



2021 BIENNIAL STRUCTURE INSPECTION PROGRAM

Township of South Stormont – October 2021



Keystone Bridge Management Corp.

Your Bridge Asset Management Specialist

Executive Summary

Keystone Bridge Management Corp. was retained by the Township of South Stormont to provide bridge assessments for all its bridges and large culverts. A total of 21 structures were evaluated of which 9 were bridges and 12 were culverts.

The structure inventory ranges in age from new to 71 years old and represents 1,839 square metres of plan surface area. The average age of South Stormont structures is 31.3 years.

The asset value of all bridges and culverts on a full replacement cost basis is of the order of \$13.35 million.

Approximately \$3.3 million is required in capital investment to continue to maintain the structural inventory in good serviceable condition for the next ten years. Four culverts are identified for replacement. Five bridges are nominated for a comprehensive rehabilitation.

In the next 20 years there will be a need to replace about \$3.3M in bridge and culvert assets.

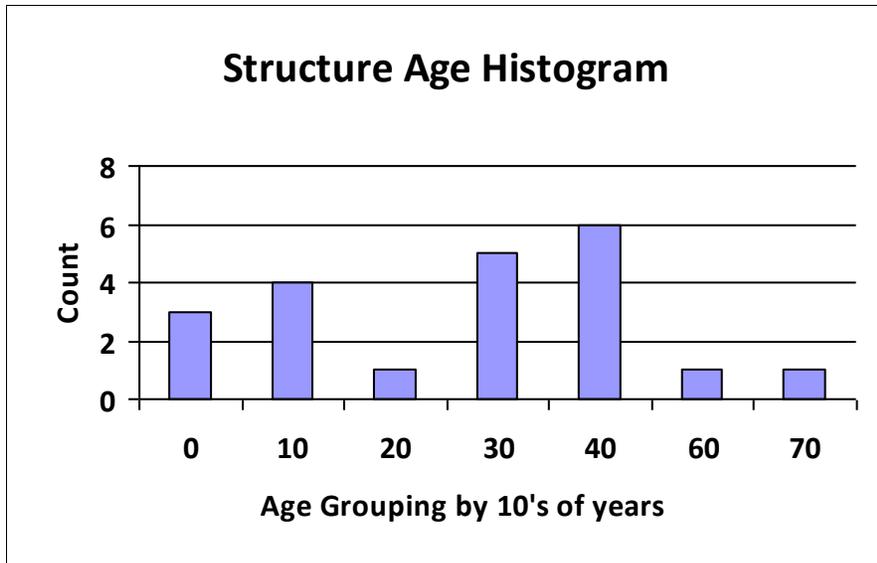
The bridges are presently depreciating at a rate of \$140K per year. They retain about 67% of their new value. In the absence of capital investment, the bridges will retain 34% of their new value in 20 years. The bridges have lost 6.5% in value due to deterioration. The ideal long-term investment in bridges is \$135K annually.

The culvert assets are depreciating at a rate of \$41K per year. They currently retain about 49% of their new value. Without capital investment, the culverts will retain 21% of their new value in 20 years. The recommended on-going expenditure for culverts is \$75K annually.

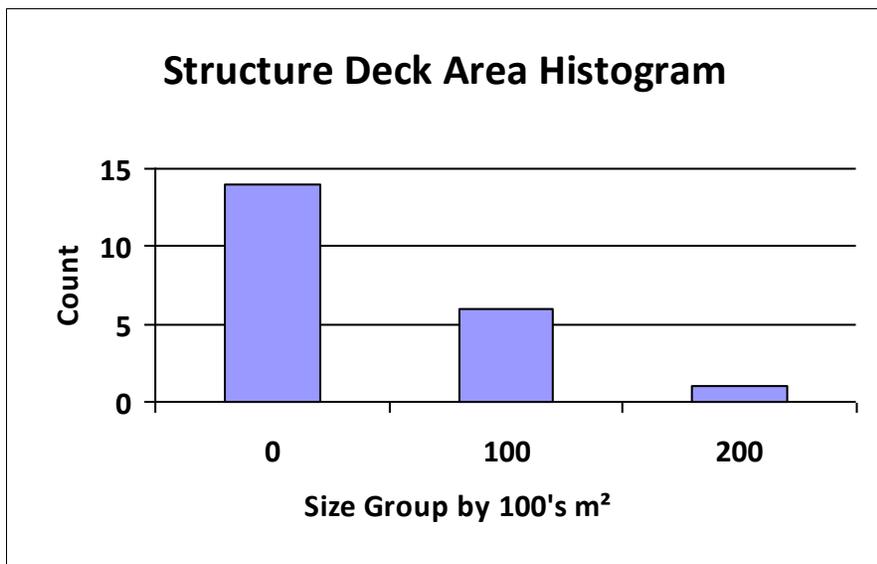
A total of 57.1% of the inspected structures have a Bridge Condition Index greater than 70. The remaining structures have BCI values between 54.7 and 70. South Stormont is 22.9% behind the MTO's goal of maintaining at least 80% of its structures with a BCI greater than or equal to 70.



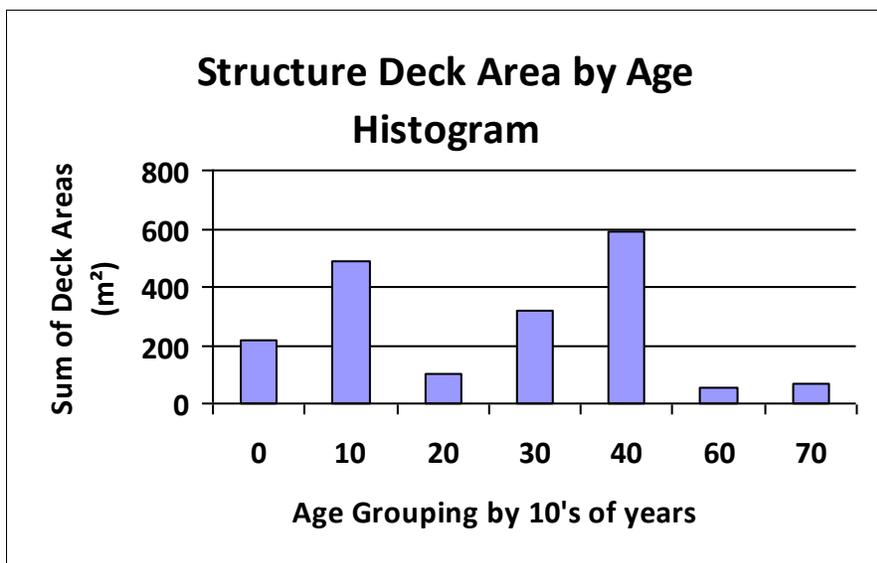
Structure Summary Statistics



Average Age 31.3
 Youngest Age 1
 Oldest Age 71
Structure Count 21



Average Deck Area 88 m²
 Min Deck Area 29 m²
 Max Deck Area 207 m²
Total Deck Area 1,839 m²



Deck area < 20 yrs old 706 m²
 Deck area < 50 yrs old 1721 m²
 Deck area > 50 yrs old 118 m²



Bridge List

Bridge ID	Name	Route	Length	Width	Spans	Const Yr
31-170	North Lunenburg Bridge	North Lunenburg Road W	8.7	9.3	1	2008
31-175	Valade Road Bridge	Valade Rd.	22.3	6.7	1	1978
31-181	Red Bridge	Lefebvre Road	19.6	6.4	1	1978
31-182	McMillan Bridge	Delaney Road	21.8	9.5	1	2009
31-186	Kennedy Bridge	Delaney Road	11.3	9.0	1	2006
31-187	Campbell Bridge	McPhail Road	13.3	10.1	1	1988
31-208	Race Track Bridge	Barlow Road	5.6	5.1	1	1985
31-303	Shaver Bridge	Shaver Road	13.4	5.0	1	1950
31-A21	Johnston Bridge	Morgan Road	11.6	8.5	1	2007

Total # of Bridges 9

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



Culvert List

Culvert ID	Name	Route	Length	Span	Cells	Const Yr
C31-167	North Lunenburg Road Culvert	North Lunenburg Road, W	20.0	3.6	1	2020
C31-169	North Lunenburg Road Culvert	North Lunenburg Road, W	21.9	5.8	1	1974
C31-A01	Goldfield Road Culvert	Goldfield Road	22.1	3.8	1	2018
C31-A02	Hunters Road Culvert	Hunters Road	21.8	3.8	1	1976
C31-A03	Otto Road Culvert	Otto Road	17.2	3.6	1	2013
C31-A06	Beckstead Road Culvert	Beckstead Road	14.7	3.6	1	1980
C31-A08	Anderson Road Culvert	Anderson Road	12.2	4.2	1	1960
C31-A12	Cooper Road Culvert	Cooper Road	21.7	4.8	1	1994
C31-A13	Wilburn Road Culvert	Wilburn Road	11.2	3.5	1	1990
C31-A15	MacRae Road Culvert	MacRae Road	18.2	3.3	1	1985
C31-A16	Northfield Road Culvert	Northfield Road	15.3	3.6	1	1990
C31-A18	O'Keefe Road Culvert	O'Keefe Road	17.2	3.2	1	1975

Total # of Culverts 12

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



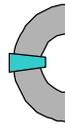
Capital Needs Report

Year 2022

Structure ID	Name	Route	Work	Cost
31-181	Red Bridge	Lefebvre Road	Misc Concrete Repairs, O'LAY, B/Wall, Guide Rail, Ret Walls, Abut Rep	\$493,000
31-303	Shaver Bridge	Shaver Road	Abut Repairs	\$24,000
Sum for Year				\$517,000
Percentage of Grand Total				16.0%

Year 2023

Structure ID	Name	Route	Work	Cost
C31-A02	Hunters Road Culvert	Hunters Road	New Conc Culvert	\$462,000
C31-A15	MacRae Road Culvert	MacRae Road	Concrete floor liner	\$36,000
Sum for Year				\$498,000
Percentage of Grand Total				15.4%



Year 2024

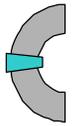
Structure ID	Name	Route	Work	Cost
31-187	Campbell Bridge	McPhail Road	WP&P, B/Wall, Guide Rail	\$322,000
31-208	Race Track Bridge	Barlow Road	Replace Deck, B/Wall	\$240,000
C31-A12	Cooper Road Culvert	Cooper Road	Guide Rail	\$48,000

Sum for Year \$610,000
Percentage of Grand Total 18.9%

Year 2025

Structure ID	Name	Route	Work	Cost
C31-169	North Lunenburg Road Culvert	North Lunenburg Road, West	New Conc Culvert	\$657,000

Sum for Year \$657,000
Percentage of Grand Total 20.3%



Year 2026

Structure ID	Name	Route	Work	Cost
31-A21	Johnston Bridge	Morgan Road	O'Lay, WP&P	\$121,000
C31-A06	Beckstead Road Culvert	Beckstead Road	New Conc Culvert	\$350,000
Sum for Year				\$471,000
Percentage of Grand Total				14.6%

Year 2027

Structure ID	Name	Route	Work	Cost
31-170	North Lunenburg Bridge	North Lunenburg Road West	O'Lay, WP&P	\$108,000
Sum for Year				\$108,000
Percentage of Grand Total				3.3%

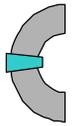
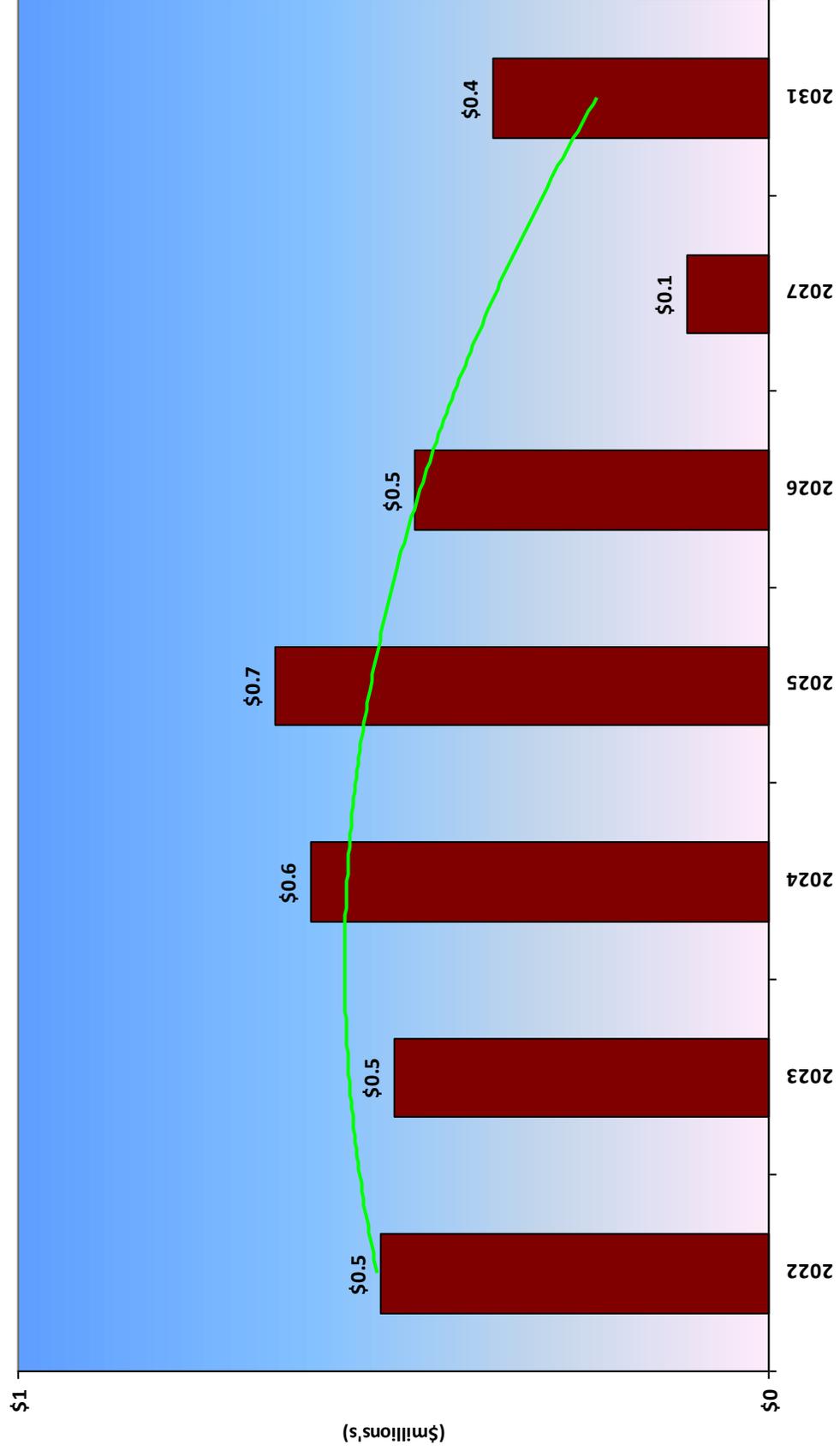
Year 2031

Structure ID	Name	Route	Work	Cost
C31-A18	O'Keefe Road Culvert	O'Keefe Road	New Conc Culvert	\$368,000
Sum for Year				\$368,000
Percentage of Grand Total				11.4%

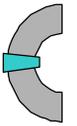
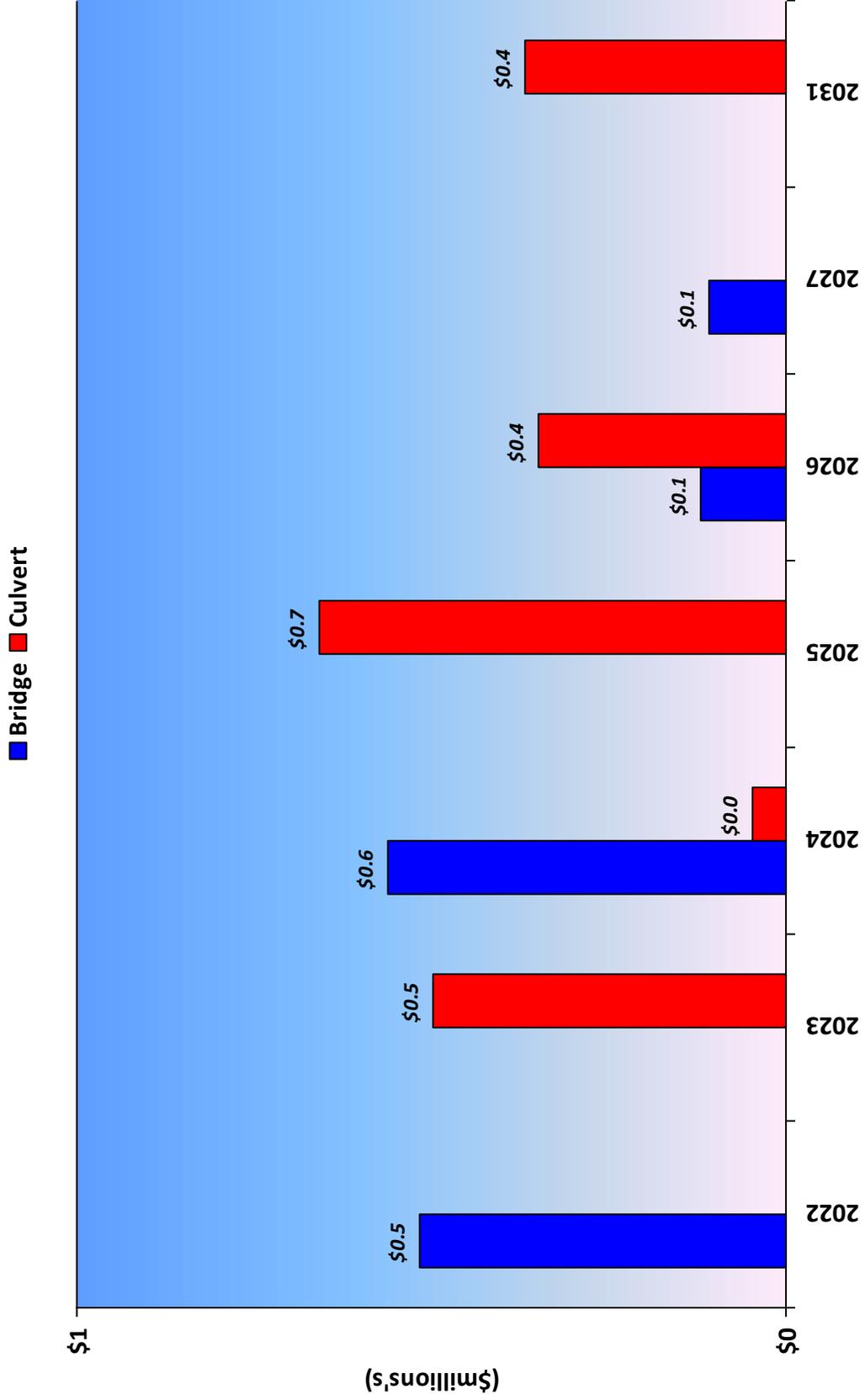


Total Capital Needs (m's) \$3,229,000 Over 10 Years

Capital Expenditure by Year



Capital Expenditure by Structure Type



2 Year Priority Report

Priority	Estimate	Bridge ID	CapYear	Remark
1	\$24,000.00	31-303 Shaver Bridge	2022	Construction year was estimated at 1950. However abutments are thought to be 1920's construction. This bridge is unsafe due to the loss of support under the south bearings. Bridge bearing in SE corner is of major concern, loss of concrete in SE corner has left bearing unstable, SW similar but not quite as bad. Condition of this bridge was brought to owners attention 2019, immediate repairs are needed. Load limit signs missing at 2021 site visit.
2	\$493,000.00	31-181 Red Bridge	2022	This bridge is planned for a major rehabilitation, 2022. Joints and barrier system are driving the need for rehab. Poor drainage from bridge is damaging exterior girders.
3	\$36,000.00	C31-A15 MacRae Road Culvert	2023	Construction year was estimated at 1985. Perforations were noted in the barrel walls and floor. A concrete floor liner may be an appropriate repair strategy for this culvert due to the perforations being low in floor or walls. Without liner this culvert will need replacement within in a 5-7 year timeframe. Floor liner would add 20 years to life of culvert.
4	\$462,000.00	C31-A02 Hunters Road Culvert	2023	This culvert has an obvious crimp line along lower barrel walls, walls are easily penetrated with pick hammer in this area. Programming for replacement of this culvert should be started. Plan on replacing this culvert within two years.
Estimated 2 Year Need		\$1,015,000.00		



Bridge Maintenance Report

Bridge ID	Name	Road	Component	Maintenance	Cost
31-170	North Lunenburg Bridge	North Lunenburg Road West	Embankment	Remove Brush/Trees	1,000
	<i>Bell attached to north side of structure. Well groomed on the north side, thick vegetation growth on the south side.</i>				
31-181	Red Bridge	Lefebvre Road	Embankment	Remove Brush/Trees	1,000
	<i>Trees & brush require brushing out, notably in the SW corner. Wild parsnip present. Erosion is occurring around the disintegrating retaining walls.</i>				
31-182	McMillan Bridge	Delaney Road	Embankment	Remove Brush/Trees	1,000
	<i>Trees & brush around wing walls & under bridge should be cleared. Erosion at the ends of curbs. Wild parsnip noted on embankments. Stone protection against abutment walls.</i>				
31-187	Campbell Bridge	McPhail Road	Embankment	Remove Brush/Trees	1,000
	<i>Good condition. Wild parsnip is present. Some tree growth near wing walls. Trees should be cleared at bridge corners.</i>				
31-303	Shaver Bridge	Shaver Road	Load Posting	Replace Sign	600
	<i>Signs missing in 2021. Bridge was posted with 10 tonne limit. Signs located at end of south guide rail. Road is dead end so no signs on north side.</i>				
			RC Abutment Wall	Re & Re Concrete	3,200
	<i>South abutment has major disintegration, north abutment minor disintegration. Loss of support at SE corner under bearing is very concerning.</i>				
			Embankment	Remove Brush/Trees	1,000
	<i>Thick vegetation at bridge wing walls.</i>				
			Steel Sliding Plate	Remove debris	600
	<i>SE bearing has lost approximately 50% of bearing due to disintegration of the old south abutment. Soil & vegetation cover all bearings.</i>				
C31-169	North Lunenburg Road Culvert	North Lunenburg Road, West	Embankment	Remove Brush/Trees	1,000
	<i>Significant tree growth. Stable slopes. Wild parsnip. No delineators or guide rail at this site.</i>				
C31-A03	Otto Road Culvert	Otto Road	Embankment	Remove Brush/Trees	1,000
	<i>Wild parsnip flourishing.</i>				
C31-A08	Anderson Road Culvert	Anderson Road	Embankment	Remove Brush/Trees	1,000
	<i>Heavy vegetation growth at south end, nicely groomed at north end. Brush & trees at south end should be cleared.</i>				
C31-A12	Cooper Road Culvert	Cooper Road	Embankment	Remove Brush/Trees	1,000
	<i>Thick vegetation at culvert ends. Wild parsnip present. Tree in the SE corner should be cut back.</i>				



Bridge ID	Name	Road	Component	Maintenance	Cost
C31-A13	Wilburn Road Culvert	Wilburn Road	Embankment	Remove Brush/Trees	1,000
	<i>Steep embankments, erosion in the NW corner. Retaining walls may be warranted due to the short length culvert. Wild parsnip present.</i>				
C31-A18	O'Keefe Road Culvert	O'Keefe Road	Embankment	Remove Brush/Trees	1,000
	<i>Thick brush. Wild parsnip. Dry stone retaining wall in NW is partially failed.</i>				
			Steel Beam on Wood Post	Spot post replacement	2,200
				Local repair	
	<i>Many posts have major decay. Ends are not properly buried and don't meet current standard. Post in the SE is damaged. Sections of flex beam badly corroded. Guide rail system requires renewal.</i>				
			Water Channel	Remove Obstructions	1,600
	<i>Stagnant flow, no water in upstream or downstream, barrel has 600mm stagnant water inside. Slight flow in 2021, still stagnant water inside barrel, 600mm. Large stones at both ends of barrel partially obstruct channel flow.</i>				
Total Estimated Component Level Maintenance Cost:					\$19,200

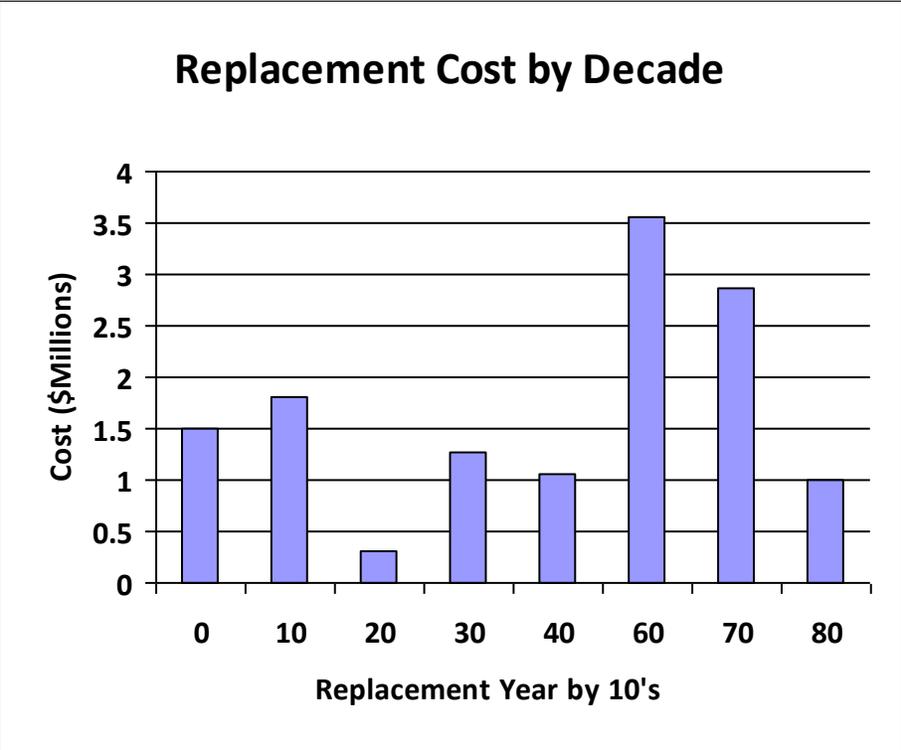


Structure Replacement Costs

Bridge ID	Name	Estimated Remaining Service Life	Program Year	Estimated Replacement Cost
C31-167	North Lunenburg Road Culvert	89		\$447,000
31-A21	Johnston Bridge	86	2026	\$550,000
31-182	McMillan Bridge	78		\$1,467,000
31-170	North Lunenburg Bridge	77	2027	\$787,000
31-186	Kennedy Bridge	75		\$602,000
31-175	Valade Road Bridge	67		\$1,265,000
31-187	Campbell Bridge	67	2024	\$1,817,000
C31-A12	Cooper Road Culvert	63	2024	\$473,000
31-181	Red Bridge	47	2022	\$1,064,000
C31-A01	Goldfield Road Culvert	37		\$355,000
31-208	Race Track Bridge	34	2024	\$211,000
C31-A03	Otto Road Culvert	32		\$694,000
C31-A08	Anderson Road Culvert	29		\$310,000
C31-A13	Wilburn Road Culvert	16		\$212,000
31-303	Shaver Bridge	14	2022	\$968,000
C31-A16	Northfield Road Culvert	14		\$289,000
C31-A18	O'Keefe Road Culvert	10	2031	\$331,000
C31-A15	MacRae Road Culvert	6	2023	\$288,000
C31-A06	Beckstead Road Culvert	5	2026	\$298,000
C31-169	North Lunenburg Road Culvert	4	2025	\$536,000
C31-A02	Hunters Road Culvert	2	2023	\$384,000



Bridge ID	Name	Estimated Remaining Service Life	Program Year	Estimated Replacement Cost
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Total Replacement Cost	\$13,348,000
Average Replacement Cost	\$635,619
Total Deck Area	1839 m²



Culvert Replacement Cost

Culvert ID	Name	Existing Culvert Type	Common Costs	Total Cost Concrete Replacement	Total Cost Steel Replacement	Existing Culvert Replacement Cost	Life-Cycle Cost Concrete Replacement	Life-Cycle Cost Steel Replacement
C31-167	North Lunenburg Road Culvert	Concrete Culvert	\$176,000	\$447,000	\$378,000	\$447,000	\$452,400	\$461,200
C31-169	North Lunenburg Road Culvert	Soil-Steel Structure	\$258,100	\$657,000	\$536,000	\$536,000	\$664,900	\$653,900
C31-A01	Goldfield Road Culvert	Soil-Steel Structure	\$160,400	\$406,000	\$355,000	\$355,000	\$410,900	\$433,100
C31-A02	Hunters Road Culvert	Soil-Steel Structure	\$181,400	\$462,000	\$384,000	\$384,000	\$467,500	\$468,500
C31-A03	Otto Road Culvert	Soil-Steel Structure	\$314,500	\$911,000	\$694,000	\$694,000	\$921,900	\$846,700
C31-A06	Beckstead Road Culvert	Soil-Steel Structure	\$166,100	\$350,000	\$298,000	\$298,000	\$354,200	\$363,600
C31-A08	Anderson Road Culvert	Concrete Culvert	\$147,000	\$310,000	\$268,000	\$310,000	\$313,700	\$327,000
C31-A12	Cooper Road Culvert	Concrete Culvert	\$182,900	\$473,000	\$393,000	\$473,000	\$478,700	\$479,500
C31-A13	Wilburn Road Culvert	Soil-Steel Structure	\$111,300	\$238,000	\$212,000	\$212,000	\$240,900	\$258,600
C31-A15	MacRae Road Culvert	Soil-Steel Structure	\$147,800	\$347,000	\$288,000	\$288,000	\$351,200	\$351,400
C31-A16	Northfield Road Culvert	Soil-Steel Structure	\$155,800	\$341,000	\$289,000	\$289,000	\$345,100	\$352,600
C31-A18	O'Keefe Road Culvert	Soil-Steel Structure	\$190,100	\$368,000	\$331,000	\$331,000	\$372,400	\$403,800

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

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

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

Total Number of Timber Structures: 0

Total Number of Steel Structures: 9

Total Number of Concrete Structures: 3

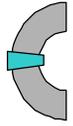
Total Cost of Culvert Replacement Based on Similar Size and Type: \$4,617,000



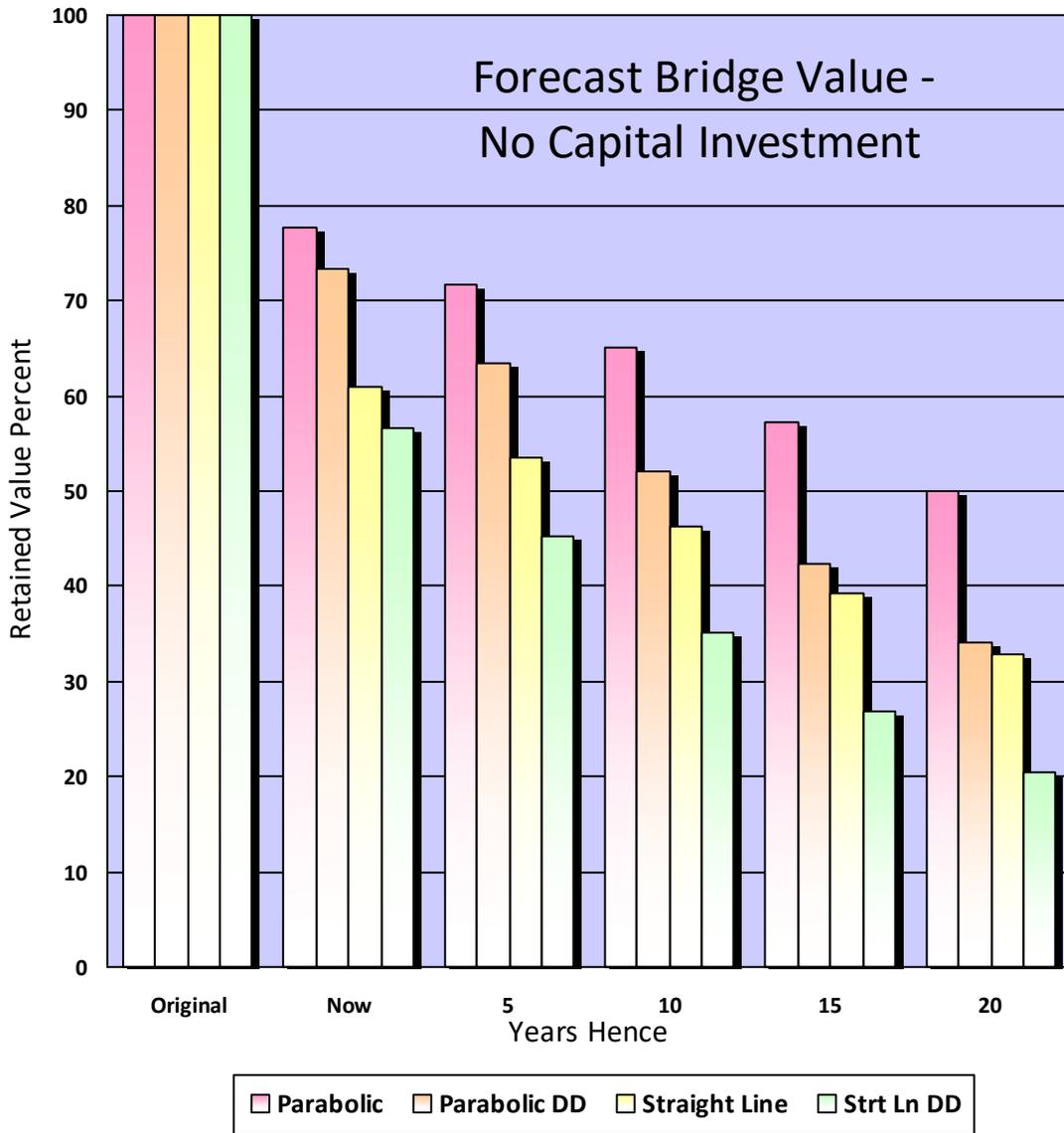
Parabolic & Straight Line Depreciation

(Does not include culverts)

Name	Bridge ID	Built	Value (New)	Damage/Defects	Present Val (Parab)	Present Val (S/L)
North Lunenburg Bridge	31-170	2008	\$600,581	3.1%	\$547,106	\$457,765
Valade Road Bridge	31-175	1978	\$861,663	0.1%	\$598,549	\$455,962
Red Bridge	31-181	1978	\$714,762	21.8%	\$290,907	\$152,301
McMillan Bridge	31-182	2009	\$830,796	2.1%	\$762,928	\$633,765
Kennedy Bridge	31-186	2006	\$445,750	0.4%	\$397,475	\$321,966
Campbell Bridge	31-187	1988	\$392,199	7.6%	\$272,071	\$184,101
Race Track Bridge	31-208	1985	\$148,106	8.6%	\$97,704	\$66,449
Shaver Bridge	31-303	1950	\$317,895	19.1%	\$112,470	\$87,349
Johnston Bridge	31-A21	2007	\$487,584	3.2%	\$437,518	\$356,394
Grand Total			\$4,799,336	6.5%	\$3,516,728	\$2,716,052



Bridge Depreciation Forecast 1

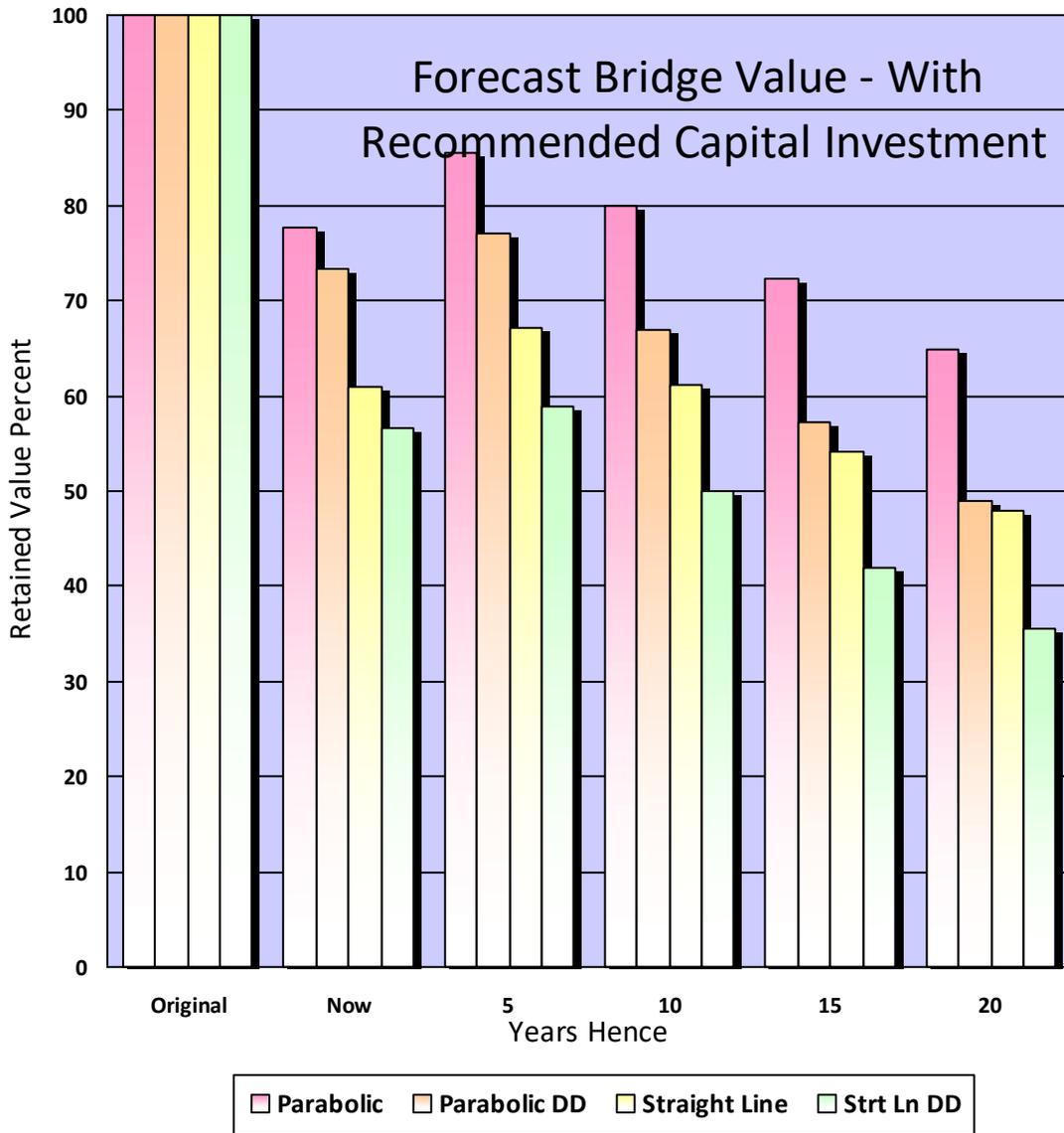


Legend

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



Bridge Depreciation Forecast 2



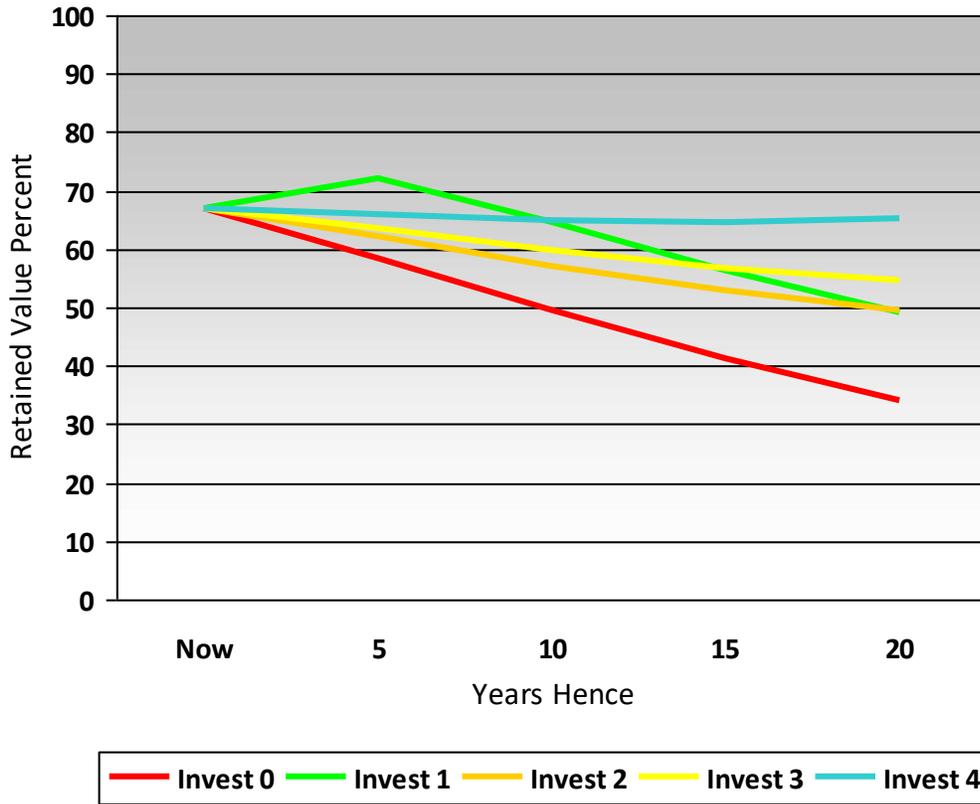
Legend

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



Average Bridge Depreciation with Investment

Remaining Value of all Bridges

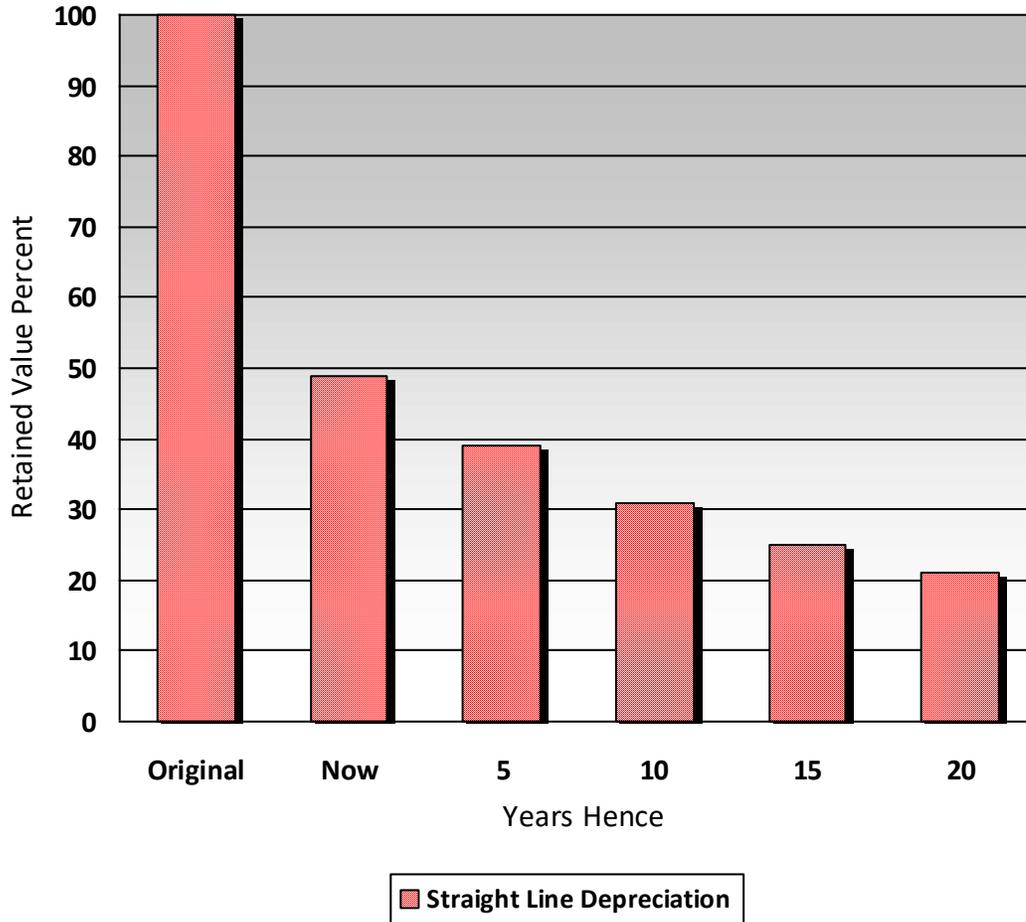


<u>Key</u>	<u>Investment Description</u>	<u>Annual Amount</u>
Invest 0	No Investment	\$0
Invest 1	Recommended Capital (Average)	\$65,000
Invest 2	0.75% Replacement Value	\$67,500
Invest 3	1.0% Replacement Value	\$90,000
Invest 4	1.5% Replacement Value	\$135,000



Culvert Depreciation Forecast

Remaining Value of all Culverts



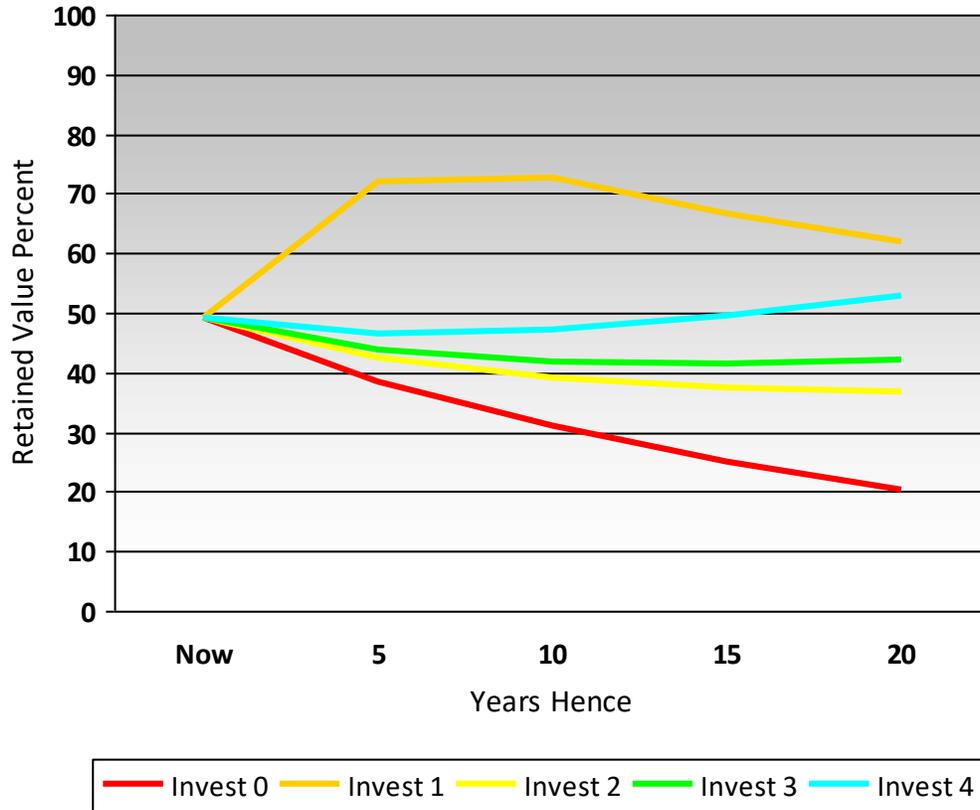
Original & Depreciated Values

Original	Now	5	10	15	20
\$4,617,000	\$2,277,747	\$1,780,617	\$1,442,175	\$1,167,499	\$950,080



Average Culvert Depreciation with Investment

Remaining Value of all Culverts

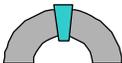


<u>Key</u>	<u>Investment Description</u>	<u>Annual Amount</u>
Invest 0	No Investment	\$0
Invest 1	Recommended Capital (Average)	\$96,000
Invest 2	0.75% Replacement Value	\$37,500
Invest 3	1.0% Replacement Value	\$50,000
Invest 4	1.5% Replacement Value	\$75,000



Recommended Investigations

Bridge ID	Name	Deck Condition Survey	Enhanced Inspection	Underwater Investigation	Ice Inspection	Boat Inspection	Structure Evaluation	Load Posting	Planning Study
31-170	North Lunenburg Bridge						✓		
31-208	Race Track Bridge								✓
31-A21	Johnston Bridge						✓		



Performance Deficiencies Report

Bridge ID	Name	Component	Deficiency
31-181	Red Bridge	Embankment	Toxic Weeds
		Steel Beam on Wood Post	Weakened
		Laminated Rubber Brg	Uneven Bearing
31-182	McMillan Bridge	Embankment	Toxic Weeds
31-186	Kennedy Bridge	Embankment	Toxic Weeds
		Delineator	Inadequate Height
31-187	Campbell Bridge	Steel Beam on Wood Post	Weakened
31-208	Race Track Bridge	Steel Post & Guide Rail	Weakened
31-303	Shaver Bridge	Water Channel	Lacking Freeboard
		Delineator	Obscured
		Steel Sliding Plate	Uneven Bearing
		Load Posting	Missing
31-A21	Johnston Bridge	Embankment	Toxic Weeds
C31-167	North Lunenburg Road Culvert	Embankment	Toxic Weeds
C31-169	North Lunenburg Road Culvert	Embankment	Toxic Weeds
C31-A01	Goldfield Road Culvert	Embankment	Toxic Weeds
C31-A02	Hunters Road Culvert	CS Plate Pipe Arch	Load Carrying Capacity
		Embankment	Toxic Weeds
C31-A06	Beckstead Road Culvert	CS Plate Pipe Arch	Insufficient Barrel Length
		Embankment	Toxic Weeds
C31-A12	Cooper Road Culvert	Steel Beam on Wood Post	Inadequate Height
		Embankment	Toxic Weeds
C31-A13	Wilburn Road Culvert	Embankment	Toxic Weeds
		CS Plate Pipe Arch	Insufficient Barrel Length
		Water Channel	Obstructed
C31-A15	MacRae Road Culvert	Embankment	Over-steepened
C31-A16	Northfield Road Culvert	Embankment	Toxic Weeds
C31-A18	O'Keefe Road Culvert	Embankment	Toxic Weeds
		Steel Beam on Wood Post	Does'nt Meet New Standard



Bridge Condition Index Report

Bridge ID	Name	BCI	Program Year
31-170	North Lunenburg Bridge	81.8	2027
31-175	Valade Road Bridge	81.4	
31-181	Red Bridge	68.9	2022
31-182	McMillan Bridge	83.4	
31-186	Kennedy Bridge	81.1	
31-187	Campbell Bridge	73.1	2024
31-208	Race Track Bridge	74.0	2024
31-303	Shaver Bridge	69.7	2022
31-A21	Johnston Bridge	80.8	2026
C31-167	North Lunenburg Road Culvert	97.3	
C31-169	North Lunenburg Road Culvert	60.4	2025
C31-A01	Goldfield Road Culvert	96.3	
C31-A02	Hunters Road Culvert	54.7	2023
C31-A03	Otto Road Culvert	90.0	
C31-A06	Beckstead Road Culvert	56.4	2026
C31-A08	Anderson Road Culvert	74.3	
C31-A12	Cooper Road Culvert	73.8	2024
C31-A13	Wilburn Road Culvert	62.4	
C31-A15	MacRae Road Culvert	62.9	2023
C31-A16	Northfield Road Culvert	60.3	
C31-A18	O'Keefe Road Culvert	61.8	2031

Total Number of Structures: 21			
BCI < 50: 0	BCI Between 50 and 60: 2	BCI Between 60 and 70: 7	BCI Above 70: 12
Percent: 0	9.5%	33.3%	57.1%



Bridge Inspection Report

North Lunenburg Bridge

Road Name: North Lunenburg Road West
Site ID: 31-170
Structure Type: Conc Rigid Frame Precast
Owner: Township South Stormont
Built: 2008
Length: 8.7 m
Width: 9.3 m
Spans: 1
Spans Arrange: 7.9
Feature Under: Navigable Channel
Crossing: Raisin River
Location: 100 m West of County Road 12

Inspection Date: July-28-21
Inspector: Steve Reid, C.E.T.
Assistant: Kyle Davis, Eng Student

Comments:

The current condition of this bridge is good. Topping slab has some open cracks, no delaminations at this time. Topping slab not stiff enough to control reflection cracking from joints in precast. Consider overlay, waterproofing and paving to remedy seepage and stiffen slab subject to structural evaluation.

Recommended Investigations:

Structural Evaluation

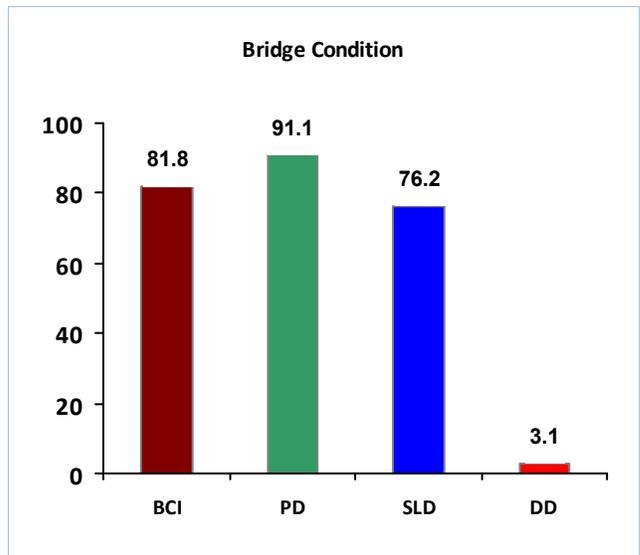
Recommended Capital Works:

O'Lay, WP&P

Estimated Replacement Value: **\$787,000**
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: **77 Years**
Rehabilitation Year and Estimated Cost: **2027 \$108,000**



AADT: 200 **Latitude:** 45.06769300
Lanes: 2 **Longitude:** -74.96798700
Skew: 0 ° **Orientation:** N-S
Speed: 80 km/h **Road Width:** 8.5 m
Trucks **Load Posting:** No Posting



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

Unprotected BSRC Deck (1)	Defects 30.0%	Minor Scaling, Minor Abrasion
Topping Slab	Damage 1.0%	Moderate Cracking, Minor Impact
Length: 8.7 m	Maintenance None	
Width: 8.5 m	Capital Rec. None	
Height: 0.15 m	<i>Wide open longitudinal & transverse cracks in deck surface. Surface is scaled. No delaminations found. Some minor damage at deck ends from plow. Asphalt padding has been added along deck ends.</i>	
Soffit (1)	Defects 2.0%	Minor Staining, Minor Leaching/Seepage
Deck Soffit	Damage 0.0%	
Length: 8.7 m	Maintenance None	
Width: 8.5 m	Capital Rec. None	
Height:	<i>Good condition. Some minor leach stains at the precast joints.</i>	
Asphalt Wear Surf (1)	Defects 0.0%	
Approach Wear Surface	Damage 0.0%	
Length: 10 m	Maintenance None	
Width: 8.5 m	Capital Rec. None	
Height:	<i>Satisfactory condition. Asphalt padding next to deck ends due to minor settlement.</i>	
Conc Curb (2)	Defects 0.0%	
Approach Curb	Damage 0.0%	
Length: 9.2 m	Maintenance None	
Width: 0.4 m	Capital Rec. None	
Height: 0.25 m	<i>Good condition, steel guide posts anchored to top of curbs. Approach curbs located on top of wing walls.</i>	
Conc Curb (2)	Defects 0.0%	
Curbs	Damage 0.0%	
Length: 8.7 m	Maintenance None	
Width: 0.4 m	Capital Rec. None	
Height: 0.25 m	<i>Remain in good condition, steel thrie beam posts anchored to top of curbs on deck.</i>	
Steel Post & Guide Rail (4)	Defects 0.0%	
Approach Barrier	Damage 0.0%	
Length: 6 m	Maintenance None	
Width:	Capital Rec. None	
Height: 0.72 m	<i>Good condition, located on approaches. Eccentric loader end treatments at the SE & NW.</i>	



Component Inspection Information

Thrie Beam G/R (2) Barrier Length: 8.7 m Width: Height: 0.72 m	Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>Satisfactory condition. Steel post & thrie beam located on bridge.</i>
RC Abutment Wall (2) Precast Wall Length: Width: 9.3 m Height: 1.5 m	Defects 0.1% Minor Leaching Cracks Damage 1.0% Minor Spalling Maintenance None Capital Rec. None <i>Precast walls have some minor parging repairs. 3-sided sections were placed on top of concrete abutment walls without proper bearing, the stress is causing spalling at the base of the precast walls.</i>
RC Abutment Wall (2) Abutment Stem Length: Width: 9.3 m Height: 3.2 m	Defects 1.0% Minor Leaching Cracks Damage 0.0% Maintenance None Capital Rec. None <i>Small abutment walls supporting the precast 3-sided sections. Walls are in good condition, some leaching cracks.</i>
RC Wing Walls (4) Wing Walls Length: 9.2 m Width: Height: 1.88 m	Defects 0.0% Damage 0.1% Minor Spalling Maintenance None Capital Rec. None <i>Remain in good condition. Small spall at the end of the NW wing wall.</i>
Water Channel (1) Channel	Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>Well centred under bridge.</i>
Embankment (4) Embankment	Defects 0.0% Damage 0.0% Maintenance Remove Brush/Trees Capital Rec. None <i>Bell attached to north side of structure. Well groomed on the north side, thick vegetation growth on the south side.</i>



Capital Needs Cost Estimate Break-Down

Item	Req'd	Units	Quantity	Unit Price \$	Estimated Cost
Misc Concrete Repairs	X	m ²	0.0	\$800	\$0
Deck Concrete Overlay	✓	m ²	80.9	\$400	\$32,364
Deck Replacement	X	m ²	80.9	\$2,500	\$0
Barrier Wall Replacement	X	m	32.7	\$3,000	\$0
Expansion Joint	X	m	18.6	\$5,500	\$0
Waterproof & Pave	✓	m ²	80.9	\$220	\$17,800
Bearing Replacement	X	Count	0.0	\$5,000	\$0
Approach Guide Rail	X	m	80.0	\$250	\$0

Other Work

\$0

Structural Items Subtotal	\$50,000
Mobilization General Sitework	\$10,000
Estimated Traffic Management & Civil Items	\$30,000
Contract Admin & Contingencies 20%	\$18,000
Total Rehabilitation Cost Estimate	<i>\$108,000</i>

Recommended Capital Work Summary

Recommended Capital Year

2027

O'Lay, WP&P

Inspection Comments

The current condition of this bridge is good. Topping slab has some open cracks, no delaminations at this time. Topping slab not stiff enough to control reflection cracking from joints in precast. Consider overlay, waterproofing and paving to remedy seepage and stiffen slab subject to structural evaluation.



Image 170



North elevation

Image 159



East approach

Image 160



North channel

Image 161



Deck surface

Image 162



South channel

Image 163



South railing and curb



Image 164



North railing and curb

Image 165



Typical deck end

Image 166



East abutment

Image 167



Soffit

Image 168



Soffit joint leaching and saturation

Image 169



West abutment



Bridge Inspection Report

Valade Road Bridge

Road Name: Valade Rd.
Site ID: 31-175
Structure Type: Prestressed Solid Slab
Owner: Township South Stormont
Built: 1978
Length: 22.25 m
Width: 6.73 m
Spans: 1
Spans Arrange: 21.1
Feature Under: Navigable Channel
Crossing: Raisin River
Location: 0.1 km East of County Road 18, Con 6 Lot 19

Inspection Date: June-29-21
Inspector: Steve Reid, C.E.T.
Assistant: Kyle Davis, Eng Student

Comments:
Bridge under going rehab in 2021.

Recommended Investigations:
No Special Investigations Recommended

Recommended Capital Works:
No Capital Works Recommendations

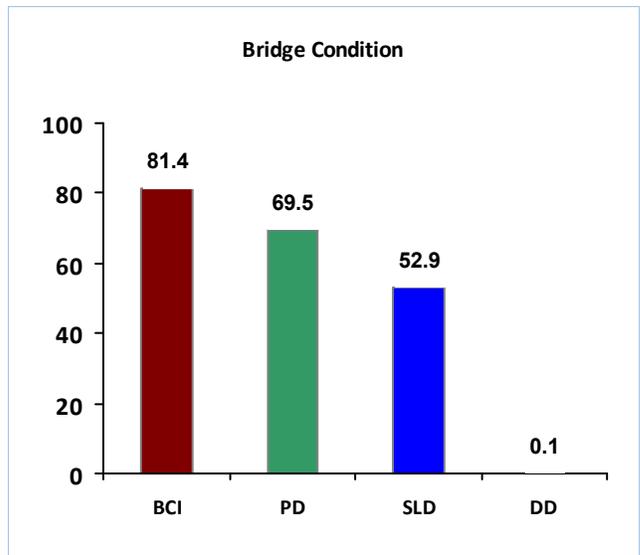
Estimated Replacement Value: \$1,265,000

Estimated replacement value is based on replacement in kind

Estimated Remaining Service Life: 67 Years



AADT: N/A **Latitude:** 45.09048100
Lanes: 1 **Longitude:** -74.83533100
Skew: 0 ° **Orientation:** E-W
Speed: 80 km/h **Road Width:** 5.7 m
Trucks **Load Posting:** No Posting



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

Unprotected BSRC Deck (1) Defects **0.0%**
Topping Slab Damage **0.0%**
Length: **22.25 m** Maintenance **None**
Width: **6.73 m** Capital Rec. **None**
Height:

Soffit (1) Defects **0.0%**
Deck Soffit Damage **0.0%**
Length: **21.4 m** Maintenance **None**
Width: **6.3 m** Capital Rec. **None**
Height: *Soffit is underside of box girders. See girder notes.*

Armouring (2) Defects **0.0%**
Expansion Joints Damage **0.0%**
Length: **5.73 m** Maintenance **None**
Width: Capital Rec. **None**
Height:

Conc Curb (2) Defects **0.0%**
Curbs Damage **0.0%**
Length: **22.25 m** Maintenance **None**
Width: **0.5 m** Capital Rec. **None**
Height: **0.19 m**

Steel Tube Rail & Post (2) Defects **0.0%**
Barrier Damage **0.0%**
Length: **25 m** Maintenance **None**
Width: Capital Rec. **None**
Height: **0.64 m**

Steel Beam on Steel Post (2) Defects **0.0%**
Guide Rail Damage
Length: **87.5 m** Maintenance **None**
Width: Capital Rec. **None**
Height: **0.8 m**



Component Inspection Information

Conc Rail/End Posts (4)	Defects 0.0%	
Barrier	Damage 0.0%	
Length: 1.2 m	Maintenance None	
Width: 0.35 m	Capital Rec. None	
Height: 0.64 m		
RC Box (5)	Defects 0.5%	Minor Leaching Cracks, Minor Leaching/Seepage
Girders	Damage 0.0%	
Length: 21.4 m	Maintenance None	
Width: 1.2 m	Capital Rec. None	
Height: 0.7 m		<i>Fascia of exterior girders repaired in 2021. Minor delaminations on bottom of girders at east end due to leaking joint.</i>
RC Abutment Wall (2)	Defects 0.0%	
Abutment Stem	Damage 0.0%	
Length:	Maintenance None	
Width: 6.3 m	Capital Rec. None	
Height: 1.7 m		<i>Good condition.</i>
RC Ballast Wall (2)	Defects 0.0%	
Ballast Wall	Damage 0.0%	
Length: 6.3 m	Maintenance None	
Width:	Capital Rec. None	
Height: 0.85 m		<i>Satisfactory condition.</i>
RC Wing Walls (4)	Defects 0.0%	
Wing Walls	Damage 0.0%	
Length: 2.9 m	Maintenance None	
Width:	Capital Rec. None	
Height: 1.2 m		<i>Good condition.</i>
Laminated Rubber Brg (28)	Defects 0.0%	
Abutment Bearings	Damage 0.0%	
Length:	Maintenance None	Partial Inspection
Width:	Capital Rec. None	
Height:		<i>Limited views of bearings, visible bearings were in good condition.</i>



Component Inspection Information

Water Channel (1)
Channel
Defects **0.0%**
Damage **0.0%**
Maintenance **None**
Capital Rec. **None**
No concerns.

Embankment (4)
Embankment
Defects **0.0%**
Damage **0.0%**
Maintenance **None**
Capital Rec. **None**

Delineator (4)
Signs
Length:
Width:
Height:
Defects **0.0%**
Damage **0.0%**
Maintenance **None**
Capital Rec. **None**



Image 853



Under construction





Bridge Inspection Report

Red Bridge

Road Name: *Lefebvre Road*
Site ID: *31-181*
Structure Type: *Prestressed Solid Slab*
Owner: *Township South Stormont*
Built: *1978*
Length: *19.6 m*
Width: *6.4 m*
Spans: *1*
Spans Arrange: *19.6*
Feature Under: *Water*
Crossing: *Raisin River*
Location: *0.15 km North of County Rd 18, Con 6 Lot 7*

Inspection Date: *June-29-21*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Kyle Davis, Eng Student*

Comments:
This bridge is planned for a major rehabilitation, 2022. Joints and barrier system are driving the need for rehab. Poor drainage from bridge is damaging exterior girders.

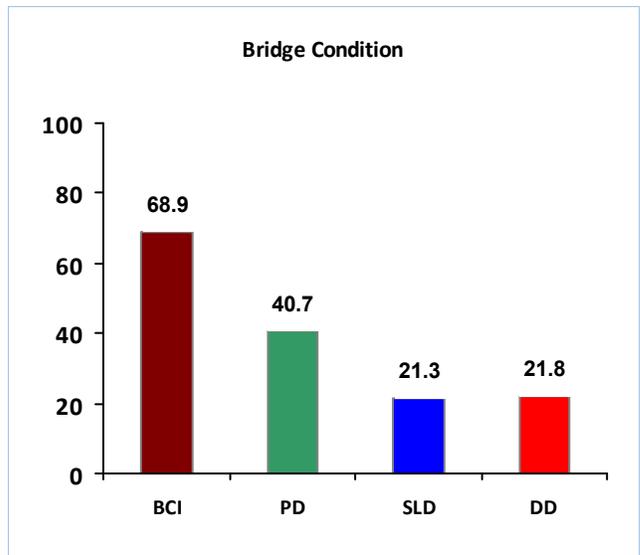
Recommended Investigations:
No Special Investigations Recommended

Recommended Capital Works:
Misc Concrete Repairs, O'LAY, B/Wall, Guide Rail, Ret Walls, Abut Rep

Estimated Replacement Value: *\$1,064,000*
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: *47 Years*
Rehabilitation Year and Estimated Cost: *2022 \$493,000*



AADT: *N/A* **Latitude:** *45.10995300*
Lanes: *2* **Longitude:** *-74.77310700*
Skew: *0 °* **Orientation:** *N-S*
Speed: *80 km/h* **Road Width:** *5.2 m*
Trucks **Load Posting:** *No Posting*



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

RC Topping Slab (1)	Defects 0.0%	
Deck Surface	Damage 0.0%	
Length: 19.6 m	Maintenance None	
Width: 6.4 m	Capital Rec. None	
Height:	<i>Concrete topping slab on top of box girders. Deck is covered with asphalt. Evidence of recent deck condition survey in asphalt. No proper drainage from deck, runoff is off the edges of bridge.</i>	
Soffit (1)	Defects 5.0%	Minor Staining
Deck Soffit	Damage 5.0%	Minor Delamination
Length: 19.6 m	Maintenance None	
Width: 6.4 m	Capital Rec. None	
Height:	<i>Soffit is the bottom of box girders. North end is stained (no spalling) due to fire pit under bridge. See girders.</i>	
Asphalt Wear Surf (1)	Defects 0.0%	
Wear Surface	Damage 5.0%	Moderate Cracking
Length: 19.6 m	Maintenance None	
Width: 5.2 m	Capital Rec. None	
Height:	<i>Numerous random cracks. Evidence of recent condition survey. Potholes in the approach surface.</i>	
X- Joint Conventional (2)	Defects 0.0%	
Expansion Joints	Damage 15.0%	Major End Dam Breakage, Major Plow Gouging
Length: 6.4 m	Maintenance None	
Width:	Capital Rec. Replace in 2 years	
Height:	<i>Joint seals are over compressed. Tops of both ballast walls have major damage from winter plow. Armouring also has minor plow scrapes.</i>	
Steel Beam on Wood Post (Defects 0.0%	
Guide Rail	Damage 15.0%	Major Decay, Moderate Impact
Length: 42.5 m	Maintenance None	
Width:	Capital Rec. Replace in 2 years	Perf Def: Weakened
Height: 0.72 m	<i>Guide rail has many collision scrapes. One post is completely severed at NE end. 47 m (E) + 38 m (W).</i>	
RC Box (7)	Defects 7.0%	Moderate Staining, Minor Rust Staining
Girders	Damage 2.0%	Minor Delamination
Length: 19.6 m	Maintenance None	
Width: 0.9 m	Capital Rec. None	
Height: 0.7 m	<i>Delaminated area on bottom of west girder. Spall on exterior of west girder. Lack of drainage from deck is causing damage to exterior girders also missing drain tubes from box girders are causing damage. Soot staining on underside of girders at north end evident of camp fires under bridge.</i>	



Component Inspection Information

RC Abutment Wall (2) Abutment Stem Length: Width: 6.4 m Height: 2.7 m	Defects 22.0% Moderate Scaling, Minor Graffiti Damage 2.0% Minor Delamination, Minor Spalling Maintenance None Capital Rec. None <i>Abutments tops were recast. NW corner has spalls and delaminated areas under girder bearing. NW girder bearing is compromised due to the damaged bearing seat in NW corner. Old abutment walls have moderate scaling some disintegration.</i>
RC Ballast Wall (2) Ballast Wall Length: Width: 6.4 m Height: 0.8 m	Defects 10.0% Moderate Scrapes/Gouging Damage 1.0% Minor Spalling Maintenance None Not Inspected Capital Rec. None <i>Unable to view. Exposed top is damaged from winter plow.</i>
RC Wing Walls (4) Wing Walls Length: 1.8 m Width: Height: 1.4 m	Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>Satisfactory condition.</i>
Laminated Rubber Brg (2) Abutment Bearings Length: Width: Height:	Defects 0.0% Damage 0.0% Maintenance None Partial Inspection Capital Rec. None Perf Def: Uneven Bearing <i>Only visible at corners of abutments. NW corner is lacking support due to damage at bearing seat.</i>
Water Channel (1) Channel	Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>Stream well centered under bridge.</i>
Embankment (4) Embankment	Defects 5.0% Moderate Erosion Damage 0.0% Maintenance Remove Brush/Trees Capital Rec. None Perf Def: Toxic Weeds <i>Trees & brush require brushing out, notably in the SW corner. Wild parsnip present. Erosion is occurring around the disintegrating retaining walls.</i>



Component Inspection Information

Delineator (4)

Defects **0.0%**

Signs

Damage **1.0%** **Minor Impact**

Length:

Maintenance **None**

Width:

Capital Rec. **None**

Height:

Delineators at all guide rail ends. Some minor traffic scrapes.



Capital Needs Cost Estimate Break-Down

Item	Req'd	Units	Quantity	Unit Price \$	Estimated Cost
<i>Misc Concrete Repairs</i>	✓	m ²	20.0	\$800	\$16,000
<i>Deck Concrete Overlay</i>	✓	m ²	125.4	\$400	\$50,176
<i>Deck Replacement</i>	✗	m ²	125.4	\$2,500	\$0
<i>Barrier Wall Replacement</i>	✓	m	43.6	\$3,000	\$189,600
<i>Expansion Joint</i>	✗	m	12.8	\$5,500	\$0
<i>Waterproof & Pave</i>	✗	m ²	125.4	\$220	\$0
<i>Bearing Replacement</i>	✗	Count	14.0	\$5,000	\$0
<i>Approach Guide Rail</i>	✓	m	80.0	\$250	\$40,000

Other Work

Ret Walls, Abut Rep \$50,000

Structural Items Subtotal	\$346,000
Mobilization General Sitework	\$35,000
Estimated Traffic Management & Civil Items	\$30,000
Contract Admin & Contingencies 20%	\$82,000
Total Rehabilitation Cost Estimate	<i>\$493,000</i>

Recommended Capital Work Summary

Recommended Capital Year **2022**

Misc Concrete Repairs, O' Lay, B/Wall, Guide Rail, Ret Walls, Abut Rep

Inspection Comments

This bridge is planned for a major rehabilitation, 2022. Joints and barrier system are driving the need for rehab. Poor drainage from bridge is damaging exterior girders.



Image 917



West elevation

Image 894



South approach

Image 895



South expansion joint

Image 896



East channel downstream

Image 897



North expansion joint

Image 898



West channel upstream



Image 899



Asphalt on deck with random cracking (typical)

Image 900



West guide rail (typical)

Image 901



Post rot (typical)

Image 902



NE guide rail damage

Image 903



North abutment

Image 904



Large spall NW corner



Image 905



Soffit

Image 906



NW bearing seat disintegration

Image 907



NW corner disintegration under expansion joint

Image 908



Deck drain end with saturation and rust (typical)

Image 909



Soot stains in north soffit

Image 910



South abutment



Image 911



SE wing wall disintegration

Image 912



Spalls on east fascia

Image 913



Soffit delamination at west

Image 915



East elevation

Image 916



Erosion NE corner

Image 918



North expansion joint end dam damage





Bridge Inspection Report

McMillan Bridge

Road Name: *Delaney Road*
Site ID: *31-182*
Structure Type: *Slab on Steel Girder*
Owner: *Township South Stormont*
Built: *2009*
Length: *21.8 m*
Width: *9.5 m*
Spans: *1*
Spans Arrange: *19.2*
Feature Under: *Navigable Channel*
Crossing: *Raisin River*
Location: *0.5km North of County Rd 18, Lot 1, Concession 6,*

Inspection Date: *June-29-21*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Kyle Davis, Eng Student*

Comments:
Current condition of this bridge is good, minor maintenance recommended at this time.

Recommended Investigations:
No Special Investigations Recommended

Recommended Capital Works:
No Capital Works Recommendations

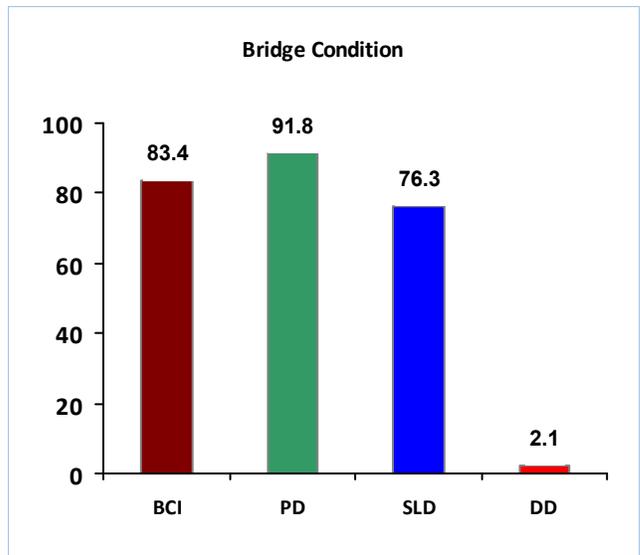
Estimated Replacement Value: *\$1,467,000*

Estimated replacement value is based on replacement in kind

Estimated Remaining Service Life: *78 Years*



AADT: *22* **Latitude:** *45.12453600*
Lanes: *2* **Longitude:** *-74.76022500*
Skew: *0 °* **Orientation:** *N-S*
Speed: *80 km/h* **Road Width:** *8.5 m*
Trucks **Load Posting:** *No Posting*



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

Unprotected BSRC Deck (1)	Defects 15.0%	Minor Scaling, Minor Scrapes/Gouging
Deck Surface	Damage 0.2%	Minor Cracking
Length: 21.8 m	Maintenance None	
Width: 9.5 m	Capital Rec. None	
Height: 0.23 m	<i>Most of tining has been lost. Minor plow gouging at north end. Transverse cracks at north end. Scaling of exposed concrete surface. Chain drag 2021 found no delaminations.</i>	
Soffit (1)	Defects 0.0%	
Deck Soffit	Damage 0.0%	
Length: 21.8 m	Maintenance None	
Width: 8.4 m	Capital Rec. None	
Height:	<i>Good condition.</i>	
Approach Slab (2)	Defects 0.0%	
Approach Slab	Damage 0.1%	Minor Delamination
Length: 6 m	Maintenance None	
Width: 9.5 m	Capital Rec. None	
Height:	<i>Tining has mostly worn off. Surface treatment extends partially on to approach slabs. Small delamination in the south slab NW corner.</i>	
Asphalt Wear Surf (1)	Defects 0.0%	
Appr Wear Surface	Damage 0.0%	
Length: 10 m	Maintenance None	
Width: 9.5 m	Capital Rec. None	
Height:	<i>Surface treatment on approaches to bridge. Good condition.</i>	
Conc Curb (2)	Defects 4.0%	Minor Scaling
Curbs	Damage 0.5%	Minor Cracking
Length: 29.2 m	Maintenance None	
Width: 0.59 m	Capital Rec. None	
Height: 0.15 m	<i>Curbs have a very poor finish. Many transverse cracks in top of curbs. Curb on SE wing wall appears to be in the worst condition.</i>	
Steel Beam on Steel Post (2)	Defects 0.0%	
Guide Rail	Damage 0.0%	
Length: 102.4 m	Maintenance None	
Width:	Capital Rec. None	
Height: 0.72 m	<i>Eccentric loader end treatment at all guide rail ends. Erosion at corners of bridge have exposed guide rail posts next to end walls. 94.20 m (W) + 110.60 m (E)</i>	



Component Inspection Information

Steel Beam (20)	Defects 0.0%	
Diaphragms	Damage 0.0%	
Length: 2.1 m	Maintenance None	
Width: 0.165 m	Capital Rec. None	
Height: 0.31 m	Good condition. Painted at abutments.	
Thrie Beam G/R (2)	Defects 0.0%	
Barrier	Damage 0.0%	
Length: 29.2 m	Maintenance None	
Width:	Capital Rec. None	
Height: 0.69 m	Thrie beams are mounted on the bridge curbs, condition is good.	
Steel-Fabricated (5)	Defects 0.0%	
Girders	Damage 0.0%	
Length: 19.6 m	Maintenance None	
Width: 0.292 m	Capital Rec. None	
Height: 0.84 m	Girders are in good condition. Ends of girders are nicely coated.	
RC Abutment Wall (2)	Defects 1.0%	Minor Graffiti, Minor Scaling
Abutment Stem	Damage 0.1%	Minor Cracking
Length:	Maintenance None	
Width: 9.3 m	Capital Rec. None	
Height: 3.65 m	Some areas of poor segregation of concrete on north wall. Graffiti on both walls mainly south. Rip rap against walls.	
RC Ballast Wall (2)	Defects 0.1%	Minor Leaching Cracks
Ballast Wall	Damage 0.0%	
Length:	Maintenance None	Partial Inspection
Width: 9.3 m	Capital Rec. None	
Height: 0.58 m	Semi-integral abutments. Leaching crack in the NW corner.	
RC Wing Walls (4)	Defects 0.0%	
Wing Walls	Damage 0.0%	
Length: 5.3 m	Maintenance None	
Width:	Capital Rec. None	
Height: 2.6 m	Good condition.	



Component Inspection Information

Laminated Rubber Brg (10)	Defects 0.0%	
Abutment Bearings	Damage 0.0%	
Length:	Maintenance None	Partial Inspection
Width:	Capital Rec. None	
Height:	<i>Satisfactory condition. Only limited views.</i>	

Water Channel (1)	Defects 0.0%
Channel	Damage 0.0%
	Maintenance None
	Capital Rec. None
	<i>Water moving well under bridge.</i>

Embankment (4)	Defects 5.0%	Moderate Erosion
Embankment	Damage 0.0%	
	Maintenance Remove Brush/Trees	
	Capital Rec. None	Perf Def: Toxic Weeds
	<i>Trees & brush around wing walls & under bridge should be cleared.</i>	
	<i>Erosion at the ends of curbs. Wild parsnip noted on embankments. Stone protection against abutment walls.</i>	

Delineator (2)	Defects 0.0%	
Signs	Damage 1.0%	Minor Impact
Length:	Maintenance None	
Width:	Capital Rec. None	
Height:	<i>Delineator all intact.</i>	



Image 934



East elevation

Image 919



South approach

Image 920



Concrete deck surface

Image 921



East channel

Image 922



West channel

Image 923



East railing and curb



Image 924



West railing and curb

Image 925



North deck end

Image 927



Coated girder ends (typical)

Image 928



Soffit

Image 929



North abutment

Image 930



South abutment



Image 931



Hairline transverse crack in soffit

Image 932



Typical diaphragm in south

Image 935



Girder bottom condition (typical)

Image 936



West elevation





Bridge Inspection Report

Kennedy Bridge

Road Name: *Delaney Road*
Site ID: *31-186*
Structure Type: *Precast Arch*
Owner: *Township South Stormont*
Built: *2006*
Length: *11.3 m*
Width: *9 m*
Spans: *1*
Spans Arrange: *11*
Feature Under: *Water*
Crossing: *North Raisin River*
Location: *75m South of McPhail Rd, Lot 1 Concession 7,*

Inspection Date: *June-29-21*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Kyle Davis, Eng Student*

Comments:
Structure is in overall good condition. The approach guide rail will need updating within 10 years.

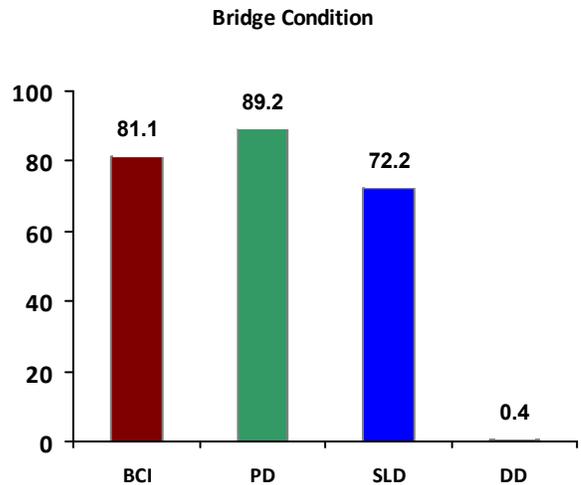
Recommended Investigations:
No Special Investigations Recommended

Recommended Capital Works:
No Capital Works Recommendations

Estimated Replacement Value: *\$602,000*
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: *75 Years*



AADT: *200* **Latitude:** *45.14623900*
Lanes: *2* **Longitude:** *-74.77131600*
Skew: *0 °* **Orientation:** *N-S*
Speed: *80 km/h* **Road Width:** *7.6 m*
Trucks **Load Posting:** *No Posting*



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

Precast Concrete Arch (1)	Defects 0.5%	Minor Graffiti, Minor Formed Patches
Conduit	Damage 0.0%	
Length: 11 m	Maintenance None	
Width: 9 m	Capital Rec. None	
Height: 3.1 m	<i>Overall very good condition. Graffiti on the north wall. Small repair in soffit, likely due to handling spall.</i>	
RC Topping Slab (1)	Defects 0.0%	
Deck Surface	Damage 0.0%	
Length: 11.3 m	Maintenance None	Partial Inspection
Width: 9 m	Capital Rec. None	
Height:	<i>Covered with asphalt, suspect no problems on deck.</i>	
Asphalt Wear Surf (1)	Defects 0.0%	
Wear Surface	Damage 0.0%	
Length: 11.3 m	Maintenance None	
Width: 7.6 m	Capital Rec. None	
Height:	<i>Good condition. Few small cracks.</i>	
Conc Curb (2)	Defects 0.0%	
Curbs	Damage 0.0%	
Length: 11.8 m	Maintenance None	
Width: 0.4 m	Capital Rec. None	
Height: 0.1 m	<i>Good condition. Thrie beam posts secured to curb tops.</i>	
Steel Beam on Steel Post (4)	Defects 0.0%	
Guide Rail	Damage 1.0%	Minor Impact
Length: 24.5 m	Maintenance None	
Width:	Capital Rec. None	
Height: 0.72 m	<i>Buried ends in the NE & SW, eccentric loader end treatment in the NW & SE. Several areas of impact damage to approach guide rail. Small impact strike in the NW.</i>	
Thrie Beam G/R (2)	Defects 0.0%	
Barrier	Damage 0.0%	
Length: 11 m	Maintenance None	
Width:	Capital Rec. None	
Height: 0.72 m	<i>Good condition. Thrie beam over bridge, secured to steel posts on curbs.</i>	



Component Inspection Information

RC Wing Walls (4) Wing Walls Length: 7 m Width: 0.25 m Height: 2.4 m	Defects 1.0% Minor Scaling Damage 0.0% Maintenance None Capital Rec. None <i>Good condition. Some light scaling on the SW wall.</i>
Headwall (2) Head Wall Length: 11.3 m Width: Height: 1 m	Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>Headwalls have varied height. West headwall has small area of damage, appears to have been done at time of construction.</i>
Water Channel (1) Channel	Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>Good condition.</i>
Embankment (4) Embankment	Defects 0.5% Minor Gullyng Damage 0.0% Maintenance None Capital Rec. None Perf Def: Toxic Weeds <i>Large stone protection at ends of wing walls. Some gullyng in the NW embankment from rain water runoff. Wild parsnip was noted.</i>
Delineator (4) Signs Length: Width: Height:	Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None Perf Def: Inadequate Height <i>Signs are located at the ends of guide rail. Signs are set too low.</i>



Image 952



East elevation

Image 941



South approach

Image 942



West channel

Image 943



East channel

Image 944



East railing and curb

Image 945



West curb joint and plate



Image 946



Asphalt on deck

Image 947



Gullying NW

Image 948



Soffit

Image 949



South wall

Image 950



North wall

Image 951



NE wing wall (typical)





Bridge Inspection Report

Campbell Bridge

Road Name: *McPhail Road*
Site ID: *31-187*
Structure Type: *Concrete Rigid Frame CIP*
Owner: *Township South Stormont*
Built: *1988*
Length: *13.3 m*
Width: *10.1 m*
Spans: *1*
Spans Arrange: *12*
Feature Under: *Water*
Crossing: *North Raisin River*
Location: *5km East of Hwy. 138, Lot 1, Concession 7 & 8,*

Inspection Date: *June-29-21*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Kyle Davis, Eng Student*

Comments:

Bridge is in good condition. Lack of proper drainage control on bridge is causing damage to soffit on the south side and will eventually damage abutment walls if left in current condition. The guide rail has many areas of collision damage due to the curved road alignment at the bridge. Buried end treatments do not meet the current standards. Due to the damage and performance deficiencies recommend the guide rail be replaced within two years. This may be a good time to add curbs to the bridge, the improved drainage from deck top would greatly

Recommended Investigations:

No Special Investigations Recommended

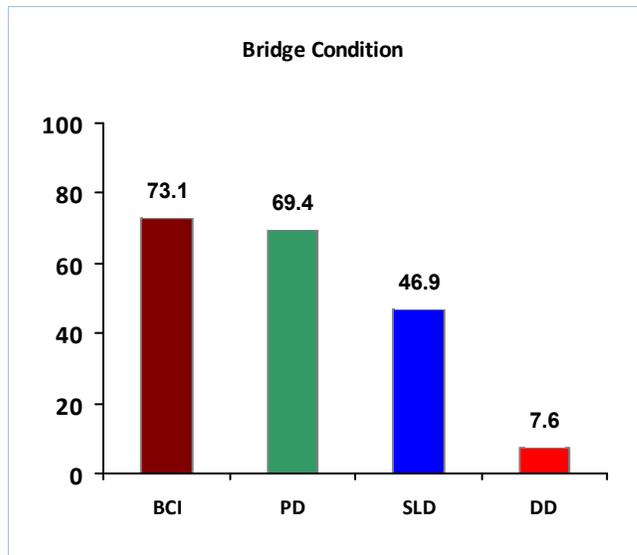
Recommended Capital Works:

WP&P, B/Wall, Guide Rail

Estimated Replacement Value: **\$1,817,000**
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: **67 Years**
Rehabilitation Year and Estimated Cost: **2024 \$322,000**



AADT: *960* **Latitude:** *45.14823400*
Lanes: *2* **Longitude:** *-74.77434500*
Skew: *20 °* **Orientation:** *E-W*
Speed: *80 km/h* **Road Width:** *8.8 m*
Trucks **Load Posting:** *No Posting*



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

RC Topping Slab (1)	Defects 1.0%	Minor Scrapes/Gouging
Deck Surface	Damage 0.1%	Minor Cracking
Length: 13.3 m	Maintenance None	
Width: 10.1 m	Capital Rec. None	
Height:	<i>Covered with a skim coat of asphalt, shoulder areas of deck are exposed. Chain drag in 2019 found no delaminations. Crack was noted in the NW corner. Tining is still present on the exposed deck areas. Some plow damage at deck ends.</i>	
Soffit (1)	Defects 0.0%	
Deck Soffit	Damage 1.0%	Minor Delamination, Minor Cracking
Length: 12 m	Maintenance None	
Width: 10.1 m	Capital Rec. None	
Height:	<i>Overall good condition. Some minor cracking in soffit. Minor delaminated areas along the south edge. Lack of proper drainage control from the deck is causing damage at south edge.</i>	
Asphalt Wear Surf (1)	Defects 0.0%	
Wear Surface	Damage 0.2%	Minor Cracking
Length: 13.3 m	Maintenance None	
Width: 6.5 m	Capital Rec. None	
Height:	<i>Satisfactory condition. Skim coat on deck.</i>	
Steel Beam on Wood Post (Defects 0.0%	
Guide Rail	Damage 15.0%	Moderate Impact, Moderate Decay
Length: 20 m	Maintenance None	
Width:	Capital Rec. Replace in 2 years	Perf Def: Weakened
Height: 0.7 m	<i>Many vehicle strikes. Four posts on the north side of bridge are damaged from vehicle impact, post anchors weakened from collision. Buried end treatments at all ends. Timber posts have varying degree of decay. Guide rail is due for renewal.</i>	
RC Abutment Wall (2)	Defects 5.0%	Minor Leaching Cracks, Minor Honeycomb, Minor Graffiti
Abutment Stem	Damage 1.0%	Minor Cracking
Length:	Maintenance None	
Width: 10.1 m	Capital Rec. None	
Height: 2.3 m	<i>Overall good condition. All corners were wet in 2021 from water runoff abutment wall corners will be damaged in the future due to this problem. Some vertical moderate cracks noted. Minor leaching cracks, mostly around the wall drains. Small pocket of honeycomb on south wall. North wall is stained on lower portion. Graffiti on north wall. Founded on bedrock.</i>	



Component Inspection Information

<p>RC Wing Walls (4) Wing Walls Length: 6 m Width: Height: 1.4 m</p>	<p>Defects 0.1% Minor Leaching/Seepage Damage 0.0% Maintenance None Capital Rec. None <i>Overall good condition. Some leaching at exterior knee joints. Difficult to view due to the thick brush vegetation at bridge corners.</i></p>
<p>Rip Rap (4) Channel Armour</p>	<p>Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>No concerns.</i></p>
<p>Water Channel (1) Channel</p>	<p>Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>Good condition. Flat bedrock channel bottom.</i></p>
<p>Embankment (4) Embankment</p>	<p>Defects 0.0% Damage 0.0% Maintenance Remove Brush/Trees Capital Rec. None <i>Good condition. Wild parsnip is present. Some tree growth near wing walls. Trees should be cleared at bridge corners.</i></p>
<p>Delineator (4) Signs Length: Width: Height:</p>	<p>Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>Delineators at the ends of guide rail.</i></p>



Capital Needs Cost Estimate Break-Down

Item	Req'd	Units	Quantity	Unit Price \$	Estimated Cost
Misc Concrete Repairs	X	m ²	0.0	\$800	\$0
Deck Concrete Overlay	X	m ²	134.3	\$400	\$0
Deck Replacement	X	m ²	134.3	\$2,500	\$0
Barrier Wall Replacement	✓	m	37.3	\$3,000	\$151,800
Expansion Joint	X	m	20.2	\$5,500	\$0
Waterproof & Pave	✓	m ²	134.3	\$220	\$29,553
Bearing Replacement	X	Count	0.0	\$5,000	\$0
Approach Guide Rail	✓	m	80.0	\$250	\$40,000

Other Work

\$0

Structural Items Subtotal	\$221,000
Mobilization General Sitework	\$22,000
Estimated Traffic Management & Civil Items	\$25,000
Contract Admin & Contingencies 20%	\$54,000
Total Rehabilitation Cost Estimate	\$322,000

Recommended Capital Work Summary

Recommended Capital Year **2024**

WP&P, B/Wall, Guide Rail

Inspection Comments

Bridge is in good condition. Lack of proper drainage control on bridge is causing damage to soffit on the south side and will eventually damage abutment walls if left in current condition. The guide rail has many areas of collision damage due to the curved road alignment at the bridge. Buried end treatments do not meet the current standards. Due to the damage and performance deficiencies recommend the guide rail be replaced within two years. This may be a good time to add curbs to the bridge, the improved drainage from deck top would greatly benefit this bridge and prevent damage from water runoff.



Image 970



South elevation

Image 953



East approach

Image 954



East deck end

Image 955



North railing

Image 956



North channel upstream

Image 957



South channel downstream



Image 958



Asphalt on deck (typical)

Image 959



Damage at west deck end

Image 960



East abutment

Image 961



West abutment

Image 962



Soffit

Image 965



Delamination in south soffit



Image 966



Spalling in south soffit

Image 967



Leaching east abutment

Image 968



Horizontal and vertical cracking in west abutment

Image 969



Small soffit crack

Image 971



South curb spall

Image 972



SW wing wall (typical)





Bridge Inspection Report

Race Track Bridge

Road Name: *Barlow Road*
Site ID: *31-208*
Structure Type: *Slab on Steel Girder*
Owner: *Township South Stormont*
Built: *1985*
Length: *5.6 m*
Width: *5.12 m*
Spans: *1*
Spans Arrange: *5.1*
Feature Under: *Water*
Crossing: *South Raisin River*
Location: *1km East of County Rd 33. Lot 17, Concession 4.*

Inspection Date: *June-29-21*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Kyle Davis, Eng Student*

Comments:

The timber deck is showing moderate wear in the wheel paths and the bridge barrier system is in need of replacement. Bridge is low priority but barrier system is due for replacement. Consider replacing entire structure with new culvert instead of deck replacement.

Recommended Investigations:

Planning Study

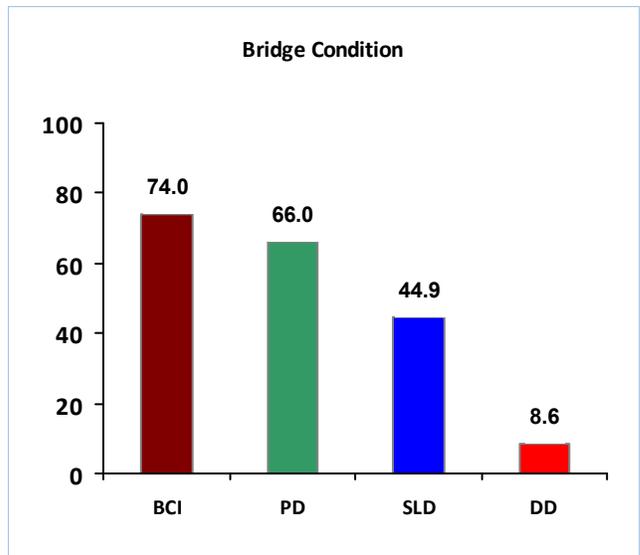
Recommended Capital Works:

Replace Deck, B/Wall

Estimated Replacement Value: **\$211,000**
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: **34 Years**
Rehabilitation Year and Estimated Cost: 2024 \$240,000



AADT: *N/A* **Latitude:** *45.05443800*
Lanes: *1* **Longitude:** *-74.80034900*
Skew: *0 °* **Orientation:** *N-S*
Speed: *50 km/h* **Road Width:** *4.84 m*
Trucks **Load Posting:** *No Posting*



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

Soffit (1)	Defects 0.0%	
Deck Soffit	Damage 0.0%	
Length: 5.62 m	Maintenance None	
Width: 5.12 m	Capital Rec. None	
Height:	<i>Underside of timber is in satisfactory condition.</i>	
Timber Wear Surface (1)	Defects 0.0%	
Wear Surface	Damage 4.0%	Moderate Wear, Minor Gouging
Length: 5.62 m	Maintenance None	
Width: 5.12 m	Capital Rec. None	
Height:	<i>Partially covered with gravel, west side is exposed (2019). Deck top fully exposed in 2021. Moderate wear in the wheel paths. Top of exposed timbers have minor damage from winter plow.</i>	
Armouring (2)	Defects 0.0%	
Expansion Joints	Damage 0.0%	
Length: 5.12 m	Maintenance None	Not Inspected
Width:	Capital Rec. None	
Height:	<i>No expansion joints, just angle iron protection on concrete end dams. No concerns.</i>	
Timber Curb (2)	Defects 10.0%	Moderate Bowed/Warped
Curbs	Damage 15.0%	Moderate Breakage, Moderate Impact
Length: 5.62 m	Maintenance None	
Width: 0.14 m	Capital Rec. Replace in 1 year	
Height: 0.16 m	<i>Curb on east side is mostly missing. West side is comprised of 3 2x8 boards. Boards have pulled up at north end. Similar conditions in 2021.</i>	
Steel Post & Guide Rail (4)	Defects 0.0%	
Approach Barrier	Damage 35.0%	Moderate Impact
Length: 15.6 m	Maintenance None	
Width:	Capital Rec. Replace in 1 year	Perf Def: Weakened
Height: 0.72 m	<i>Many impact strikes on flex beam. Post spacing not up to standard. 15.2 m (N) + 16.0 m (S).</i>	
Steel Beam on Wood Post (Defects 0.0%	
Guide Rail	Damage 25.0%	Moderate Impact, Major Decay
Length: 5.6 m	Maintenance None	
Width:	Capital Rec. Replace in 1 year	
Height: 0.72 m	<i>Major collision damage to both sides of guide rail barrier. Timber posts have major decay in top surface. Post spacing is not up to standard.</i>	



Component Inspection Information

Steel-Fabricated (7) Girders Length: 5.1 m Width: 0.205 m Height: 0.31 m	Defects 5.0% Minor Tarnishing Damage 0.0% Maintenance None Capital Rec. None <i>Good condition, galvanized coating mostly intact. Girder ends are embedded in concrete abutment walls.</i>
RC Abutment Wall (2) Abutment Stem Length: Width: 6.7 m Height: 1.94 m	Defects 5.0% Moderate AAR Cracking, Minor Honeycomb, Minor Erosion Damage 0.0% Maintenance None Capital Rec. None <i>Minor honeycomb in the NW face, small pocket of erosion in the SE face. Exterior edges have AAR open cracking.</i>
RC Wing Walls (4) Wing Walls Length: 1.55 m Width: Height: 1.1 m	Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>Satisfactory condition.</i>
Rip Rap (1) Slope Protection Length: Width: Height:	Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>South end corners have slid down into channel.</i>
Water Channel (1) Channel	Defects 0.0% Damage 5.0% Minor Bank/Channel Scour Maintenance None Capital Rec. None <i>Accumulation of stones at the west upstream side of bridge. Minor scour under the bridge. Water moving west to east.</i>
Embankment (4) Embankment	Defects 5.0% Minor Erosion Damage 0.0% Maintenance None Capital Rec. None <i>Embankments at the corners of the bridge are slipping down into channel.</i>



Capital Needs Cost Estimate Break-Down

Item	Req'd	Units	Quantity	Unit Price \$	Estimated Cost
<i>Misc Concrete Repairs</i>	x	m ²	0.0	\$800	\$0
<i>Deck Concrete Overlay</i>	x	m ²	28.7	\$400	\$0
<i>Deck Replacement</i>	✓	m ²	28.7	\$2,500	\$71,680
<i>Barrier Wall Replacement</i>	✓	m	29.6	\$3,000	\$105,600
<i>Expansion Joint</i>	x	m	10.2	\$5,500	\$0
<i>Waterproof & Pave</i>	x	m ²	28.7	\$220	\$0
<i>Bearing Replacement</i>	x	Count	14.0	\$5,000	\$0
<i>Approach Guide Rail</i>	x	m	80.0	\$250	\$0

Other Work

\$0

Structural Items Subtotal	\$177,000
Mobilization General Sitework	\$18,000
Estimated Traffic Management & Civil Items	\$5,000
Contract Admin & Contingencies 20%	\$40,000
Total Rehabilitation Cost Estimate	<i>\$240,000</i>

Recommended Capital Work Summary

Recommended Capital Year **2024**

Replace Deck, B/Wall

Inspection Comments

The timber deck is showing moderate wear in the wheel paths and the bridge barrier system is in need of replacement. Bridge is low priority but barrier system is due for replacement. Consider replacing entire structure with new culvert instead of deck replacement.



Image 883



East elevation

Image 877



South approach

Image 878



East guide rail with missing curb

Image 879



West guide rail and curb

Image 880



Wheel path wearing in deck

Image 881



Timber deck surface (typical)



Image 882



Curb disconnected in NW

Image 885



Erosion in SE embankment

Image 887



South abutment

Image 884



SE abutment AAR

Image 886



North abutment

Image 888



Soffit and girders



Image 889



Girder 3 bottom

Image 890



West elevation

Image 891



West channel

Image 892



East channel

Image 893



Guide rail damage SE





Bridge Inspection Report

Shaver Bridge

Road Name: *Shaver Road*
Site ID: *31-303*
Structure Type: *Truss-Half Through*
Owner: *Township South Stormont*
Built: *1950*
Length: *13.4 m*
Width: *5 m*
Spans: *1*
Spans Arrange: *12.2*
Feature Under: *Water*
Crossing: *Hoople Creek*
Location: *0.8km N of Colonial Rd, Lot 12 & 13, Concession 11*

Inspection Date: *July-30-21*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Kyle Davis, Eng Student*

Comments:

Construction year was estimated at 1950. However abutments are thought to be 1920's construction. This bridge is unsafe due to the loss of support under the south bearings. Bridge bearing in SE corner is of major concern, loss of concrete in SE corner has left bearing unstable, SW similar but not quite as bad. Condition of this bridge was brought to owners attention 2019, immediate repairs are needed. Load limit signs missing at 2021 site visit.

Recommended Investigations:

No Special Investigations Recommended

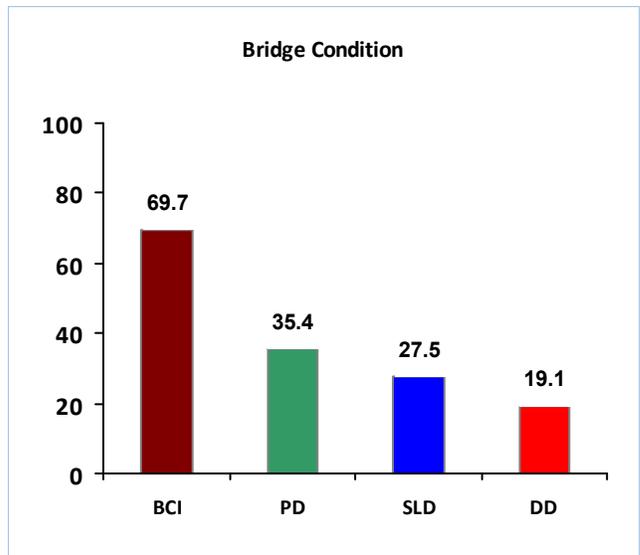
Recommended Capital Works:

Abut Repairs

Estimated Replacement Value: *\$968,000*
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: *14 Years*
Rehabilitation Year and Estimated Cost: *2022 \$24,000*



AADT: *200* **Latitude:** *45.01440800*
Lanes: *1* **Longitude:** *-74.95646600*
Skew: *0 °* **Orientation:** *N-S*
Speed: *80 km/h* **Road Width:** *4.7 m*
Trucks **Load Posting:** *10 tonne*



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

Unprotected BSRC Deck (1)	Defects 0.0%	
Deck Surface	Damage 0.0%	
Length: 13.35 m	Maintenance None	
Width: 5.1 m	Capital Rec. None	
Height: 0.18 m	<i>Good condition. Some granular materials from approaches have migrated onto deck.</i>	
Soffit (1)	Defects 0.5%	Minor Leaching/Seepage
Deck Soffit	Damage 0.0%	
Length: 13.35 m	Maintenance None	
Width: 5.04 m	Capital Rec. None	
Height: 0.175 m	<i>Satisfactory condition.</i>	
Strip Seal (2)	Defects 0.0%	
Expansion Joints	Damage 10.0%	Moderate Torn/Perforated Seal
Length: 5 m	Maintenance None	
Width:	Capital Rec. None	
Height:	<i>Joints are over compressed, seals are damaged.</i>	
Conc Curb (2)	Defects 0.2%	Minor Leaching Cracks
Curbs	Damage 0.0%	
Length: 13.35 m	Maintenance None	
Width: 0.15 m	Capital Rec. None	
Height: 0.15 m	<i>Good condition. Some minor leaching cracks.</i>	
Steel Beam on Steel Post (2)	Defects 0.0%	
Guide Rail	Damage 0.0%	
Length: 31 m	Maintenance None	
Width:	Capital Rec. None	
Height: 0.72 m	<i>Guide rail is overgrown with vegetation. Guide rail on bridge is attached to new verticals, supports are attached to the exterior deck curb fascia & floor beams.</i>	
Top Chord (2)	Defects 0.0%	
Top Chord	Damage 0.0%	
Length: 9.2 m	Maintenance None	
Width: 0.08 m	Capital Rec. None	
Height: 0.08 m	<i>Remains in satisfactory condition.</i>	



Component Inspection Information

Bottom Chord (2)	Defects 0.0%
Bottom Chord	Damage 2.0% Moderate Deformation
Length: 13.3 m	Maintenance None
Width: 0.08 m	Capital Rec. None
Height: 0.08 m	<i>Damaged in several locations. Built up angle sections. No noticed change since 2019.</i>
Diagonal/Post/Hangar (12)	Defects 0.0%
Diagonals/Hangars	Damage 0.0%
Length: 3.1 m	Maintenance None
Width: 0.07 m	Capital Rec. None
Height: 0.07 m	<i>Remain in satisfactory condition.</i>
Stringers (36)	Defects 0.0%
Steel Stringer	Damage 0.0%
Length: 6.7 m	Maintenance None
Width: 0.04 m	Capital Rec. None
Height: 0.25 m	<i>Remain in satisfactory condition.</i>
Bailey Bottom Bracing (6)	Defects 0.0%
Bracing	Damage 2.0% Moderate Deformation
Length: 6.7 m	Maintenance None
Width: 0.06 m	Capital Rec. None
Height: 0.08 m	<i>Several bent members.</i>
Steel Floor Beam (6)	Defects 0.0%
Connections	Damage 0.0%
Length:	Maintenance None
Width:	Capital Rec. None
Height:	<i>Satisfactory condition. Limited view of several connections due to high water at bridge.</i>
Steel Floor Beam (2)	Defects 0.0%
Floor Beams	Damage 0.0%
Length: 5.23 m	Maintenance None
Width: 0.082 m	Capital Rec. None
Height: 0.53 m	<i>Remain in satisfactory condition. Limited view due to high water.</i>



Component Inspection Information

<p>RC Abutment Wall (2) Abutment Stem Length: Width: 5.04 m Height: 1.2 m</p>	<p>Defects 50.0% Major Scaling Damage 40.0% Critical Disintegration, Major Disintegration Maintenance Re & Re Concrete Capital Rec. None <i>South abutment has major disintegration, north abutment minor disintegration. Loss of support at SE corner under bearing is very concerning.</i></p>	
<p>RC Ballast Wall (2) Ballast Wall Length: Width: 5.04 m Height: 0.67 m</p>	<p>Defects 0.0% Damage 5.0% Moderate Disintegration Maintenance None Capital Rec. None <i>Disintegration noted at south end.</i></p>	
<p>RC Wing Walls (4) Wing Walls Length: 2.3 m Width: 0.3 m Height: 0.43 m</p>	<p>Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>Satisfactory condition.</i></p>	
<p>Steel Sliding Plate (4) Abutment Bearings Length: Width: Height:</p>	<p>Defects 0.0% Damage 50.0% Critical Section Loss Maintenance Remove debris Capital Rec. None <i>SE bearing has lost approximately 50% of bearing due to disintegration of the old south abutment. Soil & vegetation cover all bearings.</i></p>	 Perf Def: Uneven Bearing
<p>Water Channel (1) Channel</p>	<p>Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>Open channel, debris on floor members indicate water levels can be high at this location. Channel clear in 2021.</i></p>	Perf Def: Lacking Freeboard
<p>Embankment (2) Embankment</p>	<p>Defects 0.0% Damage 0.0% Maintenance Remove Brush/Trees Capital Rec. None <i>Thick vegetation at bridge wing walls.</i></p>	



Component Inspection Information

Load Posting (4)

Defects **0.0%**

Signs

Damage **100.0%** **Critical Missing**



Length:

Maintenance **Replace Sign**

Width:

Capital Rec. **None**

Perf Def: Missing

Height:

Signs missing in 2021. Bridge was posted with 10 tonne limit. Signs located at end of south guide rail. Road is dead end so no signs on north side.

Delineator (4)

Defects **70.0%** **Moderate Obstructed**

Signs

Damage **0.0%**

Length:

Maintenance **None**

Width:

Capital Rec. **None**

Perf Def: Obscured

Height:

Four delineators at ends of guide rail. Signs at north end are engulfed with vegetation.



Capital Needs Cost Estimate Break-Down

Item	Req'd	Units	Quantity	Unit Price \$	Estimated Cost
<i>Misc Concrete Repairs</i>	X	m ²	0.0	\$800	\$0
<i>Deck Concrete Overlay</i>	X	m ²	67.0	\$400	\$0
<i>Deck Replacement</i>	X	m ²	67.0	\$2,500	\$0
<i>Barrier Wall Replacement</i>	X	m	37.4	\$3,000	\$0
<i>Expansion Joint</i>	X	m	10.0	\$5,500	\$0
<i>Waterproof & Pave</i>	X	m ²	67.0	\$220	\$0
<i>Bearing Replacement</i>	X	Count	0.0	\$5,000	\$0
<i>Approach Guide Rail</i>	X	m	80.0	\$250	\$0

Other Work

Abut Repairs

\$10,000

Structural Items Subtotal \$10,000

Mobilization General Sitework \$10,000

Estimated Traffic Management & Civil Items \$0

Contract Admin & Contingencies 20% \$4,000

Total Rehabilitation Cost Estimate \$24,000

Recommended Capital Work Summary

Recommended Capital Year

2022

Abut Repairs

Inspection Comments

Construction year was estimated at 1950. However abutments are thought to be 1920's construction. This bridge is unsafe due to the loss of support under the south bearings. Bridge bearing in SE corner is of major concern, loss of concrete in SE corner has left bearing unstable, SW similar but not quite as bad. Condition of this bridge was brought to owners attention 2019, immediate repairs are needed. Load limit signs missing at 2021 site visit.



Image 370



East elevation

Image 351



South approach

Image 352



East channel

Image 353



West channel

Image 354



Deck surface

Image 355



East truss



Image 356



West truss

Image 357



South expansion joint

Image 358



North expansion joint

Image 360



SW bearing disintegrating abutment

Image 361



SW wing wall

Image 362



West elevation



Image 363



SE bearing abutment disintegration

Image 364



SE bearing

Image 365



South abutment

Image 366



North abutment

Image 367



Floor system typical

Image 368



Stringers south end



Image 369



Bottom chord deformed east side

Image 371



Potholes gravel approach north

Image 372



NW bearing missing bolt

Image 373



Stringers at north end

Image 374



Bent lateral brace north abutment

Image 375



Deformed bottom chord in the SW



Bridge Inspection Report

Johnston Bridge

Road Name: *Morgan Road*
Site ID: *31-A21*
Structure Type: *Precast 3 Sided RF*
Owner: *Township South Stormont*
Built: *2007*
Length: *11.6 m*
Width: *8.5 m*
Spans: *1*
Spans Arrange: *10.7*
Feature Under: *Water*
Crossing: *Hoople Creek*
Location: *2 km North of Dafoe Road*

Inspection Date: *July-09-21*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Kyle Davis, Eng Student*

Comments:

Nice small bridge in very good condition. Deck is polished and has wide longitudinal cracks, no delaminations at this time. Topping slab needs to be made stiffer to control reflection cracking from girder joints. Consider overlay, waterproofing and paving subject to capacity of bridge.

Recommended Investigations:

Structural Evaluation

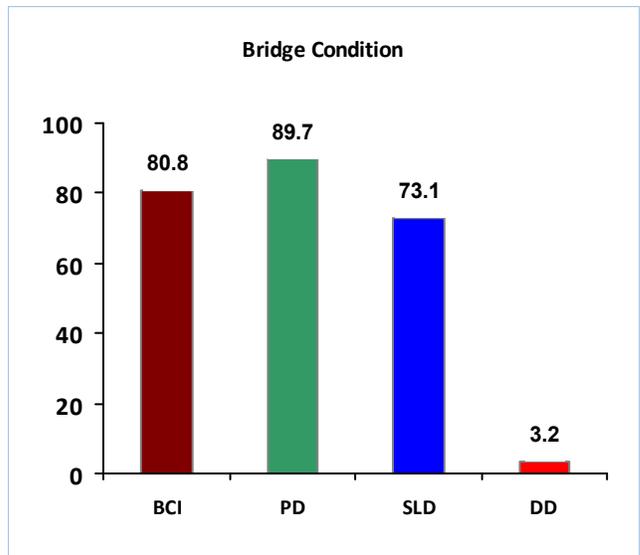
Recommended Capital Works:

O'Lay, WP&P

Estimated Replacement Value: *\$550,000*
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: *86 Years*
Rehabilitation Year and Estimated Cost: *2026 \$121,000*



AADT: *N/A* **Latitude:** *45.01670300*
Lanes: *2* **Longitude:** *-75.01049200*
Skew: *0 °* **Orientation:** *N-S*
Speed: *50 km/h* **Road Width:** *6 m*
Trucks **Load Posting:** *No Posting*



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

RC Topping Slab (1) Deck Surface Length: 11.58 m Width: 8.5 m Height:	Defects 50.0% Moderate Polished Damage 1.0% Moderate Cracking Maintenance None Capital Rec. None <i>Several full length longitudinal reflection cracks noted in topping slab. Deck surface polished, tining never present. No delaminations detected.</i>
Soffit (1) Deck Soffit Length: 11.58 m Width: 8.5 m Height:	Defects 2.0% Minor Leaching/Seepage, Moderate Shrinkage Cracking Damage 0.0% Maintenance None Capital Rec. None <i>Overall good condition. East & west precast sections are leaking at precast joints. Wet areas on fascia. Transverse cracks noted in several precast sections.</i>
Asphalt Wear Surf (1) Appr Wear Surface Length: 6 m Width: 8.5 m Height:	Defects 0.0% Damage 1.0% Minor Potholing Maintenance None Capital Rec. None <i>Minor potholes in south approach. Same in 2021.</i>
RC Parapet (2) Barrier Length: 25.71 m Width: 0.4 m Height: 0.9 m	Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>New parapet has the old railing system attached to exterior, assumed for aesthetics. Condition of new parapet is good.</i>
Steel Beam on Steel Post (4) Guide Rail Length: 17.75 m Width: Height:	Defects 0.0% Damage 0.2% Minor Impact Maintenance None Capital Rec. None <i>Guide rail connection at NW corner has minor impact damage at the connection to bridge. Eccentric loader end treatment at all ends of guide rail.</i>
RC Abutment Wall (2) Abutment Stem Length: Width: 9.31 m Height: 2.8 m	Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None <i>Remain in good condition.</i>



Component Inspection Information

RC Wing Walls (4) Defects **0.0%**
Wing Walls Damage **0.0%**
Length: **7 m** Maintenance **None**
Width: Capital Rec. **None**
Height: **1.67 m** *Remain in good condition.*

Spread Footing (2) Defects **0.0%**
Abutment Foundation Damage **0.0%**
Length: **1 m** Maintenance **None**
Width: **9.4 m** Capital Rec. **None**
Height: **1.2 m** *Remain in good condition. Some rock protection against footings.*

Water Channel (1) Defects **0.0%**
Channel Damage **0.0%**
Maintenance **None**
Capital Rec. **None**
No concerns. Nicely centred under bridge.

Embankment (4) Defects **0.0%**
Embankment Damage **0.0%**
Maintenance **None**
Capital Rec. **None** Perf Def: **Toxic Weeds**
Good condition. Wild parsnip noted.



Capital Needs Cost Estimate Break-Down

Item	Req'd	Units	Quantity	Unit Price \$	Estimated Cost
<i>Misc Concrete Repairs</i>	x	m ²	0.0	\$800	\$0
<i>Deck Concrete Overlay</i>	✓	m ²	98.6	\$400	\$39,440
<i>Deck Replacement</i>	x	m ²	98.6	\$2,500	\$0
<i>Barrier Wall Replacement</i>	x	m	35.6	\$3,000	\$0
<i>Expansion Joint</i>	x	m	17.0	\$5,500	\$0
<i>Waterproof & Pave</i>	✓	m ²	98.6	\$220	\$21,692
<i>Bearing Replacement</i>	x	Count	0.0	\$5,000	\$0
<i>Approach Guide Rail</i>	x	m	80.0	\$250	\$0

Other Work

\$0

Structural Items Subtotal	\$61,000
Mobilization General Sitework	\$10,000
Estimated Traffic Management & Civil Items	\$30,000
Contract Admin & Contingencies 20%	\$20,000
Total Rehabilitation Cost Estimate	<i>\$121,000</i>

Recommended Capital Work Summary

Recommended Capital Year

2026

O'Lay, WP&P

Inspection Comments

Nice small bridge in very good condition. Deck is polished and has wide longitudinal cracks, no delaminations at this time. Topping slab needs to be made stiffer to control reflection cracking from girder joints. Consider overlay, waterproofing and paving subject to capacity of bridge.



Image 354



West elevation

Image 347



North approach

Image 348



West parapet and railing

Image 349



East parapet and railing

Image 350



Plaque NW

Image 351



West channel



Image 352



East channel

Image 353



Concrete deck surface

Image 355



North abutment

Image 356



Soffit

Image 357



West joint leaking

Image 358



South abutment



Culvert Inspection Report

North Lunenburg Road Culvert

Road Name: North Lunenburg Road, West
Site ID: C31-167
Structure Type: Concrete Culvert
Owner: Township South Stormont
Built: 2020
Length: 20 m
Width: 3.6 m
Spans: 1
Spans Arrange: 3.7
Feature Through: Water
Crossing: Raisin River
Location: 500m East of County Road 14

Inspection Date: July-09-21
Inspector: Steve Reid, C.E.T.
Assistant: Kyle Davis, Eng Student

Comments:

Culvert is in very good condition, several minor blemishes due to installation of precast units.

Recommended Investigations:

No Special Investigations Recommended

Recommended Capital Works:

No Capital Works Recommendations

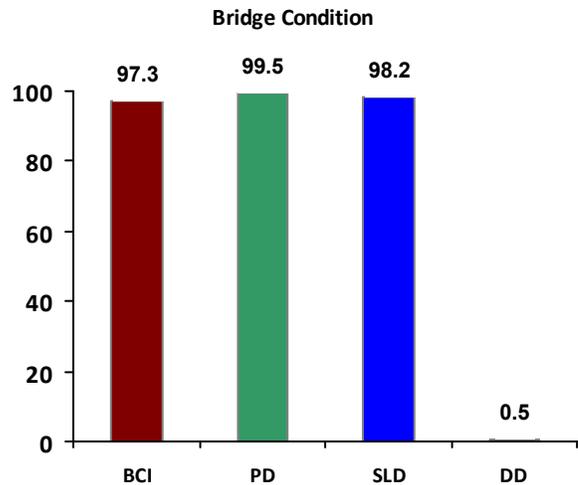
Estimated Replacement Value: \$447,000

Estimated replacement value is based on replacement in kind

Estimated Remaining Service Life: 89 Years



AADT: N/A **Latitude:** 45.05002900
Lanes: 2 **Longitude:** -75.02128600
Skew: 0 ° **Orientation:** E-W
Speed: 80 km/h **Road Width:** 6 m
Trucks: **Load Posting:** No Posting
Fill: 0.5 m **H2O Depth:** 0.15 m



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

Precast RF Box Culvert (1)	Defects 0.0%	Corrosion
Conduit	Damage 0.1%	Minor Cracking, Minor Spalling
Length: 20 m	Maintenance None	
Width: 3.6 m	Capital Rec. None	
Height: 2.4 m	<i>Condition good. One small crack in upper haunch NW end see pic. Several small spalls in soffit. All damage caused by installation fit-up.</i>	
Asphalt Wear Surf (1)	Defects 0.0%	
Wear Surface	Damage 0.0%	
Length: 20 m	Maintenance None	
Width: 6 m	Capital Rec. None	
Height:	<i>New 2020.</i>	
Steel Beam on Steel Post (2)	Defects 0.0%	
Guide Rail	Damage 0.0%	
Length: 50 m	Maintenance None	
Width:	Capital Rec. None	
Height: 0.7 m	<i>Installed in 2020. Extruder end treatments in the SW and NE.</i>	
Precast Concrete Block (4)	Defects 0.0%	
Inlet/Outlet Walls	Damage 0.0%	
Length: 2.7 m	Maintenance None	
Width: 0.9 m	Capital Rec. None	
Height: 1.5 m	<i>Concrete blocks at culvert corners, all good.</i>	
Water Channel (1)	Defects 0.0%	
Conduit Channel	Damage 0.0%	
	Maintenance None	
	Capital Rec. None	
	<i>Moving well through culvert.</i>	
Embankment (4)	Defects 0.0%	
Embankment	Damage 0.0%	
	Maintenance None	
	Capital Rec. None	Perf Def: Toxic Weeds
	<i>Rip rap on the sides of culvert. Some wild parsnip noted.</i>	



Component Inspection Information

Delineator (2)	Defects 0.0%
Signs	Damage 0.0%
Length:	Maintenance None
Width:	Capital Rec. None
Height:	<i>Signs in the NE and SW.</i>



Image 363



North elevation

Image 359



West approach

Image 360



South channel

Image 361



Asphalt overtop

Image 362



North channel upstream

Image 364



Crack in west wall



Image 365



West wall

Image 366



Soffit spall

Image 367



East wall

Image 368



Soffit

Image 369



Through from south

Image 370



Leaking at joints





Culvert Inspection Report

North Lunenburg Road Culvert

Road Name: North Lunenburg Road, West
Site ID: C31-169
Structure Type: Soil-Steel Structure
Owner: Township South Stormont
Built: 1974
Length: 21.9 m
Width: 5.8 m
Spans: 1
Spans Arrange: 1 @ 5.8
Feature Through: Water
Crossing: Raisin River
Location: 1.2km West of County Road 12

Inspection Date: July-27-21
Inspector: Steve Reid, C.E.T.
Assistant: Kyle Davis, Eng Student

Comments:

This culvert is in satisfactory condition with possibly 4 to 8 years of remaining service life. Culvert is over-sized. Little change in condition recorded in 2021.

Recommended Investigations:

No Special Investigations Recommended

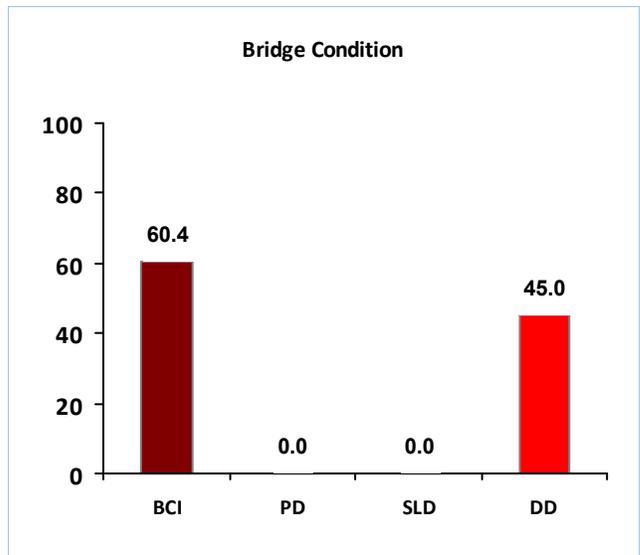
Recommended Capital Works:

New Conc Culvert

Estimated Replacement Value: \$536,000
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: 4 Years
Year of Replacement and Cost: 2025 \$657,000



AADT: N/A **Latitude:** 45.06463600
Lanes: 2 **Longitude:** -74.98129800
Skew: 0 ° **Orientation:** N-S
Speed: 80 km/h **Road Width:** 6.7 m
Trucks: **Load Posting:** No Posting
Fill: 0.3 m **H2O Depth:** 0.6 m



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

<p>Circular CS Pipe (1) Conduit Length: 21.9 m Width: 5.8 m Height: 3.7 m</p>	<p>Defects 40.0% Minor Corrosion, Moderate Corrosion Damage 5.0% Minor Section Loss, Minor Deformation/Bulging Maintenance None Capital Rec. None</p> <p><i>Corroded with full loss of galvanizing in bottom 0.8m of culvert. Upper part of culvert is in generally good condition, with good shape. Settlement of about 0.3m from middle to ends. Invert slightly low compared to downstream channel.</i></p>
<p>Surface Treatment (1) Wear Surface Length: 4 m Width: 6.7 m Height:</p>	<p>Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None</p> <p><i>Satisfactory condition. Shallow cover over culvert.</i></p>
<p>Water Channel (1) Conduit Channel</p>	<p>Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None</p> <p><i>Overgrown both upstream & downstream, stagnant inside barrel.</i></p>
<p>Embankment (1) Embankment</p>	<p>Defects 0.0% Damage 0.0% Maintenance Remove Brush/Trees Capital Rec. None</p> <p style="text-align: right;">Perf Def: Toxic Weeds</p> <p><i>Significant tree growth. Stable slopes. Wild parsnip. No delineators or guide rail at this site.</i></p>



Capital Needs Cost Estimate Break-Down

<i>Cost of Asphalt Removal:</i>	\$6,800	<i>Cost of Waterproofing:</i>	\$31,800
<i>Cost of Dewatering:</i>	\$96,000	<i>Cost of Road Replace:</i>	\$46,500
<i>Cost Erosion Control:</i>	\$6,000	<i>Cost of SBGR:</i>	\$43,500
<i>Cost of Excavation:</i>	\$38,000	<i>Cost of Seeding:</i>	\$1,300
<i>Cost of Existing Structure Removal:</i>	\$6,000		
<i>Installation Cost for Similar Size Concrete:</i>	\$202,000		
<i>Cost of Retaining Walls etc:</i>	\$0		

New Concrete Culvert



Structural Items Subtotal	\$477,000
Mobilization General Sitework	\$50,000
Estimated Traffic Management & Civil Items	\$20,000
Contract Admin & Contingencies 20%	\$110,000
Total Rehabilitation Cost Estimate	<i>\$657,000</i>

Recommended Capital Work Summary

Recommended Capital Year **2025**

New Conc Culvert

Inspection Comments

This culvert is in satisfactory condition with possibly 4 to 8 years of remaining service life. Culvert is over-sized. Little change in condition recorded in 2021.



Image 99



West elevation

Image 94



North approach

Image 95



West channel

Image 96



Wearing surface overtop

Image 97



East channel

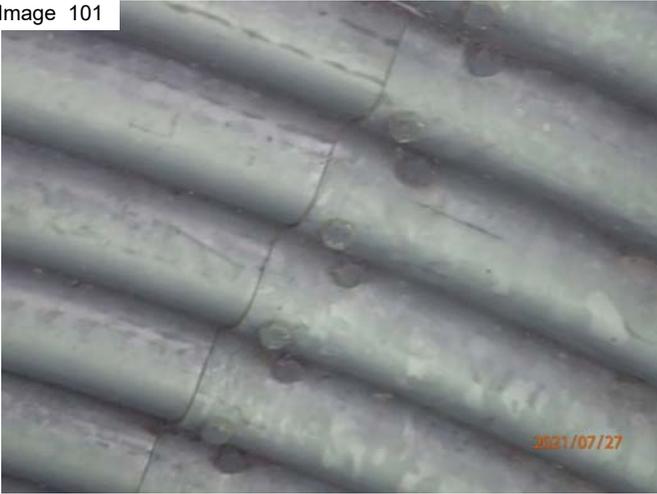
Image 100



Through barrel from west



Image 101



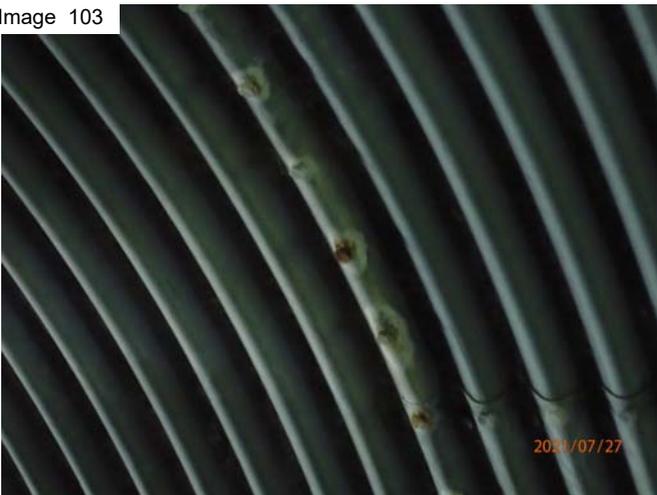
Incorrect plate lapping

Image 102



Waterline condition

Image 103



Leaching and rust at bolts

Image 104



Corrosion near waterline





Culvert Inspection Report

Goldfield Road Culvert

Road Name: Goldfield Road
Site ID: C31-A01
Structure Type: Soil-Steel Structure
Owner: Township South Stormont
Built: 2018
Length: 22.1 m
Width: 3.8 m
Spans: 1
Spans Arrange: 3.8
Feature Through: Water
Crossing: Municipal Drain
Location: 250m North of Hunter Road

Inspection Date: July-09-21
Inspector: Steve Reid, C.E.T.
Assistant: Kyle Davis, Eng Student

Comments:
New polymer coated pipe arch culvert, condition good, 2021. No delineators or guide rail were installed at this site. Delineators are recommended,.

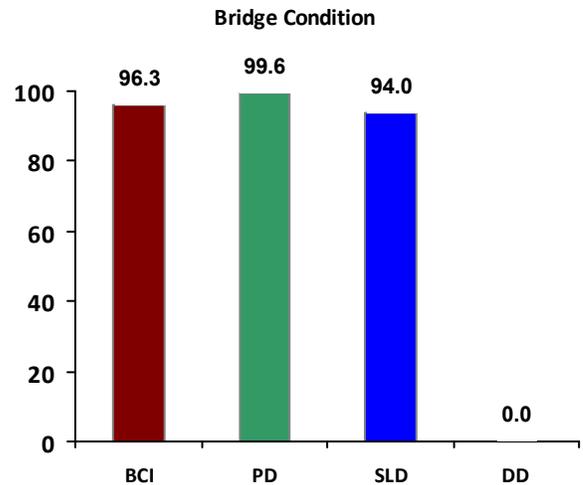
Recommended Investigations:
No Special Investigations Recommended

Recommended Capital Works:
No Capital Works Recommendations

Estimated Replacement Value: **\$355,000**
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: **37 Years**



AADT: N/A **Latitude:** 45.09991400
Lanes: 2 **Longitude:** -75.11402400
Skew: 15 ° **Orientation:** N-S
Speed: 80 km/h **Road Width:** 7 m
Trucks: **Load Posting:** No Posting
Fill: 1.2 m **H2O Depth:** 0.3 m



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

CS Plate Pipe Arch (1)	Defects 0.0%
Conduit	Damage 0.0%
Length: 22.1 m	Maintenance None
Width: 3.8 m	Capital Rec. None
Height: 2 m	<i>Condition is good. Culvert has polymer coating. Several areas at the east exterior had touch up repairs to coating. Bottom of barrel has approximately 500mm of stone granular material.</i>
Gravel Surface (1)	Defects 0.0%
Wear Surface	Damage 0.0%
Length: 3.7 m	Maintenance None
Width: 6.2 m	Capital Rec. None
Height:	<i>Good condition.</i>
Small Culv Ret Wall (4)	Defects 0.0%
Inlet/Outlet Walls	Damage 0.0%
Length: 1.5 m	Maintenance None
Width:	Capital Rec. None
Height: 0.8 m	<i>Small sheet pile type retaining walls at culvert ends.</i>
Water Channel (1)	Defects 0.0%
Conduit Channel	Damage 0.0%
	Maintenance None
	Capital Rec. None
	<i>No flow at time of inspection 2019 Or 2021. Up to 300mm standing water inside. River stones installed through barrel.</i>
Embankment (4)	Defects 0.0%
Embankment	Damage 0.0%
	Maintenance None
	Capital Rec. None
	Perf Def: Toxic Weeds
	<i>Rip rap stones on embankments. Ditch culvert in the NW quadrant. Wild parsnip noted in 2021. No delineators of guide rail at this culvert, delineators should be added.</i>



Image 331



East elevation

Image 326



North approach

Image 327



East channel

Image 328



Wearing surface overtop

Image 329



West channel

Image 332



Through barrel from east





Culvert Inspection Report

Hunters Road Culvert

Road Name: *Hunters Road*
Site ID: *C31-A02*
Structure Type: *Soil-Steel Structure*
Owner: *Township South Stormont*
Built: *1976*
Length: *21.8 m*
Width: *3.8 m*
Spans: *1*
Spans Arrange: *3.8*
Feature Through: *Water*
Crossing: *Municipal Drain*
Location: *60m West of Goldfield Rd South*

Inspection Date: *July-09-21*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Kyle Davis, Eng Student*

Comments:

This culvert has an obvious crimp line along lower barrel walls, walls are easily penetrated with pick hammer in this area. Programming for replacement of this culvert should be started. Plan on replacing this culvert within two years.

Recommended Investigations:

No Special Investigations Recommended

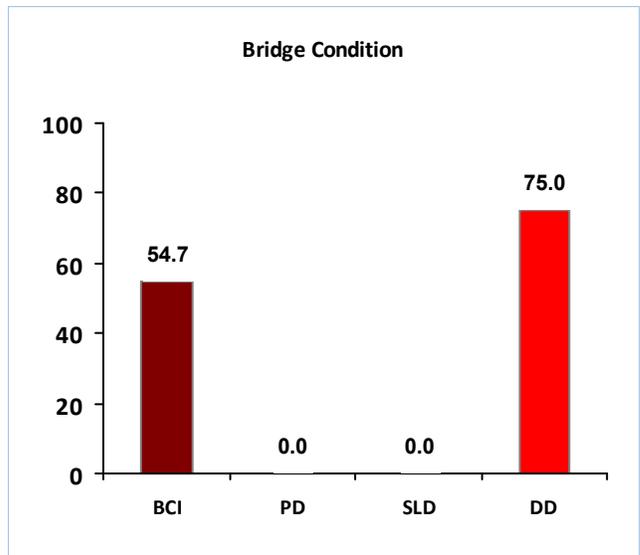
Recommended Capital Works:

New Conc Culvert

Estimated Replacement Value: *\$384,000*
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: *2 Years*
Year of Replacement and Cost: *2023 \$462,000*



AADT: *N/A* **Latitude:** *45.09765100*
Lanes: *2* **Longitude:** *-75.11300400*
Skew: *0 °* **Orientation:** *E-W*
Speed: *80 km/h* **Road Width:** *6.2 m*
Trucks **Load Posting:** *No Posting*
Fill: *0.8 m* **H2O Depth:** *0.3 m*



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

CS Plate Pipe Arch (1)	Defects 50.0% Major Corrosion, Moderate Corrosion, Moderate Tarnishing
Conduit	Damage 10.0% Major Crimping, Moderate Section Loss
Length: 21.8 m	Maintenance None
Width: 3.8 m	Capital Rec. Replace in 2 years Perf Def: Load Carrying Capacity
Height: 2.29 m	<i>Date of construction is most likely incorrect. This culvert has a crimping line in both walls and cusping at obvert seam. Perforations are present or the walls can easily be penetrated with pick hammer along this crimp line. Similar observation 2021, walls easily penetrated with pick at the waterline.</i>
Asphalt Wear Surf (1)	Defects 0.0%
Wear Surface	Damage 2.0% Minor Cracking, Minor Uneven Surface
Length: 3.8 m	Maintenance None
Width: 6.2 m	Capital Rec. None
Height:	<i>Some edge cracking along pavement shoulders. Minor settlement on south side.</i>
Water Channel (1)	Defects 0.0%
Conduit Channel	Damage 0.0%
	Maintenance None
	Capital Rec. None
	<i>Upstream & downstream overgrown with vegetation very little flow in channel at time of inspection. Barrel filled with up to 300mm silty material.</i>
Embankment (4)	Defects 0.0%
Embankment	Damage 0.0%
	Maintenance None
	Capital Rec. None Perf Def: Toxic Weeds
	<i>Wild parsnip present. Thick vegetation on embankments. No guide rail or delineators at this site.</i>



Capital Needs Cost Estimate Break-Down

<i>Cost of Asphalt Removal:</i>	\$5,600	<i>Cost of Waterproofing:</i>	\$20,700
<i>Cost of Dewatering:</i>	\$35,000	<i>Cost of Road Replace:</i>	\$38,500
<i>Cost Erosion Control:</i>	\$6,000	<i>Cost of SBGR:</i>	\$43,500
<i>Cost of Excavation:</i>	\$32,000	<i>Cost of Seeding:</i>	\$800
<i>Cost of Existing Structure Removal:</i>	\$4,000		
<i>Installation Cost for Similar Size Concrete:</i>	\$129,000		
<i>Cost of Retaining Walls etc:</i>	\$0		

New Concrete Culvert



Structural Items Subtotal	\$315,000
Mobilization General Sitework	\$50,000
Estimated Traffic Management & Civil Items	\$20,000
Contract Admin & Contingencies 20%	\$77,000
Total Rehabilitation Cost Estimate	<i>\$462,000</i>

Recommended Capital Work Summary

Recommended Capital Year **2023**

New Conc Culvert

Inspection Comments

This culvert has an obvious crimp line along lower barrel walls, walls are easily penetrated with pick hammer in this area. Programming for replacement of this culvert should be started. Plan on replacing this culvert within two years.



Image 346



South elevation

Image 333



West approach

Image 334



South channel

Image 335



Asphalt overtop

Image 336



North channel

Image 337



Waterline condition at east

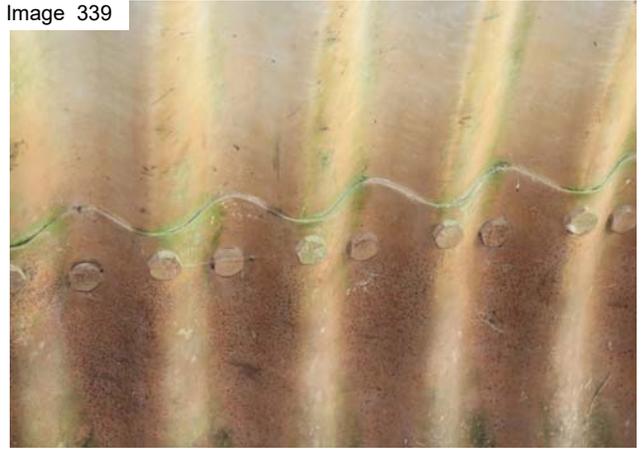


Image 338



Vegetation at south end

Image 339



Incorrect plate lap

Image 340



Perforation at waterline west side

Image 343



Perforation at waterline east side

Image 344



Through from south

Image 345



Sagging in invert





Culvert Inspection Report

Otto Road Culvert

Road Name: *Otto Road*
Site ID: *C31-A03*
Structure Type: *Soil-Steel Structure*
Owner: *Township South Stormont*
Built: *2013*
Length: *17.2 m*
Width: *3.6 m*
Spans: *1*
Spans Arrange: *3.6*
Feature Through: *Water*
Crossing: *Municipal Drain*
Location: *4 km West of County Road 14*

Inspection Date: *July-09-21*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Kyle Davis, Eng Student*

Comments:

Steel box culvert is performing well. Clearing thick vegetation at culvert ends only recommendation at this time.

Recommended Investigations:

No Special Investigations Recommended

Recommended Capital Works:

No Capital Works Recommendations

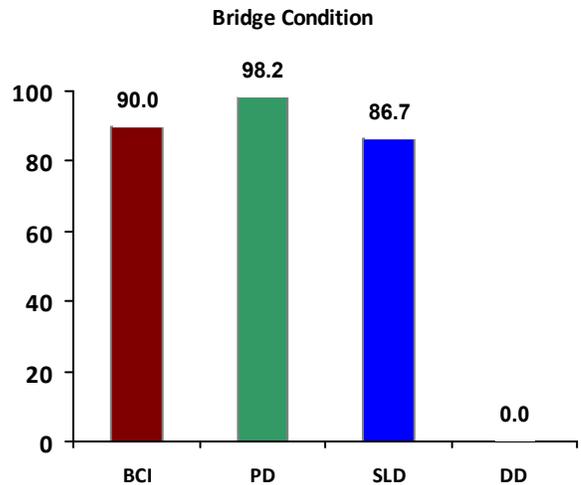
Estimated Replacement Value: *\$694,000*

Estimated replacement value is based on replacement in kind

Estimated Remaining Service Life: *32 Years*



AADT: *N/A* **Latitude:** *45.07514200*
Lanes: *2* **Longitude:** *-75.07406800*
Skew: *0 °* **Orientation:** *E-W*
Speed: *80 km/h* **Road Width:** *6.5 m*
Trucks **Load Posting:** *No Posting*
Fill: *0.8 m* **H2O Depth:** *0.3 m*



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

CS Plate Arch (1)	Defects 0.0%
Conduit	Damage 0.0%
Length: 3.55 m	Maintenance None
Width: 17.2 m	Capital Rec. None
Height: 1.42 m	<i>Steel box culvert polymer coating on concrete footings. Culvert is performing well. Several bolts missing and loose. Lower portion of walls stained.</i>
Asphalt Wear Surf (1)	Defects 0.0%
Wear Surface	Damage 0.0%
Length: 3.55 m	Maintenance None
Width: 6.5 m	Capital Rec. None
Height:	<i>Remains in good condition.</i>
Steel Beam on Steel Post (4)	Defects 0.0%
Guide Rail	Damage 0.0%
Length: 57.6 m	Maintenance None
Width:	Capital Rec. None
Height:	<i>Extruder end treatment at all four ends of guide rail. 82.7m (SW) + 46.7m (NW) + 75.9m (NE) +25.1m (SE)</i>
Thrie Beam G/R (2)	Defects 0.0%
Barrier	Damage 0.0%
Length: 14 m	Maintenance None
Width:	Capital Rec. None
Height:	<i>Good condition. Small section of thrie beam attached to timber posts locally over culvert.</i>
Spread Footing (12)	Defects 0.0%
Foundation	Damage 0.0%
Length: 17.2 m	Maintenance None
Width: 0.3 m	Capital Rec. None
Height: 1 m	<i>Dimensions assumed and require confirmation.</i>
Rip Rap (4)	Defects 0.0%
Channel Armour	Damage 0.0%
	Maintenance None
	Capital Rec. None
	<i>Rip rap placed at culvert ends. Rip rap has slid down into channel at corners, not affecting channel flow.</i>



Component Inspection Information

Water Channel (1)

Defects **0.0%**

Conduit Channel

Damage **0.0%**

Maintenance **None**

Capital Rec. **None**

Channel is overgrown. Stagnant water inside culvert. Water flows from north to south.

Embankment (2)

Defects **0.0%**

Embankment

Damage **0.0%**

Maintenance **Remove Brush/Trees**

Capital Rec. **None**

Wild parsnip flourishing.

Delineator (4)

Defects **0.0%**

Signs

Damage **0.0%**

Length:

Maintenance **None**

Width:

Capital Rec. **None**

Height:

Delineators located at ends of guide rail.



Image 392



North elevation

Image 382



East approach

Image 383



North guide rail (typical)

Image 384



South channel

Image 385



Asphalt overtop

Image 386



North channel upstream



Image 387



Through barrel from north

Image 388



Waterline condition at west

Image 389



Waterline condition at east

Image 390



Missing bolts in obvert

Image 391



Loose nut in obvert





Culvert Inspection Report

Beckstead Road Culvert

Road Name: Beckstead Road
Site ID: C31-A06
Structure Type: Soil-Steel Structure
Owner: Township South Stormont
Built: 1980
Length: 14.7 m
Width: 3.6 m
Spans: 1
Spans Arrange: 3.6
Feature Through: Water
Crossing: Municipal Drain
Location: 2 km East of County Road 11

Inspection Date: July-09-21
Inspector: Steve Reid, C.E.T.
Assistant: Kyle Davis, Eng Student

Comments:

Construction year was estimated at 1980. Current condition is satisfactory to poor. Lower half of barrel walls has moderate to severe section loss, culvert has approximately 5 years of remaining service life.

Recommended Investigations:

No Special Investigations Recommended

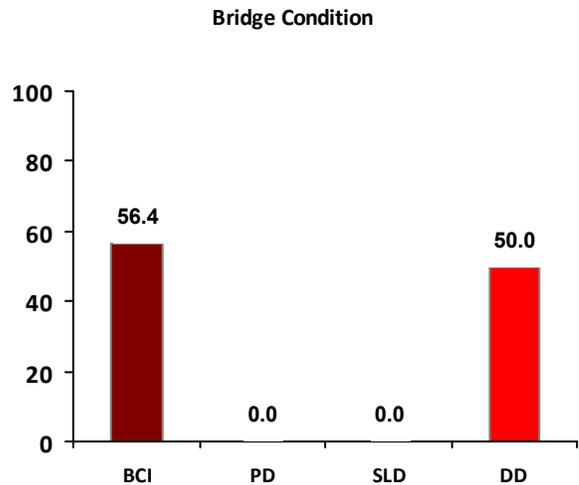
Recommended Capital Works:

New Conc Culvert

Estimated Replacement Value: \$298,000
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: 5 Years
Year of Replacement and Cost: 2026 \$350,000



AADT: N/A **Latitude:** 45.04875100
Lanes: 2 **Longitude:** -75.06475000
Skew: 20 ° **Orientation:** E-W
Speed: 80 km/h **Road Width:** 6 m
Trucks: **Load Posting:** No Posting
Fill: 0.4 m **H2O Depth:** 0.3 m



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

<p>CS Plate Pipe Arch (1) Conduit</p> <p>Length: 14.7 m Width: 3.6 m Height: 2.29 m</p>	<p>Defects 60.0% Minor Corrosion, Moderate Corrosion, Major Corrosion</p> <p>Damage 4.0% Minor Section Loss, Moderate Section Loss</p> <p>Maintenance None</p> <p>Capital Rec. None Perf Def: Insufficient Barrel Length</p> <p><i>Overall barrel condition is satisfactory to poor. Walls above bolt line have minor corrosion, below bolt line walls have moderate to major corrosion with some section loss. Length of culvert is inadequate for road platform, also cover over barrel is minimal. Approximately 500mm of silt has built up inside barrel.</i></p>
<p>Asphalt Wear Surf (1) Wear Surface</p> <p>Length: 3.6 m Width: 6 m Height:</p>	<p>Defects 0.0%</p> <p>Damage 0.0%</p> <p>Maintenance None</p> <p>Capital Rec. None</p> <p><i>Surface treatment over culvert, condition is good. Minor settlement around culvert ends.</i></p>
<p>Water Channel (1) Conduit Channel</p>	<p>Defects 0.0%</p> <p>Damage 0.0%</p> <p>Maintenance None</p> <p>Capital Rec. None</p> <p><i>Channel is overgrown with vegetation both upstream & downstream channels. Stagnant water inside barrel.</i></p>
<p>Embankment (4) Embankment</p>	<p>Defects 0.0%</p> <p>Damage 0.0%</p> <p>Maintenance None</p> <p>Capital Rec. None Perf Def: Toxic Weeds</p> <p><i>Steep embankments due to culvert being too short. Wild parsnip present. Thick vegetation growth at culvert ends.</i></p>
<p>Delineator (2) Signs</p> <p>Length: Width: Height:</p>	<p>Defects 0.0%</p> <p>Damage 0.0%</p> <p>Maintenance None</p> <p>Capital Rec. None</p> <p><i>Sign in the NE & SW. Signs are visible but slightly obscured from vegetation.</i></p>



Capital Needs Cost Estimate Break-Down

<i>Cost of Asphalt Removal:</i>	\$5,300	<i>Cost of Waterproofing:</i>	\$13,200
<i>Cost of Dewatering:</i>	\$33,000	<i>Cost of Road Replace:</i>	\$36,600
<i>Cost Erosion Control:</i>	\$6,000	<i>Cost of SBGR:</i>	\$43,500
<i>Cost of Excavation:</i>	\$21,000	<i>Cost of Seeding:</i>	\$700
<i>Cost of Existing Structure Removal:</i>	\$3,000		
<i>Installation Cost for Similar Size Concrete:</i>	\$84,000		
<i>Cost of Retaining Walls etc:</i>	\$0		

New Concrete Culvert



Structural Items Subtotal	\$246,000
Mobilization General Sitework	\$25,000
Estimated Traffic Management & Civil Items	\$20,000
Contract Admin & Contingencies 20%	\$59,000
Total Rehabilitation Cost Estimate	<i>\$350,000</i>

Recommended Capital Work Summary

Recommended Capital Year **2026**

New Conc Culvert

Inspection Comments

Construction year was estimated at 1980. Current condition is satisfactory to poor. Lower half of barrel walls has moderate to severe section loss, culvert has approximately 5 years of remaining service life.



Image 381



North elevation

Image 371



East approach

Image 372



North channel

Image 373



Asphalt overtop

Image 374



South channel

Image 376



Incorrect plate lap

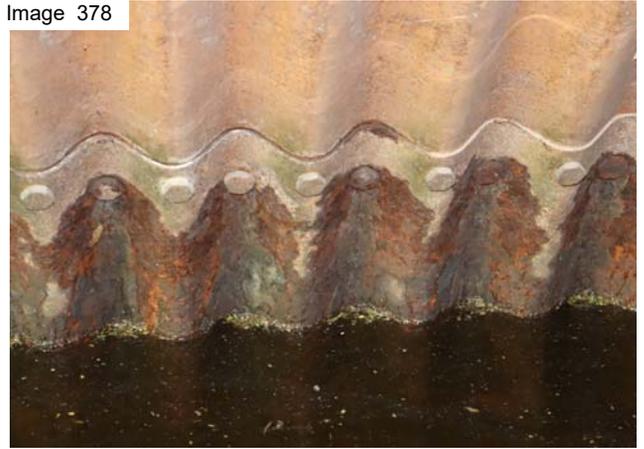


Image 377



Waterline corrosion at west

Image 378



Waterline corrosion at east, incorrect plate lap

Image 379



Leaching at seam

Image 380



Through barrel from north





Culvert Inspection Report

Anderson Road Culvert

Road Name: Anderson Road
Site ID: C31-A08
Structure Type: Concrete Culvert
Owner: Township South Stormont
Built: 1960
Length: 12.2 m
Width: 4.2 m
Spans: 1
Spans Arrange: 3.7
Feature Through: Water
Crossing:
Location: 2 km East of Aultsville Road

Inspection Date: July-30-21
Inspector: Steve Reid, C.E.T.
Assistant: Kyle Davis, Eng Student

Comments:

Construction year was estimated at 1960. This concrete culvert is in good condition. Delineators have been added to corners of this culvert since 2019. Culvert appears over-sized.

Recommended Investigations:

No Special Investigations Recommended

Recommended Capital Works:

No Capital Works Recommendations

Estimated Replacement Value: \$310,000

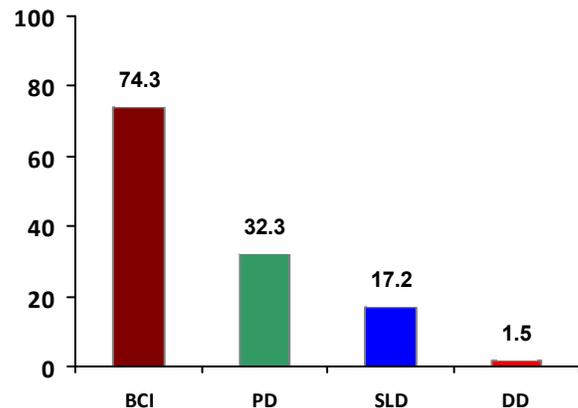
Estimated replacement value is based on replacement in kind

Estimated Remaining Service Life: 29 Years



AADT: N/A **Latitude:** 44.97936300
Lanes: 2 **Longitude:** -75.03533900
Skew: 5 ° **Orientation:** E-W
Speed: 80 km/h **Road Width:** 6.2 m
Trucks: **Load Posting:** No Posting
Fill: 0.5 m **H2O Depth:** 0.05 m

Bridge Condition



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

<p>CIP RF Open Ftg Culv (1)</p> <p>Conduit</p> <p>Length: 12.2 m</p> <p>Width: 4.2 m</p> <p>Height: 1.5 m</p>	<p>Defects 3.0% Minor Scaling, Minor Leaching Cracks</p> <p>Damage 0.0%</p> <p>Maintenance None</p> <p>Capital Rec. None</p> <p><i>Overall condition remains good. Approximately 500mm of cover over top of culvert. Minor scaling on walls. Minor scaling on soffit, some damp areas at soffit ends. Scour in the SW corner has undermined footing slightly.</i></p>
<p>Surface Treatment (1)</p> <p>Wear Surface</p> <p>Length: 4.2 m</p> <p>Width: 6.2 m</p> <p>Height:</p>	<p>Defects 0.0%</p> <p>Damage 0.0%</p> <p>Maintenance None</p> <p>Capital Rec. None</p> <p><i>Surface treatment, remains in satisfactory condition.</i></p>
<p>Water Channel (1)</p> <p>Conduit Channel</p>	<p>Defects 0.0%</p> <p>Damage 0.0%</p> <p>Maintenance None</p> <p>Capital Rec. None</p> <p><i>Channel dry at time of inspection, 2019. Some standing water inside, 2021. Overgrown upstream & downstream.</i></p>
<p>Embankment (4)</p> <p>Embankment</p>	<p>Defects 0.0%</p> <p>Damage 0.0%</p> <p>Maintenance Remove Brush/Trees</p> <p>Capital Rec. None</p> <p><i>Heavy vegetation growth at south end, nicely groomed at north end. Brush & trees at south end should be cleared.</i></p>
<p>Delineator (4)</p> <p>Signs</p> <p>Length:</p> <p>Width:</p> <p>Height:</p>	<p>Defects 0.0%</p> <p>Damage 0.0%</p> <p>Maintenance None</p> <p>Capital Rec. None</p> <p><i>4 delineators have been added at corners of culvert since 2019.</i></p>



Image 5



North elevation

Image 1



East approach

Image 2



North channel

Image 3



South channel

Image 4



Asphalt over culvert

Image 6



East wall



Image 7



West wall

Image 8



Soffit

Image 11



East footing disintegration

Image 12



Leaching crack wall in the SE

Image 13



Through culvert



Culvert Inspection Report

Cooper Road Culvert

Road Name: *Cooper Road*
Site ID: *C31-A12*
Structure Type: *Concrete Culvert*
Owner: *Township South Stormont*
Built: *1994*
Length: *21.7 m*
Width: *4.8 m*
Spans: *1*
Spans Arrange: *4.8*
Feature Through: *Water*
Crossing:
Location: *2 km West of County Road 12*

Inspection Date: *July-27-21*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Kyle Davis, Eng Student*

Comments:

This precast box culvert is in good condition. Guide rail over the culvert is due for replacement.

Recommended Investigations:

No Special Investigations Recommended

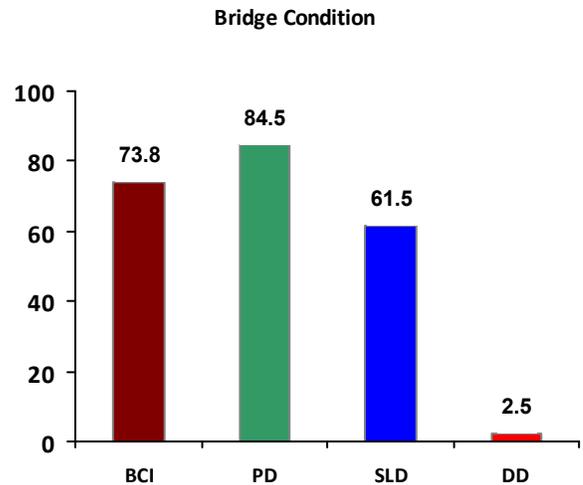
Recommended Capital Works:

Guide Rail

Estimated Replacement Value: *\$473,000*
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: *63 Years*
Rehabilitation Year and Estimated Cost: *2024 \$48,000*



AADT: *N/A* **Latitude:** *45.08249500*
Lanes: *2* **Longitude:** *-75.00437100*
Skew: *0 °* **Orientation:** *E-W*
Speed: *80 km/h* **Road Width:** *6 m*
Trucks **Load Posting:** *No Posting*
Fill: *0.5 m* **H2O Depth:** *0.4 m*



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

<p>Precast RF Box Culvert (1) Conduit Length: 21.7 m Width: 4.2 m Height: 1.8 m</p>	<p>Defects 5.0% Minor Scaling, Minor Staining, Minor Leaching/Seepage Damage 0.0% Maintenance None Capital Rec. None</p> <p><i>Condition of the interior is good. Walls are lightly scaled. Minor stains around precast joints in soffit. Joints actively leaking in 2021.</i></p>
<p>Asphalt Wear Surf (1) Wear Surface Length: 4.7 m Width: 6 m Height:</p>	<p>Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None</p> <p><i>Asphalt on approaches is in poor condition, asphalt over culvert is satisfactory.</i></p>
<p>Steel Beam on Wood Post (Guide Rail Length: 20 m Width: Height: 0.5 m</p>	<p>Defects 0.0% Damage 10.0% Major Decay Maintenance None Capital Rec. Replace in 1 year Perf Def: Inadequate Height</p> <p><i>Guide rail is too low to be an effective traffic barrier. Guide rail does not have standard end treatments. Timber posts & spacer blocks have major decay in the top surface. Major vegetation growth around guide rail.</i></p>
<p>Water Channel (1) Conduit Channel</p>	<p>Defects 5.0% Minor Aggradation Damage 0.0% Maintenance None Capital Rec. None</p> <p><i>Aggradation noted at SE & NE ends & along east wall inside barrel. Water flows from north to south.</i></p>
<p>Embankment (4) Embankment</p>	<p>Defects 0.0% Damage 0.0% Maintenance Remove Brush/Trees Capital Rec. None Perf Def: Toxic Weeds</p> <p><i>Thick vegetation at culvert ends. Wild parsnip present. Tree in the SE corner should be cut back.</i></p>



Capital Needs Cost Estimate Break-Down

<i>Other Work</i>		
<i>Guide Rail</i>		\$30,000
	Structural Items Subtotal	\$30,000
	Mobilization General Sitework	\$10,000
	Estimated Traffic Management & Civil Items	\$0
	Contract Admin & Contingencies 20%	\$8,000
	Total Rehabilitation Cost Estimate	\$48,000

Recommended Capital Work Summary **Recommended Capital Year** **2024**
Guide Rail

Inspection Comments
This precast box culvert is in good condition. Guide rail over the culvert is due for replacement.



Image 82



North elevation

Image 70



West approach

Image 71



Typical guide rail

Image 72



Typical post decay

Image 73



North channel

Image 74



South channel



Image 76



Asphalt overtop

Image 77



Through from north

Image 78



Leaky joint at north

Image 79



East wall

Image 80



West wall

Image 81



Soffit





Culvert Inspection Report

Wilburn Road Culvert

Road Name: *Wilburn Road*
Site ID: *C31-A13*
Structure Type: *Soil-Steel Structure*
Owner: *Township South Stormont*
Built: *1990*
Length: *11.2 m*
Width: *3.5 m*
Spans: *1*
Spans Arrange: *3.5*
Feature Through: *Water*
Crossing: *Dixon Creek*
Location: *0.5 km West of County Road 12*

Inspection Date: *July-27-21*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Kyle Davis, Eng Student*

Comments:

Construction Year was estimated at 1990. This culvert is in satisfactory condition at this time. Major corrosion and bolt line cracks were identified, planning for replacement of this culvert in a +/- 10 year timeframe should be started.

Recommended Investigations:

No Special Investigations Recommended

Recommended Capital Works:

No Capital Works Recommendations

Estimated Replacement Value: **\$212,000**

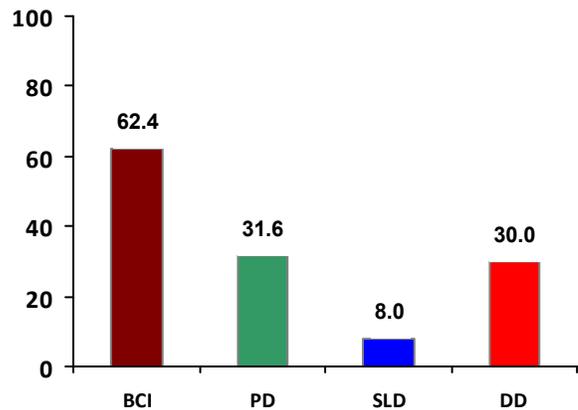
Estimated replacement value is based on replacement in kind

Estimated Remaining Service Life: **16 Years**



AADT: *N/A* **Latitude:** *45.08254500*
Lanes: *1* **Longitude:** *-74.98669300*
Skew: *0 °* **Orientation:** *E-W*
Speed: *80 km/h* **Road Width:** *4 m*
Trucks: **Load Posting:** *No Posting*
Fill: *1.2 m* **H2O Depth:** *0.2 m*

Bridge Condition



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

CS Plate Pipe Arch (1) Conduit	Defects 40.0% Minor Corrosion, Moderate Corrosion, Major Corrosion Damage 2.0% Minor Section Loss, Minor Bolt Line Crack'g
Length: 11.2 m Width: 3.5 m Height: 2 m	Maintenance None Capital Rec. None Perf Def: Insufficient Barrel Length <i>Barrel walls have light corrosion above bolt line seam, below seam corrosion is moderate to major with minor some section loss. Bolt line cracks were noted in the west wall, (approximately 2m length). Minor impact type damage at south end. Culvert length is insufficient for road platform.</i>
Gravel Surface (1) Wear Surface	Defects 0.0% Damage 0.0%
Length: 3.5 m Width: 4 m Height:	Maintenance None Capital Rec. None <i>Narrow gravel dead end road. Loose gravel.</i>
Water Channel (1) Conduit Channel	Defects 0.0% Damage 0.0% Maintenance None Capital Rec. None Perf Def: Obstructed <i>Moderate velocity flow. Water flowing from north to south.</i>
Embankment (4) Embankment	Defects 5.0% Minor Erosion Damage 0.0% Maintenance Remove Brush/Trees Capital Rec. None Perf Def: Toxic Weeds <i>Steep embankments, erosion in the NW corner. Retaining walls may be warranted due to the short length culvert. Wild parsnip present.</i>



Image 92



North elevation

Image 83



West approach

Image 84



North channel

Image 85



South channel upstream

Image 86



Gravel wearing surface overtop

Image 87



South elevation

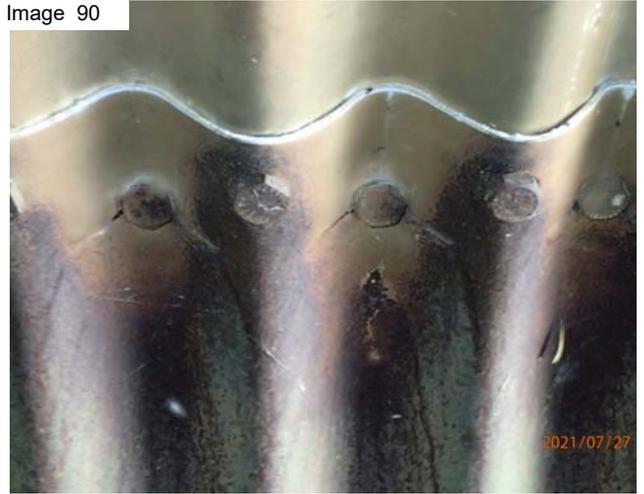


Image 89



Incorrect plate lapping

Image 90



Boltline cracking

Image 91



Through barrel from north

Image 93



Embankment erosion in NW



Culvert Inspection Report

MacRae Road Culvert

Road Name: *MacRae Road*
Site ID: *C31-A15*
Structure Type: *Soil-Steel Structure*
Owner: *Township South Stormont*
Built: *1985*
Length: *18.2 m*
Width: *3.3 m*
Spans: *1*
Spans Arrange: *3.3*
Feature Through: *Water*
Crossing:
Location: *1.5km north of Dixon Road*

Inspection Date: *July-27-21*
Inspector: *Steve Reid, C.E.T.*
Assistant: *Kyle Davis, Eng Student*

Comments:

Construction year was estimated at 1985. Perforations were noted in the barrel walls and floor. A concrete floor liner may be an appropriate repair strategy for this culvert due to the perforations being low in floor or walls. Without liner this culvert will need replacement within in a 5-7 year timeframe. Floor liner would add 20 years to life of culvert.

Recommended Investigations:

No Special Investigations Recommended

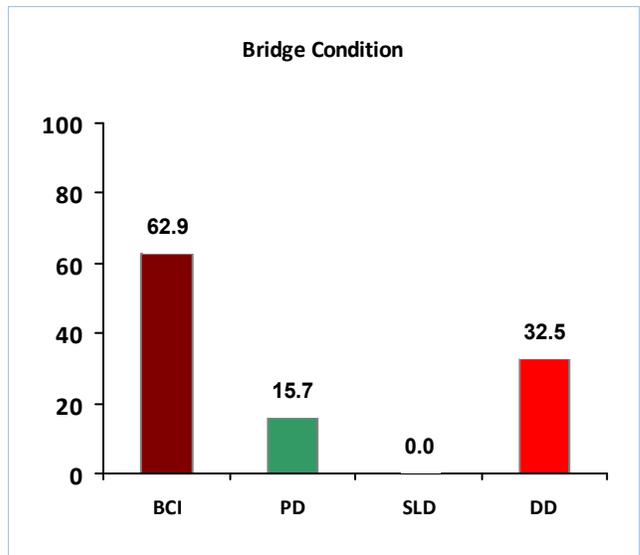
Recommended Capital Works:

Concrete floor liner

Estimated Replacement Value: **\$288,000**
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: **6 Years**
Rehabilitation Year and Estimated Cost: 2023 \$36,000



AADT: *N/A* **Latitude:** *45.10873800*
Lanes: *2* **Longitude:** *-74.96583200*
Skew: *0 °* **Orientation:** *N-S*
Speed: *80 km/h* **Road Width:** *5.5 m*
Trucks **Load Posting:** *No Posting*
Fill: *0.8 m* **H2O Depth:** *0.4 m*



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

<p>Circular CS Pipe (1)</p> <p>Conduit</p> <p>Length: 18.2 m</p> <p>Width: 3.3 m</p> <p>Height: 2.3 m</p>	<p>Defects 35.0% Minor Corrosion, Moderate Corrosion</p> <p>Damage 3.0% Minor Perforation, Minor Section Loss</p> <p>Maintenance None</p> <p>Capital Rec. Repair in 3 years</p> <p><i>Lower half of barrel has moderate corrosion. Perforations at normal waterline at the east end. Random perforations along many seams of barrel.</i></p>
<p>Gravel Surface (1)</p> <p>Wear Surface</p> <p>Length: 3.3 m</p> <p>Width: 5.5 m</p> <p>Height:</p>	<p>Defects 0.0%</p> <p>Damage 0.0%</p> <p>Maintenance None</p> <p>Capital Rec. None</p> <p><i>Gravel road over culvert.</i></p>
<p>Water Channel (1)</p> <p>Conduit Channel</p>	<p>Defects 0.0%</p> <p>Damage 0.0%</p> <p>Maintenance None</p> <p>Capital Rec. None</p> <p><i>Channel is open & moving through culvert. Remains of old bridge abutments west side of culvert at inlet.</i></p>
<p>Embankment (2)</p> <p>Embankment</p>	<p>Defects 0.0%</p> <p>Damage 0.0%</p> <p>Maintenance None</p> <p>Capital Rec. None</p> <p>Perf Def: Over-steepened</p> <p><i>No guide rail or delineators at this site. Steep embankments. Wild parsnip.</i></p>



Capital Needs Cost Estimate Break-Down

<i>Other Work</i>		
<i>Concrete floor liner</i>		\$20,000
	Structural Items Subtotal	\$20,000
	Mobilization General Sitework	\$10,000
	Estimated Traffic Management & Civil Items	\$0
	Contract Admin & Contingencies 20%	\$6,000
	Total Rehabilitation Cost Estimate	\$36,000

Recommended Capital Work Summary	Recommended Capital Year	2023
<i>Concrete floor liner</i>		

Inspection Comments
Construction year was estimated at 1985. Perforations were noted in the barrel walls and floor. A concrete floor liner may be an appropriate repair strategy for this culvert due to the perforations being low in floor or walls. Without liner this culvert will need replacement within in a 5-7 year timeframe. Floor liner would add 20 years to life of culvert.



Image 56



East elevation

Image 51



North approach

Image 52



West channel

Image 53



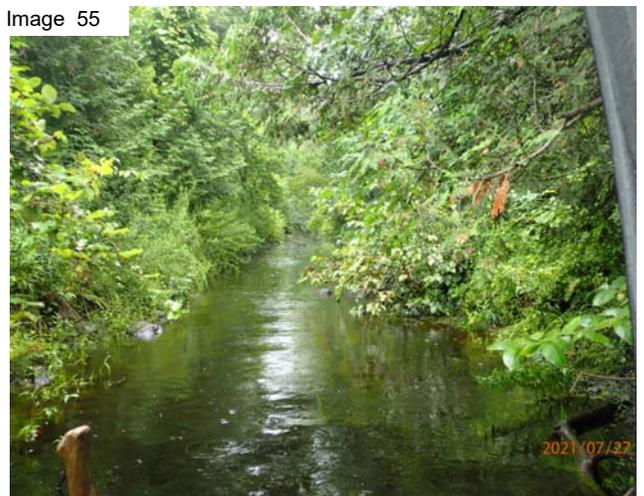
Through barrel from west

Image 54



Small perforation at north

Image 55



East channel



Image 57



Gravel wearing surface overtop





Culvert Inspection Report

Northfield Road Culvert

Road Name: Northfield Road
Site ID: C31-A16
Structure Type: Soil-Steel Structure
Owner: Township South Stormont
Built: 1990
Length: 15.3 m
Width: 3.6 m
Spans: 1
Spans Arrange: 3.6
Feature Through: Water
Crossing: Municipal Drain
Location: 1 km North of County Road 18

Inspection Date: July-27-21
Inspector: Steve Reid, C.E.T.
Assistant: Kyle Davis, Eng Student

Comments:

Construction year was estimated at 1990. Delineators should be installed to identify the culvert location. Cusping is a concern that poses risk of a failure. Additional vigilance recommended.

Recommended Investigations:

No Special Investigations Recommended

Recommended Capital Works:

No Capital Works Recommendations

Estimated Replacement Value: **\$289,000**

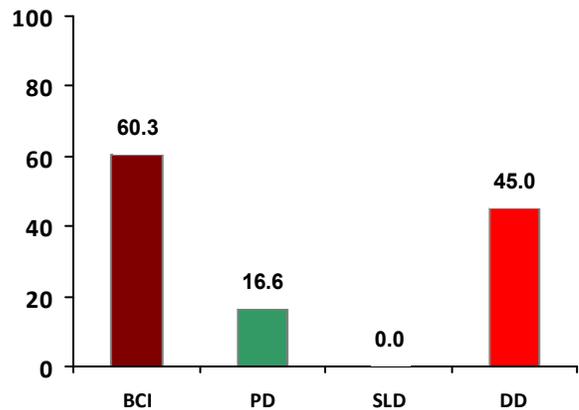
Estimated replacement value is based on replacement in kind

Estimated Remaining Service Life: **14 Years**



AADT: N/A **Latitude:** 45.07444300
Lanes: 2 **Longitude:** -74.93634500
Skew: 0 ° **Orientation:** N-S
Speed: 80 km/h **Road Width:** 7.5 m
Trucks: **Load Posting:** No Posting
Fill: 0.6 m **H2O Depth:** 0.5 m

Bridge Condition



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

CS Plate Pipe Arch (1)	Defects 40.0% Minor Corrosion, Moderate Corrosion, Moderate Plate Lapping Reversed
Conduit	Damage 5.0% Minor Section Loss, Moderate Cusping
Length: 15.3 m	Maintenance None
Width: 3.6 m	Capital Rec. None
Height: 2.29 m	<i>Light corrosion at high water line & below. Moderate corrosion with minor section loss at normal water line. Obvert of culvert has reverse curvature (cusping), & incorrect plate lapping.</i>
Gravel Surface (1)	Defects 0.0%
Wear Surface	Damage 0.0%
Length: 3.6 m	Maintenance None
Width: 7.5 m	Capital Rec. None
Height:	<i>Gravel road over culvert.</i>
Water Channel (1)	Defects 0.0%
Conduit Channel	Damage 0.0%
	Maintenance None
	Capital Rec. None
	<i>Stagnant water at time of inspection. High water level appears to be half way up the barrel wall. Silty material inside barrel. Water flows from east to west. Channel overgrown.</i>
Embankment (4)	Defects 0.0%
Embankment	Damage 0.0%
	Maintenance None
	Capital Rec. None
	Perf Def: Toxic Weeds
	<i>No guide rail or delineators at this site. Thick vegetation at culvert ends. Dry stone retaining walls at culvert ends hard to see due to the thick vegetation. Wild parsnip.</i>



Image 41



West elevation

Image 37



North approach

Image 38



East channel

Image 39



Gravel wearing surface otop

Image 40



West channel

Image 42



Incorrect plate lapping



Image 43



Condition of wall at waterline

Image 45



Bent bolt in NE

Image 48



Through barrel from east

Image 49



Reverse curvature (cussing) in obvert



Culvert Inspection Report

O'Keefe Road Culvert

Road Name: O'Keefe Road
Site ID: C31-A18
Structure Type: Soil-Steel Structure
Owner: Township South Stormont
Built: 1975
Length: 17.2 m
Width: 3.2 m
Spans: 1
Spans Arrange: 3.2
Feature Through: Water
Crossing: Municipal Drain
Location: 1km South of Myers Road

Inspection Date: June-29-21
Inspector: Steve Reid, C.E.T.
Assistant: Kyle Davis, Eng Student

Comments:

Age of this culvert should be verified, more likely constructed in 90's not 1975. Culvert is in satisfactory condition at this time. Current guide rail protection should be updated within 2 years.

Recommended Investigations:

No Special Investigations Recommended

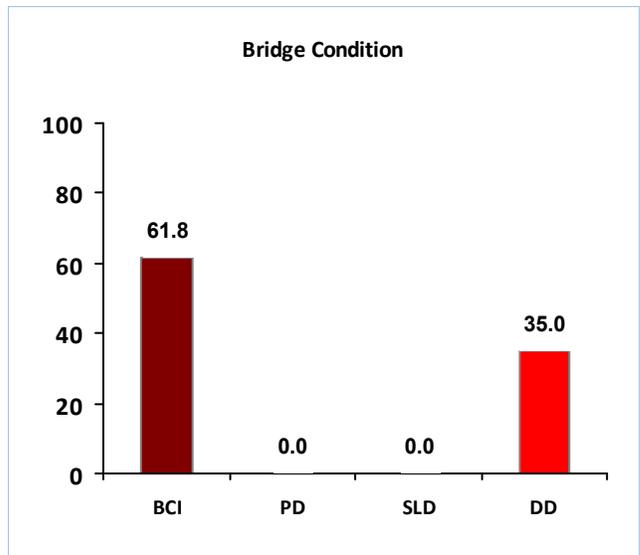
Recommended Capital Works:

New Conc Culvert

Estimated Replacement Value: \$331,000
Estimated replacement value is based on replacement in kind
Estimated Remaining Service Life: 10 Years
Year of Replacement and Cost: 2031 \$368,000



AADT: N/A **Latitude:** 45.11210600
Lanes: 2 **Longitude:** -74.83444100
Skew: 20 ° **Orientation:** N-S
Speed: 80 km/h **Road Width:** 5.5 m
Trucks: **Load Posting:** No Posting
Fill: 1.2 m **H2O Depth:** 0.5 m



BCI = Bridge Condition Index MTO Calculation

PD = Parabolic Depreciation
% retained value

SLD = Straight Line Depreciation
% retained value

DD = Defects and Damage
% loss of retained value



Component Inspection Information

Circular CS Pipe (1) Conduit Length: 17.2 m Width: 3.2 m Height: 2.1 m	Defects 40.0% Moderate Corrosion, Major Corrosion Damage 3.0% Minor Section Loss, Moderate Section Loss Maintenance None Capital Rec. None <i>Date of construction should be verified, unlikely this culvert was constructed in 1975. Bottom third of culvert has moderate to major corrosion with some minor section loss. No perforations detected.</i>
Asphalt Wear Surf (1) Wear Surface Length: 3.2 m Width: 5.5 m Height:	Defects 2.0% Minor Ravelling Damage 0.0% Maintenance None Capital Rec. None <i>Satisfactory condition. Minor ravelling.</i>
Steel Beam on Wood Post (Guide Rail Length: 30.5 m Width: Height: 0.8 m	Defects 5.0% Minor Checking Damage 5.0% Major Decay, Moderate Impact Maintenance Spot post replacement, Local repair Capital Rec. Replace in 2 years Perf Def: Does'nt Meet New Standard <i>Many posts have major decay. Ends are not properly buried and don't meet current standard. Post in the SE is damaged. Sections of flex beam badly corroded. Guide rail system requires renewal.</i>
Water Channel (1) Conduit Channel	Defects 0.0% Damage 5.0% Moderate Debris Obstruction Maintenance Remove Obstructions Capital Rec. None <i>Stagnant flow, no water in upstream or downstream, barrel has 600mm stagnant water inside. Slight flow in 2021, still stagnant water inside barrel, 600mm. Large stones at both ends of barrel partially obstruct channel flow.</i>
Embankment (4) Embankment	Defects 5.0% Moderate Erosion Damage 5.0% Moderate Local Instability Maintenance Remove Brush/Trees Capital Rec. None Perf Def: Toxic Weeds <i>Thick brush. Wild parsnip. Dry stone retaining wall in NW is partially failed.</i>
Delineator (4) Signs Length: Width: Height:	Defects 0.0% Damage 0.5% Minor Impact Maintenance None Capital Rec. None <i>Delineators at ends of guide rail. Sign in NE has some minor impact damage.</i>



Capital Needs Cost Estimate Break-Down

<i>Cost of Asphalt Removal:</i>	\$5,600	<i>Cost of Waterproofing:</i>	\$0
<i>Cost of Dewatering:</i>	\$44,000	<i>Cost of Road Replace:</i>	\$38,200
<i>Cost Erosion Control:</i>	\$6,000	<i>Cost of SBGR:</i>	\$43,500
<i>Cost of Excavation:</i>	\$32,000	<i>Cost of Seeding:</i>	\$800
<i>Cost of Existing Structure Removal:</i>	\$3,000		
<i>Installation Cost for Similar Size Concrete:</i>	\$88,000		
<i>Cost of Retaining Walls etc:</i>	\$0		

New Concrete Culvert



Structural Items Subtotal	\$261,000
Mobilization General Sitework	\$25,000
Estimated Traffic Management & Civil Items	\$20,000
Contract Admin & Contingencies 20%	\$62,000
Total Rehabilitation Cost Estimate	<i>\$368,000</i>

Recommended Capital Work Summary

Recommended Capital Year **2031**

New Conc Culvert

Inspection Comments

Age of this culvert should be verified, more likely constructed in 90's not 1975. Culvert is in satisfactory condition at this time. Current guide rail protection should be updated within 2 years.



Image 873



West elevation

Image 864



South approach

Image 865



Post damage at SE

Image 866



East channel downstream

Image 867



West channel upstream

Image 868



West guide rail (typical)

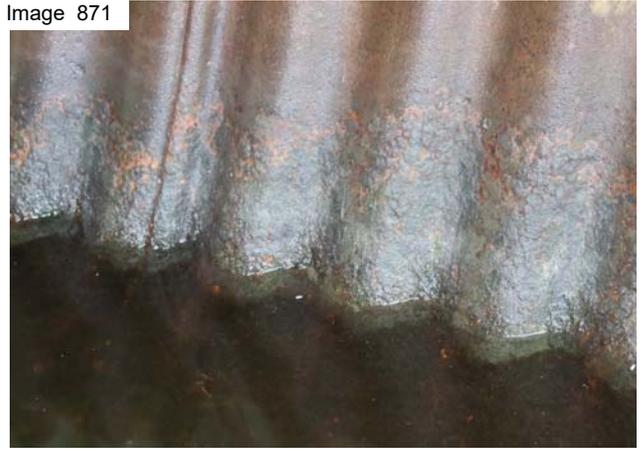


Image 870



Through barrel from west

Image 871



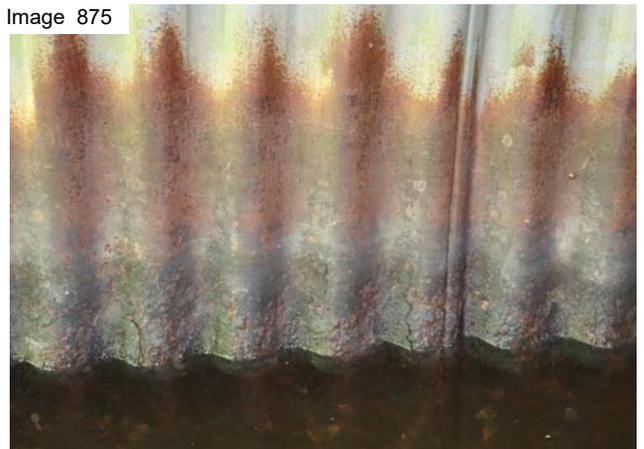
Waterline condition (typical)

Image 874



NW embankment

Image 875



Waterline condition

Image 876



East elevation



