continuous maintenance, enhancement and operating of our assets in a fiscally responsible manner.

DISCUSSION

Asset Management Plan – Definition

An Asset Management Plan is a strategy for the management of infrastructure assets within a municipality that incorporates technical and financial approaches over the life span of an asset to a specified level.

Incorporated Asset Management Plans are similar to one described above. This refers to the assets that share the same location within the utility boundaries such as roads, curb, sidewalk, and sewer and water systems.

All assets have diverse life cycles which result in the need for technical and financial professionals to examine and determine, depending on the asset condition, the urgency for replacement or rehabilitation. A roadway that requires resurfacing creates the examination of the infrastructure below, such as the sewers and water. In contrast, a watermain that requires replacement will force the need to reconstruct the road and determine whether a patch is sufficient or reconstruct the entire roadway.

An Asset Management Plan also integrates the existing preventative maintenance and programs to avert the failure of an asset against the risk factor. The preventative maintenance program provides a system that day-to-day use of the asset is dealt with to ensure the asset reaches its expected life.

Asset Management Plan – Benefits

The associated benefits within an Asset Management Plan are that it:

- promotes the formation and subsequent application of policy objectives and related performance evaluation;
- averts problems and possible crises;
- contributes to improved and dependable levels of service to the community;
- extends improved communication with the community, financial organizations and regulators;
- allows municipalities to make better decisions regarding allocation of resources;
- reduces risk;
- allows for improved financial planning and
- contributes to more productive data management

Asset Management Plan – Principles

Asset Management can be represented by the following principles:

- it is a vital and aggressive approach that places a premium on statistics, information, and management;
- it includes a continuing extensive review of infrastructure performance and expense and
- choices that are policy driven that adjust depending on priorities.

Asset Management Plan – Components

The Asset Management must contain the following components to accomplish the principles of the Asset Management Plan.

1. Asset Value:

   All infrastructure assets have a monetary value. We have determined the actual costs of the majority of the assets and have provided estimates for the others.

2. Life Span Management:

   All assets have a limited life span. Estimates can be used, however once a decision has been made in regards to the assets remaining life, significant changes are made to maintain and related costs of the asset.

3. Viability:

   Viable development is the ability to meet the needs of the current generation without affecting future generations. The Asset Management Plan needs to establish a long-term financial plan to ensure sufficient funds are available. These funds are necessary to produce, reconstruct and ultimately replace the asset at the ideal time to accomplish the lowest life span cost. The plan ensures that the current users pay a reasonable share for the services so future users are not placed with a higher cost burden because there was no maintenance or associated plan for replacement.

4. Combination of technical and financial plans:

   This plan must provide minimal life span costs while maintaining acceptable levels of service for the least amount of risk. The financial plan must provide monetary amounts required each year to maintain the requirements of the technical plan. Both of these plans may be altered from time to time depending on the condition of the asset surveyed.

5. Risk Evaluation:

   This plan includes the management of risk associated with the condition of the asset and probability of a failure. Risk is influenced by financial, environmental, legal, and public health and safety.

6. Performance Survey:

   The approach to advance the performance of the asset and reconstruction should be monitored regularly and adjustments made in the assets life span to attain an acceptable balance between cost and level of service.

Initiatives

The purchase of an integrated infrastructure management plan software program is currently being utilized. This tool assists with the organization of the asset management plans described in this report. This system aids to monitor scheduled and non-scheduled maintenance and to document inspection results and tasks within the maintenance work. This also ensures that all departments are working together from the same schedules. The outcome is that all capital projects can be planned better and all long-term planning will be improved thus maximizing the life of the asset.

FINANCIAL SIGNIFICANCE

The financial association (estimated cost per year) is represented in this report. Based on this plan, the funds available from Capital Budgets and forecasting will likely not be acceptable to preserve the current level of service. This administration will continue to work together to contain the financial and technical requirements of this plan, including taking advantage of any grant funding programs that are available.

CONCLUSION

Based on the Asset Management Plan as presented is an organized process that allows for the maintenance, operating and rehabilitation of our infrastructure assets in a cost effective manner so we can ultimately meet new demands while being fiscally responsible and sustaining our quality of life.

Road Network Infrastructure

The analysis in this section is for urban and rural paved roads. Gravel roads are not included, as they require continuous maintenance and funding. However, the gravel roads have been included in the Road Network Inventory and replacement values.

The following table outlines the entire network of 21.3 km of road.

Road Network Inventory		
Asset Type	Asset Component	Quantity
Roads	Rural – Gravel Rural – Paved Urban – Paved	4,632m 9,771m 6,902m
	Total Roads	21,305m
Road Base	Rural – Road Base Urban – Road Base	8,571m 5,189m
	Total Road Base	13,760m
Sidewalk		3,320m

Value of Road Network

The estimated replacement value of the road network is based on 2012 funds, which is approximately $7.5 million. The cost per household for the road network is $ 24,670.00, based on 304 households.

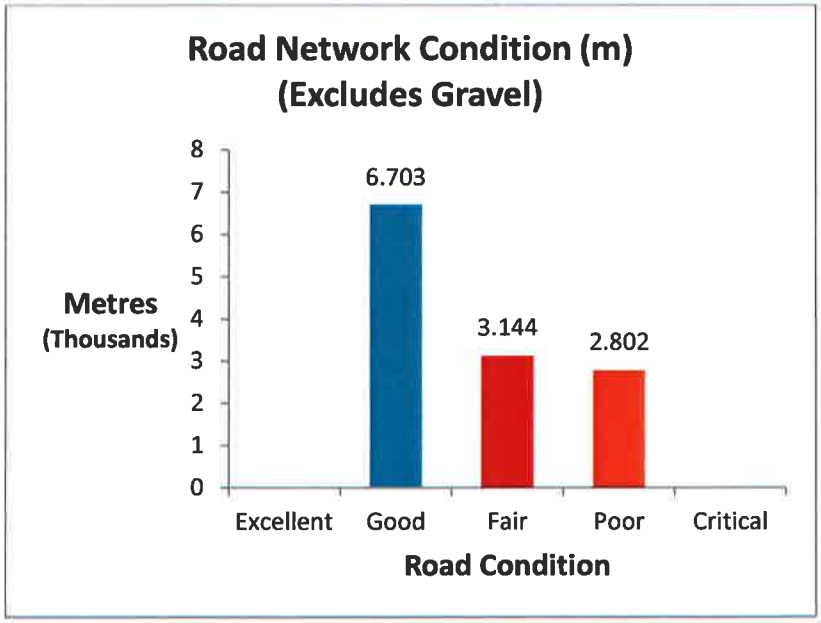
Road Network Replacement Value				
Asset Type	Asset Component	Quantity	Replacement Cost (per unit)	Overall Replacement Cost
Roads	Rural – Gravel	4632m	$175/m	$ 810,600.00
	Rural – Paved	9771m	$250/m	$ 2,442,750.00
	Urban – Paved	6902m	$250/m	$ 1,725,500.00
	Rural – Road Base	8571m	$160/m	$ 1,371,360.00
	Urban – Road Base	5189m	$180/m	$ 934,020.00
	Sidewalks	3320m	$ 65/m	$ 215,000.00
				$ 7,500,030.00

Condition of the Asset

The majority of the road network is in good condition. However, the main arterial road is in poor condition. Therefore, the municipality as a whole has a rating of "fair" for its road network.

The graph is based on the following criteria:

1. Excellent – no visible/noticeable defects
2. Good – minor deterioration
3. Fair – deterioration evident
4. Poor – serious deterioration
5. Critical – complete failure



Plan to Determine Needs

There are four stages in the assets life cycle that require specific types of consideration and action.

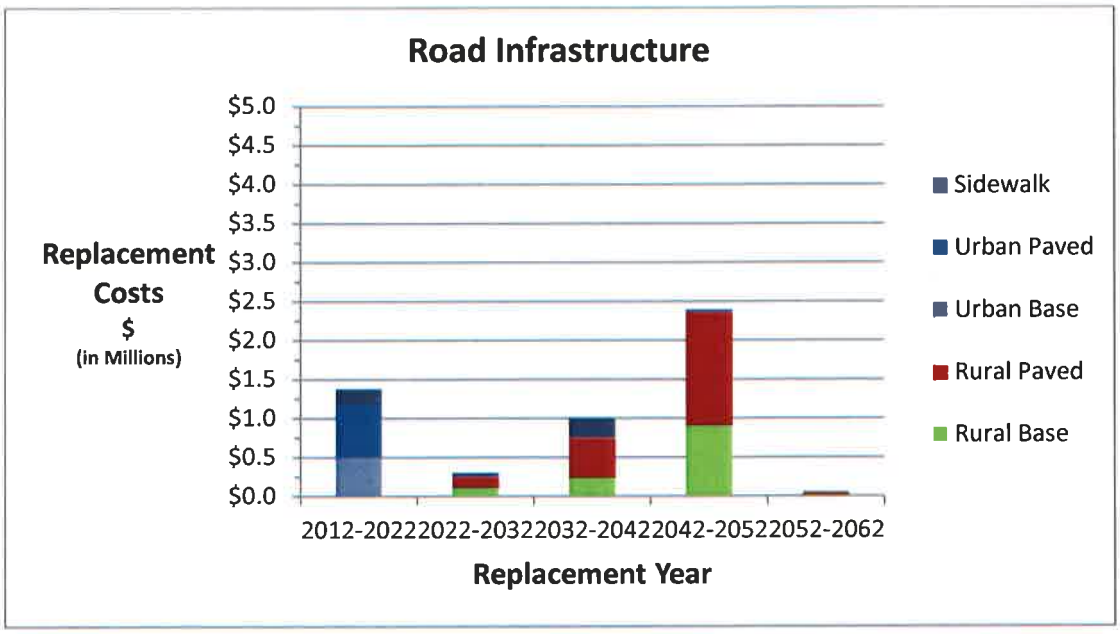
Addressing Asset Needs		
Phase	Life Cycle Activity	Asset Life Cycle
Minor Maintenance	Inspection, monitoring and cleaning controls	1st
Major Maintenance	Repairing potholes and patching	2nd
Rehabilitation	Milling, overlays and paving	3rd
Replacement	Full reconstruction	4th

Determining Timeframe

The chart below is to identify the asset and its useful life span.

Asset Life (in years)		
Asset Type	Asset Component	Useful Life
Roads	Rural Gravel Rural Paved Urban Paved Rural Road Base Urban Road Base	100 50 35 50 35
Sidewalk		25

The data acquired in the field has been placed in the RIVA program to establish accuracy of assets and age and therefore determine replacement needs and dates. The following table presents the projection of replacement costs based on asset age.



Funds Needed

The analysis completed to determine the revenue requirements was based on the following constraints and expectations.

1. Replacement costs are based on unit costs.
2. Timing for specific road replacement is defined by replacement year.
3. All values are in 2012 monies.
4. The analysis was continued through a 50 year period to ensure all assets experienced at least one cycle of replacement providing a viable projection.

Reaching Viability

Based on the framework, the average annual revenue required to ensure the municipality's road network is $ 82,660.00. Based on the current annual revenue, there is an annual deficit for the roads network of $ 98,000.00

In conclusion, the data acquired has established that there is a major portion of the road network in good condition. However, through physical inspection, there will also be significant needs within the next ten years that must be addressed, estimated at approximately $ 1,386,000.00. In implementing field assessments and risk perspectives, The municipality's priority should be the road network. The assessment condition program will aid the municipality in prioritizing the overall needs for rehabilitation and replacement and assist with short and long term budgeting.

Recommendation

The municipality received a fair to good overall rating for its road network. Therefore we propose the following:

- a condition assessment program be established for the entire roads network to achieve an improved understanding of the current conditions and performance.

- an additional study be implemented to assess the overall maintenance costs involved with the gravel roads and whether there is a benefit to converting any of the gravel roads to a hard surface, thereby reducing long term costs.

- an appropriate amount of the asset replacement value be used for operation and maintenance annually.

- the reports on infrastructure be updated continually throughout the year.

Bridges Infrastructure

The following is a summary of the two bridges currently in the Village of Oil Springs.

Bridge Inventory			
Asset Type	Asset Component	Quantity(m2)	Quantity
Bridge	Structure Deck	265m2 265m2	2 2
			2

Value of the Bridges

The estimated replacement value of the bridge infrastructure based on 2012 funds is approximately $ 1,350,000.00. The cost per household for the bridges is $ 4,440.00 based on 304 households.

Bridge Replacement Value				
Asset Type	Asset Component	Quantity (m2)	Quantity	Replacement Value
Bridge	Structure Deck	265m2 265m2	2 2	$ 895,000.00 $ 455,000.00
				$ 1,350,000.00

Condition of Asset

Currently, the two bridges in the municipality are in good condition.

Plan to Determine Needs

There are four stages in the assets life cycle that require specific types of consideration and action.

Addressing Asset Needs		
Phase	Life Cycle Activity	Asset Life Cycle
Minor Maintenance	Inspection, monitoring, cleaning	1st
Major Maintenance	Repairing cracks, spalling concrete, expansion joints, damaged railings	2nd
Rehabilitation	Structural reinforcement or deck replacement	3rd
Replacement	Full reconstruction	4th

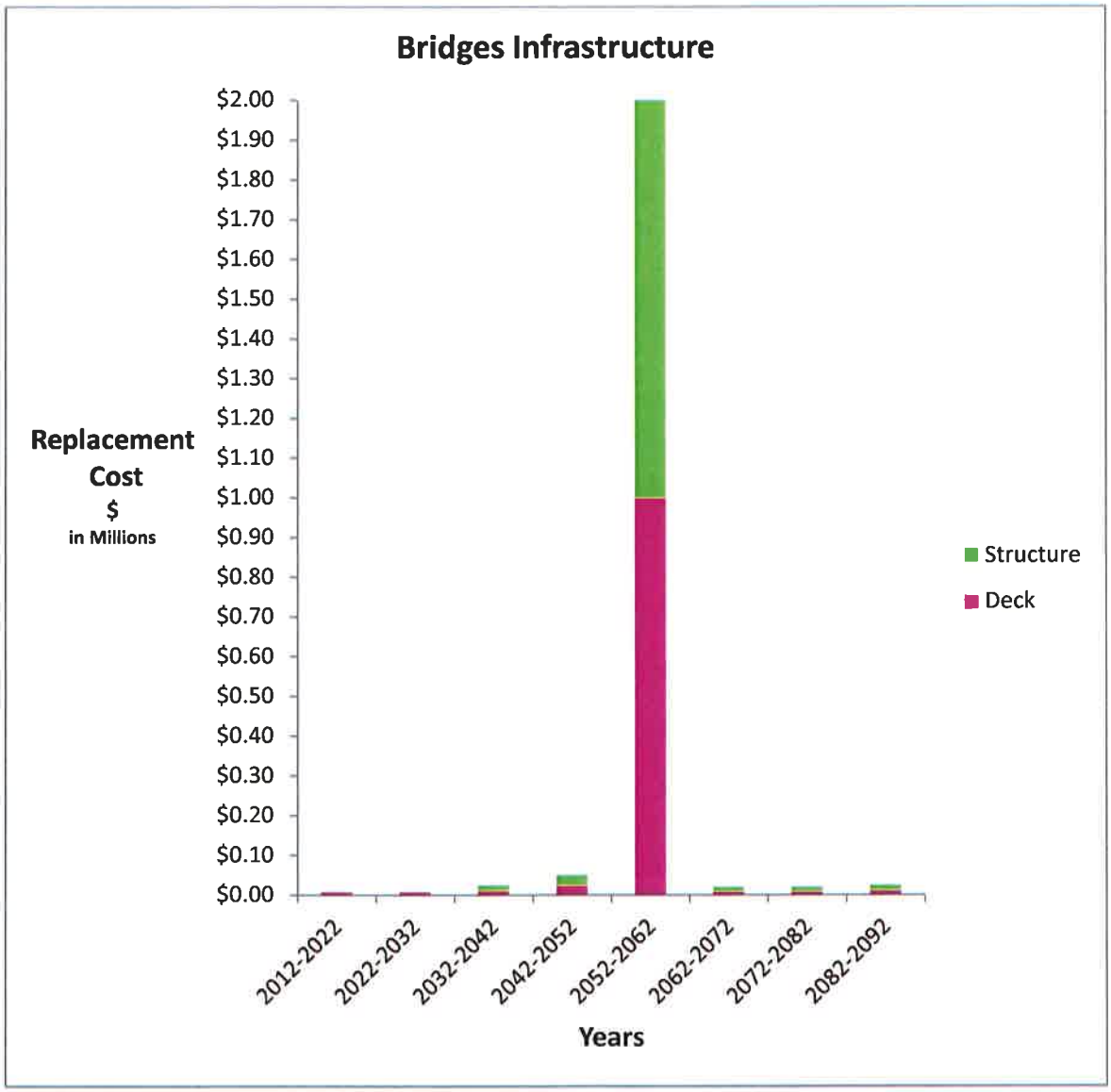
Determining Timeframe

The proposed useful life is to determine replacement needs of each asset, which will become part of the overall financial requirement.

Asset Life		
Asset Type	Asset Component	Useful Life
Bridges	Structure Deck	75 75

The data acquired from the field inspections should be loaded into the RIVA program to establish accuracy of assets age and condition and therefore, determine replacement needs and dates.

The following table presents projection of replacement costs based on asset age.



Needed Funds

The analysis completed to determine revenue required was based on the following constraints and expectations:

1. Replacement costs are based on unit costs.
2. Timing for structure replacement is defined by replacement year.
3. All values are based on 2012 funds.
4. The analysis was continue through a 80 year period to ensure all assets experienced at least one cycle of replacement providing viable projection.

Reaching Viability

Based on the framework, the average annual revenue required to ensure the Village of Oil Springs bridges is $ 28,533.00. Based on the current annual revenue there is a deficit of $ 28,533.00.

In conclusion, the data acquired has established that the two bridges are in good condition. However, through physical inspection, there will be needs to be addressed within the next ten years totalling approximately $ 10,000.00. Bridge structures are among the highest liability assets a municipality may own. Thus, a priority for the condition of the bridges must be analysed continually and tracked within the RIVA software. Continuous monitoring will help prioritize short and long term rehabilitation and replacement needs and costs.

Recommendations

The municipality received a good rating overall on its bridge structures. Therefore we propose the following:

- as a result of the condition asset policy, all further inspections and condition data should be included in the RIVA software in order to track current conditions of the asset.

- an appropriate amount of asset value be based for operation and maintenance annually.

- the reports on the infrastructure be updated annually.

Water Infrastructure

The following is a summary of the water distribution system within the municipality of Oil Springs. All drinking water in the area is supplied by the Town of Petrolia.

Water Inventory		
Asset Type	**Asset Component**	**Quantity**
Water	Mains – 50mm Mains – 100mm Mains – 150mm Mains – 200mm Mains – 250mm Mains – 300mm	2104m 1302m 5887m 738m 2250m 97m
	Hydrants	29

Value of the Water System

The estimated replacement value of the water distribution system based on 2012 funds is approximately $ 3,768,550.00. The cost per household for the water infrastructure is $ 12,396.00 based on 304 households.

Water Replacement Value				
Asset Type	**Asset Component**	**Quantity**	**2012 Replacement Cost / m**	**Overall Replacement Cost**
Water	Mains – 50mm	2104m	$ 150.00/m	$ 315,600.00
	Mains – 100mm	1302m	$ 250.00/m	$ 325,500.00
	Mains – 150mm	5887m	$ 300.00/m	$ 1,766,100.00
	Mains – 200mm	738m	$ 350.00/m	$ 258,300.00
	Mains – 250mm	2250m	$ 400.00/m	$ 900,000.00
	Mains – 300mm	97m	$ 450.00/m	$ 43,650.00
	Hydrants	29	$ 5500.00/ea	$ 159,900.00

Condition of Asset

Currently the existing water infrastructure is in good-to-excellent condition based on the age of the system.

Plan to Determine Needs

There are four phases in the life cycle of these assets.

Addressing Asset Needs		
Phase	Life Cycle Activity	Asset Life Cycle
Minor Maintenance	Inspection, monitoring, cleaning, flushing and pressure testing	1st
Major Maintenance	Repairing leaks or breaks, valves, replacement of pipe	2nd
Rehabilitation	Lining to protect pipe deterioration	3rd
Replacement	Full replacement	4th

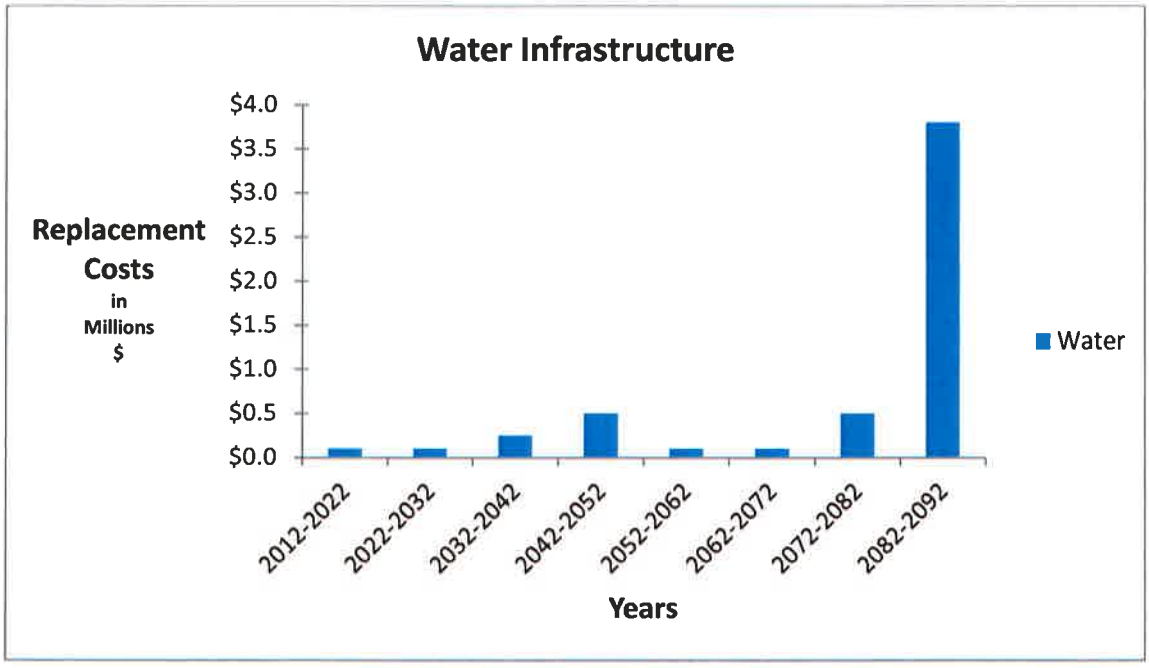
Determining Timeframe

The proposed useful life data is used to determine replacement needs of each asset, which will become part of the overall financial requirement.

Asset Useful Life		
Asset Type	Asset Component	Useful Life(years)
Water	Mains – 50mm Mains – 100mm Mains – 150mm Mains – 200mm Mains – 250mm Mains – 300mm	75 75 75 75 75 75
	Hydrants	35

Information being gathered in the field should be entered continually into the RIVA program to track the condition and current age.

The following table presents the projected replacement costs based on the asset age.



Needed Funds

The analysis completed to determine revenue required was based on the following expectations:

1. Replacement costs are based on unit costs.
2. Timing for replacement is based on asset age.
3. All values are in 2012 funds.
4. The analysis was continued through a 75 year period to ensure the assets experienced at least one life cycle providing a viable projection.

Reaching Viability

Based on the framework, the average annual revenue required to ensure the municipality's water system is $ 53,533.00. Based on the current annual revenue, there is a deficit of $ 5335.50.

In conclusion, the Village of Oil Springs water distribution system is in good-to-excellent condition, based on the data compiled. However, the asset should be tracked continually as the age and condition will change, thus giving ample time to address rehabilitation needs.

Recommendations

The municipality received a good-to-excellent rating overall on the water distribution system. Therefore, we propose the following:

- all inspections, testing and condition data should be tracked in the RIVA software.
- an appropriate amount of the asset value be used for operation and maintenance annually.
- this report should be updated annually.

Sanitary Sewer Infrastructure

The following is a summary of the sanitary sewer system within the Village of Oil Springs.

Sanitary Sewer Inventory		
Asset Type	Asset Component	Quantity
Sanitary Sewer	Mains – 100mm Mains – 200mm Mains – 250mm Mains – 300mm	434m 4,443m 861m 1,026m
	Maintenance holes	76

Value of Sanitary Sewer System

The estimated replacement value of the sanitary sewer system based on 2012 values is approximately $ 2,608,800.00. The cost per household for the sanitary infrastructure is $ 9,058.00 based on 288 households.

Sanitary Replacement Value				
Asset Type	Asset Component	Quantity	2012 Replacement Cost / m	Overall Replacement Cost
Sanitary	Mains – 100mm	434m	$ 250.00/m	$ 108,500.00
	Mains – 200mm	4,443m	$ 300.00/m	$ 1,322,900.00
	Mains – 250mm	860m	$ 350.00/m	$ 301,000.00
	Mains – 300mm	1,026m	$ 400.00/m	$ 410,400.00
	Maintenance holes	76	$ 6000.00/ea	$ 456,000.00

Condition of Asset

Currently the existing sanitary sewer system is in fair condition based on the age of the system.

Plan to Determine Needs

There are four phases in the life cycle of the sanitary sewer system presented in the chart below.

Addressing Asset Needs		
Phase	Life Cycle Activity	Asset Life Cycle
Minor Maintenance	Inspection, monitoring, cleaning, video and flushing	1st
Major Maintenance	Repairing maintenance holes, replacing pipe	2nd
Rehabilitation	Lining to protect pipe deterioration	3rd
Replacement	Full replacement	4th

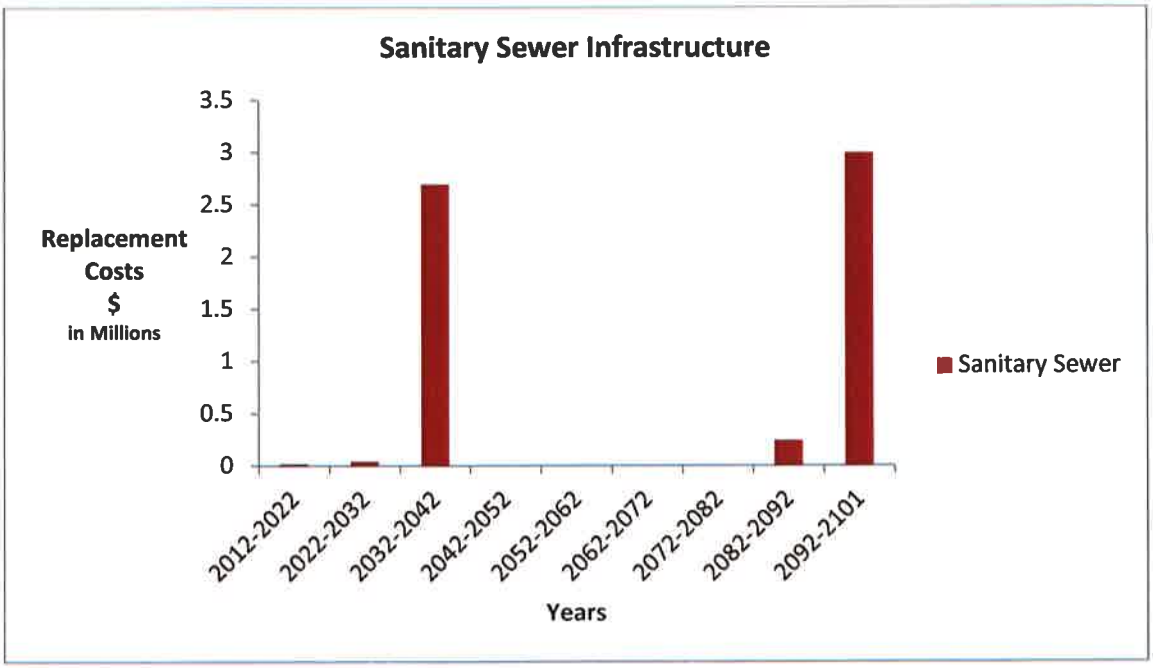
Determining Timeframe

The proposed useful life data is used to determine replacement needs of each asset and will become part of the overall financial requirement.

Asset Useful Life		
Asset Type	Asset Component	Useful Life(years)
Sanitary Sewer	Mains – 100mm Mains – 200mm Mains – 250mm Mains – 300mm	75 75 75 75
	Maintenance holes	75

Information gathered in the field should be entered continually into the RIVA software to track conditions and age of the asset.

The following table presents the projected replacement costs based on the asset age.



Needed Funds

The analysis completed to determine revenue required was based on the following expectations:

1. Replacement costs are based on unit costs.
2. Timing for replacement is based on asset age.
3. All values are in 2012 funds.
4. The analysis was continued through a 75 year period to ensure the assets experienced at least one life cycle providing a viable projection.

Reaching Viability

Based on the framework, the average annual revenue required to ensure the municipality's sanitary sewer system is $ 81,266.00. Based on the current annual revenue, there is a deficit of $ 33,068.00.

In conclusion, the Village of Oil Springs sanitary sewer system is in fair condition, based on the data compiled. However, the asset should be tracked continually as the age and condition will change, thus giving ample time to address rehabilitation needs.

Recommendations

The municipality received a fair rating overall on the sanitary sewer system. Therefore, we propose the following:

- all inspections, testing and condition data should be tracked in the RIVA software.
- an appropriate amount of the asset value be used for operation and maintenance annually.
- this report should be updated annually.

Storm Sewer Infrastructure

The following is a summary of the storm sewer system within the Village of Oil Springs.

Storm Sewer Inventory		
Asset Type	Asset Component	Quantity
Storm Sewer	Mains – 100mm Mains – 150mm Mains – 200mm Mains – 250mm Mains – 300mm Mains – 450mm Mains – 600mm Mains – 750mm	316m 2381m 801m 268m 704m 40m 34m 32m
	Catch basins	132
	Maintenance holes	5

Value of Storm Sewer System

The estimated replacement value of the storm sewer system based on 2012 values is approximately $ 1,466,050.00. The cost per household for the storm infrastructure is $ 4,822.00 based on 304 households.

Storm Sewer Replacement Value				
Asset Type	Asset Component	Quantity	2012 Replacement Cost / m	Overall Replacement Cost
Storm	Mains – 100mm	316m	$ 150.00/m	$ 47,400.00
	Mains – 150mm	2381m	$ 200.00/m	$ 476,200.00
	Mains – 200mm	801m	$ 250.00/m	$ 200,250.00
	Mains – 250mm	268m	$ 300.00/m	$ 80,400.00
	Mains – 300mm	704m	$ 350.00/m	$ 246,400.00
	Mains – 450mm	40m	$ 400.00/m	$ 16,000.00
	Mains – 600mm	34m	$ 500.00/m	$ 17,000.00
	Mains – 750mm	32m	$ 700.00/m	$ 22,400.00
	Catch basins	132	$ 2500.00/ea	$ 330,000.00
	Maintenance holes	5	$ 6000.00/ea	$ 30,000.00

Condition of Asset

Currently the existing storm sewer infrastructure is in good-to-excellent condition based on the age of the system.

Plan to Determine Needs

There are four phases in the life cycle of these assets.

Addressing Asset Needs		
Phase	Life Cycle Activity	Asset Life Cycle
Minor Maintenance	Inspection, monitoring, cleaning, flushing and pressure testing	1st
Major Maintenance	Repairing leaks or breaks, valves, replacement of pipe	2nd
Rehabilitation	Lining to protect pipe deterioration	3rd
Replacement	Full replacement	4th

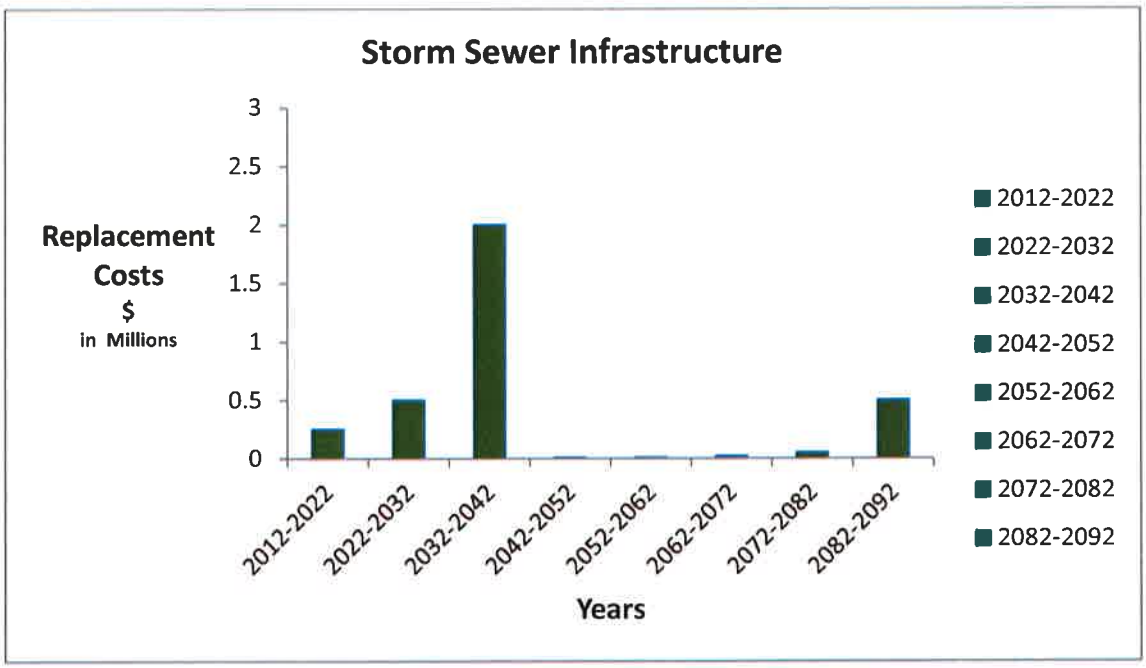
Determining Timeframe

The proposed useful life data is used to determine replacement needs of each asset, which will become part of the overall financial requirement.

Asset Useful Life		
Asset Type	Asset Component	Useful Life(years)
Storm Sewer	Mains – 100mm Mains – 150mm Mains – 200mm Mains – 250mm Mains – 300mm Mains – 450mm Mains – 600mm Mains – 750mm	75 75 75 75 75 75 75 75
	Catch basins	75
	Maintenance holes	75

Information gathered in the field should be entered continually into the RIVA software to track conditions and age of the asset.

The following table presents the projected replacement costs based on the asset age.



Needed Funds

The analysis completed to determine revenue required was based on the following expectations:

1. Replacement costs are based on unit costs.
2. Timing for replacement is based on asset age.
3. All values are in 2012 funds.
4. The analysis was continued through a 75 year period to ensure the assets experienced at least one life cycle providing a viable projection.

Reaching Viability

Based on the framework, the average annual revenue required to ensure the municipality's storm sewer system is $ 44,533.00. Based on the current annual revenue, there is a deficit of $ 44533.00.

In conclusion, the Village of Oil Springs storm sewer system is in fair condition, based on the data compiled. However, the asset should be tracked continually as the age and condition will change, thus giving ample time to address rehabilitation needs.

Recommendations

The municipality received a fair rating overall on the sanitary sewer system. Therefore, we propose the following:

- all inspections, testing and condition data should be tracked in the RIVA software.
- an appropriate amount of the asset value be used for operation and maintenance annually.
- this report should be updated annually.

In addition, it is our opinion that an engineering study be produced to develop a storm management system for the municipality. At present, the storm system is insufficient to meet the needs of the municipality and is at a high risk level for liability issues to arise. The majority of the municipality utilizes road side ditches without proper outlets causing additional deterioration to road bases and thus road surfaces. The storm system should be incorporated into a plan that would encompass storm sewer being installed as road projects are scheduled.

Desired Levels of Service

Desired levels of service is a high level index that characterizes and measures the quality of the services that a municipality should be providing to the community. They summarize the vital goals to which a municipality is graded based on its communities needs and expectations, legislative requirements and standards and the financial responsibility to achieve those levels.

These levels of service are as follows:

- to advise the community of the type and level of service they can expect
- to establish the expense and benefit of the service to the community
- to determine if such asset is appropriate and affordable

This optimal level of service that all municipalities desire can only be achieved by the delivery of those services and the ability of the municipality to maintain them.

Leading factors that impact the level of service:

- strategic objectives
- legislative requirement
- community expectations
- available finances

Strategic Objectives

Strategic plans outline what direction a municipality wants to go, how they will get there and decide which items are priorities. These priorities determine how they allocate tax dollars which will ultimately affect the level of service a community receives for their infrastructure.

Legislative Requirements

There are many regulated standards currently in place that will directly influence the level of service. These safeguards are in place to keep the conditions of the municipalities infrastructure above a certain level.

Asset Performance Expectations

The level of service is dependent on the current condition of the asset, its performance and the ability to meet all regulations and standards. Furthermore, the life cycle of the asset, the maintenance required, the rehabilitation and/or replacement and cost of these items will factor in the level of service that is ultimately provided.

Expectations

The community has a large part in determining the level of service. The public should be involved on how the infrastructure monies are spent and are given the opportunity to be educated as to how choices are made and why.

Financial Availability

The level of service is ultimately controlled by the amount of finances. The funds must be available to have all assets meet regulatory requirements, address asset life cycles and meet the community's expectations. This level will be dependent on the funds available, or the municipality's ability to raise funds or the community's ability to increase their taxes.

Asset Management Strategy

Objective

To build a framework and create a set of planned actions that will enable the assets to implement a desired and viable level of service, while controlling risk, at the lowest life cycle cost.

The Asset Management Strategy will establish a process that can be continually adjusted to the changing demands of identifying and prioritizing the restoration, rehabilitation and maintenance activities. This process will aid in the municipality's overall achievement of a sound infrastructure for further growth.

The following will examine the assessments for each asset and life cycles required, including prioritizing projects into the budget while incorporating the risk factors involved.

Non-Infrastructure Requirements

The Village should analyse, as per the provincial requirements, which non-infrastructure solutions should be included into the budgets for road, bridges, water and sewer infrastructure. These include studies, inspections, programs, consultations and more, that could possibly extend the life cycle or reduce the amount spent on the asset in the future.

One solution would be to associate the Asset Management Plan with a strategic plan for growth, infrastructure master plan, and public dialogue on condition and levels of asset services. An analysis of these requirements should be reviewed for future asset management plans and be incorporated in the budget to cover these expenditures.

Condition Assessment Programs

The groundwork for good asset management practice is based on the information compiled of the condition of the infrastructure. The municipality should have a good understanding of the asset's condition and performance, thus being able to manage future investment to prolong the asset life cycle.

Some of the benefits of these programs are as follows:

- understanding the infrastructure condition will lead to optimal management practices
- creates rehabilitation programs
- avoids possible future failures and provides liability protection

- the possibility of lower operating and maintenance expenditures
- specific asset assessment
- provides for the start of a risk assessment program
- provides for schedules and preventative maintenance programs
- averts unnecessary spending
- extends asset life cycle and improves level of service
- provides financial clarity and accountability
- facilitates factual asset recording which enables better decision making

The following outlines the condition assessment programs for road, bridge, water and sewer infrastructure that the Village would find helpful.

Pavement Inspections

Typically pavement inspections are performed by consultants using specialized vehicles with electronic sensors to collect data. The vehicles will normally drive the entire road network and compile inspection data on surface distress and surface roughness. Surface distress usually involves the collection of data from equipment mounted to the inspection vehicle or visual inspection by the consultant. Examples of this surface distress are:

- Asphalt surfaces – alligator cracking / longitudinal cracking / edge cracking / rippling / rutting / potholes / patching / distortion / excessive crowning
- Concrete surfaces – aggregate loss / excessive crown / corner cracking / distortion / joint failure / joint spalling / linear cracking / potholes / scaling / joint sealant loss / patching

Roughness data of the pavement is collected by a series of lasers mounted to the inspection vehicle. This data is then compiled and formatted to the engineers specifications to produce an overall condition index of the road. This system is ideal for the client to upload to the RIVA program to track present conditions and those in the future to determine the right course of action in determining a timeframe of maintenance work and costs involved.

This process is widely used and is an excellent way to collect a true representation of the road surface and often includes video as well. An estimate of such inspection is roughly

$ 150.00 per km of paved road, but may vary depending on location of the site. In this situation it would cost the Village approximately $ 2500.00 for the 17km of paved road. Since the Village owns over $ 5,000,000.00 worth of paved roads, this is a highly economic investment.

The other option in the collection of data is to use visual inspection to assess the condition by the road crews as they are on the roadways each day. Many municipalities use this system because of the cost savings. A simple system of tracking visual and ride comfort in their daily travels can be compiled with a checklist and then inserted in the RIVA program at certain intervals to track the condition and performance of the road.

It is recommended that the Village incorporate a pavement condition assessment program and use a portion of their capital funding for this purpose.

Bridge Inspections

At present, all municipalities in Ontario are legislated by the Ministry of Transportation to inspect all structures. There are two structures in the Village of Oil Springs.

Structural inspections must be carried out by a structural engineer and must be performed every two years and include type of structure, number of spans, span lengths, detailed photos, and other elements of the structure to rate and ultimately make recommendations for repairs, rehabilitation and replacement.

In this case, the Village only has two structures and the best course of action would be to have the engineering consultant develop a maintenance schedule report while completing the inspections. This report would include an overview of the structures condition and develop maintenance requirements, rehabilitation and replacement timeframes. This information would then be recorded and tracked through the RIVA program.

Sewer Inspections (Sanitary and Storm)

The most popular type is a Closed Circuit Television Video (CCTV). This involves a robotic camera being lowered into a maintenance hole and travels inside the pipe recording any defects or deterioration along its path. This system can detect a wide range of issues such as deterioration, joint displacement, cracking, exfiltration, deformities in the pipe and collapses.

This is a very good tool for collecting and evaluating the overall condition of the sewer system. However, this option is fairly expensive and time consuming when dealing with large quantities of pipe.

The other option, and more cost effective is the use of Zoom Equipment technology. This is similar to the CCTV technology but instead of using the camera to travel the entire

length of the pipe, it uses a camera that sits in the maintenance hole and "zooms" an image down the length of the pipe. The only drawback to this technology is the further the image is zoomed the less clear the image becomes. However, the upside is this process is quicker and significantly less expensive. It should also be noted, that the majority of the deficiencies in the pipe occur within 20 metres of the maintenance holes.

The following is an approximate representation of the expense involved in using the CCTV system as opposed to the "zoom" technology. These costs may vary, depending on the location of the site and the material and quantity of pipe to be inspected.

Sanitary and Storm Sewer Inspection Costs				
Sewer Type	**Assessment Activity**	**Cost**	**Metres of Main/ # of Manholes**	**Total**
Sanitary	Full CCTV	$ 10/m	6764	$ 67,640.00
	Zoom	$ 300/MH	76	$ 22,800.00
Storm	Full CCTV	$ 10/m	4576	$ 45,760.00
	Zoom	$ 300/MH	5	$ 1500.00

In examining the figures above, the 'zoom' technology is significantly less and should be used to inspect the entire system to locate poor and critical areas in the pipe. Once this has been completed, the CCTV technology should be used to determine the severity of the damaged or deteriorated sections.

It is recommended that the Village establish a sewer condition assessment program using a portion of their capital budget. As noted above, the storm sewer network is in poor-to-critical condition and should become the first priority.

Through the video inspections, it is now easier to examine and track inspection results and grade the system in order to include this in the RIVA program.

Water Network

Water mains are unlike sewer systems in the fact that they cannot be inspected from the inside due to the constant flow and pressure of water. However, in certain circumstances this is possible, but very expensive and time consuming in that the water system must be shut down and the water removed. This practice usually only occurs on large trunk mains because of the affects on the community being without water for the entire time the inspection is taking place.

Therefore, the majority of data and inspection information is collected using the following key factors (without disrupting water flow and pressure) :

- age of the water main
- the material type
- the number of breaks and locations
- flow inspections at hydrant locations
- soil and environmental conditions

The age of the pipe is important and will determine the remaining life of the system. In addition, keeping track of water main breaks and monitoring to predict future breaks is the best tool in assisting with scheduling rehabilitation and replacement.

At present, the water system in the Village is in 'good' condition based on the age of the system.

It is recommended that the Village collect and keep inspection notes to include the information in the RIVA program in order to better track water main maintenance and breaks.

Asset Management Strategy – Life Span Analysis

This analysis was conducted to determine which activities applied to an asset would provide the greatest impact on the assets life at the lowest cost. This, in other words, is choosing to do the right thing at the right time to the right asset. If this strategy was carried throughout the entire asset network, the Village would achieve a better overall rating while keeping the programs total costs at a minimum.

Paved Roads

In determining the timeframe of when certain work activities should be applied is in direct relation to the current state of the asset. These phases are divided into the following:

Excellent Condition (Maintenance phase only)
Condition Range: 100 – 76

- Maintenance only

Good Condition (Preventative maintenance)
Condition Range: 75 – 51

- Crack Sealing
- Emulsions

Fair Condition (Rehabilitation phase)
Condition Range: 50 – 26

- Resurface – Mill and pave, asphalt overlay

In updating the Asset Management Plan Strategy, the Village may review the condition ranges and timeframes outlined to suit their program. As these ranges are adjusted, the financial requirements will have to be modified as well. These adjustments will also have an impact on the level of service that will be provided.

These changes can be input into the RIVA program and can easily be tracked and updated as the need arises.

The following outlines the costs of various road activities that may add life to each asset, the condition at which they should be applied and the associated costs for each added year of life to the asset.

Road Life Activity Options				
Activity	Average Cost	Added Life	Condition Range	Cost of Activity/ Added Life
Rural Reconstruction	$200	35	25 – 0	$5.71
Urban Reconstruction	$75	15	50 – 26	$5.00
Rural Reconstruction	$120	35	25 – 0	$3.43
Rural Resurfacing	$50	20	50 – 26	$2.50
Surface Treatment	$30	10	50 – 26	$3.00
Crack Sealing	$4	3	75 – 51	$1.33

As noted above, preventative maintenance activities such as, crack sealing are the most economical having the lowest cost (per sq. m). However, this preventative maintenance can only be started early in the assets life cycle.
Also, the rehabilitation activities such as resurfacing have a more economical approach than a full reconstruction.

It is recommended that the Village implement a program to track and plan for scheduling of the road network rehabilitation. This program must include for a section to account for a condition score for determining the activity more easily.

Gravel Roads

As stated earlier in this report, just under 30% of the Village's road network are gravel roads. The activities to extend life of a gravel road are much different than that of a paved road. Gravel roads require continuous maintenance, including re-grading, reshaping, section replacement, dust and drainage control.

Gravel roads require more frequent maintenance due to weather conditions and increased traffic flow. These two items can cause rapid deterioration if left unattended. This can easily be prevented by regularly grading to keep the road profile intact.

Another option may be to convert some of the gravel roads to a hard surface. This can be cost effective especially if there is a high frequency of maintenance on that particular road based on high traffic volumes.

Sanitary and Storm Sewers

During the sanitary and storm main's life cycle, there are various stages that the system can be maintained and is in direct correlation with the condition of the asset. These are divided into the following:

Excellent Condition (Maintenance phase only)
Condition Range: 100 – 76
- Maintenance only (cleaning and flushing)

Good Condition (Preventative maintenance)
Condition Range: 75 – 51
- Maintenance hole repairs
- Pipe repairs

Fair Condition (Rehabilitation phase)
Condition Range: 50 – 26
- Lining (structural deterioration)

Poor Condition (Reconstruction phase)
Condition Range: 25 – 1
- Replacement

In updating the Asset Management Plan Strategy, the Village may review the condition ranges and timeframes outlined to suit their program. As these ranges are adjusted, the financial requirements will have to be modified as well. These adjustments will also have an impact on the level of service that will be provided.

These changes can be input into the RIVA program and can easily be tracked and updated as the need arises.

The following outlines the costs of various pipe activities that may add life to each asset, the condition at which they should be applied and the associated costs for each added year of life to the asset.

Sewer Main Lifecycle Activity				
Asset	**Cost (per m)**	**Added Life (years)**	**Condition Range**	**Cost /Added Life (1 year)**
Structural Rehabilitation				
0 – 350mm	$ 225.00	75	50 – 75	$ 3.00
350 – 650mm	$ 350.00	75	50 – 75	$ 4.66
650 – 925mm	$ 1,250.00	75	50 – 75	$ 16.60
Replacement				
0 – 350mm	$ 450.00	100	76 – 100	$ 4.50
350 – 650mm	$ 675.00	100	76 – 100	$ 6.75
650 – 925mm	$ 800.00	100	76 – 100	$ 8.00

From the table above, lining (structurally) of the sewer mains is an extremely cost effective option in comparison to replacement. The unit cost for lining of the sewers is approximately one third the replacement cost for one extra year of life to the asset. For This technology has been available for some time and has been proven to extend the life of a sewer by 75 to 100 years, which is roughly the same time frame as a replacement strategy.

It is recommended that the Village implement a program to track the condition of the sewers and input them to the RIVA program, so they may identify which pipes are at the stage of lining or replacement.

Bridges

The Village of Oil Springs only contains two bridges, and for this reason, should have the structural engineer, who performs the inspections currently, to expand his role and establish a maintenance report for rehabilitation and replacement requirements.

Water System

During the water systems life cycle, there are various stages that the system can be maintained and is in direct correlation with the condition of the asset. These are divided into the following:

Excellent Condition (Maintenance phase only)
Condition Range: 100 – 76
- Maintenance only (cleaning and flushing)

Good Condition (Considerable maintenance)
Condition Range: 75 – 51
- Water main breaks
- Pipe repairs

Fair Condition (Rehabilitation phase)
Condition Range: 50 – 26
- Lining (structural deterioration)

Poor Condition (Reconstruction phase)
Condition Range: 25 – 1
- Replacement

Water Main Lifecycle Activity				
Asset	**Cost (per m)**	**Added Life (years)**	**Condition Range**	**Cost /Added Life (1 year)**
Structural Rehabilitation				
50 – 100mm	$ 200.00	50	50 – 75	$ 4.00
150 – 200mm	$ 300.00	50	50 – 75	$ 6.00
250 – 300mm	$ 400.00	50	50 – 75	$ 8.00
Replacement				
50 – 100mm	$ 200.00	75	76 – 100	$ 2.66
150 – 200mm	$ 300.00	75	76 – 100	$ 4.00
250 – 300mm	$ 425.00	75	76 – 100	$ 5.66

From the table above, lining (structurally) of the water mains is prohibitive due to the fact that there is still some excavation required due to lack of accessibility. Therefore, currently, this option would be more expensive than replacement. This technology on water mains is relatively new, but should not be ruled out indefinitely since technology changes so rapidly. This should be revisited from time to time as new technology becomes available.

It is recommended that the Village implement a program to track the condition of the water main and input them to the RIVA program. At present, the water system in the Village is in good condition based on the age and shortage of maintenance and existence of breaks.

Growth and Demand

Generally, most municipalities have plans in place for future growth. It is important that the Asset Management Strategy should incorporate the possibility of growth and not just the existing infrastructure. The strategy should include financial aspects for the construction of new infrastructure and the possibility of expanding the existing. These should be part of the plan and be included in the RIVA software program.

Financial Strategy

Analysis of Financial Plan Requirements

In order for an Asset Management Plan to be productive, it must be accompanied by a financial plan as well as long term budgeting. In developing a financial plan, the Village of Oil Springs can establish the financial resources required to preserve the existing asset network and desired levels of service for future growth.

Village of Oil Springs Financial Information

The objective is to accomplish full funding within a ten year period for the following assets:

- Tax funded assets – roads, bridges, storm sewers
- Rate funded assets – water and waste water systems

Tax Funded Assets

The following tables outline the annual investment required, current funding and funding increases needed to obtain full funding on assets traditionally funded by taxes.

Asset Requirements and Current Funding Available					
Asset: Tax Funded	Average Annual Investment Needed	Tax/Rate	Gas Tax	Total	Annual Deficit
Roads	$ 120,000.00	0	$ 21,994.00	$21,994.00	$ 98,006.00
Bridges	$ 26,750.00	0	0	0	$ 26,750.00
Storm Sewers	$ 19,547.00	0	0	0	$ 19,547.00
	$ 166,297.00	0	$ 21,994.00	$21,994.00	$144,303.00

As noted in the table, the Village of Oil Springs is running with an annual deficit on the tax funded portion of their Asset Management Plan. In order for the municipality to attain sustainability in this section of their infrastructure inventory, they must increase their tax base to fund the Plan. The municipality must review the tax structure each time the Plan is updated in the future.

Recommendations for full funding

The average annual investment currently by the municipality for roads, bridges and storm sewer is $ 35,790.00. Revenue designated to these assets is $ 21,994.00 leaving a deficit of $ 144,303.00 annually. Therefore, the municipality is only funding 15% of their long term requirements.

Revenue Required for Full Funding		
Asset Tax Funded	**Tax Rate Increase Required**	**Total Annual Revenue**
Roads	2%	$ 82,660.40
Bridges	1.5%	$ 40,125.00
Storm Sewers	1.5%	$ 29,320.00
Total	5%	$ 152,105.40

We recommend that the tax rate be increased by 5% in order to receive the funds needed to allocate to the Asset Management Plan in order to gain the option of prioritizing capital projects.

Rate Funded Assets

As in most municipalities, rate funded user fees are implemented for water and waste water infrastructure. However, there are many variations to how to approach this segment.

There are many factors that should be considered when establishing a tax rate, these include:

- conservation
- legitimacy
- revenue support
- understanding
- viability
- development

Current funding

These tables outline the annual asset investment required, current funding and increases needed by the Village of Oil Springs to obtain full funding.

Asset Requirements and Current Funding Available					
Asset: Tax Funded	Average Annual Investment Needed	Tax/Rate	Gas Tax	Total	Annual Deficit
Water	$ 53,533.00	$ 48,197.00	0	$ 48,197.00	$ 5,335.00
Wastewater	$ 81,266.00	$ 48,197.00	0	$ 48,197.00	$ 33,068.00
Total	$ 134,799.00	$ 96,395.00	0	$ 96,395.00	$ 38,404.00

Revenue Required for Full Funding		
Asset Tax Funded	Tax Rate Increase Required	Total Annual Revenue
Water	3%	$ 50,187.50
Wastewater	1.5%	$ 81,266.00

Recommendations for full funding

Water Assets

The average annual investment currently by the municipality for water is $ 53,533.00. Revenue designated to these assets is $ 48,197.00 leaving a surplus of $ 5,335.00 annually. Therefore, the municipality is funding 100+% of their long term requirements.

From the previous table, the revenue requirements are being met, but should include an increase as well to place in reserve, should the need arise and to allocate a portion to the Asset Management Plan. A reserve for the water assets is strongly recommended due to the fact that these assets have a higher probability of requiring increased maintenance in the later years. The following will outline the approach to increase the revenue in phases.

Increase Revenue Options			
	5 Years	10 Years	Continually
Water	2.5%	2.5%	1.5%
Wastewater	3.5%	2.5%	1.5%

We are recommending the 10 year option for the water assets. This will meet the municipalities target for full funding by:

- increasing water revenues by 2.5% annually for 10 years and distributing this between Operations and the Asset Management Plan

- increasing water revenues by 1.5% annually after the 10 years to maintain an increase to the Operations revenue and reserves

Wastewater Assets

The average annual investment currently by the municipality for the wastewater system is $ 48,198.00. Revenue designated to these assets is $ 81,266.00 leaving a deficit of $ 33,068.00 annually. Therefore, the municipality is only funding 40% of their long term requirements.

As indicated in the table above, full funding will require the wastewater revenue to increase by 3.5%. It is recommended that we use the 10 year option to obtain full funding by:

- increasing wastewater revenues by 2.5% annually for 10 years and distributing this between Operations and the Asset Management Plan

- increasing wastewater revenues by 1.5% annually after the 10 years to maintain an increase to the Operations revenue

Recommendation:

As full funding becomes a reality, the municipality should develop a program to address high priority infrastructure expenditures in the near future. Once full funding is accomplished, the opportunity to accumulate reserves is recommended.

Accumulation of reserves will benefit the municipality in future planning and desired level of service to its community