



ROAD STRUCTURE ASSET MANAGEMENT REPORT

City of Greater Sudbury



Keystone Bridge Management Corp.

Your Bridge Asset Management Specialist

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Executive Summary

Keystone Bridge Management Corp. was retained by the City of Greater Sudbury to provide information that will help the City satisfy the requirements of Ontario Regulation 588/17 **Asset Management Planning for Municipal Infrastructure**. Keystone's involvement was specific to the core municipal infrastructure assets of bridges and large culverts. The City has 185 structures of which 90 are considered bridges and the remaining 95 are culverts.

This report responds primarily to Part 5 of the Regulation, **Asset Management Plans**, and particularly Section 3 as it relates to bridges and culverts. To wit:

- i. All bridges and culverts are identified and listed,
- ii. Replacement costs of all bridges and culverts is provided,
- iii. The average age of bridges and large culverts,
- iv. Extensive information on the condition of the bridges and culverts,
- v. A description of how the bridges and culverts are assessed.

The City of Greater Sudbury has captured vital asset management intelligence for its bridges and culverts that is not necessarily requested in the Regulation. This information is shared in the present report.



Introduction

This report is offered as partial fulfillment of Ontario Regulation 588/17, Asset Management Planning for Municipal Infrastructure. Bridges and large culverts that require biennial inspection following the Ontario Structure Inspection Manual (OSIM) are considered core municipal infrastructure assets. An asset management plan for core assets is obligated by July 1, 2021.

Understanding Asset Management

There are varying accepted definitions of the term “asset management”. Some follow:

“AM is a comprehensive process that allocates funds effectively and efficiently among competing pavement, structure, and other infrastructure needs.” Transportation Association of Canada

“AM is the process of guiding the acquisition, use and disposal of assets to make the most of their service delivery potential and manage the related risks and costs over their entire life.” Government of Victoria – Australia

“A systematic process of maintaining, upgrading, and operating physical assets cost effectively. It combines engineering principles with sound business practices and economic theory, and it provides tools to facilitate a more organized, logical approach to decision-making.” FHWA - USA

The writer defines AM as:

“Asset management is the application of engineering, economics, and risk science principles to achieve enduring benefit from the asset at minimal cost.”

The need for public agencies to systematically undertake asset management was recognized more overtly at the beginning of the present century. Central to any discussion of managing public assets is the notion of core municipal infrastructure assets or tangible capital assets. The Public Sector Accounting Board of Canada defines these as:

(a) Tangible capital assets are non-financial assets having physical substance that:

- (i) are held for use in the production or supply of goods and services, for rental to others, for administrative purposes or for the development, construction, maintenance or repair of other tangible capital assets;**
- (ii) have useful economic lives extending beyond an accounting period;**
- (iii) are to be used on a continuing basis; and**
- (iv) are not for sale in the ordinary course of operations.**

Dr. Dana Vanier of the National Research Council of Canada speaking at an international congress in 2000 described the ability to answer the following six questions as fundamental to Asset Management:

- What do you own?
- What is it worth?
- What is the deferred maintenance?
- What is its condition?



- What is the remaining service life?
- What do you fix first?

Six additional questions when answered help frame an understanding of Asset Management:

- Where is the asset located?
- What is the consequence of investment in the asset?
- What is the cost of perpetual ownership, or in other words, the commuted cost?
- What risks and liabilities are associated with ownership of the asset?
- What is the present and future demand for the asset?
- What value is the asset generating?

This report demonstrates that the City of Greater Sudbury has an advanced standing in managing its road and park structure assets. The answers to the majority of the preceding 12 questions are provided within this document and accompanying appendices.

Keystone Bridge Management Involvement

Keystone Bridge Management Corp. (KBMC) has completed seven consecutive cycles of biennial bridge and large culvert inspections on behalf of the City of Greater Sudbury. Keystone initially inspected Sudbury structures in 2008, and then every second year thereafter.

As part of its services Keystone provides detailed capital needs, maintenance needs, individual bridge depreciations to date, forecast inventory depreciation, and the bridge condition index, for all 185 of the inspected structures. The estimated remaining service life and replacement cost is detailed for each structure. Individual inspection reports are prepared for each structure.

Network level reports are generated that speak meaningfully to asset management objectives. The following reports are provided by KBMC and are further described and explained herein:

1. Summary Statistics Report
2. Bridge List
3. Culvert List
4. Capital Needs
5. Maintenance List
6. Structure Replacement Cost & Estimated Remaining Service Life Report
7. Culvert Replacement Cost Report
8. Bridge Parabolic & Straight-Line Depreciation
9. Bridge Depreciation Forecast
10. Bridge Depreciation Forecast with Recommended Capital Investment
11. Bridge Average Depreciation with Investment Scenarios
12. Depreciation Forecast – Culverts
13. Average Culvert Depreciation with Investment Scenarios
14. Recommended Investigations
15. Performance Deficiencies
16. BCI Report



O. Reg. Table 5

This portion of the report attempts to directly satisfy Part 5 of Ontario Regulation 588/17, and more specifically responds to Part 5(2)-1, i & ii for Table 5, “Bridges and Culverts.”

Description of Traffic

Community Levels of Service

The traffic supported by municipal bridges and culverts includes:

- Pedestrian traffic
- Cycling traffic
- Normal passenger vehicle traffic
- Emergency vehicles
- Public transit including Municipal bus service and school bus service
- Heavy commercial trucks
- Specialized ore hauling trucks
- Permitted over-load traffic
- Dangerous goods traffic

A subset of structures are park bridges and pedestrian culverts. These are designed for pedestrian and cyclist traffic only and do not support light service vehicles.

Technical Level of Service

The information required for bridges regarding their technical level of service are load and dimensional restrictions.

The table below identifies which bridges in Sudbury had load postings as of 2020. There were four in total in 2020, but two have since been replaced. Accordingly, 1.08% of Sudbury structures presently have load restrictions.

Table 1 List of Load Posted Structures

Bridge	ID	Posting (t)	Remark
Spanish River Bridge	1000	15	Replaced 2020
Kalmo Road Bridge / Whitson River	3006	10	Programmed for Replacement 2022
Vermilion River	4001	19-30-42	Replaced 2020
Romford Creek Bridge	5013	9-17-23	Programmed for Replacement 2022

The following table indicates the population of bridges with only one lane of traffic. This is construed to be a horizontal dimensional restriction for the purposes of this report.



Table 2 List of One-lane Bridges

Name	ID
Spanish River Bridge	1000
Manninen Road Bridge	1003
Chicago Mine Road Bridge	1005
Spanish River near Worthington Road	1006
Nelson Lk Rd @ Rapid River	3000
Kalmo Road Bridge / Whitson River	3006
Roberts River	4000
Vermilion River	4001
Industrial Rd (Ski Hill Rd)	4003
Roberts River	4005
Deer Creek Bridge	5020
Deer Creek Bridge	5021
Forest Lake Road Culvert	5503

A total of 13 bridges operates as one lane bridges. They are tabled above. The traffic demand on these bridges is relatively light and it is permissible by the Canadian Highway Bridge Design Code to have one lane bridges. Statistically 7.03% of Sudbury bridges are one lane, but that it is not to suggest they are dimensionally inadequate. All the one lane bridges have at least 3.0 m of horizontal clearance which is sufficient to pass all traffic except permitted traffic where that permitted traffic is carrying an extra wide load.

The CPR Subway on College Street, Site 6001 has a vertical dimensional limitation of 3.8 m clearance. The Brady Street Underpass Site 5003 has a signed vertical clearance of 4.4 m. The Ministry of Transportation Ontario requires all trucks not exceed a height of 4.15 m. Thus, the Brady Street Underpass is not deficient in height, even though permitted over-height loads would have to navigate Sudbury on a different route. For the purposes of Ontario Regulation 588/17, only one bridge or 0.54% of bridges has a dimensional vertical restriction.

All pedestrian bridges and culverts have adequate horizontal and vertical clearance.

Condition of Bridges and Culverts

Community level of Service

The condition of all bridges and culverts is captured in individual inspection reports that are updated every two years in conformance with the Ontario Bridges Act and Regulations thereunder. All inspection reports are available separately from the present report but are discussed later in the present report. An example inspection report is appended to this report at the beginning of the Appendices.

Extensive photographic imagery is utilized to present the condition of the bridges and culverts in the inspection reports. In 2020, 1136 images of the 70 road bridges were captured, or an average of 16.23 images per bridge. Similarly, for culverts, 1129 images of the 93 roads culverts were taken, for an



average of 12.14 images per culvert. The 22 pedestrian bridges and culverts had 311 pictures in 2020. That is an average of 14.14 images per pedestrian structure.

Technical Level of Service

The average bridge condition index (BCI) for bridges in the City of Greater Sudbury is 75.25. Similarly, for culverts, the average BCI is 79.10. The average BCI for pedestrian bridges and culverts respectively is 77.17 and 68.50.

The BCI is not necessarily the best or only measure for describing the state of the municipal structure inventory. This is discussed more fully later in this report.

Since 2008 Sudbury has tracked the physical depreciation of its bridge and large culvert inventory. In a manner like accounting practise, the level of depreciation of each structure component is evaluated based on its age, normal life expectancy, relative value, rehabilitation history, and deterioration. The component depreciation is aggregated to obtain depreciation levels for each structure, and the entire structure inventory. This technical metric is not explicitly a requirement of Table 5, and thus a fuller description follows later in this report.

Summary of Bridge and Culvert Assets

Bridge and Culvert Lists

A printout of Sudbury's bridges and culverts is provided in the Appendices as **Bridge List** and **Culvert List**. These two printouts clarify what are considered as bridges and which structures are deemed culverts. Culverts are defined as an opening through the embankment and have soil cover.

Bridges typically have no cover, although certain bridges may have had their riding surface elevated by infilling between the curbs. The **Bridge List** identifies 90 structures that are considered bridges. The remaining 95 structures on the inventory are culverts. Nine culverts have a span less than 3.0 m and are therefore not subject to Statutory biennial inspection.

Structure Age & Other Summary Statistics

A one-page **Structure Summary Statistics** report included in the Appendices provides three graphical representations of the structure inventory by way of three histograms. The Structure Age Histogram shows that the Sudbury structures have a reasonably even age distribution. Seventy-three structures are new or have been replaced in the past 20 years. The average age of Sudbury structures as of 2020 is 31.4 years. There are 27 structures that are more than 60 years old. The oldest structure is 90 years old. The average of the road bridges is 42.8 years as of 2021. Similarly, the average age of the road culverts is 25.4 years as of the present. Where the age of a structure is uncertain, defining characteristics such as formwork marks and bridge railing type are utilized to provide an informed estimate.

The Structure Deck Area Histogram demonstrates that over half of the structures have less than 200 square metres of plan area. The largest structure has a plan area of 2,381 square metres. The average plan area is 234 square metres. The total plan area of structural assets is 43,219 square metres. Bridges with more than 600 square metres of deck surface are considered large bridges. Sudbury has 12 large bridges.



The Structure Deck Area per Age Histogram is a hybrid of the previous two histograms. It is a key piece of asset management information because this chart presents the age and size-weighted picture of the structure inventory. The plot shows a slightly unbalanced distribution. About 28% of the deck area is greater than 50 years old. About 16.6% of the deck area has been renewed in the past 20 years. A rate of at least 1% per year renewal is critical for a sustainable inventory. Sudbury is nearly achieving this with a rate of 0.83% per year.

The table below compares some key statistics tracked between 2014 and 2020.

Table 3 Comparison of Selected Structure Statistics 2014-2020

Year	Plan Area (m ²)	Average Age	Age of Oldest Structure
2020	43,219	31.4	90
2018	41,218	32.4	88
2016	41,055	35.1	86
2014	40,391	35.5	84

The increase in plan area of almost 3000 square metres from 2014 to 2020 is principally due to the addition of two large previously undocumented culverts, correction of the length of one other culvert, and inventory improvements.

Replacement Costs & Estimated Remaining Service Life

The estimated remaining service life (ERSL) and the replacement cost are vital asset management intelligence. These values are provided in an appended report titled **Structure Replacement Costs**.

Estimated Remaining Service Life

The structures are ordered based on the ERSI. The newest structures top the list. The structures at the bottom of the list, have effectively no or little remaining service life. Those structures that have a formally identified capital need have the recommended program year identified. All structures with less than ten years of estimated remaining service life are identified on the capital program.

The ERSI is calculated based on the deemed life of the structure, and present age. This is modified by an algorithm that recognizes the actual condition of the structure. Old bridges in good condition automatically have their lives extended. Newer structures in exceptionally poor condition have their life expectancy reduced. Recently rehabilitated bridges had their lives extended by not less than ten years. Thereafter, engineering judgement is applied to arrive at the listed ERSI.

Replacement Cost

The replacement costs are premised on replacement in kind. Typically, when a bridge is replaced, it is replaced with an improved structure type, and often to improved design criteria. Hence the replacement costs are not a reliable indicator of actual replacement costs. However, it is a useful parameter for asset management purposes, particularly when assessing the level of asset depreciation.

The replacement cost for bridges considers numerous factors and is computed by an algorithm. The factors are listed below:



- Structure type
- Plan area of bridge (Overall length by overall width)
- Location (city more expensive than rural)
- Skew (cost increased by 10% if skew angle > 0)
- Symmetry (cost increased by 10% if irregular or unsymmetrical)
- Size (a discount factor is applied as the size increases)
- Aspect ratio (A wide bridge has a lower unit cost)
- Allowance for existing structure removal
- The base replacement cost is factored by an allowance for design costs and contingencies.

Unit and fixed costs are updated yearly to adjust for inflation and market conditions.

The culvert replacement costs are calculated separately, and this is explained later in this report.

Summary Results

The estimated total replacement cost for the City of Greater Sudbury bridges and culverts was updated in 2021 and is \$535,870,000. The average replacement cost per structure is nominally \$2.9M.

A graph forecasts the future costs for structure replacement by decade. In the period from 40 to 50 years hence, there is a forecast requirement to replace about \$96M in structure assets. The City needs to strategize on how best to prepare for this significant road structure renewal cost. Timely rehabilitation of some of these structures will prolong their service life.

Caveat

The estimated remaining service life is a guideline only. Rehabilitation can extend the life of a structure by 20 to 50 years. In some instances, the ERSL may be optimistic, especially for steel culverts.

The estimated replacement costs are a reasonable indication of actual replacement in-kind costs. However, there are numerous other considerations that influence replacement costs. Chief among these are market conditions, challenging foundation conditions, and traffic management requirements.

Culvert Replacement Cost Report

The **Culvert Replacement Cost** Report is in the Appendices to this report. It is generated based on a complex algorithm within KBMS that considers parameters such as depth of cover, skew, water depth, road width, and presence of guide rail. The estimated replacement cost is generated for both a corrugated steel and concrete box type culvert.

Concrete culverts outnumber steel culverts by 81 to 14. This is a favourable statistic. Keystone's experience indicates that only shallow cover smaller diameter steel culverts in shallow water can be justified over concrete culverts on a life-cycle cost basis.

The estimated cost to replace all the City of Greater Sudbury culverts, in kind, is \$234,175,000.

Bridge Replacement Costs

From the previous two network level reports it is easily deduced that the replacement value of only the bridges is \$301,695,000.



Information on Condition of Bridges & Culverts

The following information is captured as part of Sudbury's asset management program for bridges and large culverts.

- Defects and Damage to Bridge and Culvert Components
- Aggregate Level of Defects and Damage on a per structure basis
- Aggregate level of Defects and Damage for the entire Bridge Inventory
- Level of Depreciation of Bridge and Culvert Components
- Aggregate level of depreciation for individual bridges and culverts
- Aggregate level of depreciation for the entire bridge inventory and culvert inventory.
- Rate of depreciation separately for bridges and culverts
- Impact of Capital investment (recapitalization)
- Special Maintenance needs on a component and structure basis
- Capital improvement needs for all structures
- Performance Deficiencies
- Bridge Condition Index

Defects and Damage

All bridges and culvert components are assessed in terms of physical defects and damage. The amount of defects and damage is estimated as a percentage of the component. Defects are generally cosmetic in nature, detract from the structure aesthetics, may affect serviceability, and are typically caused by surface breakdown of poorly performing materials. Examples are scaling of concrete, and loss of paint or galvanizing.

Damage is more serious and is typically deeper and more consequential than defects. A delaminated deck surface or perforated culvert are examples of damage.

Both defects and damage reduce the value of the affected component, and in turn, the value of the structure. One percent damage to a component is deemed to devalue that component by 5%. Consequently, a component that is 20% damaged has lost all its value. Ten percent defect is treated as one percent damage.

Aggregate Defects and Damage

The cumulative effects of defects and damage to components is aggregated for each structure and graphically displayed on each individual structure inspection report. The entire bridge inventory is similarly aggregated to measure the deemed loss in value. In 2020, the bridges were assessed to have lost 8.2% of their value due to defects and damage. Almost \$25 million in bridge value has been lost to the affects of defects and damage.

Bridge Depreciation

The New Value of each bridge is premised on the geometry and deemed unit price of the main components and summing the individual values. The costs of foundations are not included. Foundations are relatively expensive bridge components that may cost from \$100K to \$1,000K per bridge foundation unit. The deemed unit prices are approximate, and not necessarily reflective of current actual costs. Dollar values are current as opposed to historical values used in accounting



practise. A report included in the Appendices titled **Parabolic and Straight-Line Depreciation** provides individual retained values for all the bridges. Culverts are not included in this report. The retained value is the reduced value of a bridge after accounting for aging depreciation and deterioration depreciation. It is expressed as a dollar amount and percentage.

Depreciation is premised on the actual age of each bridge component. So, for example if a bridge has replacement components such as expansion joints or new barrier walls, the depreciation of these components is based on their year of installation rather than the age of the original bridge. In some instances, judgement was required to establish the installation date of replacement bridge components.

The Present Value (book value) of a bridge is expressed in terms of how much of the original value is retained after considering Depreciation, Defects and Damage. Depreciation is calculated as Parabolic or Straight-Line (S/L). With a parabolic depreciation function, only 25% of the depreciation takes place in the first half of the component's life. Parabolic depreciation sustains a bridge's value in the early part of its life. Straight-line depreciation is probably a more realistic and conservative approach to describing the current book value of a bridge. Examples of four depreciation functions are illustrated in Figure 1. below.

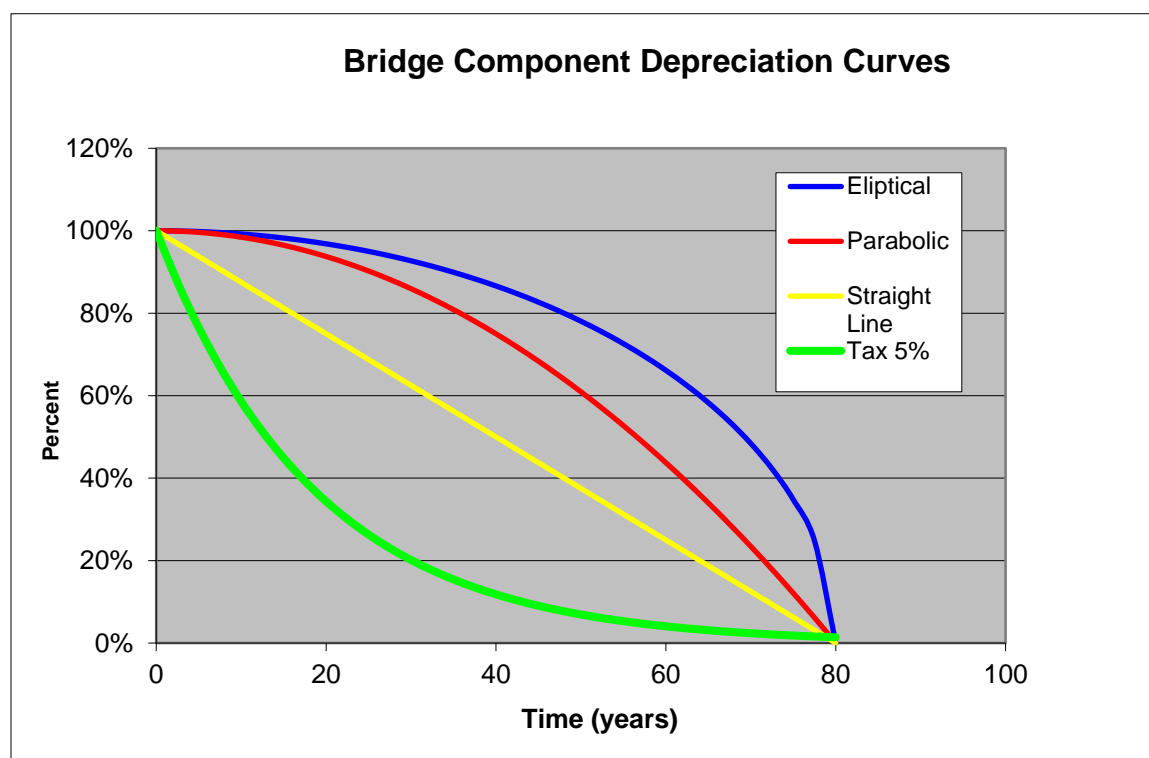


Figure 1 Examples of four depreciation functions for a bridge component with an 80-year deemed service life

The total depreciated value of the bridge inventory is 51.9% of the deemed New Value if parabolic depreciation is assumed. Similarly, for straight-line depreciation the value has declined to 34.6% of the original deemed New Value.



Alternate Technical Level of Service

Earlier in this report, BCI values are provided as a technical level of service for bridges and culverts. Here it is proposed that a more reliable level of service can be measured in terms of depreciation. Moreover, it is suggested that technical level of service targets for bridges should align with desirable and sustainable levels of depreciation.

Assuming a 100 year write down period for bridges, it is a desirable goal to maintain the entire bridge inventory at nominally 50% depreciation or better if Straight Line Depreciation is adopted. Similarly, for Parabolic Depreciation, it is desirable to maintain the level of depreciation at or above 67%. Depending on the choice of Depreciation function, The City of Greater Sudbury is behind the depreciation level of service target by 13.9% or 13.3% respectively.

There are six bridges where defects and damage account for more than 25% of the depreciation. All these structures are identified by Keystone as being recommended for the capital program.

A comparison of the results of this analysis to the previous three cycles of inspection completed by Keystone is provided in the table below. The retained value of the bridge assets has improved notably since 2016 because of significant recent investment. The value of investment is clearly exceeding the loss of value due to depreciation. The loss of value due to defects and damage has improved considerably since 2014. This is a strong indicator of the effectiveness of investment in repair and renewal of the bridge inventory.

Continued and greater strategic investment in rehabilitation and renewal will improve the depreciation numbers and bring Sudbury closer to the technical level of service targets.

Table 4 Comparison of Damage, Defects and Depreciation for Bridges 2014-2020

Year	Damage & Defects Loss in Value %	Retained Value Parabolic Depreciation %	Retained Value Straight-Line Depreciation %
2020	8.2	53.7	36.1
2018	10.2	51.1	33.5
2016	11.5	50.6	33.2
2014	12.5	52.3	34.4

Bridge Depreciation Forecast

As part of the bridge inspection deliverables, the bridges and culverts were assessed for their depreciated value and rate of depreciation. This section discusses bridge depreciation only.

The Depreciated percentage is calculated based on the deemed value, deemed life, and age of each bridge component. Once Defects or Damage is identified on a component, the Defects and/or Damage is assumed to grow at 0.5% per year non-compounded. Thus, a sidewalk that presently has 5% scaling (a Defect), is assumed to have 7.5% scaling in another five years time.

Depending on assumptions, the retained value of bridge assets is between 36% to 60% of the new value.



The projected average depreciation is approximately 1.48 percent per year. Accepting an actual replacement cost of \$301.7M for only the bridge assets, the forecast depreciation loss in terms of replacement value is nominally \$4.5M per year. Hence an annual capital expenditure of not less than this amount is required just to maintain the bridge inventory at present levels of depreciation. It is important to note this discussion does not include large culverts. A report in the Appendices called **Bridge Depreciation Forecast 1** shows the forecast depreciation for 20 from the present

Bridge Depreciation Forecast with Recommended Capital Investment

A companion to the preceding **Depreciation Forecast**, is a similar looking chart, **Bridge Depreciation Forecast 2**, also provided in the Appendices. However, this second chart demonstrates the effects of investing the recommended Capital Needs into the bridge inventory. Investing the recommended Capital expenditures helps increase the value of the bridges, and greatly improves the depreciation outlook.

It is important to understand this chart speaks only to bridges. The culverts are discussed separately in the sections following.

The premise for this chart is as follows. The recommended capital investments from the Capital Needs Report are grouped in five-year groupings. Hence all the recommended capital needs for bridges from the present to five years out is grouped, and so on and so on for 6 to 10-year needs, 11 to 15-year needs, and 16 to 20-year needs. The Capital is deemed to be spent exactly as recommended. The recapitalization of the bridge inventory offsets the depreciation.

The graph shows that the recommended capital spending for the first ten is insufficient to keep up with depreciation.

The graph is premised on one dollar of capital investment off sets one dollar of depreciation. This is reasonable when the replacement values of bridges include all the associated sundry costs of a bridge replacement in kind. Realistically, one dollar of capital may only offset eighty cents of depreciation.

In summary, the second **Bridge Depreciation Forecast** demonstrates that the recommended expenditures in the Keystone Capital Needs Report will, if followed exactly, still be insufficient to overcome the ongoing effects of Depreciation, Damage and Defects.

Over the past five years the City of Greater Sudbury has budgeted an average \$7.5M annually on capital investment for bridges and culverts.

Average Bridge Depreciation with Investment Report

A chart named the **Average Bridge Depreciation with Investment** is appended to this report. It tests various investment strategies and their impact on long term depreciation.

As the title suggests, this chart considers the Average Depreciation. In the previous two charts, four different types of depreciation assumptions are provided. In this chart, the four assumptions are averaged. The resulting average is shown as a red line captioned as “**Invest 0**”. For the City of Greater Sudbury, the average level of depreciation is about 47% of New Value and is projected to decline to 17% of New Value in 20 years in the absence of capital investment.



Superimposed on the Zero Investment scenario are four other colour coded investment scenarios labelled **Invest 1** to **Invest 4**. The **Invest 1** scenario models the effect of following the Capital Needs Report exactly as recommended. The average investment is \$1.3M per year for 20 years.

Examining the chart, and in particular, the green line that represents this investment scenario, it is shown that the recommended capital expenditure is insufficient in the long-term to overcome the projected depreciation.

The three other investment scenarios correspond to investing 0.75%, 1.0%, and 1.5% of the replacement cost of the bridge inventory annually. It is evident that only a long-term investment of 1.5% of the replacement value annually will begin to restore the bridge assets to desirable depreciation levels. The City of Greater Sudbury should commit to spending not less than \$4.5M per year on their bridges for the foreseeable future.

Culvert Depreciation Forecast

A chart showing the **Culvert Depreciation Forecast** is provided as part of Keystone's bridge asset management services and is included herein as part of the Appendices. Culverts are treated differently than bridges and this is explained next.

The new or Original Value of culverts is based on their replacement value. The replacement value of a culvert calculation was explained earlier in this report. Basically, the replacement value considers the costs of excavating the road surface, providing water control, removal of the existing culvert, and replacement in kind of the existing culvert. The costs include backfill and restoring the pavement structure of paved roads. The estimated cost to replace in kind the entire Sudbury culvert inventory is \$234,175,000. This is equivalent to \$2.47M per culvert.

Straight-line depreciation is utilized to depreciate the culverts. Since the culvert conduit is only part of the cost of the entire replacement cost, it was deemed that only simple depreciation without considering the effects of defects and damage was the more appropriate depreciation model. Depreciation assumes a 100-year life for concrete culverts and a 35-year life for corrugated steel and timber culverts. The assumed life is adjusted in the calculations to the estimated remaining service life.

The culverts are individually depreciated based on their age, and construction. The chart shows that the retained value of the culverts is about 58% of their Original or new value. In the absence of capital investment, the culverts will depreciate a further 20% in 20 years, or 1.0% per year.

Since the entire cost of culvert replacement is considered, then like the bridges, a dollar invested in culvert replacement yields a dollar improvement in the depreciated values. The depreciated value changes from \$136M to \$89M in 20 years. This is nominally \$2.35M per year. Thus, a minimum annual capital expenditure of \$2.35M per year is required just to maintain the present depreciated value of the culverts.

Previously it was noted the average cost of a culvert in Sudbury is \$2.47M. At a \$2.35M annual rate of depreciation, not less than one culvert on average should be programmed for replacement every year, to maintain the current retained value.



Although it is recognized that Sudbury has invested heavily in culvert replacements over the past ten years, continued investment is still required.

Average Culvert Depreciation with Investment

A second chart that examines five different investment scenarios for culverts is also provided. Located in the Appendices is a copy of the report **Average Culvert Depreciation with Investment**. Based on the Capital Needs Report, it was identified that about \$11.6M is required for culvert needs between the present and 2030.

The first, or null investment scenario shows that the depreciated value of the culverts will decline from 58% retained value to 38% retained value over 20 years.

The **Invest 1** scenario models the impact of capital investment following exactly the Capital Needs Report recommendations for culverts. This average level of expenditure of \$579K per year for 20 years results in the retained value of the culverts stabilizing for five years, and thereafter declining to 44% after 20 years.

The **Invest 2**, **Invest 3**, and **Invest 4** scenarios correspond to spending 0.75%, 1.0%, and 1.5% of the replacement value of the culverts annually. The chart confirms that an annual average expenditure of \$2.0M per year (under 1% of replacement value) is the most ideal capital investment strategy for culvert renewal for Sudbury.

Recommended Investigations Report

Biennial inspection of bridges as mandated by OSIM (Ontario Structure Inspection Manual) provides a cost-effective means of inspecting and reporting on the general condition of a bridge. Where, in the opinion of the Engineer, additional investigation is required, it is prescribed as part of the Inspection Report.

A one-page **Recommended Investigations** report is included in the Appendices of this report.

Bridge deck condition investigations (BDI's) are recommended for all structures identified as requiring comprehensive rehabilitation. Six bridges are recommended for a BDI. The ideal time for a BDI is two years before the planned rehabilitation.

Eleven structures are recommended for an enhanced inspection. An under-bridge type inspection vehicle is typically required to access parts of the bridge that cannot be accessed through a ground based ordinary OSIM type inspection. It is a good idea to map deterioration during an enhanced inspection.

Three structures are recommended for an under-water inspection. A dive team is required to perform such an inspection.

One structure would benefit from a boat inspection.

Nine structures are recommended for a planning study. Planning studies are a cost-effective approach to assessing the most prudent rehabilitation strategies for bridges earmarked for comprehensive rehabilitation.



Capital Needs Report

The capital needs were estimated with an estimating tool contained in the Keystone Bridge Management System. This utility covers common items that include deck replacement, expansion joint replacement, barrier wall replacement, waterproofing and paving. The utility provides guidance for traffic management costs. All costs are marked up 20% to account for contingencies and engineering. Contract administration costs are not included.

The **Capital Needs** for the City of Greater Sudbury are summarized in a separate Keystone report provided in the Appendices of this report.

The **Capital Needs Report** is organized from the most immediate needs to the less immediate needs by the Recommended Year sub-headings. Two capital needs pictures are graphically presented at the end of the Report. A Grand Total of **\$39,756,000** is the projected capital need from the present to 2030.

There are 65 Capital Projects identified over the 10-year planning period to 2030. Six bridges and seven culverts are recommended for replacement. Twelve road bridges are scheduled for a comprehensive rehabilitation.

The distribution of capital needs is depicted in two different graphs at the end of the Capital Needs Report. The first graph shows the inventory needs and a line of “best fit” that describes the average needs over the planning period. The City of Greater Sudbury has \$9.7M in immediate capital needs, and a further \$26.9M in needs distributed from 2023 to 2030. The average ten-year outlook is about \$3.7M in capital per year.

The second graph breaks down the capital expenditures between bridges, culverts and pedestrian structures. Bridge and culvert needs are reasonably well distributed through the planning period.

The capital needs groupings in the Capital Needs Report suggests relative priority, but other considerations such as traffic demand, risk of failure, and combining projects should also be considered to establish actual priorities.

It should be noted that capital estimates provided are approximate by nature. Environmental considerations, difficult foundations, dewatering requirements, and traffic management costs can be significant variables that can only be estimated accurately at the preliminary design stage. Culvert replacement cost estimates are premised on replacement with a similar sized culvert, but typically concrete culverts are chosen over steel.

Improved Prioritization of Capital Needs

An improved procedure for prioritizing capital needs was developed in 2021. Capital needs were assessed against six weighted factors as follows:

Table 5 Prioritization Factors and Weightings for Capital Needs

Prioritization Factor	Weight (out of 100)
Traffic Volume (AADT)	20
Capital Cost to Replacement Cost Ratio	5
Structure Depreciation	20



Failure Risk	25
Crash Worthiness	15
Inspector's Urgency Rating	15

The traffic volume is indicative of the structure importance. The ratio of Capital Cost to rehabilitate a structure to Estimated Replacement Cost of the same structure gives slight precedence to larger projects. Those structures that have the greatest overall level of depreciation are prioritized. Vulnerable structures as determined from a comprehensive risk analysis receive the greatest weight. Structures that have inadequate crash protection to safeguard the motoring public are considered. And lastly, there is room for human intervention to push the urgency of certain projects.

Bridge Maintenance

Detailed maintenance needs are provided in the **Bridge Maintenance Report**, a copy of which is included in the Appendices to this report.

Maintenance needs shown in **red font** are considered the most urgent.

Some of the more common maintenance needs identified are:

- Removing brush from around bridges and culverts
- Removal of obstructions in stream channels
- Repair of minor damage
- Cleaning surfaces

The maintenance list is not a substitute for ordinary regular maintenance but is intended to highlight where regular maintenance activity is insufficient.

The maintenance list offers guidance that will help maintain the life and serviceability of the structures, and in some instances, improve safety. These maintenance items are duplicated in the individual structure reports.

A course estimate of the cost of maintenance is provided as part of the report. The costs are offered as guidance only and should not be the basis of estimating the actual cost.

A common rule of thumb is to spend 1% of the replacement value per annum on structure maintenance. In practise, few municipalities spend even 0.1% of replacement value on bridge and large culvert maintenance. The most responsible division of capital and maintenance expenditures is elusive. Suffice to say that a productive and skilled maintenance crew can achieve significant reductions in capital needs while maximising the serviceability and service life of those structures they maintain.

Performance Deficiencies

The various components in and around a structure all have a purpose or functionality. Where the purpose or functionality is compromised, it is recorded as a performance deficiency. The performance deficiencies observed for the City of Greater Sudbury's bridges and large culverts is detailed in a six-page **Performance Deficiencies Report**. A copy is in the Appendices.



These deficiencies are often difficult or expensive to remedy. Ideally, a replacement structure should address the present performance deficiencies. These deficiencies should be reviewed when prioritizing the capital program. Bridges and culverts with numerous performance deficiencies, such as the Simmons Road Bridge (2000) and Martin Road Bridge (3002) should be prioritized for rehabilitation or replacement.

Performance Deficiencies require risk management strategizing by the owner.

Bridge Condition Index (BCI)

A **Bridge Condition Index Report** is contained in the Appendices. The calculation of BCI requires inspection following the OSIM Excellent-Good-Fair-Poor (EGFP) rating system. Up to 55 structural elements are considered in the calculation.

Keystone follows its proprietary Triple-D approach instead of the EGFP method of rating a bridge. To translate the Triple-D method to EGFP the following approach is observed. Anything considered Damaged in Triple-D format is mapped 1:1 as Poor in EGFP format. All bridge components transition from Excellent to Good in a straight-line decay function over a 20-year period. Thus, a new component becomes 10% Excellent and 90% Good after ten years of service. The determination of Fair is based on the percent Defects and considers the percent Damage loosely following OSIM philosophy and is performed following an algorithm implicit to KBMS. The percent Good is determined as 100% less the percent Excellent, Fair, and Poor. Excellent, Good, Fair, and Poor are weighted 1.00, 0.75, 0.40, and 0.0 respectively in the BCI calculations following the published MTO methods of July 2009.

The calculated BCI information is provided in the included report of the same name. Where the BCI is between 60 and 70 the index is printed in green font. Where the BCI is between 50 and 60 it is shown in orange font. Below 50 the BCI is shown in red font.

One hundred and thirty-seven of the 185 inspected structures, or 74.1% have a BCI greater than 70. Conversely, 26% of the structures have a BCI less than 70. The MTO's goal is to maintain at least 80% of its structures with a BCI greater than or equal to 70. On this account, the City of Greater Sudbury is 5.9% behind this metric.

The lowest BCI of 50.9 is for the Nolins Creek bridge-culvert, (2519). This structure is recommended for replacement in 2021. The top slab is weakened from deterioration caused by poorly detailed catch basins.

In summary, the BCI is a useful measure of the overall condition of common bridges and culverts but is still highly variable and dependent on the judgement of the individual bridge inspector. The BCI calculations could easily be ten points less if determined by others essentially because of the ambiguity and lack of consistency in differentiating between Fair and Poor in strict OSIM methodology inspections.

Comparing BCI to Other Measures

Unfortunately, the Bridge Condition Index is a capricious measure that is not the most suitable for asset management purposes. When the BCI was created, it was to replace an even more inappropriate measure of bridge condition. Formerly in Ontario, the overall condition of bridges was reported based on the condition of the asphalt on the bridge decks. Certainly, the BCI is a significant improvement over



historical practise. However, the BCI was not created or calibrated to support asset management considerations.

To understand the problem with BCI one must examine how a bridge component in good condition is treated, and human psychology. A bridge that is entirely in good condition will have a BCI of 75 by definition. This is incontrovertible.

In fact, most bridge components remain in mostly **Good** condition for extended periods. Girders, piers, soffits, and waterproofed deck surfaces will remain in good condition for 50 years or more. Human psychology has been demonstrated in a remarkable American study to influence how inspectors rate a bridge. There is a tendency to rate something **Good** even if it might otherwise be **Excellent**.

There are conflicting and vague descriptions to help define what is intended to be considered a **Fair** rating. MTO taught inspectors to think of an imaginary “halo” around **Poor** areas that should be considered as in **Fair** condition. Fortunately, the **Poor** rating is relatively unambiguous and can be applied more faithfully.

One other aspect of inspection that makes the exercise fraught is the weak-link syndrome. If you have a brand-new chain with 100 links and only one middle link is critically defective, how do you rate the chain? Some will argue 99% **Excellent** and 1% **Poor**, whereas others will say the entire chain is **Poor**. Who is right?

To demonstrate this phenomenon City of Greater Sudbury data was utilized in the following graph. All of Sudbury’s structures were grouped into five-year cohorts, 0-5 years old, 6-10 years old, 11-15 and so on. The average BCI and the average straight-line depreciation are compared for each cohort. The straight-line depreciation includes depreciation due to defects and damage.

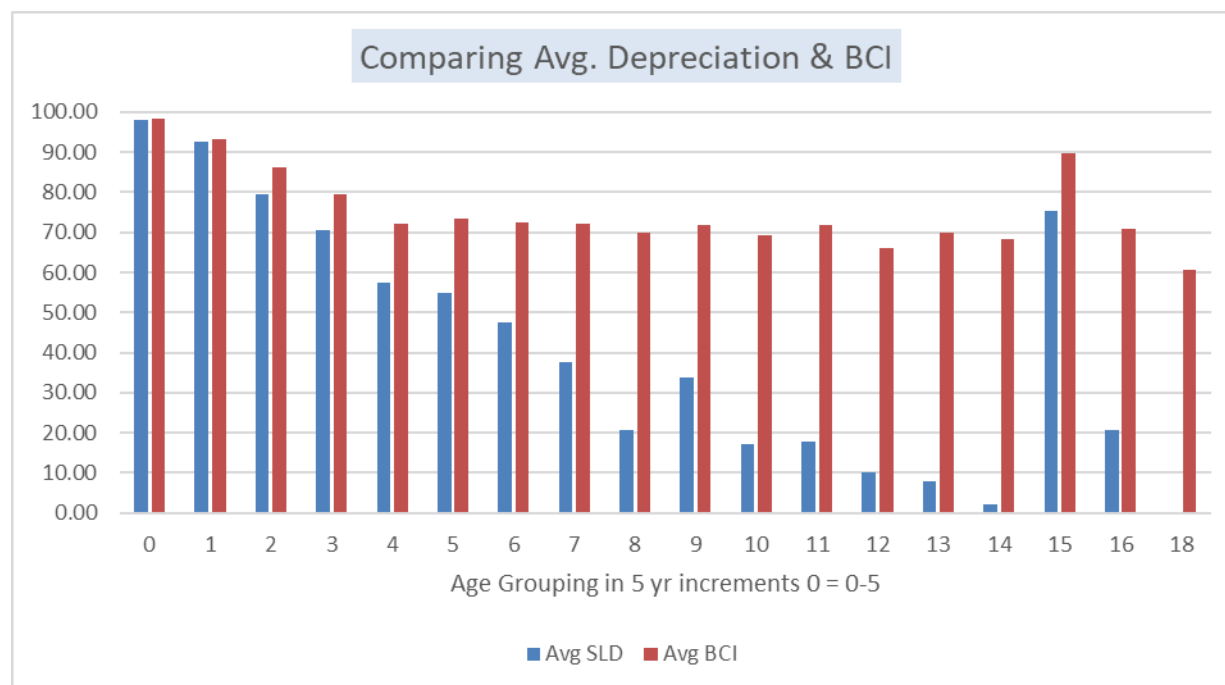


Figure 2 Comparing BCI and Depreciation levels for Sudbury structures



Examining this graph, the average BCI declines to just over 70 after 20 years, and plateaus. The level of depreciation continues to decline as might be expected.

There is an aberration at the 15th cohort. This represents a substantial reconstruction of a bridge or bridges where the original year of construction is retained, but much of the structure is updated.

The spike in depreciation of the 9th cohort and accompanying slight improvement of BCI rating is a clear indication of capital investment in the structures represented in this age group.

The reason that the BCI declines so uniformly in the first 20 years is that Keystone utilizes an algorithm that eases a new bridge component rating from Excellent to Good over 20 years.

For asset management, the depreciation of bridge components is a better measure of the inventory than BCI. The BCI is only capable of an imprecise and somewhat ambiguous measure of the condition of bridges and large culverts. Tracking depreciation offers a more in-depth and dynamic view of structure condition. Notwithstanding this, the City could consider using the BCI metric with MTO level of service goals as a metric for comparison purposes with other municipalities, provided the variabilities and limitations stated in this report are kept in mind.

Assessing Condition of Bridges and Large Culverts

The City of Greater Sudbury has retained Keystone Bridge Management Corp. on a biennial basis starting in 2008 to provide provincially mandated inspections of the City's bridges and large culverts. Keystone has completed seven biennial inspections of Sudbury's road structures to date. The inspections are mostly visual, ground based, and follow routine methodology. All ordinarily visible components of the structure are inspected, and existing condition descriptions updated in a database. Inspections capture:

1. Material changes in structure components
2. Maintenance Needs
3. Capital Needs
4. Performance deficiencies
5. Hazards associated with structure.

Biennial bridge inspection is mandated in Ontario under the Public Transportation and Highway Improvement Act and more specifically Ontario Regulation 104/97 "Standards for Bridges."

Most engineering consultants follow the default provisions of the Act, which is to follow exactly the Ontario Structure Inspection Manual (OSIM), and supplement this as required by the Municipality or by following their own proprietary value-added services.

Keystone at the inception of its incorporation in 2006 recognized that OSIM on its own does not effectively respond to asset management considerations.

The Regulation states "... the inspection of a bridge may vary from the Ontario Structure Inspection Manual if,

- (a) The variation is not a marked departure from the Ontario Structure Inspection Manual; and
- (b) The variation does not adversely affect the safety and mobility of people and goods."



Keystone's approach is an element-by-element quantitative inspection like OSIM that conforms to the spirit and intent of the Act. Keystone's approach provides an inspection of a Municipality's bridge and large culvert assets that both satisfies the Act, and as a natural byproduct, provides a wealth of asset management information. This information has already been shared in this report.

Risk Assessment Study

In 2020 Keystone supplemented the regular biennial inspection of Sudbury's structures with a risk assessment. Every structure was checked for the presence of 40 possible vulnerabilities. The implications of these vulnerabilities were translated into risk scores. The scoring considered catastrophic loss of the structure and the social and economic implications of the loss of any one structure. Separate scoring assessed the risk associated with deficient or missing traffic protection such as bridge railings, protruding culvert ends and inadequate guiderail.

The reader should review the risk assessment study independently. Results of the risk assessment study are being utilized to better inform the prioritization of capital needs.

Closing

Keystone Bridge Management Corp. is pleased to report on asset management considerations specific to the City of Greater Sudbury vehicle bridges and large culverts and pedestrian structures. Should there be any lingering concerns or additional information required with respect to this assignment, then Keystone will be happy to respond.

We trust the services rendered are complete, and in full keeping with the Terms of Reference. It is Keystone's sincerest desire that the information stemming from this work will be helpful to the City of Greater Sudbury in partly satisfying Ontario Regulation 588/17. Keystone strives to help you get the most out of your road and park structure assets.

Harold Kleywegt, P.Eng.
Managing Director
Keystone Bridge Management Corp.



Keystone Bridge
Management Corp.

Appendices

The following reports have been referenced in this report and are included in the Appendices following.

1. Sample Bridge Inspection Report
2. Bridge List
3. Culvert List
4. Structure Summary Statistics
5. Structure Replacement Costs
6. Culvert Replacement Cost
7. Parabolic & Straight-Line Depreciation
8. Bridge Depreciation Forecast 1
9. Bridge Depreciation Forecast 2 (with Recommended Capital Investment)
10. Average Bridge Depreciation with Investment
11. Culvert Depreciation Forecast
12. Average Culvert Depreciation with Investment
13. Recommended Investigations
14. Capital Needs
15. Maintenance List
16. Performance Deficiencies Report
17. Bridge Condition Index Report

Additional Reference Documents

(Bound Separately)

- 2020 Bridge & Large Culvert Structural Inspection Report
- Structure Risk Assessment & Analysis Report



Bridge Inspection Report

Deer Creek Bridge

Road Name: *Red Deer Rd.*
Site ID: *5020*
Structure Type: *Slab on Steel Girder*
Owner: *Greater Sudbury*
Built: *1970*
Length: *18.5 m*
Width: *5.7 m*
Spans: *3*
Spans Arrange: *5.4, 7.7, 5.4*
Feature Under: *Navigable Channel*
Crossing: *Deer Creek*
Location: *1.9 km south of Woodland Road*

Inspection Date: *August-12-20*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Seamus Fisher, Eng Student*

Comments:

This bridge requires major rehabilitation, however, economically it may be better option to replace. Wing walls require new timber piles. Lagging needs to be replaced and extended below the waterline at abutments. Girders should be cleaned and painted. Curbs require renewal. Recommend a planning study to review options for rehab or replacement. Investigate deck for remaining service life. Perforation detected in H pile at south pier in 2020.

Recommended Investigations:

Enhanced Inspection, Planning Study

Recommended Capital Works:

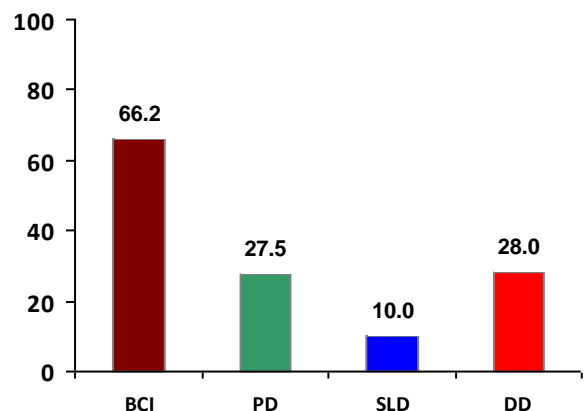
Replace Bridge

Estimated Replacement Value: \$1,015,000
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: 19 Years
Rehabilitation Year and Estimated Cost: 2030 \$1,350,000



AADT: *N/A* Latitude: *46.43857570*
Lanes: *1* Longitude: *-80.70454535*
Skew: *0 °* Orientation: *N-S*
Speed: *30 km/h* Road Width: *4.5 m*
Trucks *0%* Load Posting: *None*

Bridge Condition



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

Timber-Laminated (1)	Defects	0.0%	
Deck	Damage	10.0%	Moderate Wear, Moderate Breakage
Length:	18.4 m	Maintenance	Spot deck plank replacement
Width:	5.8 m	Capital Rec.	None
Height:			2x10 boards on side comprise deck. Laminated timber deck is slightly worn. Timber running boards are damaged at south end. NE corner is settled, deck boards slightly displaced.
Timber Curb (2)	Defects	15.0%	Moderate Checking, Minor UV Weathering
Curb	Damage	25.0%	Minor Breakage, Moderate Impact
Length:	18.4 m	Maintenance	None
Width:	0.6 m	Capital Rec.	Replace in 2 years
Height:	0.2 m		Curbs are damaged on both sides. Curb in NE corner is badly damaged. Curbs will need renewal within the next 2 years.
Timber Post & Guide Rail (2)	Defects	0.0%	
Guide Rail	Damage	5.0%	Minor Decay, Minor Impact
Length:	18.4 m	Maintenance	None
Width:		Capital Rec.	Replace in 2 years
Height:			No blocking for guide rail. Flex beam ends have minor impact damage, posts have minor decay in the top surface. NW corner post split at bolt connection.
Steel-Rolled (3)	Defects	15.0%	Moderate Corrosion, Major Corrosion, Minor Graffiti
Girder	Damage	2.0%	Major Section Loss
Length:	18.4 m	Maintenance	None
Width:	0.47 m	Capital Rec.	None
Height:	0.61 m		Properly supported. Girders starting to corrode and blister. East girder has major corrosion with section loss occurring to the web at the bottom flange.
Paint Coating (1)	Defects	25.0%	Moderate Peeling/Blistering
Steel Coating	Damage	0.0%	
Length:		Maintenance	None
Width:		Capital Rec.	Replace in 2 years
Height:			Coating is blistering and flaking off. All structural steel should be cleaned and recoated at next rehabilitation.



Component Inspection Information

Timber Pile & Lagging (2)	Defects 0.0%	Damage 20.0% Moderate Decay, Moderate Crushing
Abutment Stem	Maintenance None	Capital Rec. Replace in 2 years
Length:	<i>Generally in satisfactory condition however some granular material is potentially escaping from bottom of lagging. Wing wall piles and blocking exhibit substantial decay in the top metre and will require replacement. Walls are deformed between H piles due to backfill pressure, several boards exhibit moderate crushing. H piles have major corrosion at waterline, and minor section loss.</i>	
Width: 9.9 m		
Height: 1.4 m		
Steel Bent (6)	Defects 20.0% Minor Corrosion, Moderate Corrosion, Minor Pitting	
Piers	Damage 2.0% Minor Section Loss, Minor Perforation	
Length: 0.47 m	Maintenance Repair Minor Damage	
Width: 0.47 m	Capital Rec. Repair in 1 year	
Height: 1.4 m	<i>Major corrosion at and below the water line, perforation noted (2020) at middle H pile (web) south end. Major pitting. Bracing is in satisfactory condition. Perforated H pile needs repair to bolster web.</i>	
Steel Sliding Plate (6)	Defects 0.0%	
Pier Bearings	Damage 0.0%	
Length:	Maintenance None	Not Inspected
Width:	Capital Rec. None	
Height:	<i>Unable to view due to the water depth.</i>	
Steel Sliding Plate (6)	Defects 30.0% Moderate Corrosion, Major Corrosion	
Abutment Bearings	Damage 3.0% Moderate Section Loss, Major Section Loss	
Length:	Maintenance None	
Width:	Capital Rec. None	
Height:	<i>Major corrosion and section loss to bearings, notably the exterior corner bearings.</i>	
Water Channel (1)	Defects 0.0%	
Channel	Damage 0.0%	
	Maintenance None	
	Capital Rec. None	
	<i>Sluggish stream is navigable for small boats. Channel clear in 2020.</i>	



Component Inspection Information

Embankment (2)	Defects 12.0% Moderate Erosion
Embankment	Damage 0.0%
	Maintenance None
	Capital Rec. None
	<i>Erosion in the SE corner due to boat launching activity. Material escaping through bottom of abutment bent lagging. No approach guide rail at this structure.</i>

Delineator (4)	Defects 0.0%
Sign	Damage 5.0% Minor Impact
Length:	Maintenance None
Width:	Capital Rec. None
Height:	<i>All signs have some minor impact damage. Signs located at the end of bridge barrier system.</i>

Recommended Investigations

X denotes not required

Deck Conditon Survey	Enhanced Inspection	Underwater Investigation	Ice Inspection	Boat Inspection	Structure Evaluation	Load Posting	Planning Study
X	✓	X	X	X	X	X	✓



Capital Needs Cost Estimate Break-Down

Item	Req'd	Units	Quantity	Unit Price \$	Estimated Cost
<i>Misc Concrete Repairs</i>	X	m ²		\$1,120	\$0
<i>Deck Concrete Overlay</i>	X	m ²	105.5	\$560	\$0
<i>Deck Replacement</i>	X	m ²	105.5	\$3,500	\$0
<i>Barrier Wall Replacement</i>	X	m	42.5	\$4,200	\$0
<i>Expansion Joint</i>	X	m	11.4	\$7,000	\$0
<i>Waterproof & Pave</i>	X	m ²	105.5	\$308	\$0
<i>Bearing Replacement</i>	X	Count	18.0	\$7,000	\$0
<i>Approach Guide Rail</i>	X	m	80.0	\$350	\$0

Other Work

Replace Bridge \$1,000,000

Structural Items Subtotal \$1,000,000

Mobilization General Sitework \$100,000

Estimated Traffic Management & Civil Items \$25,000

Contract Admin & Contingencies 20% \$225,000

Total Rehabilitation Cost Estimate \$1,350,000

Recommended Capital Work Summary

Recommended Capital Year **2030**

Replace Bridge

Inspection Comments

This bridge requires major rehabilitation, however, economically it may be better option to replace. Wing walls require new timber piles. Lagging needs to be replaced and extended below the waterline at abutments. Girders should be cleaned and painted. Curbs require renewal. Recommend a planning study to review options for rehab or replacement. Investigate deck for remaining service life. Perforation detected in H pile at south pier in 2020.



Image 228



West elevation

Image 210



South approach

Image 211



South deck surface damaged boards

Image 212



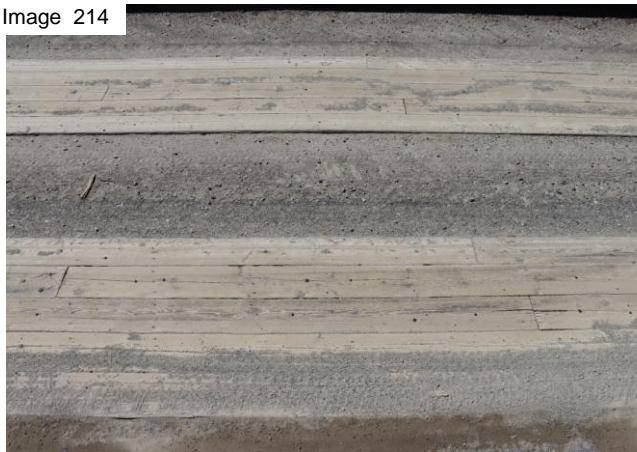
West guide rail & curb

Image 213



East guide rail & curb

Image 214



Deck surface

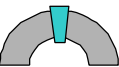


Image 215



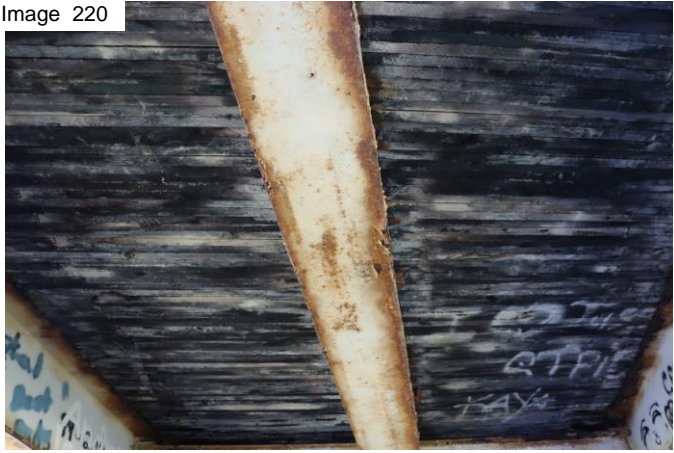
West channel

Image 218



East elevation

Image 220



North soffit

Image 217



North approach

Image 219

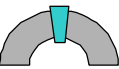


North abutment

Image 221



North bearing

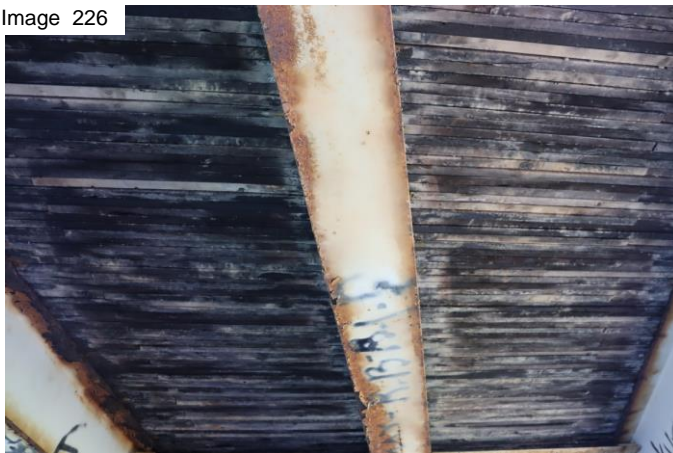




North pier



South abutment



South soffit



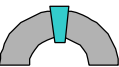
Mid span soffit



South pier pile perforation



South pier



Bridge List

Bridge ID	Name	Route	Length	Width	Spans	Const Yr
1000	Spanish River Bridge	Spanish River Rd.	30.5	3.3	1	2020
1001	Vermillion River Bridge	Panache Lake Rd.	80.6	9.5	2	1983
1002	Little Panache Lake Narrows	Panache Lake Rd.	27.5	11.0	3	1981
1003	Maninen Road Bridge	Manninen Rd.	13.3	4.9	1	1980
1004	High Falls Road Bridge	High Falls Rd.	33.5	9.0	3	2020
1005	Chicago Mine Road Bridge	Chicago Mine Rd.	18.6	4.7	1	2015
1006	Spanish River near Worthington Road	Spanish River Rd.	18.3	5.0	1	2007
1007	Vermillion River Bridge	Regional Rd. 55	91.5	10.6	4	1948
1008	Moxam Creek Bridge	Regional Rd. 55	38.7	12.5	3	1988
1009	Old Soo Road Bridge	Old Soo Rd.	4.1	8.5	1	2020
1010	Black Lake Road Bridge	Black Lake Rd.	25.6	10.1	1	1976
1011	Mikkola Road Bridge	Mikkola Rd.	43.4	9.4	3	1976
1012	Fielding Road Bridge	Fielding Rd.	30.6	9.5	1	1987
1013	CPR Overhead (Westbound)	Old Highway 17 (Regiona	150.7	15.8	6	1955
1014	CPR Overhead (Eastbound)	Regional Rd. 55	92.0	12.1	3	1969
1015	Finland Creek Bridge	Godfrey Dr.	4.4	14.5	1	2007
1019	Finland Creek Bridge	Balsam St.	15.0	7.0	1	2016
1020	Finland Street Bridge	Finland St.	46.0	5.6	1	1940
1022	Poland Street Bridge	Poland St.	7.0	9.8	1	1960
1023	Orford Street Bridge	Orford St.	6.3	10.2	1	1960
1024	Big Nickel Mine Rd	Big Nickel Mine Rd	46.5	10.1	1	2003
1025	Lily Creek Bridge	Bouchard St.	7.7	17.1	1	1959
1026	Junction Creek Bridge	Regent St.	9.2	18.5	1	1990
1028	Struthers Pedestrian Bridge	Struthers St.	22.0	2.0	3	1982
1029	Copper Cliff Trail Bridge	MR 55 (Old Hwy 17)	15.3	2.0	1	2010
1030	Meatbird Creek Pedestrian Bridge	Ped Path	18.3	1.8	1	2016
1561	Trans Canada Trail	Hillfield Trail #1	22.2	2.5	1	2006
2000	Simmons Road Bridge	Simmons Rd.	61.5	8.6	3	1970
2001	Vermillion Lk Rd	Vermillion Lk Rd	18.0	10.5	1	2006
2002	Main Street Bridge	Main St.	33.4	11.5	3	1967
2003	Whitson Creek Bridge	MR 15	21.1	9.6	1	1967
2004	Whitson Creek Bridge	MR 15	21.9	9.6	1	1967



Bridge ID	Name	Route	Length	Width	Spans	Const Yr
2005	Onaping River Bridge	M R 8	83.8	11.5	3	1959
2006	Onaping River Bridge	Morgan Rd.	41.2	9.5	3	1983
2007	Vermillion River Bridge	Morgan Rd.	39.8	10.4	3	1961
2008	Montee Principale Bridge	Montee Principale	25.9	9.8	3	1986
2009	Whitson River Bridge	M R 15	17.8	9.8	1	1967
2010	Landry Street Bridge	Landry St.	11.0	8.6	1	1981
2012	INCO Railway	Elm St. West	32.2	18.6	3	1975
2013	Lasalle Interchange	Elm St. West	19.6	18.2	1	1975
2014	CPR Overhead	Lasalle Blvd.	51.9	19.0	2	1975
2015	CPR Overpass / Nolin Creek	Elm St. West	73.2	18.6	3	1975
2016	Dufferin Street Bridge	Dufferin St.	6.5	11.0	1	1940
2021	Pedestrian Crossing	Dufferin St.	18.3	2.0	3	1980
2533	Trans Canada Trail	Onaping Falls	52.5	2.3	2	1989
2534	Bridge St /Emile St	Trans Canada Trail	50.0	2.2	3	2006
3000	Nelson Lk Rd @ Rapid River	Nelson Lk Rd.	15.0	5.4	1	1965
3001	Vermillion River Bridge	Desmarais	36.0	10.6	3	2010
3002	Martin Road Bridge	Martin Rd.	30.1	9.8	3	1965
3003	Whitson River Bridge	M R 15	17.0	11.0	1	1967
3004	Frappier Road Bridge	Frappier Rd.	19.0	9.8	1	1970
3005	Whitson River	M R 80 (Hwy 69)	14.9	22.1	1	1990
3006	Kalmo Road Bridge / Whitson River	Kalmo Rd.	27.6	3.6	1	1998
4000	Roberts River	M R 84 (Moose Mt)	21.9	5.7	1	1997
4001	Vermillion River	M R 84 (Moose Mt)	27.4	5.3	1	2020
4002	Bowland Bay Bridge	Bowland Bay Rd.	18.1	10.1	3	1983
4003	Industrial Rd (Ski Hill Rd)	Industrial Rd (Ski Hill Rd)	27.0	7.0	1	2005
4004	CNR Overpass	Falconbridge Rd.	62.7	17.0	3	1973
4005	Roberts River	Ironside Lake Rd.	12.3	4.2	1	2020
4010	Junction Creek Ped Bridge	Fielding St.	11.0	2.0	1	1980
4513	Gary Avenue Dead End	Trans Canada Trail	9.5	2.0	1	2006
5000	Riverside Drive Bridge	Riverside Dr.	9.6	20.3	1	1942
5002	Broadway Street Bridge	Broadway St.	19.8	3.7	1	1960
5003	Brady Street Underpass	Brady St.	19.8	19.3	2	1962
5008	Paris St Overpass SBL	Paris St.	207.3	11.0	3	1973
5009	Coniston Creek Bridge	Garson Coniston Rd.	14.9	10.1	1	1960



Bridge ID	Name	Route	Length	Width	Spans	Const Yr
5010	Romford Creek Bridge	Caruso St.	5.8	10.5	1	1950
5013	Romford Creek Bridge	Walter St.	6.5	10.5	1	1950
5015	Romford Creek Bridge	Edward Ave.	8.7	10.0	1	1955
5016	Coniston Creek	Government Rd.	11.9	8.9	1	2016
5017	Mountain View Road Bridge	Mountain View Rd.	8.0	13.0	1	1998
5018	Roseland Drive Bridge	Roseland Dr.	8.0	13.0	1	1998
5020	Deer Creek Bridge	Red Deer Rd.	18.5	5.7	3	1970
5021	Deer Creek Bridge	Woodland Rd.	8.3	5.6	1	2000
5022	Pedestrian Bridge	Wellington	22.0	2.0	3	1980
5023	Pedestrian Bridge	Nelson St.	51.9	3.6	1	1980
5029	Coniston Creek Pedestrian Bridge	Poplar St.	22.3	1.8	1	2020
5030	Paris St Overpass NBL	Paris St.	207.3	11.0	3	1973
5051	Centennial Dr Park Bridge	Centennial Dr.	12.8	2.5	1	1990
5516	Mallards Landing Park	Trans Canada Trail @ M	20.3	2.1	1	2006
6001	CPR Subway	College St.	15.5	19.5	2	1930
6008	Leslie Street Bridge	Leslie St.	48.5	13.3	3	1970
6009	Bond Street Bridge	Bond St.	7.1	6.8	1	1950
6010	King Street Bridge	King St.	7.1	14.9	1	1940
6012	Pedestrian Bridge	Agnes St.	12.5	2.0	1	1989
6013	Pedestrian Bridge	Perrault St.	20.4	2.0	3	1983
6014	Pedestrian Bridge	Stafford St.	11.0	2.0	1	1982
6015	Pedestrian Bridge	Mountainview Cres.	11.0	2.0	1	1980
6017	Eva Avenue Pedestrian Bridge	Eva Avenue	56.3	2.9	1	2000
6510	Trans Canada Trail (Barrydowne Aren	Trans Canada Trail	15.7	2.8	1	2006

Total # of Bridges 90

Those bridges where the span is highlighted in amber are not subject to the Ontario Statute for biennial inspection.



Culvert List

Culvert ID	Name	Route	Length	Span	Cells	Const Yr
1016	Creighton Road at Club Road	Creighton Rd.	14.7	3.0	1	2013
1017	Creighton Road at Tennis Club	Creighton Rd.	26.9	3.0	1	2013
1018	Power Street Bridge	Power St.	19.5	3.0	1	2013
1529	MR 24 Culvert	Regional Rd. 24	28.3	3.7	1	1960
1530	Finland Creek	Power St.	20.0	3.5	1	1987
1531	Junction Creek	Kelly Lake Rd.	30.0	10.0	1	2017
1532	Junction Creek	Martindale Rd.	39.0	8.2	1	1964
1533	Lily Creek	Martindale Rd.	20.0	6.7	1	2007
1534	Junction Creek	McLeod St.	54.6	8.4	1	1956
1535	Lily Creek	Regent St.	40.0	7.0	1	1952
1536	Fairbank Creek	Bay St	25.7	4.5	1	2006
1537	Fairbank Creek	Bay St (MR # 3)	22.2	3.6	1	2006
1538	Fairbank Creek	Fairbanks Lk Rd	22.0	3.6	1	2006
1539	Inco Drainage Ditch	MR 55 (old Hwy 17)	51.5	3.0	2	2006
1540	Panache Lake Rd Culvert	Panache Lake Rd.	28.2	4.2	1	2003
1541	Panache Lake Rd. Culvert	Panache Lake Rd.	19.2	3.4	1	2005
1542	Wabagishik Road Culvert	Wabagishik Rd.	17.0	5.0	1	2006
1543	Hill Road Culvert	Hill Rd.	23.8	3.0	1	2014
1544	C. Johnson Road Culvert @ MR #4	C. Johnsons Rd.	19.8	3.6	3	1980
1545	Lorne Falls Rd. Culvert	Lorne Falls Rd.	19.5	3.0	1	2009
1546	Graham Rd. Culvert	Graham Rd.	26.0	4.7	1	2009
1547	Worthington Rd. Culvert	Worthington Rd.	18.5	4.4	1	1980
1548	CSPA Culvert	Grassy Lake Rd.	18.6	3.1	1	1980
1549	Balsam Street Bridge	Balsam St.	19.8	2.4	1	2000
1553	Fairbank Creek Culvert	RR 55	38.5	2.4	2	2017
1560	Southview Dr.	Southview Dr	18.6	4.5	1	2006
1562	Old Soo Rd Box Culvert	Old Soo Rd	9.2	3.0	1	2017
1563	Fairbank Creek	RR 55	25.0	3.7	1	1950
1564	Fairbank Lake Rd Culvert	Fairbank Lake Rd.	17.1	2.4	2	2013
1565	Fairbank Creek Culvert	Fairbank Lake Road	28.0	2.4	2	2014
2020	Pedestrian Underpass	Dufferin St.	55.5	3.5	1	1987
2500	Birch St Culvert	Birch St	25.4	3.7	2	1970



Culvert ID	Name	Route	Length	Span	Cells	Const Yr
2503	Montpellier Road South Culvert	Montpellier Rd.	15.3	3.0	1	2016
2504	Montpellier Road Middle Culvert	Montpellier Rd.	18.4	2.4	2	2013
2505	Nickel Basin Road Culvert	Nickel Basin Rd. (North)	16.8	2.4	2	2016
2506	Mckenzie Road Culvert	Mckenzie Road	15.0	4.8	1	2018
2507	Pilon Drain	Notre Dame Ave.	31.3	2.4	1	2018
2508	Landry Creek	Notre Dame Ave.	38.0	3.0	1	1960
2509	Inco Pipeline	Elm St. West	60.0	6.1	1	1975
2510	Whitewater Creek	MR 35	46.0	3.6	2	1993
2511	Huron Street Culvert	Huron St.	66.4	3.5	1	1980
2512	Nolins Creek	Frood Rd.	25.3	3.6	1	1960
2513	Inco Drainage Ditch	Lasalle Blvd.	73.0	3.6	1	1970
2514	Granite-McKim Culvert	Granite/McKim Streets	400.0	3.4	1	1993
2516	McNeil Pedestrian Crossing	Over Nolins Creek	15.1	2.0	2	1980
2517	Erie/Monck Pedestrian Crossing	Erie St.	27.0	2.1	1	1970
2518	Lasalle/Inco Culvert	Lasalle Blvd.	62.0	2.4	1	1990
2519	Nolins Creek	Beatty St.	24.0	5.3	1	1970
2536	McKenzie Creek Culvert	Montpellier Road	20.0	2.4	2	2014
3007	Whitson Flood Channel Culvert	MR 15	25.3	3.7	1	2017
3502	Lasalle Blvd Culvert	Lasalle Blvd	168.0	2.4	1	1940
3503	MR 80	MR 80	32.0	3.7	1	1995
3504	Fleming Street Culvert	MR 80 (Highway 69 North	36.8	3.1	1	2002
3505	Bodson East Culvert	Bodson East	12.3	3.0	1	2015
3510	Yorkshire Dr. Culverts	Yorkshire Drive	15.2	1.8	2	2017
4500	Christina St. Culvert	Christina St.	16.0	0.9	2	1985
4501	Junction Creek Culvert	Lasalle Blvd.	38.5	6.9	1	1971
4502	Robin St	Robins St W. of Crestmoo	19.2	3.0	1	2018
4503	Junction Creek	Madison Ave.	25.5	3.0	2	2015
4505	Junction Creek	Lansing Ave.	42.2	4.4	2	1970
4506	Madison Avenue	Madison Ave.	58.7	3.0	1	2007
4507	Junction Creek	Maley Dr.	29.4	3.7	1	1990
4508	MR 85 CULVERT	MR 85 Radar Rd.	22.0	2.4	2	2010
4514	Hanmer Lake Culvert	Hanmer Lake Rd West	17.0	1.8	2	2016
5001	Junction Creek Bridge	Douglas St.	137.3	7.6	1	1980
5011	Romford Creek Bridge	Allan St.	14.0	5.5	1	2020



Culvert ID	Name	Route	Length	Span	Cells	Const Yr
5014	Romford Creek Bridge	William Ave.	14.8	7.0	1	2019
5024	Elgin Pedestrian Subway	Elgin St.	86.0	2.9	1	1956
5025	Lily Creek	Paris St.	47.5	3.8	2	1972
5500	Chief Lake Road Culvert	Chief Lake Rd.	19.5	3.0	1	1994
5501	Elbow Creek Culvert	Dryden Rd.	26.5	3.4	1	2016
5502	Hill Street Culvert	Hill Street	24.6	1.5	2	2019
5503	Forest Lake Road Culvert	Forest Lake Rd	12.6	2.0	1	2016
5504	Garson Coniston Rd	Garson Coniston Rd.	30.0	5.0	1	2018
5506	Long Lake Road Culvert	Long Lake Rd.	43.0	5.0	1	2009
5507	Long Lake Road	Long Lake Rd.	26.8	3.1	1	1965
5508	Broadway	Broadway	46.0	7.6	1	1960
5511	Centennial Dr @ Lily Creek	Centennial Dr.	28.5	3.5	1	2003
5514	Jumbo Rd South	Jumbo Road	17.2	3.0	1	2015
5517	Kari Road Culvert	Kari Road	19.2	3.0	1	2018
5518	Walter Street Culvert	Walter Street	24.0	1.8	2	2018
5519	Jumbo Rd North	Jumbo Rd	19.2	3.0	1	2018
6011	Attlee Avenue Bridge	Attlee Ave.	31.0	7.2	1	1975
6020	Mountain Street	Mountain St.	69.2	6.7	1	1985
6500	Beatrice Crescent Culvert	Beatrice Cr.	24.3	2.4	1	2018
6501	Leon Drainage Ditch	Lasalle Blvd.	19.2	3.3	1	1950
6502	Junction Creek	Barrydowne Rd.	37.3	6.9	1	1967
6503	Hebert Street Culvert	Hebert St.	25.2	3.0	1	2015
6504	Belfry Avenue Culvert	Belfry Ave.	24.0	3.2	1	2006
6505	Attlee Avenue Culvert	Attlee Ave.	32.3	4.4	1	1980
6506	Third Avenue	Bancroft Dr.	24.5	3.7	1	1995
6507	Arthur Street	Arthur St.	22.5	6.0	1	2011
6508	Kenwood Avenue	Kenwood Ave.	33.0	3.8	2	1970
6509	Highgate	Highgate	35.0	3.5	2	1980
6511	Attlee Ave Pedestrian	Trail	12.5	3.5	1	1980

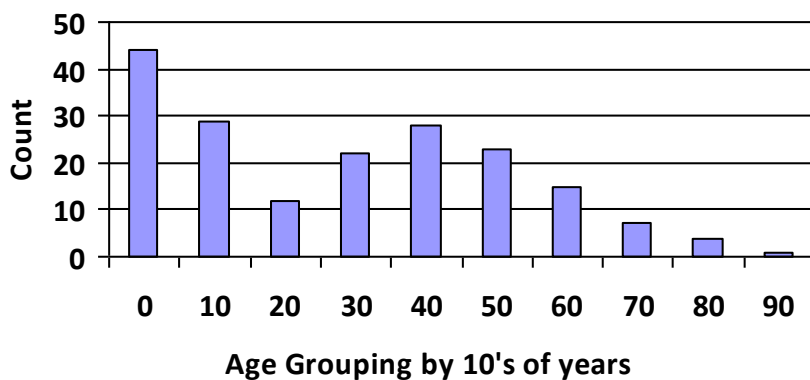
Total # of Culverts 95

Those culverts where the span is highlighted in amber are not subject to the Ontario Statute for biennial inspection.



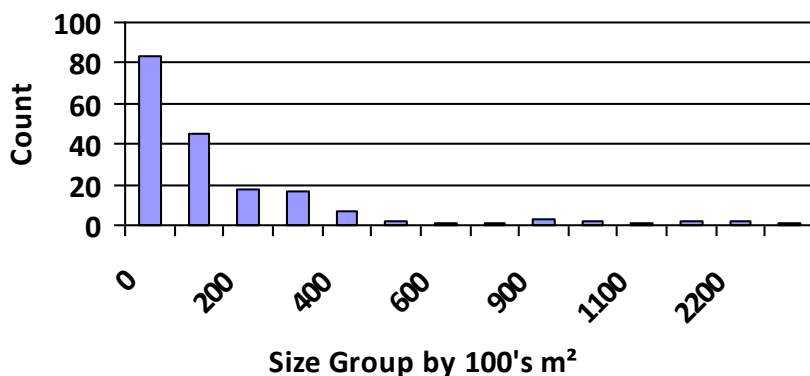
Structure Summary Statistics

Structure Age Histogram



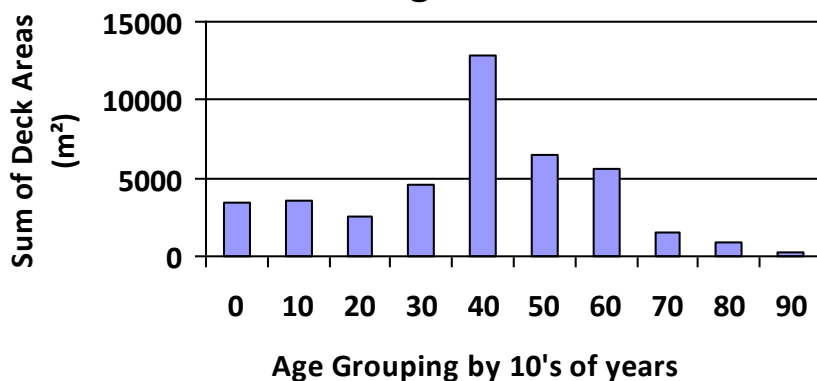
Average Age	31.4
Youngest Age	0
Oldest Age	90
Structure Count	185

Structure Deck Area Histogram



Average Deck Area	234 m²
Min Deck Area	19 m²
Max Deck Area	2381 m²
Total Deck Area	43,219 m²

Structure Deck Area by Age Histogram



Deck area < 20 yrs old	7171 m²
Deck area < 50 yrs old	29096 m²
Deck area > 50 yrs old	12308 m²



Structure Replacement Costs

Bridge ID	Name	Estimated Remaining Service Life	Program Year	Estimated Replacement Cost
1009	Old Soo Road Bridge	99		\$980,000
5011	Romford Creek Bridge	99		\$663,000
1019	Finland Creek Bridge	95		\$2,196,000
5014	Romford Creek Bridge	88		\$1,738,000
5502	Hill Street Culvert	88		\$1,580,000
2507	Pilon Drain	87		\$1,346,000
4502	Robin St	87		\$1,116,000
5504	Garson Coniston Rd	87		\$2,436,000
6500	Beatrice Crescent Culvert	87		\$1,212,000
5519	Jumbo Rd North	87		\$1,108,000
5517	Kari Road Culvert	87		\$1,178,000
2506	Mckenzie Road Culvert	87		\$1,230,000
5518	Walter Street Culvert	87		\$1,551,000
1531	Junction Creek	86		\$4,402,000
1562	Old Soo Rd Box Culvert	86		\$754,000
1553	Fairbank Creek Culvert	86		\$3,014,000
3007	Whitson Flood Channel Culvert	86		\$1,685,000
3510	Yorkshire Dr. Culverts	86		\$1,058,000
2503	Montpellier Road South Culvert	85		\$1,088,000
2505	Nickel Basin Road Culvert	85		\$1,660,000
5016	Coniston Creek	85		\$1,420,000
5501	Elbow Creek Culvert	85		\$1,386,000
4514	Hanmer Lake Culvert	85		\$1,034,000
5503	Forest Lake Road Culvert	85		\$563,000
3505	Bodson East Culvert	84		\$848,000
4503	Junction Creek	84		\$2,999,000
6503	Hebert Street Culvert	84		\$1,299,000
5514	Jumbo Rd South	84		\$1,136,000
1543	Hill Road Culvert	83		\$1,617,000
1565	Fairbank Creek Culvert	83		\$2,367,000
2536	McKenzie Creek Culvert	83		\$1,853,000
1016	Creighton Road at Club Road	82		\$754,000
1017	Creighton Road at Tennis Club	82		\$1,168,000
1018	Power Street Bridge	82		\$940,000
2504	Montpellier Road Middle Culvert	82		\$1,808,000



Bridge ID	Name	Estimated Remaining Service Life	Program Year	Estimated Replacement Cost
1564	Fairbank Lake Rd Culvert	82		\$1,551,000
6507	Arthur Street	80		\$2,510,000
3001	Vermillion River Bridge	79		\$3,985,000
4001	Vermillion River	79		\$3,158,000
4005	Roberts River	79		\$1,167,000
4508	MR 85 CULVERT	79		\$2,052,000
1000	Spanish River Bridge	79		\$2,229,000
1545	Lorne Falls Rd. Culvert	78		\$1,192,000
1546	Graham Rd. Culvert	78		\$2,246,000
5506	Long Lake Road Culvert	78		\$4,385,000
5017	Mountain View Road Bridge	77	2022	\$1,991,000
5018	Roseland Drive Bridge	77		\$1,991,000
1533	Lily Creek	76		\$2,085,000
4506	Madison Avenue	76		\$2,499,000
1536	Fairbank Creek	75		\$2,160,000
1537	Fairbank Creek	75		\$1,644,000
1538	Fairbank Creek	75		\$1,595,000
1542	Wabagishik Road Culvert	75	2023	\$1,424,000
1560	Southview Dr.	75		\$1,253,000
2001	Vermillion Lk Rd	75		\$1,881,000
1539	Inco Drainage Ditch	75		\$5,398,000
1541	Panache Lake Rd. Culvert	74		\$1,186,000
3004	Frappier Road Bridge	74		\$3,180,000
1024	Big Nickel Mine Rd	72	2022	\$4,608,000
4002	Bowland Bay Bridge	72		\$1,822,000
5511	Centennial Dr @ Lily Creek	72		\$1,313,000
1026	Junction Creek Bridge	69		\$3,071,000
3005	Whitson River	69	2022	\$5,124,000
5021	Deer Creek Bridge	69		\$480,000
1006	Spanish River near Worthington Road	66	2021	\$2,067,000
1015	Finland Creek Bridge	66		\$904,000
2003	Whitson Creek Bridge	66		\$3,784,000
2004	Whitson Creek Bridge	66		\$3,921,000
2009	Whitson River Bridge	66		\$3,277,000
3003	Whitson River Bridge	66		\$3,504,000
1010	Black Lake Road Bridge	65		\$2,209,000
2509	Inco Pipeline	64		\$5,679,000



Bridge ID	Name	Estimated Remaining Service Life	Program Year	Estimated Replacement Cost
4003	Industrial Rd (Ski Hill Rd)	64		\$4,134,000
6506	Third Avenue	64		\$1,482,000
5500	Chief Lake Road Culvert	63		\$1,149,000
1001	Vermillion River Bridge	62		\$6,748,000
2510	Whitewater Creek	62	2024	\$6,161,000
4004	CNR Overpass	62		\$9,142,000
2514	Granite-McKim Culvert	62		\$20,024,000
1011	Mikkola Road Bridge	60		\$3,702,000
2010	Landry Street Bridge	60	2024	\$2,167,000
2518	Lasalle/Inco Culvert	59		\$2,874,000
4507	Junction Creek	59		\$1,924,000
5001	Junction Creek Bridge	59		\$14,286,000
1004	High Falls Road Bridge	58		\$3,215,000
1008	Moxam Creek Bridge	57	2024	\$4,534,000
1012	Fielding Road Bridge	56	2022	\$2,702,000
1530	Finland Creek	56		\$1,274,000
4000	Roberts River	56	2021	\$2,751,000
5000	Riverside Drive Bridge	56		\$2,359,000
2008	Montee Principale Bridge	55	2025	\$2,494,000
2012	INCO Railway	54		\$7,753,000
2013	Lasalle Interchange	54	2024	\$7,085,000
3503	MR 80	54	2022	\$2,062,000
6020	Mountain Street	54		\$6,165,000
1532	Junction Creek	53		\$5,025,000
1540	Panache Lake Rd Culvert	52	2022	\$2,338,000
2006	Onaping River Bridge	52	2022	\$3,564,000
3504	Fleming Street Culvert	51		\$2,236,000
5009	Coniston Creek Bridge	49		\$2,841,000
5029	Coniston Creek Pedestrian Bridge	49		\$360,000
6010	King Street Bridge	49	2024	\$1,990,000
1025	Lily Creek Bridge	48	2025	\$2,333,000
1002	Little Panache Lake Narrows	45		\$2,944,000
1030	Meatbird Creek Pedestrian Bridge	45		\$299,000
1005	Chicago Mine Road Bridge	44		\$1,275,000
2014	CPR Overhead	44	2024	\$8,621,000
2015	CPR Overpass / Nolin Creek	44	2023	\$12,454,000
5507	Long Lake Road	44		\$1,377,000



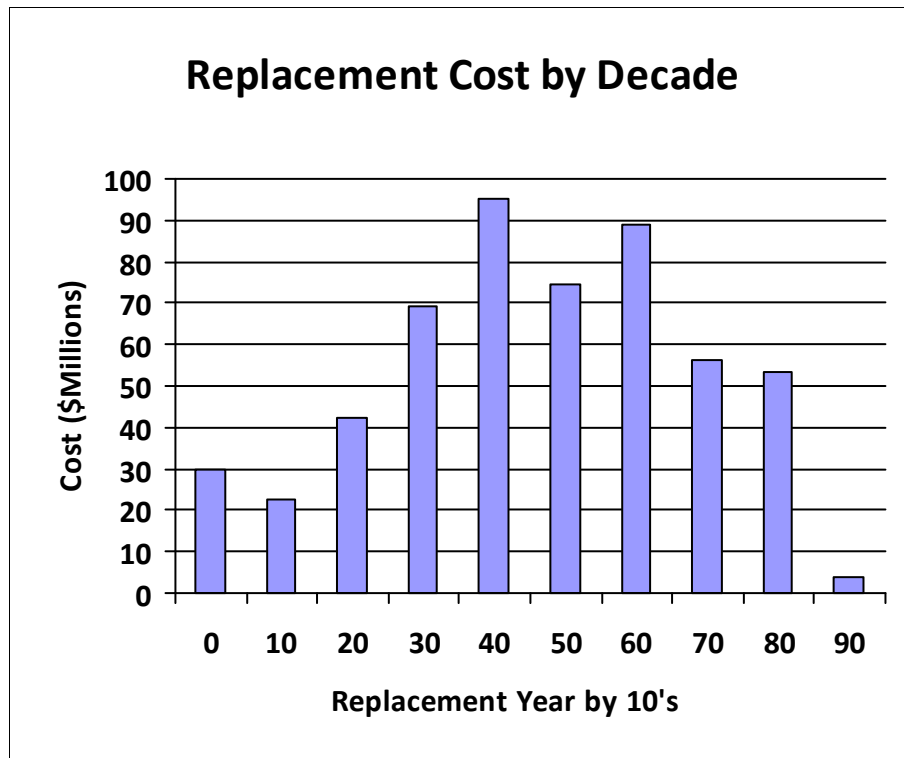
Bridge ID	Name	Estimated Remaining Service Life	Program Year	Estimated Replacement Cost
6011	Attlee Avenue Bridge	44		\$3,196,000
2005	Onaping River Bridge	43	2030	\$8,115,000
5008	Paris St Overpass SBL	42	2022	\$17,176,000
5030	Paris St Overpass NBL	42	2023	\$17,176,000
5025	Lily Creek	41	2022	\$6,971,000
2007	Vermilion River Bridge	40	2023	\$3,936,000
4501	Junction Creek Culvert	40		\$3,917,000
2000	Simmons Road Bridge	39	2025	\$5,378,000
2513	Inco Drainage Ditch	39	2022	\$4,798,000
5002	Broadway Street Bridge	39		\$902,000
6008	Leslie Street Bridge	39	2023	\$6,625,000
1029	Copper Cliff Trail Bridge	39		\$270,000
1014	CPR Overhead (Eastbound)	38		\$14,575,000
6502	Junction Creek	36	2025	\$3,866,000
1561	Trans Canada Trail	35	2024	\$498,000
2534	Bridge St /Emile St	35		\$1,863,000
4513	Gary Avenue Dead End	35		\$170,000
5024	Elgin Pedestrian Subway	35	2025	\$1,496,000
5516	Mallards Landing Park	35	2025	\$383,000
6510	Trans Canada Trail (Barrydowne Aren	35		\$395,000
1013	CPR Overhead (Westbound)	34		\$14,598,000
5015	Romford Creek Bridge	34		\$1,795,000
2533	Trans Canada Trail	33	2022	\$1,161,000
1535	Lily Creek	31	2025	\$6,129,000
5003	Brady Street Underpass	31	2024	\$4,358,000
1022	Poland Street Bridge	29	2025	\$1,264,000
1023	Orford Street Bridge	29	2025	\$1,257,000
5508	Broadway	29		\$5,123,000
6017	Eva Avenue Pedestrian Bridge	29		\$1,421,000
2002	Main Street Bridge	26	2023	\$8,096,000
1534	Junction Creek	25	2023	\$6,401,000
6504	Belfry Avenue Culvert	25		\$692,000
6501	Leon Drainage Ditch	24	2023	\$1,257,000
5051	Centennial Dr Park Bridge	24	2021	\$287,000
3502	Lasalle Blvd Culvert	24		\$6,998,000
1549	Balsam Street Bridge	24		\$952,000
6012	Pedestrian Bridge	23		\$165,000



Bridge ID	Name	Estimated Remaining Service Life	Program Year	Estimated Replacement Cost
1007	Vermillion River Bridge	22		\$8,156,000
1003	Maninen Road Bridge	19	2021	\$673,000
1529	MR 24 Culvert	19		\$1,713,000
2016	Dufferin Street Bridge	19	2022	\$1,263,000
5020	Deer Creek Bridge	19	2030	\$1,067,000
1563	Fairbank Creek	19		\$1,868,000
6013	Pedestrian Bridge	17		\$270,000
1028	Struthers Pedestrian Bridge	16		\$291,000
6014	Pedestrian Bridge	16	2022	\$146,000
1020	Finland Street Bridge	14	2024	\$5,621,000
2021	Pedestrian Crossing	14		\$242,000
2500	Birch St Culvert	14	2023	\$1,446,000
2516	McNeil Pedestrian Crossing	14		\$1,240,000
4010	Junction Creek Ped Bridge	14	2023	\$145,000
5022	Pedestrian Bridge	14		\$291,000
5023	Pedestrian Bridge	14	2022	\$1,619,000
6009	Bond Street Bridge	14		\$1,022,000
6015	Pedestrian Bridge	14		\$151,000
6508	Kenwood Avenue	14		\$1,460,000
6511	Attlee Ave Pedestrian	14		\$332,000
2020	Pedestrian Underpass	11		\$1,273,000
4500	Christina St. Culvert	11		\$406,000
2517	Erie/Monck Pedestrian Crossing	9	2022	\$472,000
3006	Kalmo Road Bridge / Whitson River	9	2027	\$2,512,000
6505	Attlee Avenue Culvert	9	2028	\$951,000
3002	Martin Road Bridge	7	2028	\$2,875,000
1548	CSPA Culvert	7	2027	\$606,000
6001	CPR Subway	5	2026	\$5,682,000
1544	C. Johnson Road Culvert @ MR #4	4	2026	\$1,640,000
2508	Landry Creek	4	2022	\$1,918,000
4505	Junction Creek	4	2023	\$2,106,000
5010	Romford Creek Bridge	4	2024	\$1,141,000
5013	Romford Creek Bridge	4	2023	\$1,736,000
6509	Highgate	4	2024	\$1,382,000
1547	Worthington Rd. Culvert	2	2023	\$573,000
2512	Nolins Creek	1	2022	\$1,841,000
3000	Nelson Lk Rd @ Rapid River	1	2021	\$829,000



Bridge ID	Name	Estimated Remaining Service Life	Program Year	Estimated Replacement Cost
2519	Nolins Creek	0	2021	\$2,408,000
2511	Huron Street Culvert	0	2021	\$1,287,000



Total Replacement Cost	\$535,870,000
Average Replacement Cost	\$2,896,595
Total Deck Area	43275 m ²



Culvert Replacement Cost

Culvert ID	Name	Existing Culvert Type	Common Costs	Total Cost Concrete Replacement	Total Cost Steel Replacement	Existing Culvert Replacement Cost	Life-Cycle Cost Concrete Replacement	Life-Cycle Cost Steel Replacement
1009	Old Soo Road Bridge	Precast 3 Sided RF	\$392,100	\$1,145,000	\$980,000	\$980,000	\$1,158,700	\$1,195,600
1016	Creighton Road at Club Road	Concrete Culvert	\$208,500	\$754,000	\$709,000	\$754,000	\$763,000	\$865,000
1017	Creighton Road at Tennis Club	Concrete Culvert	\$225,500	\$1,168,000	\$1,087,000	\$1,168,000	\$1,182,000	\$1,326,100
1018	Power Street Bridge	Concrete Culvert	\$229,400	\$940,000	\$876,000	\$940,000	\$951,300	\$1,068,700
1529	MR 24 Culvert	Concrete Culvert	\$373,900	\$1,713,000	\$1,632,000	\$1,713,000	\$1,733,600	\$1,991,000
1530	Finland Creek	Concrete Culvert	\$246,500	\$1,274,000	\$1,183,000	\$1,274,000	\$1,289,300	\$1,443,300
1531	Junction Creek	Concrete Culvert	\$612,900	\$4,402,000	\$4,161,000	\$4,402,000	\$4,454,800	\$5,076,400
1532	Junction Creek	Concrete Culvert	\$633,700	\$5,025,000	\$4,620,000	\$5,025,000	\$5,085,300	\$5,636,400
1533	Lily Creek	Concrete Culvert	\$363,700	\$2,085,000	\$1,927,000	\$2,085,000	\$2,110,000	\$2,350,900
1534	Junction Creek	Concrete Culvert	\$574,500	\$6,401,000	\$6,026,000	\$6,401,000	\$6,477,800	\$7,351,700
1535	Lily Creek	Concrete Culvert	\$2,107,200	\$6,129,000	\$5,893,000	\$6,129,000	\$6,202,500	\$7,189,500
1536	Fairbank Creek	Concrete Culvert	\$368,800	\$2,160,000	\$2,004,000	\$2,160,000	\$2,185,900	\$2,444,900
1537	Fairbank Creek	Concrete Culvert	\$350,300	\$1,644,000	\$1,534,000	\$1,644,000	\$1,663,700	\$1,871,500
1538	Fairbank Creek	Concrete Culvert	\$333,700	\$1,595,000	\$1,488,000	\$1,595,000	\$1,614,100	\$1,815,400
1539	Inco Drainage Ditch	Concrete Culvert	\$430,500	\$5,398,000	\$4,992,000	\$5,398,000	\$5,462,800	\$6,090,200
1540	Panache Lake Rd Culvert	Concrete Culvert	\$387,200	\$2,338,000	\$2,217,000	\$2,338,000	\$2,366,100	\$2,704,700
1541	Panache Lake Rd. Culvert	Concrete Culvert	\$226,500	\$1,186,000	\$1,101,000	\$1,186,000	\$1,200,200	\$1,343,200
1542	Wabagishik Road Culvert	Concrete Culvert	\$302,300	\$1,424,000	\$1,323,000	\$1,424,000	\$1,441,100	\$1,614,100
1543	Hill Road Culvert	Concrete Culvert	\$278,100	\$1,617,000	\$1,507,000	\$1,617,000	\$1,636,400	\$1,838,500



Culvert ID	Name	Existing Culvert Type	Common Costs	Total Cost Concrete Replacement	Total Cost Steel Replacement	Existing Culvert Replacement Cost	Life-Cycle Cost Concrete Replacement	Life-Cycle Cost Steel Replacement
1544	C. Johnson Road Culvert @ MR	Soil-Steel Structure	\$455,600	\$1,968,000	\$1,640,000	\$1,640,000	\$1,991,600	\$2,000,800
1545	Lorne Falls Rd. Culvert	Concrete Culvert	\$269,800	\$1,192,000	\$1,112,000	\$1,192,000	\$1,206,300	\$1,356,600
1546	Graham Rd. Culvert	Concrete Culvert	\$365,300	\$2,246,000	\$2,079,000	\$2,246,000	\$2,273,000	\$2,536,400
1547	Worthington Rd. Culvert	Soil-Steel Structure	\$230,900	\$671,000	\$573,000	\$573,000	\$679,100	\$699,100
1548	CSPA Culvert	Soil-Steel Structure	\$226,100	\$693,000	\$606,000	\$606,000	\$701,300	\$739,300
1549	Balsam Street Bridge	Concrete Culvert	\$215,200	\$952,000	\$889,000	\$952,000	\$963,400	\$1,084,600
1553	Fairbank Creek Culvert	Concrete Culvert	\$371,100	\$3,014,000	\$2,846,000	\$3,014,000	\$3,050,200	\$3,472,100
1560	Southview Dr.	Concrete Culvert	\$252,600	\$1,253,000	\$1,159,000	\$1,253,000	\$1,268,000	\$1,414,000
1562	Old Soo Rd Box Culvert	Concrete Culvert	\$315,300	\$754,000	\$730,000	\$754,000	\$763,000	\$890,600
1563	Fairbank Creek	Concrete Culvert	\$391,200	\$1,868,000	\$1,778,000	\$1,868,000	\$1,890,400	\$2,169,200
1564	Fairbank Lake Rd Culvert	Concrete Culvert	\$286,400	\$1,551,000	\$1,440,000	\$1,551,000	\$1,569,600	\$1,756,800
1565	Fairbank Creek Culvert	Concrete Culvert	\$286,200	\$2,367,000	\$2,236,000	\$2,367,000	\$2,395,400	\$2,727,900
2020	Pedestrian Underpass	Soil-Steel Structure	\$250,700	\$1,484,000	\$1,273,000	\$1,273,000	\$1,501,800	\$1,553,100
2500	Birch St Culvert	Soil-Steel Structure	\$406,000	\$1,708,000	\$1,446,000	\$1,446,000	\$1,728,500	\$1,764,100
2503	Montpellier Road South Culvert	Concrete Culvert	\$290,500	\$1,088,000	\$1,022,000	\$1,088,000	\$1,101,100	\$1,246,800
2504	Montpellier Road Middle Culvert	Concrete Culvert	\$349,400	\$1,808,000	\$1,683,000	\$1,808,000	\$1,829,700	\$2,053,300
2505	Nickel Basin Road Culvert	Concrete Culvert	\$347,900	\$1,660,000	\$1,545,000	\$1,660,000	\$1,679,900	\$1,884,900
2506	Mckenzie Road Culvert	Concrete Culvert	\$287,400	\$1,230,000	\$1,146,000	\$1,230,000	\$1,244,800	\$1,398,100
2507	Pilon Drain	Concrete Culvert	\$220,200	\$1,346,000	\$1,245,000	\$1,346,000	\$1,362,200	\$1,518,900
2508	Landry Creek	Concrete Culvert	\$293,400	\$1,918,000	\$1,774,000	\$1,918,000	\$1,941,000	\$2,164,300
2509	Inco Pipeline	Concrete Culvert	\$883,100	\$5,679,000	\$5,376,000	\$5,679,000	\$5,747,100	\$6,558,700



Culvert ID	Name	Existing Culvert Type	Common Costs	Total Cost Concrete Replacement	Total Cost Steel Replacement	Existing Culvert Replacement Cost	Life-Cycle Cost Concrete Replacement	Life-Cycle Cost Steel Replacement
2510	Whitewater Creek	Concrete Culvert	\$859,900	\$6,161,000	\$5,823,000	\$6,161,000	\$6,234,900	\$7,104,100
2511	Huron Street Culvert	Soil-Steel Structure	\$314,900	\$1,582,000	\$1,287,000	\$1,287,000	\$1,601,000	\$1,570,100
2512	Nolins Creek	Concrete Culvert	\$296,800	\$1,841,000	\$1,746,000	\$1,841,000	\$1,863,100	\$2,130,100
2513	Inco Drainage Ditch	Concrete Culvert	\$1,510,900	\$4,798,000	\$4,603,000	\$4,798,000	\$4,855,600	\$5,615,700
2514	Granite-McKim Culvert	Concrete Culvert	\$1,050,400	\$20,024,000	\$18,781,000	\$20,024,000	\$20,264,300	\$22,912,800
2516	McNeil Pedestrian Crossing	Concrete Culvert	\$146,900	\$1,240,000	\$1,146,000	\$1,240,000	\$1,254,900	\$1,398,100
2517	Erie/Monck Pedestrian Crossing	Soil-Steel Structure	\$130,900	\$563,000	\$472,000	\$472,000	\$569,800	\$575,800
2518	Lasalle/Inco Culvert	Concrete Culvert	\$663,100	\$2,874,000	\$2,740,000	\$2,874,000	\$2,908,500	\$3,342,800
2519	Nolins Creek	Concrete Culvert	\$438,500	\$2,408,000	\$2,250,000	\$2,408,000	\$2,436,900	\$2,745,000
2536	McKenzie Creek Culvert	Concrete Culvert	\$269,600	\$1,853,000	\$1,755,000	\$1,853,000	\$1,875,200	\$2,141,100
3007	Whitson Flood Channel Culvert	Concrete Culvert	\$247,600	\$1,685,000	\$1,558,000	\$1,685,000	\$1,705,200	\$1,900,800
3502	Lasalle Blvd Culvert	Concrete Culvert	\$637,700	\$6,998,000	\$6,586,000	\$6,998,000	\$7,082,000	\$8,034,900
3503	MR 80	Concrete Culvert	\$454,400	\$2,062,000	\$1,964,000	\$2,062,000	\$2,086,700	\$2,396,100
3504	Fleming Street Culvert	Concrete Culvert	\$441,600	\$2,236,000	\$2,080,000	\$2,236,000	\$2,262,800	\$2,537,600
3505	Bodson East Culvert	Concrete Culvert	\$283,500	\$848,000	\$801,000	\$848,000	\$858,200	\$977,200
3510	Yorkshire Dr. Culverts	Concrete Culvert	\$210,700	\$1,058,000	\$990,000	\$1,058,000	\$1,070,700	\$1,207,800
4500	Christina St. Culvert	Soil-Steel Structure	\$197,000	\$450,000	\$406,000	\$406,000	\$455,400	\$495,300
4501	Junction Creek Culvert	Concrete Culvert	\$696,800	\$3,917,000	\$3,716,000	\$3,917,000	\$3,964,000	\$4,533,500
4502	Robin St	Concrete Culvert	\$244,300	\$1,116,000	\$1,041,000	\$1,116,000	\$1,129,400	\$1,270,000
4503	Junction Creek	Concrete Culvert	\$426,500	\$2,999,000	\$2,836,000	\$2,999,000	\$3,035,000	\$3,459,900
4505	Junction Creek	Soil-Steel Structure	\$445,200	\$2,608,000	\$2,106,000	\$2,106,000	\$2,639,300	\$2,569,300



Culvert ID	Name	Existing Culvert Type	Common Costs	Total Cost Concrete Replacement	Total Cost Steel Replacement	Existing Culvert Replacement Cost	Life-Cycle Cost Concrete Replacement	Life-Cycle Cost Steel Replacement
4506	Madison Avenue	Concrete Culvert	\$255,000	\$2,499,000	\$2,288,000	\$2,499,000	\$2,529,000	\$2,791,400
4507	Junction Creek	Concrete Culvert	\$267,300	\$1,924,000	\$1,778,000	\$1,924,000	\$1,947,100	\$2,169,200
4508	MR 85 CULVERT	Concrete Culvert	\$306,200	\$2,052,000	\$1,903,000	\$2,052,000	\$2,076,600	\$2,321,700
4514	Hanmer Lake Culvert	Concrete Culvert	\$175,800	\$1,034,000	\$955,000	\$1,034,000	\$1,046,400	\$1,165,100
5001	Junction Creek Bridge	Concrete Culvert	\$821,800	\$14,286,000	\$13,113,000	\$14,286,000	\$14,457,400	\$15,997,900
5014	Romford Creek Bridge	Concrete Culvert	\$439,100	\$1,738,000	\$1,636,000	\$1,738,000	\$1,758,900	\$1,995,900
5024	Elgin Pedestrian Subway	Pedestrian Tunnel	\$245,200	\$1,846,000	\$1,496,000	\$1,496,000	\$1,868,200	\$1,825,100
5025	Lily Creek	Concrete Culvert	\$1,227,100	\$6,971,000	\$6,471,000	\$6,971,000	\$7,054,700	\$7,894,600
5500	Chief Lake Road Culvert	Concrete Culvert	\$234,000	\$1,149,000	\$1,070,000	\$1,149,000	\$1,162,800	\$1,305,400
5501	Elbow Creek Culvert	Concrete Culvert	\$217,400	\$1,386,000	\$1,281,000	\$1,386,000	\$1,402,600	\$1,562,800
5502	Hill Street Culvert	Concrete Culvert	\$246,200	\$1,580,000	\$1,476,000	\$1,580,000	\$1,599,000	\$1,800,700
5503	Forest Lake Road Culvert	Concrete Culvert	\$121,000	\$563,000	\$529,000	\$563,000	\$569,800	\$645,400
5504	Garson Coniston Rd	Concrete Culvert	\$352,700	\$2,436,000	\$2,306,000	\$2,436,000	\$2,465,200	\$2,813,300
5506	Long Lake Road Culvert	Concrete Culvert	\$612,100	\$4,385,000	\$4,146,000	\$4,385,000	\$4,437,600	\$5,058,100
5507	Long Lake Road	Concrete Culvert	\$227,200	\$1,377,000	\$1,274,000	\$1,377,000	\$1,393,500	\$1,554,300
5508	Broadway	Concrete Culvert	\$618,200	\$5,123,000	\$4,836,000	\$5,123,000	\$5,184,500	\$5,899,900
5511	Centennial Dr @ Lily Creek	Concrete Culvert	\$215,400	\$1,313,000	\$1,220,000	\$1,313,000	\$1,328,800	\$1,488,400
5514	Jumbo Rd South	Concrete Culvert	\$293,200	\$1,136,000	\$1,065,000	\$1,136,000	\$1,149,600	\$1,299,300
5517	Kari Road Culvert	Concrete Culvert	\$275,500	\$1,178,000	\$1,123,000	\$1,178,000	\$1,192,100	\$1,370,100
5518	Walter Street Culvert	Concrete Culvert	\$235,200	\$1,551,000	\$1,434,000	\$1,551,000	\$1,569,600	\$1,749,500
5519	Jumbo Rd North	Concrete Culvert	\$197,300	\$1,108,000	\$1,029,000	\$1,108,000	\$1,121,300	\$1,255,400



Culvert ID	Name	Existing Culvert Type	Common Costs	Total Cost Concrete Replacement	Total Cost Steel Replacement	Existing Culvert Replacement Cost	Life-Cycle Cost Concrete Replacement	Life-Cycle Cost Steel Replacement
6011	Attlee Avenue Bridge	Concrete Culvert	\$486,100	\$3,196,000	\$2,938,000	\$3,196,000	\$3,234,400	\$3,584,400
6020	Mountain Street	Concrete Culvert	\$585,000	\$6,165,000	\$5,805,000	\$6,165,000	\$6,239,000	\$7,082,100
6500	Beatrice Crescent Culvert	Concrete Culvert	\$254,300	\$1,212,000	\$1,130,000	\$1,212,000	\$1,226,500	\$1,378,600
6501	Leon Drainage Ditch	Concrete Culvert	\$385,600	\$1,257,000	\$1,180,000	\$1,257,000	\$1,272,100	\$1,439,600
6502	Junction Creek	Concrete Culvert	\$616,700	\$3,866,000	\$3,560,000	\$3,866,000	\$3,912,400	\$4,343,200
6503	Hebert Street Culvert	Concrete Culvert	\$268,100	\$1,299,000	\$1,236,000	\$1,299,000	\$1,314,600	\$1,507,900
6504	Belfry Avenue Culvert	Soil-Steel Structure	\$271,000	\$764,000	\$692,000	\$692,000	\$773,200	\$844,200
6505	Attlee Avenue Culvert	Soil-Steel Structure	\$293,900	\$1,136,000	\$951,000	\$951,000	\$1,149,600	\$1,160,200
6506	Third Avenue	Concrete Culvert	\$299,500	\$1,482,000	\$1,374,000	\$1,482,000	\$1,499,800	\$1,676,300
6507	Arthur Street	Concrete Culvert	\$427,900	\$2,510,000	\$2,326,000	\$2,510,000	\$2,540,100	\$2,837,700
6508	Kenwood Avenue	Soil-Steel Structure	\$368,400	\$1,680,000	\$1,460,000	\$1,460,000	\$1,700,200	\$1,781,200
6509	Highgate	Soil-Steel Structure	\$326,900	\$1,700,000	\$1,382,000	\$1,382,000	\$1,720,400	\$1,686,000
6511	Attlee Ave Pedestrian	Soil-Steel Structure	\$116,700	\$384,000	\$332,000	\$332,000	\$388,600	\$405,000

Estimated cost is based on a new culvert of similar size.

Recorded values, Length, Width, Height, Fill Depth, # Lanes Over, Water Depth are used in the calculations.

Typical culvert works (dewatering, traffic, etc.) are estimated and totalled for each structure.

Total Number of Timber Structures: 0

Total Number of Steel Structures: 14

Total Number of Concrete Structures: 80

Total Cost of Culvert Replacement Based on Similar Size and Type: \$234,175,000



Parabolic & Straight Line Depreciation

(Does not include culverts)

Name	Bridge ID	Built	Value (New)	Damage/Defects	Present Val (Parab)	Present Val (S/L)
Spanish River Bridge	1000	2020	\$470,230	0.0% \$0	100.0% \$470,230	100.0% \$470,230
Vermillion River Bridge	1001	1983	\$4,122,194	1.6% \$66,532	72.6% \$2,992,372	48.5% \$1,998,015
Little Panache Lake Narrows	1002	1981	\$2,474,535	5.1% \$127,226	62.4% \$1,544,756	39.3% \$972,361
Maninen Road Bridge	1003	1980	\$157,430	19.3% \$30,306	16.7% \$26,266	8.1% \$12,715
High Falls Road Bridge	1004	2020	\$1,062,160	0.0% \$0	100.0% \$1,062,160	100.0% \$1,062,160
Chicago Mine Road Bridge	1005	2015	\$441,978	3.3% \$14,600	95.9% \$424,047	88.3% \$390,445
Spanish River near Worthington Road	1006	2007	\$260,037	5.9% \$15,353	88.5% \$230,153	71.3% \$185,342
Vermillion River Bridge	1007	1948	\$3,278,860	0.7% \$22,572	82.1% \$2,691,257	76.8% \$2,516,877
Moxam Creek Bridge	1008	1988	\$2,101,332	4.1% \$85,328	73.1% \$1,535,635	49.3% \$1,035,661
Old Soo Road Bridge	1009	2020	\$211,890	0.0% \$0	100.0% \$211,890	100.0% \$211,890
Black Lake Road Bridge	1010	1976	\$1,231,892	1.2% \$14,188	62.0% \$763,472	41.0% \$505,624
Mikkola Road Bridge	1011	1976	\$2,170,861	1.2% \$25,471	64.6% \$1,401,320	42.3% \$917,248
Fielding Road Bridge	1012	1987	\$1,320,645	16.8% \$221,879	60.9% \$804,748	39.3% \$519,652
CPR Overhead (Westbound)	1013	1955	\$8,711,555	4.5% \$390,104	23.6% \$2,054,182	14.7% \$1,281,600
CPR Overhead (Eastbound)	1014	1969	\$6,050,574	8.8% \$535,178	40.8% \$2,471,369	21.0% \$1,268,861
Finland Creek Bridge	1015	2007	\$119,900	1.4% \$1,620	91.5% \$109,767	75.4% \$90,373
Finland Creek Bridge	1019	2016	\$294,930	0.0% \$0	99.5% \$293,345	93.6% \$275,918
Finland Street Bridge	1020	1940	\$886,490	21.3% \$189,019	0.0% \$0	0.0% \$0



(Does not include culverts)

Name	Bridge ID	Built	Value (New)	Damage/Defects		Present Val (Parab)		Present Val (S/L)	
Poland Street Bridge	1022	1960	\$217,822	54.0%	\$117,523	6.2%	\$13,485	1.8%	\$3,883
Orford Street Bridge	1023	1960	\$239,738	37.5%	\$89,861	9.6%	\$23,087	3.0%	\$7,268
Big Nickel Mine Rd	1024	2003	\$2,749,250	20.1%	\$553,053	74.0%	\$2,035,640	56.2%	\$1,544,254
Lily Creek Bridge	1025	1959	\$489,141	16.6%	\$81,187	14.7%	\$71,983	9.5%	\$46,594
Junction Creek Bridge	1026	1990	\$1,744,446	7.2%	\$125,713	65.9%	\$1,149,592	42.9%	\$748,348
Struthers Pedestrian Bridge	1028	1982	\$128,250	3.7%	\$4,692	50.2%	\$64,347	30.4%	\$39,001
Copper Cliff Trail Bridge	1029	2010	\$107,306	0.2%	\$268	51.3%	\$55,087	44.9%	\$48,142
Meatbird Creek Pedestrian Bridge	1030	2016	\$174,779	0.0%	\$0	99.5%	\$173,966	93.6%	\$163,539
Trans Canada Trail	1561	2006	\$166,408	11.5%	\$19,110	84.0%	\$139,745	68.2%	\$113,500
Simmons Road Bridge	2000	1970	\$1,858,690	6.7%	\$124,796	39.6%	\$735,834	22.0%	\$408,272
Vermillion Lk Rd	2001	2006	\$911,048	5.0%	\$45,660	89.6%	\$816,691	73.9%	\$673,428
Main Street Bridge	2002	1967	\$2,372,690	7.4%	\$174,516	37.6%	\$892,518	19.4%	\$460,214
Whitson Creek Bridge	2003	1967	\$1,342,768	4.4%	\$59,395	51.2%	\$687,004	31.7%	\$425,718
Whitson Creek Bridge	2004	1967	\$1,736,757	2.3%	\$40,342	51.2%	\$888,753	31.5%	\$546,854
Onaping River Bridge	2005	1959	\$3,092,950	6.0%	\$184,273	34.4%	\$1,063,615	22.0%	\$681,825
Onaping River Bridge	2006	1983	\$1,679,629	12.1%	\$203,045	59.1%	\$992,295	36.6%	\$614,716
Vermillion River Bridge	2007	1961	\$1,876,898	8.6%	\$161,296	34.5%	\$646,911	19.3%	\$362,240
Montee Principale Bridge	2008	1986	\$972,198	7.1%	\$69,477	63.2%	\$614,894	41.7%	\$405,598
Whitson River Bridge	2009	1967	\$1,522,492	1.9%	\$29,575	52.4%	\$798,277	32.9%	\$500,443
Landry Street Bridge	2010	1981	\$781,496	18.4%	\$143,913	51.4%	\$401,519	28.1%	\$219,630



(Does not include culverts)

Name	Bridge ID	Built	Value (New)	Damage/Defects		Present Val (Parab)		Present Val (S/L)	
INCO Railway	2012	1975	\$2,906,838	17.1%	\$497,147	73.2%	\$2,126,645	57.9%	\$1,682,186
Lasalle Interchange	2013	1975	\$5,960,880	9.1%	\$539,558	54.9%	\$3,272,432	31.2%	\$1,861,570
CPR Overhead	2014	1975	\$3,500,754	8.4%	\$295,376	50.5%	\$1,768,886	29.4%	\$1,029,003
CPR Overpass / Nolin Creek	2015	1975	\$4,206,247	23.8%	\$1,002,527	39.6%	\$1,665,962	19.1%	\$803,896
Dufferin Street Bridge	2016	1940	\$494,724	17.5%	\$86,784	0.0%	\$0	0.0%	\$0
Pedestrian Crossing	2021	1980	\$167,196	3.1%	\$5,263	45.1%	\$75,413	26.3%	\$43,978
Trans Canada Trail	2533	1989	\$442,736	1.6%	\$7,275	78.8%	\$348,942	55.8%	\$246,875
Bridge St /Emile St	2534	2006	\$1,301,925	0.0%	\$150	96.0%	\$1,250,385	80.3%	\$1,045,827
Nelson Lk Rd @ Rapid River	3000	1965	\$334,225	13.3%	\$44,388	32.0%	\$106,927	17.7%	\$59,102
Vermillion River Bridge	3001	2010	\$1,593,397	2.1%	\$33,361	81.7%	\$1,302,399	66.8%	\$1,064,088
Martin Road Bridge	3002	1965	\$769,999	24.1%	\$185,464	9.3%	\$71,711	0.9%	\$7,018
Whitson River Bridge	3003	1967	\$1,536,480	5.0%	\$76,669	49.0%	\$752,255	29.5%	\$453,491
Frappier Road Bridge	3004	1970	\$1,532,862	0.0%	\$146	59.4%	\$910,363	38.9%	\$595,853
Whitson River	3005	1990	\$2,217,443	22.3%	\$494,903	59.4%	\$1,316,838	36.0%	\$798,873
Kalmo Road Bridge / Whitson River	3006	1998	\$430,404	2.7%	\$11,635	75.7%	\$325,720	59.6%	\$256,406
Roberts River	4000	1997	\$433,624	4.7%	\$20,259	77.3%	\$335,110	55.8%	\$241,937
Vermillion River	4001	2020	\$454,790	0.0%	\$0	100.0%	\$454,790	100.0%	\$454,790
Bowland Bay Bridge	4002	1983	\$755,840	1.7%	\$12,635	78.8%	\$595,529	60.2%	\$455,207
Industrial Rd (Ski Hill Rd)	4003	2005	\$623,725	1.8%	\$11,340	88.1%	\$549,450	69.8%	\$435,625



(Does not include culverts)

Name	Bridge ID	Built	Value (New)	Damage/Defects		Present Val (Parab)		Present Val (S/L)	
CNR Overpass	4004	1973	\$3,723,032	2.9%	\$108,414	56.9%	\$2,119,200	34.9%	\$1,298,354
Roberts River	4005	2020	\$561,580	0.0%	\$0	100.0%	\$561,580	100.0%	\$561,580
Junction Creek Ped Bridge	4010	1980	\$106,046	22.9%	\$24,269	34.4%	\$36,527	20.7%	\$21,939
Gary Avenue Dead End	4513	2006	\$100,227	0.0%	\$0	47.2%	\$47,294	39.3%	\$39,438
Riverside Drive Bridge	5000	1942	\$1,503,635	0.0%	\$530	66.3%	\$997,528	62.5%	\$939,483
Broadway Street Bridge	5002	1960	\$599,692	9.4%	\$56,562	27.9%	\$167,033	12.0%	\$72,034
Brady Street Underpass	5003	1962	\$2,472,538	12.3%	\$305,295	62.8%	\$1,552,817	45.2%	\$1,118,547
Paris St Overpass SBL	5008	1973	\$12,970,847	4.9%	\$637,121	55.0%	\$7,138,785	33.0%	\$4,277,090
Coniston Creek Bridge	5009	1960	\$1,267,557	5.4%	\$68,359	33.8%	\$428,683	17.6%	\$223,463
Romford Creek Bridge	5010	1950	\$221,416	12.6%	\$27,868	0.0%	\$0	0.0%	\$0
Romford Creek Bridge	5013	1950	\$204,402	11.3%	\$23,004	5.5%	\$11,289	3.9%	\$7,942
Romford Creek Bridge	5015	1955	\$461,711	14.6%	\$67,268	8.7%	\$40,143	2.8%	\$12,717
Coniston Creek	5016	2016	\$1,234,874	9.2%	\$114,000	90.3%	\$1,114,901	84.6%	\$1,044,774
Mountain View Road Bridge	5017	1998	\$329,472	8.4%	\$27,617	79.9%	\$263,292	59.7%	\$196,650
Roseland Drive Bridge	5018	1998	\$315,500	5.2%	\$16,514	79.3%	\$250,211	59.3%	\$186,963
Deer Creek Bridge	5020	1970	\$596,151	28.0%	\$167,189	28.9%	\$172,345	11.1%	\$66,170
Deer Creek Bridge	5021	2000	\$262,610	0.6%	\$1,562	34.4%	\$90,229	25.0%	\$65,575
Pedestrian Bridge	5022	1980	\$182,574	5.5%	\$10,001	39.7%	\$72,527	22.0%	\$40,226
Pedestrian Bridge	5023	1980	\$1,145,543	15.4%	\$176,182	46.4%	\$531,989	24.2%	\$276,728
Coniston Creek Pedestrian Bridge	5029	2020	\$198,375	0.0%	\$0	100.0%	\$198,375	100.0%	\$198,375

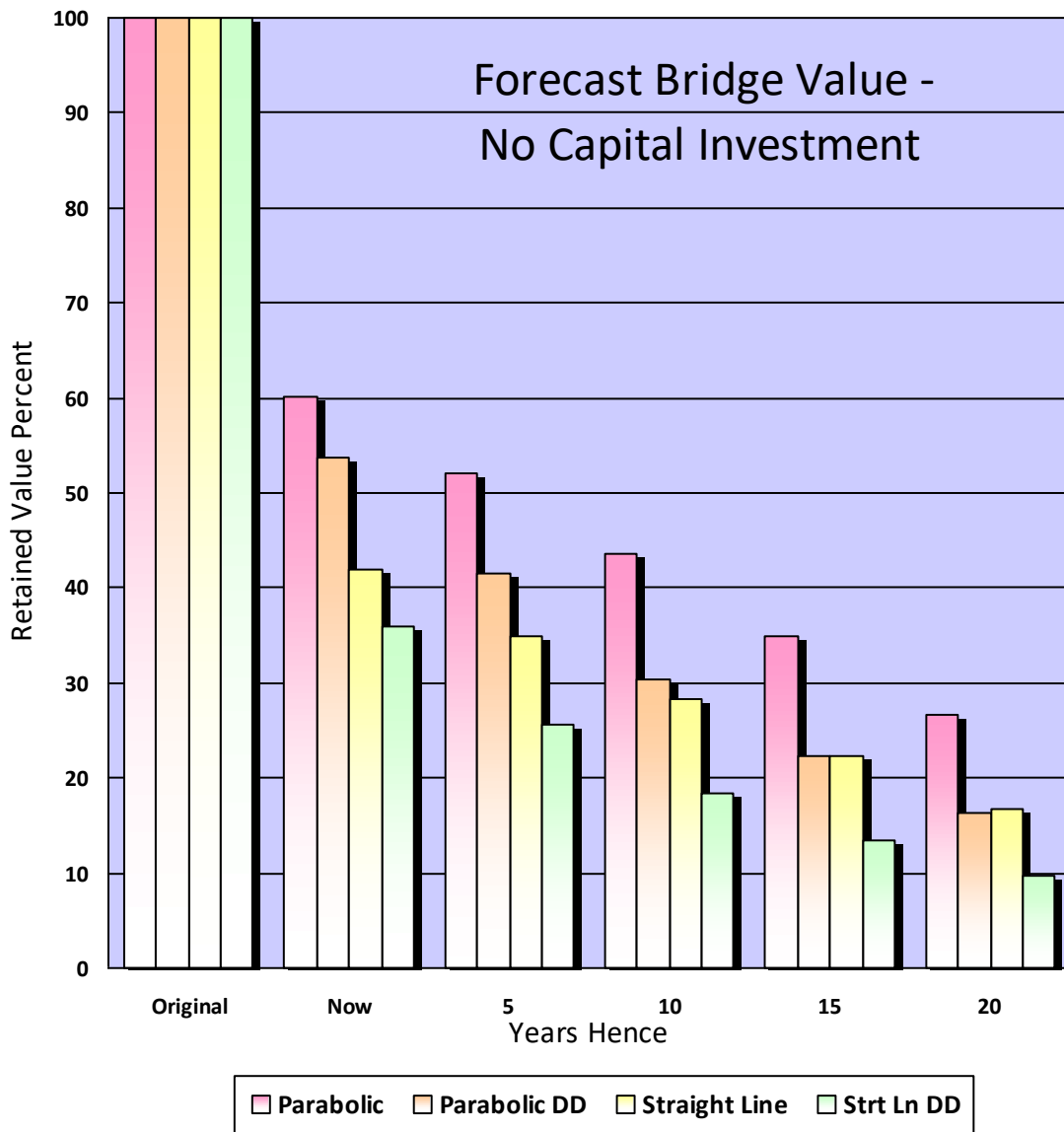


(Does not include culverts)

Name	Bridge ID	Built	Value (New)	Damage/Defects		Present Val (Parab)		Present Val (S/L)	
Paris St Overpass NBL	5030	1973	\$13,055,347	8.2%	\$1,076,891	51.2%	\$6,687,571	29.2%	\$3,808,830
Centennial Dr Park Bridge	5051	1990	\$101,662	2.6%	\$2,622	81.8%	\$83,186	58.0%	\$58,964
Mallards Landing Park	5516	2006	\$99,125	11.8%	\$11,697	83.3%	\$82,569	67.3%	\$66,725
CPR Subway	6001	1930	\$787,852	34.6%	\$272,420	0.0%	\$0	0.0%	\$0
Leslie Street Bridge	6008	1970	\$2,087,283	13.5%	\$281,071	30.0%	\$626,975	14.3%	\$298,324
Bond Street Bridge	6009	1950	\$574,870	34.7%	\$199,654	9.7%	\$55,785	4.9%	\$28,453
King Street Bridge	6010	1940	\$645,336	15.9%	\$102,867	36.7%	\$237,028	27.7%	\$178,817
Pedestrian Bridge	6012	1989	\$116,803	20.6%	\$24,005	48.0%	\$56,023	28.6%	\$33,351
Pedestrian Bridge	6013	1983	\$189,655	1.7%	\$3,312	51.9%	\$98,447	31.6%	\$59,986
Pedestrian Bridge	6014	1982	\$114,999	38.3%	\$44,032	24.2%	\$27,854	9.5%	\$10,897
Pedestrian Bridge	6015	1980	\$123,556	8.4%	\$10,394	36.1%	\$44,598	20.3%	\$25,068
Eva Avenue Pedestrian Bridge	6017	2000	\$1,192,310	2.4%	\$28,213	88.8%	\$1,058,755	68.4%	\$815,664
Trans Canada Trail (Barrydowne Arena)	6510	2006	\$190,917	3.0%	\$5,660	64.3%	\$122,816	51.8%	\$98,921
Grand Total			\$136,933,829	8.2%	\$11,186,541	53.7%	\$73,558,324	36.1%	\$49,396,211



Bridge Depreciation Forecast 1



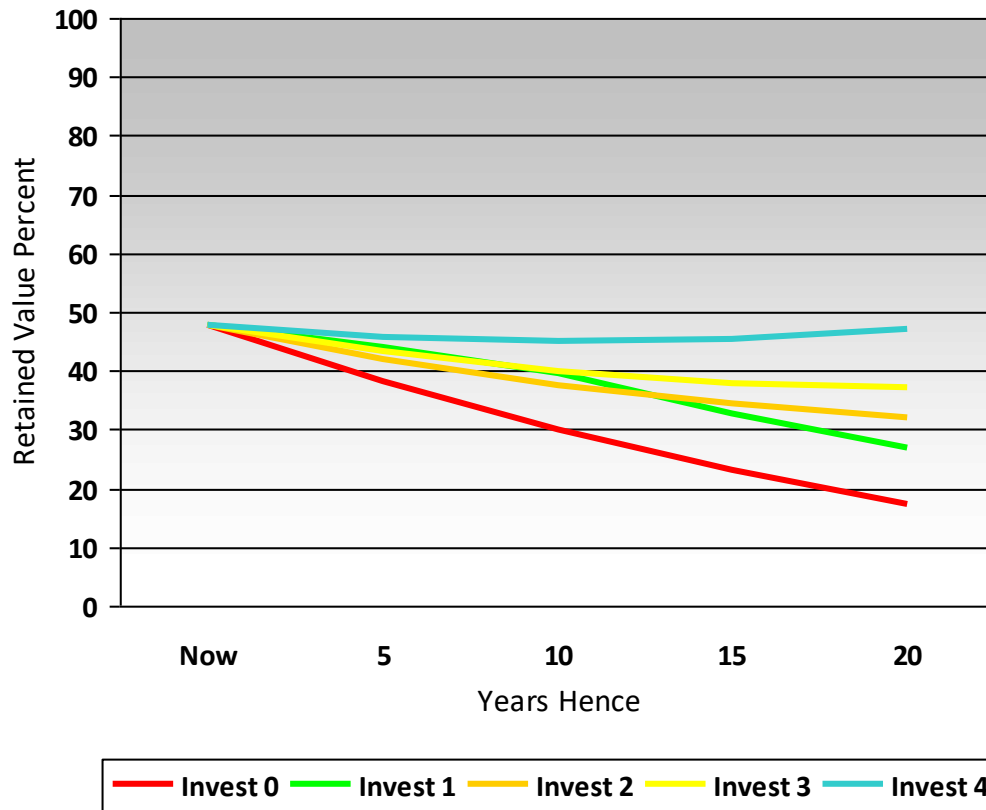
Legend

- Parabolic: Parabolic Depreciation not including effects of Defects & Damage
Parabolic DD: Parabolic Depreciation including effects of Defects & Damage
Straight Line: Straight-Line Depreciation not including effects of Defects & Damage
Strt Ln DD: Straight-Line Depreciation including effects of Defects & Damage



Average Bridge Depreciation with Investment

Remaining Value of all Bridges

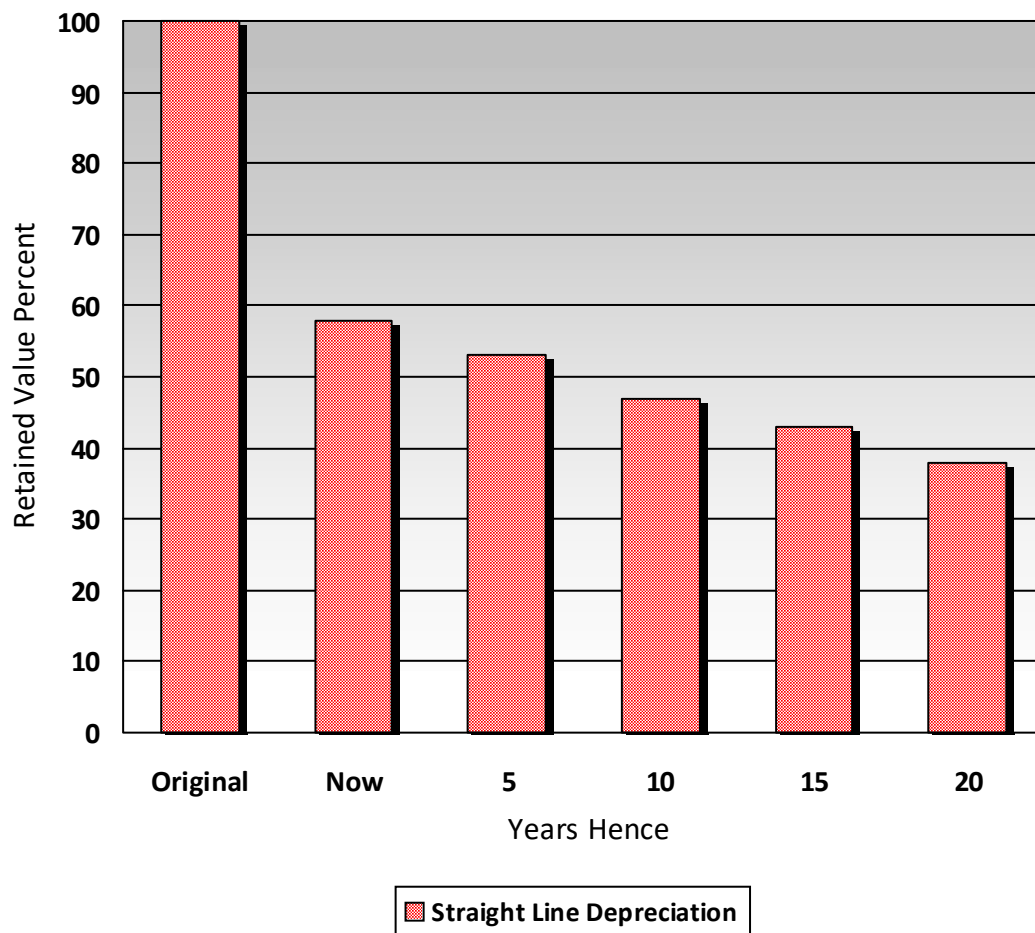


Key	Investment Description	Annual Amount
Invest 0	No Investment	\$0
Invest 1	Recommended Capital (Average)	\$1,296,000
Invest 2	0.75% Replacement Value	\$2,002,500
Invest 3	1.0% Replacement Value	\$2,670,000
Invest 4	1.5% Replacement Value	\$4,005,000



Culvert Depreciation Forecast

Remaining Value of all Culverts



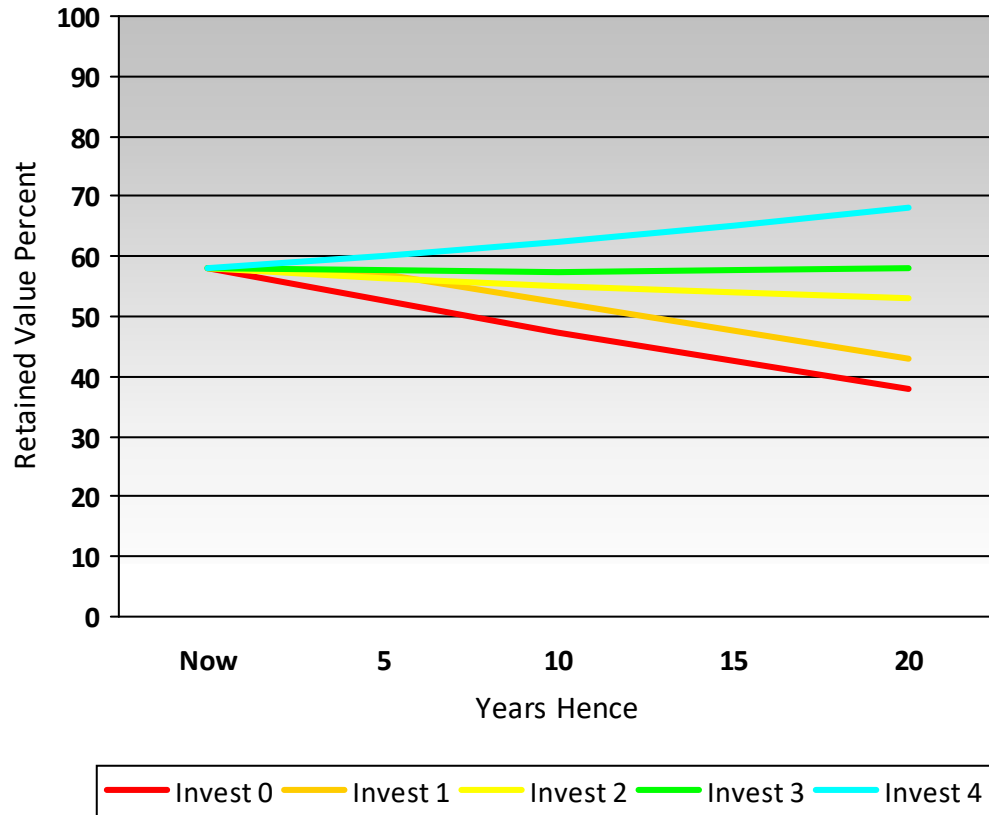
Original & Depreciated Values

Original	Now	5	10	15	20
\$234,175,000	\$135,778,897	\$123,074,816	\$111,177,262	\$99,773,756	\$88,873,696



Average Culvert Depreciation with Investment

Remaining Value of all Culverts



<u>Key</u>	<u>Investment Description</u>	<u>Annual Amount</u>
Invest 0	No Investment	\$0
Invest 1	Recommended Capital (Average)	\$579,000
Invest 2	0.75% Replacement Value	\$1,762,500
Invest 3	1.0% Replacement Value	\$2,350,000
Invest 4	1.5% Replacement Value	\$3,525,000



Recommended Investigations

Bridge ID	Name	Deck Condition Survey	Enhanced Inspection	Underwater Investigation	Ice Inspection	Boat Inspection	Structure Evaluation	Load Posting	Planning Study
1008	Moxam Creek Bridge	✓							
1535	Lily Creek		✓	✓					
1544	C. Johnson Road Culvert @ MR #4			✓					
2000	Simmons Road Bridge		✓	✓					
2002	Main Street Bridge	✓							
2005	Onaping River Bridge	✓							
2013	Lasalle Interchange	✓							
2015	CPR Overpass / Nolin Creek	✓	✓						
2016	Dufferin Street Bridge		✓						✓
2512	Nolins Creek		✓						✓
2514	Granite-McKim Culvert		✓						
2516	McNeil Pedestrian Crossing								✓
2519	Nolins Creek								✓
3000	Nelson Lk Rd @ Rapid River								✓
3002	Martin Road Bridge		✓						
3005	Whitson River	✓							
4505	Junction Creek		✓						✓
5020	Deer Creek Bridge		✓						✓
5023	Pedestrian Bridge								✓
5506	Long Lake Road Culvert					✓			
5508	Broadway		✓						
6020	Mountain Street		✓						



Bridge ID	Name	Deck Condition Survey	Enhanced Inspection	Underwater Investigation	Ice Inspection	Boat Inspection	Structure Evaluation	Load Posting	Planning Study
6509	Highgate								✓



Capital Needs Report

Year **2021**

Structure ID	Name	Route	Work	Cost
1003	Maninen Road Bridge	Manninen Rd.	Replace Deck, Guide Rail, Paint or galvanize girders	\$455,000
1006	Spanish River near Worthington Road	Spanish River Rd.	Replace Timber Deck	\$85,000
2511	Huron Street Culvert	Huron St.	Partial Replacement	\$842,000
2519	Nolins Creek	Beatty St.	New Conc Culvert	\$1,252,000
3000	Nelson Lk Rd @ Rapid River	Nelson Lk Rd.	Replace bridge	\$977,000
4000	Roberts River	M R 84 (Moose Mt)	Wearing surface, Impact protection, Repair rakers	\$169,000
5051	Centennial Dr Park Bridge	Centennial Dr.	New timber deck, Paint bridge	\$160,000
Sum for Year				\$3,940,000
Percentage of Grand Total				9.9%



Year **2022**

Structure ID	Name	Route	Work	Cost
1012	Fielding Road Bridge	Fielding Rd.	Misc Concrete Repairs, WP&P, X-Jnt, Guide Rail, Repave approaches	\$575,000
1024	Big Nickel Mine Rd	Big Nickel Mine Rd	Resurface, Seal Concrete, Seal B/W Joints	\$218,000
1540	Panache Lake Rd Culvert	Panache Lake Rd.	Seal Culvert Walls	\$160,000
2006	Onaping River Bridge	Morgan Rd.	Concrete sealing, Exp Jnt Repair	\$134,000
2016	Dufferin Street Bridge	Dufferin St.	Misc Concrete Repairs, O'Lay, WP&P, B/Wall, Retaining Walls, Deck Drains	\$492,000
2508	Landry Creek	Notre Dame Ave.	Partial Culvert Replacement	\$450,000
2512	Nolins Creek	Frood Rd.	Culvert Replacement, Retaining walls	\$1,097,000
2513	Inco Drainage Ditch	Lasalle Blvd.	Daylighting	\$188,000
2517	Erie/Monck Pedestrian Crossing	Erie St.	Replace retaining walls, surfacing	\$79,000



2533	Trans Canada Trail	Onaping Falls	Wood Span Replacement	\$54,000
3005	Whitson River	M R 80 (Hwy 69)	Misc Concrete Repairs, WP&P, Guide Rail, New Pedestrian Railings, Pipe Rails	\$410,000
3503	MR 80	MR 80	Retaining Wall, New Guide Rail	\$108,000
5008	Paris St Overpass SBL	Paris St.	Misc Concrete Repairs, WP&P, X-Jnt, Coat girder ends, Abut repair	\$1,616,000
5017	Mountain View Road Bridge	Mountain View Rd.	Guide Rail, Gabions	\$108,000
5023	Pedestrian Bridge	Nelson St.	Misc Concrete Repairs, Replace Deck, X-Jnt, Truss Coating, Repl Meshing	\$1,236,000
5025	Lily Creek	Paris St.	Pedestrian Railings	\$116,000
6014	Pedestrian Bridge	Stafford St.	Ballast walls, Retaining walls, Rails etc.	\$131,000
				<hr/>
Sum for Year				\$7,172,000
Percentage of Grand Total				18.0%



Year **2023**

Structure ID	Name	Route	Work	Cost
1534	Junction Creek	McLeod St.	Misc Concrete Repairs, Waterproofing, Conc Rep.	\$295,000
1542	Wabagishik Road Culvert	Wabagishik Rd.	Update Guide Rail	\$86,000
1547	Worthington Rd. Culvert	Worthington Rd.	New Conc Culvert	\$556,000
2002	Main Street Bridge	Main St.	Misc Concrete Repairs, WP&P, Replace brg, curbs, sidewalk	\$323,000
2007	Vermilion River Bridge	Morgan Rd.	Guide Rail	\$142,000
2015	CPR Overpass / Nolin Creek	Elm St. West	Misc Concrete Repairs, WP&P, FRP Pier Repair, Deck Drains	\$935,000
2500	Birch St Culvert	Birch St	Replace Guiderail	\$79,000
4010	Junction Creek Ped Bridge	Fielding St.	Repair concrete ballast walls, approach railings	\$102,000
4505	Junction Creek	Lansing Ave.	Concrete Liner	\$324,000



5013	Romford Creek Bridge	Walter St.	Replace Bridge	\$1,260,000
5030	Paris St Overpass NBL	Paris St.	Misc Concrete Repairs, WP&P, X-Jnt, Coat girder ends, Abut repair	\$1,757,000
6008	Leslie Street Bridge	Leslie St.	Girder end repairs	\$116,000
6501	Leon Drainage Ditch	Lasalle Blvd.	Outlet Wall Repair	\$83,000
				<hr/>
Sum for Year				\$6,058,000
Percentage of Grand Total				15.2%



Year **2024**

Structure ID	Name	Route	Work	Cost
1008	Moxam Creek Bridge	Regional Rd. 55	Seal barrier walls	\$176,000
1020	Finland Street Bridge	Finland St.	Misc Concrete Repairs, WP&P, Renew upstream retaining walls	\$846,000
1561	Trans Canada Trail	Hillfield Trail #1	Painting	\$102,000
2010	Landry Street Bridge	Landry St.	Misc Concrete Repairs, WP&P, Guide Rail, Replace Sidewalks	\$292,000
2013	Lasalle Interchange	Elm St. West	Misc Concrete Repairs, WP&P, Approach Drainage, C&G	\$360,000
2014	CPR Overhead	Lasalle Blvd.	Remediate Drainage, Abut Repair	\$218,000
2510	Whitewater Creek	MR 35	Waterproof or Topping slab, Ret Walls	\$498,000
5003	Brady Street Underpass	Brady St.	Misc Concrete Repairs, Sealing	\$270,000
5010	Romford Creek Bridge	Caruso St.	Replace Bridge	\$634,000



6010	King Street Bridge	King St.	Abutment wall repairs	\$71,000
6509	Highgate	Highgate	New Conc Culvert	\$1,313,000
				<hr/>
Sum for Year				\$4,780,000
Percentage of Grand Total				12.0%



Year **2025**

Structure ID	Name	Route	Work	Cost
1022	Poland Street Bridge	Poland St.	Misc Concrete Repairs, O'Lay, WP&P, B/Wall, Abutment wall refacing	\$469,000
1023	Orford Street Bridge	Orford St.	Misc Concrete Repairs, O'Lay, WP&P, B/Wall, Abutment wall refacing	\$456,000
1025	Lily Creek Bridge	Bouchard St.	Retaining walls	\$184,000
1535	Lily Creek	Regent St.	Partial replacement, Ret Walls	\$842,000
2000	Simmons Road Bridge	Simmons Rd.	Misc Concrete Repairs, Strengthen/Replace Barriers	\$500,000
2008	Montee Principale Bridge	Montee Principale	Misc Concrete Repairs, WP&P, B/Wall, X-Jnt, Guide Rail	\$888,000
5024	Elgin Pedestrian Subway	Elgin St.	Floor & Wall Repairs	\$218,000
5516	Mallards Landing Park	Trans Canada Trail @ Mall	Coating truss, new decking	\$95,000
6502	Junction Creek	Barrydowne Rd.	Waterproof, Drain Improvements	\$324,000



Sum for Year	\$3,976,000
Percentage of Grand Total	10.0%

Year 2026

Structure ID	Name	Route	Work	Cost
1544	C. Johnson Road Culvert @ MR #4	C. Johnsons Rd.	New Conc Culvert	\$1,528,000
6001	CPR Subway	College St.	Repl Bridge	\$3,886,000

Sum for Year	\$5,414,000
Percentage of Grand Total	13.6%

Year 2027

Structure ID	Name	Route	Work	Cost
1548	CSPA Culvert	Grassy Lake Rd.	New Conc Culvert	\$546,000
3006	Kalmo Road Bridge / Whitson River	Kalmo Rd.	Replace with 2 lane bridge	\$2,647,000

Sum for Year	\$3,193,000
Percentage of Grand Total	8.0%



Year 2028

Structure ID	Name	Route	Work	Cost
3002	Martin Road Bridge	Martin Rd.	Replace Bridge	\$2,381,000
6505	Attlee Avenue Culvert	Attlee Ave.	New Conc Culvert	\$887,000
Sum for Year				\$3,268,000
Percentage of Grand Total				8.2%

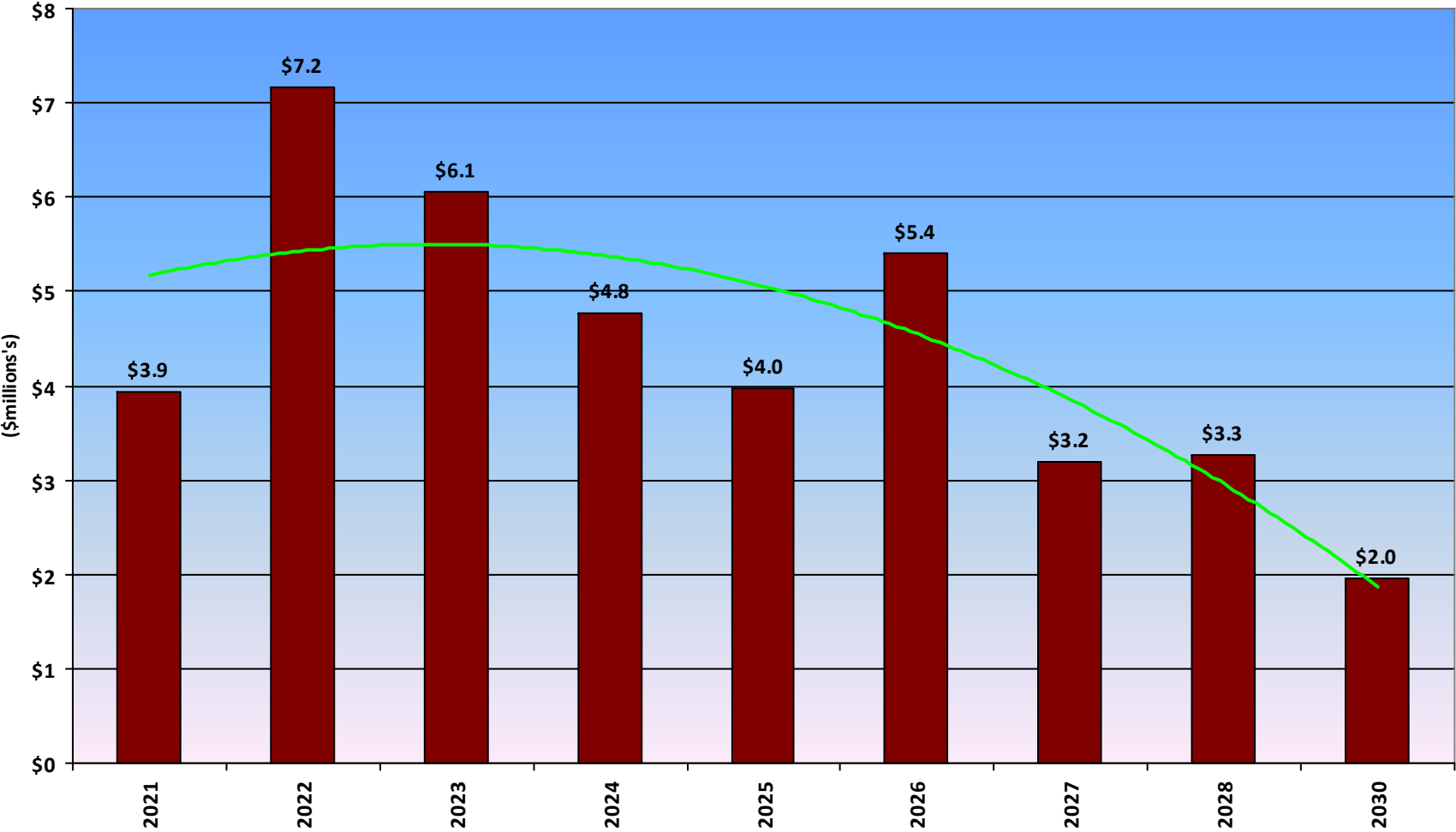
Year 2030

Structure ID	Name	Route	Work	Cost
2005	Onaping River Bridge	M R 8	WP&P, Guide Rail	\$575,000
5020	Deer Creek Bridge	Red Deer Rd.	Replace Bridge	\$1,380,000
Sum for Year				\$1,955,000
Percentage of Grand Total				4.9%

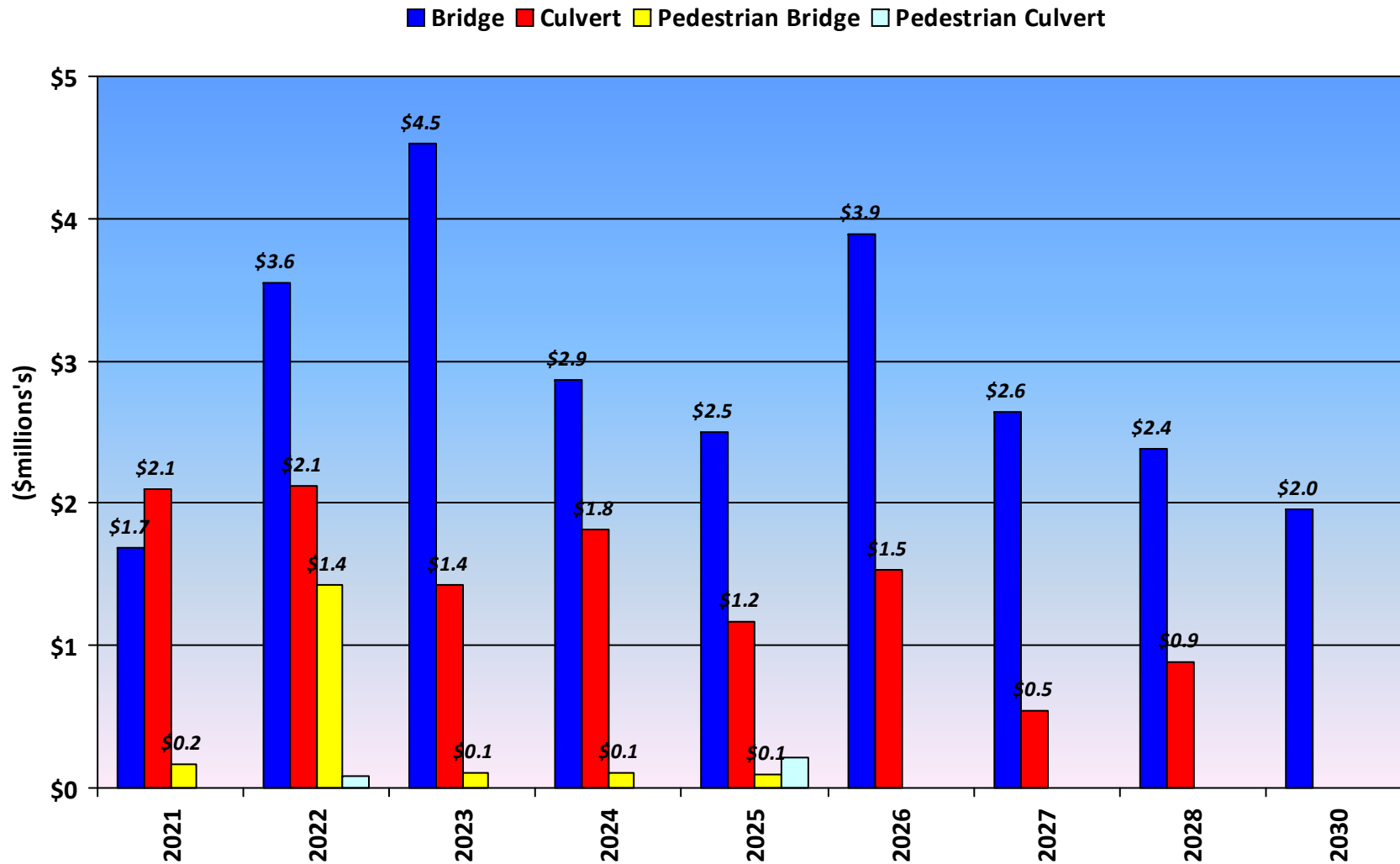


Total Capital Needs (m's) \$39,756,000 Over 10 Years

Capital Expenditure by Year



Capital Expenditure by Structure Type



Bridge Maintenance Report

Bridge ID	Name	Road	Component	Maintenance
Southwest				
1001	Vermillion River Bridge	Panache Lake Rd.	Steel Post & Guide Rail	Repair Minor Damage
Attachment to barrier wall ends not improved in 2016. End treatment at the SE has been damaged from vehicle impact, this requires repair. Several vehicle scrapes on all quadrants.				
			Delineator	Straighten Sign
4 hazard markers, 2 name boards, 2 bridge lces signs. Sign at end of SE barrier wall requires straightening.				
			Safety Shape B/Wall	Apply Sealant
Generally in fair to good condition. Consider sealing.				
1003	Maninen Road Bridge	Manninen Rd.	Water Channel	Remove Obstructions
There is a significant scour pool downstream of the bridge. The fore-slopes of the bridge have constricted the channel thereby increasing the stream velocity downstream. Small beaver dam under bridge 2020.				
			Steel Sliding Plate	Power Wash
Satisfactory condition. Accumulating debris.				
			Timber-Laminated	Spot deck plank replacement
2x6 PT laminated deck showing decay at top surface in 2018. Deck is leaking onto girders causing corrosion. Major decay in several timber deck boards and damage in soffit noted in 2020.				
			Delineator	Replace Sign
Delineator missing at the SE end of guide rail. Narrow bridge signs located on the approaches.				
			Embankment	Remove Brush/Trees
Thick vegetation around bridge. Brushing out is recommended.				
1005	Chicago Mine Road Bridge	Chicago Mine Rd.	Timber Curb	Local repair
Timber curb on east side has localized area of major decay. Sand gravel accumulating against curbs.				



Bridge ID	Name	Road	Component	Maintenance
1005	Chicago Mine Road Bridge	Chicago Mine Rd.	Steel-Rolled	Power Wash
<i>Corrosion is occurring on bottom flange of middle girders, due to the open deck along centreline. Open deck ends will cause damage to girder ends in future. Sandy granulars accumulating along the top side of the bottom flange of exterior girders.</i>				
1006	Spanish River near Worthington Road	Spanish River Rd.	Steel Sliding Plate	Power Wash
<i>Bearing seats on east side covered with sandy granular material. All bearings are covered or partially covered with debris.</i>				
			Timber Curb	Local repair
<i>Scuffed, assumed from winter plow. SE end portion requires replacement. Sand accumulation along curbs.</i>				
			Water Channel	Remove Obstructions
<i>Beaver dam under bridge is partly obstructing channel. Beaver dam holding about 1.0 m head at time of 2014 inspection. Old abutments could potentially fall into channel and result in a severe scour condition. No change in 2020, beaver dam still under bridge.</i>				
1008	Moxam Creek Bridge	Regional Rd. 55	Safety Shape B/Wall	Apply Sealant
<i>Barrier walls have AAR cracking and scaling throughout. Reaction rims developing on some AAR cracking. Some random wide vertical cracks.</i>				
1009	Old Soo Road Bridge	Old Soo Rd.	Delineator	Repair Pavement Joint
1011	Mikkola Road Bridge	Mikkola Rd.	Delineator	Replace Sign
<i>Delineators located at ends of the guide rails. NE and SE signs damaged from vehicle impact.</i>				
			Steel Post & Guide Rail	Repair Minor Damage
<i>Extruder end treatments at all ends. Small vehicle scrapes. End treatment at NE is detached should be repaired.</i>				
			Asphalt Wear Surf	Repair Pavement Joint
<i>Satisfactory, condition around joints at end of approach slabs is in need of repairs.</i>				
1012	Fielding Road Bridge	Fielding Rd.	Delineator	Replace Sign
<i>Delineators at ends of barrier walls, SW corner sign is missing, laying on embankment.</i>				



Bridge ID	Name	Road	Component	Maintenance
1030	Meatbird Creek Pedestrian Bridge	Ped Path	Embankment	Place rip-rap
<i>Protected with rip rap. SW corner rip rap stones have slid down exposing geotextile fabric.</i>				
1529	MR 24 Culvert	Regional Rd. 24	Steel Post & Guide Rail	Repair Minor Damage
<i>New guide rail was installed in 2016. NW end treatment has been damaged from vehicle impact, repairs are required.</i>				
1536	Fairbank Creek	Bay St	Steel Beam on Steel Post	Repair Minor Damage
<i>Several scrapes from vehicle impact. Eccentric loader end treatments at all ends. SW end treatment too low to be effective. Guide rail overgrown with vegetation.</i>				
1537	Fairbank Creek	Bay St (MR # 3)	Water Channel	Remove Obstructions
<i>Very poor channel alignment to culvert, both at inlet and outlet. Beaver dam 20m upstream of culvert.</i>				
			Embankment	Remove Brush/Trees
<i>Large stone rip rap on embankments, some slippage into channel at culvert corners. Tree growth at culvert ends should be cleared. Natural gas noted on south side.</i>				
			Steel Beam on Steel Post	Repair Minor Damage
<i>Several scrapes from vehicle impact. SW end treatment is damaged and needs repairs. Guide rail is overgrown with vegetation.</i>				
1540	Panache Lake Rd Culvert	Panache Lake Rd.	Embankment	Erosion Control Place rip-rap
<i>Areas of washout at and near culvert. Drop curb and gutter with spillway beyond the culvert location would prevent washout of embankments.</i>				
1541	Panache Lake Rd. Culvert	Panache Lake Rd.	Embankment	Place rip-rap Repair Gullies
<i>Sparse vegetation. Washout of embankment at culvert corners. Recommend placing some rip rap on culvert embankments.</i>				
			Asphalt Wear Surf	Routine Maintenance
<i>Random unsealed cracks throughout. Settlement over culvert may indicate problem with sub-grade.</i>				
			Steel Post & Guide Rail	Repair Minor Damage
<i>NW and SE end treatments damaged from vehicle impact.. Eccentric loader end treatment at all four corners.</i>				



Bridge ID	Name	Road	Component	Maintenance
1542	Wabagishik Road Culvert	Wabagishik Rd.	Embankment	Place rip-rap
<i>Partial failure of embankment at all 4 corners of culvert. Stone rubble type embankment is falling down into channel. Washout noted in the SW embankment, roadside.</i>				
			3 Cable Wood Post	Local repair
<i>Some cables are slack. One post split and one severed on west side.</i>				
1543	Hill Road Culvert	Hill Rd.	Steel Post & Guide Rail	Repair Minor Damage
<i>Eccentric loader end treatment at NW, SW, SE, extruder end treatment at NE. Minor impact damage at SW end treatment..</i>				
1545	Lorne Falls Rd. Culvert	Lorne Falls Rd.	Embankment	Remove Brush/Trees
<i>Rip rap protection on embankments and over culvert ends. Heavy vegetation growth around guide rail should be cleared.</i>				
1547	Worthington Rd. Culvert	Worthington Rd.	Embankment	Remove Brush/Trees
<i>Brush growth around culvert ends should be removed. Embankments are stable. No guide rail protection at this site.</i>				
1561	Trans Canada Trail	Hillfield Trail #1	Timber-Sawn	Spot deck plank
<i>Several boards are loose/detached and require replacement. Deck ends are a pedestrian trip hazard.</i>				
			RC Abutment Wall	Clean/sweep surface
<i>Good condition. Rust stains on face of abutment walls, debris on bearing seats. Debris is holding moisture and should be cleared before causing damage to abutments.</i>				
1562	Old Soo Rd Box Culvert	Old Soo Rd	Steel Beam on Steel Post	Repair Minor Damage
<i>End treatments on north side are both damaged from vehicle impact. Minor scrape in the SW corner.</i>				
1563	Fairbank Creek	RR 55	3 Cable Wood Post	Local repair
<i>Cables loose on north side. Cables partially detached on south side. Cables badly corroded.</i>				
			Water Channel	Remove Obstructions
<i>Debris is accumulating at both inlet and outlet. Beaver dam at inlet has almost 1.5 m head. Fall at outlet. This has resulted in a very large scour pool downstream of culvert.</i>				



Bridge ID	Name	Road	Component	Maintenance
1564	Fairbank Lake Rd Culvert	Fairbank Lake Rd.	Steel Beam on Steel Post	Repair Minor Damage
<i>Extruder end treatment located at all four corners. Damaged in SE, SW, and NW. Some end treatment is obscured by thick vegetation.</i>				
			Embankment	Remove Brush/Trees
<i>Rip rap placed on embankment. Some stones have slipped down into channel at culvert corners. Vegetation at guide rail ends should be cleared.</i>				
1565	Fairbank Creek Culvert	Fairbank Lake Road	Delineator	Replace Sign
<i>Delineators located in the NW, SW, and SE. Signs in the SE and SW are damaged from vehicle impact.</i>				
			Embankment	Erosion Control
<i>Some slippage of rip rap stones into channel at culvert ends. South end outlet has partial blockage due the stones from embankment. Natural gas noted on the north side of road.</i>				



Bridge ID	Name	Road	Component	Maintenance
Southeast				
4004	CNR Overpass	Falconbridge Rd.	Concrete-Prestressed	See Comment
<i>Girder ends repaired as part of 2019 rehabilitation. Repairs standing up very well in 2019. Otherwise girders are in mostly good condition. Web of exterior girder in NE corner not repaired and this should be repaired ASAP. One small spall on girder flange in NE corner about 3 m from bearing.</i>				
4010	Junction Creek Ped Bridge	Fielding St.	Steel Pipe Ped Barrier	Repair Minor Damage
<i>Welded wire mesh has holes cut in it, & has corroded. Condition continues to worsened.</i>				
			RC Abutment Wall	Clean/sweep surface
<i>Generally in good condition. Rust stains at west abutment. Graffiti covering abutments. Granular material accumulating on bearing seats.</i>				
			Embankment	Remove Brush/Trees
				See Comment
<i>Asphalt padding added to both approaches. Approaches still require railings. Trees around bridge should be cut back.</i>				
			RC Ballast Wall	Re & Re Concrete
<i>Ballast walls require reconstruction. Asphalt has been placed to fill areas of damaged east ballast wall. Lack of room for expansion has damaged the ballast walls.</i>				
			Water Channel	Remove Obstructions
<i>Beaver dam under bridge.</i>				
4500	Christina St. Culvert	Christina St.	Embankment	Remove Brush/Trees
<i>Overgrown at barrel ends. Trees growing between barrels at the east end.</i>				
4505	Junction Creek	Lansing Ave.	Embankment	Remove Brush/Trees
<i>Undermining of slope protection. Tree growth at culvert ends should be cut back.</i>				
			Water Channel	Remove Obstructions
<i>Moderate aggradation of waterway at outlet Aggradation islands at west end outlet of both barrels, mainly the south barrel. North barrel has significant aggradation inside (up to 1.0m) & carries minimal flow under low flow conditions. Trees down across channel upstream of culvert (east).</i>				



Bridge ID	Name	Road	Component	Maintenance
4513	Gary Avenue Dead End	Trans Canada Trail	Embankment	Erosion Control Remove Brush/Trees
				<i>Some erosion of embankment along water channel.</i>
			Water Channel	Place rip-rap
				<i>Suspected to have overtopped bridge due to debris caught in stringers.</i>
5008	Paris St Overpass SBL	Paris St.	Scupper & Pipe	Unplug Scuppers
				<i>One scupper on each end of deck. Expansion joints have their own drain systems. North scupper is causing delamination of north pier.</i>
			X- Joint Conventional	Repair End Dams
				<i>Dams have uniform light to moderate scaling, and some spalling. Spalls should be repaired at this time. Seal appears to be pulling out of retainer in one area. Small areas of missing armouring.</i>
			Sidewalk	Minor Patching
				<i>Brick pavers on north approach have settled up to 50 mm and are a potential tripping hazard. Frequent shrinkage cracks.</i>
			X-Joint Modular.	Repair End Dams
				<i>Dams have uniform light to moderate scaling, and some spalling. Spalls should be repaired at this time. Joint performing reasonably well.</i>
5009	Coniston Creek Bridge	Garson Coniston Rd.	Delineator	Straighten Sign
				<i>Delineators should have been placed before guide rail on approaches. Minor impact strikes to all signs. NE sign needs to be reset.</i>
5013	Romford Creek Bridge	Walter St.	Load Posting	Brush Sign
				<i>Posted 9-17-23 tonnes. SW sign should be cleared of vegetation.</i>
			Gabion Basket	Stabilize walls
				<i>Needs to be completely reconstructed with a 1:6 back slope. Local resident voiced concerns with gabion walls in NE. No change in gabion walls noted in 2018 or 2020.</i>
5015	Romford Creek Bridge	Edward Ave.	Delineator	Replace Sign
				<i>Three delineators in place, SE, NW and NE. Missing sign in SW.</i>



Bridge ID	Name	Road	Component	Maintenance
5015	Romford Creek Bridge	Edward Ave.	Gabion Basket	Stabilize walls
<i>Gabions line the channel at bridge corners. Baskets are bulged and displaced. Some loss of fill. Baskets require maintenance.</i>				
			Embankment	Remove Brush/Trees
<i>Satisfactory condition. Gabion baskets along the SW embankment. Wild parsnip noted at NE embankment.</i>				
5017	Mountain View Road Bridge	Mountain View Rd.	Gabion Basket	Stabilize walls
<i>Gabion baskets are tilting towards channel. Baskets are spilling their contents. Gabion baskets should all be reset and refilled.</i>				
5030	Paris St Overpass NBL	Paris St.	X-Joint Modular.	Repair End Dams
<i>Dams have uniform moderate scaling, and some spalling. Spalls should be repaired at this time. Seals are leaking.</i>				
			Scupper & Pipe	Unplug Scuppers
<i>One scupper on deck. Expansion joints have their own drain systems. Drains are poorly placed causing damage to slope protection and piers. Drains plugged in 2020.</i>				
			X- Joint Conventional	Repair End Dams
<i>Dams have moderate scaling, and some spalling. Seal retainer is broken for 1.5 m length. Spalls should be repaired at this time.</i>				
5501	Elbow Creek Culvert	Dryden Rd.	Embankment	Remove Brush/Trees
<i>Rip rap on embankments. Some minor wash-out of the granular shoulder over north end of culvert. Tree growth at SW corner should be cleared.</i>				
			Water Channel	Remove Obstructions
<i>Moderate velocity current at time of 2018 inspection. Water moving well through culvert. Small beaver/debris blockage at north end 2020. Scour hole just downstream south of culvert.</i>				
6008	Leslie Street Bridge	Leslie St.	Concrete-Prestressed	Repair Damage
<i>With the exception of the girder ends the girders are in good condition. One middle girder at east abutment has a large spall. Other girders show incipient spalling, presumably caused by earlier leaking expansion joints. Previous repairs to girder ends have delaminated. Girder ends need repairs soon.</i>				
			Embankment	Remove Brush/Trees
<i>Stable, with exception of the minor wash-out from deck rains emptying onto foreslopes. Evidence of regular human activity under this bridge.</i>				



Bridge ID	Name	Road	Component	Maintenance
6008	Leslie Street Bridge	Leslie St.	Scupper & Pipe	Unplug Scuppers
<i>Light corrosion at drainage pipe ends; drains eroding slope protection in front of embankments. Drains were all plugged at deck top.</i>				
			Conc Curb	Re & Re Concrete
<i>Damage in NE & NW corners. Localized area of disintegration.</i>				
			Water Channel	Place rip-rap
<i>Channel is undercutting gabion baskets that support the ped path, east side. Channel is centered between the piers. Shopping carts in the channel.</i>				
			Sidewalk	Minor Patching
<i>Brick pavers on approaches have settled in all corners & should be reset. Asphalt padding has been added to approaches. Longitudinal cracks in top surface of sidewalk.</i>				
6009	Bond Street Bridge	Bond St.	Steel Post & Panel	Repair Minor Damage
<i>North top steel rail has minor impact damage. Same damage noted in 2018, damage not effecting pedestrian safety. Condition similar in 2020.</i>				
			Water Channel	Remove Obstructions
<i>Watermain pipe is partly obstructing channel during normal high water. Water is reasonably fast flowing and scour has developed under the bridge. Several shopping carts in channel.</i>				
			Embankment	Remove Brush/Trees
<i>Satisfactory condition. Tree growth around bridge should be cut back.</i>				
6010	King Street Bridge	King St.	Water Channel	Remove Obstructions
<i>Shopping carts in channel under the bridge.</i>				
			RC Abutment Wall	Re & Re Concrete
<i>Base of wall in NE corner & for 2/3 of the length of this abutment going downstream is undercut by disintegration to a depth of 25cm and should be repaired. CSP storm outlet penetrates the east wall, damage around. West wall has numerous areas of honeycomb.</i>				
6012	Pedestrian Bridge	Agnes St.	Steel Pipe Ped Barrier	Repair Minor Damage
<i>Railing in SE quadrant is bent and should be straightened. Sections of 1" x 1" fencing has bulged and should be replaced. Several small holes in fencing.</i>				



Bridge ID	Name	Road	Component	Maintenance
6012	Pedestrian Bridge	Agnes St.	Ped End Post	Spot post replacement
<i>Old timber bollard replaced with concrete block with hazard marker located at the west end.</i>				
			RC Abutment Wall	Re & Re Concrete
<i>Spalling at bearing seat under east end of girders, exposing bearing anchor bolts. Maintenance type concrete repairs are required.</i>				
			Water Channel	Remove Obstructions
<i>Sides of channel lined with steel sheet piling. Shopping cart in channel, channel is flowing well.</i>				
6013	Pedestrian Bridge	Perrault St.	Steel Sliding Plate	Remove debris
<i>Light corrosion. Debris is accumulating.</i>				
			Embankment	Remove Brush/Trees
<i>Well vegetated. Mass concrete on west foreslope, east foreslope has large amount of granular material against the abutment wall. Tree growth around bridge should be cut back.</i>				
			RC Abutment Wall	Clean/sweep surface
<i>East abutment wall buried by granular debris. Mass concrete at the west abutment wall, voids noted under the concrete. Abutment walls were not visible, bearing seats were only visible portion. Similar condition 2020.</i>				
6014	Pedestrian Bridge	Stafford St.	Steel Pipe Ped Barrier	Repair Minor Damage
<i>Approach railings are critically perforated & have lost most of their support. Replace railings & add proper retaining walls in all four corners. Approach trail has eroded away at ends of deck.</i>				
			RC Ballast Wall	Re & Re Concrete
<i>Both ballast walls require replacement. Bridge was too long for abutments, bridge expansion has destroyed ballast walls. South end suffering the worst damage.</i>				
			Water Channel	Place rip-rap
<i>Revetment in front of the abutments is a high priority maintenance requirement. Tree down upstream of bridge across the channel. No change from previous visit.</i>				
			Steel Channel	Repair Minor Damage
<i>Generally in good condition. Connections at north & south ends have severed and need to be reset.</i>				



Bridge ID	Name	Road	Component	Maintenance
6014	Pedestrian Bridge	Stafford St.	Embankment	Erosion Control
<i>Significant bank erosion on both sides warrants channel armouring at this time. South footing is exposed from scouring. Erosion at level of path is compromising path surface. Condition of trail at both approaches is a pedestrian hazard.</i>				
6015	Pedestrian Bridge	Mountainview Cres.	RC Abutment Wall	Repair Damage Clean/sweep surface
<i>Abutments slightly twisted causing the structure to rack. Spalls under the girders at bearing locations. Debris is accumulating on bearing seats.</i>				
			Timber Soldier Post	Spot post replacement
<i>West bollard post has been removed. East bollard post has been replaced.</i>				
			RC Ballast Wall	Repair Damage
<i>East ballast wall has spalled & broke off in sections. Girders are tight against ballast walls this is causing the damage, no room for expansion.</i>				
6017	Eva Avenue Pedestrian Bridge	Eva Avenue	Steel Floor Beam	Power Wash
<i>Patina well developed. Cleaning at abutments strongly encouraged.</i>				
			Stringers	Power Wash
<i>Patina well developed. No excessive corrosion at abutments.</i>				
			Steel Sliding Plate	Power Wash
<i>Good condition.</i>				
			RC Abutment Wall	Clean/sweep surface
<i>Satisfactory condition. Debris on bearing seats.</i>				
6020	Mountain Street	Mountain St.	Embankment	Repair Security Fence
<i>Stable. Security fence on north side is leaning and would benefit from maintenance.</i>				
6500	Beatrice Crescent Culvert	Beatrice Cr.	Embankment	See Comment
<i>Rip rap stone around culvert ends. No guide rail protection at road side. Fence post hazard at outlet end requires removal. See image.</i>				



Bridge ID	Name	Road	Component	Maintenance
6502	Junction Creek	Barrydowne Rd.	Water Channel	Remove Obstructions
<i>Significant scour over 1 m deep at middle of culvert. Aggradation is occurring along the north wall. Many shopping carts (at least 6) in the channel causing obstruction these should be removed.</i>				
6504	Belfry Avenue Culvert	Belfry Ave.	Embankment	Remove Brush/Trees
<i>North embankment is over steepened. Heavy vegetation around guide rail should be brushed out. Gabion basket retaining walls at south end of culvert.</i>				
6506	Third Avenue	Bancroft Dr.	Water Channel	Channel Dredging
<i>Downstream channelization recommended. Aggradation building up inside barrel at south end outlet, culvert should be cleaned out. Large aggradation island at the south end, channel forced to flow out at SE corner of culvert barrel.</i>				
6507	Arthur Street	Arthur St.	Timber Post & Guide Rail	Spot post replacement
<i>Rip rap has been placed and guide rail posts have been supported. Eccentric loader end treatments on west side. Wraps around into driveway in the SE. One post on the west side has been severed, see pic.</i>				
			Embankment	Remove Brush/Trees See Comment
<i>Old sheet pile holding up old concrete wall in SE corner. SE corner should be updated with proper retaining wall. Large tree in SE corner interfering with retaining wall. Rip rap on NE side. West embankments are good.</i>				
6508	Kenwood Avenue	Kenwood Ave.	Embankment	Remove Brush/Trees
<i>Mature trees growing at culvert ends should be removed.</i>				
			Water Channel	Place rip-rap
<i>Raising invert with culvert liner has initiated some channel scour downstream (south). Low flow is mostly in east barrel. Channel drops about 0.7 m into scour hole at outlet. No change in 2020.</i>				
6509	Highgate	Highgate	Embankment	See Comment Remove Brush/Trees
<i>Sink hole has developed around catch basin in SW quadrant, see image.</i>				
			Water Channel	Remove Obstructions Channel Dredging
<i>Both inlet & outlet ends should have channel cleaned. Significant aggradation & sedimentation at outlet is backing up water in culverts. Marshy growth is obstructing channel. Small beaver dam at outlet (south end) of east barrel (2016-2020).</i>				
			CS Plate Pipe Arch	Remove debris
<i>Small perforations present at inlet of both barrels, north end. Light to moderate corrosion. Many nuts missing. Aggradation inside both barrels up to 0.5m. East barrel carries flow of the channel. Large amount of debris in east barrel. Difficult to assess condition of bottom of culvert due to the aggradation inside barrels.</i>				



Bridge ID	Name	Road	Component	Maintenance
6510	Trans Canada Trail (Barrydowne Arena)	Trans Canada Trail	Bottom Chord	Spot Paint
<i>Paint is blistering and debonding. Significant loss of coating on underside of the bridge. Exposed steel has moderate corrosion.</i>				
			Steel Floor Beam	Spot Paint
<i>Paint is blistering & debonding. Touch up paint would be beneficial.</i>				
6511	Attlee Ave Pedestrian	Trail	Embankment	Remove Brush/Trees
<i>Concrete & stone slope protection at culvert ends, good condition. Trees growing through chain link fence over culvert should be cleared.</i>				
			Chain Link Fence	Repair Minor Damage
<i>Fencing is damaged in several locations. One post is severed.</i>				



Bridge ID	Name	Road	Component	Maintenance
South				
1013	CPR Overhead (Westbound)	Old Highway 17 (Regional 55)	Asphalt Wear Surf	Repair Pavement Joint
<i>Resurfaced in 2017. West end driving lane off bridge there is settlement, potholing and distortion.</i>				
			Protected ECRC Deck	Clean/sweep surface
<i>Deck was rehabilitated in 2017. Appears full depth deck repairs were required. Presumed deck was waterproofed. Deck should be in reasonable serviceable condition following rehab.</i>				
			X- Joint Conventional	Local repair
<i>All expansion joints replaced with Type A clamping plate type joints in 2017. Joints ends do not align with joint drains on sides of bridge, see images. Joint drains should be reworked. Joint cover plates on barrier walls are facing the wrong direction. Some minor spalling of concrete dams.</i>				
1014	CPR Overhead (Eastbound)	Regional Rd. 55	Protected ECRC Deck	Clean/sweep surface
<i>Deck is covered with asphalt, no signs of any problems with deck top.</i>				
			Embankment	Erosion Control Place rip-rap
<i>Areas of gullyng type erosion along NW embankment and at SE embankment. SE erosion is caused by failing CSP in embankment. Both areas will eventually cause loss of road shoulder if not repaired. Extending curbs and adding catch basins may help. Additional severe gullyng of SW embankment noted in 2020.</i>				
			Asphalt Wear Surf	Repair Pavement Joint
<i>Asphalt on deck is in good condition. Asphalt expansion joints at approaches are settled and distorted and require repair. Normal wear and aging on deck. No evidence of underlaying delamination.</i>				
1015	Finland Creek Bridge	Godfrey Dr.	Sidewalk	Re & Re Concrete
<i>Footprints in original concrete sidewalk. Abrasion along curbs.</i>				
1022	Poland Street Bridge	Poland St.	Paint Coating	Touch-up Paint
<i>Coating on railing system, several areas require touch-up.</i>				
			Sidewalk	Repair Damage
<i>Sidewalk has settled on approaches, possible tripping hazard for pedestrians. Asphalt padding should be added or grind down uneven surface.</i>				



Bridge ID	Name	Road	Component	Maintenance
1024	Big Nickel Mine Rd	Big Nickel Mine Rd	RC Wing Walls	Re & Re Concrete See Comment <i>Brine discharge occurring below semi-integral abutment joint detail at all wing walls. Brine has caused deep disintegration and development of AAR. This has given an unsightly appearance to recently rehabbed bridge. Gaps in barrier walls should be sealed to contain brine. Substantial delamination in NE wing wall. About 1.2 m^2 severe disintegration and 3-4 m^2 delam on SE wing wall.</i>
			Asphalt Wear Surf	Repair Pavement Joint <i>Excessive random cracking given the age of pavement. Expansion joints in pavement off ends of approach slabs require maintenance repairs. No evidence of underlaying delamination however one suspect area noted in SE quadrant.</i>
1025	Lily Creek Bridge	Bouchard St.	Stacked Concrete	Re & Re Concrete <i>Under-cut in SE corner and requires maintenance to stabilize.</i>
1026	Junction Creek Bridge	Regent St.	Safety Shape B/Wall	Apply Sealant Repair Damage <i>Extensive cracking on interior face. Part of barrier wall removed in 2018 & replaced with steel beam guide rail. Guide rail posts have sharp burrs where cut off and should be ground smooth.</i>
1028	Struthers Pedestrian Bridge	Struthers St.	Guide Posts	Spot post replacement <i>Timber Bollards at both ends of deck are decayed & should be replaced.</i>
			Embankment	Remove Brush/Trees Pad approach settlement <i>Trees are overhanging structure.</i>
			RC Shaft	See Comment <i>Small delamination on east pier, small spall on west pier at girder bearing. Embankment pushing on piers and should be graded to balance pressure on pier faces.</i>
			RC Abutment Wall	See Comment <i>West abutment partly obscured by granular material. Small spall NE corner of east abutment. Bearing seats should be cleared of granular debris.</i>
			Steel Pipe Ped Barrier	Repair Minor Damage <i>Two panels moderately corroded. Several locations where the steel mesh has separated from top rail.</i>
1029	Copper Cliff Trail Bridge	MR 55 (Old Hwy 17)	Paint Coating	Touch-up Paint <i>Good condition. Very minor spot rust.</i>



Bridge ID	Name	Road	Component	Maintenance
1533	Lily Creek	Martindale Rd.	Water Channel	Remove Obstructions
<i>The inlet alignment is not ideal. Aggradation inside barrel of culvert. Beaver dam just upstream of culvert inlet, this appears to be an on-going problem at this site. Some debris in downstream channel as well.</i>				
			Embankment	Remove Brush/Trees
<i>Paved shoulders over top of the structure. Old tree on SW side is partially obstructing the channel.</i>				
1534	Junction Creek	McLeod St.	Embankment	Remove Brush/Trees
<i>Well vegetated.</i>				
1560	Southview Dr.	Southview Dr	Steel Beam on Steel Post	Repair Minor Damage
<i>Some minor impact damage.</i>				
2012	INCO Railway	Elm St. West	Asphalt Wear Surf	Repair Pavement Joint
<i>Random open cracking on approaches. Pattern cracking along asphalt joints. Asphalt joints have been repaired since 2014 inspection but require further attention. Normal wear and aging. One lane in WBL resurfaced since 2018.</i>				
2013	Lasalle Interchange	Elm St. West	Embankment	Repair Gullies
				Place rip-rap
<i>Erosion at ends of barrier walls has been padded with asphalt. Curbs on south side have detached. Slopes on low side of superelevation are being washed out regularly. Improved curb and gutter with directed drainage and catch basins recommended.</i>				
			Soffit	Scale Loose Concrete
<i>Minor delaminations and rust staining on construction joint of original structure. About 10 m² shallow delam on original bridge soffit. To prevent further damage to the soffit it is recommended that the deck be water proofed and paved. Small distressed area developing on fascia corner south side.</i>				
			Asphalt Wear Surf	Rout & Seal
<i>Open random cracking. Pavement joints have been repaired.</i>				
2014	CPR Overhead	Lasalle Blvd.	Steel Post & Guide Rail	Repair Minor Damage
<i>Minor guide rail damage is projecting into traffic.</i>				
			RC Abutment Wall	Re & Re Concrete
<i>Disintegration observed on both abutments, east side where water is leaking through semi-integral abutment joints. Approximately 2.0m² of severe disintegration in southeast corner. And 1.0m² by 0.6 m deep in northeast corner. Disintegration up to 60 cm deep estimated in 2020. Rate of disintegration is alarming and repair and prevention measures urgently required.</i>				



Bridge ID	Name	Road	Component	Maintenance
2015	CPR Overpass / Nolin Creek	Elm St. West	Embankment	See Comment
<i>Bridge is partly in rock cut. Despite stabilization efforts on east side, loose rock is falling on the east pier footing. Further rock face stabilization warranted.</i>				
			RC Column	Apply Sealant Re & Re Concrete
<i>Exterior pier columns are suffering due to location of deck drains. Base of south column at east pier has significant deterioration and open AAR cracking that will require repair.</i>				
			Pier Base/Foundation	Re & Re Concrete
<i>Wide longitudinal cracks observed. Disintegration under deck drain to a depth of 150 over most of the end of the east pier.</i>				
			Asphalt Wear Surf	Repair Pavement Joint
<i>Expansion joints in asphalt at ends of bridge are very distorted and cracked and require maintenance.</i>				
			RC Cap	Apply Sealant
<i>Pier caps are partly wrapped with FRP. Appears to be recently installed. Generally caps in good condition.</i>				
2016	Dufferin Street Bridge	Dufferin St.	Water Channel	Remove Obstructions
<i>Small weir located at inlet is severely corroded and gathering debris. This weir is resulting in some minor scour. Large scour hole downstream of this bridge is associated with a storm water sewer. Log resting against entrance to bridge in 2020.</i>				
			Embankment	Remove Brush/Trees
<i>Brush growing against bridge. Embankments stable.</i>				
			Steel Pipe Ped Barrier	Repair Minor Damage
<i>Secure. 40% loss of coating. Moderate impact damage SW corner. Does not satisfy current standards. Not suitable for traffic barriers.</i>				
2020	Pedestrian Underpass	Dufferin St.	Single Pipe Hand Rail	Repair Minor Damage
<i>Railing damaged at south end.</i>				
2021	Pedestrian Crossing	Dufferin St.	RC Shaft	Remove Graffiti See Comment
<i>Minor spalls below bearings. Bearings at the piers are corroded. Embankment is pushing on face of north pier. Slope should be regraded to relieve pressure.</i>				



Bridge ID	Name	Road	Component	Maintenance
2021	Pedestrian Crossing	Dufferin St.	RC Abutment Wall	Clean/sweep surface
<i>North abutment partly buried with fill. Small spalls west abutment at bearing location. Debris at north abutment should be removed.</i>				
			Embankment	Pad approach settlement
<i>Recommend padding approaches to prevent trip hazard.</i>				
2509	Inco Pipeline	Elm St. West	CIP RF Box Culvert	Apply Sealant
<i>Culvert has been extended to the south. Extension is in excellent condition. Open AAR cracking at north fascia to 10 mm wide. Plastic sheeting hanging from original soffit. Some leaking noted at CJ north extension.</i>				
2512	Nolins Creek	Frood Rd.	Steel Pipe Ped Barrier	Repair Minor Damage
<i>Top rail separated, loose mesh. Partially insecure.</i>				
			Embankment	Stabilize Wall Repair Security Fence
<i>Retaining wall in the southeast corner is undercut and should be strengthened. Neighbour complained about surface flow from adjacent street.</i>				
2513	Inco Drainage Ditch	Lasalle Blvd.	CIP RF Box Culvert	See Comment
<i>Barrel is overall in good condition. Only concern is the complete obstruction of the south end. Silt has started to build up inside culvert at buried end. Only inspected from north end in 2020 due to confined space and water depth concerns.</i>				
			Water Channel	Remove Obstructions
<i>Outlet is obstructed by infilling of channel with waste earth material. Also storm water outlet is discharging material into outlet end of culvert. Water is ponding & trickling through fill. This condition is not sustainable. Culvert will eventually silt full and be rendered unserviceable. No notable change in 2020.</i>				
2516	McNeil Pedestrian Crossing	Over Nolins Creek	Wood Post Wood Rail	Spot post replacement
<i>This refers to the platform railing. Based on age, posts and rails should be assessed by a carpenter and replaced as required.</i>				
2517	Erie/Monck Pedestrian Crossing	Erie St.	Sidewalk	Repair Damage
<i>Asphalt sidewalk at both the north and south entrance are a hazard for pedestrians. Culvert and approaches do not satisfy accessibility standards. Severe distortion and settlement of asphalt at north entrance.</i>				
2518	Lasalle/Inco Culvert	Lasalle Blvd.	Water Channel	Remove Obstructions
<i>Gravelly material is being eroded from slopes and is being deposited as a large alluvial fan that is partly obstructing the culvert outlet. A retaining wall is suggested to maintain channel.</i>				



Bridge ID	Name	Road	Component	Maintenance
2519	Nolins Creek	Beatty St.	CIP RF Open Ftg Culv	Repair Damage
<i>Soffit is saturated, has extensive leaching, spalling, and delaminated areas mainly associated with a catch-basin penetrating the soffit. Wide crack in barrel walls. Water main through culvert is severely corroded. Steel bracing for water main pipe has severe corrosion and section loss, bracing is attached to spalled areas on soffit. Culvert is vulnerable to localized failure around catch basins.</i>				
			Steel Pipe Ped Barrier	Repair Minor Damage
<i>Bottom rail of steel railing west side is damaged and there is perforation evident.</i>				
5002	Broadway Street Bridge	Broadway St.	Chain Link Fencing	Repair Minor Damage
<i>Light corrosion and pitting of posts and mesh. Two post caps missing causing instability. Trees growing into fence.</i>				
			Embankment	Remove Brush/Trees
<i>Stable. Trees growing into fence should be cleared.</i>				
5003	Brady Street Underpass	Brady St.	RC Wing Walls	Apply Sealant
<i>Disintegration & AAR most prominent in splash zone.</i>				
5020	Deer Creek Bridge	Red Deer Rd.	Steel Bent	Repair Minor Damage
<i>Major corrosion at and below the water line, perforation noted (2020) at middle H pile (web) south end. Major pitting. Bracing is in satisfactory condition. Perforated H pile needs repair to bolster web.</i>				
			Timber-Laminated	Spot deck plank replacement
<i>2x10 boards on side comprise deck. Laminated timber deck is slightly worn. Timber running boards are damaged at south end. NE corner is settled, deck boards slightly displaced.</i>				
5021	Deer Creek Bridge	Woodland Rd.	Timber Post & Guide Rail	Spot post replacement
<i>Flex beam attached to 2 - HSS sections on bridge. Timber post and guide rail on approaches. Several posts have major decay in tops , similar timber blocking.</i>				
			Embankment	Erosion Control
<i>Fill slopes on both south sides has spilled into the water channel and is constricting the flow. Erosion in the NW corner behind ballast wall, G/R post is partially exposed.</i>				
5022	Pedestrian Bridge	Wellington	RC Abutment Wall	Clean/sweep surface
<i>Abutments buried.</i>				



Bridge ID	Name	Road	Component	Maintenance
5022	Pedestrian Bridge	Wellington	Water Channel	Place rip-rap
<i>Downstream north bank is scouring and would benefit from rip rap slope revetment.</i>				
			Steel Grating	Repair Minor Damage
<i>Grating is not square on girders which suggests the bridge may have an inadvertent skew. One section of grating near north end is raised about 20 mm and should be refastened tight to the girder.</i>				
			Steel Pipe Ped Barrier	Repair Minor Damage
<i>One missing bolt on east side south end post base. One rail panel at north end is missing one bolt. Panel on east side is corroded and should be replaced. Welded wire mesh partly detached from top rail of centre span west side.</i>				
			Timber Soldier Post	Spot post replacement
<i>Soldier posts have been removed since 2016. No change 2020.</i>				
5023	Pedestrian Bridge	Nelson St.	Conc Curb	Clean/sweep surface
<i>Satisfactory condition.</i>				
			Unprotected BSRC Deck	Clean/sweep surface
<i>One section of deck is significantly disintegrated. Another large section is delaminated.</i>				
			Embankment	Remove Brush/Trees Repair Gullies
<i>Over-steepened below abutments.</i>				
			Bottom Chord	Remove debris Power Wash
<i>Debris is contributing to corrosion of bottom chords. No obvious cleaning since previous inspection.</i>				
5024	Elgin Pedestrian Subway	Elgin St.	Unprotected BSRC Deck	Repair Damage
<i>Stairs rehabilitated in 2017. Walking surface through tunnel has localized areas of delamination through out. Minor spalling occurring.</i>				
			CIP RF Box Culvert	Re & Re Concrete
<i>Some light graffiti competing with the intended art. Two uneven sections of floor warrant repair. Interior surfaces have been painted thus obscuring some concrete defects. Structurally the tunnel is in good condition. The SE wall of the culvert adjacent the south portal has delaminated with some spalled areas. Moisture & active seepage penetrating top of structure at north entrance. Scaled areas on soffit near south end.</i>				



Bridge ID	Name	Road	Component	Maintenance
5025	Lily Creek	Paris St.	Ped Steel Post & Panel	Repair Minor Damage
<i>Railing on the both sides have collision damage most likely from plow, west side is worst condition. Post in the SE corner lacks proper support. Railing is not secure for pedestrians.</i>				
5051	Centennial Dr Park Bridge	Centennial Dr.	Bottom Chord	Spot Paint
<i>Areas of paint loss are starting to corrode. Utility conduit attached to the north bottom chord.</i>				
			Timber-Sawn	Spot deck plank
<i>Deck has been repaired since 2016, plywood over top of 2x6 planks. Deck requires renewal, boards are decayed and failing. Bollard at west end restricts vehicle traffic.</i>				
			RC Abutment Wall	Clean/sweep surface
<i>Good condition. Wingwalls are not connected to the abutments and have begun to separate causing some erosion. Debris accumulating on the bearing seats, this should be cleaned.</i>				
5500	Chief Lake Road Culvert	Chief Lake Rd.	Embankment	Remove Brush/Trees
<i>Satisfactory condition tree growth should be brushed back at culvert ends. No traffic protection at this site. No guide rail or delineators at this location.</i>				
5506	Long Lake Road Culvert	Long Lake Rd.	Steel Post & Guide Rail	Repair Minor Damage
<i>Guide rail has partially detached in the NE corner. Eccentric loader end treatment in the NW is damaged from vehicle impact. Several impact strikes to long guide rail at this structure.</i>				
5507	Long Lake Road	Long Lake Rd.	Water Channel	Remove Obstructions
<i>Drop structure designed into culvert. Blocky stone material is partly obstructing inlet (north). High velocity current at 2018 inspection. Moderate velocity at 2020.</i>				
			Embankment	Repair Gullies Place rip-rap
<i>Check warrant for protecting ends of culvert. Wash-out of granular material noted on both sides of road. Natural gas line noted at south end of structure.</i>				
5508	Broadway	Broadway	RC Slab on Wall Culvert	Re & Re Concrete
<i>South exposed ends have severe scaling & disintegration . Ice inspection carried out in 2014 revealed interior of culvert is in generally good condition. Water main crosses through roof of culvert. Leaching and minor damage around CJ. Not possible to wade through culvert in 2018 due to current and water level.</i>				
			Embankment	Remove Brush/Trees
<i>Slopes are stable. Trees need brushing back.</i>				



Bridge ID	Name	Road	Component	Maintenance
5511	Centennial Dr @ Lily Creek	Centennial Dr.	Embankment	Remove Brush/Trees
<i>Tree growing over culvert at the south end.</i>				
5516	Mallards Landing Park	Trans Canada Trail @ Mall	Embankment	Remove Brush/Trees Pad approach
<i>Brush growing tight to bridge.</i>				
6001	CPR Subway	College St.	Sidewalk	Repair Damage
<i>The sidewalk on the west side has a steel clad splash barrier. The barrier is secure but heavily corroded with perforations in a few areas.</i>				
			RC Wing Walls	Re & Re Concrete
<i>Retaining walls on approaches have severe open AAR cracking. Substantially delaminated in 2018 and at risk of sudden crumbling.</i>				



Bridge ID	Name	Road	Component	Maintenance
Northwest				
2000	Simmons Road Bridge	Simmons Rd.	X- Joint Conventional	Reinstate Seal Repair End Dams
<i>Expansion joints replaced around 2000. Seal is depressed and pulled out of retainer and leaking at west joint. Large spall in west expansion joint dam. AAR present. Numerous smaller spalls.</i>				
			RC Column	Re & Re Concrete
<i>Columns of east bent are honeycombed and scaled at water line. North column of west pier has lost about 1/3 of its section due to spalling or severe honeycomb, or possibly ice damage, and should be repaired with a steel collar and grout. Remaining columns have similar but less severe condition. One column of east pier is out-of-plumb. Not possible to access in 2020.</i>				
			Embankment	Remove Brush/Trees
<i>Some severe erosion in SW corner. Retaining wall recommended at water gauging station.</i>				
			Scupper & Pipe	Unplug Scuppers
<i>Grating on one drain in NE corner has been broken off. Unusual side discharge leads to easy plugging of drains.</i>				
2001	Vermillion Lk Rd	Vermillion Lk Rd	Safety Shape B/Wall	Re & Re Concrete
<i>Base of both barrier walls exhibiting delamination. About 10 m length of spalling and delamination at base of south wall and 6 m on north wall.</i>				
2002	Main Street Bridge	Main St.	Embankment	Remove Brush/Trees
<i>No concerns. Syringes previously noted under bridge.</i>				
2003	Whitson Creek Bridge	MR 15	Asphalt Wear Surf	Routine Maintenance
<i>Minor longitudinal crack. Debris on shoulders.</i>				
2004	Whitson Creek Bridge	MR 15	Single Pipe Hand Rail	Replace/Tighten Nuts
<i>Good condition. Railing detached from one post in NW quadrant, 3rd bracket from west.</i>				
2005	Onaping River Bridge	M R 8	Timber Post & Guide Rail	Spot post replacement Local repair
<i>Some moderate decay in posts but about 5 years of remaining service life. Guide rail set too low adjacent sidewalk at east end.</i>				



Bridge ID	Name	Road	Component	Maintenance
2005	Onaping River Bridge	M R 8	X- Joint Conventional	Local repair
<i>Some scaling appearing on end dams. Minor abrasion. In the SE corner at the expansion joint dam thickening wood in the concrete has caused a spall. Joint is sealed. Some seepage from west paved over joint. Some ravelling of asphalt adjacent the dams.</i>				
			Sidewalk	Re & Re Concrete
<i>Scuffed by snow ploughs. Sidewalk soffit has frequent leach stained cracks. Abraded several mm by snowmobiles.</i>				
			Embankment	See Comment
<i>Spotty vegetation cover. Evidence of combustibles being stockpiled in SW corner. Severe gullyng in NE quadrant.</i>				
2006	Onaping River Bridge	Morgan Rd.	Deck_Drain Tube	Re&Re Deck Drain Tubes
<i>Missing, leading to brine from deck dripping on girder ends.</i>				
			RC Wing Walls	Apply Sealant
<i>Generally in good condition.</i>				
			RC Abutment Wall	Apply Sealant
<i>AAR related cracking and spalling noted in abutment corners. Worst AAR in NE corner with 4 mm wide cracks, about to disintegrate.</i>				
			Safety Shape B/Wall	Apply Sealant
<i>Light AAR throughout is most noticeable at base. Small collision spall in NW corner. Snow plough scoring on base.</i>				
			Embankment	Erosion Control
<i>Not fully vegetated. Some erosion at bridge corners most notably in the SE corner.</i>				
			Conc Filled Pipe	Spot Paint
<i>Light pitting of columns. Pier collars have some light scaling throughout. About 10% loss of coal tar epoxy coating. Base of pier columns has been undercut in SE corner.</i>				
			X- Joint Conventional	Local repair
<i>Joint dams have pronounced AAR and scaling, and are starting to disintegrate. No evidence of leakage at time of inspection (2020). Large divots in dams require repair. South expansion joint in poorest condition.</i>				



Bridge ID	Name	Road	Component	Maintenance
2006	Onaping River Bridge	Morgan Rd.	RC Cap	Apply Sealant
<i>Open AAR cracks on exposed ends of piers. West end of south pier cap has delaminated and will likely spall off within the next 2-4 years.</i>				
2007	Vermillion River Bridge	Morgan Rd.	Embankment	Remove Brush/Trees
<i>Mostly vegetated. Banks scour susceptible.</i>				
			Timber Post & Guide Rail	Spot post replacement Local repair
<i>Tops of many posts exhibit major decay. G/R attachment to SE end wall requires repairs.</i>				
			Water Channel	Remove Obstructions
<i>Navigable channel. River is cutting into upstream east bank. Some pre-emptive rip rap revetment may help keep river in desired channel. Debris has accumulated against east pier and about 40% of the channel is obstructed.</i>				
2008	Montee Principale Bridge	Montee Principale	X- Joint Conventional	Remove Debris
<i>Moderate AAR and scaling developing on concrete dams. Drainage from north joint at NW corner is causing disintegration damage to the substructure. Seals slightly pulled at retainers.</i>				
			RC Abutment Wall	Apply Sealant
<i>AAR developing on exposed ends.</i>				
			RC Wing Walls	Re & Re Concrete
<i>Wingwalls at NE & NW corners are spalled and disintegrated due to AAR and expansion joint leakage.</i>				
			Embankment	Remove Brush/Trees
<i>Minor erosion on fore-slopes. Trees around wing walls need to be cleared, especially SE quadrant.</i>				
			Asphalt Wear Surf	Rout & Seal
<i>Normal wear. Numerous random, transverse and longitudinal sealed and unsealed cracks throughout. No evidence of underlying delamination.</i>				
2009	Whitson River Bridge	M R 15	Asphalt Wear Surf	Routine Maintenance
<i>Deck waterproofed and paved in 2017. Some debris on deck shoulders should be cleaned. Cracking from thermal bridge movement at ends of bridge.</i>				



Bridge ID	Name	Road	Component	Maintenance
2009	Whitson River Bridge	M R 15	Safety Shape B/Wall	Repair Minor Damage
<i>New safety shape barrier wall installed in 2017.</i>				
2010	Landry Street Bridge	Landry St.	RC Wing Walls	Apply Sealant
<i>Good condition. Early AAR visible. Etching below water line.</i>				
			Timber Post & Guide Rail	Local repair
<i>Recommend spot replacement of the decayed posts. No terminals present.</i>				
			Embankment	Remove Brush/Trees
<i>South embankments have stacked curb protection. Wall at the SE corner has partially failed. Tree growing between concrete blocking in the SE. SE wall is unstable.</i>				
			Twin Pipe & Stanchion	Repair Minor Damage
<i>Two caps missing at NE end. Top railing on south side has minor impact damage.</i>				
			RC Arched Slab	Apply Sealant
<i>Deck surface was remeasured in 2018. Extensive open AAR cracking on both fascia. Cracks approaching 3mm width.</i>				
2500	Birch St Culvert	Birch St	Embankment	Remove Brush/Trees
<i>Well vegetated. Wild parsnip noted along embankments 2020. Recommend brushing out culvert ends. Trees growing between barrels at both ends.</i>				
2504	Montpellier Road Middle Culvert	Montpellier Rd.	Steel Post & Guide Rail	Repair Minor Damage
<i>Extruders in all 4 corners. Damage to ends at south side in 2020, see images.</i>				
2508	Landry Creek	Notre Dame Ave.	Steel Pipe Ped Barrier	Repair Minor Damage
<i>Railing at the south end at bus stop location. Railing is loose. Top rail is bent.</i>				
			Gabion Basket	Repair Minor Damage
<i>Loss of stones from baskets.</i>				



Bridge ID	Name	Road	Component	Maintenance
2510	Whitewater Creek	MR 35	Gabion Basket	Repair Minor Damage
<i>Basket in NW corner has lost its contents, also similar in the NE. A more permanent solution than gabion baskets is justified.</i>				
			Precast RF Box Culvert	See Comment
<i>Good alignment. Scaling developing below the water line. Staining and damp areas on walls due leaking joints. Ice inspection in 2014 confirms good condition of interior. Could not walk through in 2020, joints at ends are leaking east end is the worst case. Leakage at the joints will be the cause of future damage to this culvert. Principal flow through east barrel. About 20 cm settlement at upstream end. Erosion has resulted in partial obstruction of outlet of north pipe. Channelizing recommended. Retaining wall in NW quadrant would help with erosion.</i>				
2533	Trans Canada Trail	Onaping Falls	Embankment	Remove Brush/Trees
<i>Brush at west end should be trimmed to promote air circulation at abutment.</i>				
			RC Ballast Wall	Re & Re Concrete
<i>Good condition. Minor spalls in tops of both ballast walls.</i>				
			Timber-Sawn	Spot deck plank
<i>About 12 boards require replacement as of 2020. Deck is being well maintained.</i>				
2534	Bridge St /Emile St	Trans Canada Trail	RC Abutment Wall	Clean/sweep surface
<i>Debris on top of abutments should be removed.</i>				
			Embankment	Remove Brush/Trees Erosion Control
<i>Embankment is contacting bottom of bridge at NW corner. Local hand excavation required to remove this condition. There is a large gully feeding into the stream and this is a potential liability. On the west approach erosion is reducing the width of the approach path and this may result in accessibility and liability challenges. Bollards on bridge ends should have a reflective strip.</i>				
			RC Cap	Clean/sweep surface
<i>Good condition.</i>				
2536	McKenzie Creek Culvert	Montpellier Road	Steel Post & Guide Rail	Repair Minor Damage
<i>Extruders in all four corners. Repair of extruders in SW & NE corners required.</i>				



Bridge ID	Name	Road	Component	Maintenance
Northeast				
3000	Nelson Lk Rd @ Rapid River	Nelson Lk Rd.	Timber Post & Guide Rail	Spot post replacement
<i>Buried end treatments. Several posts are starting to decay on top surface. Guide rail at NE corner has minor impact damage.</i>				
3001	Vermillion River Bridge	Desmarais	Steel Post & Guide Rail	Repair Minor Damage
<i>Satisfactory condition. Eccentric loader at the NE and extruder end treatment at NE. NE end has been repaired since 2018. SE flex beam has a long tear from vehicle scrub this section of beam should be replaced, see pic.</i>				
			RC Parapet	Re & Re Concrete
<i>SW end wall is damaged from presumably vehicle impact, top is spalled see pic. Walls have numerous areas of parging and leaching cracks.</i>				
			Embankment	Remove Brush/Trees
<i>Large stone on fore slopes. Tree growth under bridge and around bridge requires removal.</i>				
			Single Pipe Hand Rail	Repair Minor Damage
<i>2 damaged railing anchors on east side. Damage at SW end post.</i>				
3002	Martin Road Bridge	Martin Rd.	Gabion Basket	Repair wire mesh
<i>Gabion baskets in SW quadrant have lost most of their contents. These should be reset and refilled. Gabions on all corners are failing to some degree.</i>				
			Timber-Laminated	Local repair
<i>Creosoted timber in mostly good condition. Asphalt on deck indicates several suspect areas in the deck surface see pics. Expect some localized areas of major decay in top of deck boards.</i>				
			Steel-Rolled	Remove debris
<i>Some minor section loss and significant slab rust where approach girders rest on main girders. Appears salt is penetrating the deck and corroding the girders.</i>				
			Water Channel	Remove Obstructions
<i>Some upstream bank scour. Tree lodged against south pier. Evidence of scour on the fore slopes. Stream stable and centred under bridge. Adequate bridge opening.</i>				
			Asphalt Wear Surf	Routine Maintenance
<i>Asphalt has a number of small cracks corresponding with laminated timber deck boards. In 2018 a "soft" spot was noted on the centre span, west side. Possible decay in underlaying deck. This is also noted in several locations during the 2020 inspection.</i>				



Bridge ID	Name	Road	Component	Maintenance
3002	Martin Road Bridge	Martin Rd.	Timber Post & Guide Rail	Local repair
<i>Strut supporting G/R post is displaced on downstream side. Appears post is split in half. Damaged post at the NW end. Barrier system on bridge should be updated.</i>				
			Timber Curb	Local repair
<i>Curb has moderate impact damage at the SE and NW from winter plow.</i>				
3005	Whitson River	M R 80 (Hwy 69)	Single Pipe Hand Rail	Repair Minor Damage
<i>Snow plow damage on both sides. One post anchor on east side has been severed. About 10 posts anchors damaged in total. Missing end caps in all four corners. Railing is rusted through in numerous locations.</i>				
			Timber Post & Guide Rail	Local repair
<i>Extruder end treatment located in NW and SE corners. Buried ends in NE and SW corners, buried ends are not fully buried and have some impact damage. A number of posts have been split or damaged from sidewalk traffic.</i>				
			Steel Pipe Ped Barrier	Repair Minor Damage
<i>Chain-link fencing attached to the pedestrian railings. Railings on both sides are leaning outwards.</i>				
3006	Kalmo Road Bridge / Whitson River	Kalmo Rd.	Bailey Bearings	Power Wash
				Remove debris
<i>Mostly covered with debris.</i>				
			Steel Angle	Repair Minor Damage
<i>One steel angle approach curb has been removed in the northwest corner and should be replaced.</i>				
			Timber-Laminated	Spot deck plank replacement
<i>Laminated deck portion in good condition. Some wear and decay in chassing and running boards.</i>				
			Timber Wear Surface	Local repair
				Reset Nail Heads
<i>Mechanical wear. Some running boards partly replaced. Lag bolts should be counter-sunk so they are not plucked by traffic or plough. Curbs are tired.</i>				
3503	MR 80	MR 80	Timber Post & Guide Rail	Spot post replacement
<i>Some minor collision damage. Minor decay noted in guide rail posts. These posts should be spot replaced. End treatments are damaged and should be updated due to high volume traffic at this location.</i>				



Bridge ID	Name	Road	Component	Maintenance
3504	Fleming Street Culvert	MR 80 (Highway 69 North)	Steel Beam on Steel Post	Repair Minor Damage
<i>Installed in 2008. Several areas of impact damage to both guide rails. Extruder end treatment in the NW end.</i>				
4000	Roberts River	M R 84 (Moose Mt)	Timber Post & Guide Rail	Spot post replacement
<i>Satisfactory condition. Guide rail does not properly align with HSS box beam rail system on the bridge. 1 timber post on north approach is split needs replacement. End treatments or connections to bridge do not meet current standards.</i>				
			Panel Bridge Brg	Remove debris
<i>Good condition, debris is accumulating and should be cleaned. South end is fixed bearing.</i>				
			Water Channel	Remove Obstructions
<i>Small beaver dam about 70m downstream of bridge. Beaver debris under bridge also.</i>				
			Timber-Sawn	Spot deck plank replacement
<i>Timber deck is covered by 2 x 6 timber wearing surface. Consider replacing with steel grate type deck.</i>				
			Mabey Panel	Repair Minor Damage
<i>Good condition. Two rakers, one at each approach corner (SE & NW) have been plastically deformed and bent, see images. The Maybe panels at these corners have received slight damage. Better impact prevention measures are needed. Condition unchanged in 2020.</i>				
			Timber Wear Surface	Local repair
<i>Wearing surface should be replaced at this time. Several boards have major decay and require replacement. Nail heads are sticking up at numerous locations. Several loose boards.</i>				
			RC Abutment Wall	Clean/sweep surface
<i>Good condition. Requires debris removal from bearing seat. Rock protection at face of abutment walls.</i>				
4003	Industrial Rd (Ski Hill Rd)	Industrial Rd (Ski Hill Rd)	Panel Bridge Brg	Remove debris
<i>2 roller bearings per corner. Tree growth at east end requires removal.</i>				
			Bin Wall	Remove debris
<i>Trees growing in bin wall should be removed.</i>				



Bridge ID	Name	Road	Component	Maintenance
4003	Industrial Rd (Ski Hill Rd)	Industrial Rd (Ski Hill Rd)	Steel Post & Guide Rail	Repair Minor Damage
<i>Several areas of damage from vehicle impact at the east ends.</i>				
			Embankment	Remove Brush/Trees
<i>Rip rap revetment in place.</i>				
			Delineator	Replace Sign
<i>All delineators are vulnerable to impact damage and require frequent straightening. Delineators should be properly installed in the ground not on guide rail.</i>				
4005	Roberts River	Ironside Lake Rd.	RC Abutment Wall	Local repair
<i>New 2020.</i>				
			Gravel Surface	Local repair



Performance Deficiencies Report

Bridge ID	Name	Component	Deficiency
1001	Vermillion River Bridge	Scupper & Pipe	Ponding
1002	Little Panache Lake Narrows	Paved-Over	Leaking
1003	Maninen Road Bridge	Water Channel	Constricted
		Paint Coating	Adhesion Loss
1005	Chicago Mine Road Bridge	Water Channel	Constricted
1006	Spanish River near Worthington Road	Water Channel	Obstructed
		Embankment	Erosion
1007	Vermillion River Bridge	Embankment	Erosion
		Paint Coating	Adhesion Loss
1012	Fielding Road Bridge	X- Joint Conventional	Leaking
		Asphalt Wear Surf	Uneven,Potholed
1019	Finland Creek Bridge	Water Channel	Lacking Freeboard
		Chain Link Fencing	Weakened
1020	Finland Street Bridge	Water Channel	Lacking Freeboard
		Asphalt Wear Surf	Uneven,Potholed
1022	Poland Street Bridge	Water Channel	Aggradation
		Sidewalk	Uneven,Potholed
1024	Big Nickel Mine Rd	Asphalt Wear Surf	Settlement
		Embankment	Over-steepened
1025	Lily Creek Bridge	Stacked Concrete	Displaced
1026	Junction Creek Bridge	Sidewalk	Settlement
1028	Struthers Pedestrian Bridge	RC Shaft	Tilting
1030	Meatbird Creek Pedestrian Bridge	Restriction	Missing
1529	MR 24 Culvert	Asphalt Wear Surf	Uneven,Potholed
		Water Channel	Obstructed
1531	Junction Creek	CIP RF Open Ftg Culv	Aggradation
1532	Junction Creek	Concrete Wing Walls	Displaced
1533	Lily Creek	Water Channel	Obstructed
1535	Lily Creek	Gabion Basket	Spilling
		Embankment	Erosion



Bridge ID	Name	Component	Deficiency
1535	Lily Creek	Timber Post & Cable	Weakened
1537	Fairbank Creek	Water Channel	Poor Alignment
1538	Fairbank Creek	Precast RF Box Culvert	Insufficient Barrel Length
1541	Panache Lake Rd. Culvert	Water Channel	Poor Alignment
		Steel Post & Guide Rail	Weakened
		Embankment	Erosion
1542	Wabagishik Road Culvert	Precast RF Box Culvert	Lacking Freeboard
		3 Cable Wood Post	Weakened
		Embankment	Erosion
1544	C. Johnson Road Culvert @ MR #4	Water Channel	Constricted
		Circular CS Plate Pipe	Lacking Freeboard
1545	Lorne Falls Rd. Culvert	Steel Post & Guide Rail	Inadequate Height
1546	Graham Rd. Culvert	Water Channel	Scour Prone
1548	CSPA Culvert	Circular CS Plate Pipe	Insufficient Barrel Length
1549	Balsam Street Bridge	Masonry Retaining Wall	Tilting
1553	Fairbank Creek Culvert	Steel Beam on Steel Post	Weakened
1561	Trans Canada Trail	Paint Coating	Adhesion Loss
1563	Fairbank Creek	CIP RF Open Ftg Culv	Insufficient Barrel Length
		Water Channel	Obstructed
		3 Cable Wood Post	Weakened
1565	Fairbank Creek Culvert	Water Channel	Poor Alignment
2000	Simmons Road Bridge	RC Column	Tilting
		Steel Sliding Plate	Uneven Bearing
		Paint Coating	Adhesion Loss
		Conc Rail/End Posts	Weakened
		X- Joint Conventional	Leaking
		Scupper & Pipe	Plugged
		RC Abutment Wall	Tilting
		Water Channel	Lacking Freeboard
2002	Main Street Bridge	Conc Curb	Inadequate Height
2003	Whitson Creek Bridge	Embankment	Over-steepened
2004	Whitson Creek Bridge	Conc Curb	Weakened



Bridge ID	Name	Component	Deficiency
2004	Whitson Creek Bridge	Embankment	Over-steepened
2005	Onaping River Bridge	Pole Base	Under Strength
		Rocker or Roller Bearing	Excess Displacement
		Timber Post & Guide Rail	Inadequate Height
2007	Vermillion River Bridge	Timber Post & Guide Rail	Weakened
		RC Cantilever	Tilting
		Water Channel	Obstructed
2008	Montee Principale Bridge	Water Channel	Scour Prone
2009	Whitson River Bridge	Embankment	Over-steepened
2010	Landry Street Bridge	Embankment	Unstable
2012	INCO Railway	Embankment	Over-steepened
2015	CPR Overpass / Nolin Creek	Scupper & Pipe	Collateral Damage
		Embankment	Unstable
2016	Dufferin Street Bridge	Water Channel	Scour Prone
		Soffit	Under Strength
		Steel Pipe Ped Barrier	Does'nt Meet New Standard
		Sidewalk	Uneven,Potholed
2500	Birch St Culvert	Circular CS Plate Pipe	Settlement
2505	Nickel Basin Road Culvert	Water Channel	Constricted
2507	Pilon Drain	Water Channel	Poor Alignment
2508	Landry Creek	Steel Pipe Ped Barrier	Weakened
		RC Slab on Wall Culvert	Load Carrying Capacity
2509	Inco Pipeline	Embankment	Unstable
2510	Whitewater Creek	Precast RF Box Culvert	Settlement
2512	Nolins Creek	Water Channel	Settlement
2513	Inco Drainage Ditch	Timber Post & Cable	Weakened
		Water Channel	Obstructed
		CIP RF Box Culvert	Obstructed
		Embankment	Unstable
2516	McNeil Pedestrian Crossing	Water Channel	Scour Prone
2517	Erie/Monck Pedestrian Crossing	Sidewalk	Uneven,Potholed
		RC Inlet/Outlet Walls	Tilting



Bridge ID	Name	Component	Deficiency
2517	Erie/Monck Pedestrian Crossing	Elliptical CS Plate Pipe	Lacking Freeboard
2518	Lasalle/Inco Culvert	Embankment	Unstable
2519	Nolins Creek	Wood Post Wood Rail	Weakened
		CIP RF Open Ftg Culv	Insufficient Barrel Length
		Asphalt Wear Surf	Uneven,Potholed
2534	Bridge St /Emile St	Embankment	Erosion
3000	Nelson Lk Rd @ Rapid River	Asphalt Wear Surf	Uneven,Potholed
		Timber Post & Guide Rail	Does'nt Meet New Standard
		Timber Post & Guide Rail	Does'nt Meet New Standard
		Embankment	Unstable
3001	Vermillion River Bridge	Delineator	Obscured
3002	Martin Road Bridge	Timber Post & Guide Rail	Weakened
		Timber Post & Guide Rail	Does'nt Meet New Standard
		Water Channel	Scour Prone
		Paint Coating	Material Breakdown
		Gabion Basket	Displaced
3003	Whitson River Bridge	Safety Shape B/Wall	Weakened
3005	Whitson River	Water Channel	Constricted
3006	Kalmo Road Bridge / Whitson River	Water Channel	Lacking Freeboard
		Bailey Transom	Exess LL Deflection/Vibration
3503	MR 80	Asphalt Wear Surf	Rutting
		Gabion Basket	Spilling
4000	Roberts River	Timber Post & Guide Rail	Does'nt Meet New Standard
		Mabey Panel	Connection
4005	Roberts River	RC Abutment Wall	Settlement
4501	Junction Creek Culvert	Water Channel	Aggradation
4503	Junction Creek	Water Channel	Poor Alignment
4505	Junction Creek	CS Plate Pipe Arch	Obstructed
		Water Channel	Obstructed
4506	Madison Avenue	Precast RF Box Culvert	Lacking Freeboard
		Water Channel	Lacking Freeboard
4507	Junction Creek	Water Channel	Obstructed



Bridge ID	Name	Component	Deficiency
4508	MR 85 CULVERT	Water Channel	Poor Alignment
4513	Gary Avenue Dead End	Water Channel	Lacking Freeboard
		Embankment	Erosion
5001	Junction Creek Bridge	Steel Post & Panel	Weakened
		RC Parapet	Weakened
5009	Coniston Creek Bridge	Water Channel	Obstructed
		Asphalt Wear Surf	Rutting
5010	Romford Creek Bridge	RC Wing Walls	Tilting
		Embankment	Unstable
5011	Romford Creek Bridge	Steel Post & Guide Rail	Weakened
5013	Romford Creek Bridge	RC Abutment Wall	Tilting
		Gabion Basket	Tilting
		Steel Pipe Ped Barrier	Does'nt Meet New Standard
5015	Romford Creek Bridge	Water Channel	Aggradation
		Embankment	Toxic Weeds
		Gabion Basket	Spilling
5017	Mountain View Road Bridge	Gabion Basket	Tilting
5018	Roseland Drive Bridge	Gabion Basket	Tilting
5021	Deer Creek Bridge	Water Channel	Constricted
		Delineator	Obscured
		RC Ballast Wall	Tilting
5023	Pedestrian Bridge	Misc Steel	Weakened
		Embankment	Erosion
5025	Lily Creek	Ped Steel Post & Panel	Weakened
		Sidewalk	Undermined/Voids
5029	Coniston Creek Pedestrian Bridge	Water Channel	Constricted
		RC Abutment Wall	Tilting
5030	Paris St Overpass NBL	X- Joint Conventional	Leaking
		X-Joint Modular.	Leaking
5051	Centennial Dr Park Bridge	Water Channel	Lacking Freeboard
5502	Hill Street Culvert	Water Channel	Poor Alignment
5504	Garson Coniston Rd	Steel Post & Guide Rail	Weakened



Bridge ID	Name	Component	Deficiency
5504	Garson Coniston Rd	Water Channel	Constricted
5506	Long Lake Road Culvert	Steel Post & Guide Rail	Weakened
5511	Centennial Dr @ Lily Creek	Precast RF Box Culvert	Lacking Freeboard
5517	Kari Road Culvert	Water Channel	Poor Alignment
6008	Leslie Street Bridge	Steel Post & Guide Rail	Does'nt Meet New Standard
6010	King Street Bridge	Sidewalk	Uneven,Potholed
6014	Pedestrian Bridge	Steel Pipe Ped Barrier	Weakened
		Embankment	Erosion
6501	Leon Drainage Ditch	Headwall	Tilting
		Water Channel	Aggradation
6502	Junction Creek	Timber Post & Guide Rail	Weakened
6504	Belfry Avenue Culvert	Water Channel	Poor Alignment
		Embankment	Over-steepened
6505	Attlee Avenue Culvert	Water Channel	Aggradation
6506	Third Avenue	Water Channel	Obstructed
		Gabion Basket	Spilling
6507	Arthur Street	Embankment	Unstable
6508	Kenwood Avenue	Water Channel	Scour Prone
6509	Highgate	Water Channel	Obstructed



Bridge Condition Index Report

Bridge ID	Name	BCI	Program Year
1000	Spanish River Bridge	100.0	
1001	Vermillion River Bridge	75.2	
1002	Little Panache Lake Narrows	73.5	
1003	Maninen Road Bridge	67.3	2021
1004	High Falls Road Bridge	100.0	
1005	Chicago Mine Road Bridge	93.2	
1006	Spanish River near Worthington Road	80.5	2021
1007	Vermillion River Bridge	90.4	
1008	Moxam Creek Bridge	73.4	2024
1009	Old Soo Road Bridge	100.0	
1010	Black Lake Road Bridge	76.2	
1011	Mikkola Road Bridge	75.9	
1012	Fielding Road Bridge	70.1	2022
1013	CPR Overhead (Westbound)	73.4	
1014	CPR Overhead (Eastbound)	72.2	
1015	Finland Creek Bridge	82.8	
1016	Creighton Road at Club Road	90.1	
1017	Creighton Road at Tennis Club	90.1	
1018	Power Street Bridge	91.1	
1019	Finland Creek Bridge	95.0	
1020	Finland Street Bridge	64.6	2024
1022	Poland Street Bridge	63.5	2025
1023	Orford Street Bridge	62.0	2025
1024	Big Nickel Mine Rd	72.6	2022
1025	Lily Creek Bridge	69.3	2025
1026	Junction Creek Bridge	72.9	
1028	Struthers Pedestrian Bridge	73.4	
1029	Copper Cliff Trail Bridge	87.1	
1030	Meatbird Creek Pedestrian Bridge	95.0	
1529	MR 24 Culvert	65.3	
1530	Finland Creek	77.9	
1531	Junction Creek	96.3	
1532	Junction Creek	74.2	
1533	Lily Creek	80.4	
1534	Junction Creek	69.7	2023
1535	Lily Creek	66.3	2025
1536	Fairbank Creek	81.1	
1537	Fairbank Creek	81.3	
1538	Fairbank Creek	80.8	
1539	Inco Drainage Ditch	80.4	



Bridge ID	Name	BCI	Program Year
1540	Panache Lake Rd Culvert	71.1	2022
1541	Panache Lake Rd. Culvert	77.0	
1542	Wabagishik Road Culvert	82.5	2023
1543	Hill Road Culvert	88.7	
1544	C. Johnson Road Culvert @ MR #4	75.3	2026
1545	Lorne Falls Rd. Culvert	85.0	
1546	Graham Rd. Culvert	82.4	
1547	Worthington Rd. Culvert	66.5	2023
1548	CSPA Culvert	55.6	2027
1549	Balsam Street Bridge	72.1	
1553	Fairbank Creek Culvert	96.3	
1560	Southview Dr.	81.1	
1561	Trans Canada Trail	77.7	2024
1562	Old Soo Rd Box Culvert	96.3	
1563	Fairbank Creek	64.0	
1564	Fairbank Lake Rd Culvert	89.8	
1565	Fairbank Creek Culvert	90.9	
2000	Simmons Road Bridge	72.5	2025
2001	Vermillion Lk Rd	81.8	
2002	Main Street Bridge	71.8	2023
2003	Whitson Creek Bridge	77.0	
2004	Whitson Creek Bridge	76.1	
2005	Onaping River Bridge	73.1	2030
2006	Onaping River Bridge	71.4	2022
2007	Vermillion River Bridge	72.7	2023
2008	Montee Principale Bridge	72.9	2025
2009	Whitson River Bridge	75.8	
2010	Landry Street Bridge	67.9	2024
2012	INCO Railway	67.3	
2013	Lasalle Interchange	69.4	2024
2014	CPR Overhead	72.5	2024
2015	CPR Overpass / Nolin Creek	71.3	2023
2016	Dufferin Street Bridge	67.6	2022
2020	Pedestrian Underpass	68.7	
2021	Pedestrian Crossing	73.8	
2500	Birch St Culvert	67.8	2023
2503	Montpellier Road South Culvert	95.0	
2504	Montpellier Road Middle Culvert	91.1	
2505	Nickel Basin Road Culvert	95.0	
2506	Mckenzie Road Culvert	97.5	
2507	Pilon Drain	97.5	
2508	Landry Creek	60.3	2022



Bridge ID	Name	BCI	Program Year
2509	Inco Pipeline	69.7	
2510	Whitewater Creek	69.5	2024
2511	Huron Street Culvert	62.1	2021
2512	Nolins Creek	51.3	2022
2513	Inco Drainage Ditch	73.6	2022
2514	Granite-McKim Culvert	73.2	
2516	McNeil Pedestrian Crossing	65.2	
2517	Erie/Monck Pedestrian Crossing	68.5	2022
2518	Lasalle/Inco Culvert	72.1	
2519	Nolins Creek	50.9	2021
2533	Trans Canada Trail	74.5	2022
2534	Bridge St /Emile St	82.5	
2536	McKenzie Creek Culvert	90.9	
3000	Nelson Lk Rd @ Rapid River	72.6	2021
3001	Vermillion River Bridge	84.0	
3002	Martin Road Bridge	66.2	2028
3003	Whitson River Bridge	70.5	
3004	Frappier Road Bridge	78.7	
3005	Whitson River	70.2	2022
3006	Kalmo Road Bridge / Whitson River	84.5	2027
3007	Whitson Flood Channel Culvert	91.7	
3502	Lasalle Blvd Culvert	67.4	
3503	MR 80	70.3	2022
3504	Fleming Street Culvert	69.9	
3505	Bodson East Culvert	92.3	
3510	Yorkshire Dr. Culverts	96.3	
4000	Roberts River	72.8	2021
4001	Vermillion River	100.0	
4002	Bowland Bay Bridge	80.3	
4003	Industrial Rd (Ski Hill Rd)	79.1	
4004	CNR Overpass	73.8	
4005	Roberts River	100.0	
4010	Junction Creek Ped Bridge	69.4	2023
4500	Christina St. Culvert	67.4	
4501	Junction Creek Culvert	70.3	
4502	Robin St	96.0	
4503	Junction Creek	93.4	
4505	Junction Creek	59.9	2023
4506	Madison Avenue	83.7	
4507	Junction Creek	71.5	
4508	MR 85 CULVERT	87.5	
4513	Gary Avenue Dead End	82.5	



Bridge ID	Name	BCI	Program Year
4514	Hanmer Lake Culvert	93.5	
5000	Riverside Drive Bridge	85.6	
5001	Junction Creek Bridge	77.8	
5002	Broadway Street Bridge	70.1	
5003	Brady Street Underpass	70.4	2024
5008	Paris St Overpass SBL	72.5	2022
5009	Coniston Creek Bridge	70.2	
5010	Romford Creek Bridge	69.5	2024
5011	Romford Creek Bridge	100.0	
5013	Romford Creek Bridge	71.6	2023
5014	Romford Creek Bridge	97.5	
5015	Romford Creek Bridge	68.3	
5016	Coniston Creek	90.1	
5017	Mountain View Road Bridge	73.7	2022
5018	Roseland Drive Bridge	73.2	
5020	Deer Creek Bridge	66.2	2030
5021	Deer Creek Bridge	74.6	
5022	Pedestrian Bridge	73.8	
5023	Pedestrian Bridge	69.0	2022
5024	Elgin Pedestrian Subway	68.7	2025
5025	Lily Creek	71.2	2022
5029	Coniston Creek Pedestrian Bridge	100.0	
5030	Paris St Overpass NBL	71.9	2023
5051	Centennial Dr Park Bridge	77.0	2021
5500	Chief Lake Road Culvert	67.4	
5501	Elbow Creek Culvert	95.0	
5502	Hill Street Culvert	98.8	
5503	Forest Lake Road Culvert	95.0	
5504	Garson Coniston Rd	96.0	
5506	Long Lake Road Culvert	83.0	
5507	Long Lake Road	64.4	
5508	Broadway	65.8	
5511	Centennial Dr @ Lily Creek	75.2	
5514	Jumbo Rd South	93.8	
5516	Mallards Landing Park	76.8	2025
5517	Kari Road Culvert	96.0	
5518	Walter Street Culvert	97.5	
5519	Jumbo Rd North	97.5	
6001	CPR Subway	60.7	2026
6008	Leslie Street Bridge	69.5	2023
6009	Bond Street Bridge	64.2	
6010	King Street Bridge	70.3	2024



