



## Summary Action Report

MTO Site Number: Unknown

Structure ID: K-0009

<u>Structure Name:</u>	Big Bay Culvert	Bridge Condition Index (BCI): 29.6	
<u>Road Name:</u>	Big Bay Sideroad		
<u>Location:</u>	Lot 37/38 – Colpoj Range Keppel	<u>Inspection Date:</u>	June 3, 2024
<u>Structure Type:</u>	SPCSP Culvert	<u>Inspected By:</u>	Jesse Borges, P.Eng.
<u>No. of Spans:</u>	Single Span	<u>Spans Lengths:</u>	2.5m
<u>Road Width:</u>	6.5m	<u>Overall Structure Length:</u>	19.3m
<u>Year of Construction:</u>	1970	<u>Current Load Limit:</u>	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 #		<input type="checkbox"/> On <input type="checkbox"/> Under	Crossing Type:	<input type="checkbox"/> Navig. Water <input checked="" type="checkbox"/> Non-Navig. Water <input type="checkbox"/> Rail <input type="checkbox"/> Road <input type="checkbox"/> Ped. <input type="checkbox"/> 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:	<input checked="" type="checkbox"/> Not Cons. <input type="checkbox"/> Cons./not App. <input type="checkbox"/> List/not Desig. <input type="checkbox"/> Desig./not List <input type="checkbox"/> Desig. & List		
MTO Region:	30	Road Class:	<input type="checkbox"/> Freeway <input type="checkbox"/> Arterial <input type="checkbox"/> Collector <input checked="" type="checkbox"/> 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 <sup>2</sup>	Special Routes:	<input type="checkbox"/> Transit <input type="checkbox"/> Truck <input type="checkbox"/> School <input type="checkbox"/> 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:	<input checked="" type="checkbox"/> OSIM <input type="checkbox"/> 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**

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

**Maintenance Needs**

- |   |  |   |
|---|--|---|
| <b>01</b> Lift and Swing Bridge Maintenance | <b>07</b> Repair to Structural Steel   | <b>13</b> Erosion Control at Bridges            |
| <b>02</b> Bridge Cleaning                   | <b>08</b> Repair of Bridge Concrete    | <b>14</b> Concrete Sealing                      |
| <b>03</b> Bridge Handrail Maintenance       | <b>09</b> Repair of Bridge Timber      | <b>15</b> Rout and Seal                         |
| <b>04</b> Painting Steel Bridge Structures  | <b>10</b> Bailey bridges – Maintenance | <b>16</b> Bridge Deck Drainage                  |
| <b>05</b> Bridge Deck Joint Repair          | <b>11</b> Animal/Pest Control          | <b>17</b> Scaling (Loose Concrete or ACR Steel) |
| <b>06</b> Bridge Bearing Maintenance        | <b>12</b> Bridge Surface Repair        | <b>18</b> 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 <sup>2</sup>	
Environment:		Benign / Moderate / <b>Severe</b>		Limited Inspection <input type="checkbox"/>			
Protection System:							Perform. Deficiencies
Condition	Units		Exc.	Good	Fair	Poor	Perform. Deficiencies
Data:	m <sup>2</sup> / m / each / % / all			130			None
Comments: Wearing surface appears to be in overall good condition with no deficiencies noted.							
Recommended Work:				Maintenance Needs:		None	
<input type="checkbox"/> Rehab <input checked="" type="checkbox"/> Replace <input checked="" type="checkbox"/> Urgent <input type="checkbox"/> 1-5 years <input type="checkbox"/> 6-10 years <input type="checkbox"/> None				<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input type="checkbox"/> 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 Guiderail		Total Quantity:		140m	
Environment:		Benign / Moderate / <b>Severe</b>		Limited Inspection <input type="checkbox"/>			
Protection System:							Perform. Deficiencies
Condition	Units		Exc.	Good	Fair	Poor	Perform. Deficiencies
Data:	m <sup>2</sup> / m / each / % / all			140			None
Comments: Guiderail appears to be in overall good condition. It is assumed that the entire guardrail system will be replaced with steel beam guiderail and new end treatments during the culvert replacement to improve the safety of the roadway.							
Recommended Work:				Maintenance Needs:		None	
<input type="checkbox"/> Rehab <input checked="" type="checkbox"/> Replace <input checked="" type="checkbox"/> Urgent <input type="checkbox"/> 1-5 years <input type="checkbox"/> 6-10 years <input type="checkbox"/> None				<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input type="checkbox"/> 2 year			
Guiderail 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 <sup>2</sup>	
Environment:		Benign / Moderate / <b>Severe</b>		Limited Inspection <input type="checkbox"/>			
Protection System:							Perform. Deficiencies
Condition	Units		Exc.	Good	Fair	Poor	Perform. Deficiencies
Data:	m <sup>2</sup> / m / each / % / all			16.3			None
Comments: Wearing surface appears to be in overall good condition with no deficiencies noted.							
Recommended Work:				Maintenance Needs:		None	
<input type="checkbox"/> Rehab <input checked="" type="checkbox"/> Replace <input checked="" type="checkbox"/> Urgent <input type="checkbox"/> 1-5 years <input type="checkbox"/> 6-10 years <input type="checkbox"/> None				<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input type="checkbox"/> 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 <sup>2</sup>	
Environment:		Benign / <b>Moderate</b> / Severe		Limited Inspection <input type="checkbox"/>			
Protection System:		Hot Dip Galvanizing				Perform. Deficiencies	
Condition	Units	Exc.	Good	Fair	Poor	Perform. Deficiencies	
Data:	m <sup>2</sup> / m / each / % / all				135	02	
<p>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.</p>							
Recommended Work:				Maintenance Needs:		None	
<input type="checkbox"/> Rehab <input checked="" type="checkbox"/> Replace <input checked="" type="checkbox"/> Urgent <input type="checkbox"/> 1-5 years <input type="checkbox"/> 6-10 years <input type="checkbox"/> None				<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input type="checkbox"/> 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 / <b>Moderate</b> / Severe		Limited Inspection <input type="checkbox"/>			
Protection System:						Perform. Deficiencies	
Condition	Units	Exc.	Good	Fair	Poor	Perform. Deficiencies	
Data:	m <sup>2</sup> / m / <b>each</b> / % / all		3	1		None	
<p>Comments: Embankments are in overall good to fair condition. The northwest embankment has minor failure of the slope protection with some geotextile exposed.</p>							
Recommended Work:				Maintenance Needs:		None	
<input type="checkbox"/> Rehab <input checked="" type="checkbox"/> Replace <input checked="" type="checkbox"/> Urgent <input type="checkbox"/> 1-5 years <input type="checkbox"/> 6-10 years <input checked="" type="checkbox"/> None				<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input type="checkbox"/> 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 / <b>Moderate</b> / Severe		Limited Inspection <input type="checkbox"/>			
Protection System:						Perform. Deficiencies	
Condition	Units	Exc.	Good	Fair	Poor	Perform. Deficiencies	
Data:	m <sup>2</sup> / m / each / % / <b>all</b>		1			None	
<p>Comments: Watercourse appears to be in overall good condition.</p>							
Recommended Work:				Maintenance Needs:		None	
<input type="checkbox"/> Rehab <input type="checkbox"/> Replace <input type="checkbox"/> Urgent <input type="checkbox"/> 1-5 years <input type="checkbox"/> 6-10 years <input type="checkbox"/> None				<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input type="checkbox"/> 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
<b>Total Repair/Rehabilitation Cost:</b>				<b>\$205,000</b>
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
			<b>Total Associated Work Cost:</b>	<b>\$195,000</b>
			<b>Total Cost:</b>	<b>\$510,000</b>

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.