

# Bridge & Culvert Prioritization Program



Council Meeting #2  
February 11, 2025



**TRITON  
ENGINEERING  
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Consulting Engineers

# Bridge Prioritization Program Overview

Recap - Council meeting #1 September 18<sup>th</sup>, 2024: Reviewed the Bridge Prioritization program rationale and provided further details of the variables that are the product of determining the total risk of asset failure

01

103 structures in the Municipality of West Grey have been analyzed as part of this ***Bridge Prioritization Program***. There are 114 structures total, however, 103 have been identified as part of the vehicular transportation network.

02

Structure priority is derived from the **Total Risk of Asset Failure** as well as the number of service years remaining. Total Risk of Asset Failure is the product of:

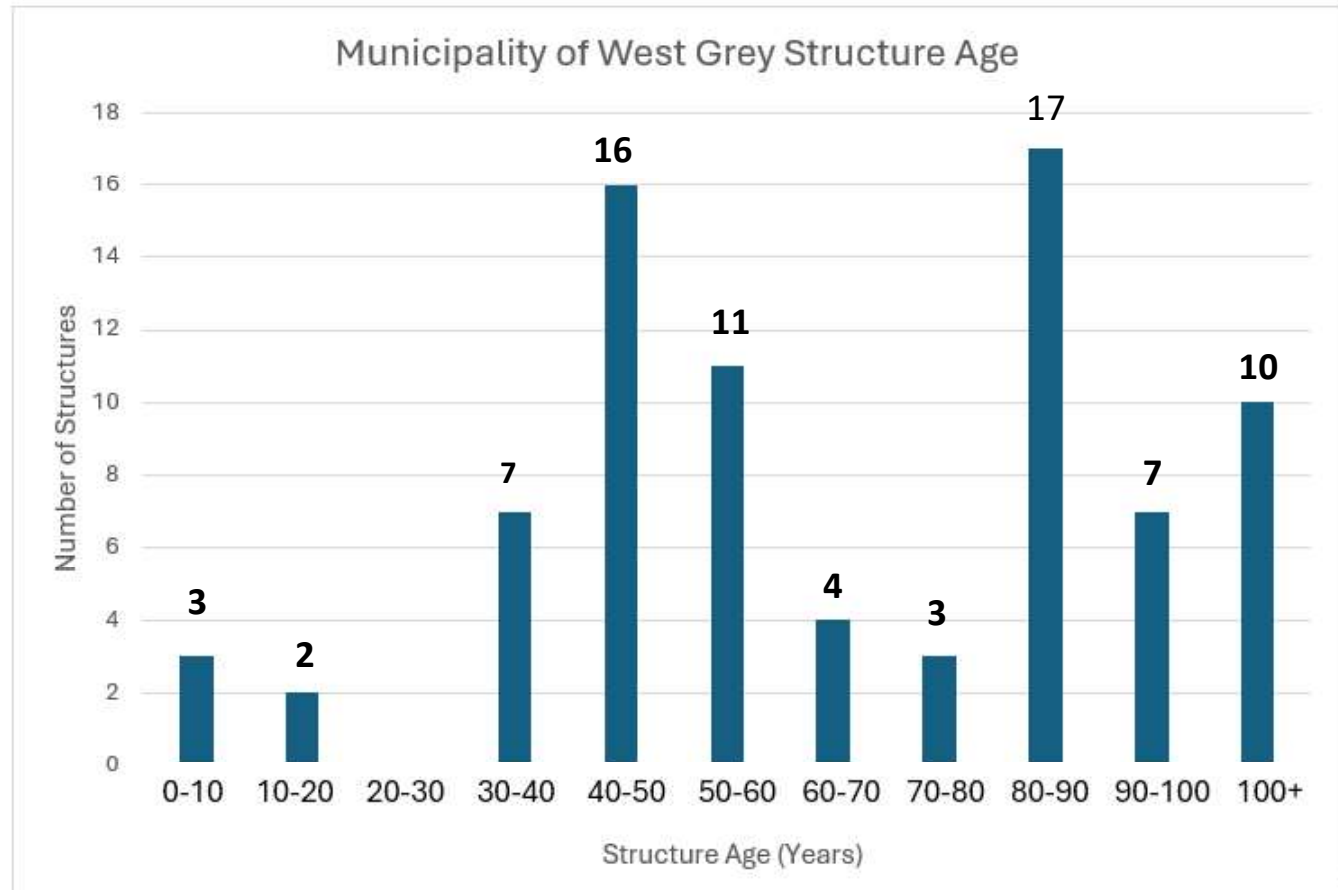
- 1. Total Probability of Asset Failure**
- 2. Total consequence of Asset Closure/Failure**

03

The purpose of this program is to provide a quantitative approach to asset management to remove subjectivity as much as possible.

# Existing Structures Within the Municipality of West Grey

- 37 structures are over the age of 70 years in the Municipality of West Grey, which is of concern as the average expected useful life of a bridge in Ontario ranges between 64 to 88 years. (Statistics Canada 2024)
- Recent 2024 OSIM reports have identified 25 structures that have a Bridge Condition Index (BCI) under 70 with a service life of less than 10 years and considered critical from an asset management perspective
- Using the 2024 OSIM as reference, at least 41 structures are coming due in the next 20 years for major rehabilitation and/or full replacement.



# Total Risk of Asset Failure

$$\begin{aligned} & \textit{Total Risk of Asset Failure} \\ & = \textit{Probability of Failure} * \textit{Consequence of Failure} \end{aligned}$$

- A higher numeric value for the Total Risk of Asset Failure generally indicates a higher priority in the **Bridge Prioritization Program**

## Total Probability of Failure

The sum of the following components and scored out of 5 each:

1. ADT – Average Daily Traffic from traffic counts provided by the Municipality
2. Bridge Condition Index (BCI) – Structural rating from the Ontario Structure Inspection Manual (OSIM) Report

**A higher value indicates a higher probability of failure**

## Total Consequence of Closure/Failure

The sum of the following components and scored out of 5 each:

1. ADT – Consistent with Total Probability of Failure
2. Detour Length (km) – Distance from one side of the structure to the other without crossing
3. Emergency Response Time – Change in response time measured in minutes resulting from the closure of a structure
4. Local Access – Inconvenience of a structure closure to residents and the community

**A higher value indicates greater consequence to the public as a result of closure/failure**

# Total Risk of Asset Failure – Highest Risk

- These structures have potential to significantly impact the transportation network of West Grey if they require closure or are currently closed

Structure ID	Structure Status (open/closed)	Total Probability of Failure	Total Consequence of Failure	Total Risk of Asset Failure
N-051	Closed	7.11	14.73	<b>104.72</b>
N-060	Open	6.52	15.57	<b>101.47</b>
N-058	Open	6.50	14.93	<b>97.02</b>
N-059	Open	6.44	14.79	<b>95.28</b>
B-020	Closed	6.43	14.22	<b>90.95</b>
N-054	Open	5.36	15.23	<b>81.66</b>
N-199	Open	6.26	12.14	<b>75.94</b>
N-057	Open	5.25	13.96	<b>73.32</b>
EG-001	Open	4.15	16.00	<b>66.40</b>
B-021	Open	5.45	12.15	<b>66.19</b>
B-003	Open	6.49	10.17	<b>66.01</b>
N-050	Open	5.26	11.50	<b>60.50</b>

# Total Risk of Asset Failure – Lowest Risk

- This group of structures are either still structurally capable of performing as designed and/or will have less of an impact if they require closure, or are already closed

Structure ID	Structure Status (open/closed)	Total Probability of Failure	Total Consequence of Failure	Total Risk of Asset Failure
B-112	Open	1.02	5.37	5.48
G-126	Open	1.02	7.47	7.65
G-197	Open	1.08	9.13	9.86
B-007	Open	2.42	4.42	10.68
G-032	Open	2.29	5.70	13.05
B-113	Open	2.30	5.70	13.13
B-118	Open	2.28	6.23	14.20
N-065	Open	2.28	6.36	14.54
N-183	Open	2.33	6.43	14.98
N-068	Open	2.26	6.77	15.27
G-148	Open	2.26	6.95	15.73
G-030	Open	2.26	6.98	15.76
B-025	Closed	3.11	5.18	16.11

# Years of Service Life Remaining

- These structures have the lowest remaining years of service life in the Municipality of West Grey
- 0 Years of service indicates the structure is currently closed

Structure ID	Total Probability of Failure	Total Consequence of Failure	Total Risk of Asset Failure	Years of Service
<b>N-051</b>	7.11	14.73	104.72	<b>0</b>
<b>B-020</b>	6.43	14.22	91.45	<b>0</b>
<b>G-038</b>	3.79	12.51	47.36	<b>0</b>
<b>G-033</b>	3.57	9.25	32.97	<b>0</b>
<b>N-055</b>	3.84	8.41	32.31	<b>0</b>
<b>N-070</b>	2.63	9.54	25.10	<b>0</b>
<b>B-025</b>	3.11	5.19	16.15	<b>0</b>
<b>EG-001</b>	4.15	10.23	66.40	<b>0</b>
<b>B-003</b>	6.50	10.23	66.43	<b>1 to 5</b>
<b>G-132</b>	2.91	16.00	46.56	<b>1 to 5</b>
<b>G-037</b>	3.12	12.60	39.26	<b>1 to 5</b>
<b>N-188</b>	4.30	7.92	34.02	<b>1 to 5</b>
<b>N-184</b>	3.66	7.94	29.05	<b>1 to 5</b>
<b>B-001</b>	3.63	9.09	33.01	<b>6 to 10</b>
<b>B-011</b>	2.63	10.69	28.05	<b>6 to 10</b>

# Structure Priority List

- Derived from the highest risk for Total Probability of Asset Failure as well as estimated remaining service life from the 2024 OSIM reports
- This list will be kept up to date with structures analyzed bi-annually in collaboration with OSIM reporting
- A closed structure that isolates property from the transportation network is given highest priority

Rank	Structure ID	Discussion	Years of Service Life Remaining	Cost (2024 Dollar Value for Concrete)
1	G-038	Isolation of properties from potential flooding known to occur on this road segment. Structure is currently closed.	0	\$ 2,001,000
1	G-037	Isolation of properties from potential flooding known to occur on this road segment.	1	\$ 1,794,000
3	EG-001	Currently has a BCI of 37 and is recommended for replacement. Stone Hill Road culvert is on a dead-end road resulting in stranded residents if closure is required.	0	\$ 184,000
4	N-051	Closed due to significant deterioration. ADT of 1018 was the highest amongst structures with less than 5 service years remaining and a high change in EMS response time.	0	\$ 2,944,000
5	G-044	Lengthy detours and emergency response times would be the result of a structure closure at this location on North Line.	1	\$ 2,200,000
6	B-003	High ADT of 601 with limited service life remaining. It is Currently recommended for inspection every 6 months.	1	\$ 2,600,000
7	G-132	While the use is minimal, a property becomes isolated if closed.	2	\$ 1,334,000
8	B-020	Although B-020 has been closed for almost 10 years, the 2016 ADT indicates this road segment has a high ADT of 953.	0	\$ 3,197,000
9	N-060	This structure has a high ADT of 1196 and reported in fair to poor condition with no signs of structural distress.	8	\$ 1,127,000
10	N-058	This structure has a high ADT of 1196 and reported in fair to poor condition with no signs of structural distress.	8	\$ 1,725,000



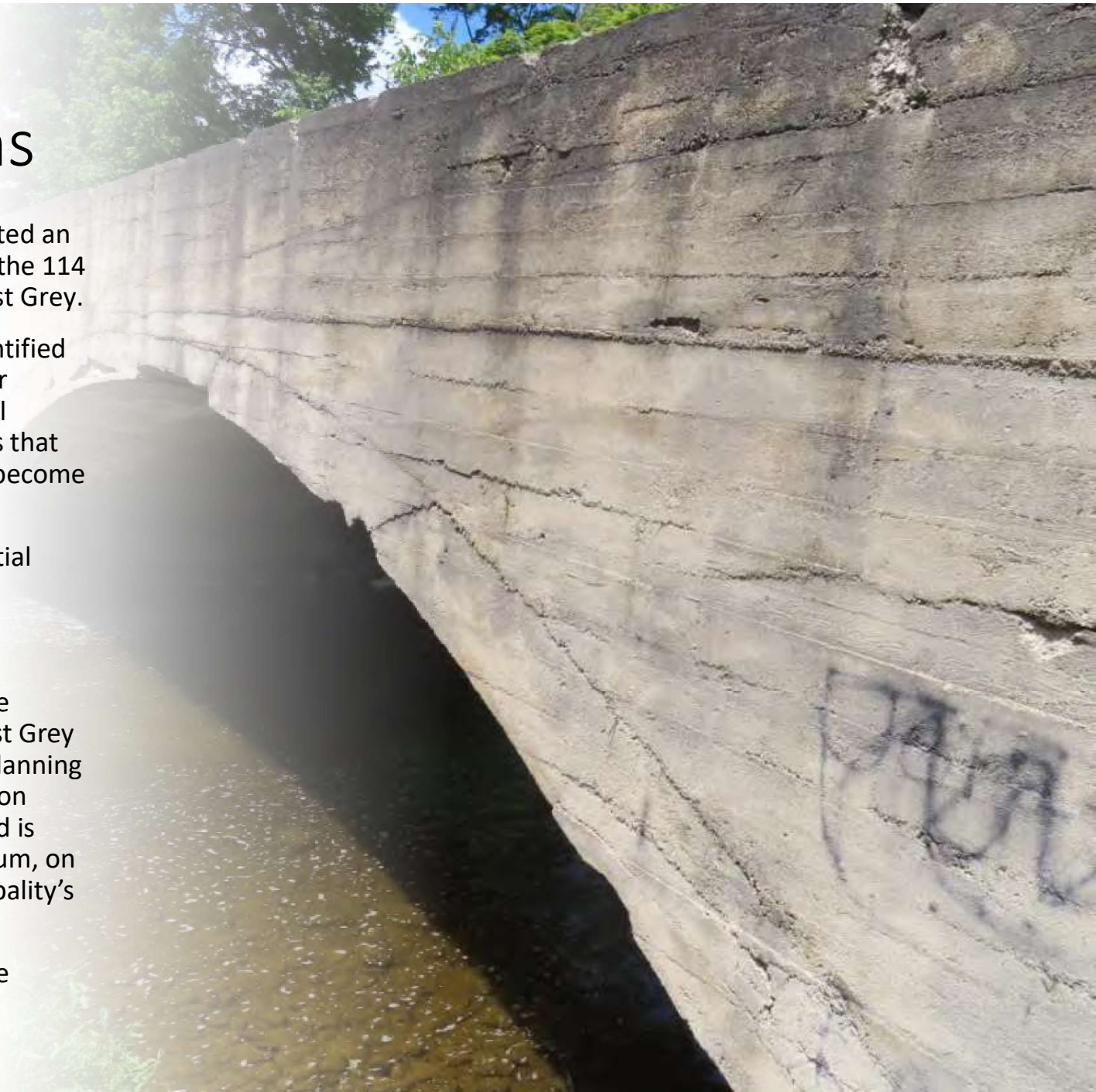
# Candidate Structures for Closure

- Highlighted structures are currently closed
- Based on their Total Consequence of Closure/Failure to the transportation network within the Municipality, these structures can be considered for closure at the end of their service life
- Closure would result in a replacement capital and life cycle cost savings up to \$23 million for structures listed based on typical 2024 concrete construction values

Structure ID	Total Probability of Failure	Total Consequence of Failure	Total Risk of Asset Failure	Years of Service
<b>B-025</b>	3.11	<b>5.19</b>	16.15	0
<b>G-133</b>	2.73	<b>6.72</b>	18.30	10+
<b>B-008</b>	3.81	<b>7.24</b>	27.59	6 to 10
<b>N-185</b>	2.63	<b>7.66</b>	20.15	10+
<b>N-188</b>	4.30	<b>7.92</b>	34.02	1 to 5
<b>N-184</b>	3.66	<b>7.94</b>	29.05	1 to 5
<b>N-055</b>	3.84	<b>8.41</b>	32.31	0
<b>N-061</b>	3.58	<b>8.81</b>	31.51	10+
<b>G-033</b>	3.57	<b>9.25</b>	32.97	0
<b>N-070</b>	2.63	<b>9.54</b>	25.10	0

# Conclusion & Recommendations

- Through the development of this *Bridge Prioritization Program*, Triton has completed an in-depth review and evaluation of 103 of the 114 structures, within the Municipality of West Grey.
- The Bridge Prioritization Program has identified 10 structures approaching the end of their service life that are essential to the overall transportation network, and 10 structures that are proposed to either remain closed, or become closed at the end of their service life.
- These strategic closures ensure the essential structures within the community receive adequate resources to provide an overall sustainable transportation network.
- These continued structural evaluations are intended to assist the Municipality of West Grey with their structural asset management planning to be in compliance with Ontario Regulation 588/17 “Asset Management Planning” and is recommended to be updated, at a minimum, on a bi-annual basis to align with the Municipality’s bi-annual OSIM structure inspections.
- Ongoing and regular updates to the Bridge Prioritization Program will ensure a non-subjective “greater good” approach is maintained.







Questions?

