



Summary Action Report

MTO Site Number: Unknown

Structure ID: K-0009

Structure Name: Big Bay Culvert

Bridge Condition Index (BCI): 29.6

Road Name: Big Bay Sideroad

Location: Lot 37/38 – Colpoy
Range Keppel

Inspection Date: June 3, 2024

Structure Type: SPCSP Culvert

Inspected By: Jesse Borges, P.Eng.

No. of Spans: Single Span

Spans Lengths: 2.5m

Road Width: 6.5m

Overall Structure Length: 19.3m

Year of Construction: 1970

Current Load Limit: N/A



Overall Comments:

The structure appears to be in overall critical condition with large perforations and evidence of active overstressing of the culvert barrel walls. There are two large perforations noted at the north and south walls of the culvert. The north perforation measures 4.0m x 0.3m, which has caused the north wall of the barrel to settle and slip below the invert. Bolt hole cracking and crimping of the barrel corrugations was also noted along the south wall. Due to the presents of these deficiencies, the structure appears to be exhibiting buckling / failure issues and urgent replacement of the culvert (within 1 year) is recommended.

	Estimated Costs for Rehabilitation					
Construction Project Type	Urgent, Within 1 Year	1 to 5 Years	6 to 10 Years	Associated Costs	Contingencies and Engineering Costs	Total
Replacement	\$205,000			\$195,000	\$110,000	\$505,000



Inventory Data:					
Structure Name	Big Bay Culvert				
Main Hwy/Road #		☐ On ☐ Under	Crossing Type:	☐ Navig. Water ☒ Non-Navig. Water ☐ Rail ☐ Road ☐ Ped. ☐ Other	
Hwy/Road Name	Big Bay Sideroad				
Structure Location	Lot 37/38 – Colpoy Range, Keppel – 750m north of Cape Road				
Latitude:	44.786207	Longitude:	-80.950072		
Owner(s):	The Township of Georgian Bluffs	Heritage Designation:	☒ Not Cons. ☐ Cons./not App. ☐ List/not Desig. ☐ Desig./not List ☐ Desig. & List		
MTO Region:	30	Road Class:	☐ Freeway ☐ Arterial ☐ Collector ☒ Local		
MTO District:	33	Posted Speed:	80km/h	No. of Lanes:	2
Old County:	County of Grey	AADT:		% Trucks:	
Geographic Twp.:	Keppel	Inspection Route Sequence:			
Structure Type:	SPCSP	Interchange No.:			
Total Deck Length:	19.3m	Interchange Structure No.:			
Overall Str. Width:	2.5m	Min Vertical Clearance:			
Total Deck Area:	48.3m ²	Special Routes:	☐ Transit ☐ Truck ☐ School ☐ Bicycle		
Roadway Width:	6.5m	Detour Length Around Bridge:	5.5km		
Skew Angle:	30°	Direction of Structure:	E-W		
No. of Spans:	1	Fill on Structure:	1.0m		
Span Lengths:	2.5				

Historical Data:			
Year Built:	1970	Year of Last Major Rehab:	Unknown
Last OSIM Inspection:	2022	Last Load Evaluation:	N/A
Last Enhanced OSIM Inspection:	N/A	Current Load Limit:	N/A
Enhanced Access Equipment (ladder, boat, lift, etc.):	None	Load Limit By-Law #:	N/A
Last Underwater Inspection:	N/A	By-Law Expiry Date:	N/A
Last Condition Survey:	N/A		

Rehab History (Date and Description): No rehabilitation history provided by Township.



Field Inspection Information:				
Date of Inspection:	2024/06/03	Type of Inspection:	☒ OSIM ☐ Enhanced OSIM	
Inspector:	Jesse Borges, P.Eng.			
Others in Party:	David DeBoer, E.I.T.			
Access Equipment Used:				
Weather:	Sunny, 20°C			
Additional Investigations Required:		Priority		Estimated Cost
		None	Normal	Urgent
Material Condition Survey		X		
Detailed Deck Condition Survey:		X		
Non-destructive Delam. Survey of Asphalt-Covered Deck:		X		
Concrete Substructure Condition Survey:		X		
Detailed Coating Condition Survey:		X		
Detailed Timber Investigation		X		
Post-Tensioned Strand Investigation		X		
Underwater Investigation:		X		
Fatigue Investigation:		X		
Seismic Investigation:		X		
Structure Evaluation:		X		
Monitoring (deformations, settlements, movements, crack widths):				If Req. TBD
Load Posting – Estimated Load		Total Cost		TBD
Investigation Notes: Monitoring of deformations recommended if structure is not replaced in 2024.				

Overall Structure Notes:	
Overall Comments:	The structure appears to be in overall critical condition with large perforations and evidence of active overstressing of the culvert barrel walls. There are two large perforations noted at the north and south walls of the culvert. The north perforation measures 4.0m x 0.3m, which has caused the north wall of the barrel to settle and slip below the invert. Bolt hole cracking and crimping of the barrel corrugations was also noted along the south wall. Due to the presents of these deficiencies, the structure appears to be exhibiting buckling / failure issues and urgent replacement of the culvert (within 1 year) is recommended.
Date of Next Inspection:	2026

Suspected Performance Deficiencies

- | | | |
|--|---|-------------------------------------|
| 01 Load carrying capacity | 06 Bearing not uniformly loaded/unstable | 12 Slippery surfaces |
| 02 Excessive deformations (deflections & rotations) | 07 Jammed expansion joint | 13 Flooding/channel blockage |
| 03 Continuing settlement | 08 Pedestrian/vehicular hazard | 14 Undermining of foundation |
| 04 Continuing movements | 09 Rough riding surface | 15 Unstable embankments |
| 05 Seized bearings | 10 Surface ponding | 16 Other |
| | 11 Deck drainage | |

Maintenance Needs

- | | | |
|---|--|---|
| 01 Lift and Swing Bridge Maintenance | 07 Repair to Structural Steel | 13 Erosion Control at Bridges |
| 02 Bridge Cleaning | 08 Repair of Bridge Concrete | 14 Concrete Sealing |
| 03 Bridge Handrail Maintenance | 09 Repair of Bridge Timber | 15 Rout and Seal |
| 04 Painting Steel Bridge Structures | 10 Bailey bridges – Maintenance | 16 Bridge Deck Drainage |
| 05 Bridge Deck Joint Repair | 11 Animal/Pest Control | 17 Scaling (Loose Concrete or ACR Steel) |
| 06 Bridge Bearing Maintenance | 12 Bridge Surface Repair | 18 Other |



Element Data

Element Group:	Approach	Length:	6.5m			
Element Name:	Wearing Surface	Width:	10m			
Location:	Each Side	Height:				
Material:	Asphalt	Count:	2			
Element Type:		Total Quantity:	130m ²			
Environment:	Benign / Moderate / Severe	Limited Inspection	☐			
Protection System:						
Condition	Units	Exc.	Good	Fair	Poor	Perform. Deficiencies
Data:	m ² / m / each / % / all		130			None
Comments: Wearing surface appears to be in overall good condition with no deficiencies noted.						
Recommended Work: ☐ Rehab ☒ Replace				Maintenance Needs: None		
☒ Urgent ☐ 1-5 years ☐ 6-10 years ☐ None				☐ Urgent ☐ 1 year ☐ 2 year		
Wearing Surface will be replaced during the culvert replacement.						

Element Group:	Approach	Length:	140m			
Element Name:	Barriers	Width:				
Location:	Each Quadrant	Height:				
Material:		Count:	1			
Element Type:	3-Cable Post-Tension Guidrail	Total Quantity:	140m			
Environment:	Benign / Moderate / Severe	Limited Inspection	☐			
Protection System:						
Condition	Units	Exc.	Good	Fair	Poor	Perform. Deficiencies
Data:	m ² / m / each / % / all		140			None
Comments: Guidrail appears to be in overall good condition. It is assumed that the entire guardrail system will be replaced with steel beam guidrail and new end treatments during the culvert replacement to improve the safety of the roadway.						
Recommended Work: ☐ Rehab ☒ Replace				Maintenance Needs: None		
☒ Urgent ☐ 1-5 years ☐ 6-10 years ☐ None				☐ Urgent ☐ 1 year ☐ 2 year		
Guidrail system to be replaced during the culvert replacement.						

Element Group:	Decks	Length:	6.5m			
Element Name:	Wearing Surface	Width:	2.5m			
Location:	Over Structure	Height:				
Material:	Asphalt	Count:	1			
Element Type:		Total Quantity:	16.3m ²			
Environment:	Benign / Moderate / Severe	Limited Inspection	☐			
Protection System:						
Condition	Units	Exc.	Good	Fair	Poor	Perform. Deficiencies
Data:	m ² / m / each / % / all		16.3			None
Comments: Wearing surface appears to be in overall good condition with no deficiencies noted.						
Recommended Work: ☐ Rehab ☒ Replace				Maintenance Needs: None		
☒ Urgent ☐ 1-5 years ☐ 6-10 years ☐ None				☐ Urgent ☐ 1 year ☐ 2 year		
Wearing surface will be replaced during the culvert replacement. Costed under Approach Element.						



Element Data

Element Group:	Culvert	Length:	19.3m			
Element Name:	Barrels	Width:	2.5m			
Location:		Height:	1.75m			
Material:	Corrugated Steel	Count:	1			
Element Type:	Multi- Plate Pipe	Total Quantity:	135m ²			
Environment:	Benign / Moderate / Severe	Limited Inspection	☐			
Protection System:	Hot Dip Galvanizing					
Condition	Units	Exc.	Good	Fair	Poor	Perform. Deficiencies
Data:	m ² / m / each / % / all				135	02
Comments: The barrel is in overall poor condition and requires urgent replacement. The culvert has a large perforation (4.0m x 0.2m) along the north wall of the barrel at mid-length. Due to the perforation, the north wall of the barrel is settling and beginning to slide beneath the invert. The culvert also has a large perforation (3.0m x 0.1m) along the south wall of the barrel at mid-length. The south wall of the barrel is also exhibiting bolt hole cracking at the mid bolt line and the adjacent corrugations are beginning to crimp (6.0m of barrel). The west end of the culvert has experienced impact damage reducing the hydraulic capacity of the structure.						
Recommended Work: ☐ Rehab ☒ Replace				Maintenance Needs:		None
☒ Urgent ☐ 1-5 years ☐ 6-10 years ☐ None				☐ Urgent ☐ 1 year ☐ 2 year		
Recommend the replacement of the structure within 1 year.						

Element Group:	Embankments and Streams	Length:				
Element Name:	Embankments	Width:				
Location:	Each Quadrant	Height:				
Material:	Soil	Count:	4			
Element Type:		Total Quantity:	4			
Environment:	Benign / Moderate / Severe	Limited Inspection	☐			
Protection System:						
Condition	Units	Exc.	Good	Fair	Poor	Perform. Deficiencies
Data:	m ² / m / each / % / all		3	1		None
Comments: Embankments are in overall good to fair condition. The northwest embankment has minor failure of the slope protection with some geotextile exposed.						
Recommended Work: ☐ Rehab ☒ Replace				Maintenance Needs:		None
☒ Urgent ☐ 1-5 years ☐ 6-10 years ☒ None				☐ Urgent ☐ 1 year ☐ 2 year		
Replace embankments during culvert replacement.						

Element Group:	Embankments and Streams	Length:				
Element Name:	Streams and Waterways	Width:				
Location:		Height:				
Material:		Count:				
Element Type:		Total Quantity:	All			
Environment:	Benign / Moderate / Severe	Limited Inspection	☐			
Protection System:						
Condition	Units	Exc.	Good	Fair	Poor	Perform. Deficiencies
Data:	m ² / m / each / % / all		1			None
Comments: Watercourse appears to be in overall good condition.						
Recommended Work: ☐ Rehab ☐ Replace				Maintenance Needs:		None
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☐ None				☐ Urgent ☐ 1 year ☐ 2 year		



Performance Deficiencies				
Element Group		Element Name	Performance Deficiency	
Culvert		Barrels	02 - Excessive Deformations	
Maintenance Needs				
Element Group		Element Name	Maintenance Needs	
Repair/Rehabilitation				
Element Group	Element Name	Repair/Rehabilitation	Priority	Cost Estimate
Approach	Barriers	Install Steel Beam Barrier System	Urgent	\$65,000
Approach	Wearing Surface	Remove and Repave Roadway	Urgent	\$20,000
Culverts	Barrels	Remove and Install new SPCSP Culvert	Urgent	\$120,000
Total Repair/Rehabilitation Cost:				\$205,000
Associated Work				
			Comments	Cost Estimate
Site Mob./Demob.				\$30,000
Traffic Control			Assuming full roadway closure with detour route.	\$10,000
Approaches			Restore embankments with rip-rap and topsoil.	\$20,000
Utilities			Utility Protection During Construction	\$5,000
Right-of-way				
Background Studies			Geotechnical, Hydrology, Hydraulics, EIS, etc.	\$40,000
Environmental Assessment			Assume Schedule 'A' (Exempt)	
Worksite Isolation and Dewatering			End Cofferdams and Water Diversion Pipe	\$80,000
Environmental Protection				\$10,000
Other				
			<u>Contingencies (15%):</u>	\$55,000
			<u>Engineering (15%):</u>	\$55,000
Total Associated Work Cost:				\$195,000
Total Cost:				\$510,000

Justification:

Replacement of the structure is recommended to ensure the safety of the public. The structure is exhibiting signs of overstressing and buckling which we anticipate will worsen over time with continued traffic use and further deterioration of the culvert barrel. This will also give the Township an opportunity to improve the safety of the roadway by installing a new steel beam guiderail system over the structure.

If the structure is not replaced before the end of 2024, we recommend that the structure be monitored on a regular basis by a qualified individual until construction can be completed.



Photo 1 - View of Structure Facing South.



Photo 2 - View of West Culvert End.



Photo 3 - View of Barrel Facing East.



Photo 4 - View of Large Perforation on North Side of the Culvert.

Date of Photos: June 3, 2024

Inspector: Jesse Borges, P.Eng.



Photo 5 - View of Large Perforation on South Side of the Culvert.



Photo 6 - View of Local Buckling of Corrugations North Side of Barrel.



Photo 7 - View of Bolt Hole Cracking on South Wall of Barrel.



Photo 8 - View of Damaged Invert — West End.

Date of Photos: June 3, 2024

Inspector: Jesse Borges, P.Eng.