



TOWN OF TILLSONBURG

2019 OSIM INSPECTIONS

NEEDS STUDY



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Architects & Planners*

TOWN OF TILLSONBURG 2019 OSIM INSPECTIONS NEEDS STUDY

EXECUTIVE SUMMARY

In the spring of 2019, G. Douglas Vallee Limited staff completed field inspections on 35 known bridges, culverts, and retaining walls in the Town of Tillsonburg. The biennial inspections were performed in accordance with the Ontario Structure Inspection Manual (OSIM). The purpose of the inspections was to update the 2017 OSIM inventory and add new data to the inventory for 12 culverts less than 3 meters in span. Full OSIM reports for all structures inspected were completed as part of the scope of the project.

The inspection reports were analyzed in order to determine which structures are in need of rehabilitation or replacement. This process is used to prepare a needs study schedule of rehabilitation and replacement work over the next decade. This will establish a multi-year plan to perform the required work to maintain the assets in a safe and functional condition.

This document summarizes the recommendations and cost estimates for structure replacement, structure rehabilitation, and additional investigations as shown in the following table. This document will also serve as a tool for long range budget planning.

ASSET PLAN	QUANTITY	ENGINEERING	CONSTRUCTION	ASSOCIATED WORK	TOTAL
FULL REPLACEMENT	7	\$437,000	\$3,003,000	\$235,000	\$3,675,000
REHABILITATIONS	12	\$638,000	\$4,388,500	\$385,000	\$5,411,500
REMOVAL	0	\$0	\$0	\$0	\$0
MAINTENANCE ONLY	14	\$0	\$128,200	\$22,000	\$150,200
ADDITIONAL INVESTIGATIONS	12	\$200,000	\$0	\$0	\$200,000
				GRAND TOTAL	\$9,436,700

TABLE OF CONTENTS

1.0	BACKGROUND	
1.1	DETAILED INSPECTIONS – OSIM	3
1.2	RETAINING WALL BIENNIAL INVESTIGATIONS	3
2.0	INVENTORY	
2.1	BRIDGE AND CULVERT INVENTORY	4
	2.1.1 BRIDGE AND CULVERT TYPES AND VINTAGE	4
	2.1.2 STRUCTURES ADDED TO THE INVENTORY	5
2.2	RETAINING WALL INVENTORY	5
3.0	RESULTS AND RECOMMENDATIONS	
3.1	PROFESSIONAL SERVICES & CONSTRUCTION	7
3.2	ADDITIONAL INVESTIGATIONS	8
3.3	ENHANCED OSIM INSPECTIONS	8
3.4	GENERAL MAINTENANCE & IMPROVEMENTS	9
3.5	REHABILITATION RECOMMENDATIONS	10
3.6	REPLACEMENT RECOMMENDATIONS	11
4.0	LIFE CYCLE ANALYSIS	
4.1	BRIDGE CONDITION INDEX	12
4.2	DEGRADATION DRIVERS	12
4.3	DEGRADATION MODELS	12
4.4	DISCUSSION	13
4.5	BRIDGE DEGRADATION ANALYSIS	13
	4.5.1 AVERAGE BCI	13
	4.5.2 ANNUAL BUDGET	13
	4.5.3 ASSET DEGRADATION	13
4.6	BCI ANALYSIS	14
4.7	BUDGETARY ANALYSIS	15
4.8	ANALYSIS RESULT	15
5.0	CONCLUSION	16
	APPENDICES	
	APPENDIX A: 2019 OSIM PERFORMANCE SNAPSHOTS	
	APPENDIX B: STRUCTURE INVENTORY TABLE	
	APPENDIX C: PROPOSED BUDGET PLANNING SCHEDULE	
	APPENDIX D: STRUCTURE COMMENTS, POTENTIAL SCENARIOS, AND ALTERNATIVE REHABILITATION STRATEGIES	
	APPENDIX E: PROPOSED 2020-2030 CAPITAL BUDGET FORECAST	
	APPENDIX F: STRUCTURE LOCATION MAP	

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1.0 **BACKGROUND**

1.1 **DETAILED INSPECTIONS – OSIM**

The Ontario Structure Inspection Manual (OSIM) has the following objectives for inspections:

- to maintain structures in a safe condition;
- to protect and prolong the useful life of structures;
- to identify maintenance, repair, and rehabilitation needs of structures;
- to provide a basis for a structure management system that will assist the planning and funding for the maintenance and rehabilitation of structures.

Prior to attending each site, previous OSIM reports prepared by GM Blueplan Engineering Limited were reviewed. Copies of the previous OSIM reports and photographs were taken to each site and used as a basis to determine the nature, severity, and rate of any ongoing deterioration. The OSIM reports were updated in the field to reflect the current condition of the structures. For structures not having a prior OSIM inspection completed, a blank sheet was taken into the field. Date, observations, and measurements were recorded, and new reports were prepared.

The physical processes of inspecting individual structures include a detailed visual examination of each element. The visual inspections of elements were conducted from within an arm's-length where accessible. In many cases the inspection involved physically tapping concrete structures with a hammer or using a Delam 2000 tool to test for soundness.

Structures which exhibit deterioration of elements were recommended for rehabilitation or replacement. There were also maintenance issues that were noted during the detailed visual examinations. Examples of these issues include: embankment erosion, vegetation overgrowth, debris, minor collision damage, minor concrete damage, etc. Areas of deterioration or maintenance needs for each individual structure were noted on the OSIM forms as well as documented with photographs which are included in the OSIM Report.

We recommend that select structures undertake additional investigations such as Structure Evaluations and Bridge Condition Studies to help determine the extent of scope of work required for future capital projects and to assist in preparing budget estimates. This will be discussed in greater detail in the following sections of this report.

1.2 **RETAINING WALL BIENNIAL INVESTIGATIONS**

The Ontario Structure Inspection Manual (OSIM) specifies that retaining walls shall be inspected every 2 years (biennially) unless the engineer believes the retaining wall condition will not change before the next inspection, in which case the inspection interval can be increased to 4 years.

Based on the results of the 2019 OSIM inspections, and given the relatively low number of retaining walls in the inventory, we recommend inspecting the full inventory biennially.

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2.0 **INVENTORY**

2.1 **BRIDGE AND CULVERT INVENTORY**

The Canadian Highway Bridge Design Code (CHBDC) and the Ontario Structure Inspection Manual (OSIM) are used as reference documents for this assignment. These documents typically define a bridge as a structure that provides a roadway or walkway for the passage of vehicles, pedestrians, or cyclists across any obstruction, gap, or facility that is greater than 3 m in span. The same is true for a culvert except that the opening is through soil. Typically, a culvert will convey water under a given road, whereas a bridge carries the road over the waterway or obstacle. The 2019 inventory of the Town of Tillsonburg structures includes 35 bridges, culverts, and retaining walls (8 bridges, 7 culverts, 12 culverts less than 3m in span, 8 retaining walls).

2.1.1 **BRIDGE AND CULVERT TYPES AND VINTAGE**

The types of structures owned by the Town of Tillsonburg are varied in size, age, and material. Examining the age of structures reveals that approximately 44% of the inventory was built before 1979 and is over 40 years old. Typically, bridges are expected to have a lifespan of 70+ years, however damage and deterioration due to wear and exposure is inevitable, reducing a structures lifespan below 70 years if timely rehabilitation work is not completed.

STRUCTURE TYPE	INVENTORY
Rigid Frame – Vertical legs	1
“I” Beams / Girders	3
Box Culvert	2
Box Culvert < 3m span	2
Ellipse Culvert	2
Half-Through Truss	4
Round Culvert	2
Round Culvert < 3m span	10
Twin Round Culvert	1
TOTAL	27

YEAR CONSTRUCTED	BRIDGES & CULVERTS
1900's	0
1910's	1
1920's	0
1930's	0
1940's	0
1950's	5
1960's	2
1970's	4
1980's	4
1990's	4
2000's	7
2010's	0
TOTAL	27

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2.1.2 STRUCTURES ADDED TO THE INVENTORY

Since the previous OSIM Summary Report in 2017, the following structures with a span of less than 3 meters were added as part of the provisional culvert inventory:

STRUCTURE #	STRUCTURE NAME
CU_BROA3948_1	Broadway St. Culvert at Sobeyes
CU_QUAR1937_12	Quarter Town Line at Oak Park Pond
CU_BALD1103_1	Baldwin St. Culvert at Whispering Pine
CU_BALD1272_1	Baldwin St. at Goldenrod Dr.
CU_NEWE1362_1	Newell Rd. Culvert
CU_BAYH0993_1	Bayham Dr. Culvert
CU_VIEN0615_1	Vienna Rd. from Stubbs Crt. Culvert
CU_CONCE0299_1	Lake Lisgar Outlet Culvert
CU_BRIDE0274_1	Lisgar Ave Culvert Part 1
CU_BRIDE0274_2	Lisgar Ave Culvert Part 2
CU_LISG2209_1	Lisgar Ave Culvert Outlet at Brock St. E.
CU_SPRU0541_3	Spruce St. Culvert

2.2 RETAINING WALL INVENTORY

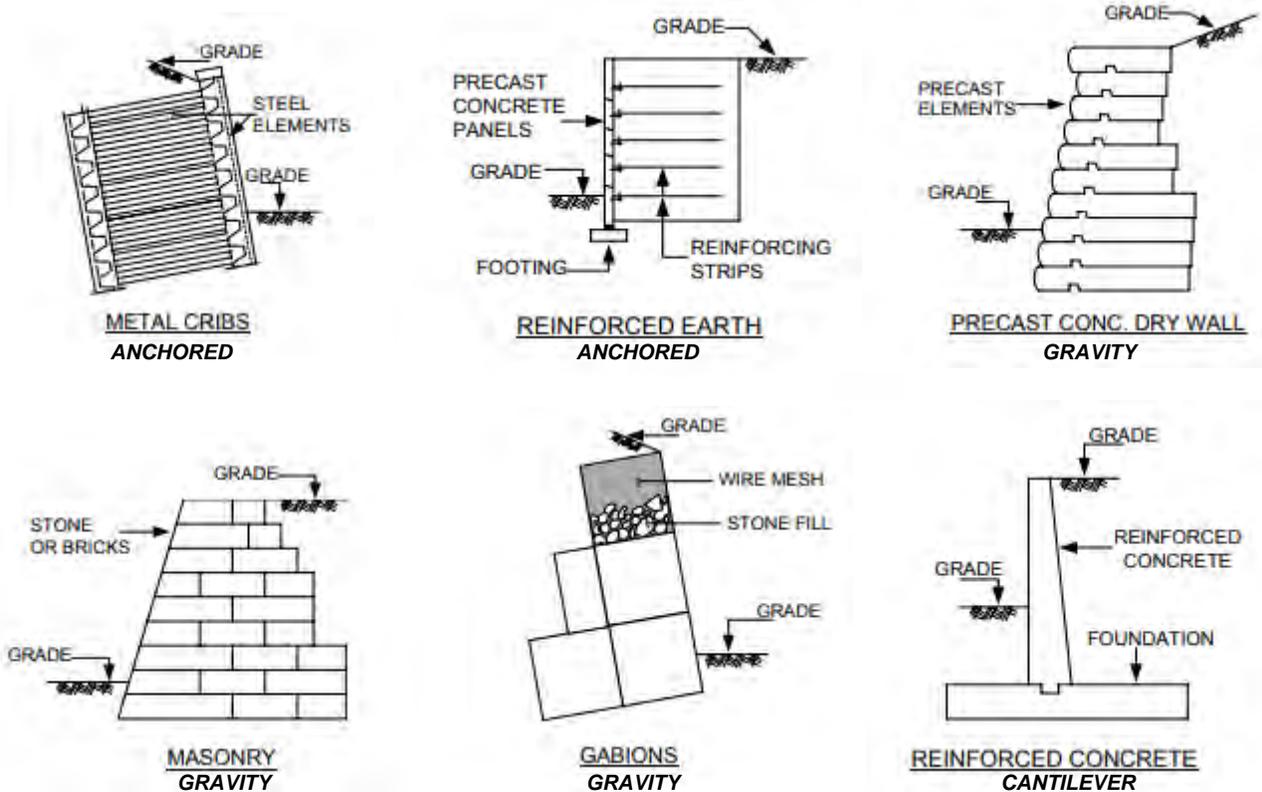
The OSIM manual is used as a reference document to complete structure inspections and reports for the retaining walls in the Town of Tillsonburg. This document defines a retaining wall as a wall with or without a foundation, and categorizes them into three different classes which can further be broken down by type:

- Gravity,
- Cantilever,
- and Anchored retaining walls.

The types of retaining walls owned by the Town of Tillsonburg vary in size, age, and material. An analysis of the current inventory of 8 retaining walls reveals that the majority of those examined are gravity retaining wall structures. The type of structure was determined based on the exterior area visible during the inspection.

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The following are examples of wall types taken directly from the OSIM manual depicting various types of retaining walls:



Refer to Figure 1.5.1.4 (a-c) of the OSIM manual (2018) for more examples of retaining wall structures. In conjunction with the OSIM manual, the Ontario Building Code (OBC) was also used to define a retaining wall as a “designated structure”. The following refers to OBC 1.1.2.2.(2)(c) in regards to retaining walls:

“...Subject to Articles 1.1.2.6. and 1.3.1.2., Part 4 of Division B applies to,...

(c) a retaining wall exceeding 1 000 mm in exposed height adjacent to,

- (i) public property,
- (ii) access to a building, or
- (iii) private property to which the public is admitted ...”

A complete list of the retaining wall inventory can be found in Appendix B and shows the replacement cost based on the surface area of the retaining wall. If work is recommended to be completed on a structure, a more in-depth cost break down can be found in the individual inspection reports as well as the Proposed Budget Planning Schedule included in Appendix C.

Most of the retaining walls in the inventory are *designated structures*, and are subject to the requirements of the Ontario Building Code. Further information regarding the type of retaining wall can be found in the inspection reports for each structure.

3.0 **RESULTS AND RECOMMENDATIONS**

3.1 **PROFESSIONAL SERVICES & CONSTRUCTION**

The professional services required to complete structure rehabilitations or structure replacements may include the following:

- Geotechnical investigations;
- Legal land surveys;
- Topographical land surveys;
- Environmental screening (Species-at-risk, endangered species, etc.);
- Hydraulic assessment;
- Archaeological assessments;
- Cultural heritage impact assessment reports;
- Municipal class environmental assessments;
- Engineering design, project tendering, and contract administration;
- Material Testing Quality Assurance during construction.

Many services may be needed to satisfy the requirements of permitting authorities prior to commencing the engineering design of a given project. Typically, replacement projects will require all of the services listed above, whereas rehabilitation projects may require varying amounts of services. The varying nature and degree of complexity of rehabilitations results in a scope of work that changes on a project to project basis. In the event that an environmental screening reveals that there are species at risk present at the bridge location, a relocation program may be required, involving additional costs, permitting processes, and time. Conversely, in a rehabilitation that will not affect the water course, or hydraulic capacity of a structure, a hydraulic assessment may not be required.

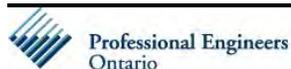
The following chart lists the asset plan work recommended and the associated costs:

ASSET PLAN	QUANTITY	ENGINEERING	CONSTRUCTION	ASSOCIATED WORK	TOTAL
FULL REPLACEMENT	7	\$437,000	\$3,003,000	\$235,000	\$3,675,000
REHABILITATIONS	12	\$638,000	\$4,388,500	\$385,000	\$5,411,500
REMOVAL	0	\$0	\$0	\$0	\$0
MAINTENANCE ONLY	14	\$0	\$128,200	\$22,000	\$150,200
ADDITIONAL INVESTIGATIONS	12	\$200,000	\$0	\$0	\$200,000
GRAND TOTAL					\$9,436,700

Notes:

- ¹ These figures are based on approximated present day values and do not reflect the amortized cost (i.e.: depreciation, etc.) of performing the necessary work in the future.
- ² Engineering includes: Additional Investigations, EA, Design, Contract Preparation, & Inspection.
- ³ Construction includes: Construction & Contingency for the construction stages.
- ⁴ Associated Work includes: Other Direct and Indirect Costs & General Project Contingencies.

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3.2 ADDITIONAL INVESTIGATIONS

Based on the results of the 2019 OSIM inspections, we recommend that a number of structures in the Town of Tillsonburg inventory have additional investigations completed. A complete list of structures recommended to have additional investigations completed and estimated costs for these studies has been included in Appendix C.

3.3 ENHANCED OSIM INSPECTIONS

Periodically, it may be necessary to utilize special equipment and tools to get within arms-reach of all areas of structure elements. Inspections of this nature are Enhanced OSIM inspections. The frequency of Enhanced OSIM inspections should be a maximum of 6 years for structures that:

- are over 30 years old,
- and contain critical elements and components in poor condition.

The Lake Lisgar Culvert (CU_CONCE0299_1) is the only structure currently recommended for an enhanced OSIM. This structure was unable to be inspected within arm's reach due to limited access. The cost estimate for this enhanced OSIM is included in Appendix C. Precautions and items that may assist in the enhanced OSIM include;

- Restricting the lake flow into the barrel to allow for further inspection of the inlet, barrel, and spillway;
- Utilizing a Delam 2000 tool to complete a sounding of the elements beyond arm's reach;
- Confined space equipment and practices.

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3.4 GENERAL MAINTENANCE & IMPROVEMENTS

A total of 14 structures in the inventory require maintenance only and/or improvements ranging from erosion control to guide rail improvements. The following structures are recommended for maintenance:

STRUCTURE #	STRUCTURE NAME
RW_VICT	Victoria St. Concession St. West
RW_BRIDGE0274	Bridge St. at Lisgar Ave.
CU_BRIDE0274_1	Lisgar Ave. Culvert Part 1
BR_GOLF0002	The Bridges Golf Course John Pound Rd.
RW_BROAD	Broadway St. at Bloomer St.
CU_BALD1272_1	Baldwin St. at Goldenrod Dr.
CU_VIEN0615_1	Vienna Rd. from Stubbs Crt. Culvert
CU_BRIDE0274_2	Lisgar Ave. Culvert Part 2
CU_GLEND0176_1	Glendale Dr. Culvert at Victoria St.
BR_VAN0001	Van St. Pedestrian Bridge
BR_GOLF0001	The Bridges Golf Course at Hole 10
BR_GOLF0003	The Bridges Golf Course at Hole 12 and 17
CU_BAYH0993_1	Bayham Dr. Culvert
CU_QUAR1937_12	Quarter Town Line at Oak Park Pond

Each of the maintenance issues are indicated on the individual OSIM report forms for each structure. Many of the maintenance issues requiring attention are minor and may include the following:

- erosion control on the approach embankments and slopes at the inlet and outlet;
- hazard sign repair/replacement;
- overgrowth removal;
- waterway debris removal;
- wearing surface maintenance (crack sealing, asphalt patching);
- deck surface cleaning;
- minor concrete repairs not requiring engineering direction.

The inspections revealed that some structures do not have barriers and guide rails that meet current standards. The requirement for guide rails on the structures and on the approaches is dependent upon a number of factors including:

- elevation difference between the road centerline and adjacent properties;
- traffic volume (AADT);
- operating speeds;
- road geometry (e.g. sight lines, curves, etc.);
- hazards.

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3.5 REHABILITATION RECOMMENDATIONS

There are 12 structures that require some form of rehabilitation or repair to select elements and nearly all of the structures inspected require some form of maintenance. The following structures are recommended for rehabilitation organized in order of priority based on timing and BCI:

STRUCTURE #	STRUCTURE NAME
CU_QUAR2685_1	Quarter Town Line Culvert at Stoney Creek
BR_KINS0001	Kinsmen Pedestrian Bridge
CU_LISG2209_1	Lisgar Ave. Culvert Outlet at Brock St. E
CU_CONCE0299_1	Lake Lisgar Outlet Culvert
CU_BALD0654_1	Baldwin St. Culvert at Participark Trail
BR_LAKE0001	Hawkins Pedestrian Bridge
BR_SIMCO0001	Simcoe Street Bridge
CU_VICT0569_1	Victoria St. Driveway Access Culvert
CU_LISG1158_1	Lisgar Ave. North Culvert
BR_CONCW0001	Concession St. W. Bridge
RW_FAIR	Fairway Hills Blvd. and Quarter Town Line
RW_WILL	William St. and Quarter Town Line

Refer to Appendix C for the Proposed Budget Planning Schedule showing all rehabilitation projects and estimated costs for additional investigations, engineering, construction, and associated costs.

In order to assist in prioritizing the recommended work, the calculated MTO Bridge Condition Index (BCI) number has been included in the rehabilitation recommendations table. The BCI values are used for capital budget planning purposes for repair work and do not represent the relative safety of the bridge. In general, for a bridge with a BCI value:

- Greater than 70 - Maintenance/repair work is not usually required within the next five years;
- Between 60 and 70 - Maintenance work is usually scheduled within the next five years;
- Less than 60 - Maintenance work is usually scheduled within the next year.

The Bridge Sufficiency Index (BSI) was also updated for each bridge and culvert structure. Unlike the BCI, the BSI determines the overall needs of a structure by considering non-structural parameters. The parameters used to determine the BSI include: traffic, economics, bridge width, and alignment.

Other factors may also be considered in the prioritization of the structure rehabilitation recommendations including:

- state of deterioration and estimated length of prolonged useful lifespan;
- need for rehabilitation given the length of detour or alternate access;
- cost vs. benefit consideration with respect to possible future replacement.

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It should be noted that the recommendations and relative priority rankings shown in the Capital Budget Planning Schedule are based on the inspections of the structures in accordance with the OSIM manual as well as engineering judgement and experience. As mentioned in the previous section, it is recommended to complete additional investigations such as bridge condition studies on structures corresponding with the priority rankings. The priority list shown in the capital budget planning schedule may be modified to suit the results from such studies once completed.

3.6 REPLACEMENT RECOMMENDATIONS

Based on our detailed visual inspections of each structure, we have compiled a list of 7 structures recommended for replacement.

The following structures are recommended for replacement organized in order of priority based on timing and BCI:

STRUCTURE #	STRUCTURE NAME
RW_BEECH	Quarter Town Line Retaining Wall at Beech Blvd.
CU_DEVONS0314_1	Devonshire Ave. Culvert
RW_NEWE0002	Newell Road East Retaining Wall
RW_NEWE0001	Newell Road West Retaining Wall
CU_NEWE1362_1	Newell Rd. Culvert
CU_BALD1103_1	Baldwin St. Culvert at Whispering Pine
CU_BROA2247_1	Broadway & Christie St. Culvert

Refer to the Appendix C for the Proposed Budget Planning Schedule showing all replacement projects and estimated costs for additional investigations, engineering, construction, and associated costs.

4.0 **LIFE CYCLE ANALYSIS**

Typically, a bridge will undergo minor and major rehabilitations in order to reach the target 75 year lifespan. As such, degradation models incorporate a minor and major rehabilitation at 25 and 50 years respectively. If rehabilitations are delayed and a structure is not regularly maintained, records indicate that reaching the target lifespan will not be achieved. Conversely, if the structure is adequately maintained and appropriate care and timing with respect to rehabilitations is observed, it is not uncommon for structures to greatly outlive the 75-year lifespan target. Culverts and retaining walls are not expected to undergo a major rehabilitation, however they may still require some minor rehabilitation and regular maintenance to reach their expected lifespan.

Our analysis provides a focused look at the proposed capital expenditure recommendations for the next 10 years and the effect on the average BCI for the inventory. This provides a simple asset management tool that gives insight to the immediate needs of the inventory over the next decade, while biennial updates keep the analysis refreshed so that there are no surprises in the future.

4.1 **BRIDGE CONDITION INDEX**

Tillsonburg's inventory of bridges and culverts has an updated Bridge Condition Index (BCI) as an abstract indicator of a bridge's overall condition. BCI scores are provided for both bridges and culverts. G. Douglas Vallee Limited has also applied this concept to the retaining walls in the Town of Tillsonburg. A new bridge will have a BCI of 100, and the BCI value decreases as wearing and weathering degrade the components of the structure. The bridges and culverts are reviewed biennially and these ratings are updated by a qualified engineer.

4.2 **DEGRADATION DRIVERS**

There are a number of factors that affect the rate of degradation of a specific structure. These include, but are not limited to: traffic volume, traffic type, regular maintenance, weather, sun and shade exposure, application of salts and deicing agents, quality of original construction, construction materials (e.g. air entrained concrete), and variations in design details.

4.3 **DEGRADATION MODELS**

Three degradation patterns are typically considered when modelling asset degradation: a linear degradation model, a logarithmic degradation model and a step-wise (MTO) model. With a realistic timeline from one rehabilitation to the next, the selection of a degradation model generally does not affect the outcome. The life cycle model varies based on structure type:

- 75 years for bridges and concrete culverts,
- 50 years for CSP culverts,
- 40 years for gabion basket retaining walls,
- 30 years for non-engineered stone or block retaining walls.

The model incorporates a like-for-like replacement structure with the same life cycle expectancy, however non-engineered retaining walls are expected to be replaced with engineered walls that have a 75 year life expectancy.

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4.4 DISCUSSION

As mentioned above, bridges are typically expected to undergo a minor and a major rehabilitation in order to reach the target 75 year lifespan. In some cases, there is benefit for a structure having two minor rehabilitations prior to a major rehabilitation; on the other side of the spectrum, there are structures that have performed well and gone straight to a major rehabilitation. Each bridge and each site is unique. For this reason, our approach is to stay focused on the short term while keeping long term longevity targets in view with sound capital planning recommendations.

The overall approach to structure asset management is to utilize a general model for degradation, apply this model to each structure in the inventory, and extrapolate the results over the long term. This is tracked along with estimated expenses for each rehabilitation and replacement project required to reach the structure's full service life. In general, a minor rehabilitation is usually 25% (+/- 10%) of full replacement cost, and a major rehabilitation is usually 45% (+/- 5%) of full replacement cost.

A simplified guideline to cost vs benefit analysis is to anticipate a major rehabilitation around age 50 that costs less than 50% of replacement value. In the event that the major rehabilitation is more expensive than 50% of replacement cost for a structure over 50 years old, a detailed cost vs benefit analysis should be completed to determine if the major rehabilitation should be undertaken or if a replacement should be planned.

4.5 BRIDGE DEGRADATION ANALYSIS

The following highlights major considerations of the relationship between the condition of the structures and the budgets required to maintain them.

4.5.1 **Average BCI:** A single number indicator can simplify monitoring of overall infrastructure health. The average BCI value does not account for bridge-specific rehabilitation or replacement costs. The inherent risk is that an average BCI for a 'healthy' inventory may be hiding some very big budgetary surprises.

To put this in context, a multi-million dollar bridge that requires replacement will have the same influence on the 'average BCI' as a small bridge that requires a fraction of the budget to replace. Rehabilitation and replacement costs need to be considered when evaluating the actual health of an inventory.

Totaling all expenses over the full service life of each bridge to determine a minimum average annual budget is a more reliable means of benchmarking. This will be discussed next.

4.5.2 **Annual Budgets:** Another common approach to assessing overall inventory health is dividing the total asset replacement value by the typical structure service life (eg. 75 years), resulting in a '*dollars per year*' value. Generally, this is interpreted as the average annual budget required to maintain the inventory. For example, if the calculation comes out to \$2 million per year, and current budgets are \$1 million per year, then budgetary shortfalls can be expected in the future.

The risk to this approach is that it does not consider the cost of rehabilitation work that is required to reach full service life. A more reliable representation can be achieved by including the anticipated rehabilitation work that is required over that lifespan.

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4.5.3 **Asset Degradation:** As an asset degrades over time, it will eventually require replacement. However, periodic investments in the rehabilitation of the structure can result in a more economical management of the asset. This concept, as described in *The Town of Tillsonburg Comprehensive Asset Management Plan 2016*, demonstrates that the costs over the life of an asset can be reduced through periodic rehabilitation instead of allowing an asset to degrade to failure and replacing it. Periodic rehabilitation increases the amount of time the assets remain in a state of slower degradation. For example, planning for a minor and a major rehabilitation on a bridge structure before recommendation of full replacement.

4.6 BCI ANALYSIS

The Town of Tillsonburg structure inventory was analyzed to compare the average BCI values of each structure type in three scenarios: the 10 year projected BCI assuming completion of all recommended work here-in, if only urgent and 1-5 year work recommendations are completed, and if no work is completed. The results are presented in the following table:

	CURRENT AVERAGE BCI	10 YEAR PROJECTED BCI (recommended work)	10 YEAR PROJECTED BCI (urgent to 5 yr work only)	10 YEAR PROJECTED BCI (no work)
BRIDGE	80	71	69	68
CULVERT	76	77	67	62
RETAINING WALLS	68	80	59	55
BCI AVERAGE	75	76	66	62
AVERAGE COST PER YEAR		\$ 844,230	\$ 519,800	\$ 0

As demonstrated in the table above, the average BCI for the structural inventory in the Town of Tillsonburg is currently 75. Without upkeep from the 10 year recommended work to repair and replace deteriorating structures, the average BCI could fall to 62. Also, if only the structures recommended for urgent and 1-5 year work is completed, the BCI is projected to only reach 66. Maintaining an average BCI of between 70 and 80 is a helpful guide to maintaining a healthy inventory without overspending. While this approach doesn't reveal the whole picture, for reasons discussed above, it is a decent benchmark when not used in isolation. The proposed work in the capital plan would maintain the BCI above 70, while focusing work on the retaining wall infrastructure which has fallen below the 70 BCI threshold.

It may be noted that the BCI average for bridges is declining over the 10 year window even considering the recommended work. However, it is maintained above a BCI of 70, and the retaining wall inventory has returned to a strong average condition. With this approach, all three structure types have an average BCI above 70, which is an indicator for overall well-being of the entire structure inventory. It can be anticipated that the next 10 year planning window will need to more heavily address the bridge structures.

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4.7 BUDGETARY ANALYSIS

To cross-examine the data with the annual budget method, a review of the Town of Tillsonburg planning and budget data was completed. As per Appendix B, *Structure Inventory Table*, the total replacement value of the Town of Tillsonburg bridge, culvert, and retaining wall assets is estimated at over \$40 million. However, as discussed previously, many structures require rehabilitation work to reach that 75 year life. An estimated rehabilitation schedule was applied in the following manner:

- A minor rehabilitation is done at 25% of the replacement cost,
- A major rehabilitation is done at 45% of the replacement cost.

This results in an estimated annual budget average of **\$743,550** to maintain a healthy inventory. Comparing this result against the average cost per year for all recommended work, at \$844,230 shown in the above section, suggests that the health of the inventory has slightly fallen behind.

In 2019, the Town of Tillsonburg allocated \$125,000 to bridge, culvert, and retaining wall projects. If this trend continues to be applied year to year, it will not be sufficient to maintain the structure inventory in a healthy state. Also as shown in the above section, if the Town plans on completing all the recommended work to structures with urgent and 1-5 year needs only, at \$519,800 per year it is projected that the overall state of the structure inventory will still degrade.

If the target construction budget isn't met, an overall degradation of the Town's asset inventory can be expected. In addition to this, the lifespan of structure may not be realized, as it is usually expected that the structure will undergo rehabilitation work to reach a structure life of 75 years. The long-term results of not reaching the target budget could include:

- the Town would need to react to structure changes and complete emergency and urgent structure repairs,
- reacting to emergency repairs would inhibit the Town in fulfilling any proactive asset planning schedules,
- over time, the total cost to maintain the asset inventory would become greater,
- the Town may have to replace or close structures earlier than expected.

4.8 ANALYSIS RESULTS

The asset data has been cross-examined by both structure condition (BCI) and by annual budget comparison to mitigate the drawbacks of each methodology. The results indicate that the current and 10 year work plan proposed in Appendix E are consistent with the needs of the structural inventory. The proposed work will maintain the bridge structures within the 70-80 BCI window, while returning the retaining wall structures to a 'good' average condition.

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5.0 CONCLUSION

In all, there are 35 bridges, culverts, and retaining walls in the OSIM inventory currently owned and maintained by the Town. At the present time, 7 of those structures are recommended for replacement and 12 other structures are in need of rehabilitation work in less than 10 years. There are 14 other structures that are also in need of maintenance efforts. In the analysis of all inspection reports, the prioritized needs of the bridge, culvert, and retaining wall inventory, we offer the following recommendations:

- Regularly scheduled maintenance work be completed on structures exhibiting minor, non-structural damage and deterioration, and that are identified to have maintenance needs;
- Biennial OSIM inspections on structures continue to be completed on the entire structure inventory;
- The capital project budget forecast be reviewed considering a recommended annual budget of \$844,230 against the structure rehabilitation and replacement work recommended over the next 10 years.

We trust that this summary report contains the vital information that the Town of Tillsonburg will need to make preparations for the bridge and culvert work in the next two years. It has been a pleasure to work with staff over the duration of this project and we look forward to continuing to assist the Town of Tillsonburg in the future.



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APPENDICES

- APPENDIX A: 2019 OSIM PERFORMANCE SNAPSHOTS
- APPENDIX B: STRUCTURE INVENTORY TABLE
- APPENDIX C: PROPOSED BUDGET PLANNING SCHEDULES
- APPENDIX D: STRUCTURE COMMENTS, POTENTIAL
SCENARIOS, AND ALTERNATIVE STRATEGIES
- APPENDIX E: PROPOSED 2020-2030 CAPITAL BUDGET
FORECAST
- APPENDIX F: STRUCTURE LOCATION MAP

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APPENDIX A

2019 OSIM PERFORMANCE SNAPSHOTS

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2019 OSIM INSPECTIONS - SNAPSHOTS

	<u>NUMBER</u>	<u>STRUCTURE NAME</u>
1	BR_KINS0001	Kinsmen Pedestrian Bridge
2	BR_SIMCO0001	Simcoe Street Bridge
3	BR_CONCW0001	Concession St. W. Bridge
4	BR_GOLF0001	The Bridges Golf Course at Hole 10
5	BR_GOLF0002	The Bridges Golf Course John Pound Rd.
6	BR_GOLF0003	The Bridges Golf Course at Hole 12 and 17
7	BR_LAKE0001	Hawkins Pedestrian Bridge
8	BR_VAN0001	Van St. Pedestrian Bridge
9	CU_BALD0654_1	Baldwin St. Culvert at Participark Trail
10	CU_BROA2247_1	Broadway & Christie St. Culvert
11	CU_DEVONS0314_1	Devonshire Ave. Culvert
12	CU_GLEND0176_1	Glendale Dr. Culvert at Victoria St.
13	CU_LISG1158_1	Lisgar Ave. North Culvert
14	CU_QUAR2685_1	Quarter Town Line Culvert at Stoney Creek
15	CU_VICT0569_1	Victoria St. Driveway Access Culvert
16	RW_BEECH	Quarter Town Line Retaining Wall at Beech Blvd.
17	RW_BRIDGE0274	Bridge St. at Lisgar Ave.
18	RW_BROAD	Broadway St. at Bloomer St.
19	RW_FAIR	Fairway Hills Blvd. and Quarter Town Line
20	RW_NEWE0001	Newell Road West Retaining Wall
21	RW_NEWE0002	Newell Road East Retaining Wall
22	RW_VICT	Victoria St. Concession St. West
23	RW_WILL	William St. and Quarter Town Line
24	CU_BROA3948_1	Broadway St. Culvert at Sobeys
25	CU_QUAR1937_12	Quarter Town Line at Oak Park Pond
26	CU_BALD1103_1	Baldwin St. Culvert at Whispering Pine
27	CU_BALD1272_1	Baldwin St. at Goldenrod Dr.
28	CU_NEWE1362_1	Newell Rd. Culvert
29	CU_BAYH0993_1	Bayham Dr. Culvert
30	CU_VIEN0615_1	Vienna Rd. from Stubbs Crt. Culvert
31	CU_CONCE0299_1	Lake Lisgar Outlet Culvert
32	CU_BRIDE0274_1	Lisgar Ave. Culvert Part 1
33	CU_BRIDE0274_2	Lisgar Ave. Culvert Part 2
34	CU_LISG2209_1	Lisgar Ave. Culvert Outlet at Brock St. E.
35	CU_SPRU0541_3	Spruce St. Culvert

OSIM Inspection Performance Snapshot

Kinsmen Pedestrian Bridge

MAP LINK

Site Number: BR_KINS0001

Location: 170m West of Rolph St.

OSIM Recommendation: Major Rehab - 1 to 5 years

BCI	45
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Overall Comments:

Enhanced OSIM Inspection completed with use of rope access technicians. All structure members inspected to determine severity of deterioration. Steel members showing light to severe corrosion and delamination. Delaminated steel sections are flaking. Steel strapping missing on North I pier cap (refer to Enhanced OSIM Drawing for element locations). The overall condition... Refer to OSIM for details.



General Structure Information:

Lanes: 1
 Type: I-Beam or Girders
 Spans: 9
 Span Length: 8 @ 11m, 1 @18m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): None
 Construction Date: 1910
 Inspection Date: June 17, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$1,721,000.00
Associated Costs	\$1,130,000.00
Total Costs	\$2,851,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Ballast Walls		
Bearing / Bearing Seat	1 - 5 yr	Rehab	Bearings (At Piers)	1 - 5 yr	Rehab
Wingwalls			Wearing Surface (Approaches)		
Railing Systems	1 - 5 yr	Rehab	Diaphragms (Horizontals)	1 - 5 yr	Replace
Diaphragms (Diagonals)	1 - 5 yr	Replace	Floor Beams		
Girders	1 - 5 yr	Rehab	Stringers		
Diagonal Bracing Element	1 - 5 yr	Rehab	Horizontal Bracing Element	1 - 5 yr	Rehab
Bracing Element	1 - 5 yr	Replace	Structural Connections	1 - 5 yr	Rehab
Wearing Surface (Decks)			Embankments		
Streams and Waterways			Foundation (Below Ground Level)		
Bearings			Caps	1 - 5 yr	Rehab
Shafts/Columns/Pile Bents	1 - 5 yr	Rehab	Shafts/Columns/Pile Bents		

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls	2 yr	Other: Reinstall Mortar	Ballast Walls		
Bearing / Bearing Seat			Bearings (At Piers)		
Wingwalls	2 yr	Other: Reinstall Mortar	Wearing Surface (Approaches)	2 yr	Rout & Seal
Railing Systems	1 yr	Other: Fix Loose Wire	Diaphragms (Horizontals)		
Diaphragms (Diagonals)			Floor Beams		
Girders			Stringers		
Diagonal Bracing Element			Horizontal Bracing Element		
Bracing Element			Structural Connections		
Wearing Surface (Decks)	1 yr	Deck Surface Repair	Embankments	1 yr	Erosion Control at Bridges
Streams and Waterways			Foundation (Below Ground Level)		
Bearings			Caps	Urgent	Other: Replace Missing Strapping
Shafts/Columns/Pile Bents			Shafts/Columns/Pile Bents	2 yr	Other: Reinstall Mortar

Additional Investigation:

Comment: Enhanced OSIM Inspection completed. Next Enhanced OSIM Inspection to be completed in 2025.

Simcoe Street Bridge

[MAP LINK](#)

Site Number: BR_SIMCO001

Location: 0.2km West of Old Vienna Road

OSIM Recommendation: Minor Rehab - 1 to 5 years

BCI 73

Overall Comments:

Superstructure and substructure are generally in good condition.



General Structure Information:

Lanes: 5
 Type: I-Beam or Girders
 Spans: 1
 Span Length: 40 m
 AADT: 22400
 Posted Speed: 50
 Load Limit (Tonnes): None
 Construction Date: 1994
 Inspection Date: May 10, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$175,000.00
Associated Costs	\$200,000.00
Total Costs	\$375,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Wingwalls		
Sign			Utilities		
Railing Systems	1 - 5 yr	Replace	Curbs/Gutters		
Sidewalk and Medians	1 - 5 yr	Rehab	Wearing Surface (Approaches)	1 - 5 yr	Replace
Barrier / Parapet Wall			Hand Railing		
Girders			Soffit - Thin Slab		
Soffit - Thin Slab			Wearing Surface (Decks)	1 - 5 yr	Rehab
Embankments			Slope Protection		
Streams and Waterways			Foundation (Below Ground Level)		
Walls	1 - 5 yr	Rehab	Walls	1 - 5 yr	Rehab
Walls			Sidewalk and Medians		

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Wingwalls		
Sign			Utilities		
Railing Systems			Curbs/Gutters		
Sidewalk and Medians			Wearing Surface (Approaches)		
Barrier / Parapet Wall			Hand Railing	Urgent	Bridge Railing System Maintenance
Girders	2 yr	Rout and Seal	Soffit - Thin Slab		
Soffit - Thin Slab			Wearing Surface (Decks)		
Embankments			Slope Protection	1 yr	Erosion Control at Bridges
Streams and Waterways			Foundation (Below Ground Level)		
Walls			Walls		
Walls			Sidewalk and Medians		

Additional Investigation:

Detailed Deck Condition Survey.
 Comment: Deck condition survey to determine extent of rehabilitation required.

Concession St. W. Bridge

[MAP LINK](#)

Site Number: BR_CONCW0001

Location: 480m West of Broadway St.

OSIM Recommendation: Minor Rehab - 6 to 10 years

BCI 70

Overall Comments:

Localized cracking and delamination noted in soffit.



General Structure Information:

Lanes: 2
 Type: Rigid Frame, Vertical Legs
 Spans: 1
 Span Length: 10.7 m
 AADT: 4280
 Posted Speed: 50
 Load Limit (Tonnes): None
 Construction Date: 1955
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$138,000.00
Associated Costs	\$110,000.00
Total Costs	\$248,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Wingwalls		
Sign			Railing Systems		
Curbs/Gutters			Sidewalk and Medians		
Sidewalk and Medians			Wearing Surface (Approaches)	6 - 10 yr	Rehab
Barrier / Parapet Wall			Barrier / Parapet Wall		
Railing Systems			Railing Systems		
Deck Top			Soffit - Thick Slab	6 - 10 yr	Rehab
Soffit - Thick Slab	6 - 10 yr	Rehab	Wearing Surface (Decks)	6 - 10 yr	Rehab
Embankments			Streams and Waterways		
Foundation (Below Ground Level)			Walls		
Walls	6 - 10 yr	Rehab	Sidewalk and Medians		

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Wingwalls		
Sign			Railing Systems	2 yr	Bridge Railing System Maintenance
Curbs/Gutters			Sidewalk and Medians		
Sidewalk and Medians			Wearing Surface (Approaches)		
Barrier / Parapet Wall			Barrier / Parapet Wall		
Railing Systems			Railing Systems		
Deck Top			Soffit - Thick Slab		
Soffit - Thick Slab			Wearing Surface (Decks)		
Embankments	2 yr	Erosion Control at Bridges	Streams and Waterways		
Foundation (Below Ground Level)			Walls		
Walls			Sidewalk and Medians	1 yr	Bridge Cleaning

Additional Investigation:

Detailed Deck Condition Survey, Concrete Substructure Condition Survey.
 Comment: Deck condition survey to determine extent of rehabilitation required.

The Bridges Golf Course at Hole 10

[MAP LINK](#)

Site Number: BR_GOLF001

Location: Carroll Trail at Hole 10

OSIM Recommendation: Maintenance Only

BCI 89

Overall Comments:

The structure is generally in good condition.



General Structure Information:

Lanes: 1
 Type: Half-Through Truss
 Spans: 1
 Span Length: 28 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): 5.9 / /
 Construction Date: 2005
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$4,500.00
Associated Costs	\$4,000.00
Total Costs	\$8,500.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Ballast Walls		
Bearings			Wingwalls		
Wearing Surface (Approaches)			Railing Systems		
Floor Beams			Stingers		
Bracing Element			Wearing Surface (Decks)		
Embankments			Slope Protection		
Streams and Waterways			Foundation (Below Ground Level)		
Bottom Chords			Connections		
Top Chords			Verticals/Diagonals		

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Ballast Walls		
Bearings			Wingwalls		
Wearing Surface (Approaches)	2 yr	Bridge Surface Repair	Railing Systems		
Floor Beams			Stingers		
Bracing Element			Wearing Surface (Decks)	2 yr	Repair to Bridge Timber
Embankments			Slope Protection		
Streams and Waterways			Foundation (Below Ground Level)		
Bottom Chords			Connections		
Top Chords			Verticals/Diagonals		

Additional Investigation:

OSIM Inspection Performance Snapshot

The Bridges Golf Course John Pound Rd.

[MAP LINK](#)

Site Number: BR_GOLF002

Location: Carroll Trail at John Pound Rd.

OSIM Recommendation: Maintenance Only

BCI	85
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Overall Comments:

The structure is generally in good condition. Settlement of east concrete approach slab noted. Steel plate installed as temporary fix. Maintenance work required.



General Structure Information:

Lanes: 1
 Type: Half-Through Truss
 Spans: 1
 Span Length: 30 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): 5.9 / /
 Construction Date: 2005
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$10,000.00
Associated Costs	\$4,000.00
Total Costs	\$14,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Ballast Walls		
Bearings			Wingwalls		
Utilities			Wearing Surface (Approaches)		
Railing Systems			Floor Beams		
Stingers			Bracing Element		
Wearing Surface (Decks)			Embankments		
Streams and Waterways			Foundation (Below Ground Level)		
Walls			Bottom Chords		
Connections			Top Chords		
Verticals			Diagonals		

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Ballast Walls		
Bearings			Wingwalls		
Utilities			Wearing Surface (Approaches)	1 yr	Erosion Control at Bridge, Bridge Surface Repair
Railing Systems			Floor Beams		
Stingers			Bracing Element		
Wearing Surface (Decks)	2 yr	Repair to Bridge Timber	Embankments		
Streams and Waterways			Foundation (Below Ground Level)		
Walls			Bottom Chords		
Connections			Top Chords		
Verticals			Diagonals		

Additional Investigation:

Monitoring of Deformations, Settlements and Movements,.
 Comment: Monitor settlement of east concrete approach slab.

The Bridges Golf Course at Hole 12 and 17

[MAP LINK](#)

Site Number: BR_GOLF0003

Location: Carroll Trail at Hole 12 and 17

OSIM Recommendation: Maintenance Only

BCI	89
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Overall Comments:

The structure is generally in good condition. Deterioration of approach ramps noted. South utility box open during time of inspection. Maintenance work required.



General Structure Information:

Lanes: 1
 Type: Half-Through Truss
 Spans: 1
 Span Length: 21.2 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): 5.9 / /
 Construction Date: 2005
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$2,000.00
Associated Costs	\$4,000.00
Total Costs	\$6,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Ballast Walls		
Bearings			Wingwalls		
Utilities			Wearing Surface (Approaches)		
Railing Systems			Floor Beams		
Stingers			Bracing Element		
Wearing Surface (Decks)			Embankments		
Slope Protection			Streams and Waterways		
Foundation (Below Ground Level)			Bottom Chords		
Connections			Top Chords		
Verticals			Diagonals		

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Ballast Walls		
Bearings			Wingwalls		
Utilities	Urgent	Other: Reinstall Cover to Utility Box	Wearing Surface (Approaches)	1 yr	Bridge Surface Repair
Railing Systems			Floor Beams		
Stingers			Bracing Element		
Wearing Surface (Decks)			Embankments		
Slope Protection			Streams and Waterways		
Foundation (Below Ground Level)			Bottom Chords		
Connections			Top Chords		
Verticals			Diagonals		

Additional Investigation:

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Hawkins Pedestrian Bridge

[MAP LINK](#)

Site Number: BR_LAKE0001

Location: 60 West of Frank St. and Delevan Cres.

OSIM Recommendation: Minor Rehab - 1 to 5 years

BCI 71

Overall Comments:

Minor rehabilitation work required. Severe undermining of retaining wall footing at southwest quadrant. Major rehabilitation recommended in 10 years including cleaning and coating of all structural steel.



General Structure Information:

Lanes:
 Type: I-Beam or Girders
 Spans: 3
 Span Length: 20.6, 20.6, 20.6 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): None
 Construction Date: 1993
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$125,000.00
Associated Costs	\$105,000.00
Total Costs	\$230,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls	1 - 5 yr	Rehab	Other		
Barriers			Wearing Surface (Approaches)		
Railing Systems			Diaphragms	1 - 5 yr	Rehab
Girders			Bracing Element	1 - 5 yr	Rehab
Structural Steel	1 - 5 yr	Rehab	Wearing Surface (Decks)		
Embankments	1 - 5 yr	Rehab	Streams and Waterways		
Shafts/Columns/Pile Bents	6 - 10 yr	Rehab	Walls		
Walls	1 - 5 yr	Replace			

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Other		
Barriers			Wearing Surface (Approaches)		
Railing Systems			Diaphragms		
Girders			Bracing Element		
Structural Steel			Wearing Surface (Decks)		
Embankments			Streams and Waterways		
Shafts/Columns/Pile Bents			Walls		
Walls					

Additional Investigation:

Monitoring of Deformations, Settlements and Movements.
 Comment: Monitor potential rotation/deformation of diaphragm at west abutment bearing at time of next inspection.

Van St. Pedestrian Bridge

[MAP LINK](#)

Site Number: BR_VAN0001

Location: 45m East of Bloomer St.

OSIM Recommendation: Maintenance Only

BCI 89

Overall Comments:

The structure is generally in good condition. Maintenance work required.



General Structure Information:

Lanes:
 Type: Half-Through Truss
 Spans: 1
 Span Length: 30.6 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): 5.9 / /
 Construction Date: 2004
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$10,000.00
Associated Costs	\$4,000.00
Total Costs	\$14,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Ballast Walls		
Bearings			Wingwalls		
Wearing Surface (Approaches)			Railing Systems		
Floor Beams			Stingers		
Bracing Element			Wearing Surface (Decks)		
Embankments			Streams and Waterways		
Foundation (Below Ground Level)			Bottom Chords		
Connections			Top Chords		
Diagonals			Verticals		
Diagonals					

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Abutment Walls			Ballast Walls		
Bearings			Wingwalls		
Wearing Surface (Approaches)			Railing Systems	2 yr	Bridge Cleaning
Floor Beams			Stingers		
Bracing Element			Wearing Surface (Decks)		
Embankments	2 yr	Erosion Control at Bridges	Streams and Waterways		
Foundation (Below Ground Level)			Bottom Chords		
Connections			Top Chords		
Diagonals			Verticals		
Diagonals					

Additional Investigation:

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Baldwin St. Culvert at Participark Trail

[MAP LINK](#)

Site Number: CU_BALD0654_1

Location: 120m West of Edgewood Dr.

OSIM Recommendation: Minor Rehab - 1 to 5 years

BCI 69

Overall Comments:

Structure is generally in fair to good condition. Localized spalls at inlet and outlet. Minor rehabilitation work required.



General Structure Information:

Lanes: 2
 Type: Round Culvert
 Spans: 1
 Span Length: 5.3 m
 AADT: 6230
 Posted Speed: 50
 Load Limit (Tonnes): None
 Construction Date: 1970
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$55,000.00
Associated Costs	\$85,000.00
Total Costs	\$140,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Inlet Components	1 - 5 yr	Rehab	Outlet Components	1 - 5 yr	Rehab
Wearing Surface			Embankments		
Streams and Waterways			Foundation (Below Ground Level)		
Curbs			Sidewalk and Medians		

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Inlet Components			Outlet Components		
Wearing Surface			Embankments	2 yr	Erosion Control at Bridges
Streams and Waterways			Foundation (Below Ground Level)		
Curbs			Sidewalk and Medians		

Additional Investigation:

Empty box for additional investigation notes.

OSIM Inspection Performance Snapshot

Broadway & Christie St. Culvert

[MAP LINK](#)

Site Number: CU_BROA2247_1

Location: Intersection of Broadway St. and Christie St.

OSIM Recommendation: Replace - 6 to 10 years

BCI 53

Overall Comments:

Structure is generally in fair condition with some poor elements. Deformations at crown are of concern. Recommend replacing culvert within 10 years.



General Structure Information:	
Lanes:	3
Type:	Ellipse Culvert
Spans:	1
Span Length:	2.28 m
AADT:	10520
Posted Speed:	50
Load Limit (Tonnes):	None
Construction Date:	1998
Inspection Date:	May 15, 2019
Costing Summary:	
Task	Cost Estimate
Construction Costs	\$475,000.00
Associated Costs	\$225,000.00
Total Costs	\$700,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels	6 - 10 yr	Replace
Inlet Components			Outlet Components		
Wearing Surface			Embankments		
Streams and Waterways			Walls	6 - 10 yr	Rehab
Curbs			Sidewalk and Medians		

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Inlet Components			Outlet Components	1 yr	Other - Remove Debris
Wearing Surface	2 yr	Rout and Seal	Embankments	1 yr	Erosion Control at Bridges
Streams and Waterways			Walls		
Curbs			Sidewalk and Medians		

Additional Investigation:

Monitoring of Deformations, Settlements and Movements.
 Comment: Retaining wall at northeast quadrant is showing signs of movement. Cusping is evident in barrel of CSP culvert. Monitor. Hydraulic investigation may be completed to determine if liner option is acceptable.

Devonshire Ave. Culvert

[MAP LINK](#)

Site Number: CU_DEVONS0314_1

Location: 125m East of Lamers Crt.

OSIM Recommendation: Replace - 1 to 5 years

BCI 51

Overall Comments:

Structure is in overall fair to poor condition. Culvert replacement is recommended.



General Structure Information:	
Lanes:	2
Type:	Ellipse Culvert
Spans:	2
Span Length:	1.9, 1.9 m
AADT:	3490
Posted Speed:	50
Load Limit (Tonnes):	None
Construction Date:	1980
Inspection Date:	May 21, 2019
Costing Summary:	
Task	Cost Estimate
Construction Costs	\$207,000.00
Associated Costs	\$195,000.00
Total Costs	\$402,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels	1 - 5 yr	Replace
Inlet Components			Outlet Components		
Wearing Surface	1 - 5 yr	Replace	Streams and Waterways		
Curbs			Sidewalk and Medians	1 - 5 yr	Replace
Sidewalk and Medians					

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Inlet Components			Outlet Components		
Wearing Surface			Streams and Waterways		
Curbs			Sidewalk and Medians		
Sidewalk and Medians					

Additional Investigation:

Monitoring of Deformations, Settlements and Movements.
 Comment: East barrel shows signs of cusping, and differential settlement. Complete loss of section in north end of west barrel. Monitor deformations, settlements, and movements.

Glendale Dr. Culvert at Victoria St.

[MAP LINK](#)

Site Number: CU_GLEND0176_1

Location: 55m West of Victoria St.

OSIM Recommendation: Maintenance Only

BCI 89

Overall Comments:

The structure is generally in good condition. Maintenance work required.



General Structure Information:

Lanes: 2
 Type: Box Culvert
 Spans: 1
 Span Length: 3 m
 AADT: 2490
 Posted Speed: 50
 Load Limit (Tonnes): None
 Construction Date: 2003
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$2,500.00
Associated Costs	\$0.00
Total Costs	\$2,500.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Inlet Components			Outlet Components		
Wearing Surface			Embankments		
Slope Protection			Streams and Waterways		
Walls			Curbs		
Sidewalk and Medians					

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Inlet Components			Outlet Components		
Wearing Surface			Embankments		
Slope Protection			Streams and Waterways		
Walls	2 yr	Erosion Control at Bridges	Curbs		
Sidewalk and Medians					

Additional Investigation:

Empty space for additional investigation notes.

Lisgar Ave. North Culvert

[MAP LINK](#)

Site Number: CU_LISG1158_1

Location: 110m East of Van Norman Dr.

OSIM Recommendation: Minor Rehab - 6 to 10 years

BCI 70

Overall Comments:

Previous OSIM describes significant amount of deterioration. Limited inspection in 2019 due to water levels. Recommend supplementary inspection at lower levels or underwater inspection to determine appropriate recommendation.



General Structure Information:

Lanes: 2
 Type: Round Culvert
 Spans: 1
 Span Length: 3.3 m
 AADT: 4260
 Posted Speed: 50
 Load Limit (Tonnes): None
 Construction Date: 1980
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$152,500.00
Associated Costs	\$113,000.00
Total Costs	\$265,500.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels	6 - 10 yr	Rehab
Wearing Surface			Embankments		
Streams and Waterways			Curbs		
Sidewalk and Medians					

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Wearing Surface			Embankments	1 yr	Erosion Control at Bridges
Streams and Waterways			Curbs		
Sidewalk and Medians					

Additional Investigation:

Underwater Investigation, Structure Evaluation, Monitoring of Deformations, Settlements and Movements.
 Comment: Monitor wide horizontal crack (3") in west wall at mid-length at time of next inspection. Limited inspection of culvert bottom due to high water level. Structure evaluation required to determine feasibility of liner option.

Quarter Town Line Culvert at Stoney Creek

[MAP LINK](#)

Site Number: CU_QUAR2685_1

Location: 85m North of Fairway Hill Blvd.

OSIM Recommendation: Minor Rehab - Urgent

BCI 61

Overall Comments:

Severe rotation and sliding of retaining wall at southwest quadrant. Continue to monitor movement, settlement and rotation of gabion basket retaining wall on the west side until replacement. Replacement or stabilization of the southwest section should be done as soon as possible.



General Structure Information:

Lanes: 2
 Type: Box Culvert
 Spans: 2
 Span Length: 4, 4 m
 AADT: 3185
 Posted Speed: 50
 Load Limit (Tonnes): None
 Construction Date: 1970
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$82,000.00
Associated Costs	\$68,000.00
Total Costs	\$150,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Inlet Components			Outlet Components		
Wearing Surface			Embankments		
Streams and Waterways			Barrier System on Walls		
Walls	Urgent	Replace	Curbs		
Sidewalk and Medians					

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels	2 yr	Repair of Bridge Concrete
Inlet Components			Outlet Components		
Wearing Surface			Embankments		
Streams and Waterways			Barrier System on Walls		
Walls			Curbs		
Sidewalk and Medians					

Additional Investigation:

Comment: Develop monitoring program for movement, settlement and rotation of gabion basket retaining walls on the west side.

Victoria St. Driveway Access Culvert

[MAP LINK](#)

Site Number: CU_VICT0569_1

Location: 90m East of Parkdale Dr., 70m south of Glendale Dr.

OSIM Recommendation: Minor Rehab - 1 to 5 years

BCI 75

Overall Comments:

Structure is generally in good condition, however, barriers are not anchored.



General Structure Information:

Lanes: 1
 Type: Twin Round Culvert
 Spans: 2
 Span Length: 1.2, 1.8 m
 AADT: 10
 Posted Speed:
 Load Limit (Tonnes): None
 Construction Date: 1990
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$40,000.00
Associated Costs	\$18,000.00
Total Costs	\$58,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems	1 - 5 yr	Replace	Barrels		
Barrels			Wearing Surface		
Slope Protection			Slope Protection		
Streams and Waterways					

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Barrels			Wearing Surface		
Slope Protection			Slope Protection		
Streams and Waterways					

Additional Investigation:

Comment: Need for barrier may be investigated.

Quarter Town Line Retaining Wall at Beech Blvd.

[MAP LINK](#)

Site Number: RW_BEECH

Location: 0.3km North Beech Blvd.

OSIM Recommendation: Replace - Urgent

BCI	44
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Overall Comments:

Replacement is recommended. Continue to monitor movement, settlement and rotation of retaining wall until replacement. If any immediate safety concerns are identified, immediate rehabilitation or replacement is required. Evaluate structures and new RSS option in-front of existing.



General Structure Information:

Lanes:
 Type: Gabion Gravity Ret. Wall
 Wall Height (Ave): 3 m
 Wall Length: 42 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): None
 Construction Date: 2000
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$150,000.00
Associated Costs	\$295,000.00
Total Costs	\$445,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Embankments		
Barrier System on Walls			Walls	1 - 5 yr	Replace
Sidewalk and Medians					

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Embankments		
Barrier System on Walls			Walls		
Sidewalk and Medians					

Additional Investigation:

Structure Evaluation, Monitoring of Deformations, Settlements and Movements.
 Comment: Develop monitoring program for movement, settlement and rotation of gabion basket retaining wall. Evaluate structures and new RSS option in-front of existing.

OSIM Inspection Performance Snapshot

Bridge St. at Lisgar Ave

[MAP LINK](#)

Site Number: RW_BRIDGE0274

Location: Northeast of Canadian Tire

OSIM Recommendation: Maintenance Only

BCI	84
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Overall Comments:

Structure is in generally good condition. Localized areas of bulging noted in wall.



General Structure Information:

Lanes:
 Type: Gabion MSE Ret. Wall
 Wall Height (Ave): 10.35 m
 Wall Length: 135 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): None
 Construction Date: 2000
 Inspection Date: June 11, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$2,000.00
Associated Costs	\$0.00
Total Costs	\$2,000.00

Rehabilitation / Replacement Recommendations: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Embankments			Foundation (Below Ground Level)		
Barrier System on Walls			Walls		

Maintenance Needs: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Embankments			Foundation (Below Ground Level)		
Barrier System on Walls			Walls	1 yr	Other: Remove Vegetation

Additional Investigation:

Monitoring of Deformations, Settlements and Movements.
 Comment: Develop monitoring program for potential movement, settlement and rotation of retaining wall.

OSIM Inspection Performance Snapshot

Broadway St. at Bloomer St.

[MAP LINK](#)

Site Number: RW_BROAD

Location: 50m North of Bloomer St.

OSIM Recommendation: Maintenance Only

BCI	85
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Overall Comments:

Structure is in overall fair to good condition. Minor maintenance work required.



General Structure Information:

Lanes:
 Type: Concrete Gravity Ret. Wall
 Wall Height (Ave): 2.1 m
 Wall Length: 28 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): None
 Construction Date: 1960
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$1,000.00
Associated Costs	\$0.00
Total Costs	\$1,000.00

Rehabilitation / Replacement Recommendations: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Embankments			Foundation (Below Ground Level)		
Walls					

Maintenance Needs: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Embankments	1 yr	Other: Remove Vegetation	Foundation (Below Ground Level)		
Walls					

Additional Investigation:

Fairway Hills Blvd. and Quarter Town Line

[MAP LINK](#)

Site Number: RW_FAIR

Location: 70m North of Fairway Hills Blvd.

OSIM Recommendation: Minor Rehab - 6 to 10 years

BCI 73

Overall Comments:

The structure is in fair to good condition. Settlement of wall is causing deformation to elements above.



General Structure Information:

Lanes:
 Type: Gabion Gravity Ret. Wall
 Wall Height (Ave): 3.65 m
 Wall Length: 110 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): None
 Construction Date: 2000
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$25,000.00
Associated Costs	\$44,000.00
Total Costs	\$69,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Embankments		
Barrier System on Walls			Walls	6 - 10 yr	Rehab

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Embankments		
Barrier System on Walls			Walls		

Additional Investigation:

Monitoring of Deformations, Settlements and Movements,
 Comment: Monitor wall for settlement and rotation.

Newell Road West Retaining Wall

[MAP LINK](#)

Site Number: RW_NEWE0001

Location: 250m South of Baldwin St.

OSIM Recommendation: Replace - 6 to 10 years

BCI	50
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Overall Comments:

The structure is generally in fair to poor condition. It is recommended that the retaining wall be replaced.



General Structure Information:	
Lanes:	
Type:	Masonry Gravity Ret. Wall
Wall Height (Ave):	8 m
Wall Length:	60 m
AADT:	
Posted Speed:	
Load Limit (Tonnes):	None
Construction Date:	1950
Inspection Date:	May 21, 2019
Costing Summary:	
Task	Cost Estimate
Construction Costs	\$150,000.00
Associated Costs	\$143,000.00
Total Costs	\$293,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Embankments		
Walls	6 - 10 yr	Replace			

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Embankments		
Walls					

Additional Investigation:

Monitoring of Deformations, Settlements and Movements.
 Comment: Monitor dry stack concrete slabs for movement at time of next inspection.

Newell Road East Retaining Wall

[MAP LINK](#)

Site Number: RW_NEWE0002

Location: 250m South of Baldwin St.

OSIM Recommendation: Replace - 6 to 10 years

BCI 48

Overall Comments:

The structure is generally in fair to poor condition. It is recommended that the retaining wall be replaced.



General Structure Information:

Lanes:
 Type: Masonry Gravity Ret. Wall
 Wall Height (Ave): 8 m
 Wall Length: 80 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): None
 Construction Date: 1950
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$195,000.00
Associated Costs	\$143,000.00
Total Costs	\$338,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Embankments		
Walls	6 - 10 yr	Replace			

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Embankments		
Walls					

Additional Investigation:

Structure Evaluation, Monitoring of Deformations, Settlements and Movements.
 Comment: Monitor dry stack concrete slabs for movement at time of next inspection.

Victoria St. Concession St. West

[MAP LINK](#)

Site Number: RW_VICT

Location: At Corner of Ralph St., Across from Victoria St.

OSIM Recommendation: Maintenance Only

BCI 83

Overall Comments:

The structure is in overall fair to good condition. Broken fence post at west end of wall.



General Structure Information:

Lanes:
 Type: Precast Conc. Drywall Grav. Ret.
 Wall Height (Ave): 2.17 m
 Wall Length: 51 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): None
 Construction Date: 1980
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$200.00
Associated Costs	\$0.00
Total Costs	\$200.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Embankments			Foundation (Below Ground Level)		
Barrier System on Walls			Barrier System on Walls		
Walls					

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Embankments			Foundation (Below Ground Level)		
Barrier System on Walls			Barrier System on Walls	1 yr	Other: Remove broken post
Walls					

Additional Investigation:

Monitoring of Deformations, Settlements and Movements,.
 Comment: Monitor movement of wooden fence at time of next inspection.

William St. and Quarter Town Line

[MAP LINK](#)

Site Number: RW_WILL

Location: 30m North of William St.

OSIM Recommendation: Minor Rehab - 6 to 10 years

BCI 73

Overall Comments:

Settlement of gabion baskets noted. Settlement and rotation of structure causing sidewalk above wall to rotate.



General Structure Information:

Lanes:
 Type: Gabion Gravity Ret. Wall
 Wall Height (Ave): 3.55 m
 Wall Length: 52 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): None
 Construction Date: 2000
 Inspection Date: May 21, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$11,000.00
Associated Costs	\$12,000.00
Total Costs	\$23,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Embankments		
Barrier System on Walls			Walls		
Sidewalk and Medians	6 - 10 yr	Rehab			

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Embankments		
Barrier System on Walls			Walls	1 yr	Other: Remove tree
Sidewalk and Medians					

Additional Investigation:

Monitoring of Deformations, Settlements and Movements,
 Comment: Monitor wall for settlement and rotation.

OSIM Inspection Performance Snapshot

Broadway St. Culvert at Sobeys

[MAP LINK](#)

Site Number: CU_BROA3948_1

Location: 25m Southeast of Entrance to Sobeys

OSIM Recommendation: No Work Recommended -

BCI	94
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Overall Comments:

Limited inspection of structure due to limited access and size of structure. Structure barrel was not visible from barrel access points.



General Structure Information:	
Lanes:	4
Type:	Round Culvert (Assumed)
Spans:	1
Span Length:	0.8 (Assumed) m
AADT:	10520
Posted Speed:	60
Load Limit (Tonnes):	None
Construction Date:	1950
Inspection Date:	June 11, 2019
Costing Summary:	
Task	Cost Estimate
Construction Costs	\$0.00
Associated Costs	\$0.00
Total Costs	\$0.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Inlet Components		
Outlet Components			Wearing Surface		

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Inlet Components		
Outlet Components			Wearing Surface		

Additional Investigation:

Comment: Limited inspection of structure due to limited access and size of structure. Recommend use of CCTV inspection or similar.

Quarter Town Line at Oak Park Pond

[MAP LINK](#)

Site Number: CU_QUAR1937_12

Location: 50m North of William St.

OSIM Recommendation: Maintenance Only

BCI 89

Overall Comments:

Limited inspection of structure due to limited access and size of structure. This inspection only includes the culvert structure and elements located on the east end of the structure. All other elements (i.e. retaining wall and barriers at west end of structure) are recorded in the William St. and Quarter Town Line OSIM report (Site Number: RW_WILL).



General Structure Information:

Lanes: 2
 Type: Round Culvert
 Spans: 1
 Span Length: 0.4 m
 AADT: 4280
 Posted Speed: 50
 Load Limit (Tonnes): None
 Construction Date: 2007
 Inspection Date: June 11, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$5,000.00
Associated Costs	\$0.00
Total Costs	\$5,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Inlet Components			Outlet Components		
Wearing Surface			Embankments		
Sidewalk and Medians					

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Inlet Components			Outlet Components	1 yr	Other: Remove Debris
Wearing Surface			Embankments	2 yr	Erosion Control at Bridges
Sidewalk and Medians					

Additional Investigation:

Baldwin St. Culvert at Whispering Pine

[MAP LINK](#)

Site Number: CU_BALD1103_1

Location: 75m East of Whispering Pine Ln.

OSIM Recommendation: Replace - 6 to 10 years

BCI 53

Overall Comments:

The structure is generally in fair to poor condition.



General Structure Information:

Lanes: 2
 Type: Round Culvert
 Spans: 1
 Span Length: 1.1 m
 AADT: 6230
 Posted Speed: 50
 Load Limit (Tonnes): None
 Construction Date: 1968
 Inspection Date: June 11, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$176,000.00
Associated Costs	\$103,000.00
Total Costs	\$279,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels	6 - 10 yr	Replace
Inlet Components	6 - 10 yr	Replace	Outlet Components	6 - 10 yr	Replace
Wearing Surface			Embankments	6 - 10 yr	Replace
Sidewalk and Medians	6 - 10 yr	Replace			

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Inlet Components	1 yr	Other - Remove Debris	Outlet Components		
Wearing Surface			Embankments	2 yr	Erosion Control at Bridges
Sidewalk and Medians					

Additional Investigation:

Monitoring of Deformations, Settlements and Movements.
 Comment: Monitor deformation and cusping of barrel.

OSIM Inspection Performance Snapshot

Baldwin St. at Goldenrod Dr.

[MAP LINK](#)

Site Number: CU_BALD1272_1

Location: 15m East of Goldenrod Dr.

OSIM Recommendation: Maintenance Only

BCI	86
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Overall Comments:

Limited inspection of barrel due to limited access. Condition assumed based on condition of wearing surface above structure and visual inspection from inlet and outlet.



General Structure Information:	
Lanes:	2
Type:	Round Culvert
Spans:	1
Span Length:	0.4 m
AADT:	6230
Posted Speed:	50
Load Limit (Tonnes):	None
Construction Date:	1969
Inspection Date:	June 11, 2019
Costing Summary:	
Task	Cost Estimate
Construction Costs	\$8,000.00
Associated Costs	\$1,000.00
Total Costs	\$9,000.00

Rehabilitation / Replacement Recommendations: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Inlet Components		
Outlet Components			Embankments		
Wearing Surface			Sidewalk and Medians		

Maintenance Needs: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Inlet Components		
Outlet Components			Embankments	1 yr	Erosion Control at Bridges
Wearing Surface	2 yr	Rout and Seal	Sidewalk and Medians		

Additional Investigation:

Newell Rd. Culvert

[MAP LINK](#)

Site Number: CU_NEWE1362_1

Location: 250m South of Baldwin St.

OSIM Recommendation: Replace - 6 to 10 years

BCI 53

Overall Comments:

The condition of the guide rail barriers as well as the retaining walls on either side of the culvert is recorded in the OSIM reports for the Newell Road/Quarter Town Line Retaining Walls (Site Numbers RW_NEWE0001 and RW_NEWE0002). The Culvert is recommended to be replaced at the same time as the retaining wall.



General Structure Information:	
Lanes:	2
Type:	Round Culvert
Spans:	1
Span Length:	2.1 m
AADT:	3185
Posted Speed:	50
Load Limit (Tonnes):	None
Construction Date:	1989
Inspection Date:	June 11, 2019
Costing Summary:	
Task	Cost Estimate
Construction Costs	\$1,110,000.00
Associated Costs	\$188,000.00
Total Costs	\$1,298,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Barrels	6 - 10 yr	Replace	Inlet Components	6 - 10 yr	Replace
Outlet Components	6 - 10 yr	Replace	Wearing Surface		
Embankments	6 - 10 yr	Replace	Walls	6 - 10 yr	Replace
Curbs					

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Inlet Components		
Outlet Components			Wearing Surface		
Embankments			Walls		
Curbs					

Additional Investigation:

Monitoring of Deformations, Settlements and Movements.
 Comment: Deformation noted in the soffit and bottom of culvert barrel. Monitor barrel for further deformation.

OSIM Inspection Performance Snapshot

Bayham Dr. Culvert

[MAP LINK](#)

Site Number: CU_BAYH0993_1

Location: At the intersection of Pressey Line and Bayham Drive

OSIM Recommendation: Maintenance Only

BCI	89
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Overall Comments:

The structure is generally in good condition. Maintenance work required.



General Structure Information:	
Lanes:	2
Type:	Round Culvert
Spans:	1
Span Length:	1.5 m
AADT:	
Posted Speed:	50
Load Limit (Tonnes):	None
Construction Date:	2005
Inspection Date:	June 11, 2019
Costing Summary:	
Task	Cost Estimate
Construction Costs	\$10,000.00
Associated Costs	\$2,000.00
Total Costs	\$12,000.00

Rehabilitation / Replacement Recommendations: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Inlet Components		
Outlet Components			Embankments		
Wearing Surface					

Maintenance Needs: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Barrels	2 yr	Bridge Cleaning	Inlet Components		
Outlet Components			Embankments		
Wearing Surface	2 yr	Rout and Seal			

Additional Investigation:

OSIM Inspection Performance Snapshot

Vienna Rd. from Stubbs Crt. Culvert

[MAP LINK](#)

Site Number: CU_VIEN0615_1

Location: 230m South of Simcoe St.

OSIM Recommendation: Maintenance Only

BCI 87

Overall Comments:

Limited inspection of structure due to limited access and size of structure. Structure is generally in good condition. Build-up of debris at inlet. Maintenance work required.



General Structure Information:	
Lanes:	2
Type:	Round Culvert
Spans:	1
Span Length:	1.5 m
AADT:	
Posted Speed:	60
Load Limit (Tonnes):	None
Construction Date:	1975
Inspection Date:	June 11, 2019
Costing Summary:	
Task	Cost Estimate
Construction Costs	\$9,000.00
Associated Costs	\$0.00
Total Costs	\$9,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Inlet Components		
Outlet Components			Wearing Surface		
Embankments					

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Inlet Components	1 yr	Other - Remove Debris
Outlet Components			Wearing Surface	2 yr	Rout and Seal
Embankments	1 yr	Erosion Control at Bridges			

Additional Investigation:

OSIM Inspection Performance Snapshot

Lake Lisgar Outlet Culvert

[MAP LINK](#)

Site Number: CU_CONCE0299_1

Location: 100m East of Park Ave.

OSIM Recommendation: Minor Rehab - 1 to 5 years

BCI	68
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Overall Comments:

Limited inspection of barrel due to limited access. Enhanced OSIM recommended. Severe undermining of footing at outlet. Rehabilitation recommended.



General Structure Information:

Lanes: 2
 Type: Box Culvert
 Spans: 1
 Span Length: 1.55 m
 AADT: 4280
 Posted Speed: 50
 Load Limit (Tonnes): None
 Construction Date: 1952
 Inspection Date: June 11, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$116,000.00
Associated Costs	\$173,000.00
Total Costs	\$289,000.00

Rehabilitation / Replacement Recommendations: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Inlet Components			Outlet Components	6 - 10 yr	Rehab
Wearing Surface			Embankments		
Foundation (Below Ground Level)	1 - 5 yr	Rehab	Walls	1 - 5 yr	Replace
Curbs			Sidewalk and Medians		

Maintenance Needs: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Railing Systems			Barrels		
Inlet Components	1 yr	Other - Remove Debris	Outlet Components	1 yr	Other - Remove Tree
Wearing Surface	2 yr	Rout and Seal	Embankments	2 yr	Erosion Control at Bridges
Foundation (Below Ground Level)			Walls		
Curbs			Sidewalk and Medians		

Additional Investigation:

Monitoring of Deformations, Settlements and Movements.
 Comment: Severe undermining of footing at outlet with exposed timber piles. Monitor structure for settlement and further undermining.

Lisgar Ave Culvert Part 1

[MAP LINK](#)

Site Number: CU_BRIDE0274_1

Location: 50m South of Frank St in Canadian Tire Parking Lot

OSIM Recommendation: Maintenance Only

BCI	85
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Overall Comments:

This structure is one of three structures that are connected together to create CU_BRIDE0274_1, CU_BRIDE0274_2, and LISG2209_1. Each structure, from the inlet at the north to the outlet at the south, is: CU_BRIDE0274_1 (round culvert 63 in length) and transitions to CU_BRIDE0274_2 (round culvert 77 m in length) which transitions to LISG2209_1 (concrete box culvert 376m... Refer to OSIM for details.



General Structure Information:

Lanes: 3
 Type: Round Culvert
 Spans: 1
 Span Length: 1.5 m
 AADT:
 Posted Speed: 50
 Load Limit (Tonnes): None
 Construction Date: 1950
 Inspection Date: June 11, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$19,000.00
Associated Costs	\$6,000.00
Total Costs	\$25,000.00

Rehabilitation / Replacement Recommendations: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Inlet Components		
Outlet Components			Wearing Surface		
Embankments			Streams and Waterways		

Maintenance Needs: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Barrels	1 yr	Other - Joint Repair	Inlet Components		
Outlet Components	1 yr	Bridge Cleaning	Wearing Surface	2 yr	Rout and Seal
Embankments	1 yr	Erosion Control at Bridges	Streams and Waterways	Urgent	Other - Clear Debris

Additional Investigation:

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Lisgar Ave Culvert Part 2

[MAP LINK](#)

Site Number: **CU_BRIDE0274_2**

Location: 110m South of Frank St in Canadian Tire Parking Lot

OSIM Recommendation: Maintenance Only

BCI	87
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Overall Comments:

This structure is one of three structures that are connected together to create CU_BRIDE0274_1, CU_BRIDE0274_2, and LISG2209_1. Each structure, from the inlet at the north to the outlet at the south, is: CU_BRIDE0274_1 (round culvert 63 in length) and transitions to CU_BRIDE0274_2 (round culvert 77 m in length) which transitions to LISG2209_1 (concrete box culvert 376m... Refer to OSIM for details.



General Structure Information:	
Lanes:	
Type:	Round Culvert
Spans:	1
Span Length:	1.7 m
AADT:	
Posted Speed:	
Load Limit (Tonnes):	None
Construction Date:	1977
Inspection Date:	June 11, 2019
Costing Summary:	
Task	Cost Estimate
Construction Costs	\$22,000.00
Associated Costs	\$20,000.00
Total Costs	\$42,000.00

Rehabilitation / Replacement Recommendations: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Inlet Components		
Outlet Components			Wearing Surface		
Streams and Waterways					

Maintenance Needs: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Barrels	2 yr	Bridge Cleaning	Inlet Components	2 yr	Bridge Cleaning
Outlet Components	2 yr	Repair to Bridge Concrete	Wearing Surface	2 yr	Rout and Seal
Streams and Waterways					

Additional Investigation:

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Lisgar Ave Culvert Outlet at Brock St. E.

[MAP LINK](#)

Site Number: CU_LISG2209_1

Location: Outlet Located on Brock St. E, across from Lisgar Ave.

OSIM Recommendation: Minor Rehab - 1 to 5 years

BCI 61

Overall Comments:

This structure is one of three structures that are connected together to create CU_BRIDE0274_1, CU_BRIDE0274_2, and LISG2209_1. Each structure, from the inlet at the north to the outlet at the south, is: CU_BRIDE0274_1 (round culvert 63 in length) and transitions to CU_BRIDE0274_2 (round culvert 77 m in length) which transitions to LISG2209_1 (concrete box culvert 376m... Refer to OSIM for details.



General Structure Information:

Lanes: 2
 Type: Box Culvert
 Spans: 1
 Span Length: 1.7 m
 AADT: 4260
 Posted Speed: 50
 Load Limit (Tonnes): None
 Construction Date: 1950
 Inspection Date: June 11, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$160,000.00
Associated Costs	\$98,000.00
Total Costs	\$258,000.00

Rehabilitation / Replacement Recommendations: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Barrels	1 - 5 yr	Rehab	Barrels		
Barrels			Inlet Components		
Outlet Components			Wearing Surface		
Embankments			Streams and Waterways		
Foundation (Below Ground Level)					

Maintenance Needs: (Refer to OSIM elements for full details)

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Barrels		
Barrels			Inlet Components	2 yr	Repair to Bridge Concrete
Outlet Components	2 yr	Repair to Bridge Concrete	Wearing Surface	2 yr	Rout and Seal
Embankments			Streams and Waterways		
Foundation (Below Ground Level)					

Additional Investigation:

Structure Evaluation, Monitoring of Deformations, Settlements and Movements.
 Comment: Investigate cause and effect of pressurized leakage in soffit of the culvert. Monitor progression of deterioration caused by leakage.

OSIM Inspection Performance Snapshot

Spruce St. Culvert

[MAP LINK](#)

Site Number: CU_SPRU0541_3

Location: Spruce St. between Freudenberg and Dodsley

OSIM Recommendation: No Work Recommended -

BCI	97
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Overall Comments:

Limited inspection of structure due to limited access and size of structure. Structure is generally in good condition.



General Structure Information:

Lanes:
 Type: Round Culvert
 Spans: 1
 Span Length: 0.5 m
 AADT:
 Posted Speed:
 Load Limit (Tonnes): None
 Construction Date: 1985
 Inspection Date: June 11, 2019

Costing Summary:

Task	Cost Estimate
Construction Costs	\$0.00
Associated Costs	\$0.00
Total Costs	\$0.00

Rehabilitation / Replacement Recommendations: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Inlet Components		
Outlet Components			Embankments		

Maintenance Needs: *(Refer to OSIM elements for full details)*

Element	Timing	Work Required	Element	Timing	Work Required
Barrels			Inlet Components		
Outlet Components			Embankments		

Additional Investigation:

APPENDIX B

STRUCTURE INVENTORY TABLE

G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners

**APPENDIX B - STRUCTURE INVENTORY TABLE:
2019 TOWN OF TILLSONBURG STRUCTURES**

	Bridge / Culvert/ Retaining Wall	Site Number	Structure Name	Hwy/Road Name	Crossing Type	Structure Type	Year Built	Total Deck Length / Total Wall Length (m)	Overall Structure Width / Average Wall Height(m)	No. of Spans	Span Lengths (m)	Total Span	Load Posting (tonne)	AADT	Estimated Replacement Cost	Estimated BCI	2017 BCI
1	Bridge	BR_KINS0001	Kinsmen Pedestrian Bridge	Veterans Memorial Walkway	Pedestrian	I-Beam or Girders	1910	107	4	9	8 @ 11m, 1 @18m	108	-/-	0	\$ 4,095,000	45	50
2	Bridge	BR_SIMCO0001	Simcoe Street Bridge	Highway 19/ Simcoe Street	Road	I-Beam or Girders	1994	40	23.5	1	40	40	-/-	22400	\$ 5,625,000	73	74
3	Bridge	BR_CONCW0001	Concession St. W. Bridge	Concession St.	Road	Rigid Frame, Vertical Legs	1955	10.7	12.9	1	10.7	10.7	-/-	4280	\$ 1,203,750	70	72
4	Bridge	BR_GOLF0001	The Bridges Golf Course at Hole 10	Carroll Trail	Pedestrian	Half-Through Truss	2005	28	2.75	1	28	28	5.9/-	0	\$ 190,000	89	74
5	Bridge	BR_GOLF0002	The Bridges Golf Course John Pound Rd.	Carroll Trail	Pedestrian	Half-Through Truss	2005	30	2.75	1	30	30	5.9/-	0	\$ 202,500	85	74
6	Bridge	BR_GOLF0003	The Bridges Golf Course at Hole 12 and 17	Carroll Trail	Pedestrian	Half-Through Truss	2005	21.2	2.65	1	21.2	21.2	5.9/-	0	\$ 143,750	89	75
7	Bridge	BR_LAKE0001	Hawkins Pedestrian Bridge	Memorial Park Trail	Pedestrian	I-Beam or Girders	1993	61.8	1.96	3	20.6, 20.6, 20.6	61.8	-/-	0	\$ 417,500	71	70
8	Bridge	BR_VAN0001	Van St. Pedestrian Bridge	Van St.	Pedestrian	Half-Through Truss	2004	30.8	3.44	1	30.6	30.6	5.9/-	0	\$ 208,750	89	73
9	Culvert	CU_BALD0654_1	Baldwin St. Culvert at Participark Trail	Baldwin St.	Road	Round Culvert	1970	5.3	66	1	5.3	5.3	-/-	6230	\$ 2,775,000	69	63
10	Culvert	CU_BROA2247_1	Broadway & Christie St. Culvert	Broadway Street	Road	Ellipse Culvert	1998	2.1	30.2	1	2.28	2.28	-/-	10520	\$ 700,000.00	53	46
11	Culvert	CU_DEVONS0314_1	Devonshire Ave. Culvert	Devonshire Ave.	Road	Ellipse Culvert	1980	3.4	20.1	2	1.9, 1.9	3.8	-/-	3490	\$ 402,000	51	63
12	Culvert	CU_GLEND0176_1	Glendale Dr. Culvert at Victoria St.	Glendale Dr.	Road	Box Culvert	2003	3.5	27.5	1	3	3	-/-	2490	\$ 1,025,000	89	64
13	Culvert	CU_LISG1158_1	Lisgar Ave. North Culvert	Lisgar Ave.	Road	Round Culvert	1980	3.5	48.8	1	3.3	3.3	-/-	4260	\$ 1,825,000	70	60
14	Culvert	CU_QUAR2685_1	Quarter Town Line Culvert at Stoney Creek	Quarter Town Line	Road	Box Culvert	1970	10.2	21.3	2	4, 4	8	-/-	3185	\$ 1,100,000	61	67
15	Culvert	CU_VICT0569_1	Victoria St. Driveway Access Culvert	Victoria St.	Road	Twin Round Culvert	1990	7.5	12	2	1.2, 1.8	3	-/-	10	\$ 812,500	75	73
16	Retaining Wall	RW_BEECH	Quarter Town Line Retaining Wall at Beech Blvd.	Quarter Town Line		Gabion Gravity Ret. Wall	2000	42	3	0	0	0	-/-	0	\$ 445,000	44	57
17	Retaining Wall	RW_BRIDGE0274	Bridge St. at Lisgar Ave	Bridge St.		Gabion MSE Ret. Wall	2000	135	10.35	0	0	0	-/-	0	\$ 1,837,500	84	64
18	Retaining Wall	RW_BROAD	Broadway St. at Bloomer St.	Broadway St.		Concrete Gravity Ret. Wall	1960	28	2.1	0	0	0	-/-	0	\$ 62,500	85	61
19	Retaining Wall	RW_FAIR	Fairway Hills Blvd. and Quarter Town Line	Quarter Town Line		Gabion Gravity Ret. Wall	2000	110	3.65	0	0	0	-/-	0	\$ 400,000	73	74
20	Retaining Wall	RW_NEWE0001	Newell Road West Retaining Wall	Newell Road		Masonry Gravity Ret. Wall	1950	60	8	0	0	0	-/-	0	\$ 293,000	50	39
21	Retaining Wall	RW_NEWE0002	Newell Road East Retaining Wall	Newell Road		Masonry Gravity Ret. Wall	1950	80	8	0	0	0	-/-	0	\$ 338,000	48	40
22	Retaining Wall	RW_VICT	Victoria St. Concession St. West	Concession St. West		Precast Conc. Drywall Grav. Ret. Wall	1980	51	2.17	0	0	0	-/-	0	\$ 112,500	83	63
23	Retaining Wall	RW_WILL	William St. and Quarter Town Line	Quarter Town Line		Gabion Gravity Ret. Wall	2000	52	3.55	0	0	0	-/-	0	\$ 187,500	73	75
24	Culvert	CU_BROA3948_1	Broadway St. Culvert at Sobey's	Broadway St.	Road	Round Culvert	1950	0.9	41	1	0.8	0.8	-/-	10520	\$ 375,000	94	-
25	Culvert	CU_QUAR1937_12	Quarter Town Line at Oak Park Pond	Quarter Town Line	Road	Round Culvert	2007	0.42	50	1	0.4	0.4	-/-	4280	\$ 212,500	89	-
26	Culvert	CU_BALD1103_1	Baldwin St. Culvert at Whispering Pine	Baldwin St.	Road	Round Culvert	1968	1.1	40	1	1.1	1.1	-/-	6230	\$ 279,000	53	-
27	Culvert	CU_BALD1272_1	Baldwin St. at Goldenrod Dr.	Baldwin St.	Road	Round Culvert	1969	0.4	60	1	0.4	0.4	-/-	6230	\$ 250,000	86	-
28	Culvert	CU_NEWE1362_1	Newell Rd. Culvert	Newell Road	Road	Round Culvert	1989	2.1	75	1	2.1	2.1	-/-	3185	\$ 1,298,000	53	-
29	Culvert	CU_BAYH0993_1	Bayham Dr. Culvert	Pressey Road	Road	Round Culvert	2005	1.5	55	1	1.5	1.5	-/-	0	\$ 825,000	89	-
30	Culvert	CU_VIEN0615_1	Vienna Rd. from Stubbs Cr. Culvert	Vienna Rd.	Road	Round Culvert	1975	1.1	44	1	1.5	1.5	-/-	0	\$ 487,500	87	-
31	Culvert	CU_CONCE0299_1	Lake Lisgar Outlet Culvert	Concession St. East	Road	Box Culvert	1952	1.55	45	1	1.55	1.55	-/-	4280	\$ 700,000	68	-
32	Culvert	CU_BRIDE0274_1	Lisgar Ave Culvert Part 1	Bridge St. East	Road	Round Culvert	1950	1.5	63	1	1.5	1.5	-/-	0	\$ 950,000	85	-
33	Culvert	CU_BRIDE0274_2	Lisgar Ave Culvert Part 2	Former Raynes St.	Road	Round Culvert	1977	1.7	77	1	1.7	1.7	-/-	0	\$ 1,312,500	87	-
34	Culvert	CU_LISG2209_1	Lisgar Ave Culvert Outlet at Brock St. E.	Lisgar Ave.	Road	Box Culvert	1950	2.3	376	1	1.7	1.7	-/-	4260	\$ 8,650,000	61	-
35	Culvert	CU_SPRU0541_3	Spruce St. Culvert	Spruce St.	Road	Round Culvert	1985	0.5	60	1	0.5	0.5	-/-	0	\$ 300,000	97	-
															\$ 40,041,250.00		

APPENDIX C **PROPOSED BUDGET PLANNING SCHEDULES**

G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners

**APPENDIX C - PROPOSED BUDGET PLANNING SCHEDULES
(CLASS D ESTIMATES)**

Priority	Structure No.	Structure Name	Minimum Recommended Work (OSIM)		BCI	BSI	Investigations (\$000s)	Engineering (\$000s)	Construction (\$000s)	Associated Work (\$000s)	Estimated Project Cost (\$000s)
			Work	Years							
Replacements											
1	RW_BEECH	Quarter Town Line Retaining Wall at Beech Blvd.	Replace	Urgent	44	-	\$ 15	\$ 70	\$ 290	\$ 70	\$ 445
2	CU_DEVONS0314_1	Devonshire Ave. Culvert	Replace	1 to 5 Years	51	48	\$ 10	\$ 90	\$ 272	\$ 30	\$ 402
3	RW_NEWE0002	Newell Road East Retaining Wall	Replace	6 to 10 Years	48	-	\$ 15	\$ 48	\$ 255	\$ 20	\$ 338
4	RW_NEWE0001	Newell Road West Retaining Wall	Replace	6 to 10 Years	50	-	\$ 10	\$ 53	\$ 210	\$ 20	\$ 293
5	CU_NEWE1362_1	Newell Rd. Culvert	Replace	6 to 10 Years	53	-	\$ 10	\$ 83	\$ 1170	\$ 35	\$ 1298
6	CU_BALD1103_1	Baldwin St. Culvert at Whispering Pine	Replace	6 to 10 Years	53	-	\$ 10	\$ 33	\$ 216	\$ 20	\$ 279
7	CU_BROA2247_1	Broadway & Christie St. Culvert	Replace	6 to 10 Years	53	51	\$ 10	\$ 60	\$ 590	\$ 40	\$ 700
SUBTOTAL							\$80,000	\$437,000	\$3,003,000	\$235,000	\$3,755,000
Major Rehabilitation											
1	BR_KINS0001	Kinsmen Pedestrian Bridge	Major Rehabilitation	1 to 5 Years	45	37	-	\$ 135	\$ 2506	\$ 210	\$ 2851
SUBTOTAL							\$0	\$135,000	\$2,506,000	\$210,000	\$2,851,000
Minor Rehabilitation											
1	CU_QUAR2685_1	Quarter Town Line Culvert at Stoney Creek	Minor Rehabilitation	Urgent	61	58	-	\$ 28	\$ 102	\$ 20	\$ 150
2	CU_LISG2209_1	Lisgar Ave Culvert Outlet at Brock St. E.	Minor Rehabilitation	1 to 5 Years	61	-	\$ 2	\$ 46	\$ 200	\$ 10	\$ 258
3	CU_CONCE0299_1	Lake Lisgar Outlet Culvert	Minor Rehabilitation	1 to 5 Years	68	-	\$ 50	\$ 63	\$ 156	\$ 20	\$ 289
4	CU_BALD0654_1	Baldwin St. Culvert at Participark Trail	Minor Rehabilitation	1 to 5 Years	69	66	-	\$ 45	\$ 85	\$ 10	\$ 140
5	BR_LAKE0001	Hawkins Pedestrian Bridge	Minor Rehabilitation	1 to 5 Years	71	63	\$ 20	\$ 125	\$ 635	\$ 25	\$ 805
6	BR_SIMCO0001	Simcoe Street Bridge	Minor Rehabilitation	1 to 5 Years	73	-	\$ 20	\$ 50	\$ 280	\$ 25	\$ 375
7	CU_VICT0569_1	Victoria St. Driveway Access Culvert	Minor Rehabilitation	1 to 5 Years	75	75	-	\$ 8	\$ 45	\$ 5	\$ 58
8	CU_LISG1158_1	Lisgar Ave. North Culvert	Minor Rehabilitation	6 to 10 Years	70	67	\$ 12	\$ 66	\$ 177.5	\$ 10	\$ 265.5
9	BR_CONCW0001	Concession St. W. Bridge	Minor Rehabilitation	6 to 10 Years	70	67	\$ 16	\$ 54	\$ 153	\$ 25	\$ 248
10	RW_FAIR	Fairway Hills Blvd. and Quarter Town Line	Minor Rehabilitation	6 to 10 Years	73	-	-	\$ 13	\$ 36	\$ 20	\$ 69
11	RW_WILL	William St. and Quarter Town Line	Minor Rehabilitation	6 to 10 Years	73	-	-	\$ 5	\$ 13	\$ 5	\$ 23
SUBTOTAL							\$120,000	\$503,000	\$1,882,500	\$175,000	\$2,680,500

**APPENDIX C - PROPOSED BUDGET PLANNING SCHEDULES
(CLASS D ESTIMATES)**

Priority	Structure No.	Structure Name	Minimum Recommended Work (OSIM)		BCI	BSI	Investigations (\$000s)	Engineering (\$000s)	Construction (\$000s)	Associated Work (\$000s)	Estimated Project Cost (\$000s)	
			Work	Years								
Maintenance												
	RW_VICT	Victoria St. Concession St. West	Maintenance	-	83	-	-	-	\$.2	-	\$.2	
	RW_BRIDGE0274	Bridge St. at Lisgar Ave	Maintenance	-	84	-	-	-	\$ 2	-	\$ 2	
	CU_BRIDE0274_1	Lisgar Ave Culvert Part 1	Maintenance	-	85	-	-	-	\$ 22	\$ 3	\$ 25	
	BR_GOLF0002	The Bridges Golf Course John Pound Rd.	Maintenance	-	85	75	-	-	\$ 12.5	\$ 1.5	\$ 14	
	RW_BROAD	Broadway St. at Bloomer St.	Maintenance	-	85	-	-	-	\$ 1	-	\$ 1	
	CU_BALD1272_1	Baldwin St. at Goldenrod Dr.	Maintenance	-	86	-	-	-	\$ 8	\$ 1	\$ 9	
	CU_VIEN0615_1	Vienna Rd. from Stubbs Crt. Culvert	Maintenance	-	87	-	-	-	\$ 9	-	\$ 9	
	CU_BRIDE0274_2	Lisgar Ave Culvert Part 2	Maintenance	-	87	-	-	-	\$ 32	\$ 10	\$ 42	
	CU_GLEND0176_1	Glendale Dr. Culvert at Victoria St.	Maintenance	-	89	87	-	-	\$ 2.5	-	\$ 2.5	
	BR_VAN0001	Van St. Pedestrian Bridge	Maintenance	-	89	77	-	-	\$ 12.5	\$ 1.5	\$ 14	
	BR_GOLF0001	The Bridges Golf Course at Hole 10	Maintenance	-	89	79	-	-	\$ 7	\$ 1.5	\$ 8.5	
	BR_GOLF0003	The Bridges Golf Course at Hole 12 and 17	Maintenance	-	89	79	-	-	\$ 4.5	\$ 1.5	\$ 6	
	CU_BAYH0993_1	Bayham Dr. Culvert	Maintenance	-	89	-	-	-	\$ 10	\$ 2	\$ 12	
	CU_QUAR1937_12	Quarter Town Line at Oak Park Pond	Maintenance	-	89	-	-	-	\$ 5	-	\$ 5	
							SUBTOTAL	\$0	\$0	\$128,200	\$22,000	\$150,200
No Work Recommended												
	CU_BROA3948_1	Broadway St. Culvert at Sobeyes	None	-	94	-	-	-	-	-	-	
	CU_SPRU0541_3	Spruce St. Culvert	None	-	97	-	-	-	-	-	-	
							SUBTOTAL	\$0	\$0	\$0	\$0	\$0
							TOTAL	\$200,000	\$1,075,000	\$7,519,700	\$642,000	\$9,436,700

APPENDIX D
**STRUCTURE COMMENTS, POTENTIAL
SCENARIOS, AND ALTERNATIVE STRATEGIES**

G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners

APPENDIX D - STRUCTURE COMMENTS, POTENTIAL SCENARIOS, AND ALTERNATIVE REHABILITATION STRATEGIES

Priority	Structure No.	Structure Name	Additional Inspections, Investigations, Studies		Comments, Potential Scenario	Alternative Rehabilitation Strategies
			Recommended	Completed		
Replacements						
1	RW_BEECH	Quarter Town Line Retaining Wall at Beech Blvd.	- Structure Evaluation - Monitoring of Deformations, Settlements, and Movements		Replacement is recommended. Continue to monitor movement, settlement and rotation of retaining wall until replacement.	If any immediate safety concerns are identified, immediate rehabilitation or replacement is required. Extensive road work and staging may be required in a replacement project. Alternative solution to consider: Leave existing in-place and install new RSS in-front of existing - various material options may be feasible. Evaluate structure against existing buried civil services and utilities.
2	CU_DEVONS0314_1	Devonshire Ave. Culvert	- Monitoring of Deformations, Settlements, and Movements		Replace structure due to cusping, differential settlement, and corrosion. Monitor deformations, settlements, and movements.	Cost based on assumption of bridge being closed to traffic during construction. Cost will increase if construction is staged. Hydraulic investigation may reveal liner option is available. If a culvert liner option is available, significant costs related to traffic management may be saved.
3	RW_NEWE0002	Newell Road East Retaining Wall	- Structure Evaluation - Monitoring of Deformations, Settlements, and Movements		Replace retaining wall. Sections of wall are missing and displaced throughout. Monitor for deformation. Estimate costs account for replacement of the complete retaining wall.	Geotechnical investigation may determine if Newell Road will be affected by the excavation required for the retaining wall replacement. If Newell Road is not affected, traffic control, staging, or detours may not be required. Alternative solutions may include RSS walls - various material options may be feasible. This option may limit traffic management. Evaluate structure against existing buried civil services and utilities.
4	RW_NEWE0001	Newell Road West Retaining Wall	- Monitoring of Deformations, Settlements, and Movements		Replace retaining wall. Sections of wall are missing and displaced throughout. Monitor for deformation. Estimate costs account for replacement of the complete retaining wall.	Geotechnical investigation may determine if Newell Road will be affected by the excavation required for the retaining wall replacement. If Newell Road is not affected, traffic control, staging, or detours may not be required. Alternative solutions may include RSS walls - various material options may be feasible. This option may limit traffic management. Evaluate structure against existing buried civil services and utilities.
5	CU_NEWE1362_1	Newell Rd. Culvert	- Monitoring of Deformations, Settlements, and Movements		Replace structure. Deformation and deterioration of the culvert is anticipated to continue through the decade. Monitor deformation and cusping. Construction cost based on road closure and detour.	An investigation may be completed to determine if liner option is available. If a culvert liner option is available, significant costs related to traffic management may be saved.
6	CU_BALD1103_1	Baldwin St. Culvert at Whispering Pine	- Monitoring of Deformations, Settlements, and Movements		Replacement of cusping 1100mm CSP culvert. Deformation and deterioration of the culvert is anticipated to continue through the decade. Monitor deformation and cusping. Construction cost based on road closure and detour.	An investigation may be completed to determine if liner option is available. If a culvert liner option is available, significant costs related to traffic management may be saved.
7	CU_BROA2247_1	Broadway & Christie St. Culvert	- Monitoring of Deformations, Settlements, and Movements		Replacement of cusping elliptical culvert (2280mm x 1500mm). Monitor deformation and cusping. Retaining wall at northeast quadrant to be monitored for movement. Culvert replacement includes repair to headwalls at inlet and outlet to suit new structure. A traffic investigation and staging design may be required to complete the work with traffic maintained.	Hydraulic investigation may reveal liner option is available. If a culvert liner option is available, significant costs related to traffic management may be saved.
Major Rehabilitation						
1	BR_KINS0001	Kinsmen Pedestrian Bridge			Rehabilitation strategy and cost outlined in the Enhanced OSIM report. Rehabilitation would include replacement of select elements like-for-like, and rehabilitation and reinforcement of existing steel.	Evaluate structure elements considering it functions as a pedestrian bridge only - this may determine a cost efficient rehabilitation strategy. Less rehabilitation and reinforcement work may be required if the design incorporates the current load vs. original train loads.
Minor Rehabilitation						
1	CU_QUAR2685_1	Quarter Town Line Culvert at Stoney Creek			Severe rotation and sliding of retaining wall at southwest quadrant. Continue to monitor movement, settlement and rotation of gabion basket retaining wall on the west side until replacement. Replacement or stabilization of the southwest section should be done as soon as possible. Construction cost based on road closure and detour.	Geotechnical investigation may determine if Quarter Town Line will be affected by the excavation required for the retaining wall replacement. If road is not affected, traffic control, staging, or detours may not be required. Alternative solutions may include RSS walls - various material options may be feasible. This option may limit traffic management. Evaluate retaining wall against existing buried civil services and utilities.
2	CU_LISG2209_1	Lisgar Ave Culvert Outlet at Brock St. E.	- Structure Evaluation - Monitoring of Deformations, Settlements, and Movements		The structure is part of a combined system containing three (3) culverts. There is a pressurized water leak in the soffit of the structure. Monitor the deterioration caused by the leakage. An urgent investigation is recommended into the cause of the pressurized leakage to determine the extent and strategy of rehabilitation.	Alternative strategies may be considered after the investigation is completed, and should include all environmental impacts. Strategies should include, but not be limited to, a review of the impact to sidewalks, roads, intersections, civil services and utilities, private property, and parking lots. Project planning years in advance of planned work may be required.
3	CU_CONCE0299_1	Lake Lisgar Outlet Culvert	- Monitoring of Deformations, Settlements, and Movements		Minor rehabilitation of the spillway and outlet wingwalls, and footings. Replacement of the retaining wall at the southeast quadrant. Severe undermining of the footing at outlet with exposed timber piles. Monitor for settlement and further undermining.	An enhanced OSIM inspection is recommended due to limited access to the barrel. A more detailed underwater investigation of the structure not visible may reveal additional work not currently planned. Dewatering, or limiting flow from the lake may be necessary to complete these investigations. Coordination with the LPRCA may be required. Alternative materials or solutions may involve the installation of sheet-pile walls.
4	CU_BALD0654_1	Baldwin St. Culvert at Participark Trail			Minor rehabilitation to repair the eroded concrete at the inlet and outlet. Dewatering will likely be required.	Planned rehabilitation of this structure may include a proprietary polymer spray-on liner to theoretically prolong lifespan. Alternative solutions for the retaining wall repair may include steel sheet pile, tremie concrete (depending on water level), pump-able SCC.
5	BR_LAKE0001	Hawkins Pedestrian Bridge	- Monitoring of Deformations, Settlements, and Movements		Minor rehabilitation of structural steel components, embankments, approaches, and retaining walls. Monitor deformation of diaphragm at west abutment bearing. Design work for new retaining walls on the banks and a rehabilitation of the approaches is underway.	While a minor rehabilitation is recommended in the short term (1 - 5 years), cleaning and coating of the steel piers is also recommended (6 - 10 years). At that time, a major rehabilitation may be expected and may include a blasting of localized steel areas, cleaning and over-coating of the remaining steel areas, and a deck replacement. Major costs associated with this work is expected.

APPENDIX D - STRUCTURE COMMENTS, POTENTIAL SCENARIOS, AND ALTERNATIVE REHABILITATION STRATEGIES

Priority	Structure No.	Structure Name	Additional Inspections, Investigations, Studies		Comments, Potential Scenario	Alternative Rehabilitation Strategies
			Recommended	Completed		
6	BR_SIMCO0001	Simcoe Street Bridge	- Detailed Condition Survey		Minor rehabilitation of the approaches, deck wearing surface, and waterproofing. Construction staging recommended. Detailed condition survey recommended prior to design. Results of the detailed condition study will determine the rehabilitation strategy.	A traffic investigation and staging design will be required to complete the work with traffic maintained. Based on the age and history of the structure, the MTO Structure Rehabilitation Manual, Appendix 2.C., rehab methods include removal and replacement of the existing waterproofing.
7	CU_VICT0569_1	Victoria St. Driveway Access Culvert			Minor rehabilitation including replacing the railing system.	An review of the site, slope grades, and service (traffic AADT), may be completed to evaluate the design of and the need for a barrier.
8	CU_LISG1158_1	Lisgar Ave. North Culvert	- Underwater Investigation - Structure Evaluation - Monitoring of Deformations, Settlements, and Movements		Minor rehabilitation of the culvert barrel. Limited inspection due to high water levels.	A structure evaluation is recommended, along with an underwater investigation to determine the appropriate scope of rehabilitation. Considering typical deterioration trends of these types of culverts, it would be safe to assume the condition of the steel below the water line is deteriorating at a faster rate than above the water line. There is potential for corrosion and section loss. Potential solutions could include a culvert liner or a proprietary spray-on liner to extend the life of the structure. Hydraulic investigation would be required for the liner option.
9	BR_CONCW0001	Concession St. W. Bridge	- Detailed Condition Survey - Concrete Substructure Condition Survey		Minor rehabilitation of the approaches, deck wearing surface, soffit, and retaining walls. Results of the detailed condition study will determine the rehabilitation strategy.	The minor rehabilitation strategy includes replacement of the wearing surface. The OSIM reports a previous deck rehabilitation, in 2004. By the time this structure is scheduled for work (6 - 10 years), it would be safe to assume new waterproofing is required, with at least localized patch repairs of the deck. If traffic is to be maintained, a traffic study would be required to determine appropriate temporary traffic lights at each approach. The private entrances and Kinsmen Park parking area would need to be maintained.
10	RW_FAIR	Fairway Hills Blvd. and Quarter Town Line	- Monitoring of Deformations, Settlements, and Movements		Minor rehabilitation to prevent further settlement and deformation of the retaining wall structure. Monitor the structure for settlement and rotation.	The retaining wall appears stable at the time of inspection, however there is evidence of potential movement occurring. The sidewalk, barrier, and fill above the retaining wall has settled.
11	RW_WILL	William St. and Quarter Town Line	- Monitoring of Deformations, Settlements, and Movements		Minor rehabilitation of sidewalk due to settlement. Monitor settlement of the retaining wall and sidewalk. Monitor the structure for settlement and rotation.	The retaining wall appears stable at the time of inspection, however there is evidence of potential movement occurring. The sidewalk above the retaining wall has settled partially. The suspected rotation may only be a result of construction (stone installation and bulging of gabion basket).

Maintenance

	RW_VICT	Victoria St. Concession St. West	- Monitoring of Deformations, Settlements, and Movements			
	RW_BRIDGE0274	Bridge St. at Lisgar Ave	- Monitoring of Deformations, Settlements, and Movements			
	CU_BRIDE0274_1	Lisgar Ave Culvert Part 1				
	BR_GOLF0002	The Bridges Golf Course John Pound Rd.	- Monitoring of Deformations, Settlements, and Movements			
	RW_BROAD	Broadway St. at Bloomer St.				
	CU_BALD1272_1	Baldwin St. at Goldenrod Dr.				
	CU_VIEN0615_1	Vienna Rd. from Stubbs Crt. Culvert				
	CU_BRIDE0274_2	Lisgar Ave Culvert Part 2				
	CU_GLEND0176_1	Glendale Dr. Culvert at Victoria St.				
	BR_VAN0001	Van St. Pedestrian Bridge				
	BR_GOLF0001	The Bridges Golf Course at Hole 10				
	BR_GOLF0003	The Bridges Golf Course at Hole 12 and 17				
	CU_BAYH0993_1	Bayham Dr. Culvert				
	CU_QUAR1937_12	Quarter Town Line at Oak Park Pond				

No Work Recommended

	CU_BROA3948_1	Broadway St. Culvert at Sobeyes				
	CU_SPRU0541_3	Spruce St. Culvert				

APPENDIX E
**PROPOSED 2020-2030 CAPITAL BUDGET
FORECAST**

G. DOUGLAS VALLEE LIMITED
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Bridge/Structure Program - COSTS

Tillsonburg - Project #19-033

APPENDIX E - PROPOSED 2020 - 2030 CAPITAL BUDGET FORECAST

Last Updated: August 16, 2019

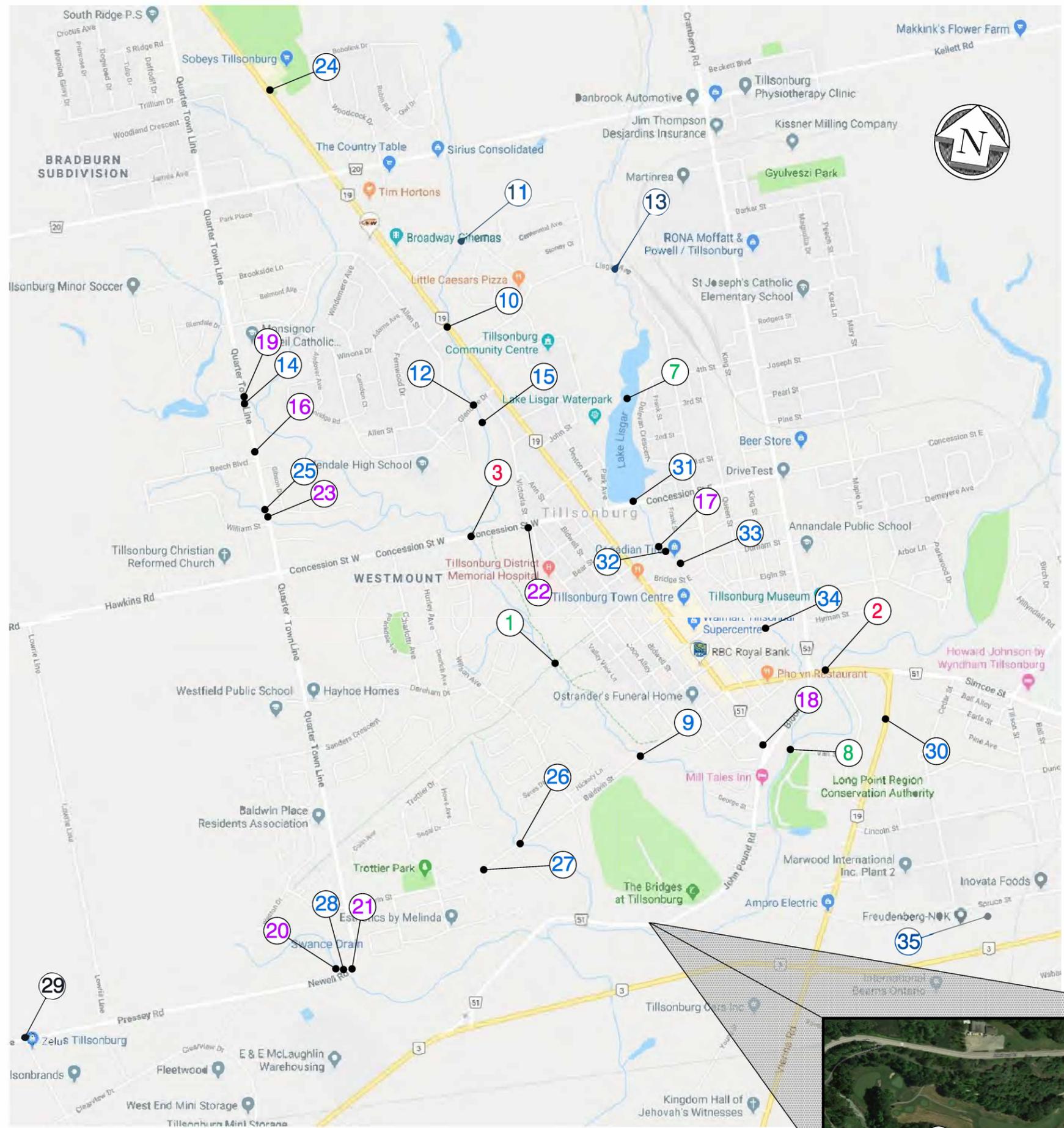
Priority	Structure No.	Structure Name	Work Description	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	CU_QUAR2685_1	Quarter Town Line Culvert at Stoney Creek	Minor Rehabilitation	\$150,000.00										
2	RW_BEECH	Quarter Town Line Retaining Wall at Beech Blvd.	Replace	\$85,000.00	\$360,000.00									
3	BR_KINS0001	Kinsmen Pedestrian Bridge	Major Rehabilitation	\$135,000.00	\$2,716,000.00									
4	CU_DEVONS0314_1	Devonshire Ave. Culvert	Replace	\$100,000.00	\$302,000.00									
5	CU_LISG2209_1	Lisgar Ave Culvert Outlet at Brock St. E.	Minor Rehabilitation		\$48,000.00	\$210,000.00								
6	CU_CONCE0299_1	Lake Lisgar Outlet Culvert	Minor Rehabilitation		\$113,000.00	\$176,000.00								
7	CU_BALD0654_1	Baldwin St. Culvert at Participark Trail	Minor Rehabilitation			\$45,000.00	\$95,000.00							
8	BR_LAKE0001	Hawkins Pedestrian Bridge	Minor Rehabilitation			\$70,000.00	\$160,000.00						\$75,000.00	\$500,000.00
9	BR_SIMCO0001	Simcoe Street Bridge	Minor Rehabilitation			\$70,000.00	\$305,000.00							
10	CU_VICT0569_1	Victoria St. Driveway Access Culvert	Minor Rehabilitation			\$8,000.00	\$50,000.00							
11	RW_NEWE0002	Newell Road East Retaining Wall	Replace				\$63,000.00	\$275,000.00						
12	RW_NEWE0001	Newell Road West Retaining Wall	Replace				\$63,000.00	\$230,000.00						
13	CU_NEWE1362_1	Newell Rd. Culvert	Replace					\$93,000.00	\$1,205,000.00					
14	CU_BALD1103_1	Baldwin St. Culvert at Whispering Pine	Replace						\$43,000.00	\$236,000.00				
15	CU_BROA2247_1	Broadway & Christie St. Culvert	Replace							\$70,000.00	\$630,000.00			
16	CU_LISG1158_1	Lisgar Ave. North Culvert	Minor Rehabilitation								\$78,000.00	\$187,500.00		
17	BR_CONCW0001	Concession St. W. Bridge	Minor Rehabilitation									\$70,000.00	\$178,000.00	
18	RW_FAIR	Fairway Hills Blvd. and Quarter Town Line	Minor Rehabilitation										\$13,000.00	\$56,000.00
19	RW_WILL	William St. and Quarter Town Line	Minor Rehabilitation										\$5,000.00	\$18,000.00
TOTAL				\$470,000.00	\$3,539,000.00	\$579,000.00	\$736,000.00	\$598,000.00	\$1,248,000.00	\$306,000.00	\$708,000.00	\$257,500.00	\$271,000.00	\$574,000.00
AVERAGE				\$844,227.27										

BR_LAKE0001 Hawkins Pedestrian Bridge recommended for a major rehab in 6-10 years. Work includes removal and reapplying of structural steel coating. Costs in above table are included as allowances for future work.

Note: The first year costs shown represent estimated investigation and engineering costs. The second year cost shown represent estimated construction and associated work costs.

APPENDIX F **STRUCTURE LOCATION MAP**

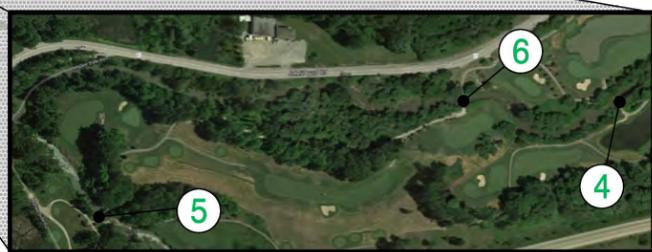
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**TOWN OF TILLSONBURG
STRUCTURE INSPECTIONS - 2019**

- BRIDGE STRUCTURES
- CULVERT STRUCTURES
- PEDESTRIAN BRIDGE STRUCTURES
- RETAINING WALL STRUCTURES

TYPE	NUMBER	STRUCTURE NAME	LOCATION
■	1	BR_KINS0001	KINSMEN PEDESTRIAN BRIDGE
■	2	BR_SIMC00001	SIMCOE ST. BRIDGE
■	3	BR_CONCW0001	CONCESSION ST. W. BRIDGE
■	4	BR_GOLF001	THE BRIDGES GOLF COURSE AT HOLE 10
■	5	BR_GOLF002	THE BRIDGES GOLF COURSE AT JOHN POUND ROAD
■	6	BR_GOLF003	THE BRIDGES GOLF COURSE AT HOLE 12 AND 17
■	7	BR_LAKE0001	HAWKINS PEDESTRIAN BRIDGE
■	8	BR_VAN0001	VAN ST. PEDESTRIAN BRIDGE
■	9	CU_BALD0654_1	BALDWIN ST. CULVERT AT PARTICIPARK TRAIL
■	10	CU_BROA2247_1	BROADWAY & CHRISTIE ST. CULVERT
■	11	CU_DEVONS0314_1	DEVONSHIRE AVE. CULVERT
■	12	CU_GLEN0176_1	GLENDALE DR. CULVERT AT VICTORIA ST.
■	13	CU_LISG1158_1	LISGAR AVE. NORTH CULVERT
■	14	CU_QUAR2685_1	QUARTER TOWN LINE CULVERT AT STONEY CREEK
■	15	CU_VICT0569_1	VICTORIA ST. DRIVEWAY ACCESS CULVERT
■	16	RW_BEECH	QUARTER TOWN LINE RETAINING WALL AT BEECH BLVD.
■	17	RW_BRIDGE0274	BRIDGE ST. AT LISGAR AVE.
■	18	RW_BROAD	BROADWAY ST. AT BLOOMER ST.
■	19	RW_FAIR	FAIRWAY HILLS BLVD. AND QUARTER TOWN LINE
■	20	RW_NEWE0001	NEWELL ROAD WEST RETAINING WALL
■	21	RW_NEWE0002	NEWELL ROAD EAST RETAINING WALL
■	22	RW_VICT	VICTORIA ST. AT CONCESSION ST. WEST
■	23	RW_WILL	WILLIAM ST. AND QUARTER TOWN LINE
■	24	CU_BROA3948_1	BROADWAY ST. CULVERT AT SOBEYS
■	25	CU_QUAR1937_12	QUARTER TOWN LINE AND OAK PARK POND
■	26	CU_BALD1103_1	BALDWIN ST. CULVERT AT WHISPERING PINE
■	27	CU_BALD1272_1	BALDWIN ST. AT GOLDENROD DR.
■	28	CU_NEWE1362_1	NEWELL ROAD CULVERT
■	29	CU_BAYH0993_1	BAYHAM DRIVE CULVERT
■	30	CU_VIEN0615_1	VIENNA RD. FROM STUBBS CRT. CULVERT
■	31	CU_CONCE0299_1	LAKE LISGAR OUTLET CULVERT
■	32	CU_BRIDE0274_1	LISGAR AVE. CULVERT PART 1
■	33	CU_BRIDE0274_2	LISGAR AVE. CULVERT PART 2
■	34	CU_LISG2209_1	LISGAR AVE. CULVERT OUTLET AT BROCK ST. E.
■	35	CU_SPRU0541_3	SPRUCE ST. CULVERT





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STRUCTURE LOCATION MAP

2019 OSIM INSPECTIONS
TOWN OF TILLSONBURG

Date	: OCTOBER, 4 2019
Scale	: NTS
Project No	: 19-033
Drawing No	: 1