



# TOWNSHIP OF NORTH HURON

# REPORT

Item No.

**REPORT TO:** Reeve Vincent and Members of Council  
**PREPARED BY:** Jeff Molenhuis  
**DATE:** 05/06/2017  
**SUBJECT:** NH 17-06-05 Bridge Management Report  
**ATTACHMENTS:** BM Ross Bridge Inspection Report - 2016

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## **RECOMMENDATION:**

THAT the Council of the Township of North Huron hereby receive the June 5th, 2017 Bridge Management Report for information;

AND THAT the Council of North Huron receive the attached BM Ross Bridge Inspection Report for information purposes;

## **EXECUTIVE SUMMARY**

In 2016, a Bridge Inspection Report was undertaken by BM Ross at the direction of staff. The report included a workplan review from a safety perspective, and served to update the workplan outlined in the previous Ontario Structure Inspection Manual (OSIM) reports completed for each structure in 2013. Under the Public Transportation and Highway Improvement Act, 1990 and Ontario Regulation 104/97 and Ontario Regulation 472/10 Standards for Bridges, municipalities are required to inspect bridges every two years in accordance with the OSIM document procedure. The Township had 11 structures that qualified for the OSIM inspections in 2013, with a 12<sup>th</sup> structure (Victoria Street) being transferred from the County to the Township sometime between 2013 and 2016.

From the inspections completed in 2016, a maintenance workplan was developed for the 1-5 and 6-10 year timeframes. The information noted for overall structure conditions was analyzed and updated for a majority "condition-based" management program, with minor consideration to "age-based" management. The workplan was integrated into a DRAFT 10 year capital forecast for Public Works being developed currently by Staff.

Based on the inventory, condition, replacement cost and replacement schedule of the bridge and culvert assets owned by the Township, the average annual investment into replacement, rehabilitation or reserve building that is required to sufficiently fund long term replacement needs without accumulating a deficit or considering project deferrals is in the order of \$195,000.

## **DISCUSSION**

In 2016, the Township initiated OSIM safety inspections for all bridge and culvert structures qualifying under the regulation, and requested a work program for minor and major bridge maintenance work over a 10 year period. The report focused on OSIM requirement structures and a major pedestrian bridge (the railway bridge). The inspections do not include equalizer culverts, road crossing culverts or other road drainage structures that are less than the requirements under the regulation, being anything less than a 3 metre span.

Based on the inventory and condition assessments completed in 2016, the following attributes are relevant to consider:

Asset Category	Count (ea)	Deck Length (m)	Deck Area (m <sup>2</sup> )
Bridges and Culverts (OSIM)	12	301	3,207

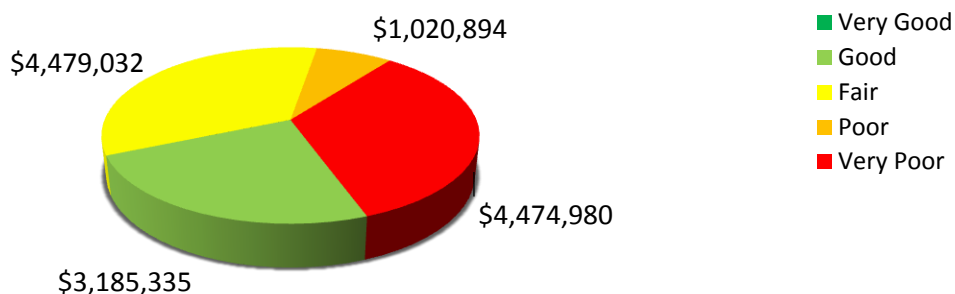
From the inspections completed, Bridge Condition scores are created by analyzing each major element of the structure. Each element is scored based on a percentage of the element being in good, fair or poor condition. These element scores are then accumulated to create a Bridge Condition Index (BCI) for each structure. This score represents a normalized condition of the structure so that the overall condition can be compared across structure types. For the purpose of estimating remaining service life (the time at which the structure would need to be replaced), the condition score of the structure is combined with the known age of the structure to calculate a percentage of remaining service life (RSL). The RSL determines the anticipated replacement timing of the asset.

The replacement cost is calculated based on the attributes listed with consideration to standard market prices and known local unit prices as benchmarks. The RSL determines the condition profile below, where RSL, in increments of 20, places the replacement cost of the structure in a condition profile to determine what value and weighting the asset category has in a particular condition. For bridges and culverts, the condition profile is as follows:

Very Good (81-100)	Good (61-80)	Fair (41-60)	Poor (21-40)	Very Poor (<20)
	\$ 3,185,335	\$ 4,479,032	\$ 1,020,894	\$ 4,474,980
0%	24%	34%	8%	34%
	\$7,664,367		\$5,495,874	
	58.23%		41.76%	

The total replacement value for 12 OSIM structures in North Huron is estimated at \$13.1 million in 2016 dollars. The Condition Profile is further outlined below in pie shape format for your information.

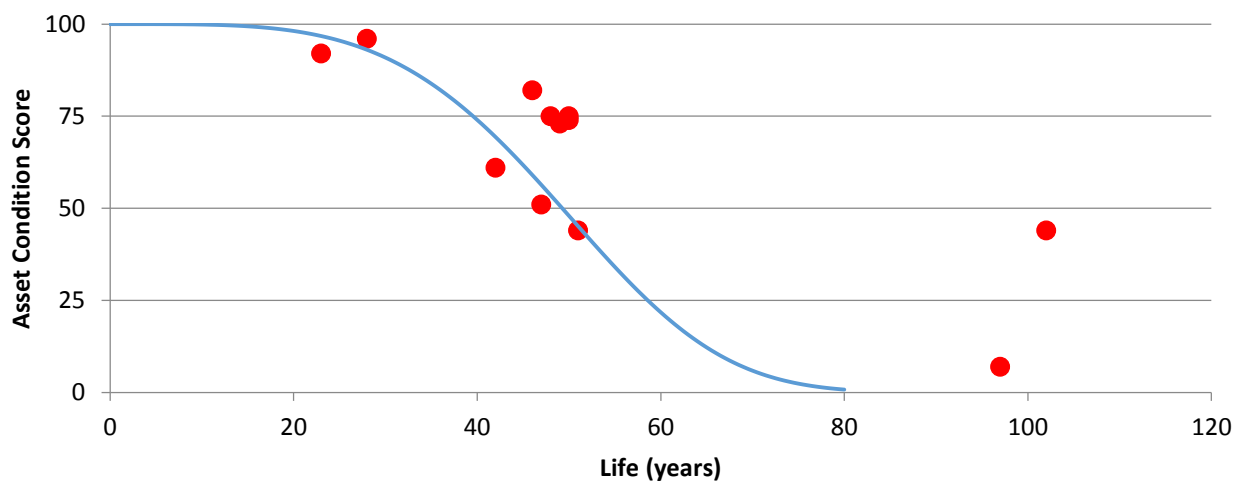
## Bridge Network - Condition Profile Chart



A general asset management best practice is to maintain good assets in good condition. In such cases, the focus of these assets should be preventative maintenance activity and rehabilitation efforts. Ultimately, this will extend the useful life of that asset, reduce long term total life-cycle costs, and continue to delay costly full replacement activities.

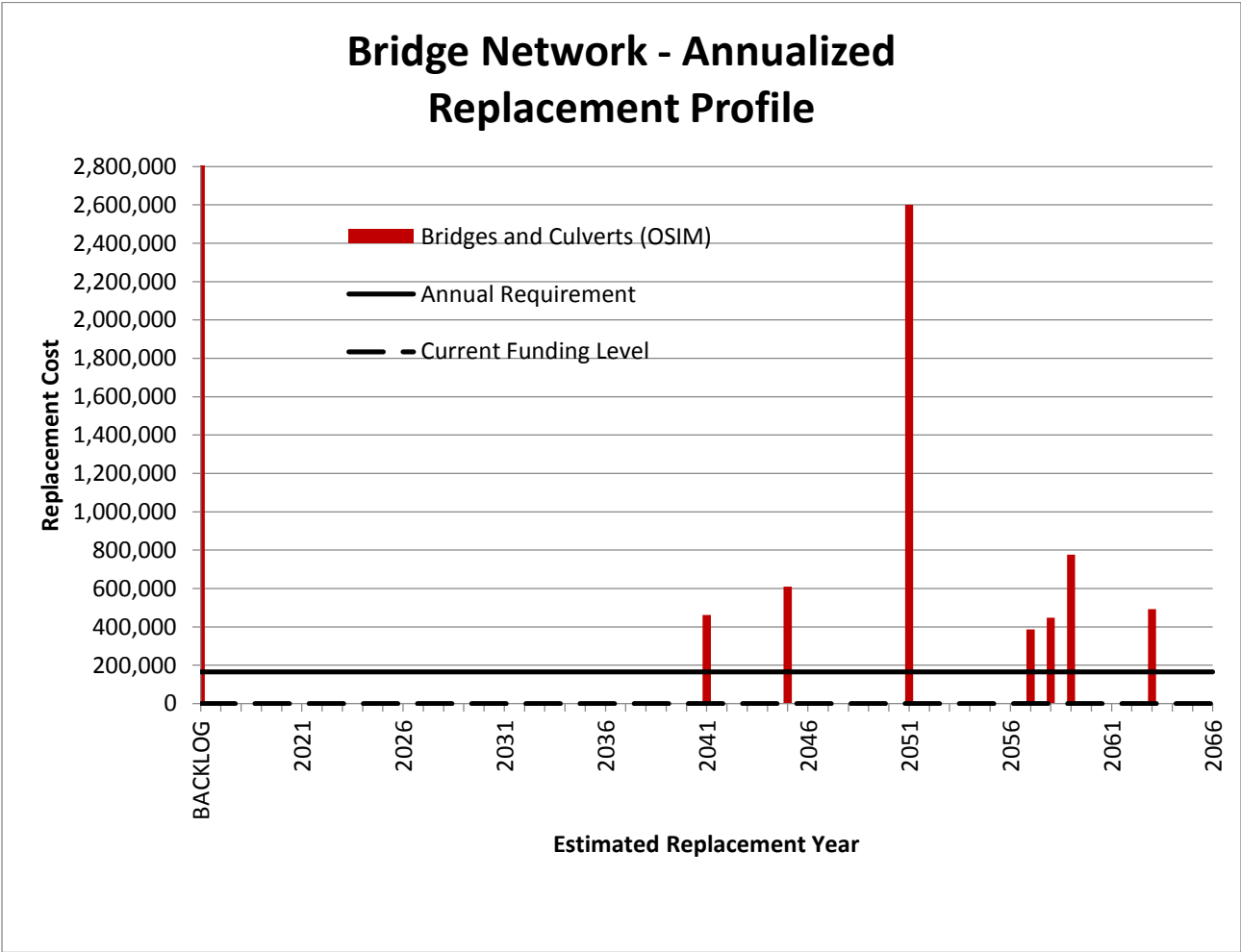
Life cycle analysis considers the active life of the asset prior to replacement. Integrating degradation estimates into the useful life of the asset helps the Township better understand current asset conditions, the impact of life-cycle extending work (preventative maintenance or rehabilitation) on condition and estimated replacement timing. The figure below shows the current condition scores of the Township's OSIM structures against a theoretical life cycle degradation curve.

## Bridge Network - Degradation Curve



Using the degradation curves, the remaining useful life of the asset can be estimated. This can help predict full replacement timing for the asset. Without preventative maintenance or rehabilitation activities, the replacement profile of the OSIM bridge network is displayed in the Annualized Replacement Profile Figure below that displays estimated replacement cost in the year the asset is predicted to be at the end of its useful life. Within the figure, a section identifying backlog is displayed at the far left of the graph. This line denotes assets that are beyond their useful life, and

replacement activities are overdue. Note that one structure is beyond it's useful life; however, it likely would have been significantly rehabilitated in previous years as the condition score is fair and has an extended age.



The annualized replacement profile is used to determine annual funding requirements for the asset category. Total replacement costs over the life of the replacement schedule are used to provide an average annual steady funding requirement. Based on replacement cost and schedule for North Huron OSIM structures, the average annual funding requirement is approximately \$195,000. This would include preventative maintenance, rehabilitation activities, analysis and planning, and reserve transfers to stabilize a steady fund specific to OSIM bridge and culvert assets.

**FINANCIAL IMPACT**

As can be seen, the current annualized steady funding level for this asset category is close to nothing. There are small order maintenance activities that are undertaken annually, such as deck washing, but those activities are minor with respect to cost. Consideration should be given to establishing a dedicated annualized bridge and culvert reserve in future budgeting years. While replacement activities appear to be in the long term, the need to undertake significant maintenance activities will arise over the life of the asset, and will be needed prior to the replacement timing noted in the replacement profile.

### **FUTURE CONSIDERATIONS**

There is a need to consider the total corporate asset load for North Huron and integrate each asset category funding requirement into a prioritized corporate plan. Ultimately an annualized investment is required to build a bank for all corporate assets and support sound financial planning practices.

Additionally, the completeness of the culvert inventory is lacking as culverts less than the OSIM requirement are not considered in this analysis, nor does the Township possess appropriate attribute data to know location and estimate condition, replacement timing or cost. More field work is necessary to gather this information and include it within the repository for the fulsome bridge and culvert network.

A draft 10 year capital plan for bridge and culvert assets is outlined below for consideration. This plan does not include an annualized reserve transfer, but does include planning and analysis, structure reviews, capital and major rehabilitation work, as well as a line for small culvert replacement. Note that this list is provided for information only, and should be brought forward as a comprehensive list for Public Works, likely at the time of budget discussions later this year or into 2019 budget preparation.

### **RELATIONSHIP TO STRATEGIC PLAN**

Goal 2 our residents are engaged and well informed. Goal 3 the Township is healthy and safe. Goal 4 the administration is fiscally responsible and strives for operational excellence.



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Jeff Molenhuis, Director of Public Works



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Sharon Chambers, CAO

## DRAFT Public Works - TRANSPORTATION 10 year Capital Forecast

Budget Year		1	2	3	4	5	6	7	8	9	10
Calendar Year	Total	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
<b><u>Roads - Bridges and Culverts</u></b>											
009 & 010 - Howson Dam and Bridge (Safety Analysis/EA)	100,000	100,000									
011 - Railway Pedestrian Bridge (Detailed Inspection/Repairs)	355,000		75,000			80,000		200,000			
003 & 004 Nature Centre Road Structure (patch, wp, pave)	140,000			140,000							
005 Marnoch Line Structure (patch repair curbs)	16,000				16,000						
002 - Currie Line Structure (patch repair, handrails)	32,000				32,000						
Small Culvert Replacement Program	58,500		6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500
Engineering Inspection (OSIM)	87,500		17,500		17,500		17,500		17,500		17,500
<b>Total - Bridges and Culverts</b>	<b>789,000</b>	<b>100,000</b>	<b>99,000</b>	<b>146,500</b>	<b>72,000</b>	<b>86,500</b>	<b>24,000</b>	<b>206,500</b>	<b>24,000</b>	<b>6,500</b>	<b>24,000</b>