

#### MUNICIPALITY OF NORTHERN BRUCE PENINSULA

## 2022 STRUCTURE INSPECTION REPORT



WSP SUITE 101 1450, 1ST AVENUE WEST OWEN SOUND, ON, CANADA N4K 6W2

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# 2022 STRUCTURE INSPECTION REPORT

MUNICIPALITY OF NORTHERN BRUCE PENINSULA

FINAL

PROJECT NO.: 201-01605-00 DATE: APRIL 03, 2023

WSP SUITE 101 1450, 1ST AVENUE WEST OWEN SOUND, ON, CANADA N4K 6W2

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TABLE 1 Bridge/Culvert Inventory/Recommendation Summary
Repair/Replacement Recommendations and Financial Plan
Municipality of Northern Bruce Peninsula

April 2023 221-12948-00

| No  | News/Leastier  | Bridge or | Time                           | Sman      | Year Built/ | Conditions |          | Load Limit                      |                                   | Recommendati          | ons         | Repai           | rs/Upgrades       | Estimated Parlacement Cost        | Estimat<br>Exped | ted Life<br>ctancy |
|-----|--|-----------|--------------------------------|-----------|-------------|------------|----------|---------------------------------|-----------------------------------|-----------------------|-------------|-----------------|-------------------|-----------------------------------|------------------|--------------------|
| No. | Name/Location  | Culvert?  | Type                           | Span      | Repaired    | Conditions | Existing | Load Limit<br>Analysis Required | Annual Inpsections<br>Recommended | Repair/Rehabilitation | Replacement | Time<br>(Years) | Estimated<br>Cost | Replacement Cost - (2023 Dollars) | As-Is            | With<br>Repairs    |
| 1   | 4th Conc. Bridge S. of Barrow Bay Rd.<br>(Judges Creek)                          | Bridge    | Concrete Beam                  | 7.6 m     | 1937/1977   | Poor       | 12 t     | Yes                             | Yes                               | *AB, BP, CR, EP, SG   | Yes         | 1-5             | \$300,000         | \$575,000                         | 2025             | 2037               |
| 2   | 10th Sideroad Bridge, Lot 10, Conc 2 E<br>(Judges Creek)                         | Bridge    | Concrete, Open<br>Footing      | 6.2 m     | 1940        | Poor       | 8 t      | Yes                             | Yes                               | *AB, BP, CR, EP, SG   | Yes         | 0-1             | \$300,000         | \$525,000                         | 2021             | 2040               |
| 3   | Cherry Hill Road Bridge, Lot 6 (N.<br>Monument Corners) (Stokes - Chin<br>Creek) | Bridge    | Concrete Beam                  | 6.1 m     | 1940        | Fair/Poor  | 15 t     | -                               | -                                 | *AB, BP, CR, EP, SG   | Consider    | 1-5             | \$160,000         | \$550,000                         | 2025             | 2040               |
| 4   | Spring Creek Bridge, Ira Lake Road (Old<br>Hwy 6)                                | Bridge    | Concrete Rigid<br>Frame        | 4.5 m     | 1925        | Poor       | 5 t      | Yes                             | Yes                               | *AB, BP, CR, EP, SG   | Yes         | 0-1             | \$230,000         | \$575,000                         | 2019             | 2025               |
| 5   | Stokes Bay Road Bridge (Copper Kettle)<br>(Stokes Sideroad)                      | Bridge    | Concrete Rigid<br>Frame        | 7.9 m     | 1950/1988   | Fair/Good  | -        | -                               | -                                 | AB, BP, EP, CR, SG    | -           | 1-5             | \$150,000         | \$575,000                         | 2035             | 2050               |
| 6   | Heron Point Road Bridge, Stokes River  | Bridge    | Concrete Rigid<br>Frame        | 7.1 m     | 1952        | Poor       | 12 t     | Yes                             | Yes                               | *AB, EP, CR           | Yes         | 0-1             | \$260,000         | \$600,000                         | 2020             | 2052               |
| 7   | Lindsay Road 5 Culvert, Stokes River   | Bridge    | Concrete Rigid<br>Frame        | 7.3 m     | 1972        | Good       | -        | -                               | -                                 | **AB, BP, CR, EP, SG  | -           | 0-1             | \$58,000          | \$500,000                         | 2045             | 2072               |
| 8   | Isthmus Bay Road Bridge, Swan Lake<br>Drain                                      | Bridge    | Concrete Rigid<br>Frame        | 6.1 m     | 1950/2000   | Good       | -        | -                               | -                                 | AB, BP, CR, SG        | -           | 1-5             | \$80,000          | \$575,000                         | 2057             | 2075               |
| 9   | Cape Chin Culvert (S. Cape Chin<br>Sideroad), Chin Creek                         | Culvert   | Concrete Rigid<br>Frame (Arch) | 4.3 m     | 2008        | Good       | •        | -                               | -                                 | BP, EP, SG            | -           | 0-1             | \$7,000           | \$400,000                         | 2054             | 2083               |
| 10  | Lindsay Road 5 Culvert (Chin Creek)  | Culvert   | Steel MPPA                     | 4.4 m     | 1970        | Fair       | -        | -                               | -                                 | **AB, BP, SG          | -           | 0-1             | \$46,000          | \$325,000                         | 2029             | 2045               |
| 11  | Myles Bay Shore Road Bridge  | Bridge    | Concrete Rigid<br>Frame        | 7.3 m     | 2001        | Good       | -        | -                               | -                                 | *AB, BP, EP, CR       | -           | 0-1             | \$75,000          | \$625,000                         | 2060             | 2101               |
| 12  | Stokes Bay Road Culvert (Old Woman's River)                                      | Culvert   | Steel MPPA                     | 4.7 m     | 1967        | Fair       | -        | -                               | Yes                               | **AB, BP, EP, SG      | Consider    | 0-1             | \$50,000          | \$300,000                         | 2027             | 2042               |
| 13  | Bury Road Culvert, Old Woman's River (Fern Creek Drain)                          | Culvert   | Concrete Open<br>Footing       | 6.1 m     | 1960's      | Fair/Poor  | 15 t     | Yes                             | Yes                               | *AB, BP, EP, CR, SG   | -           | 1-5             | \$130,000         | \$500,000                         | 2026             | 2055               |
| 14  | East Road Culvert (N. Cape Chin Rd. 4) (Chin Creek - Stokes Road)                | Culvert   | Steel MPPA                     | 3.7 m     | 1975/2007   | Good/Fair  | ı        | -                               | -                                 | AB, BP, SG            | -           | 0-1             | \$3,000           | \$300,000                         | 2035             | 2050               |
| 15  | Conc. 4 Culvert (S. of Sideroad 10)  | Culvert   | Steel SCP                      | 3.1 m     | 2014        | Good       | -        | -                               | -                                 | *AP, BP, SG           | -           | 1-5             | \$65,000          | \$225,000                         | 2054             | 2074               |
| 16  | Barrow Bay Road Culvert, E. of Conc. 4,<br>Judges Creek                          | Culvert   | Steel MPPA                     | 7.0 m     | 1980        | Fair       | 1        | -                               | -                                 | EP, SG                | -           | 1-5             | \$9,000           | \$375,000                         | 2030             | 2050               |
| 17  | Conc. 4 Culvert (N. Barrow Bay Road)   | Culvert   | Steel MPPA                     | 3.6 m     | 1980        | Good       | -        | -                               | -                                 | *AB, BP, EP, SG       | -           | 0-1             | \$65,000          | \$250,000                         | 2030             | 2045               |
| 18  | 10th Sideroad, Judges Creek, Br. Drain   | Culvert   | Steel CSP                      | 2 & 1.5 m | 1990        | Good       | 1        | -                               | -                                 | *AB, BP, EP, SG       | -           | 0-1             | \$70,000          | \$250,000                         | 2040             | 2060               |
| 19  | Pike Bay Road, Judges Creek  | Culvert   | Steel MPPA                     | 4.5 m     | 1990        | Good       | -        | -                               | -                                 | AB, BP, EP, SG        | -           | 0-1             | \$18,000          | \$300,000                         | 2040             | 2060               |
|     | Totals   |           |                                |           |             |            |          |                                 |                                   |                       |             |                 | \$2,076,000       | \$8,325,000                       |                  |                    |

| Note: | Life Expectancy for Concrete Structures | Life Expectancy for CSP - MPPA |
|-------|---|--------------------------------|
|       |   | All years = 40 to 50 years     |
|       | Between 1960-1980 = 70 - 90 years       | -                              |
|       | Post 1980 = 80 - 100 years              |                                |

Legend (Upgrade/Repair Symbols): CR = Concrete Repair BP = Barrier Protection

BAP = Barrier Posts

AP = Approach

AB = Approach Barriers

STAP = Structure & Approach

EP = Erosion Protection

EMP = Embankment Protection

SG = Signage

<sup>\*</sup>Post or maintain warning speed reduction 35 km/hr. until AB & BP installed or upgraded.

\*\*Post or maintain warning speed reduction 45 km/hr. until AB & BP installed or upgraded.

Table 2
Bridge Condition Index (BCI) Values
Municipality of Northern Bruce Peninsula

April 2023 221-12948-00

| Structure ID | Name                                   | Age | BCI |
|--------------|--|-----|-----|
| 1            | Concession 4 Bridge                    | 86  | 24  |
| 2            | Sideroad 10 Bridge                     | 83  | 22  |
| 3            | Cherry Hill Road Bridge                | 83  | 37  |
| 4            | Spring Creek (Ira Lake Road) Bridge    | 98  | 25  |
| 5            | Copper Kettle (Stokes Bay Road) Bridge | 73  | 60  |
| 6            | Heron Point Road Bridge                | 71  | 31  |
| 8            | Isthmus Bay Road Bridge                | 73  | 55  |
| 9            | Cape Chin Culvert                      | 15  | 47  |

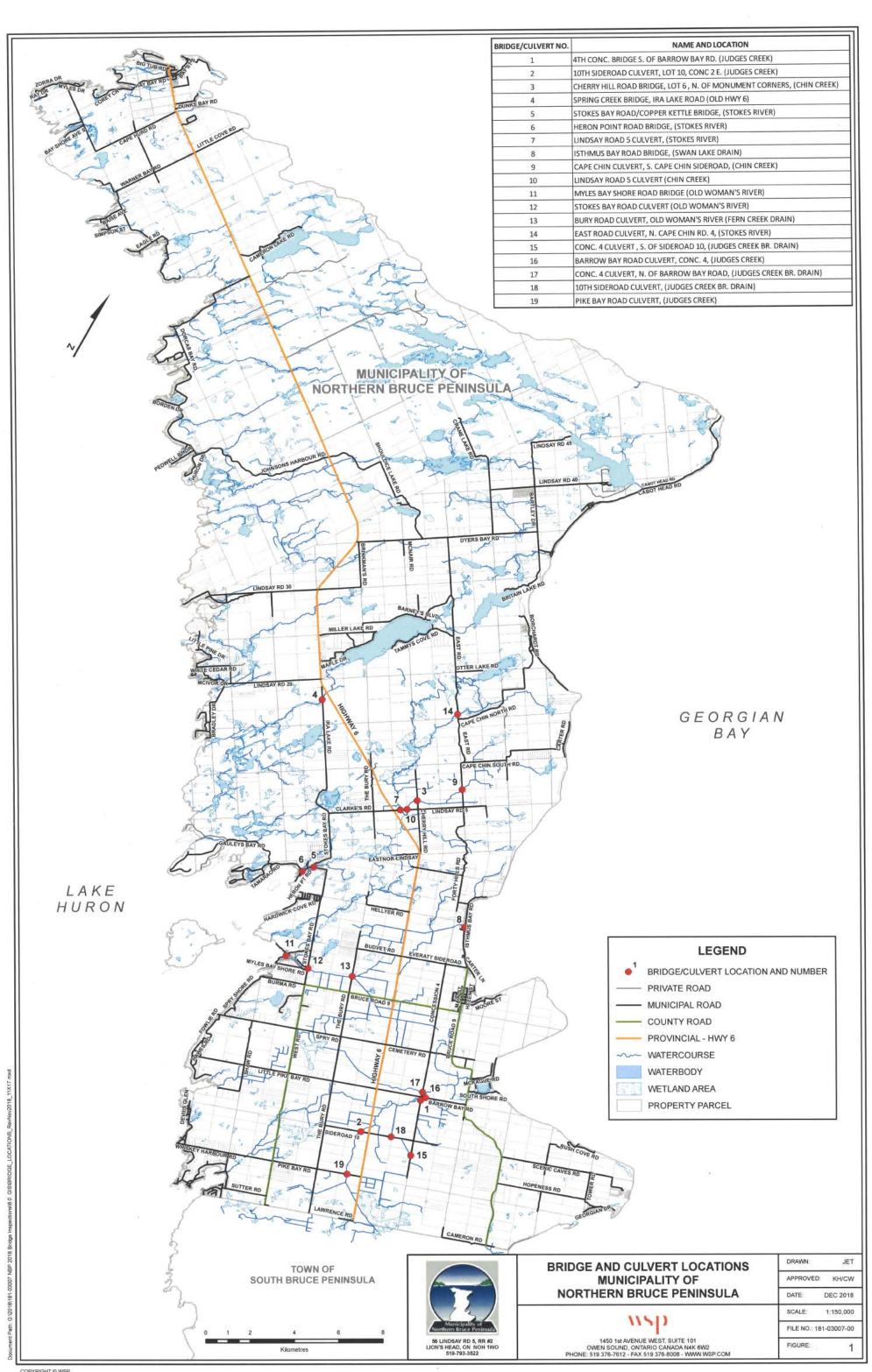
#### Legend

| Range  | Colour    | Recommendation                       |  |  |
|--------|-----------|--------------------------------------|--|--|
| 80-100 | Excellent | Continue Monitoring and Maintenance  |  |  |
| 60-80  | Good      | Continue Monitoring and Maintenance  |  |  |
| 40-60  | Fair      | Initiate planning for future repairs |  |  |
| 0-40   | Poor      | Schedule repairs in immediate future |  |  |

## TABLE 3 2022 Bridge/Culvert Maintenance Requirements Summary Municipality of Northern Bruce Peninsula

April 2023 221-12948-00

| thic Core. Bridge S. of Barrow Bay Rd. [Judges Creek]  Bridge  Construct Ream  FairPhore  Code of the readurates for derimage  Code of the includers and delivery explaints for distingle  Code of the includers and delivery explaints for distingle  Code of the includers and delivery explaints for distingle  Code of the watering states of distingle  Code of the watering states for distingle  Code of the watering states of distingle  Code of the watering states of distingle  Code of the watering states of distingle  Code of the watering states and clear vegetation for distingle  Code of the watering states and clear vegetation for distingle  Code of the watering states and clear vegetation for distingle  Code of the watering states and clear vegetation for distingle  Code of the watering states and clear vegetation for distingle  Code of the watering states and clear vegetation for distingle  Code of the watering states and clear vegetation for distingle  Code of the watering states and clear vegetation for distingle  Code of the watering states and clear vegetation for distingle  Code of the watering states and clear vegetation  | No. | Name/Location                          | Bridge /<br>Culvert | Туре          | Condition | Maintenance Requirement   | Time (Years) |
|--|-----|--|---------------------|---------------|-----------|---|--------------|
| 2 sins Siderward Bridger, Lot 10, Conc.2 E   Bridge   Concrete Copen   Poor   Concrete Sealer    | 1   |  | Bridge              | Concrete Beam | Fair/Poor | <ul> <li>Grade the shoulders and clear vegetation for drainage</li> <li>Clear debris along curbs for drainage</li> <li>Place four (4) End Hazard signs</li> <li>Align existing signs vertically and with traffic</li> </ul>   | 0-1          |
| 3 Concrete Beam Fair Beam Fair Concrete Beam Fair Concrete Beam Fair Concrete Beam Fair B | 2   |  | Bridge              |               | Poor      | Grade the shoulders and clear vegetation for drainage     Clear debris along curbs for drainage     Place four (4) End Hazard signs   | 0-1          |
| Spring Creek Bridge, Ira Lake Road (Old My 9)  Spring Creek Bridge, Ira Lake Road (Old My 9)  Bridge  Concrete Rigid Frame  Concrete Rigid Frame  Stokes Bay Road Bridge (Copper Kettle)  Bridge  Concrete Rigid Frame  Concrete Rigid Frame  Concrete Rigid Frame  Stokes Bay Road Bridge (Copper Kettle)  Bridge  Concrete Rigid Frame   | 3   |  | Bridge              | Concrete Beam | Fair      | Grade the shoulders and clear vegetation for drainage     Clear debris along curbs for drainage     Place four (4) End Hazard signs   | 1-5          |
| Final Price  | 4   |  | Bridge              |               | Poor      | Grade the wearing surface for drainage Grade the shoulders and clear vegetation for drainage Clear debris along curbs for drainage Align existing signs vertically and with traffic Place two (2) 35km/hr warning signs at each approach Place two (2) advanced load limit restriction warning signs at each approach | 0-1          |
| 7 Lindsay Road S Culvert, Stokes River  Bridge Frame Concrete Rigid Frame Sibrium Bay Road Bridge, Swan Lake Drain Bridge Concrete Rigid Frame Place four (4) End Hazard signs Frame Fr | 5   | , , , , , ,                            | Bridge              |               | Fair/Good |   | 0-1          |
| Stemmus Bay Road Bridge, Swan Lake   Bridge   Frame   Good   Place reduced speed limit 45 km/hr signage at each approach (or install   D-1   | 6   | Heron Point Road Bridge, Stokes River  | Bridge              |               | Poor      | Grade the south approach wearing surface for drainage   | 0-1          |
| Brilling Bay Noad Dright, Swart Lake   Bridge   Concrete Right   Concrete Right   Concrete Right   Steeroath, Chin Creek   Concrete Right   Frame   Arch)   Good   Place four (4) End Hazard sign   0-1  | 7   | Lindsay Road 5 Culvert, Stokes River   | Bridge              |               | Good      | Place reduced speed limit 45 km/hr signage at each approach (or install   | 0-1          |
| Sideroad), Chin Creek  | 8   | , , ,                                  | Bridge              |               | Good      | Clear debris along curbs for drainage   | 1-5          |
| Straighten northwest End Hazard sign   Straighten northwest End Hazard sign   Place two (2) 35km/hr warning signs at each approach (or install barrier protection)   | 9   |  | Culvert             |               | Good      |   | 0-1          |
| Myles Bay Shore Road Bridge Bridge Concrete rigid Frame Concrete rigid Frame Prame Prame Prame Prame Prame Prame Prame Prame Protection) Place four (4) End Hazard signs Place reduced speed limit 45 km/hr signage at each approach (or install barrier protection) Place four (4) End Hazard signs Place reduced speed limit 45 km/hr signage at each approach (or install barrier protection) Place four (4) End Hazard signs Place reduced speed limit 45 km/hr signage at each approach (or install barrier protection) Place four (4) End Hazard signs Place two (2) 35km/hr warning signs at each approach (or install barrier protection) Place four (4) End Hazard signs Place two (2) 35km/hr warning signs at each approach (or install barrier protection) Place four (4) End Hazard signs Place two (2) 35km/hr warning signs at each approach (or install barrier protection) Place four (4) End Hazard signs Place two (2) 35km/hr warning signs at each approach (or install barrier protection) Place four (4) End Hazard signs Place two (2) 35km/hr warning signs at each approach (or install barrier protection) Place four (4) End Hazard signs Place two (2) 35km/hr warning signs at each approach (or install barrier protection) Place four (4) End Hazard signs Place two (2) 35km/hr warning signs at each approach (or install barrier protection) Place two (2) 35km/hr warning signs at each approach (or install barrier protection) Place four (4) End Hazard signs Place two (2) 35km/hr warning signs at each approach (or install barrier protection) Place four (4) End Hazard signs      | 10  | Lindsay Road 5 Culvert (Chin Creek)    | Culvert             | Steel MPPA    | Fair      | Place four (4) End Hazard signs   | 0-1          |
| Stocks Bay Road Culvert, Clid Worthan's River    13   Bury Road Culvert, Old Woman's River (Fern Creek Drain)   Culvert   Concrete Open Footing   Fair   Fair   Fair   Footing   Fair   Fair   Footing   Fair   Fair   Footing   Fair   Fair   Footing   Fair   Fair   Fair   Footing   Fair   Fair   Footing   Fair   F | 11  | Myles Bay Shore Road Bridge            | Bridge              | _             | Good      | Place two (2) 35km/hr warning signs at each approach (or install barrier  | 0-1          |
| Bury Road Culvert, Old Woman's River (Fern Creek Drain)  Culvert  Culvert  Concrete Open Footing  Fair  Fair  Fair  Fair  Fair  Fair  Fair  Concrete Open Footing  Fair  | 12  |  | Culvert             | Steel MPPA    | Fair      | Place reduced speed limit 45 km/hr signage at each approach (or install   | 0-1          |
| 14 East Road Culvert (N. Cape Chin Rd. 4) (Chin Creek - Stokes Road)  Culvert Steel MPPA Good/Fair - Clear debris from inlet - Align guiderail marker signs vertically and with traffic - Align guiderail marker signs vertically and with traffic - Conc. 4 Culvert (S. of Sideroad 10)  Culvert Steel CSP Good - Grade the wearing surface for drainage - Place four (4) End Hazard signs - Place two (2) 35km/hr warning signs at each approach (or install barrier protection)  16 Barrow Bay Road Culvert, E. of Conc. 4, Judges Creek  Conc. 4 Culvert (N. Barrow Bay Road)  Culvert Steel MPPA Good - Place four (4) End Hazard signs - Place two (2) 35km/hr warning surface for drainage - Grade the wearing surface for drainage - Place the shoulders and clear vegetation for drainage - Place four (4) End Hazard signs - Place two (2) 35km/hr warning signs at each approach (or install barrier protection)  18 10th Sideroad, Judges Creek, Br. Drain Culvert Steel MPPA Good - Grade the wearing surface for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation for drainage - Grade the shoulders and clear vegetation | 13  |  | Culvert             |               | Fair      | Grade the shoulders and clear vegetation for drainage Clear debris along curbs for drainage Replace missing load limit signs Place two (2) 35km/hr warning signs at each approach (or install barrier protection)   | 1-5          |
| Conc. 4 Culvert (S. of Sideroad 10)  Culvert  Steel CSP  Good  Place four (4) End Hazard signs Place two (2) 35km/hr warning signs at each approach (or install barrier protection)  16 Barrow Bay Road Culvert, E. of Conc. 4, Judges Creek  Conc. 4 Culvert (N. Barrow Bay Road)  Culvert  Steel MPPA  Fair  Place four (4) End Hazard signs Place four (4) End Hazard signs  Grade the wearing surface for drainage Grade the wearing surface for drainage Grade the shoulders and clear vegetation for drainage Place four (4) End Hazard signs  Place four (4) End Hazard signs  Place two (2) 35km/hr warning signs at each approach (or install barrier protection)  18 10th Sideroad, Judges Creek, Br. Drain  Culvert  Steel MPPA  Good  Good  Grade the wearing surface for drainage Place four (4) End Hazard signs  Grade the wearing surface for drainage Grade the wearing surface for drainage Grade the wearing surface for drainage Grade the shoulders and clear vegetation for drai | 14  |  | Culvert             | Steel MPPA    | Good/Fair | Clear debris from inlet   | 0-1          |
| 17 Conc. 4 Culvert (N. Barrow Bay Road)  Culvert Steel MPPA  Steel MPPA  Good  | 15  | Conc. 4 Culvert (S. of Sideroad 10)    | Culvert             | Steel CSP     | Good      | Grade the wearing surface for drainage     Grade the shoulders and clear vegetation for drainage     Place four (4) End Hazard signs     Place two (2) 35km/hr warning signs at each approach (or install barrier   | 0-1          |
| Conc. 4 Culvert (N. Barrow Bay Road)  Culvert  Steel MPPA  Good  Culvert  Steel MPPA  Good  Align existing signs vertically and with traffic  Good  Good  Good  Good  Good  Align existing signs vertically and with traffic  Good  Good  Good  Good  Good  Good  Good  Align existing signs vertically and with traffic   | 16  |  | Culvert             | Steel MPPA    | Fair      | Place four (4) End Hazard signs   | 1-5          |
| 18 10th Sideroad, Judges Creek, Br. Drain Culvert Steel CSP Good • Grade the shoulders and clear vegetation for drainage 0-1 • Place four (4) End Hazard signs  19 Pike Bay Road Judges Creek Culvert Steel MPPA Good • Align existing signs vertically and with traffic 0-1   | 17  |  | Culvert             | Steel MPPA    | Good      | Grade the shoulders and clear vegetation for drainage     Place four (4) End Hazard signs     Place two (2) 35km/hr warning signs at each approach (or install barrier  | 0-1          |
| 19. Pike Bay Road, Judges Creek Culvert Steel MPPA Good • Align existing signs vertically and with traffic 0.1   | 18  | 10th Sideroad, Judges Creek, Br. Drain | Culvert             | Steel CSP     | Good      | Grade the shoulders and clear vegetation for drainage   | 0-1          |
|  | 19  | Pike Bay Road, Judges Creek            | Culvert             | Steel MPPA    | Good      | Align existing signs vertically and with traffic     Replace missing load limit sign  | 0-1          |



## **Bridge/Culvert Inspection Report**

| Site Number       | 1                     | <b>Project Number</b> | 221-12948-00             |      |    |  |
|-------------------|-----------------------|-----------------------|--------------------------|------|----|--|
| Structure Name    | 4th Concession Bridge | Municipality          | Northern Bruce Peninsula |      |    |  |
| MTO Region Code   | 30                    | County                | Bruce                    | Code | 02 |  |
| MTO District Code | 33                    | Geographic Twp Code   | 377                      |      |    |  |





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## Bridge/Culvert Inspection Report

| Inventory Data  |   |  |                               |  |  |  |  |
|---|---|--|-------------------------------|--|--|--|--|
| Structure Name  | 4th Concession Bridge   | Site Number  | 1                             |  |  |  |  |
| County  | Bruce   | Road Name  | 4th Concession                |  |  |  |  |
| Municipality  | Northern Bruce Peninsula  | Road Type  | Rural Local - Gravel          |  |  |  |  |
| Bridge or Culvert   | Bridge  | Owner  | Northern Bruce Peninsula      |  |  |  |  |
| Structure Type  | Concrete Beam   | AADT   | 100                           |  |  |  |  |
| Span (m)  | 7.6 No. 1   | % Trucks   | 15%                           |  |  |  |  |
| Height (m)  | 2.6   | Overall Structure Width (m)  | 6.4                           |  |  |  |  |
| Direction of Structure  | East/West - 22° skew  | Roadway Width (m)  | 5                             |  |  |  |  |
| Year Built/Rehabilitated  | 1937/1977   | Total Deck Length (m)  | 8.3                           |  |  |  |  |
| Current Load Limit  | 12 t  | Total Deck Area (s.m.)   | 48.64                         |  |  |  |  |
| Detour Length (km)  | 6   | None   |                               |  |  |  |  |
| Waterway  | Judges Creek  |  |                               |  |  |  |  |
| Inspection Data   |   |  |                               |  |  |  |  |
| Date of Inspection  | December 5, 2022  | Photos:<br>1-1 - Title Page  |                               |  |  |  |  |
| Name of Inspector   | Evan Montreuil, P.Eng.  | 1-2 - South abutment, soffit ar  | nd foundation                 |  |  |  |  |
|   |   | 1-3 - Abutment, girders and so delamination  | offit with spalling and       |  |  |  |  |
| Equipment Used  | Tape, pick, hammer  | 1-4 - North abutment, soffit and foundation 1-5 - Wingwall deterioration (typical) |                               |  |  |  |  |
| Weather Conditions  | Overcast  | 1-6 - Structure barrier and exc<br>1-7 - Embankment erosion bel                    | essive granular fill on deck  |  |  |  |  |
| Temperature   | 5°C   | abutment<br>1-8 - Vegetation & debris accu   |                               |  |  |  |  |
| •   |   | potholes in wearing surface<br>1-9 - Structure elevation, exter                    | rior soffit, curb and barrier |  |  |  |  |
| Last Inspection   | September 24, 2020  | 1-10 - View of watercourse up<br>1-11 - View of watercourse do                     |                               |  |  |  |  |
|   |   | 1-12 - Abutment wall drain ar  | nd wingwall                   |  |  |  |  |
| Additional Investigation<br>Required  | Foundation inspection, load limit analy   | sis and deck condition survey  |                               |  |  |  |  |
| Total Rehabilitation  | Place new approach and barrier protect<br>repair. Place foundation erosion protect<br>off deck. (Replacement recommended) | ction and repair. Place hazard sign  |                               |  |  |  |  |
| Total Rehabilitation<br>Budget Costing  | \$300,000   | Next Inspection  | December 2024                 |  |  |  |  |
| Due to the current condition of the structure, rehabilitation is no longer considered an economical solution. Complete replacement is recommended. Maintain the speed limit at 35 km/hr. as interim measure until barrier approach protection is in place. Maintain the load limit or reduce further following additional investigations recommended. |   |  |                               |  |  |  |  |

| Element Group:  | Decks L                       |                             | Length:   |                     | 9.1 m  |                       |                 |  |  |
|---|-------------------------------|-----------------------------|-----------|---------------------|--------|-----------------------|-----------------|--|--|
| Element Name:   | Wearing Sur                   | face                        | Width:    |                     | 5 m    |                       |                 |  |  |
| Location:   |                               |                             | Height:   |                     |        |                       |                 |  |  |
| Material:   | Gravel                        | Gravel                      |           |                     |        |                       |                 |  |  |
| Element Type:   |                               | Total Quantity:             |           | 45.5 m <sup>2</sup> |        |                       |                 |  |  |
| Environment:  | Severe                        | Limited Insp'n:             |           |                     |        |                       |                 |  |  |
| Protection System:  |                               |                             |           | -                   |        |                       |                 |  |  |
| Condition Data:   | Units                         | Exc.                        | Good      | Fair                | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |  |
|   | m <sup>2</sup>                |                             |           | 27.3                | 18.2   | Yes                   | Yes             |  |  |
| Comments:  The deck is flat (no grade) with poor drainage, debris accumulation on each side, and an excess of granular fill. Potholes have developed in the wheel path. |                               |                             |           |                     |        |                       |                 |  |  |
| Recommended Work:   | None<br>Grade and clear debri | 6-10 Years<br>s along curbs | 1-5 Years | < 1 Year            | Urgent |                       |                 |  |  |

#### **Element Data**

| Element Group:     | Decks                   |                 | Length:              |                      |             | 9.1 m        |        |  |
|--------------------|-------------------------|-----------------|----------------------|----------------------|-------------|--------------|--------|--|
| Element Name:      | Deck To                 | ρ               | Width:               | 5.8 m                |             |              |        |  |
| Location:          |                         |                 | Height:              |                      |             |              |        |  |
| Material:          | Concrete                |                 | Count:               |                      |             |              |        |  |
| Element Type:      |                         | Total Quantity: |                      | 52.78 m <sup>2</sup> |             |              |        |  |
| Environment:       | Moderate                | Limited Insp'n: |                      | Yes                  |             |              |        |  |
| Protection System: |                         |                 |                      | -                    |             |              |        |  |
|                    | Units                   | Exc.            | Good                 | Fair Poo             | Poor        | Perform.     | Maint. |  |
| Condition Data:    |                         |                 |                      |                      |             | Deficiencies | Needs  |  |
|                    | m <sup>2</sup>          |                 |                      | 52.78                |             |              |        |  |
| Comments:          | Limited inspection of t | he top deck co  | ondition due to cov  | er with gra          | nular weari | ing surface. |        |  |
|                    |                         |                 |                      |                      |             |              |        |  |
|                    |                         |                 |                      |                      | •           |              |        |  |
| Recommended Work:  | None                    | 6-10 Years      |                      | < 1 Year             | Urgent      |              |        |  |
|                    | Grade out excess grav   | vel and inspec  | t the condition of t | he concrete          | e deck top. |              |        |  |

| Element Group:     | Decks                      | Decks                        |                   |                           | 7      | 7.6 m                 |                 |  |  |
|--------------------|----------------------------|------------------------------|-------------------|---------------------------|--------|-----------------------|-----------------|--|--|
| Element Name:      | Soffit - Thick             | Slab                         | Width:            | 6.9 m                     |        |                       |                 |  |  |
| Location:          |                            |                              | Height:           |                           |        |                       |                 |  |  |
| Material:          | Concrete                   |                              | Count:            |                           |        |                       |                 |  |  |
| Element Type:      | 7                          |                              | Total Quantity:   | 48.64 m <sup>2</sup>      |        |                       |                 |  |  |
| Environment:       | Moderate                   |                              | Limited Insp'n:   |                           |        |                       |                 |  |  |
| Protection System: |                            |                              |                   | •                         |        |                       |                 |  |  |
| Condition Data:    | Units                      | Exc.                         | Good              | Fair                      | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |  |
|                    | m <sup>2</sup>             |                              |                   | 38.91                     | 9.73   | Yes                   | Yes             |  |  |
| Comments:          | Exterior soffit concrete   | e loss with exp              | osed rebar was ol | served.                   |        |                       |                 |  |  |
| Recommended Work:  | None<br>Remove delaminated | 6-10 Years<br>concrete, clea |                   | ] < 1 Year<br>e concrete. | Urgent |                       |                 |  |  |

| Element Group:  | Decks    |      | Length:         |               |      |              |        |  |  |
|---|----------|------|-----------------|---------------|------|--------------|--------|--|--|
| Element Name:   | Drainage |      | Width:          |               |      |              |        |  |  |
| Location:   |          |      |                 |               |      |              |        |  |  |
| Material:   | Concrete |      | Count:          |               |      |              |        |  |  |
| Element Type:   | -        |      | Total Quantity: | 2 (each side) |      |              |        |  |  |
| Environment:  | Severe   |      | Limited Insp'n: | ·             |      |              |        |  |  |
| Protection System:  |          |      |                 |               |      |              |        |  |  |
|   | Units    | Exc. | Good            | Fair          | Poor | Perform.     | Maint. |  |  |
| Condition Data:   | Utilis   |      | Good            |               |      | Deficiencies | Needs  |  |  |
|   | Each     |      |                 |               | 2    | Yes          | Yes    |  |  |
| Comments: Flat through the length of the structure deck impeding the curb to shoulder drainage (each side).  Debris and vegetation have accumulate along the curbs preventing drainage. |          |      |                 |               |      |              |        |  |  |
| Recommended Work: None 6-10 Years 1-5 Years <a></a> <a></a> <a></a> 1 Year Urgent Urgent Annual maintenance, clear debris and grade to achieve positive drainage.                       |          |      |                 |               |      |              |        |  |  |

#### **Element Data**

| Element Group:   | Sidewalks/cui          | bs        | Length:         |        | 1    | 1.5 m                 |                 |  |  |
|--|------------------------|-----------|-----------------|--------|------|-----------------------|-----------------|--|--|
| Element Name:  | Curbs                  |           | Width:          | 0.3 m  |      |                       |                 |  |  |
| Location:  |                        |           | Height:         | 0.16 m |      |                       |                 |  |  |
| Material:  | Concrete               |           | Count:          | 2      |      |                       |                 |  |  |
| Element Type:  | ent Type:              |           | Total Quantity: |        | 10   | .58 m²                |                 |  |  |
| Environment:   | Severe                 |           | Limited Insp'n: |        |      |                       |                 |  |  |
| Protection System:   |                        |           |                 |        |      |                       |                 |  |  |
| Condition Data:  | Units                  | Exc.      | Good            | Fair   | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |
|  | m <sup>2</sup>         |           |                 | 4.23   | 6.35 | Yes                   | Yes             |  |  |
| Comments:  | Severe surface spallir | g was obs | erved.          |        |      |                       |                 |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Remove poor concrete areas, clean reinforcing steel, and replace concrete. |                        |           |                 |        |      |                       |                 |  |  |

| Element Group:     | Barriers   |                            | Length:                                 |                            | 1                           | 1.5 m                 |                 |  |  |
|--------------------|--|----------------------------|---|----------------------------|-----------------------------|-----------------------|-----------------|--|--|
| Element Name:      | Barrier/Parapet \  | Width:                     | 0.17 m                                  |                            |                             |                       |                 |  |  |
| Location:          |  |                            | Height:                                 | 1.07 m                     |                             |                       |                 |  |  |
| Material:          | Concrete   |                            | Count:                                  |                            |                             | 2                     |                 |  |  |
| Element Type:      |  |                            | Total Quantity:                         |                            |                             |                       |                 |  |  |
| Environment:       | Severe   |                            | Limited Insp'n:                         |                            |                             |                       |                 |  |  |
| Protection System: |  |                            |   |                            |                             |                       |                 |  |  |
| Condition Data:    | Units  | Exc.                       | Good                                    | Fair                       | Poor                        | Perform. Deficiencies | Maint.<br>Needs |  |  |
|                    | m <sup>2</sup>   |                            |   |                            | 24.61                       |                       |                 |  |  |
| Comments:          | Section loss of vertica<br>rebar exposed and wit<br>and there is no approa | th observed<br>ach protect | d section loss. Th<br>ion, presenting a | e current co<br>pedestrian | onfiguration<br>and vehicle | does not mee          |                 |  |  |
| Recommended Wo     | <b>rk:</b> None<br>Remove and replace t<br>km/hr in the interim.           | -                          | s 1-5 Years<br>and add approacl         | < 1 Year<br>h protection   | , ,                         | the speed limit       | of 35           |  |  |

| Element Group:   | Barriers             | Barriers Length: 0.1 |                     |            |             |                       |                 |  |  |  |
|--|----------------------|----------------------|---------------------|------------|-------------|-----------------------|-----------------|--|--|--|
| Element Name:  | Posts                |                      | Width:              | 0.17 m     |             |                       |                 |  |  |  |
| Location:  |                      |                      | Height:             | 1.07 m     |             |                       |                 |  |  |  |
| Material:  | Concrete             | Count:               |                     |            | 12          |                       |                 |  |  |  |
| Element Type:  |                      |                      | Total Quantity:     | 12         |             |                       |                 |  |  |  |
| Environment:   | Severe               |                      | Limited Insp'n:     |            |             |                       |                 |  |  |  |
| Protection System:   |                      |                      |                     |            |             |                       |                 |  |  |  |
| Condition Data:  | Units                | Exc.                 | Good                | Fair       | Poor        | Perform. Deficiencies | Maint.<br>Needs |  |  |  |
|  | Each                 |                      |                     |            | 12          | Yes                   |                 |  |  |  |
| Comments: Surface spalling and exposed rebar at the post bases were observed.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                      |                      |                     |            |             |                       |                 |  |  |  |
|  | Remove and replace t | the posts wit        | h the barrier and a | add approa | ch protecti | on.                   |                 |  |  |  |

#### **Element Data**

| Element Group:     | Beam/MLE  | 's                      | Length:         | 7.6 m    |        |                          |                 |  |
|--------------------|---|-------------------------|-----------------|----------|--------|--------------------------|-----------------|--|
| Element Name:      | Floor Bean  | าร                      | Width:          | 0.41 m   |        |                          |                 |  |
| Location:          |   | Height:                 |                 | 0.       | 61 m   |                          |                 |  |
| Material:          | Concrete  | Count:                  |                 |          | 4      |                          |                 |  |
| Element Type:      |   |                         | Total Quantity: |          | 49.    | .55 m <sup>2</sup>       |                 |  |
| Environment:       | Moderate  | ;                       | Limited Insp'n: |          |        |                          |                 |  |
| Protection System: |   |                         | •               |          |        |                          |                 |  |
| Condition Data:    | Units   | Exc.                    | Good            | Fair     | Poor   | Perform.<br>Deficiencies | Maint.<br>Needs |  |
|                    | m <sup>2</sup>  |                         |                 | 12.39    | 37.16  | Yes                      | Yes             |  |
| Comments:          | Four concrete girders   |                         |                 |          |        |                          |                 |  |
| Recommended Work   | beam concrete has sp<br>and cracking at the at<br>c: None<br>Repair all poor concre | outments.<br>6-10 Years | 1-5 Years       | < 1 Year | Urgent | some exposed             | d rebar         |  |

| Element Group:     | Abutment   | 3                            | Length:         |                          |                    |                          |                 |
|--------------------|--|------------------------------|-----------------|--------------------------|--------------------|--------------------------|-----------------|
| Element Name:      | Abutment W                                       | alls                         | Width:          |                          | 7.                 | 62 m                     |                 |
| Location:          |  |                              | Height:         | 1.78 m                   |                    |                          |                 |
| Material:          | Concrete   |                              | Count:          | 2                        |                    |                          |                 |
| Element Type:      | -  |                              | Total Quantity: | ,                        |                    |                          |                 |
| Environment:       | Moderate   |                              | Limited Insp'n: |                          |                    |                          |                 |
| Protection System: |  |                              |                 |                          |                    |                          |                 |
| Condition Data:    | Units  | Exc.                         | Good            | Fair                     | Poor               | Perform.<br>Deficiencies | Maint.<br>Needs |
|                    | m <sup>2</sup>                                   |                              |                 | 18.99                    | 8.14               | Yes                      | Yes             |
| Comments:          | Surface cracking, spa<br>significant water stain | ing and verti                | cal cracking.   |                          |                    | abutment has             | <b>;</b>        |
| Recommended Work   | :: None<br>Repair all poor concre                | 6-10 Years<br>te, clean reir |                 | < 1 Year<br>I replace co | Urgent<br>oncrete. |                          |                 |

| Element Group:              | Abutments   |                   | Length:         |          | ;                  | 3.05                  |                 |  |
|-----------------------------|---|-------------------|-----------------|----------|--------------------|-----------------------|-----------------|--|
| Element Name:               | Wingwalls   |                   | Width:          |          |                    |                       |                 |  |
| Location:                   |   |                   | Height:         | 1.83     |                    |                       |                 |  |
| Material:                   | Concrete  | Concrete Count: 4 |                 |          |                    |                       |                 |  |
| Element Type:               |   |                   | Total Quantity: |          | 22                 | .32 m <sup>2</sup>    |                 |  |
| Environment:                | Moderate  |                   | Limited Insp'n: |          |                    |                       |                 |  |
| Protection System:          |   |                   |                 |          |                    |                       |                 |  |
| Condition Data:             | Units   | Exc.              | Good            | Fair     | Poor               | Perform. Deficiencies | Maint.<br>Needs |  |
|                             | %   |                   |                 | 11.16    | 11.16              |                       | Yes             |  |
| Comments:  Recommended Work | Surface spalling & cra  : None Repair all poor concre | 6-10 Years        | 1-5 Years       | < 1 Year | Urgent<br>oncrete. |                       |                 |  |

#### **Element Data**

| Element Group:     | Foundation              | S            | Length:              |              |            |                |           |
|--------------------|-------------------------|--------------|----------------------|--------------|------------|----------------|-----------|
|                    |                         |              |                      |              |            |                |           |
| Element Name:      | Foundation (below gre   | ound level)  | Width:               |              |            |                |           |
| Location:          |                         |              | Height:              |              |            |                |           |
| Material:          | Concrete                |              | Count:               |              |            |                |           |
| Element Type:      |                         |              | Total Quantity:      |              |            |                |           |
| Environment:       | Moderate                |              | Limited Insp'n:      |              |            | √              |           |
| Protection System: |                         |              |                      | •            |            |                |           |
| ·                  | Units                   | Exc.         | Good                 | Fair         | Poor       | Perform.       | Maint.    |
| Condition Data:    | Units                   | EXC.         | Good                 | Ган          | F001       | Deficiencies   | Needs     |
|                    |                         |              |                      |              |            | Yes            | Yes       |
| Comments:          | Limited inspection due  | e to high wa | ater level. Previous | reports ind  | icated poo | r condition of | concrete. |
|                    | See 2020 report for m   | ore informa  | ation.               |              |            |                |           |
| Recommended Work   | : None                  | 6-10 Years   | 1-5 Years            | < 1 Year     | Urgent     |                |           |
|                    | Repair all poor concre  | ete and plac | e erosion protection | on south sid | e.         |                |           |
|                    | Further investigation i | equired.     | ·                    |              |            |                |           |

| Element Group:     | Embankments & S                                 | Streams    | Length:            |               |             |                       |                 |
|--------------------|---|------------|--------------------|---------------|-------------|-----------------------|-----------------|
| Element Name:      | Streams and Water                               | erways     | Width:             |               |             |                       |                 |
| Location:          |   |            | Height:            |               |             |                       |                 |
| Material:          | Earth / Ston                                    | е          | Count:             |               |             |                       |                 |
| Element Type:      |   |            | Total Quantity:    |               |             | All                   |                 |
| Environment:       | Moderate  |            | Limited Insp'n:    |               |             |                       |                 |
| Protection System: |   |            |                    | •             |             |                       |                 |
| Condition Data:    | Units   | Exc.       | Good               | Fair          | Poor        | Perform. Deficiencies | Maint.<br>Needs |
|                    | All   |            |                    | All           |             |                       |                 |
| Comments:          | Low velocity stream/ r<br>no obstructions obser | •          | rain has been dred | lged in the p | past. The b | ed appears st         | able with       |
| Recommended Work   | None  | 6-10 Years | s 1-5 Years        | < 1 Year      | Urgent      |                       |                 |

| Element Group:     | Embankments & S                             | Streams | Length:           |            |                    |                       |                 |
|--------------------|---|---------|-------------------|------------|--------------------|-----------------------|-----------------|
| Element Name:      | Embankmen                                   | ıts     | Width:            |            |                    |                       |                 |
| Location:          |   |         | Height:           |            |                    |                       |                 |
| Material:          | Earth / Stone                               | е       | Count:            |            |                    |                       |                 |
| Element Type:      |   |         | Total Quantity:   |            |                    | 6                     |                 |
| Environment:       | Moderate                                    |         | Limited Insp'n:   |            |                    |                       |                 |
| Protection System: |   |         | •                 |            |                    |                       |                 |
| Condition Data:    | Units                                       | Exc.    | Good              | Fair       | Poor               | Perform. Deficiencies | Maint.<br>Needs |
|                    | Each  |         |                   | 4          | 2                  | Yes                   | Yes             |
| Comments:          | Stone and well vegetate wingwall.  rk: None |         | bankments with so | me erosior | observed<br>Urgent | along the back        | of the          |
| Necommended Wo     | Stabilize the eroded slo                    |         |                   |            | 0                  |                       |                 |

#### **Element Data**

| Element Group:     | Embankments & S                             | Streams                   | Length:           |                         |                |                       |                 |
|--------------------|---|---------------------------|-------------------|-------------------------|----------------|-----------------------|-----------------|
| Element Name:      | Slope Protect                               | ion                       | Width:            |                         |                |                       |                 |
| Location:          |   |                           | Height:           |                         |                |                       |                 |
| Material:          | Earth / Ston                                | е                         | Count:            |                         |                |                       |                 |
| Element Type:      |   |                           | Total Quantity:   |                         |                | 6                     |                 |
| Environment:       | Moderate                                    |                           | Limited Insp'n:   |                         |                |                       |                 |
| Protection System: |   |                           |                   |                         |                |                       |                 |
| Condition Data:    | Units                                       | Exc.                      | Good              | Fair                    | Poor           | Perform. Deficiencies | Maint.<br>Needs |
|                    | Each  |                           |                   | 4                       | 2              | Yes                   | Yes             |
| Comments:          | Stone and well vegetate wingwall.           | ed Earth em               | bankments with so | me erosior              | observed       | along the back        | of the          |
| Recommended Wor    | <b>'k:</b> None<br>Stabilize the eroded slo | 6-10 Years<br>pes by addi |                   | < 1 Year<br>ock protect | Urgent<br>ion. |                       |                 |

| Element Group:     | Signs   |                             | Length:             |                  |             |                       |                 |
|--------------------|---|-----------------------------|---------------------|------------------|-------------|-----------------------|-----------------|
| Element Name:      | Signs   |                             | Width:              |                  |             |                       |                 |
| Location:          |   |                             | Height:             |                  |             |                       |                 |
| Material:          | Steel   |                             | Count:              |                  |             |                       |                 |
| Element Type:      |   |                             | Total Quantity:     |                  |             | 4                     |                 |
| Environment:       | Moderate  |                             | Limited Insp'n:     |                  |             |                       |                 |
| Protection System: |   |                             | -                   |                  |             |                       |                 |
| Condition Data:    | Units   | Exc.                        | Good                | Fair             | Poor        | Perform. Deficiencies | Maint.<br>Needs |
|                    | %   |                             |                     | 4                |             | Yes                   | Yes             |
| Comments:          | Load limit, speed limit a straightening vertically. | ind narrow s                | tructure signs in p | lace, but ar     | e not pluml | b and require         |                 |
| Recommended Wor    | r <b>k:</b> None<br>Place four end hazard s         | 6-10 Years<br>signs and str |                     | < 1 Year<br>gns. | Urgent      |                       |                 |

| Element Group:   | Approaches      | 3    | Length:         |                              |      | 5 m      |        |  |  |
|--|-----------------|------|-----------------|------------------------------|------|----------|--------|--|--|
| Element Name:  | Wearing Surface |      | Width:          | 5 m                          |      |          |        |  |  |
| Location:  |                 |      | Height:         |                              |      |          |        |  |  |
| Material:  | Gravel          |      | Count:          | 2                            |      |          |        |  |  |
| Element Type:  |                 |      | Total Quantity: | 50 m <sup>2</sup>            |      |          |        |  |  |
| Environment:   | Moderate        |      | Limited Insp'n: | :                            |      |          |        |  |  |
| Protection System:   |                 |      | -               |                              |      |          |        |  |  |
|  | Units           | Exc. | Good            | Egir                         | Poor | Perform. | Maint. |  |  |
| Condition Data:  |                 | EXC. | Good            | Fair Poor Deficiencies Needs |      |          |        |  |  |
|  | $m^2$           |      |                 | 50                           |      |          | Yes    |  |  |
| Comments: Shoulder vegetation has started to encroach on the roadway. Minor potholes and wheel path rutting have developed at each approach. |                 |      |                 |                              |      |          |        |  |  |
| Recommended Work: None 6-10 Years 1-5 Years <a href="#">&lt; 1 Year</a> Urgent Grade the shoulders and clear the encroaching vegetation.     |                 |      |                 |                              |      |          |        |  |  |

| Element Group:     | Approaches                        | 3                          | Length:           |                     |        |                          |                 |
|--------------------|-----------------------------------|----------------------------|-------------------|---------------------|--------|--------------------------|-----------------|
| Element Name:      | Drainage                          |                            | Width:            |                     |        |                          |                 |
| Location:          |                                   |                            | Height:           |                     |        |                          |                 |
| Material:          | Gravel                            |                            | Count:            |                     |        |                          |                 |
| Element Type:      |                                   |                            | Total Quantity:   |                     |        | 4                        |                 |
| Environment:       | Severe                            |                            | Limited Insp'n:   |                     |        |                          |                 |
| Protection System: |                                   |                            |                   |                     |        |                          |                 |
| Condition Data:    | Units                             | Exc.                       | Good              | Fair                | Poor   | Perform.<br>Deficiencies | Maint.<br>Needs |
|                    | Each                              |                            |                   |                     | 4      | Yes                      | Yes             |
| Comments:          | Shoulder vegetation h             | as started                 | to encroach on th | e roadway.          |        |                          |                 |
| Recommended Wo     | rk: None<br>Grade the shoulders a | 6-10 Years<br>and clear th | -                 | < 1 Year egetation. | Urgent |                          |                 |



Photo 1-2: South abutment, soffit and exterior girder.



Photo 1-3: North abutment, girders and soffit with spalling and delamination



Photo 1-4: South abutment wall, soffit and girders



Photo 1-5: Wingwall deterioration (typ)



Photo 1-6 - Structure barrier and excessive granular fill on deck



Photo 1-7 - Embankment erosion behind south footing and abutment (Sept. 24, 2020)



Photo 1-8 - Vegetation and debris accumulation along shoulders, potholes in wearing surface  $\,$ 



Photo 1-9 - Structure elevation, exterior soffit, curb and barrier



Photo 1-10 - View of watercourse upstream



Photo 1-11- View of watercourse downstream



Photo 1-12 - Abutment wall drain and wingwall

## **Bridge/Culvert Inspection Report**

Site Number **Project Number** 221-12948-00 10th Sideroad Bridge Municipality Northern Bruce Peninsula **Structure Name** 30 02 MTO Region Code County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





1450 - 1st Avenue West, Suite 101 Owen Sound, Ontario N4K 6W2 Tel: 519-376-7612 Fax: 519-376-8008 Website: www.wspgroup.com

### Bridge/Culvert Inspection Report

| Inventory Data                         |   |   |                               |
|--|---|---|-------------------------------|
| Structure Name                         | 10th Sideroad Bridge  | Site Number   | 2                             |
| County                                 | Bruce   | Road Name   | 10th Sideroad                 |
| Municipality                           | Northern Bruce Peninsula  | Road Type   | Rural Local                   |
| Bridge or Culvert                      | Bridge  | Owner   | Northern Bruce Peninsula      |
| Structure Type                         | Concrete Slab - Open Footing  | AADT  | 150                           |
| Span (m)                               | 6.2 No. 1   | % Trucks  | 15%                           |
| Height (m)                             | 2.7   | Overall Structure Width (m)                                   | 6.75                          |
| Direction of Structure                 | North/South - 20° skew  | Roadway Width (m)   | 6.1                           |
| Year Built/Rehabilitated               | 1940  | Total Deck Length (m)   | 6.1                           |
| Current Load Limit                     | 8 t   | Total Deck Area (s.m.)  | 52                            |
| Detour Length (km)                     | 6   | Heritage Des.   | None                          |
| Waterway                               | Judges Creek  |   |                               |
| Inspection Data                        |   |   |                               |
| Date of Inspection                     | December 5, 2022  | Photos:   |                               |
| Name of Insurantan                     | E. Mantauril D. E. a  | 2-1 - Title Page  |                               |
| Name of Inspector                      | Evan Montreuil, P.Eng.  | 2-2 - Spalling of exterior curb 2-3 - Structure deck          |                               |
| Equipment Used                         | Tape, pick, hammer  | 2-4 - West abutment and sout                                  | h exterior soffit             |
|  |   | 2-5 - Structure elevation, wing soffit                        | gwalls, exterior curb and     |
| Weather Conditions                     | Overcast  | 2-6 - Extreme efflorescence a                                 |                               |
|  |   | 2-7 - Erosion at structure foot wingwall (typical)            | ing, efflorescence of         |
| Temperature                            | 5°C   | 2-8 - Delamination of soffit                                  |                               |
|  |   | 2-9 - Load limit posting                                      |                               |
|  |   | 2-10 - View of watercourse up<br>2-11 - View of watercourse d | =                             |
|  |   | Photo 2-12: Wingwall, abutm delamination.                     |                               |
| Last Inspection                        | October 30, 2020  |   |                               |
| Additional Investigation               | Undertake annual inspections - deck   | soffit and foundation, load limit an                          | alysis                        |
| Required                               |   | ,   | -                             |
| T (ID I 199)                           | Install approach and barrier protectio  | n, complete concrete beam, soffit a                           | nd curb repair and            |
| Total Rehabilitation                   | footing/foundation underpinning. Pla  |   |                               |
| Total Rehabilitation<br>Budget Costing | \$300,000   | Next Inspection   | December 2023                 |
|  | Due to the age, poor condition, and lo  | oad carrying capacity, complete rep                           | lacement is recommended as    |
| Justification                          | being most cost effective for long term<br>barrier protection installed. Maintain<br>additional investigations. | m service life. Reduce the posted s                           | peed limit to 35 km/hr. until |

| Element Group:           | Decks  |            | Length:         | 6.7 m    |        |                       |                 |  |  |
|--------------------------|--|------------|-----------------|----------|--------|-----------------------|-----------------|--|--|
| Element Name:            | Wearing Su   | ırface     | Width:          | 6.1 m    |        |                       |                 |  |  |
| Location:                |  |            | Height:         |          |        |                       |                 |  |  |
| Material:                | Concrete   |            | Count:          |          |        |                       |                 |  |  |
| Element Type:            |  |            | Total Quantity: |          | 40     | ).87 m <sup>2</sup>   |                 |  |  |
| Environment:             | Severe   | )          | Limited Insp'n: |          |        |                       |                 |  |  |
| Protection System:       |  | None       |                 |          |        |                       |                 |  |  |
| Condition Data:          | Units  | Exc.       | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |  |
|                          | m <sup>2</sup>   |            |                 | 36.79    | 4.08   |                       | Yes             |  |  |
| Comments: Recommended Wo | Moderarte surface we curb.  rk: None Clear granulars and o | 6-10 Years | 1-5 Years       | < 1 Year | Urgent | ccumulated alo        | ng the          |  |  |

#### **Element Data**

| Element Group:   | Decks          |      | Length:         |       | 6    | 6.7 m                 |                 |  |
|--|----------------|------|-----------------|-------|------|-----------------------|-----------------|--|
| Element Name:  | Deck To        | р    | Width:          | 6.1 m |      |                       |                 |  |
| Location:  |                |      | Height:         |       |      |                       |                 |  |
| Material:  | Concrete       |      | Count:          |       |      |                       |                 |  |
| Element Type:  |                |      | Total Quantity: |       | 40   | .87 m <sup>2</sup>    |                 |  |
| Environment:   | Severe         |      | Limited Insp'n: |       |      | Yes                   |                 |  |
| Protection System:   |                |      | •               | •     |      |                       |                 |  |
| Condition Data:  | Units          | Exc. | Good            | Fair  | Poor | Perform. Deficiencies | Maint.<br>Needs |  |
|  | m <sup>2</sup> |      |                 | 36.79 | 4.08 | Yes                   | Yes             |  |
| Comments:  Pitting of the concrete surface was observed throughout the deck length due to snow removal and grading of deck. Small delamination observed.  Recommended Work:  None 6-10 Years 1-5 Years <a href="#">&lt; 1 Year</a> Urgent Clear granular debris along the curb annually and complete concrete repairs. |                |      |                 |       |      |                       |                 |  |

| Element Group:  | Decks          |                        | Length:              | 6.2 m  |       |                       |                 |  |
|---|----------------|------------------------|----------------------|--------|-------|-----------------------|-----------------|--|
| Element Name:   | Soffit - Thick | Slab                   | Width:               | 6.75 m |       |                       |                 |  |
| Location:   |                |                        | Height:              |        |       |                       |                 |  |
| Material:   | Concrete       | Count:                 |                      |        |       |                       |                 |  |
| Element Type:   |                | Total Quantity:        | 41.85 m <sup>2</sup> |        |       |                       |                 |  |
| Environment:  | Benign         | Benign Limited Insp'n: |                      |        |       |                       |                 |  |
| Protection System:  |                | None                   |                      |        |       |                       |                 |  |
| Condition Data:   | Units          | Exc.                   | Good                 | Fair   | Poor  | Perform. Deficiencies | Maint.<br>Needs |  |
|   | m <sup>2</sup> |                        |                      | 16.74  | 25.11 | Yes                   | Yes             |  |
| Comments: Cracking was observed between slab and abutment at the construction joint with rebar exposed and evidence of active corrosion. Heavy spalling and leachate were observed throughout the soffit.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Remove the poor concrete, clean the reinforcing steel, and replace the concrete. |                |                        |                      |        |       |                       |                 |  |

| Element Group:                           | Curbs/Sidev               | <i>ı</i> alk    | Length:             | 14 m         |                  |                 |             |  |  |
|--|---------------------------|-----------------|---------------------|--------------|------------------|-----------------|-------------|--|--|
| Element Name:                            | Curbs                     |                 | Width:              |              | 0.3              | 31 m            |             |  |  |
| Location:                                | Each Side                 | 9               | Height:             | 0.31 m       |                  |                 |             |  |  |
| Material:                                | Concrete                  |                 | Count:              |              |                  | 2               |             |  |  |
| Element Type:                            |                           | Total Quantity: |                     | 2.6          | 9 m <sup>2</sup> |                 |             |  |  |
| Environment:                             | Severe                    | Limited Insp'n: |                     |              |                  |                 |             |  |  |
| Protection System:                       |                           | None            |                     |              |                  |                 |             |  |  |
|  | Units                     | Exc.            | Good                | Fair         | Poor             | Perform.        | Maint.      |  |  |
| Condition Data:                          | _                         | LAO.            | 0000                | ı alı        | 1 001            | Deficiencies    | Needs       |  |  |
|  | m <sup>2</sup>            |                 |                     | 1.08         | 1.61             | Yes             | Yes         |  |  |
| Comments:                                | No barrier currently in   | place and the   | e structure is deb  | ris covered  | . The exterior   | curb (south si  | de) has     |  |  |
|  | heavy delaminations,      | the north side  | e has some delan    | nination. Re | educe the spe    | eed limit to 35 | km/hr until |  |  |
|  | barrier protection is in  | stalled to Cod  | de.                 |              |                  |                 |             |  |  |
|  |                           |                 |                     | ]            | Urgent           |                 |             |  |  |
|  |                           |                 | 1-5 Years           |              | (Barrier         |                 |             |  |  |
| <b>Recommended Work:</b> None 6-10 Years |                           | (Replace)       | < 1 Year            | Protection)  |                  |                 |             |  |  |
|  | Install barrier to provid | le required ve  | ehicle safety, repa | air concrete | and clear de     | bris.           |             |  |  |
|  |                           |                 |                     |              |                  |                 |             |  |  |

#### **Element Data**

| Element Group:   | Abutment       | 3               | Length: | 6.75 m |                   |                          |                 |  |  |
|--|----------------|-----------------|---------|--------|-------------------|--------------------------|-----------------|--|--|
| Element Name:  | Abutment W     | alls            | Width:  |        |                   |                          |                 |  |  |
| Location:  | Each Side      |                 | Height: | 1.95 m |                   |                          |                 |  |  |
| Material:  | Concrete       |                 | Count:  |        |                   | 2                        |                 |  |  |
| Element Type:  |                | Total Quantity: |         | 26.3   | 32 m <sup>2</sup> |                          |                 |  |  |
| Environment:   | Moderate       | Limited Insp'n: |         |        |                   |                          |                 |  |  |
| Protection System:   | None           |                 |         |        |                   |                          |                 |  |  |
| Condition Data:  | Units          | Exc.            | Good    | Fair   | Poor              | Perform.<br>Deficiencies | Maint.<br>Needs |  |  |
|  | m <sup>2</sup> |                 |         | 13.16  | 13.16             |                          |                 |  |  |
| Hairline cracks were observed at the cold joints in each quadrant. Vertical hairline cracks at approximately 6' are showing water staining.  Recommended Work:  None 6-10 Years 1-5 Years 1-5 Year Urgent Replace the abutment walls when structure is replaced. |                |                 |         |        |                   |                          |                 |  |  |

| Element Group:   | Foundation  | าร           | Length:         |       |       |              |        |  |  |
|--|---|--------------|-----------------|-------|-------|--------------|--------|--|--|
| Element Name:  | Foundation (below g   | round level) | Width:          |       |       |              |        |  |  |
| Location:  | Each End  | k            | Height:         |       |       |              |        |  |  |
| Material:  | Concrete  |              | Count:          |       |       |              |        |  |  |
| Element Type:  |   |              |                 |       |       |              |        |  |  |
| Environment:   | Moderate  | ;            | Limited Insp'n: |       | Υ     | 'es          |        |  |  |
| Protection System:   | None  |              |                 |       |       |              |        |  |  |
|  | Units   | Exc.         | Good            | Fair  | Poor  | Perform.     | Maint. |  |  |
| Condition Data:  | Offico  | LXC.         | 0000            | I all | 1 001 | Deficiencies | Needs  |  |  |
|  |   |              |                 |       |       | Yes          | Yes    |  |  |
| Comments:  | Comments: Concrete spalling was observed underwater and the southeast and southwest corners are undermined. |              |                 |       |       |              |        |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Provide erosion protection and underpin the foundation/footings with concrete. Replace foundations when the structure is replaced. |   |              |                 |       |       |              |        |  |  |

#### **Element Data** Structure: 2 Embankments & Streams Element Group: Length: Element Name: Streams and Waterways Width: Location: Height: Material: Count: Element Type: Total Quantity: All Environment: Moderate Limited Insp'n: Protection System: None Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs All All Comments: Visible scour around concrete at southeast and northwest corners. 6-10 Years 1-5 Years Recommended Work: None < 1 Year Remove debris buildup and place rock protection to prevent further scour.

#### **Element Data**

| Element Group:   | Embankments &       | Streams         | Length:         |             |             |              |        |  |
|--|---------------------|-----------------|-----------------|-------------|-------------|--------------|--------|--|
| Element Name:  | Embankme            | nts             | Width:          |             |             |              |        |  |
| Location:  | Each Corner         |                 | Height:         |             |             |              |        |  |
| Material:  | C                   |                 | Count:          |             |             | 4            |        |  |
| Element Type:  |                     | Total Quantity: |                 |             |             |              |        |  |
| Environment:   | Moderate            | 9               | Limited Insp'n: |             |             |              |        |  |
| Protection System:   | None                |                 |                 |             |             |              |        |  |
|  | Units               | Exc.            | Good            | Fair        | Poor        | Perform.     | Maint. |  |
| Condition Data:  |                     |                 | Oood            |             | 1 001       | Deficiencies | Needs  |  |
|  | Each                |                 |                 | 6           |             |              | Yes    |  |
| Comments:  | The embankments are | e heavily vege  | tated with some | erosion evi | dent at eac | h quadrant.  |        |  |
|  |                     |                 |                 |             |             |              |        |  |
|  |                     |                 |                 | Ī           |             |              |        |  |
| Recommended Wor  |                     |                 | 1-5 Years       | < 1 Year    | Urgent      |              |        |  |
| Place rip-rap erosion protection to repair and prevent further erosion of embankments. |                     |                 |                 |             |             |              |        |  |
|  |                     |                 |                 |             |             |              |        |  |

| Element Group:     | Signs                              |                            | Length:                        |                                    |                       |                       |                 |  |  |
|--------------------|------------------------------------|----------------------------|--------------------------------|------------------------------------|-----------------------|-----------------------|-----------------|--|--|
| Element Name:      | Signs                              |                            | Width:                         |                                    |                       |                       |                 |  |  |
| Location:          | Each Corn                          | er                         | Height:                        |                                    |                       |                       |                 |  |  |
| Material:          | Steel (                            |                            | Count:                         |                                    |                       | 2                     |                 |  |  |
| Element Type:      |                                    |                            | Total Quantity:                |                                    |                       |                       |                 |  |  |
| Environment:       | Severe                             | Limited Insp'n:            |                                |                                    |                       |                       |                 |  |  |
| Protection System: |                                    | None                       |                                |                                    |                       |                       |                 |  |  |
| Condition Data:    | Units                              | Exc.                       | Good                           | Fair                               | Poor                  | Perform. Deficiencies | Maint.<br>Needs |  |  |
|                    | Each                               |                            |                                | 2                                  |                       | Yes                   | Yes             |  |  |
| Comments:          | Two 8 tonne load limit             | 0 11                       |                                |                                    | ,                     | ent.                  |                 |  |  |
| Recommended Wor    | ·k: None<br>Install end hazard and | 6-10 Years<br>35 km/hr spe | 1-5 Years<br>ed limit signs to | <pre>&lt; 1 Year provide req</pre> | Urgent<br>uired vehic | cle safety.           |                 |  |  |

| Element Group:  | Approaches     | 3                     | Length: |                        | 5    | m                    |                 |  |
|---|----------------|-----------------------|---------|------------------------|------|----------------------|-----------------|--|
| Element Name:   | Wearing Surfa  | ace                   | Width:  | 3.9 m                  |      |                      |                 |  |
| Location:   | Each End       | Height:               |         |                        |      |                      |                 |  |
| Material:   | Gravel         | Count:                |         |                        | 2    |                      |                 |  |
| Element Type:   | Total Quantity |                       |         | tity 39 m <sup>2</sup> |      |                      |                 |  |
| Environment:  | Severe         | Severe Limited Insp'n |         |                        |      |                      |                 |  |
| Protection System:  | None           |                       |         |                        |      |                      |                 |  |
| Condition Data:   | Units          | Exc.                  | Good    | Fair                   | Poor | Perform. Deficiencie | Maint.<br>Needs |  |
|   | m <sup>2</sup> |                       |         | 35.1                   | 4.9  | Yes                  | Yes             |  |
| Comments: Heavy vegetation was observed along the shoulder. Saturated road base observed due to poor drainage. Wheel path rutting was observed with small potholes starting to form.  Recommended Work: None 6-10 Years 1-5 Years <a href="tel://www.estarting.com/starting-to-form.">1 Years</a> Urgent Annual grading or the wearing surface and shoulders is recommended for drainage. |                |                       |         |                        |      |                      |                 |  |
| Annual grading of the wearing surface and shoulders is recommended for drainage.  |                |                       |         |                        |      |                      |                 |  |



Photo 2-2: Spalling of exterior curb



Photo 2-3: Structure deck



Photo 2-4: West abutment and south exterior soffit



Photo 2-5: Structure elevation, wingwalls, exterior curb and soffit



Photo 2-6: Extreme efflorescence at joints



Photo 2-7: Erosion at structure footing, efflorescence of wingwall (typ)



Photo 2-8: Delamination of soffit



Photo 2-9: Load limit posting



Photo 2-10: View of watercourse upstream



Photo 2-11: View of watercourse downstream



Photo 2-12: Wingwall, abutment wall and exterior soffit delamination.

## **Bridge/Culvert Inspection Report**

Site Number **Project Number** 221-12948-00 Cherry Hill Road Bridge Municipality Northern Bruce Peninsula Structure Name 30 02 MTO Region Code County Bruce Code 33 Geographic Twp Code 377 **MTO District Code** 



1450 - 1st Avenue West, Suite 101 Owen Sound, Ontario N4K 6W2 Tel: 519-376-7612 Fax: 519-376-8008

Website: www.wspgroup.com

## Bridge/Culvert Inspection Report

| Inventory Data                         |   |   |  |  |  |
|--|---|---|--|--|--|
| Structure Name                         | Cherry Hill Road Bridge   | Site Number   | 3  |  |  |
| County                                 | Bruce   | Road Name   | Cherry Hill  |  |  |
| Municipality                           | Northern Bruce Peninsula  | Road Type   | Rural Local  |  |  |
| Bridge or Culvert                      | Bridge  | Owner   | Northern Bruce Peninsula                                     |  |  |
| Structure Type                         | Concrete Beam   | AADT  | 50   |  |  |
| Span (m)                               | 6.1 No. 1   | % Trucks  | 15%  |  |  |
| Height (m)                             | 1.4   | Overall Structure Width (m)   | 5.5  |  |  |
| Direction of Structure                 | East/West   | Roadway Width (m)   | 5  |  |  |
| Year Built/Rehabilitated               | 1940  | Total Deck Length (m)   |  |  |  |
| Current Load Limit                     | 15 t  | Total Deck Area (s.m.)  | 40   |  |  |
| Detour Length (km)                     | N/A - Dead End  | Heritage Des.   | None   |  |  |
| Waterway                               | Stokes/Chin Creek   |   |  |  |  |
| <b>Inspection Data</b>                 |   |   |  |  |  |
| Date of Inspection                     | December 6, 2022  | Photos: 3-1 - Title Page - General  |  |  |  |
| Name of Inspector                      | Evan Montreuil, P.Eng.  | 3-2 - View of structure from r  | north approach   |  |  |
| Equipment Used                         | Tape, pick, hammer  | 3-3 - View of upstream water<br>3-4 - View of downstream wa<br>3-5 - Structure and approach<br>path rutting and encroaching | tercourse wearing surface with wheel                         |  |  |
| Weather Conditions                     | Overcast, partly sunny  | 3-6 - East structure elevation, wall 3-7 - Wingwall and exterior c  | exterior girder and barrier                                  |  |  |
| Temperature                            | 5°C   | 3-8 - Exterior girder delamina<br>3-9 - View of concrete girders  | ation and spalling   |  |  |
| Last Inspection                        | September 24, 2020  | 3-10 - View of west structure barrier wall  |  |  |  |
| Additional Investigation<br>Required   | Deck condition survey, foundation ins   | pection.  |  |  |  |
| Total Rehabilitation                   | Install approach protection and upgrad girders, soffit and footings. Place four 35 km/hr sign and speed limit end haza                                      | ndation erosion protection. Place   | narrow structure, speed limit                                |  |  |
| Total Rehabilitation<br>Budget Costing | \$160,000   | Next Inspection   | December 2024  |  |  |
| Justification                          | Due to low traffic and fair condition, nextend service life versus replacement upgraded and approach protection inst condition inspection. Complete sub-str | Reduce the speed limit to 35 km alled. Remove the excess granula  | n/hr. until barrier protection is r fill and complete a deck |  |  |

| Element Group:  | Decks        |                 | Length:         | 7.3   |       |                       |                 |  |
|---|--------------|-----------------|-----------------|-------|-------|-----------------------|-----------------|--|
| Element Name:   | Wearing Surf | ace             | Width:          | 5     |       |                       |                 |  |
| Location:   |              |                 | Height:         |       |       |                       |                 |  |
| Material:   | Gravel       |                 | Count:          |       |       |                       |                 |  |
| Element Type:   |              |                 | Total Quantity: |       | ,     | 36.5                  |                 |  |
| Environment:  | Severe       | Limited Insp'n: |                 |       |       |                       |                 |  |
| Protection System:  |              |                 |                 |       |       |                       |                 |  |
| Condition Data:   | Units        | Exc.            | Good            | Fair  | Poor  | Perform. Deficiencies | Maint.<br>Needs |  |
|   | $m^2$        |                 |                 | 18.25 | 18.25 | Yes                   | Yes             |  |
| Comments: Excess granular fill with wheel path rutting and heavily vegetated grass shoulders were observed.   |              |                 |                 |       |       |                       |                 |  |
| Recommended Work: None 6-10 Years 1-5 Years <a href="#">&lt; 1 Year</a> Urgent Annual grading, clear vegetation to achieve positive drainage. Reduce excess of granular fill on bridge. |              |                 |                 |       |       |                       |                 |  |

#### **Element Data**

| Element Group:   | Decks          |                 | Length:         | 7.3  |      |                       |                 |  |  |
|--|----------------|-----------------|-----------------|------|------|-----------------------|-----------------|--|--|
| Element Name:  | Deck Top       |                 | Width:          | 5    |      |                       |                 |  |  |
| Location:  |                |                 | Height:         |      |      |                       |                 |  |  |
| Material:  | Concrete       |                 | Count:          |      |      |                       |                 |  |  |
| Element Type:  |                | Total Quantity: | 36.5            |      |      |                       |                 |  |  |
| Environment:   | Moderate       |                 | Limited Insp'n: | V    |      |                       |                 |  |  |
| Protection System:   |                |                 |                 |      |      |                       |                 |  |  |
| Condition Data:  | Units          | Exc.            | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |
|  | m <sup>2</sup> |                 |                 | 36.5 |      | Yes                   | Yes             |  |  |
| Comments: The concrete deck is not visible for inspection due to cover with excessive granular fill, but is assumed to be in fair condition based on wearing surface observations.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Remove excess granular fill and sound the structure deck to investigate condition. |                |                 |                 |      |      |                       |                 |  |  |

#### **Element Data**

| Element Group:     | Decks               |               | Length:           | 7         |            |                       |                 |
|--------------------|---------------------|---------------|-------------------|-----------|------------|-----------------------|-----------------|
| Element Name:      | Soffit - Thick Slab |               | Width:            | 5.5       |            |                       |                 |
| Location:          |                     |               | Height:           |           |            |                       |                 |
| Material:          | Concrete            |               | Count:            |           |            |                       |                 |
| Element Type:      |                     |               | Total Quantity:   | 28.47     |            |                       |                 |
| Environment:       | Moderate            |               | Limited Insp'n:   |           |            |                       |                 |
| Protection System: |                     |               |                   |           |            |                       |                 |
| Condition Data:    | Units               | Exc.          | Good              | Fair      | Poor       | Perform. Deficiencies | Maint.<br>Needs |
|                    | m <sup>2</sup>      |               |                   | 25.62     | 2.85       | Yes                   | Yes             |
| Comments:          | Some cracking and s | palled surfac | ces were observed | with more | severe spa | alling of the exte    | rior soffit.    |

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Remove all poor concrete areas, clean the reinforcing steel, and replace concrete.

| Structure: | 3 |
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|------------|---|

| Element Group:     | Sidewalks/curbs                                 |                              | Length:         | 11.3                       |                       |                          |                 |
|--------------------|---|------------------------------|-----------------|----------------------------|-----------------------|--------------------------|-----------------|
| Element Name:      | Curbs   |                              | Width:          | 0.15                       |                       |                          |                 |
| Location:          |   |                              | Height:         | 0.4                        |                       |                          |                 |
| Material:          | Concrete  |                              | Count:          | 2                          |                       |                          |                 |
| Element Type:      |   |                              | Total Quantity: | 12.43                      |                       |                          |                 |
| Environment:       | Severe  |                              | Limited Insp'n: |                            |                       | V                        |                 |
| Protection System: |   |                              |                 |                            |                       |                          |                 |
| Condition Data:    | Units   | Exc.                         | Good            | Fair                       | Poor                  | Perform.<br>Deficiencies | Maint.<br>Needs |
|                    | m <sup>2</sup>                                  |                              |                 | 9.94                       | 2.49                  | Yes                      | Yes             |
| Comments:          | Surface spalling of the granular fill and heavi |                              |                 | Limited insp               | pection of t          | he interior curb         | o due to        |
| Recommended Wo     | rk: None<br>Clear the vegetation a              | 6-10 Years<br>along the curb |                 | ] < 1 Year<br>all poor cor | Urgent<br>ncrete area | S.                       |                 |

### **Element Data**

| Element Group:   | Barriers                                  |            | Length:         |          |            | 7.3                      |                 |
|--|---|------------|-----------------|----------|------------|--------------------------|-----------------|
| Element Name:  | Barrier/Parape                            | t Walls    | Width:          | 0.3      |            |                          |                 |
| Location:  |   |            | Height:         | 0.8      |            |                          |                 |
| Material:  | Concrete                                  |            | Count:          | 2        |            |                          |                 |
| Element Type:  |   |            | Total Quantity: | 11.68    |            |                          |                 |
| Environment:   | Severe                                    |            | Limited Insp'n: |          |            |                          |                 |
| Protection System:   |   |            |                 |          |            |                          |                 |
| Condition Data:  | Units                                     | Exc.       | Good            | Fair     | Poor       | Perform.<br>Deficiencies | Maint.<br>Needs |
|  | m <sup>2</sup>                            |            |                 | 9.34     | 1.17       | Yes                      | Yes             |
| Comments:  Parapet wall has observed surface cracks, spalling, and damaged ends. The current height does not meet Code and there is no approach protection in place. |   |            |                 |          |            | ight does                |                 |
| Recommended Wo   | rk: None                                  | 6-10 Years | 1-5 Years       | < 1 Year | Urgent     |                          |                 |
|  | Remove all areas of pand place approach b |            |                 | •        | replace co | oncrete. Add a           | top rail        |

| Element Group:   | Beams/MLE's L  |      | Length:         | 7     |      |                          |                 |
|--|----------------|------|-----------------|-------|------|--------------------------|-----------------|
| Element Name:  | Girders        |      | Width:          | 0.33  |      |                          |                 |
| Location:  |                |      | Height:         | 0.48  |      |                          |                 |
| Material:  | Concrete       |      | Count:          | 4     |      |                          |                 |
| Element Type:  |                |      | Total Quantity: |       | 3    | 86.12                    |                 |
| Environment:   | Moderate       |      | Limited Insp'n: |       |      |                          |                 |
| Protection System:   |                |      | -               |       |      |                          |                 |
| Condition Data:  | Units          | Exc. | Good            | Fair  | Poor | Perform.<br>Deficiencies | Maint.<br>Needs |
|  | m <sup>2</sup> |      |                 | 27.09 | 9.03 | Yes                      | Yes             |
| Comments: Poor concrete was observed at the abutment walls. The concrete at the bottom of the exterior girders has spalled exposing the rebar.           |                |      |                 |       |      |                          |                 |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Repair exterior girders remove delaminated concrete, clean the rebar, and pour new concrete. |                |      |                 |       |      | ncrete.                  |                 |
|  |                |      |                 |       |      |                          |                 |

| Ctructura  | 2 |
|------------|---|
| Structure: | ာ |

| Element Group:     | Abutments                                    |              | Length:         |            |            |                       | ļ               |  |
|--------------------|--|--------------|-----------------|------------|------------|-----------------------|-----------------|--|
| Element Name:      | Abutment W                                   | Width:       | 5.5             |            |            |                       |                 |  |
| Location:          |  | Height:      | 1.5             |            |            |                       |                 |  |
| Material:          | Concrete                                     | Count:       | 2               |            |            |                       |                 |  |
| Element Type:      |  | Total Quanti |                 |            | 16.5       |                       |                 |  |
| Environment:       | Moderate                                     | Limited Insp |                 |            |            |                       |                 |  |
| Protection System: |  |              |                 |            |            |                       |                 |  |
| Condition Data:    | Units  | Exc.         | Good            | Fair       | Poor       | Perform. Deficiencies | Maint.<br>Needs |  |
|                    | m <sup>2</sup>                               |              |                 | 16.5       |            |                       |                 |  |
| Comments:          | Some minor surface or rectangular drain hole | • .          | palling were ob | served. Th | nere are 4 | 100 mm by 100         | mm              |  |
| Recommended Wor    | k: None                                      | 6-10 Years   | ] 1-5 Years     | < 1 Year   | Urgent     |                       |                 |  |

Remove all poor concrete, clean reinforcing steel, and replace concrete.

#### **Element Data**

| Element Group:     | Abutment               | Abutments  |               |       |       | 2.5          |        |  |
|--------------------|------------------------|------------|---------------|-------|-------|--------------|--------|--|
| Element Name:      | Wingwalls              |            | Width:        |       |       |              |        |  |
| Location:          |                        |            | Height:       | 1.2   |       |              |        |  |
| Material:          | Concrete               |            | Count:        | 4     |       |              |        |  |
| Element Type:      |                        |            | Total Quanti  | 12    |       |              |        |  |
| Environment:       | Moderate               |            | Limited Insp  |       |       |              |        |  |
| Protection System: |                        |            |               |       |       |              |        |  |
|                    | Units                  | Exc.       | Good          | Fair  | Poor  | Perform.     | Maint. |  |
| Condition Data:    |                        | LXC.       | Good          | ı alı | 1 001 | Deficiencies | Needs  |  |
|                    | m <sup>2</sup>         |            |               | 12    |       |              |        |  |
| Comments:          | Minor surface spalling | & cracking | were observed | d.    |       |              |        |  |

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent
Remove all poor concrete, clean reinforcing steel, and replace concrete.

#### **Element Data**

| Element Group:     | Foundation              | Length:      |                                   |      |              |                   |        |
|--------------------|-------------------------|--------------|-----------------------------------|------|--------------|-------------------|--------|
| Element Name:      | Foundation (below gr    | ound level)  | Width:                            |      |              |                   |        |
| Location:          |                         |              | Height:                           |      |              |                   |        |
| Material:          | Concrete                |              | Count:                            |      |              |                   |        |
| Element Type:      |                         |              | Total Quanti                      |      |              |                   |        |
| Environment:       | Moderate                | Limited Insp |                                   |      | $\sqrt{}$    |                   |        |
| Protection System: |                         |              |                                   |      |              |                   |        |
|                    | Units                   | Exc.         | Good                              | Fair | Poor         | Perform.          | Maint. |
| Condition Data:    | Offics                  | EXC.         | Good                              | Ган  | FOOI         | Deficiencies      | Needs  |
|                    |                         |              |                                   |      |              | Yes               | Yes    |
| Comments:          | Limited inspection - fo |              | re below water<br>on/undercutting |      | ible portion | s of the north fo | ooting |

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent
Complete thorough inspection during low water conditions to determine extend of damage.

Monitor erosion and conditions of foundations.

| Structure: | 3 |
|------------|---|
|------------|---|

| Element Group:     | Embankments & Streams |                | Length:           |             |             |              |        |
|--------------------|-----------------------|----------------|-------------------|-------------|-------------|--------------|--------|
| Element Name:      | Streams and Wa        | terways        | Width:            |             |             |              |        |
| Location:          |                       |                | Height:           |             |             |              |        |
| Material:          |                       |                | Count:            |             |             |              |        |
| Element Type:      |                       | T-             |                   |             |             |              |        |
| Environment:       | Moderate L            |                | Limited Insp'n:   |             |             |              |        |
| Protection System: |                       |                |                   |             |             |              |        |
|                    | Units                 | Exc.           | Good              | Fair        | Poor        | Perform.     | Maint. |
| Condition Data:    | Office                | EXC.           | Good              | Fall        | F 001       | Deficiencies | Needs  |
|                    | All                   |                |                   | All         |             |              |        |
| Comments:          | The watercourse appe  | ears stable wi | th no obstruction | at the time | of inspecti | ion.         |        |
| Recommended Wo     | rk: None              | 6-10 Years     | 1-5 Years         | < 1 Year    | Urgent      |              |        |

# **Element Data**

| Element Group:     | Embankments &       | Embankments & Streams |                   |             |            |                       |                 |
|--------------------|---------------------|-----------------------|-------------------|-------------|------------|-----------------------|-----------------|
| Element Name:      | Embankments         |                       | Length:<br>Width: |             |            |                       |                 |
| Location:          |                     |                       | Height:           |             |            |                       |                 |
| Material:          | -                   |                       | Count:            | 6           |            |                       |                 |
| Element Type:      |                     |                       | Total Quantity:   | 6           |            |                       |                 |
| Environment:       | Moderate            |                       | Limited Insp'n:   |             |            |                       |                 |
| Protection System: |                     |                       |                   |             |            |                       |                 |
| Condition Data:    | Units               | Exc.                  | Good              | Fair        | Poor       | Perform. Deficiencies | Maint.<br>Needs |
|                    | Each                |                       |                   | 6           |            |                       |                 |
| Comments:          | The embankments are | e stone / eart        | h (well vegetated | ) and appea | ar stable. |                       |                 |
| Recommended Wo     | ork: None           | 6-10 Years            | 1-5 Years         | < 1 Year    | Urgent     |                       |                 |

| Element Group:     | Embankments & Streams |                 | Length:         |          |        |                       |                 |
|--------------------|-----------------------|-----------------|-----------------|----------|--------|-----------------------|-----------------|
| Element Name:      | Slope Protection      |                 | Width:          |          |        |                       |                 |
| Location:          |                       |                 | Height:         |          |        |                       |                 |
| Material:          | Earth / Stone         |                 | Count:          | 6        |        |                       |                 |
| Element Type:      |                       |                 | Total Quantity: | 6        |        |                       |                 |
| Environment:       | Moderate              | Limited Insp'n: |                 |          |        |                       |                 |
| Protection System: |                       |                 |                 |          |        |                       |                 |
| Condition Data:    | Units                 | Exc.            | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |
|                    | Each                  |                 |                 | 6        |        |                       |                 |
| Comments:          | The stone slope prote | ction appears   | s stable.       |          |        |                       |                 |
| Recommended Wo     | rk: None              | 6-10 Years      | 1-5 Years       | < 1 Year | Urgent |                       |                 |

| Structure.   3 | Structure: | 3 |
|----------------|------------|---|
|----------------|------------|---|

| Element Group:     | Signs                   |                 | Length:           |            |             |                       |                 |  |
|--------------------|-------------------------|-----------------|-------------------|------------|-------------|-----------------------|-----------------|--|
| Element Name:      | Signs                   |                 | Width:            |            |             |                       |                 |  |
| Location:          |                         |                 | Height:           |            |             |                       |                 |  |
| Material:          | Steel                   |                 | Count:            | 1          |             |                       |                 |  |
| Element Type:      |                         |                 | Total Quantity:   | 1          |             |                       |                 |  |
| Environment:       | Severe                  | Limited Insp'n: |                   |            |             |                       |                 |  |
| Protection System: |                         |                 |                   | =          |             |                       |                 |  |
| Condition Data:    | Units                   | Exc.            | Good              | Fair       | Poor        | Perform. Deficiencies | Maint.<br>Needs |  |
|                    | Each                    |                 | 2                 | 1          |             | Yes                   | Yes             |  |
| Comments:          | Only one load limit sig | gn in place (so | outh approach). I | No end haz | ard signs c | urrently in place     | ce.             |  |
| Recommended Wo     | rk: None                | 6-10 Years      | 1-5 Years         | < 1 Year   | Urgent      |                       |                 |  |

Place four end hazard signs (one at each quadrant). Replace missing load limit sign at north approach. Place reduced speed limit of 35km/hr signs for increased road user safety until barrier protection is upgraded to meet current code. Straighten the south approach load limit sign.

#### **Element Data**

| Element Group:   | Approache      | es   | Length:         |      |      | 5                     |                 |  |
|--|----------------|------|-----------------|------|------|-----------------------|-----------------|--|
| Element Name:  | Wearing Sur    | face | Width:          | 5    |      |                       |                 |  |
| Location:  |                |      | Height:         |      |      |                       |                 |  |
| Material:  | Gravel         |      | Count:          | 2    |      |                       |                 |  |
| Element Type:  |                |      | Total Quantity: | 50   |      |                       |                 |  |
| Environment:   | Severe         |      | Limited Insp'n: |      |      |                       |                 |  |
| Protection System:   |                |      |                 |      |      |                       |                 |  |
| Condition Data:  | Units          | Exc. | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |
|  | m <sup>2</sup> |      |                 | 50   |      |                       | Yes             |  |
| Comments:  Narrow granular surface approach is in fair condition with minor wheel path rutting observed.  Heavily vegetated edge of shoulders are impeding drainage. |                |      |                 |      |      |                       |                 |  |
| Recommended Work: None 6-10 Years 1-5 Years <a href="#">&lt; 1 Year</a> Urgent  Grade the approaches and shoulders appual to achieve positive drainage               |                |      |                 |      |      |                       |                 |  |

#### **Element Data**

| Element Group:     | Approache             | es            | Length:           |             |             |              |        |
|--------------------|-----------------------|---------------|-------------------|-------------|-------------|--------------|--------|
| Element Name:      | Drainage V            |               | Width:            |             |             |              |        |
| Location:          |                       |               | Height:           |             |             |              |        |
| Material:          | Gravel                |               | Count:            |             |             |              |        |
| Element Type:      |                       |               | Total Quantity:   |             |             |              |        |
| Environment:       | Severe                |               | Limited Insp'n:   |             |             |              |        |
| Protection System: |                       |               |                   |             |             |              |        |
|                    | Units                 | Exc.          | Good              | Fair        | Poor        | Perform.     | Maint. |
| Condition Data:    | _                     | EXC.          | Good              | Fall        | F 001       | Deficiencies | Needs  |
|                    | %                     |               |                   | 50          | 50          | Yes          | Yes    |
| Comments:          | Heavy (grass) vegetat | ion on should | ders should be cl | eared to in | nrove drair | nage         |        |

**Comments:** Heavy (grass) vegetation on shoulders should be cleared to improve drainage

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent

Grade the shoulders annually to promote positive drainage.



Photo 3-2: View of structure from the south approach



Photo 3-3: View of upstream watercourse



Photo 3-4: View of watercourse downstream



Photo 3-5: Structure and approach wearing surface with wheel path rutting and encroaching vegetation



Photo 3-6: East structure elevation, exterior girder and barrier wall



Photo 3-7: Wingwall and exterior curb (typical)



Photo 3-8: Exterior girder delamination and spalling

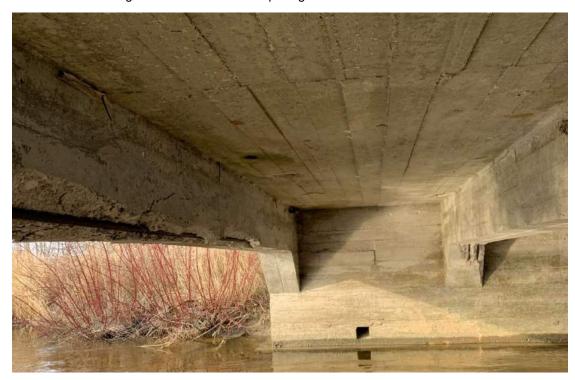


Photo 3-9: View of concrete girders and soffit



Photo 3-10: View of west structure elevation, exterior girder and barrier wall

# **Bridge/Culvert Inspection Report**

Site Number **Project Number** 221-12948-00 Ira Lake Road Bridge Municipality Northern Bruce Peninsula Structure Name 30 02 **MTO Region Code** County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





1450 - 1st Avenue West, Suite 101 Owen Sound, Ontario N4K 6W2 Tel: 519-376-7612 Fax: 519-376-8008

Website: www.wspgroup.com

# Bridge/Culvert Inspection Report

| Inventory Data                         |   |   |                                      |
|--|---|---|--------------------------------------|
| Structure Name                         | Ira Lake Road Bridge  | Site Number   | 4                                    |
| County                                 | Bruce   | Road Name   | Ira Lake (Old Hwy #6)                |
| Municipality                           | Northern Bruce Peninsula  | Road Type   | Rural Local                          |
| Bridge or Culvert                      | Bridge  | Owner [   | Northern Bruce Peninsula             |
| Structure Type                         | Rigid Frame - Open Footing  | AADT [  | 150                                  |
| Span (m)                               | 4.5 No. 1   | % Trucks  | 15%                                  |
| Height (m)                             | 1.2   | Overall Structure Width (m)   | 5.7                                  |
| Direction of Structure                 | East/West - 15° skew  | Roadway Width (m)   | 3.3                                  |
| Year Built/Rehabilitated               | 1925  | Total Deck Length (m)   | 4.7                                  |
| Current Load Limit                     | 5 t   | Total Deck Area (s.m.)  | 24                                   |
| Detour Length (km)                     | 16  | Heritage Des.   | None                                 |
| Waterway                               | Spring Creek  |   |                                      |
| Inspection Data                        |   |   |                                      |
| Date of Inspection                     | December 6, 2022  | Photos: 4-1 - Title Page - General  |                                      |
| Name of Inspector                      | Evan Montreuil, P.Eng.  | 4-2 - View of east structure elev<br>barrier  | vation, wingwalls, exterior curb and |
| Equipment Used                         | Tape, pick, hammer  | 4-3 - View of soffit and abutme<br>4-4 - View of soffit   |                                      |
| Weather Conditions                     | Overcast  | 4-5 - Wearing surface deteriora<br>4-6 - View of south abutment w<br>4-7 - View of west structure ele | vall                                 |
| Temperature                            | 5°C   | barrier 4-8 - View of watercourse upstr 4-9 - View of watercourse down                                |                                      |
| Last Inspection                        | October 30, 2020  | 4-9 - View of watercourse down  | nsucam                               |
| Additional Investigation<br>Required   | Annual inspections, complete structura  | al condition survey and load limit ar   | nalysis if left in service.          |
| Total Rehabilitation                   | Replacement recommended versus reh  | abilitation.  |                                      |
| Total Rehabilitation<br>Budget Costing | \$230,000   | Next Inspection   | December 2023                        |
| Justification                          | Due to the age and poor condition of the effective for long-term service life. Mainspect annually and maintain speed liprotection is installed to Code. | aintain load limit of 5t or reduce fur  | ther following condition assessment, |

#### Structure: **Element Data** 4

| Element Group:  | Decks          |                 |                 | 4.1 m                |           |                          |                 |  |
|---|----------------|-----------------|-----------------|----------------------|-----------|--------------------------|-----------------|--|
| Element Name:   | Deck To        | р               | Width:          | 5.1 m                |           |                          |                 |  |
| Location:   |                |                 | Height:         | 0.3 m                |           |                          |                 |  |
| Material:   | Concrete       |                 | Count:          |                      |           |                          |                 |  |
| Element Type:   |                |                 | Total Quantity: | 20.91 m <sup>2</sup> |           |                          |                 |  |
| Environment:  | Moderat        | Limited Insp'n: |                 |                      | $\sqrt{}$ |                          |                 |  |
| Protection System:  |                |                 |                 |                      |           |                          |                 |  |
| Condition Data:   | Units          | Exc.            | Good            | Fair                 | Poor      | Perform.<br>Deficiencies | Maint.<br>Needs |  |
|   | m <sup>2</sup> |                 |                 | 15.68                | 5.23      | Yes                      | Yes             |  |
| Comments:  Limited inspection due to granular wearing surface cover, but where the deck is visible there is observed spalling and delamination. |                |                 |                 |                      |           |                          |                 |  |
| Recommended Wor   | rk: None       | 6-10 Years      | 1-5 Years       | < 1 Year             | Urgent    |                          |                 |  |
| Clear the granular fill from the structure and remove all poor concrete, clean reinforcing steel, and replace concrete.                         |                |                 |                 |                      |           |                          |                 |  |

### **Element Data**

| Element Group:  | Decks          |                 | Length: | 4.5 m |                     |                       |                 |  |  |
|---|----------------|-----------------|---------|-------|---------------------|-----------------------|-----------------|--|--|
| Element Name:   | Soffit - Thick | Slab            | Width:  | 5.7 m |                     |                       |                 |  |  |
| Location:   |                |                 | Height: |       |                     | 0.3 m                 |                 |  |  |
| Material:   | Concrete       |                 | Count:  |       |                     |                       |                 |  |  |
| Element Type:   |                | Total Quantity: |         | 25    | 5.65 m <sup>2</sup> |                       |                 |  |  |
| Environment:  | Moderat        | Limited Insp'n: |         |       |                     |                       |                 |  |  |
| Protection System:  |                |                 |         |       |                     |                       |                 |  |  |
| Condition Data:   | Units          | Exc.            | Good    | Fair  | Poor                | Perform. Deficiencies | Maint.<br>Needs |  |  |
|   | m <sup>2</sup> |                 |         | 18    | 7.65                | Yes                   | Yes             |  |  |
| Comments: Spalling and severe delamination with exposed steel observed around drain holes and exterior soffit.  |                |                 |         |       |                     |                       |                 |  |  |
| Recommended Work: None 6-10 Years 1-5 Years <a href="#">&lt; 1 Year</a> Urgent Remove all poor concrete, clean reinforcing steel, and replace concrete. |                |                 |         |       |                     |                       |                 |  |  |

### **Element Data**

| Element Group:     | Decks                | ;             | Length:              |             |      |                       |                 |  |
|--------------------|----------------------|---------------|----------------------|-------------|------|-----------------------|-----------------|--|
| Element Name:      | Drainage             |               | Width:               |             |      |                       |                 |  |
| Location:          |                      |               | Height:              |             |      |                       |                 |  |
| Material:          | Concre               | e             | Count:               | 4           |      |                       |                 |  |
| Element Type:      |                      |               | Total Quantity:      | 4           |      |                       |                 |  |
| Environment:       | Severe               |               | Limited Insp'n:      |             |      |                       |                 |  |
| Protection System: |                      |               |                      |             |      |                       |                 |  |
| Condition Data:    | Units                | Exc.          | Good                 | Fair        | Poor | Perform. Deficiencies | Maint.<br>Needs |  |
|                    | Each                 |               |                      |             | 4    | Yes                   | Yes             |  |
| Comments:          | Four 75 mm dia. hole | s through cur | b are plugged and ir | neffective. | •    | •                     |                 |  |

Recommended Work:

rk: None 6-10 Years 1-5 Years <a></a> <a></a> 1 Year</a> Urgent Patch the drain holes with concrete and grade structure to achieve positive drainage.

| Element Group:  | Sidewalks/curbs |      | Length:         |                    | 5.1 m |                       |                 |  |
|---|-----------------|------|-----------------|--------------------|-------|-----------------------|-----------------|--|
| Element Name:   | Curbs           |      | Width:          | 0.46 m             |       |                       |                 |  |
| Location:   |                 |      | Height:         | 0.125 m            |       |                       |                 |  |
| Material:   | Concrete        |      | Count:          | 2                  |       |                       |                 |  |
| Element Type:   |                 |      | Total Quantity: | 5.97m <sup>2</sup> |       |                       |                 |  |
| Environment:  | Severe          |      | Limited Insp'n: | Yes                |       |                       |                 |  |
| Protection System:  |                 |      |                 | -                  |       |                       |                 |  |
| Condition Data:   | Units           | Exc. | Good            | Fair               | Poor  | Perform. Deficiencies | Maint.<br>Needs |  |
|   | m <sup>2</sup>  |      |                 | 2.99               | 2.99  | Yes                   | Yes             |  |
| Comments: Limited inspection due to cover with granular fill. Where visible for inspection (exterior curb) there is surface spalling and delamination.    |                 |      |                 |                    |       |                       |                 |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Clear granular fill, remove all poor concrete, clean reinforcing steel, and replace concrete. |                 |      |                 |                    |       |                       |                 |  |

### **Element Data**

| Element Group:  | Barriers        |       | Length:         |        | 4    | .88 m                 |                 |  |
|---|-----------------|-------|-----------------|--------|------|-----------------------|-----------------|--|
| Element Name:   | Barrier/Parapet | Walls | Width:          |        |      |                       |                 |  |
| Location:   |                 |       | Height:         | 0.81 m |      |                       |                 |  |
| Material:   | Concrete        |       | Count:          | 2      |      |                       |                 |  |
| Element Type:   |                 |       | Total Quantity: |        | 7.   | 91 m <sup>2</sup>     |                 |  |
| Environment:  | Severe          |       | Limited Insp'n: |        |      |                       |                 |  |
| Protection System:  |                 |       |                 |        |      |                       |                 |  |
| Condition Data:   | Units           | Exc.  | Good            | Fair   | Poor | Perform. Deficiencies | Maint.<br>Needs |  |
|   | m <sup>2</sup>  |       |                 |        | 7.91 | Yes                   |                 |  |
| Comments: The top concrete rail has observed delamination, surface spalling, and exposed reinforcing steel with section loss.   |                 |       |                 |        |      |                       |                 |  |
| Recommended Work: None 6-10 Years 1-5 Years <a href="#">&lt; 1 Year</a> Urgent  Remove and replace the barrier and add approach barrier protection to meet current code requirements. |                 |       |                 |        |      |                       |                 |  |

| Element Group:  | Barriers |      | Length:         |        | 0    | .16 m                 |                 |  |  |
|---|----------|------|-----------------|--------|------|-----------------------|-----------------|--|--|
| Element Name:   | Posts    |      | Width:          | 0.16 m |      |                       |                 |  |  |
| Location:   |          |      | Height:         | 0.81 m |      |                       |                 |  |  |
| Material:   | Concrete |      | Count:          | 22     |      |                       |                 |  |  |
| Element Type:   |          |      | Total Quantity: |        |      | 22                    |                 |  |  |
| Environment:  | Severe   |      | Limited Insp'n: |        |      |                       |                 |  |  |
| Protection System:  |          |      |                 | -      |      |                       |                 |  |  |
| Condition Data:   | Units    | Exc. | Good            | Fair   | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |
|   | each     |      |                 |        | 22   | Yes                   |                 |  |  |
| Comments: Surface spalling & exposed rebar was observed at the post bases. Loose connection between posts and deck. Nine interior posts are broken off and missing.                       |          |      |                 |        |      |                       |                 |  |  |
| Recommended Work: None 6-10 Years 1-5 Years <a href="#">&lt; 1 Year</a> Urgent Remove and replace with new barrier and add approach barrier protection to meet current code requirements. |          |      |                 |        |      |                       |                 |  |  |

| Element Group:  | Abutment              | S             | Length:            |             |                     |                       |                 |  |  |
|---|-----------------------|---------------|--------------------|-------------|---------------------|-----------------------|-----------------|--|--|
| Element Name:   | Abutment W            | 'alls         | Width:             | 5.69 m      |                     |                       |                 |  |  |
| Location:   |                       |               | Height:            | 1.22 m      |                     |                       |                 |  |  |
| Material:   | Concrete              |               | Count:             |             | 2                   |                       |                 |  |  |
| Element Type:   |                       |               | Total Quantity:    |             | 6.94 m <sup>2</sup> |                       |                 |  |  |
| Environment:  | Moderate              |               | Limited Insp'n:    |             |                     |                       |                 |  |  |
| Protection System:  |                       |               | •                  | •           |                     |                       |                 |  |  |
| Condition Data:   | Units                 | Exc.          | Good               | Fair        | Poor                | Perform. Deficiencies | Maint.<br>Needs |  |  |
|   | m <sup>2</sup>        |               |                    | 0.69        | 6.25                | Yes                   | Yes             |  |  |
| Comments:   | Surface cracking & se | vere spalling | were observed on e | each abutme | ent wall.           |                       |                 |  |  |
|   |                       |               |                    |             |                     |                       |                 |  |  |
| Recommended Work: None 6-10 Years 1-5 Years <a href="#">&lt; 1 Year</a> Urgent Remove all poor concrete, clean the reinforcing steel, and replace concrete. |                       |               |                    |             |                     |                       |                 |  |  |

# **Element Data**

| Element Group:     | Abutment               | s             | Length:               |                         | 1          | .83 m              |        |  |
|--------------------|------------------------|---------------|-----------------------|-------------------------|------------|--------------------|--------|--|
| Element Name:      | Wingwall               | S             | Width:                | 1.22 m                  |            |                    |        |  |
| Location:          |                        |               | Height:               |                         |            |                    |        |  |
| Material:          | Concrete               | )             | Count:                |                         |            | 4                  |        |  |
| Element Type:      |                        |               | Total Quantity:       |                         | 8          | .93 m <sup>2</sup> |        |  |
| Environment:       | Moderate Limited Ins   |               |                       |                         |            |                    |        |  |
| Protection System: |                        |               | •                     |                         |            |                    |        |  |
|                    | Units                  | Exc.          | Good                  | Fair                    | Poor       | Perform.           | Maint. |  |
| Condition Data:    |                        |               | 0000                  |                         | 1 001      | Deficiencies       | Needs  |  |
|                    | $m^2$                  |               |                       | 3.57                    | 5.36       | Yes                | Yes    |  |
| Comments:          | Severe surface spallir | ng, cracking, | and section loss at t | op of footing           | g were obs | erved.             |        |  |
|                    |                        |               |                       |                         |            |                    |        |  |
|                    |                        |               |                       | _                       |            |                    |        |  |
| Recommended Worl   | k: None                | 6-10 Years    | s 1-5 Years           | <pre> &lt; 1 Year</pre> | Urgent     |                    |        |  |
| I                  | Remove all poor cond   | rete clean t  | he reinforcing steel  | and replace             | concrete   |                    |        |  |

| Element Group:   | Foundations         |              | Length:         |      |      |                       |                 |  |  |
|--|---------------------|--------------|-----------------|------|------|-----------------------|-----------------|--|--|
| Element Name:  | Foundation (below g | round level) | Width:          |      |      |                       |                 |  |  |
| Location:  |                     |              | Height:         |      | 7.52 |                       |                 |  |  |
| Material:  | Concrete            | )            | Count:          |      |      | 2                     |                 |  |  |
| Element Type:  |                     |              | Total Quantity: |      |      |                       |                 |  |  |
| Environment:   | Moderate            | )            | Limited Insp'n: | V    |      |                       |                 |  |  |
| Protection System:   |                     |              |                 |      |      |                       |                 |  |  |
| Condition Data:  | Units               | Exc.         | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |
|  |                     |              |                 |      |      | Yes                   |                 |  |  |
| Comments: Limited inspection due to cover, however the top of footings are visibly exposed and under water with observed scaling and delamination of concrete. |                     |              |                 |      |      |                       |                 |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Remove all poor concrete, clean the reinforcing steel, and replace concrete.                       |                     |              |                 |      |      |                       |                 |  |  |

| Element Group:     | Embankment            | s & Streams             | Length:             |          |        |            |        |
|--------------------|-----------------------|-------------------------|---------------------|----------|--------|------------|--------|
| Element Name:      | Streams and           | Waterways               | Width:              |          |        |            |        |
| Location:          |                       |                         | Height:             |          |        |            |        |
| Material:          | Earth / Ston          | Earth / Stone / Bedrock |                     |          |        |            |        |
| Element Type:      | T                     |                         | Total Quantity:     |          |        |            |        |
| Environment:       | Moderate L            |                         | Limited Insp'n:     |          |        |            |        |
| Protection System: |                       |                         | •                   |          |        |            |        |
|                    | Units                 | Exc.                    | Good                | Fair     | Poor   | Perform.   | Maint. |
| Condition Data:    | Units                 | LXC.                    |                     |          | 1 001  | Deficienci | Needs  |
|                    |                       |                         |                     | All      |        | Yes        | Yes    |
| Comments:          | Scour at southeast co | rner and debris build   | dup at northeast co | orner.   |        |            |        |
|                    |                       |                         |                     |          |        |            |        |
|                    |                       |                         |                     | _        |        |            |        |
| Recommended Work:  | None                  | 6-10 Years              | 1-5 Years           | < 1 Year | Urgent |            |        |
|                    | Place rock protection | and clear debris bui    | ldup.               |          |        |            |        |
|                    |                       |                         |                     |          |        |            |        |

### **Element Data**

| Element Group:     | Embankment                      | s & Streams            | Length:             |            |            |                        |                 |  |
|--------------------|---------------------------------|------------------------|---------------------|------------|------------|------------------------|-----------------|--|
| Element Name:      | Embanl                          | rments                 | Width:              |            |            |                        |                 |  |
| Location:          |                                 |                        | Height:             |            |            |                        |                 |  |
| Material:          | Earth /                         | Count:                 |                     |            | 4          |                        |                 |  |
| Element Type:      |                                 | Total Quantity:        |                     |            | 4          |                        |                 |  |
| Environment:       | Mode                            | Limited Insp'n:        |                     |            |            |                        |                 |  |
| Protection System: |                                 |                        | •                   |            |            |                        |                 |  |
| Condition Data:    | Units                           | Exc.                   | Good                | Fair       | Poor       | Perform.<br>Deficienci | Maint.<br>Needs |  |
|                    | Each                            |                        |                     | 4          |            |                        |                 |  |
| Comments:          | Stone / Earth vegetate          | ed embankments ar      | e generally stable, | with some  | minor bank | erosion obs            | served.         |  |
| Recommended Work:  | None<br>Place rip rap erosion p | 6-10 Years protection. | 1-5 Years           | ] < 1 Year | Urgent     |                        |                 |  |

| Element Group:               | Sig  | ns    | Length:         |      |      |                   |              |  |  |
|------------------------------|--|-------|-----------------|------|------|-------------------|--------------|--|--|
| Element Name:                | Sig  | ns    | Width:          |      |      |                   |              |  |  |
| Location:                    |  |       | Height:         |      |      |                   |              |  |  |
| Material:                    | Ste  | Steel |                 | 7    |      |                   |              |  |  |
| Element Type:                | 7  |       | Total Quantity: |      |      | 7                 |              |  |  |
| Environment:                 | Moderate L   |       | Limited Insp'n: |      |      |                   |              |  |  |
| Protection System:           |  |       | -               | -    |      |                   |              |  |  |
| Condition Date:              | Units  | Exc.  | Good            | Fair | Poor | Perform.          | Maint.       |  |  |
| Condition Data:              | Each   |       |                 | 6    | 1    | Deficienci<br>Yes | Needs<br>Yes |  |  |
| Comments:  Recommended Work: | Load limit, narrow structure, and end hazard signs are in place but not plumb or facing traffic. The southeast end hazard sign is damaged and requires replacement. The South approach is missing load limit sign.  None 6-10 Years 1-5 Years < 1 Year Urgent  Maintain, straighten and align all signage with traffic. Replace the southwest end hazard sign.  Replace south load limit sign. Place advanced load limit warning and reduced speed limit 35 km/hr signs. |       |                 |      |      |                   |              |  |  |

| Approaches        |                       |                      | 5 m    |                       |                 |  |  |
|-------------------|-----------------------|----------------------|--------|-----------------------|-----------------|--|--|
| Surface           | Width:                |                      | 3.96 m |                       |                 |  |  |
|                   | Height:               |                      |        |                       |                 |  |  |
| Gravel            |                       |                      |        | 2                     |                 |  |  |
|                   |                       |                      | 39     | 9.6 m <sup>2</sup>    |                 |  |  |
| rate              | Limited Insp'n:       |                      |        |                       |                 |  |  |
|                   | •                     | •                    |        |                       |                 |  |  |
| Exc.              | Good                  | Fair                 | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |  |
|                   |                       | 29.7                 | 9.9    | Yes                   | Yes             |  |  |
| ently graded. Cor | ntinue annual grading | <u>-</u>             |        | •                     |                 |  |  |
|                   |                       |                      |        |                       |                 |  |  |
| 6-10 Years        | 1-5 Years             | < 1 Year             | Urgent |                       |                 |  |  |
|                   |                       | 6-10 Years 1-5 Years |        |                       |                 |  |  |

Grade approach and structure wearing surfaces annually.

| Element Group:   | Approac      | hes  | Length:         |      |      |                       |                 |  |  |
|--|--------------|------|-----------------|------|------|-----------------------|-----------------|--|--|
| Element Name:  | Draina       | ge   | Width:          |      |      |                       |                 |  |  |
| Location:  |              |      | Height:         |      |      |                       |                 |  |  |
| Material:  | Earth/Gravel |      | Count:          |      |      |                       |                 |  |  |
| Element Type:  |              |      | Total Quantity: |      |      |                       |                 |  |  |
| Environment:   | Moderate     |      | Limited Insp'n: |      |      |                       |                 |  |  |
| Protection System:   |              |      | •               | -    |      |                       |                 |  |  |
| Condition Data:  | Units        | Exc. | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |
|  | %            |      |                 | 100  |      | Yes                   | Yes             |  |  |
| Comments: Shoulders heavy vegetated with grass which is impeding drainage.   |              |      |                 |      |      |                       |                 |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Clear vegetation off shoulders to achieve proper drainage. |              |      |                 |      |      |                       |                 |  |  |



Photo 4-2: View of east structure elevation, wingwalls, exterior curb and barrier



Photo 4-3: View of soffit and abutment wall



Photo 4-4: View of soffit



Photo 4-5: Wearing surface deterioration



Photo 4-6: View of south abutment wall



Photo 4-7: View of west structure elevation, exterior soffit, curb and barrier



Photo 4-8: View of watercourse upstream



Photo 4-9: View of watercourse downstream

# **Bridge/Culvert Inspection Report**

Site Number **Project Number** 221-12948-00 Stokes Bay Road/Copper **Structure Name** Municipality Northern Bruce Peninsula Kettle Bridge 30 Code MTO Region Code County Bruce 33 377 **MTO District Code** Geographic Twp Code





1450 - 1st Avenue West, Suite 101 Owen Sound, Ontario N4K 6W2 Tel: 519-376-7612 Fax: 519-376-8008 Website: www.wspgroup.com

# Bridge/Culvert Inspection Report

| Inventory Data                         |  |   |                                 |
|--|--|---|---------------------------------|
| Structure Name                         | Stokes Bay Road Bridge   | Site Number   | 5                               |
| County                                 | Bruce  | Road Name   | Stokes Bay Road                 |
| Municipality                           | Northern Bruce Peninsula   | Road Type   | Rural Coll.                     |
| Bridge or Culvert                      | Bridge   | Owner   | Northern Bruce Peninsula        |
| Structure Type                         | Concrete - Rigid Frame   | AADT  | 400                             |
| Span (m)                               | 7.9 No. 1  | % Trucks  | 10%                             |
| Height (m)                             | 2  |   |                                 |
| Direction of Structure                 | East/West - 22° skew   | Overall Structure Width (m)   | 10.7                            |
| Year Built/Rehabilitated               | 1950/1988  | Roadway Width (m)   | 7.9                             |
| Current Load Limit                     | None   | Total Deck Length (m)   | 7.9                             |
| Detour Length (km)                     | 27   | Total Deck Area (s.m.)  | 84.5                            |
| Waterway                               | Stokes River   | Heritage Des.   | None                            |
| Inspection Data                        |  |   | _                               |
| Date of Inspection                     | December 7, 2022   | Photos:<br>5-1 - Title Page   |                                 |
| Name of Inspector                      | Evan Montreuil, P.Eng.   | 5-1 - Title Page<br>5-2 - View of south structure e<br>wingwalls and slope protection<br>5-3 - Impact damage to souther   |                                 |
| Equipment Used                         | Tape, pick, hammer   | 5-4 - Wooden barrier post rot (   |                                 |
| Weather Conditions                     | Overcast   | 5-6 - Southeast structure emba<br>5-7 - View of structure exterior  | nkment erosion                  |
| Temperature                            | 4°C  | 5-8 - View of structure soffit  |                                 |
| Last Inspection                        | October 30, 2020   | 5-9 - View of upstream waterc<br>5-10 - View of downstream wa<br>5-11 - View of north structure<br>and northeast wingwall |                                 |
| Additional Investigation<br>Required   |  | None  |                                 |
| Total Rehabilitation                   | Upgrade approach and barrier protection erosion protection. Repair soffit concre |   | ete foundation repair and place |
| Total Rehabilitation<br>Budget Costing | \$150,000  | Next Inspection   | December 2024                   |
| Justification                          | Repair & rehabilitation recommended<br>Replace approach and barrier protection   |   | ructure to extend service life. |

| Element Group:     | Decks                  | 3               | Length:         |          | 7      | 7.4 m                 |                 |  |
|--------------------|------------------------|-----------------|-----------------|----------|--------|-----------------------|-----------------|--|
| Element Name:      | Wearing St             | urface          | Width:          | 8.5 m    |        |                       |                 |  |
| Location:          |                        |                 | Height:         |          |        |                       |                 |  |
| Material:          | Aspha                  | lt              | Count:          |          |        |                       |                 |  |
| Element Type:      |                        |                 | Total Quantity: |          | 62     | 2.9 m <sup>2</sup>    |                 |  |
| Environment:       | Sever                  | Limited Insp'n: |                 |          |        |                       |                 |  |
| Protection System: | None                   |                 |                 |          |        |                       |                 |  |
| Condition Data:    | Units                  | Exc.            | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |
|                    | m <sup>2</sup>         |                 | 62.9            |          |        |                       |                 |  |
| Comments:          | The asphalt is in good | d condition.    | •               |          |        |                       |                 |  |
| Recommended Work:  | None                   | 6-10 Years      | 1-5 Years       | < 1 Year | Urgent |                       |                 |  |

#### **Element Data**

| Element Group:     | Decks                  | 8                  | Length:         |          | 7      | 7.4 m                 |                 |  |  |
|--------------------|------------------------|--------------------|-----------------|----------|--------|-----------------------|-----------------|--|--|
| Element Name:      | Deck T                 | ор                 | Width:          |          | 11.5 m |                       |                 |  |  |
| Location:          |                        |                    | Height:         |          |        |                       |                 |  |  |
| Material:          | Concre                 | te                 | Count:          |          |        |                       |                 |  |  |
| Element Type:      |                        |                    | Total Quantity: |          | 85     | 5.1 m <sup>2</sup>    |                 |  |  |
| Environment:       | Benig                  | n                  | Limited Insp'n: |          |        | Yes                   |                 |  |  |
| Protection System: |                        | Wearing Surface    |                 |          |        |                       |                 |  |  |
| Condition Data:    | Units                  | Exc.               | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |  |
|                    | m <sup>2</sup>         |                    | 85.1            |          |        |                       |                 |  |  |
| Comments:          | Limited inspection due | e to wearing surfa | ace cover.      | •        |        |                       |                 |  |  |
| Recommended Work   | : None                 | 6-10 Years         | 1-5 Years       | < 1 Year | Urgent |                       |                 |  |  |

| Element Group:     | Decks  | 3                                | Length:                     |            | 7            | '.9 m                 |                 |
|--------------------|--|----------------------------------|-----------------------------|------------|--------------|-----------------------|-----------------|
| Element Name:      | Soffit - Thic                                      | k Slab                           | Width:                      | 10.7 m     |              |                       |                 |
| Location:          |  |                                  | Height:                     |            |              |                       |                 |
| Material:          | Concrete   |                                  | Count:                      |            |              |                       |                 |
| Element Type:      |  |                                  | Total Quantity:             |            | 84           | .53 m <sup>2</sup>    |                 |
| Environment:       | Benig  | n                                | Limited Insp'n:             |            |              |                       |                 |
| Protection System: |  | None                             |                             |            |              |                       |                 |
| Condition Data:    | Units  | Exc.                             | Good                        | Fair       | Poor         | Perform. Deficiencies | Maint.<br>Needs |
|                    | m <sup>2</sup>                                     |                                  | 59.17                       | 17.02      | 8.45         | Yes                   | Yes             |
| Comments:          | Cracking was observe                               |                                  |                             | •          |              |                       | •               |
|                    | extension section. The concrete with signification | •                                | •                           | nt. An 8 m | section of p | ooor/delaminat        | ea              |
| Recommended Work:  | None<br>Complete concrete re                       | 6-10 Years<br>pair at the mid-sp | 1-5 Years<br>an cold joint. | ] < 1 Year | Urgent       |                       |                 |

| Element Group:  | Barrier                                   |            | Length:                         |                       | 3.85 m |                          |                 |  |  |
|---|---|------------|---------------------------------|-----------------------|--------|--------------------------|-----------------|--|--|
| Element Name:   | Railing Sys                               | tem        | Width:                          |                       |        |                          |                 |  |  |
| Location:   | Each Sid                                  | е          | Height:                         |                       |        |                          |                 |  |  |
| Material:   | Steel/Wood                                |            | Count:                          |                       |        | 16                       |                 |  |  |
| Element Type:   | Flex Beam/Post                            |            | Total Quantity:                 |                       | 61     | 1.6 m                    |                 |  |  |
| Environment:  | Severe                                    |            | Limited Insp'n:                 | :                     |        |                          |                 |  |  |
| Protection System:  |   | Galvanized |                                 |                       |        |                          |                 |  |  |
| Condition Data:   | Units                                     | Exc.       | Good                            | Fair                  | Poor   | Perform.<br>Deficiencies | Maint.<br>Needs |  |  |
|   | m   |            |                                 | 30.8                  | 30.8   | Yes                      | Yes             |  |  |
| Comments: The steel flex beam has observed impact damage to the southwest and southeast end sections.  The wooden posts are showing signs of rot, with 50% of the posts having significant rot. The current configuration (the end termination) does not meet current code. There is a pedestrian barricade that doest not meet code height for cyclists. |   |            |                                 |                       |        |                          |                 |  |  |
| Recommended Wor   | <b>k:</b> None<br>Replace/install barrier |            | 1-5 Years<br>ovide required veh | < 1 Year icle safety. | Urgent |                          |                 |  |  |

# **Element Data**

| Element Group:     | Abutmen                                    | ts              | Length:           | 1.52 m      |                   |                          |                 |  |
|--------------------|--|-----------------|-------------------|-------------|-------------------|--------------------------|-----------------|--|
| Element Name:      | Abutment V                                 | Valls           | Width:            | 10.7 m      |                   |                          |                 |  |
| Location:          | Each Sic                                   | Each Side       |                   |             |                   |                          |                 |  |
| Material:          | Concret                                    | e               | Count:            |             |                   | 2                        |                 |  |
| Element Type:      |  | Total Quantity: |                   | 32          | 53 m <sup>2</sup> |                          |                 |  |
| Environment:       | Moderat                                    | е               | Limited Insp'n:   |             |                   |                          |                 |  |
| Protection System: |  |                 |                   |             |                   |                          |                 |  |
| Condition Data:    | Units                                      | Exc.            | Good              | Fair        | Poor              | Perform.<br>Deficiencies | Maint.<br>Needs |  |
|                    | m <sup>2</sup>                             |                 | 26.02             | 6.51        |                   |                          |                 |  |
| Comments:          | Hairline cracks were observed water staini |                 | e haunches in the | cold joint. | Vertical ha       | irline cracks h          | ave             |  |
| Recommended Wo     | rk: None                                   | 6-10 Years      | 1-5 Years         | < 1 Year    | Urgent            |                          |                 |  |

| Abutments   |  | Length:  | 1.55 m  |   |  |  |  |  |  |
|---|--|--|---|---|--|--|--|--|--|
| Wingwall  | S  | Width:   | 1.57 m  |   |  |  |  |  |  |
|   |  | Height:  |   |   |  |  |  |  |  |
| Concrete  | Count:   |  |   | 4   |  |  |  |  |  |
|   | Total Quantity:  |  | 9.  | 74 m <sup>2</sup>   |  |  |  |  |  |
| Moderate  | <del></del>  | Limited Insp'n:  |   |   |  |  |  |  |  |
|   |  |  |   |   |  |  |  |  |  |
| Units   | Exc.   | Good   | Fair  | Poor  | Perform.<br>Deficiencies   | Maint.<br>Needs  |  |  |  |
| m <sup>2</sup>  |  | 3.2  | 4.6   | 1.94  |  | Yes  |  |  |  |
| Comments: Hairline cracks with efflorescence were observed at the south wingwalls. Minor spalling and delamination's were observed at the southwest wingwall. The north wingwalls have moderate honeycombing.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Remove all poor concrete, clean reinforcing steel, and replace concrete. |  |  |   |   |  |  |  |  |  |
|   | Concrete  Moderate  Units  m²  Hairline cracks with ef delamination's were of honeycombing.  K: None | m <sup>2</sup> Hairline cracks with efflorescence w delamination's were observed at the honeycombing.  None 6-10 Years | Wingwalls  Width:  Height:  Concrete  Count:  Total Quantity:  Limited Insp'n:  Units  Exc.  Good  m²  3.2  Hairline cracks with efflorescence were observed at the delamination's were observed at the southwest wingwhoneycombing.  None  6-10 Years  1-5 Years | Wingwalls  Width:  Height:  Count:  Total Quantity:  Moderate  Limited Insp'n:  Units  Exc.  Good  Fair  3.2  4.6  Hairline cracks with efflorescence were observed at the south windelamination's were observed at the southwest wingwall. The nothoneycombing.  None  6-10 Years  1-5 Years  1 Year | Wingwalls     Width:     1       Height:     Count:       Total Quantity:     9.       Moderate     Limited Insp'n:    Units  Exc.  Good  Fair  Poor  3.2  4.6  1.94  Hairline cracks with efflorescence were observed at the south wingwalls. Midelamination's were observed at the southwest wingwall. The north wingwalhoneycombing.  Signature of the country | Wingwalls     Width:     1.57 m       Height:     Count:     4       Total Quantity:     9.74 m²       Moderate     Limited Insp'n:    Units  Exc.  Good  Fair  Poor  Perform. Deficiencies  3.2 4.6 1.94  Hairline cracks with efflorescence were observed at the south wingwalls. Minor spalling ar delamination's were observed at the southwest wingwall. The north wingwalls have moder honeycombing.       K:     None     6-10 Years     1-5 Years     < 1 Year |  |  |  |

| Element Data       |                         |                       |                     |               |              | Structure:       | 5       |
|--------------------|-------------------------|-----------------------|---------------------|---------------|--------------|------------------|---------|
|                    |                         |                       |                     |               |              |                  |         |
| Element Group:     | Foundation              | ons                   | Length:             |               |              |                  |         |
| Element Name:      | Foundation (below       | ground level)         | Width:              |               |              |                  |         |
| Location:          | Each Er                 | nd                    | Height:             |               |              |                  |         |
| Material:          | Concret                 | te                    | Count:              |               |              |                  |         |
| Element Type:      |                         |                       | Total Quantity:     |               |              |                  |         |
| Environment:       | Modera                  | te                    | Limited Insp'n:     |               |              | Yes              |         |
| Protection System: |                         |                       | None                |               |              |                  |         |
|                    | Units                   | Exc.                  | Good                | Fair          | Poor         | Perform.         | Maint.  |
| Condition Data:    | Office                  | LAG.                  | 0000                | ı alı         | 1 001        | Deficiencies     | Needs   |
|                    | <u> </u>                |                       | <u> </u>            | <u> </u>      |              | <u> </u>         |         |
| Comments:          | Not visible for inspect | ion, however th       | e structure appear  | rs stable and | d is founde  | d on bedrock.    |         |
|                    |                         |                       |                     |               |              |                  |         |
|                    |                         | 1                     |                     |               |              |                  |         |
| Recommended Worl   | k: None                 | 6-10 Years            | 1-5 Years           | < 1 Year      | Urgent       |                  |         |
|                    |                         |                       |                     |               |              |                  |         |
|                    |                         |                       |                     |               |              |                  |         |
|                    |                         |                       |                     |               |              |                  |         |
| Element Data       |                         |                       |                     |               |              |                  |         |
| [=: <u></u>        |                         |                       | T                   |               |              |                  |         |
| Element Group:     | Embankments &           | •                     | Length:<br>Width:   |               |              |                  |         |
| Element Name:      | Streams and W           | Streams and Waterways |                     |               |              |                  |         |
| Location:          |                         |                       |                     |               |              |                  |         |
| Material:          | Bedroc                  | K                     | Count:              |               |              |                  |         |
| Element Type:      |                         |                       | Total Quantity:     |               |              | All              |         |
| Environment:       | Modera                  | te                    | Limited Insp'n:     |               |              |                  |         |
| Protection System: |                         |                       | None                |               |              |                  |         |
|                    | Units                   | Exc.                  | Good                | Fair          | Poor         | Perform.         | Maint.  |
| Condition Data:    |                         | Σχο.                  |                     |               |              | Deficiencies     | Needs   |
|                    | All                     |                       | <u> </u>            | All           |              | Yes              | Yes     |
| Comments:          | No signs of impedance   | e to flow. Scot       | ır was observed ar  | round the co  | ncrete at t  | ne north inlet.  |         |
|                    |                         |                       |                     |               |              |                  |         |
|                    |                         | 0.4034                |                     | 7 434         |              |                  |         |
| Recommended Worl   |                         | 6-10 Years            | 1-5 Years           | 」<1 Year      | Urgent       |                  |         |
|                    | Place rip rap slope pro | otection to prev      | ent further scour a | and repair th | e existing r | ip rap at the no | rthwest |
|                    | quadrant.               |                       |                     |               |              |                  |         |
| EL (D)             |                         |                       |                     |               |              |                  |         |
| Element Data       |                         |                       |                     |               |              |                  |         |
| Floment Craum      | Embankmanta (           | Ctrooms               | I anath.            | 1             |              |                  |         |
| Element Group:     | Embankments &           |                       | Length:             |               |              |                  |         |
| Element Name:      | Embankm                 |                       | Width:              |               |              |                  |         |
| Location:          | Each Cor                |                       | Height:             |               |              |                  |         |
| Material:          | Stone/Ea                | irtn                  | Count:              |               |              | 4                |         |
| Element Type:      | Total Qu                |                       |                     |               |              | 4                |         |
| Environment:       | Modera                  | te                    | Limited Insp'n:     |               |              |                  |         |
| Protection System: |                         | ı                     | None                | 1             |              |                  |         |
| 0                  | Units                   | Exc.                  | Good                | Fair          | Poor         | Perform.         | Maint.  |
| Condition Data:    |                         |                       |                     |               |              | Deficiencies     | Needs   |
| 0                  | Each                    | <u> </u>              | <u> </u>            | 2             | 4            | Yes              | Yes     |
| Comments:          | Heavily vegetated with  |                       |                     |               |              |                  | t. The  |
|                    | northeast and southw    | est slopes have       | e eroded and requi  | ire repair an | d protectio  | n.               |         |

k: None 6-10 Years 1-5 Years <a href="#"> < 1 Year</a> Urgent Repair slopes and add additional rip rap/rock slope protection.

Recommended Work:

#### Element Group: Signs Length: Element Name: Signs Width: Location: Each Corner Height: Count: Material: Steel Total Quantity: Element Type: Environment: Severe Limited Insp'n: Protection System: None Perform. Maint. Units Exc. Good Fair Poor **Condition Data: Deficiencies** Needs Each Yes Yes Comments: The checkboard curve sign is in good condition. There are no end hazard marker signs currently in

1-5 Years

< 1 Year

Urgent

Structure:

5

**Element Data** 

Recommended Work:

**Element Data** 

| Element Group:     | Approac                            | hes               | Length:              | 5 m               |             |                       |                 |  |
|--------------------|------------------------------------|-------------------|----------------------|-------------------|-------------|-----------------------|-----------------|--|
| Element Name:      | Wearing S                          | Wearing Surface W |                      |                   |             | 8.5 m                 |                 |  |
| Location:          | Each E                             | Each End Height:  |                      |                   |             |                       |                 |  |
| Material:          | Aspha                              | ılt               | Count:               |                   |             | 2                     |                 |  |
| Element Type:      |                                    |                   | Total Quantity:      | 85 m <sup>2</sup> |             |                       |                 |  |
| Environment:       | Sever                              | е                 | Limited Insp'n:      |                   |             |                       |                 |  |
| Protection System: |                                    |                   | None                 |                   |             |                       |                 |  |
| Condition Data:    | Units                              | Exc.              | Good                 | Fair              | Poor        | Perform. Deficiencies | Maint.<br>Needs |  |
|                    | m <sup>2</sup>                     |                   | 75                   | 10                |             |                       |                 |  |
| Comments:          | The approach wearir each approach. | ng surface is g   | enerally in good cor | ndition. Min      | or transvei | se cracking obs       | erved at        |  |

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent

6-10 Years

Place new end marker hazard signs at each quadrant.

None



Photo 5-2: View of south structure elevation, exterior curb and soffit, wingwalls and slope protection



Photo 5-3: Impact damage to southeast barrier protection



Photo 5-4: Wooden barrier post rot (typical)



Photo 5-5: Pedestrian (south side only) and structure barrier (typ)



Photo 5-6: Southeast structure embankment erosion



Photo 5-7: View of structure exterior soffit and curb



Photo 5-8: View of structure soffit



Photo 5-9: View of upstream watercourse



Photo 5-10: View of downstream watercourse



Photo 5-11: View of north structure elevation, exterior curb and soffit and northwest wingwall

# **Bridge/Culvert Inspection Report**

Site Number 6 **Project Number** 221-12948-00 Northern Bruce Peninsula Heron Point Road Bridge Municipality Structure Name 30 02 MTO Region Code County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





1450 - 1st Avenue West, Suite 101 Owen Sound, Ontario N4K 6W2 Tel: 519-376-7612 Fax: 519-376-8008 Website: www.wspgroup.com

# Bridge/Culvert Inspection Report

| Inventory Data                         |  |  |  |
|--|--|--|--|
| Structure Name                         | Heron Point Road Bridge  | Site Number  | 6  |
| County                                 | Bruce  | Road Name  | Heron Point Road   |
| Municipality                           | Northern Bruce Peninsula   | Road Type  | Rural Local  |
| Bridge or Culvert                      | Bridge   | Owner  | Northern Bruce Peninsula   |
| Structure Type                         | Rigid Frame  | AADT   | 200  |
| Span (m)                               | 7.1 No. 1  | % Trucks   | 10%  |
| Height (m)                             | 2.5  |  |  |
| Direction of Structure                 | East/West - 15° skew   | Overall Structure Width (m)  | 8.1  |
| Year Built/Rehabilitated               | 1952   | Roadway Width (m)  | 5.9  |
| Current Load Limit                     | 12 t   | Total Deck Length (m)  | 8.3  |
| Detour Length (km)                     | N/A - Dead Ends  | Total Deck Area (s.m.)   | 67.2   |
| Waterway                               | Stokes River   | Heritage Des.  | None   |
| Inspection Data                        |  |  |  |
| Date of Inspection                     | December 7, 2022   | Photos:  |  |
| Name of Inspector                      | Evan Montreuil, P.Eng.   | 6-1 - Title Page 6-2 - View of structure deck w  | vith delamination and ponding  |
| Equipment Used                         | Tape, pick, hammer   | 6-3 - View of structure from n 6-4 - View of west structure el exterior of parapet wall  |  |
| Weather Conditions                     | Overcast   | 6-5 - Damaged approach barrie  | er flex beam and wood posts  |
| Temperature  Last Inspection           | 4°C July 3, 2020   | 6-6 - View of west structure el<br>and parapet wall<br>6-7 - View of structure soffit<br>6-8 - View of foundation crack<br>6-9 - Differential foundation so<br>6-10 - View of watercourse up<br>6-11 - View of watercourse up<br>6-12 - Embankment and defici<br>6-13 - Differential foundation<br>6-14 - View of wearing surface<br>6-15 - View of wingwall | ettlement<br>ownstream<br>ostream<br>ient barrier protection<br>settlement |
| Additional Investigation               | If the structure is to remain in service, should be completed. In the interim, cowingwalls and footing separation/scour  | emplete annual inspections and mo  |  |
| Total Rehabilitation                   | Replacement or closure recommended   | as rehabilitation is no longer econ  | omically feasible.   |
| Total Rehabilitation<br>Budget Costing | \$260,000  | Next Inspection  | December 2023  |
| Justification                          | Due to the poor overall condition of the permanent closure of the structure be completed, a detailed structural evaluat to confirm the extend of the repairs requntil approach barrier upgraded. | ompleted. If the structure is to rention and load carrying capacity and  | main open and rehabilitation alysis should be completed in order           |

| Element Group:  | Decks                  |            | Length:         |          | 8.     | .05 m                    |                 |  |  |
|---|------------------------|------------|-----------------|----------|--------|--------------------------|-----------------|--|--|
| Element Name:   | Deck Top               | ס          | Width:          | 5.9 m    |        |                          |                 |  |  |
| Location:   |                        |            | Height:         |          |        |                          |                 |  |  |
| Material:   | Concrete               | )          | Count:          |          |        |                          |                 |  |  |
| Element Type:   |                        |            | Total Quantity: |          | 47     | 7.5 m <sup>2</sup>       |                 |  |  |
| Environment:  | Severe Limited Insp'n: |            |                 |          |        |                          |                 |  |  |
| Protection System:  |                        |            | -               |          |        |                          |                 |  |  |
| Condition Data:   | Units                  | Exc.       | Good            | Fair     | Poor   | Perform.<br>Deficiencies | Maint.<br>Needs |  |  |
|   | m <sup>2</sup>         |            |                 | 35.6     | 11.9   | Yes                      | Yes             |  |  |
| Comments: The structure deck has observed localized spalling and popouts, and is relatively flat allowing water to pond. Granulars have accumulated along south edge of the deck. |                        |            |                 |          |        |                          |                 |  |  |
| Recommended Wor   |                        | 6-10 Years |                 | < 1 Year | Urgent |                          |                 |  |  |
| Repair all poor and delaminated concrete, waterproof the structure deck, and place an asphalt wearing surface graded to achieve proper drainage.                                  |                        |            |                 |          |        |                          |                 |  |  |

#### **Element Data**

| Element Group:   | Decks          |      | Length:         |       | 7.   | .41 m                 |                 |  |  |
|--|----------------|------|-----------------|-------|------|-----------------------|-----------------|--|--|
| Element Name:  | Soffit - Thick | Slab | Width:          | 6.8 m |      |                       |                 |  |  |
| Location:  |                |      | Height:         |       |      |                       |                 |  |  |
| Material:  | Concrete       |      | Count:          |       |      |                       |                 |  |  |
| Element Type:  | Total Quantit  |      |                 |       | 50   | .39 m²                |                 |  |  |
| Environment:   | Moderate       | 9    | Limited Insp'n: |       |      |                       |                 |  |  |
| Protection System:   |                |      |                 |       |      |                       |                 |  |  |
| Condition Data:  | Units          | Exc. | Good            | Fair  | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |
|  | m <sup>2</sup> |      |                 | 45.35 | 5.04 | Yes                   | Yes             |  |  |
| Comments: Observed spalling, cracking, and staining with effervescence of the soffit. The spalling is severe at all corners. The southeast haunch is in very poor condition. |                |      |                 |       |      |                       |                 |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Remove all poor concrete, clean reinforcing steel and replace concrete.  |                |      |                 |       |      |                       |                 |  |  |

| Decks                  |  | Length:  |   |  |   |   |
|------------------------|--|--|---|--|---|---|
| Drainage               | 9  | Width:   |   |  |   |   |
|                        |  | Height:  |   |  |   |   |
| Concrete               | ;  | Count:   |   |  |   |   |
|                        |  | Total Quantity:  |   |  |   |   |
| Severe                 |  | Limited Insp'n:  |   |  |   |   |
|                        |  | -  | -   |  |   |   |
| Units                  | Evc  | Good   | Fair  | Poor   | Perform.  | Maint.  |
| Offito                 | LXU.   | Good   | ı alı   | 1 001  | Deficiencies  | Needs   |
|                        |  |  |   |  | Yes   |   |
| There are currently no | deck drains  | in place and the gra   | de is relativ   | ely flat allo  | wing for water  | ponding.  |
|                        |  |  |   |  |   |   |
|                        |  |  | _   |  |   |   |
| k: None                | 6-10 Years   | 1-5 Years  | < 1 Year  | Urgent   |   |   |
| Following future deck  | rehabilitation,  | place a waterproof   | ing membra  | ane and as   | phalt wearing   | surface   |
| graded to achieve pos  | sitive drainage  | ).   |   |  |   |   |
|                        | Concrete Severe Units There are currently note: None Following future deck | Concrete  Severe  Units Exc.  There are currently no deck drains in the control of the control o | Drainage Width: Height: Concrete Count: Total Quantity: Severe Limited Insp'n:  Units Exc. Good  There are currently no deck drains in place and the grantle.  k: None 6-10 Years 1-5 Years | Drainage  Width: Height: Concrete Count: Total Quantity: Limited Insp'n:  Units Exc. Good Fair  There are currently no deck drains in place and the grade is relative.  k: None 6-10 Years T-5 Years < 1 Year Following future deck rehabilitation, place a waterproofing membra | Drainage Width: Height: Concrete Count: Total Quantity: Severe Limited Insp'n:  Units Exc. Good Fair Poor  There are currently no deck drains in place and the grade is relatively flat allows.  k: None 6-10 Years 1-5 Years < 1 Year Urgent Following future deck rehabilitation, place a waterproofing membrane and as | Drainage  Width:  Height:  Concrete  Count:  Total Quantity:  Severe  Limited Insp'n:  Units  Exc.  Good  Fair  Poor  Perform.  Deficiencies  Yes  There are currently no deck drains in place and the grade is relatively flat allowing for watel  k:  None  6-10 Years  1-5 Years  < 1 Year  Urgent  Following future deck rehabilitation, place a waterproofing membrane and asphalt wearing |

# Element Data Sidewalks/curbs Length: 8.05

| Element Group:     | Sidewaiks/d    | curbs | Length:         | 8.05 |                     |              |        |  |  |
|--------------------|----------------|-------|-----------------|------|---------------------|--------------|--------|--|--|
| Element Name:      | Curbs          |       | Width:          |      | 0.21                |              |        |  |  |
| Location:          |                |       | Height:         |      | 0.21                |              |        |  |  |
| Material:          | Concret        | e     | Count:          |      | 2                   |              |        |  |  |
| Element Type:      |                |       | Total Quantity: |      | 6.76 m <sup>2</sup> |              |        |  |  |
| Environment:       | Severe         |       | Limited Insp'n: |      |                     |              |        |  |  |
| Protection System: |                |       |                 |      |                     |              |        |  |  |
|                    | Units          | Exc.  | Good            | Fair | Poor                | Perform.     | Maint. |  |  |
| Condition Data:    |                | EXC.  | J Good          | Гап  | Pool                | Deficiencies | Needs  |  |  |
|                    | m <sup>2</sup> |       |                 | 5.41 | 1.35                |              |        |  |  |

Comments: The existing curbs have observed surface spalling and end chips. The northeast corner is severely

spalled.

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent

Remove all poor concrete, clean reinforcing steel, and replace concrete.

#### **Element Data**

| Element Group:     | Barriers              |      | Length:         |                      | 8.05  |              |        |  |
|--------------------|-----------------------|------|-----------------|----------------------|-------|--------------|--------|--|
| Element Name:      | Barrier/Parapet Walls |      | Width:          | 0.15                 |       |              |        |  |
| Location:          |                       |      | Height:         |                      | 1.15  |              |        |  |
| Material:          | Concrete              |      | Count:          | 2                    |       |              |        |  |
| Element Type:      |                       |      | Total Quantity: | 18.52 m <sup>2</sup> |       |              |        |  |
| Environment:       | Severe                |      | Limited Insp'n: |                      |       |              |        |  |
| Protection System: |                       |      |                 |                      |       |              |        |  |
|                    | Units                 | Exc. | Good            | Fair                 | Poor  | Perform.     | Maint. |  |
| Condition Data:    | 2                     | LAC. | Good            | ı alı                | F 001 | Deficiencies | Needs  |  |
|                    | $m^2$                 |      |                 | 16.67                | 1.85  |              |        |  |

Comments: Parapet wall with some spalling and end damage chips.

**Recommended Work:** None 6-10 Years 1-5 Years < 1 Year Urgent

Remove all poor concrete, clean reinforcing steel, and replace concrete.

| Element Group:     | Abutmen                                 | ts                           | Length:               |                         |                     |                       |                 |  |  |
|--------------------|---|------------------------------|-----------------------|-------------------------|---------------------|-----------------------|-----------------|--|--|
| Element Name:      | Abutment V                              | Valls                        | Width:                |                         | 7.8                 |                       |                 |  |  |
| Location:          |   |                              | Height:               |                         |                     | 0.64                  |                 |  |  |
| Material:          | Concret                                 | е                            | Count:                |                         |                     | 2                     |                 |  |  |
| Element Type:      |   |                              | Total Quantity:       |                         | 9.98 m <sup>2</sup> |                       |                 |  |  |
| Environment:       | Moderate                                |                              | Limited Insp'n:       |                         |                     |                       |                 |  |  |
| Protection System: |   |                              | •                     | -                       |                     |                       |                 |  |  |
| Condition Data:    | Units                                   | Exc.                         | Good                  | Fair                    | Poor                | Perform. Deficiencies | Maint.<br>Needs |  |  |
|                    | m <sup>2</sup>                          |                              |                       | 8.98                    | 1                   |                       |                 |  |  |
| Comments:          | Surface cracking & sp                   | palling obser                | ved throughout the ab | outment walls           |                     |                       |                 |  |  |
| Recommended Wor    | <b>rk:</b> None<br>Remove all poor cond | 6-10 Years<br>crete, clean r |                       | < 1 Year replace concil | Urgent<br>rete.     |                       |                 |  |  |

| Element Group:  | Abutmen <sup>-</sup> | ts              | Length:         |          |                   |                       |                 |  |  |
|---|----------------------|-----------------|-----------------|----------|-------------------|-----------------------|-----------------|--|--|
| Element Name:   | Wingwall             | S               | Width:          |          | ;                 | 3.05                  |                 |  |  |
| Location:   |                      |                 | Height:         | 0.6      |                   |                       |                 |  |  |
| Material:   | Concrete             |                 | Count:          |          |                   | 2                     |                 |  |  |
| Element Type:   |                      | Total Quantity: |                 | 1.       | 83 m <sup>2</sup> |                       |                 |  |  |
| Environment:  | Moderate             | Э               | Limited Insp'n: |          |                   |                       |                 |  |  |
| Protection System:  |                      |                 |                 | =        |                   |                       |                 |  |  |
| Condition Data:   | Units                | Exc.            | Good            | Fair     | Poor              | Perform. Deficiencies | Maint.<br>Needs |  |  |
|   | m <sup>2</sup>       |                 |                 |          | 1.83              | Yes                   |                 |  |  |
| Comments: The northeast wingwall previously failed and was replaced with rock protection; however, severe scour was observed behind the rock protection and abutment wall/footing. The northwest wingwall is severely cracked and separating from the abutment wall connection. |                      |                 |                 |          |                   |                       |                 |  |  |
| Recommended Wor   | r <b>k:</b> None     | 6-10 Years      | 1-5 Years       | < 1 Year | Urgent            | ]                     |                 |  |  |
| Monitor inlet conditions frequently. Replace wingwalls or place rock protection to prevent further scour/undercutting of abutment wall/footings.  |                      |                 |                 |          |                   |                       |                 |  |  |

# **Element Data**

| Element Group:   | Foundations  |      | Length:         |      |       |                       |                 |  |  |  |
|--|--|------|-----------------|------|-------|-----------------------|-----------------|--|--|--|
| Element Name:  | Foundation (below ground level)  |      | Width:          | 9.5  |       |                       |                 |  |  |  |
| Location:  |  |      | Height:         |      |       | 0.85                  |                 |  |  |  |
| Material:  | Concrete   |      | Count:          | 2    |       |                       |                 |  |  |  |
| Element Type:  |  |      | Total Quantity: |      | 1     | 6.15                  |                 |  |  |  |
| Environment:   | Moderate   |      | Limited Insp'n: |      |       |                       |                 |  |  |  |
| Protection System:   |  |      |                 |      |       |                       |                 |  |  |  |
| Condition Data:  | Units  | Exc. | Good            | Fair | Poor  | Perform. Deficiencies | Maint.<br>Needs |  |  |  |
|  | m <sup>2</sup>   |      |                 |      | 16.15 | Yes                   |                 |  |  |  |
| Comments:  | Footings are exhibiting severe spalling and delamination. Both footings are severely split longitudinally throughout, and are separating from the abutment walls. Damaged inlet wingwalls allowing water to flow through cracked sections causing concrete erosion and undermining the structure. Concrete between separation is very soft and unstable. |      |                 |      |       |                       |                 |  |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent  Replace wingwalls and repair damaged/undermined footings to prevent further erosion and complete loss of structure stability. |  |      |                 |      |       |                       |                 |  |  |  |

| Element Group:   | Embankments & Streams |      | Length:         |      |      |                       |                 |  |  |  |
|--|-----------------------|------|-----------------|------|------|-----------------------|-----------------|--|--|--|
| Element Name:  | Streams and Waterways |      | Width:          |      |      |                       |                 |  |  |  |
| Location:  |                       |      | Height:         |      |      |                       |                 |  |  |  |
| Material:  | Earth / Stone / Rock  |      | Count:          |      |      |                       |                 |  |  |  |
| Element Type:  |                       |      | Total Quantity: |      |      |                       |                 |  |  |  |
| Environment:   | Moderate              |      | Limited Insp'n: |      |      |                       |                 |  |  |  |
| Protection System:   |                       |      |                 |      |      |                       |                 |  |  |  |
| Condition Data:  | Units                 | Exc. | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |  |
|  | All                   |      |                 | All  |      | Bonorono              | 110000          |  |  |  |
| Comments: Bedrock streambed is stable and free of obstruction at the time of inspection. |                       |      |                 |      |      |                       |                 |  |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent                              |                       |      |                 |      |      |                       |                 |  |  |  |

Element Data Structure: 6

| Element Group:  | Embankments                               | & Streams    | Length:         |          |        |                       |                 |
|---|---|--------------|-----------------|----------|--------|-----------------------|-----------------|
| Element Name:   | Embankr                                   | nents        | Width:          |          |        |                       |                 |
| Location:   |   |              | Height:         |          |        |                       |                 |
| Material:   | Earth / F                                 | Earth / Rock |                 | 4        |        |                       |                 |
| Element Type:   |   |              | Total Quantity: |          |        | 4                     |                 |
| Environment:  | Modera                                    | Moderate I   |                 |          |        |                       |                 |
| Protection System:  |   |              |                 |          |        |                       |                 |
| Condition Data:   | Units                                     | Exc.         | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |
|   | Each                                      |              |                 | 4        |        |                       |                 |
| Comments:  The embankments are a combination of rock and vegetated earth and appear generally stable with erosion observed at the structure inlet and outlet. Some corner erosion and settlement of the existing rock protection was observed. New rip rap placed in 2017 to protect the embankment exposed following the failure of the structure wingwall. (See wingwall notes) |   |              |                 |          |        |                       |                 |
| Recommended Wor   | <b>k:</b> None<br>Place rip-rap and/or ro | 6-10 Years   | 1-5 Years       | < 1 Year | Urgent |                       |                 |

| Element Group:     | Sign                                    | s                  | Length:            |              |           |                       |                 |  |
|--------------------|---|--------------------|--------------------|--------------|-----------|-----------------------|-----------------|--|
| Element Name:      | Sign                                    | S                  | Width:             |              |           |                       |                 |  |
| Location:          |   |                    | Height:            |              |           |                       |                 |  |
| Material:          | Steel / V                               | Steel / Wood       |                    |              |           |                       |                 |  |
| Element Type:      |   | Т                  |                    |              | 10        |                       |                 |  |
| Environment:       | Moder                                   | Moderate L         |                    |              |           |                       |                 |  |
| Protection System: |   |                    |                    |              |           |                       |                 |  |
| Condition Data:    | Units                                   | Exc.               | Good               | Fair         | Poor      | Perform. Deficiencies | Maint.<br>Needs |  |
|                    | Each                                    |                    |                    | 10           |           |                       |                 |  |
| Comments:          | Load limit (west), haze fair condition. | ard, dead end, sto | op, narrow structu | ire, and 35k | m/hr spee | d posting sign        | s are all ii    |  |
| Recommended Wor    | k: None                                 | 6-10 Years         | 1-5 Years          | < 1 Year     | Urgent    |                       |                 |  |

| Element Group:   | Approac        | hes                | Length:         |          |        | 5 m                   |                 |  |
|--|----------------|--------------------|-----------------|----------|--------|-----------------------|-----------------|--|
| Element Name:  | Wearing S      | urface             | Width:          | 5.9 m    |        |                       |                 |  |
| Location:  |                |                    | Height:         |          |        |                       |                 |  |
| Material:  | Asphalt /      | Asphalt / Gravel C |                 | 2        |        |                       |                 |  |
| Element Type:  | Т              |                    | Total Quantity: |          | 5      | 59 m <sup>2</sup>     |                 |  |
| Environment:   | Seve           | re re              | Limited Insp'n: | 1:       |        |                       |                 |  |
| Protection System:   |                |                    |                 |          |        |                       |                 |  |
| Condition Data:  | Units          | Exc.               | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |
|  | m <sup>2</sup> |                    |                 | 29.5     | 29.5   |                       | Yes             |  |
| Comments: The north approach is asphalt with observed stress cracking, and the south approach is a granular surface.                                       |                |                    |                 |          |        |                       |                 |  |
| Recommended Wor  | k: None        | 6-10 Years         | 1-5 Years       | < 1 Year | Urgent |                       |                 |  |
| Pave the south approach to reduce maintenance and improve drainage. In the interim, continue annual grading of the approach wearing surface and shoulders. |                |                    |                 |          |        |                       |                 |  |

Element Data Structure: 6

| Element Group:     | Approact               | nes                | Length:             |            |              |                  |        |
|--------------------|------------------------|--------------------|---------------------|------------|--------------|------------------|--------|
| Element Name:      | Drainag                | je                 | Width:              |            |              |                  |        |
| Location:          |                        |                    | Height:             |            |              |                  |        |
| Material:          | Asphalt / Gravel       |                    | Count:              |            |              |                  |        |
| Element Type:      | Т                      |                    | Total Quantity:     |            |              |                  |        |
| Environment:       | Severe L               |                    | Limited Insp'n:     |            |              |                  |        |
| Protection System: |                        |                    |                     |            |              |                  |        |
|                    | Units                  | Exc.               | Good                | Fair       | Poor         | Perform.         | Maint. |
| Condition Data:    |                        |                    |                     |            | F 001        | Deficiencies     | Needs  |
|                    | %                      |                    |                     | 50         | 50           | Yes              |        |
| Comments:          | Settlement (stress) ar | nd cracking of the | e north asphalt app | oroach was | observed.    |                  |        |
|                    |                        |                    |                     |            |              |                  |        |
|                    |                        |                    |                     | _          |              |                  |        |
| Recommended Work   | : None                 | 6-10 Years         | 1-5 Years           | < 1 Year   | Urgent       |                  |        |
|                    | Resurface the north s  | ide and pave sou   | uth side. Provide a | crown alor | ng the cente | er line to achie | ve     |
|                    | positive drainage.     |                    |                     |            |              |                  |        |

| Element Group:     | Approach                                       | nes                     | Length:              |               |             |                  |           |
|--------------------|--|-------------------------|----------------------|---------------|-------------|------------------|-----------|
| Element Name:      | Guidera  | ail                     | Width:               |               |             |                  |           |
| Location:          |  |                         | Height:              |               |             |                  |           |
| Material:          | Steel/Tim                                      | Steel/Timber            |                      |               |             |                  |           |
| Element Type:      | 3 - Cable and F                                | 3 - Cable and Flex Beam |                      |               |             |                  |           |
| Environment:       | Severe   |                         | Limited Insp'n:      |               |             |                  |           |
| Protection System: |  | Galvanized              |                      |               |             |                  |           |
|                    | Units  | Exc.                    | Good Fair            | Poor          | Perform.    | Maint.           |           |
| Condition Data:    |  | EXC.                    |                      | Ган           | F001        | Deficiencies     | Needs     |
|                    | %  |                         |                      | 25            | 75          | Yes              | Yes       |
| Comments:          | The configuration of the                       | ne flex beam on         | the north side of th | ne structure  | does not n  | neet Code. Th    | ere are   |
|                    | missing intermediate                           | oosts, improper o       | connections to the   | structure p   | arapet wall | s, and lack en   | d         |
|                    | protection. The 3-cabl                         | e guiderail on th       | e south approach     | is set too hi | gh, the cab | ole is loose, se | veral     |
|                    | posts are broken, and                          | the structure co        | nnection is not to   | code.         |             |                  |           |
| Recommended Work:  | None   | 6-10 Years              | 1-5 Years            | < 1 Year      | Urgent      |                  |           |
|                    | Upgrade the north app                          | oroach barrier pr       | otection and struc   | ture connec   | tion to mee | et current code  | . Replace |
|                    | the 3-cable south side barrier with flex beam. |                         |                      |               |             |                  |           |



Photo 6-2: View of structure deck with delamination



Photo 6-3: View of structure from south approach



Photo 6-4: View of west structure elevation, slope protection and exterior of parapet wall



Photo 6-5: View of approach barrier flex beam and wood posts



Photo 6-6: View of west structure elevation, wingwalls, exterior curb and parapet wall



Photo 6-7: View of structure soffit and footing/abutment wall.



Photo 6-8: View of foundation crack/separation and abutment wall



Photo 6-9: Foundation separation and concrete erosion.



Photo 6-10: View of watercourse downstream



Photo 6-11: View of watercourse upstream



Photo 6-12: Embankment and deficient barrier protection



Photo 6-13: Wingwall and footing separation.



Photo 6-14: View of wearing surface



Photo 6-15: View of abutment wall and footing spalling.

# **Bridge/Culvert Inspection Report**

Site Number **Project Number** 221-12948-00 Lindsay Road 5 Culvert Municipality Northern Bruce Peninsula Structure Name 30 02 MTO Region Code County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





1450 - 1st Avenue West, Suite 101 Owen Sound, Ontario N4K 6W2 Tel: 519-376-7612 Fax: 519-376-8008

Website: www.wspgroup.com

## Bridge/Culvert Inspection Report

| Inventory Data                         |  |   |                                |
|--|--|---|--------------------------------|
| Structure Name                         | Lindsay Road 5 Culvert   | Site Number   | 7                              |
| County                                 | Bruce  | Road Name   | Lindsay Road 5                 |
| Municipality                           | Northern Bruce Peninsula   | Road Type   | Rural Coll.                    |
| Bridge or Culvert                      | Culvert  | Owner   | Northern Bruce Peninsula       |
| Structure Type                         | Rigid Frame  | AADT  | 350                            |
| Span (m)                               | 7.3 No. 1  | % Trucks  | 15%                            |
| Height (m)                             | 3.1  | Overall Structure Width (m)   | 17.4                           |
| Direction of Structure                 | North/South  | Roadway Width (m)   | 6.1                            |
| Year Built/Rehabilitated               | 1972   | Total Deck Length (m)   | 8.4                            |
| Current Load Limit                     | None   | Total Deck Area (s.m.)  | 146                            |
| Detour Length (km)                     | 5.5  | Heritage Des.   | None                           |
| Waterway                               | Stokes River   |   |                                |
| Inspection Data                        |  |   |                                |
| Date of Inspection                     | September 24, 2020   | Photos:   |                                |
| Name of Inspector                      | Evan Montreuil, P.Eng.   | 7-1 - Title Page 7-2 - View of watercourse upend 7-3 - View of watercourse do     | ostream and upstream culvert   |
| Equipment Used                         | Tape, pick, hammer   | culvert end<br>7-4 - Structure elevation  |                                |
| Weather Conditions                     | Overcast   | <ul><li>7-5 - Structure elevation</li><li>7-6 - View of soffit and abut</li></ul> | ment walls                     |
| Temperature                            | 5°C  | 7-7 - View of soffit  |                                |
| Last Inspection                        | September 24, 2020   |   |                                |
| Additional Investigation<br>Required   |  | None  |                                |
| Total Rehabilitation                   | Install approach & barrier protection (Repair bank erosion.  | to Code. Repair soffit concrete. S  | seal the abutment cold joints. |
| Total Rehabilitation<br>Budget Costing | \$58,000   | Next Inspection   | December 2024                  |
| Justification                          | The structure is in overall good condifor public safety and to meet code. Re Install end hazard signs to provide rec | educe the speed to 45 km/hr. until  |                                |

#### **Element Data** Structure: 7 Element Group: Length: Decks Width: Element Name: Wearing Surface Location: Height: Material: Surface Treatment Count: Element Type: Total Quantity: Environment: Severe Limited Insp'n: Protection System: None Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs

15

10

**Comments:** Asphalt wearing surface recently placed. Slight settlement was observed.

75

%

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent

#### **Element Data**

| Element Group:     | Decks                   |                 | Length:           |             |          |                          |                 |
|--------------------|-------------------------|-----------------|-------------------|-------------|----------|--------------------------|-----------------|
| Element Name:      | Deck Top                | )               | Width:            |             |          |                          |                 |
| Location:          |                         |                 | Height:           |             |          |                          |                 |
| Material:          | Concrete                |                 | Count:            |             |          |                          |                 |
| Element Type:      |                         |                 | Total Quantity:   |             |          |                          |                 |
| Environment:       | Benign                  |                 | Limited Insp'n:   |             |          | Yes                      |                 |
| Protection System: |                         | Wearing Surface |                   |             |          |                          |                 |
| Condition Data:    | Units                   | Exc.            | Good              | Fair        | Poor     | Perform.<br>Deficiencies | Maint.<br>Needs |
|                    | %                       |                 | 95                | 5           |          |                          |                 |
| Comments:          | The visible ends are in | n overall good  | condition with so | me minor sp | palling. | -                        |                 |
| Recommended World  | k: None                 | 6-10 Years      | 1-5 Years         | < 1 Year    | Urgent   |                          |                 |

#### **Element Data**

| Element Group:     | Deck             | S                   | Length:              |             |      |              |        |
|--------------------|------------------|---------------------|----------------------|-------------|------|--------------|--------|
| Element Name:      | Soffit - Thi     | Soffit - Thick Slab |                      |             |      |              |        |
| Location:          |                  |                     |                      |             |      |              |        |
| Material:          | Concre           | Concrete            |                      |             |      |              |        |
| Element Type:      |                  |                     |                      |             |      |              |        |
| Environment:       | Benign           |                     | Limited Insp'n:      |             |      |              |        |
| Protection System: |                  |                     | Non                  | e           |      |              |        |
|                    | Units            | Exc.                | Good                 | Fair        | Poor | Perform.     | Maint. |
| Condition Data:    | Ullis            | EXC.                | Good                 | ган         | Pool | Deficiencies | Needs  |
|                    | %                |                     | 95                   |             | 5    |              |        |
| Comments:          | Honeycombing and | exposed reinf       | orcing steel observe | ed at north | end. |              | -      |
|                    |                  |                     |                      |             |      |              |        |

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent

#### **Element Data** Structure: 7 Element Group: **Abutments** Length: Element Name: Abutment Walls Width: Each Side Height: Location: Material: Concrete Count: Total Quantity: Element Type: Environment: Moderate Limited Insp'n: Protection System: Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs % 80 20 Comments: Hairline cracks at cold joint in haunches and some spalling (honeycomb) on walls. Transverse cracking at cold joint, 1/3 way up from footing on each side. Minor spalling erosion from high water level down to footing. None 6-10 Years Recommended Work: 1-5 Years < 1 Year Urgent Concrete repairs, seal cold joint. **Element Data** Element Group: Foundations Length: Element Name: Foundation (below ground level) Width: Location: Height: Each End Material: Concrete Count: Element Type: Total Quantity: Environment: Moderate Limited Insp'n: Yes Protection System: None Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Needs Deficiencies Comments: The foundations are not visible, but the structure appears stable. Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent **Element Data** Element Group: Embankments & Streams Length: Element Name: Streams and Waterways Width: Location: Height: Earth / Rock Material: Count: Element Type: Total Quantity: **Environment:** Moderate Limited Insp'n: Protection System: None Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs 100

No signs of impedance to flow at the time of inspection. Medium velocity watercourse.

1-5 Years

< 1 Year

Urgent

%

None

6-10 Years

Comments:

Recommended Work:

#### Structure: **Element Data**

| Element Group:  | Embankments &  | Streams         | Length:         |          |        |                       |                 |  |
|---|----------------|-----------------|-----------------|----------|--------|-----------------------|-----------------|--|
| Element Name:   | Embankme       | nts             | Width:          |          |        |                       |                 |  |
| Location:   | Each Corr      | er              | Height:         |          |        |                       |                 |  |
| Material:   | Earth / Rock C |                 | Count:          | 4        |        |                       |                 |  |
| Element Type:   |                | Total Quantity: | 4               |          |        |                       |                 |  |
| Environment:  | Moderate       | 9               | Limited Insp'n: | d .      |        |                       |                 |  |
| Protection System:  | None           |                 |                 |          |        |                       |                 |  |
| Condition Data:   | Units          | Exc.            | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |
|   | Each           |                 |                 | 4        |        | Yes                   | Yes             |  |
| Comments: The embankments are heavily vegetated with rip rap protection on the slopes. The slopes are very steep, some moderate erosion observed. |                |                 |                 |          |        |                       |                 |  |
| Recommended Works   | : None         | 6-10 Years      | 1-5 Years       | < 1 Year | Urgent |                       |                 |  |

#### **Element Data**

| Element Group:     | Signs               |               | Length:         |      |      |              |        |
|--------------------|---------------------|---------------|-----------------|------|------|--------------|--------|
| Element Name:      | Signs               |               | Width:          |      |      |              |        |
| Location:          | Each Corner         |               | Height:         |      |      |              |        |
| Material:          |                     |               | Count:          |      |      |              |        |
| Element Type:      |                     |               | Total Quantity: |      |      |              |        |
| Environment:       | Severe              |               | Limited Insp'n: |      |      |              |        |
| Protection System: |                     |               | None            | 9    |      |              |        |
|                    | Units               | Exc.          | Good            | Fair | Poor | Perform.     | Maint. |
| Condition Data:    | Offics              | EXC.          | Good            | ган  | P001 | Deficiencies | Needs  |
|                    | Each                |               |                 |      |      | Yes          |        |
| Comments:          | No end hazard signs | at structure. |                 |      |      |              |        |

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent

Repair slope erosion protection.

Install four end hazard signs to provide required vehicle safety.

#### **Element Data**

| Element Group:     | Approach   | es         | Length:         |      |      |                       |                 |
|--------------------|--|------------|-----------------|------|------|-----------------------|-----------------|
| Element Name:      | Wearing Sur  | rface      | Width:          |      |      |                       |                 |
| Location:          | Each En  | Each End H |                 |      |      |                       |                 |
| Material:          | Asphalt C  |            | Count:          |      |      |                       |                 |
| Element Type:      |  |            | Total Quantity: |      |      |                       |                 |
| Environment:       | Severe   |            | Limited Insp'n: |      |      |                       |                 |
| Protection System: |  |            | None            | е    |      |                       |                 |
| Condition Data:    | Units  | Exc.       | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |
|                    | %  |            | 70              | 25   | 5    |                       |                 |
| Comments:          | Slight settlement was observed at the deck ends. Alligator cracking observed along edge of eastbound lane. Transverse crack 5m east of deck. |            |                 |      |      |                       |                 |

None 6-10 Years 1-5 Years Recommended Work: < 1 Year Urgent

Repair road base prior to next scheduled road resurfacing.



Photo 7-2: View of watercourse upstream and upstream culvert end



Photo 7-3: View of watercourse downstream and downstream culvert end



Photo 7-4: Structure Elevation



Photo 7-5: Wearing Surface



Photo 7-6: View of soffit and abutment walls



Photo 7-7: View of soffit

# **Bridge/Culvert Inspection Report**

Site Number **Project Number** 221-12948-00 Isthmus Bay Road Bridge Municipality Northern Bruce Peninsula Structure Name 30 02 MTO Region Code County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





1450 - 1st Avenue West, Suite 101 Owen Sound, Ontario N4K 6W2 Tel: 519-376-7612 Fax: 519-376-8008 Website: www.wspgroup.com

## Bridge/Culvert Inspection Report

| Inventory Data                         |   |   |                                  |
|--|---|---|----------------------------------|
| Structure Name                         | Isthmus Bay Road Bridge   | Site Number   | 8                                |
| County                                 | Bruce   | Road Name   | Isthmus Bay Road                 |
| Municipality                           | Northern Bruce Peninsula  | Road Type   | Rural Coll.                      |
| Bridge or Culvert                      | Bridge  | Owner   | Northern Bruce Peninsula         |
| Structure Type                         | Concrete Slab   | AADT  | 350                              |
| Span (m)                               | 6.1 No. 1   | % Trucks  | 10%                              |
| Height (m)                             | 1.5   | Overall Structure Width (m)   | 9.9                              |
| Direction of Structure                 | East/West   | Roadway Width (m)   | 7.3                              |
| Year Built/Rehabilitated               | 1950/2000   | Total Deck Length (m)   | 7.3                              |
| Current Load Limit                     | None  | Total Deck Area (s.m.)  | 72                               |
| Detour Length (km)                     | 14  | Heritage Des.   | None                             |
| Waterway                               | Swan Lake Drain   |   |                                  |
| <b>Inspection Data</b>                 |   |   |                                  |
| Date of Inspection                     | December 6, 2022  | Photos:<br>8-1 - Title Page   |                                  |
| Name of Inspector                      | Evan Montreuil, P.Eng.  | 8-2 - View of structure barrier<br>encroaching vegetation<br>8-3 - View of watercourse ups  |                                  |
| Equipment Used                         | Tape, pick, hammer  | 8-4 - Deficient barrier termina<br>8-5 - View of watercourse down   | tion and hazard signage          |
| Weather Conditions                     | Overcast  | 8-6 - View of structure approa  |                                  |
| Temperature                            | 5°C   | 8-8 - View of north abutment<br>8-9 - View of south abutment  |                                  |
| Last Inspection                        | September 24, 2020  | 8-10 - View of structure soffit<br>8-11 - View of east structure of<br>protection, curb and soffit<br>8-10 - View of abutment wall<br>8-11 - View of wingwall | t                                |
| Additional Investigation<br>Required   | Deck condition survey   | 10 11 View of Willigwan   |                                  |
| Total Rehabilitation                   | Complete concrete repairs identified. U   | Jpgrade the barrier protection to n   | neet Code. Replace damaged sign. |
| Total Rehabilitation<br>Budget Costing | \$80,000  | Next Inspection   | December 2024                    |
| Justification                          | Due to the good overall condition of the protection to extend the safe service life |   | tation and upgrade the barrier   |

#### **Element Data** Structure: 8 Element Group: Decks Length: 7.3 Wearing Surface 6.4 Element Name: Width: Location: Height: Material: Asphalt Count: Total Quantity: 46.72 Element Type: Environment: Severe Limited Insp'n: Protection System: Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs $m^2$ 42.05 4.67 Yes Yes Comments: Flat grade creating poor drainage, gravel and vegetation build up at the edges retaining moisture. Settlement and potholes observed at each deck edge.

**Recommended Work:** 

Transverse cracking observed at approaches. Alligator cracking along east edge. None 6-10 Years

1-5 Years < 1 Year

Urgent

Remove gravel and debris at bridge edges.

Monitor settlement/cracking/potholes and patch as required until next resurfacing

#### **Element Data**

| Element Group:                                | Decks                       |               | Length:           |               |             | 7.3                   |                 |  |  |
|---|-----------------------------|---------------|-------------------|---------------|-------------|-----------------------|-----------------|--|--|
| Element Name:                                 | Deck To                     | ρ             | Width:            | 9.4           |             |                       |                 |  |  |
| Location:                                     |                             | Height:       |                   |               |             |                       |                 |  |  |
| Material:                                     | Concrete                    | Count:        |                   |               |             |                       |                 |  |  |
| Element Type:                                 |                             |               |                   |               | 68.62       |                       |                 |  |  |
| Environment:                                  | Moderate                    | 9             | Limited Insp'n:   |               |             | Yes                   |                 |  |  |
| Protection System:                            |                             |               | -                 |               |             |                       |                 |  |  |
| Condition Data:                               | Units                       | Exc.          | Good              | Fair          | Poor        | Perform. Deficiencies | Maint.<br>Needs |  |  |
|   | m <sup>2</sup>              |               | 68.62             |               |             | Yes                   | Yes             |  |  |
| Comments:<br>Limited inspection du            | ue to surface treatment     | wearing surfa | ace cover. The ed | dges have     | granular ar | nd vegetation bu      | uild up.        |  |  |
| Recommended Wo                                | rk: None                    | 6-10 Years    | 1-5 Years         | < 1 Year      | Urgent      |                       |                 |  |  |
| Clear the granulars a condition of the top of | and vegetation along theck. | e sides. Whe  | n the wearing sur | rface is to b | oe replaced | l, remove and ir      | nspect the      |  |  |

| Element Group:  | Decks  |                                | Length:            |              |           | 10.3                  |                 |
|---|--|--------------------------------|--------------------|--------------|-----------|-----------------------|-----------------|
| Element Name:   | Soffit - Thick                               | Soffit - Thick Slab Width: 6.1 |                    |              |           | 6.1                   |                 |
| Location:   |  |                                | Height:            | t:           |           |                       |                 |
| Material:   | Concrete                                     | Э                              | Count:             |              |           |                       |                 |
| Element Type:   |  |                                | Total Quantity:    |              |           |                       |                 |
| Environment:  | Moderat                                      | е                              | Limited Insp'n:    |              |           |                       |                 |
| Protection System:  |  |                                |                    |              |           |                       |                 |
| Condition Data:   | Units  | Exc.                           | Good               | Fair         | Poor      | Perform. Deficiencies | Maint.<br>Needs |
|   | m <sup>2</sup>                               |                                | 31.42              | 31.42        |           |                       |                 |
| Comments:   | Some spalling was ob<br>newer and in good co |                                | east end, but is i | n relatively | good cond | ition. The west       | portion is      |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |  |                                |                    |              |           |                       |                 |

## Element Data Structure: 8

| Element Group:     | Decks Lo               |                 | Length:           |           |        |              |        |
|--------------------|------------------------|-----------------|-------------------|-----------|--------|--------------|--------|
| Element Name:      | Drainage               | 9               | Width:            |           |        |              |        |
| Location:          |                        |                 | Height:           |           |        |              |        |
| Material:          | Concrete C             |                 | Count:            |           |        |              |        |
| Element Type:      | T                      |                 | Total Quantity:   |           |        |              |        |
| Environment:       | Severe                 |                 | Limited Insp'n:   |           |        |              |        |
| Protection System: |                        |                 | -                 |           |        |              |        |
|                    | Units                  | Exc.            | Good              | Fair      | Poor   | Perform.     | Maint. |
| Condition Data:    | Offico                 | LXU.            | Good              | i ali     | 1 001  | Deficiencies | Needs  |
|                    | %                      |                 |                   | 100       |        | Yes          | Yes    |
| Comments:          | Graded to curbs that a | are debris cove | ered.             |           |        |              |        |
|                    |                        |                 |                   |           |        |              |        |
|                    |                        |                 |                   |           |        |              |        |
| Recommended Wo     |                        | 6-10 Years      | 1-5 Years         | < 1 Year  | Urgent |              |        |
|                    | Clear the debris and g | ravel along the | e curb to achieve | drainage. |        |              |        |

#### **Element Data**

| Element Group:     | Sidewalks/d          | curbs            | Length:             | 10.5         |         |              |        |  |
|--------------------|----------------------|------------------|---------------------|--------------|---------|--------------|--------|--|
| Element Name:      | Curbs                |                  | Width:              | 0.3          |         |              |        |  |
| Location:          |                      | Height:          |                     | 0.25         |         |              |        |  |
| Material:          | Concret              | Count:           |                     | 2            |         |              |        |  |
| Element Type:      |                      |                  | Total Quantity:     |              | 1       | 1.55         |        |  |
| Environment:       | Severe               |                  | Limited Insp'n:     |              |         |              |        |  |
| Protection System: |                      |                  | -                   | -            |         |              |        |  |
|                    | Units                | Exc.             | Good                | Fair         | Poor    | Perform.     | Maint. |  |
| Condition Data:    |                      | LXU.             | 0000                | ı alı        | 1 001   | Deficiencies | Needs  |  |
|                    | m <sup>2</sup>       |                  | 8.66                | 2.89         |         |              |        |  |
| Comments:          | The curbs have some  | surface spallir  | ng.                 |              |         |              |        |  |
|                    |                      |                  |                     |              |         |              |        |  |
|                    |                      |                  | _                   |              |         |              |        |  |
| Recommended Wo     |                      | 6-10 Years       |                     |              | Urgent  |              |        |  |
|                    | Remove all poor cond | rete, clean reir | nforcing steel, and | d replace co | ncrete. |              |        |  |

| Element Group:     | Barriers                               |                               | Length:                |             | •            | 10.5                  |                 |
|--------------------|--|-------------------------------|------------------------|-------------|--------------|-----------------------|-----------------|
| Element Name:      | Railing Syst                           | ems                           | Width:                 |             |              |                       |                 |
| Location:          |  | Height:                       |                        |             |              |                       |                 |
| Material:          | Steel                                  | Count:                        |                        |             | 2            |                       |                 |
| Element Type:      | Box Bea                                | Total Quantity:               |                        |             | 21           |                       |                 |
| Environment:       | Severe                                 |                               | Limited Insp'n:        |             |              |                       |                 |
| Protection System: |  |                               | -                      |             |              |                       |                 |
| Condition Data:    | Units                                  | Exc.                          | Good                   | Fair        | Poor         | Perform. Deficiencies | Maint.<br>Needs |
|                    | m                                      |                               |                        | 21          |              | Yes                   |                 |
| Comments:          | There is currently no a Code (height). | pproach barrie                |                        | structure b | arrier prote | ection does no        | t meet          |
| Recommended Wo     | rk: None<br>Install barrier protection | 6-10 Years<br>on to meet curr | 1-5 Years<br>ent Code. | < 1 Year    | Urgent       |                       |                 |

## Element Data Structure: 8

| Element Group:     | Barriers                                 |                              | Length:          |          |        |                       |                 |
|--------------------|--|------------------------------|------------------|----------|--------|-----------------------|-----------------|
| Element Name:      | Posts                                    |                              | Width:           |          |        |                       |                 |
| Location:          |  | Height:                      |                  |          |        |                       |                 |
| Material:          | Steel                                    | Count:                       |                  |          | 12     |                       |                 |
| Element Type:      | I-Beam                                   | Total Quantity:              |                  |          |        |                       |                 |
| Environment:       | Severe                                   |                              | Limited Insp'n:  |          |        |                       |                 |
| Protection System: |  |                              |                  |          |        |                       |                 |
| Condition Data:    | Units                                    | Exc.                         | Good             | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |
|                    | Each                                     |                              | 12               |          |        | Yes                   |                 |
| Comments:          | The structure barrier p                  | protection doe               | s not meet Code. |          |        |                       |                 |
| Recommended Wor    | <b>k:</b> None<br>Upgrade the barrier pi | 6-10 Years<br>otection to Co |                  | < 1 Year | Urgent |                       |                 |

#### **Element Data**

| Element Group:     | Abutmen               | ts            | Length:              |               |             | 10.3         |        |  |  |
|--------------------|-----------------------|---------------|----------------------|---------------|-------------|--------------|--------|--|--|
| Element Name:      | Abutment W            | /alls         | Width:               |               |             |              |        |  |  |
| Location:          |                       |               | Height:              | 1.8           |             |              |        |  |  |
| Material:          | Concrete              | Concrete      |                      |               | 2           |              |        |  |  |
| Element Type:      |                       |               |                      |               | ;           | 37.08        |        |  |  |
| Environment:       | Moderate              | е             | Limited Insp'n:      |               |             |              |        |  |  |
| Protection System: |                       |               |                      |               |             |              |        |  |  |
|                    | Units                 | Exc.          | Good                 | Fair          | Poor        | Perform.     | Maint. |  |  |
| Condition Data:    |                       | LXC.          | Good                 | ı alı         | 1 001       | Deficiencies | Needs  |  |  |
|                    | m <sup>2</sup>        |               | 18.54                | 18.54         |             |              |        |  |  |
| Comments:          | Some surface cracking | g & spalling  | at east end.         |               |             |              |        |  |  |
|                    | West end is newer an  | d is in good  | condition.           |               |             |              |        |  |  |
|                    |                       |               |                      |               |             |              |        |  |  |
| Recommended Wor    | k: None               | 6-10 Years    | 1-5 Years            | < 1 Year      | Urgent      |              |        |  |  |
|                    | Remove and replace    | all poor cond | rete, clean reinford | cing steel, a | and replace | e concrete.  |        |  |  |

#### **Element Data**

| Element Group:     | Abutmen        | Length:         | 2.1             |      |      |                       |                 |  |  |
|--------------------|----------------|-----------------|-----------------|------|------|-----------------------|-----------------|--|--|
| Element Name:      | Wingwall       | Width:          |                 |      |      |                       |                 |  |  |
| Location:          |                |                 |                 |      | 1.5  |                       |                 |  |  |
| Material:          | Concrete       | Concrete        |                 |      | 4    |                       |                 |  |  |
| Element Type:      |                | Total Quantity: |                 |      | 12.6 |                       |                 |  |  |
| Environment:       | Moderate       | е               | Limited Insp'n: |      |      |                       |                 |  |  |
| Protection System: |                |                 | •               |      |      |                       |                 |  |  |
| Condition Data:    | Units          | Exc.            | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |
|                    | 2              |                 | 6.0             | 6.3  |      |                       |                 |  |  |
|                    | m <sup>2</sup> |                 | 6.3             | 0.5  |      |                       |                 |  |  |

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent

Remove and replace all poor concrete, clean reinforcing steel, and replace concrete.

#### Element Group: Foundations Length: Element Name: Foundation Width: Location: Height: Material: Bedrock Count: Element Type: Total Quantity: Environment: Moderate Limited Insp'n: Yes Protection System: Rip-Rap at West Corner Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs Comments: Minor scour observed at base of abutment walls. Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Continue to monitor conditions.

Structure:

8

#### **Element Data**

**Element Data** 

| Element Group:     | Embankments            | & Streams         | Length:         |          |        |                       |                 |
|--------------------|------------------------|-------------------|-----------------|----------|--------|-----------------------|-----------------|
| Element Name:      | Slope Prot             | tection           | Width:          |          |        |                       |                 |
| Location:          |                        |                   | Height:         |          |        |                       |                 |
| Material:          | Earth / Stone          |                   | Count:          | 6        |        |                       |                 |
| Element Type:      | [7                     |                   | Total Quantity: |          |        | 6                     |                 |
| Environment:       | Modera                 | ate               | Limited Insp'n: |          |        |                       |                 |
| Protection System: |                        |                   |                 |          |        |                       |                 |
| Condition Data:    | Units                  | Exc.              | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |
|                    | Each                   |                   | 6               |          |        |                       |                 |
| Comments:          | The slopes are well ve | egetated and appe | ear stable.     |          |        |                       |                 |
| Recommended Wor    | k: None                | 6-10 Years        | 1-5 Years       | < 1 Year | Urgent |                       |                 |

| Recommended Wor    | <b>k:</b> None Replace the southeas | 6-10 Years         | 1-5 Years          | < 1 Year      | Urgent    |                       |                 |
|--------------------|-------------------------------------|--------------------|--------------------|---------------|-----------|-----------------------|-----------------|
| Comments:          | Four end hazard signs               | s are currently in | place. The souther | ast sign is d | lamaged a | nd requires rep       | acement.        |
|                    | Each                                | <u> </u>           |                    | 3             | 1         | Yes                   | Yes             |
| Condition Data:    | Units                               | Exc.               | Good               | Fair          | Poor      | Perform. Deficiencies | Maint.<br>Needs |
| Protection System: |                                     |                    |                    |               |           |                       |                 |
| Environment:       | Sever                               | е                  | Limited Insp'n:    |               |           |                       |                 |
| Element Type:      |                                     |                    | Total Quantity:    | 4             |           |                       |                 |
| Material:          |                                     |                    | Count:             | 4             |           |                       |                 |
| Location:          |                                     |                    | Height:            |               |           |                       |                 |
| Element Name:      | Signs                               | S                  | Width:             |               |           |                       |                 |
| Element Group:     | Signs                               |                    | Length:            |               |           |                       |                 |

### Element Data Structure: 8

| Element Group:     | Approach   | es                           | Length:             |           |            | 5                     |                 |  |
|--------------------|--|------------------------------|---------------------|-----------|------------|-----------------------|-----------------|--|
| Element Name:      | Wearing Su                                       | rface                        | Width:              | 7.3       |            |                       |                 |  |
| Location:          |  |                              | Height:             |           |            |                       |                 |  |
| Material:          | Surface Treatment                                |                              | Count:              | 2         |            |                       |                 |  |
| Element Type:      |  |                              | Total Quantity:     |           |            | 73                    |                 |  |
| Environment:       | Severe   |                              | Limited Insp'n:     |           |            |                       |                 |  |
| Protection System: |  |                              |                     |           |            |                       |                 |  |
| Condition Data:    | Units  | Exc.                         | Good                | Fair      | Poor       | Perform. Deficiencies | Maint.<br>Needs |  |
|                    | m <sup>2</sup>                                   |                              |                     | 65.7      | 7.3        | Yes                   | Yes             |  |
| Comments:          | Stress cracking, previous throughout the wearing |                              | ettlement at bridge | deck, and | wheel path | rutting were ob       | oserved         |  |
| Recommended Wo     | rk: None<br>Replace the approach                 | 6-10 Years<br>surface treatn | 1-5 Years<br>nent.  | < 1 Year  | Urgent     |                       |                 |  |

| Element Group:     | Approach   | es             | Length:              |           |      |                       |                 |
|--------------------|--|----------------|----------------------|-----------|------|-----------------------|-----------------|
| Element Name:      | Drainage   | е              | Width:               |           |      |                       |                 |
| Location:          |  |                | Height:              |           |      |                       |                 |
| Material:          | Asphalt  |                | Count:               |           |      |                       |                 |
| Element Type:      |  |                | Total Quantity:      |           |      |                       |                 |
| Environment:       | Severe   |                | Limited Insp'n:      |           |      |                       |                 |
| Protection System: |  |                |                      |           |      |                       |                 |
| Condition Data:    | Units  | Exc.           | Good                 | Fair      | Poor | Perform. Deficiencies | Maint.<br>Needs |
|                    | %  |                |                      | 90        | 10   | Yes                   | Yes             |
| Comments:          | Poor drainage along s  | houlders signs | s of water ponding   | observed. |      |                       |                 |
| Recommended Wo     | rk: None<br>Rehab - re-establish a<br>Maintenance - clear sl |                | orm crossfall during |           |      |                       |                 |



Photo 8-2: View of structure barrier, signage (typ) and encroaching vegetation



Photo 8-3: View of watercourse upstream



Photo 8-4: Deficient barrier termination and hazard signage



Photo 8-5: View of watercourse downstream



Photo 8-6: View of structure approach and deck wearing surface



Photo 8-7: View of east structure elevation, wingwalls, exterior soffit and curb



Photo 8-8: View of north abutment wall and bedrock streambed



Photo 8-9: View of south abutment wall and soffit



Photo 8-10: View of structure soffit



Photo 8-11: View of structure elevation, exterior barrier protection, curb and soffit



Photo 8-12: View of abutment wall



Photo 8-13: View of wingwall

# **Bridge/Culvert Inspection Report**

Site Number **Project Number** 221-12948-00 Cape Chin Culvert Municipality Northern Bruce Peninsula **Structure Name** 30 02 MTO Region Code County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





1450 - 1st Avenue West, Suite 101 Owen Sound, Ontario N4K 6W2 Tel: 519-376-7612 Fax: 519-376-8008 Website: www.wspgroup.com

## Bridge/Culvert Inspection Report

| Inventory Data                         |  |  |                          |
|--|--|--|--------------------------|
| Structure Name                         | Cape Chin Culvert  | Site Number  | 09                       |
| County                                 | Bruce  | Road Name  | East Road                |
| Municipality                           | Northern Bruce Peninsula                                   | Road Type  | Rural Coll.              |
| Bridge or Culvert                      | Culvert  | Owner  | Northern Bruce Peninsula |
| Structure Type                         | Rigid Frame - Arch - Precast                               | AADT   | 350                      |
| Span (m)                               | 4.3 No. 1  | % Trucks   | 15%                      |
| Height (m)                             | 1.8  | Overall Structure Width (m)  | 15                       |
| Direction of Structure                 | East/West - 20° skew                                       | Roadway Width (m)  | 7.5                      |
| Year Built/Rehabilitated               | 2008   | Total Deck Length (m)  | 4.9                      |
| Current Load Limit                     | None   | Total Deck Area (s.m.)   | 68.6                     |
| Detour Length (km)                     | 32   | Heritage Des.  | None                     |
| Waterway                               | Chin Creek   |  |                          |
| Inspection Data                        |  |  |                          |
| Date of Inspection                     | December 6, 2022   | Photos: 9-1 - Title Page   |                          |
| Name of Inspector                      | Evan Montreuil, P.Eng.                                     | 9-2 - View of structure inlet el   |                          |
| Equipment Used                         | Tape, pick, hammer   | 9-3 - View of structure outlet<br>9-4 - View of pipe arch soffit<br>9-5 - View of west 3 cable gui | and walls                |
| Weather Conditions                     | Overcast   | 9-6 - View of watercourse ups<br>9-7 - View of watercourse dov                                     |                          |
| Temperature                            | 5°C  | 9-8 - View of northeast deficie<br>guiderail (impact damage)<br>9-9 - View of structure wearing    | ent section of 3 cable   |
| Last Inspection                        | September 24, 2020   | perspective<br>9-10 - HDPE pipe culvert dow  | vnstream of main culvert |
| Additional Investigation<br>Required   |  | None   |                          |
| Total Rehabilitation                   | The cable guiderail needs tightening. disconnected cables. | Replace the rotten posts, repair dar   | nage and re-attach       |
| Total Rehabilitation<br>Budget Costing | \$7,000  | Next Inspection  | December 2024            |
| Justification                          | Repair the barrier protection to ensure                    | e vehicle safety.  |                          |

### Element Data Structure: 9

| Element Group:     | Culvert                | Length:        |                     | 15       |        |                      |   |  |  |  |
|--------------------|------------------------|----------------|---------------------|----------|--------|----------------------|---|--|--|--|
| Element Name:      | Barrels                |                | Width:              |          |        | 4                    |   |  |  |  |
| Location:          |                        |                | Height:             | 1.1      |        |                      |   |  |  |  |
| Material:          | Concrete               | 9              | Count:              |          | 93     |                      |   |  |  |  |
| Element Type:      | Arch                   |                | Total Quantity:     |          |        |                      |   |  |  |  |
| Environment:       | Moderate               | е              | Limited Insp'n:     |          |        |                      |   |  |  |  |
| Protection System: |                        | None           |                     |          |        |                      |   |  |  |  |
| Condition Data:    | Units                  | Exc.           | Good                | Fair     | Poor   | Perform. Deficiencie | Maint.<br>Needs                         |  |  |  |
|                    | m <sup>2</sup>         |                | 93                  |          |        | 2 0.10.01.01.0       | .,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |  |  |  |
| Comments:          | The concrete arch is i | n good conditi | ion with no visible | defects. |        | -                    |   |  |  |  |
|                    |                        |                |                     |          |        |                      |   |  |  |  |
| Recommended Worl   | k: None                | 6-10 Years     | 1-5 Years           | < 1 Year | Urgent |                      |   |  |  |  |

#### **Element Data**

| Element Group:  | Culvert             |                 | Length:            |             |             |                      |                 |  |  |  |
|---|---------------------|-----------------|--------------------|-------------|-------------|----------------------|-----------------|--|--|--|
| Element Name:   | Inlet Compor        | nents           | Width:             | 4.3         |             |                      |                 |  |  |  |
| Location:   |                     |                 | Height:            | 0.2         |             |                      |                 |  |  |  |
| Material:   | Concrete            | )               | Count:             |             |             | 1                    |                 |  |  |  |
| Element Type:   |                     |                 | Total Quantity:    |             | ,           | 1.34                 |                 |  |  |  |
| Environment:  | Benign              |                 | Limited Insp'n:    |             | ,           | Yes                  |                 |  |  |  |
| Protection System:  |                     | Wearing Surface |                    |             |             |                      |                 |  |  |  |
| Condition Data:   | Units               | Exc.            | Good               | Fair        | Poor        | Perform. Deficiencie | Maint.<br>Needs |  |  |  |
|   | m <sup>2</sup>      |                 | 1.34               |             |             |                      |                 |  |  |  |
| Comments:   | The inlet embankmen | ts and slope p  | rotection appear s | table and a | re unobstru | ucted.               |                 |  |  |  |
| Comments: The inlet embankments and slope protection appear stable and are unobstructed.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                     |                 |                    |             |             |                      |                 |  |  |  |

| Element Group:   | Culvert        |                 | Length:         |      |      |                      |                 |  |  |
|--|----------------|-----------------|-----------------|------|------|----------------------|-----------------|--|--|
| Element Name:  | Outlet Compo   | nents           | Width:          | 4.3  |      |                      |                 |  |  |
| Location:  |                |                 | Height:         | 0.2  |      |                      |                 |  |  |
| Material:  | Concrete       | )               | Count:          |      |      | 1                    |                 |  |  |
| Element Type:  |                |                 | Total Quantity: |      | 1    | 1.34                 |                 |  |  |
| Environment:   | Moderate       | 9               | Limited Insp'n: |      |      |                      |                 |  |  |
| Protection System:   |                | Wearing Surface |                 |      |      |                      |                 |  |  |
| Condition Data:  | Units          | Exc.            | Good            | Fair | Poor | Perform. Deficiencie | Maint.<br>Needs |  |  |
|  | m <sup>2</sup> |                 | 1.34            |      |      |                      |                 |  |  |
| Comments: The outlet embankments and slope protection are stable. There is a HDPE pipe culvert which outlets just downstream of the main culvert.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                |                 |                 |      |      |                      |                 |  |  |
|  |                |                 |                 |      |      |                      |                 |  |  |

#### **Element Data** Structure: 9

| Element Group:     | Barriers                | 3   | Length:           |              |        | 3.85         |        |  |  |  |
|--------------------|-------------------------|---|-------------------|--------------|--------|--------------|--------|--|--|--|
| Element Name:      | Railing Sys             | tem   | Width:            |              |        |              |        |  |  |  |
| Location:          | Each Sid                | le  | Height:           |              |        |              |        |  |  |  |
| Material:          | Steel                   |   | Count:            | 35           |        |              |        |  |  |  |
| Element Type:      | 3-Cable on Wo           | 3-Cable on Wood Post Total Quantity: 134.75 |                   |              |        |              |        |  |  |  |
| Environment:       | Severe                  |   | Limited Insp'n:   | 1:           |        |              |        |  |  |  |
| Protection System: |                         | None  |                   |              |        |              |        |  |  |  |
|                    | Units                   | Exc.  | Good              | Fair         | Poor   | Perform.     | Maint. |  |  |  |
| Condition Data:    | l Oille                 | EXC.  | l Good l          | raii         | F001   | Deficionaica | Noodo  |  |  |  |
|                    |                         |   |                   |              |        | Deficiencies | Needs  |  |  |  |
|                    | m                       |   |                   |              | 134.75 | Yes          | neeus  |  |  |  |
| Comments:          | m The 3-cable guiderail | cables need t                               | ightening on both | n the east a |        | Yes          |        |  |  |  |

Recommended Work:

None

6-10 Years

Tighten the west and east cables, repair the damaged northeast section and re-attach cables.

1-5 Years < 1 Year Urgent

#### Element Data

| Element Group:     | Barriers | ;    | Length:         |      |      |                       |                 |
|--------------------|----------|------|-----------------|------|------|-----------------------|-----------------|
| Element Name:      | Posts    |      | Width:          |      |      |                       |                 |
| Location:          |          |      | Height:         |      |      |                       |                 |
| Material:          | Wood     |      | Count:          |      |      | 37                    |                 |
| Element Type:      |          |      | Total Quantity: |      |      | 37                    |                 |
| Environment:       | Severe   |      | Limited Insp'n: |      |      |                       |                 |
| Protection System: |          |      |                 |      |      |                       |                 |
| Condition Data:    | Units    | Exc. | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |
|                    | Each     |      | 17              | 15   | 5    | Yes                   |                 |
| Comments:          |          |      | (I ' I E' (E)   |      |      | nent at the north     |                 |

Recommended Work:

None 6-10 Years Tighten each cable and replace damaged posts.

1-5 Years

< 1 Year Urgent

**Element Data** 

| Element Group:     | Deck                 |                 | Length:          |         |      | 4.3                   |                 |  |
|--------------------|----------------------|-----------------|------------------|---------|------|-----------------------|-----------------|--|
| Element Name:      | Wearing Sur          | face            | Width:           | 6.9     |      |                       |                 |  |
| Location:          |                      |                 | Height:          |         |      |                       |                 |  |
| Material:          | Asphalt              | Count:          | 1                |         |      |                       |                 |  |
| Element Type:      |                      |                 | Total Quantity:  | 29.67   |      |                       |                 |  |
| Environment:       | Severe Limited Insp  |                 |                  |         |      |                       |                 |  |
| Protection System: |                      |                 |                  |         |      |                       |                 |  |
| Condition Data:    | Units                | Exc.            | Good             | Fair    | Poor | Perform. Deficiencies | Maint.<br>Needs |  |
|                    | m <sup>2</sup>       | 29.67           |                  |         |      |                       |                 |  |
| Comments:          | The new asphalt wear | ring surface is | in excellent con | dition. | -    |                       |                 |  |

Recommended Work:

None

6-10 Years

1-5 Years < 1 Year

Urgent

### Element Data Structure: 9

| Element Group:     | Founda                                       | tions           | Length:           |             |             |                          |                 |
|--------------------|--|-----------------|-------------------|-------------|-------------|--------------------------|-----------------|
| Element Name:      | Foundation (belove                           | v ground level) | Width:            |             |             |                          |                 |
| Location:          | Each I                                       | End             | Height:           |             |             |                          |                 |
| Material:          | Concrete                                     |                 | Count:            |             |             |                          |                 |
| Element Type:      |  |                 | Total Quantity:   |             |             |                          |                 |
| Environment:       | Moder  | ate             | Limited Insp'n:   |             | ,           | Yes                      |                 |
| Protection System: |  |                 | None              |             |             |                          |                 |
| Condition Data:    | Units  | Exc.            | Good              | Fair        | Poor        | Perform.<br>Deficiencies | Maint.<br>Needs |
|                    | %  |                 |                   |             |             |                          |                 |
| Comments:          | Limited inspection due the structure appears | •               | , however visible | portions ap | ppear to be | in good cond             | ition and       |
| Recommended Wor    | k: None                                      | 6-10 Years      | 1-5 Years         | < 1 Year    | Urgent      |                          |                 |

#### **Element Data**

| Element Group:     | Embankments   | & Streams         | Length:         |          |        |                          |                 |
|--------------------|---|-------------------|-----------------|----------|--------|--------------------------|-----------------|
| Element Name:      | Streams and   | Waterways         | Width:          |          |        |                          |                 |
| Location:          |   |                   | Height:         |          |        |                          |                 |
| Material:          | Bedro   | ock               | Count:          |          |        |                          |                 |
| Element Type:      |   |                   | Total Quantity: |          |        |                          |                 |
| Environment:       | Moder   | ate               | Limited Insp'n: |          |        |                          |                 |
| Protection System: |   |                   | None            | •        |        |                          |                 |
| Condition Data:    | Units   | Exc.              | Good            | Fair     | Poor   | Perform.<br>Deficiencies | Maint.<br>Needs |
|                    | Height:  Bedrock Count:  Total Quantity: ment: Moderate Limited Insp'n: on System:  None  Units Exc. Good Fair Poor Perform. Deficiencies New  The watercourse is unobstructed and in good condition. |                   |                 |          |        |                          |                 |
| Comments:          | The watercourse is un   | obstructed and in | good condition. |          |        |                          |                 |
| Recommended Wor    | rk: None  | 6-10 Years        | 1-5 Years       | < 1 Year | Urgent |                          |                 |

| Element Group:     | Embankments                              | & Streams                           | Length:               |             |            | •                        |                 |  |
|--------------------|--|-------------------------------------|-----------------------|-------------|------------|--------------------------|-----------------|--|
| Element Name:      | Embank                                   | ments                               | Width:                |             |            |                          |                 |  |
| Location:          | Each C                                   | Each Corner                         |                       |             |            |                          |                 |  |
| Material:          | Stor                                     | ne                                  | Count:                | 4           |            | 4                        |                 |  |
| Element Type:      |  |                                     | Total Quantity:       |             |            | 4                        |                 |  |
| Environment:       | Moder                                    | ate                                 | Limited Insp'n:       |             |            |                          |                 |  |
| Protection System: |  |                                     | Rip Rap               |             |            |                          |                 |  |
| Condition Data:    | Units                                    | Exc.                                | Good                  | Fair        | Poor       | Perform.<br>Deficiencies | Maint.<br>Needs |  |
|                    | Each                                     |                                     | 3                     | 1           |            | Perform. Deficiencies    |                 |  |
| Comments:          | The embankments are observed between the | •                                   | with large rip rap    | slope prote | ection. So | me minor eros            | ion was         |  |
| Recommended Wo     | rk: None  <br>Monitor erosion and re     | 6-10 Years<br>epair if conditions w | ] 1-5 Years<br>orsen. | < 1 Year    | Urgent     |                          |                 |  |

## Element Data 9

| Element Group:     | Sign  | Length:                            |                                  |                        |                      |                       |                 |  |  |
|--------------------|---|------------------------------------|----------------------------------|------------------------|----------------------|-----------------------|-----------------|--|--|
| Element Name:      | Sigr  | าร                                 | Width:                           |                        |                      |                       |                 |  |  |
| Location:          | Each Co                                     | Height:                            |                                  |                        |                      |                       |                 |  |  |
| Material:          | Steel                                       |                                    | Count:                           |                        |                      | 4                     |                 |  |  |
| Element Type:      |   |                                    | Total Quantity:                  |                        |                      |                       |                 |  |  |
| Environment:       | Seve  | re                                 | Limited Insp'n:                  | :                      |                      |                       |                 |  |  |
| Protection System: |   | None                               |                                  |                        |                      |                       |                 |  |  |
| Condition Data:    | Units                                       | Exc.                               | Good                             | Fair                   | Poor                 | Perform. Deficiencies | Maint.<br>Needs |  |  |
|                    | Each  |                                    |                                  | 3                      | 1                    | Deficiencies<br>Yes   | Yes             |  |  |
| Comments:          | Guiderail marker posts No end hazard signs. | s/sign in fair condit              | ion. Marker missii               | ng from po             | st on SW a           | approach.             |                 |  |  |
| Recommended Wor    | rk: None<br>Install four end hazard         | 6-10 Years<br>I signs and to incre | 1-5 Years<br>ease vehicle safety | < 1 Year<br>y. Replace | Urgent<br>missing gu | iiderail marker.      |                 |  |  |

| Element Group:   | Approa               | ches                 | Length:            |          |        | 5                        |                 |  |
|--|----------------------|----------------------|--------------------|----------|--------|--------------------------|-----------------|--|
| Element Name:  | Wearing S            | Surface              | Width:             |          |        | 6.9                      |                 |  |
| Location:  | Each I               | Height:              |                    |          |        |                          |                 |  |
| Material:  | Asph                 | alt                  | Count:             |          |        | 2                        |                 |  |
| Element Type:  |                      |                      | Total Quantity:    |          |        | 69                       |                 |  |
| Environment:   | Seve                 | re                   | Limited Insp'n:    |          |        |                          |                 |  |
| Protection System:   |                      |                      | None               |          |        |                          |                 |  |
| Condition Data:  | Units                | Exc.                 | Good               | Fair     | Poor   | Perform.<br>Deficiencies | Maint.<br>Needs |  |
| Material: Element Type: Environment: Protection System:  Condition Data: | m <sup>2</sup>       | 69                   |                    |          |        |                          |                 |  |
| Comments:  | The new asphalt wear | ing surface is in ex | cellent condition. |          |        |                          |                 |  |
| Recommended Wor  | k: None              | 6-10 Years           | 1-5 Years          | < 1 Year | Urgent |                          |                 |  |



Photo 9-2 - View of structure inlet elevation and embankment



Photo 9-3 - View of structure outlet elevation and embankments



Photo 9-4 - View of pipe arch soffit and walls



Photo 9-5 - View of 3 cable guiderail barrier protection with loose cable



Photo 9-6 - View of watercourse upstream



Photo 9-7 - View of watercourse downstream



Photo 9-8 - View of northeast deficient section of 3 cable guiderail (impact damage)



Photo 9-9 - View of structure wearing surface from approaching perspective

Site Number 10 **Project Number** 221-12948-00 Lindsay Road 5 Culvert Municipality Northern Bruce Peninsula Structure Name 30 02 MTO Region Code County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





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Website: www.wspgroup.com

| Inventory Data                         |   |   |                           |
|--|---|---|---------------------------|
| Structure Name                         | Lindsay Road 5 Culvert  | Site Number   | 10                        |
| County                                 | Bruce   | Road Name   | Lindsay Road 5            |
| Municipality                           | Northern Bruce Peninsula  | Road Type   | Rural Coll.               |
| Bridge or Culvert                      | Culvert   | Owner   | Northern Bruce Peninsula  |
| Structure Type                         | Steel - SP - CSP - PA   | AADT  | 350                       |
| Span (m)                               | 4.4 No. 1   | % Trucks  | 15%                       |
| Height (m)                             | 2.8   | Overall Structure Width (m)                                       | 18.3                      |
| Direction of Structure                 | North/South   | Roadway Width (m)   | 6.1                       |
| Year Built/Rehabilitated               | 1970  | Total Deck Length (m)   | 4.4                       |
| Current Load Limit                     | None  | Total Deck Area (s.m.)  | 81                        |
| Detour Length (km)                     | 5.5   | Heritage Des.   | None                      |
| Waterway                               | Chin Creek  |   |                           |
| Inspection Data                        |   |   |                           |
| Date of Inspection                     | December 6, 2022  | Photos:<br>10-1 - Title Page                                      |                           |
| Name of Inspector                      | Evan Montreuil, P.Eng.  | 10-2 - View of watercourse up                                     | -                         |
| Equipment Used                         | Tape, pick, hammer  | 10-3 - View of watercourse do                                     | n elevation               |
| Weather Conditions                     | Overcast  | 10-5 - View of interior culvert<br>10-6 - Localized corrosion wit | h section loss            |
| Temperature                            | 5°C   | 10-7 - View of embankment a                                       | nd culvert inlet interior |
| Last Inspection                        | September 30, 2020  |   |                           |
| Additional Investigation<br>Required   |   | None  |                           |
| Total Rehabilitation                   | Install approach and barrier protection   | n. Install end hazard signs.                                      |                           |
| Total Rehabilitation<br>Budget Costing | \$46,000  | Next Inspection   | December 2024             |
| Justification                          | Due to the overall good condition of Maintain the speed limit of 45 km/hr. installed. |   |                           |

| Element Group:   | Decks                 |                 | Length:           |              |           |              |        |
|--|-----------------------|-----------------|-------------------|--------------|-----------|--------------|--------|
| Element Name:  | Wearing Sur           | face            | Width:            |              |           |              |        |
| Location:  | [ ]                   |                 | Height:           |              |           |              |        |
| Material:  | Surface Treat         | ment            | Count:            |              |           |              |        |
| Element Type:  |                       |                 | Total Quantity:   |              |           |              |        |
| Environment:   | Severe                | Limited Insp'n: |                   |              |           |              |        |
| Protection System:   |                       |                 | None              | )            |           |              |        |
|  | Units                 | Exc.            | Good              | Fair         | Poor      | Perform.     | Maint. |
| Condition Data:  |                       |                 |                   |              | P001      | Deficiencies | Needs  |
|  | %                     |                 | 100               |              |           |              |        |
| Comments:  | Asphalt wearing surfa | ce was recer    | ntly replaced and | is in good o | ondition. |              |        |
| Comments: Asphalt wearing surface was recently replaced and is in good condition.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                       |                 |                   |              |           |              |        |

## **Element Data**

| Element Group:   | Culverts                 |               | Length:         |      |      |                       |                 |  |
|--|--------------------------|---------------|-----------------|------|------|-----------------------|-----------------|--|
| Element Name:  | Inlet Component          |               | Width:          |      |      |                       |                 |  |
| Location:  | North End                | <u> </u>      | Height:         |      |      |                       |                 |  |
| Material:  | Stone and E              | arth          | Count:          |      |      |                       |                 |  |
| Element Type:  |                          |               | Total Quantity: |      |      |                       |                 |  |
| Environment:   | Moderate                 | Moderate      |                 |      |      |                       |                 |  |
| Protection System:   |                          | None          |                 |      |      |                       |                 |  |
| Condition Data:  | Units                    | Exc.          | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |
|  | %                        |               | 100             |      |      |                       |                 |  |
| Comments:  | Rip-rap slope protection | on in good co | ndition.        | -    |      |                       |                 |  |
| Comments: Rip-rap slope protection in good condition.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                          |               |                 |      |      |                       |                 |  |

| Element Group:     | Culverts               |            | Length:         |          |        |                       |                 |
|--------------------|------------------------|------------|-----------------|----------|--------|-----------------------|-----------------|
| Element Name:      | Outlet Components      |            | Width:          |          |        |                       |                 |
| Location:          | South En               | d          | Height:         |          |        |                       |                 |
| Material:          | Stone and E            | arth       | Count:          |          |        |                       |                 |
| Element Type:      |                        |            | Total Quantity: |          |        |                       |                 |
| Environment:       | Moderate               | )          | Limited Insp'n: |          |        |                       |                 |
| Protection System: |                        |            | None            | •        |        |                       |                 |
| Condition Data:    | Units                  | Exc.       | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |
|                    | %                      |            | 100             |          |        |                       |                 |
| Comments:          | The culvert end is ber | nt.        | •               |          |        |                       |                 |
|                    |                        |            |                 |          |        |                       |                 |
| Recommended Worl   | K: None                | 6-10 Years | 1-5 Years       | < 1 Year | Urgent |                       |                 |

#### **Element Data** Structure: 10 Element Group: Culvert Length: Element Name: Barrel Width: Location: Height: Material: Steel Count: Element Type: Multi Plate Pipe Arch Total Quantity: Environment: Limited Insp'n: Moderate Protection System: Galvanized Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs % 40 50 10 Yes Yes Moderate corrosion at water level with minor section loss observed. Comments: Minor localized deformations observed. 1m long section in base of culvert has failed due to complete section loss. Recommended Work: None 6-10 Years 1-5 Years < 1 Year Monitor the section loss and overall structure stability, consider repair vs replacement when section loss exceeds acceptable limits. **Element Data** Element Group: Streams/Embankments Length: Streams and Waterways Width: **Element Name:** Location: Height: Material: Bedrock and Earth Count: Element Type: Total Quantity: Environment: Moderate Limited Insp'n: Protection System: None Perform. Maint. Units Exc. Good Fair Poor **Condition Data: Deficiencies** Needs % 100 Comments: Urgent Recommended Work: None 6-10 Years 1-5 Years < 1 Year

| Element Group:     | Streams/Emba        | nkments          | Length:      |          |        |                       |                 |
|--------------------|---------------------|------------------|--------------|----------|--------|-----------------------|-----------------|
| Element Name:      | Embankm             | ent              | Width:       |          |        |                       |                 |
| Location:          | Each Cor            | ner              | Height:      |          |        |                       |                 |
| Material:          |                     |                  | Count:       |          |        | 6                     |                 |
| Element Type:      |                     | Total Quantity:  |              |          | 6      |                       |                 |
| Environment:       | Moderat             | Limited Insp'n:  |              |          |        |                       |                 |
| Protection System: |                     |                  | None         | •        |        |                       |                 |
| Condition Data:    | Units               | Exc.             | Good         | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |
|                    | Each Corner         |                  | 6            |          |        |                       |                 |
| Comments:          | The embankments are | e in overall goo | d condition. |          |        |                       |                 |
| Recommended Work   | None                | 6-10 Years       | 1-5 Years    | < 1 Year | Urgent |                       |                 |

| Approach        | E5  | Length:   |   |  |  |  |
|-----------------|---|---|---|--|--|--|
| Wearing Su      | rface   | Width:  |   |  |  |  |
| Each En         | d   | Height:   |   |  |  |  |
| Surface Trea    | itment  | Count:  |   |  |  |  |
|                 |   | Total Quantity:   |   |  |  |  |
| Severe          |   | Limited Insp'n:   |   |  |  |  |
|                 | None  |   |   |  |  |  |
| Units           | Exc.  | Good  | Fair  | Poor   | Perform. Deficiencies  | Maint.<br>Needs  |
| , •             |   |   |   |  |  |  |
| k: None         | 6-10 Years  | 1-5 Years   | < 1 Year  | Urgent   |  |  |
| Accessor        | ies   | Length:   |   |  |  |  |
| Signs           |   | Width:  |   |  |  |  |
|                 | es  | Height:   |   |  |  |  |
| Steel           |   | Count:  | 2   |  |  |  |
| 0.001           |   | Oodiit.   |   |  |  |  |
| 0.001           |   | Total Quantity:   |   |  | 2  |  |
| Severe          |   |   |   |  |  |  |
|                 |   | Total Quantity:   |   |  |  |  |
| Severe<br>Units | Exc.  | Total Quantity:<br>Limited Insp'n:  | Fair  | Poor   |  | Maint.<br>Needs  |
| Severe          | Exc.  | Total Quantity: Limited Insp'n: None Good 2   |   | Poor   | Perform.   |  |
|                 | Each En Surface Trea Severe Units % Light transverse crack k: None  Accessor Signs Approach | Each End Surface Treatment  Severe  Units Exc. % Light transverse cracking observed a  k: None 6-10 Years  Accessories Signs Approaches | Each End Height: Surface Treatment Count: Total Quantity: Severe Limited Insp'n: None Units Exc. Good % 100 Light transverse cracking observed at east approach.  k: None 6-10 Years 1-5 Years  Accessories Length: Signs Width: Approaches Height: | Each End Height:  Surface Treatment Count:  Total Quantity:  Severe Limited Insp'n:  None  Units Exc. Good Fair  % 100  Light transverse cracking observed at east approach.  k: None 6-10 Years 1-5 Years < 1 Year  Accessories Length: Signs Width: Approaches Height: | Each End Height:  Surface Treatment Count:  Total Quantity: Limited Insp'n: None  Units Exc. Good Fair Poor % 100  Light transverse cracking observed at east approach.  k: None 6-10 Years 1-5 Years < 1 Year Urgent  Accessories Length: Signs Width: Approaches Height: | Each End Height:  Surface Treatment Count:  Total Quantity: Limited Insp'n:  None  Units Exc. Good Fair Poor Perform. Deficiencies  % 100  Light transverse cracking observed at east approach.  k: None 6-10 Years 1-5 Years < 1 Year Urgent  Accessories Length: Signs Width: Approaches Height: |



Photo 10-2: View of watercourse upstream and inlet component



Photo 10-3: View of watercourse downstream



Photo 10-4: View of culvert barrel in elevation



Photo 10-5: View of interior culvert barrel



Photo 10-6: Localized failure with complete section loss in base of culvert.



Photo 10-7: View of embankment and culvert inlet interior

| Site Number       | 11                          | <b>Project Number</b> | 221-         | 12948-00  | )   |
|-------------------|-----------------------------|-----------------------|--------------|-----------|-----|
| Structure Name    | Myles Bay Shore Road Bridge | Municipality          | Northern Bru | ce Penins | ula |
| MTO Region Code   | 30                          | County                | Bruce        | Code      | 02  |
| MTO District Code | 33                          | Geographic Twp Code   |              | 377       |     |





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| Inventory Data                       |   |   |   |
|--------------------------------------|---|---|---|
| Structure Name                       | Myles Bay Shore Road Bridge   | Site Number   | 11  |
| County                               | Bruce   | Road Name   | Myles Bay Shore Road                              |
| Municipality                         | Northern Bruce Peninsula  | Road Type   | Rural Local                                       |
| Bridge or Culvert                    | Bridge  | Owner   | Northern Bruce Peninsula                          |
| Structure Type                       | Concrete - Rigid Frame  | AADT  | 300   |
| Span (m)                             | 7.3 No. 1   | % Trucks  | 5%  |
| Height (m)                           | 2.2   | Overall Structure Width (m)   | 6.6   |
| Direction of Structure               | East/West   | Roadway Width (m)   | 6   |
| Year Built/Rehabilitated             | 2001  | Total Deck Length (m)   | 8.4   |
| Current Load Limit                   | None  | Total Deck Area (s.m.)  | 50  |
| Detour Length (km)                   | 3   | Heritage Des.   | None  |
| Waterway                             | Old Woman's River   |   |   |
| Inspection Data                      |   |   |   |
| Date of Inspection                   | December 7, 2022  | Photos:   |   |
| Name of Inspector                    | Evan Montreuil, P.Eng.  | 11-1 - Title Page<br>11-2 - View of east structure of<br>barrier and embankments  |   |
| Equipment Used                       | Tape, pick, hammer  | 11-3 - View of exterior barrier wingwalls   |   |
| Weather Conditions                   | Overcast  | 11-4 - View of structure soffit<br>11-5 - Rock slope protection a<br>southeast quadrant<br>11-6 - View of north abutmen | nd geotextile failure at the                      |
| Temperature                          | 4°C   | 11-7 - View of structure wears<br>and end hazard signage<br>11-8 - View of watercourse do                               | ing surface, barrier protection                   |
| Last Inspection                      | October 30, 2020  | 11-9 - View of watercourse up<br>11-10 - Minor erosion at the n<br>11-11 - Structure wearing surf                       | ostream orthwest structure quadrant               |
| Additional Investigation<br>Required |   | Deck condition survey   |   |
| Total Rehabilitation                 | Upgrade the bridge barrier protection Reduce the posted speed to 35 km/hr quadrant embankment repair and place northwest foundation corner and prove paving the approaches. | until proper barrier is installed. Co<br>ce foundation erosion protection. P  | mplete the southwest lace tremmie concrete at the |
| Total Rehabilitation Budget Costing  | \$75,000 or \$110,000 with waterproof and pave  | Next Inspection   | December 2024                                     |
| Justification                        | Undertake rehabilitation to increase u  | ser safety and extend the service lif   | e of the structure.                               |

| Element Group:     | Decks                 |                  | Length:            |         |      |                       |                 |
|--------------------|-----------------------|------------------|--------------------|---------|------|-----------------------|-----------------|
| Element Name:      | Wearing Su            | rface            | Width:             |         |      |                       |                 |
| Location:          |                       |                  | Height:            |         |      |                       |                 |
| Material:          | Surface Trea          | tment            | Count:             |         |      |                       |                 |
| Element Type:      |                       |                  | Total Quantity:    |         |      |                       |                 |
| Environment:       | Severe                |                  | Limited Insp'n:    |         |      |                       |                 |
| Protection System: |                       |                  |                    |         |      |                       |                 |
| Condition Data:    | Units                 | Exc.             | Good               | Fair    | Poor | Perform. Deficiencies | Maint.<br>Needs |
|                    | %                     |                  | 100                |         |      |                       | Yes             |
| Comments:          | The surface treatment | is relatively ne | ew and in good con | dition. |      |                       |                 |
| Recommended World  | 1-5 Years             | < 1 Year         | Urgent             |         |      |                       |                 |

## **Element Data**

| Element Group:     | Decks  |                 | Length:               |             |              |                  |            |
|--------------------|--|-----------------|-----------------------|-------------|--------------|------------------|------------|
| Element Name:      | Deck Top   |                 | Width:                |             |              |                  |            |
| Location:          |  | -               | Height:               |             |              |                  |            |
| Material:          | Concrete   | е               | Count:                |             |              |                  |            |
| Element Type:      |  |                 | Total Quantity:       |             |              |                  |            |
| Environment:       | Moderat  | е               | Limited Insp'n:       |             |              | V                |            |
| Protection System: |  |                 | •                     |             |              |                  |            |
| Condition Data:    | Units  | Exc.            | Good                  | Fair        | Poor         | Perform.         | Maint.     |
|                    |  |                 |                       |             | 1 001        | Deficiencies     | Needs      |
|                    | %  |                 | 100                   |             |              |                  |            |
| Comments:          | Limited inspection due                           | e to cover by g | ranulars (excessive   | depth) and  | surface tre  | eatment wearing  | g surface. |
| Recommended World  | k: None  | 6-10 Years      | 1-5 Years             | < 1 Year    | Urgent       |                  |            |
|                    | When the surface trea                            | atment reaches  | the end of its lifecy | cle, remove | e and inspe  | ct the condition | n of the   |
|                    | top deck. Consider pla                           | acing a waterpi | roofing membrane a    | ind paving  | the structur | e deck to maxi   | mize the   |
|                    | service life of this high asset value structure. |                 |                       |             |              |                  |            |

| Element Group:     | Decks                    |                  | Length:            |        |      |                       |                 |
|--------------------|--------------------------|------------------|--------------------|--------|------|-----------------------|-----------------|
| Element Name:      | Thick Sla                | ab               | Width:             |        |      |                       |                 |
| Location:          |                          |                  | Height:            |        |      |                       |                 |
| Material:          | Concrete                 | е                | Count:             |        |      |                       |                 |
| Element Type:      |                          |                  | Total Quantity:    |        |      |                       |                 |
| Environment:       | Moderat                  | е                | Limited Insp'n:    |        |      |                       |                 |
| Protection System: |                          |                  |                    |        |      |                       |                 |
| Condition Data:    | Units                    | Exc.             | Good               | Fair   | Poor | Perform. Deficiencies | Maint.<br>Needs |
|                    | %                        |                  | 100                |        |      |                       |                 |
| Comments:          | The soffit is in good co | ondition with no | o visible defects. | -,     |      |                       |                 |
| Recommended Worl   | k: None                  | 1-5 Years        | < 1 Year           | Urgent |      |                       |                 |

| Element Group:     | Decks                  |              | Length:             |                 |              |                |         |
|--------------------|------------------------|--------------|---------------------|-----------------|--------------|----------------|---------|
| Element Name:      | Drainage               | :            | Width:              |                 |              |                |         |
| Location:          |                        |              | Height:             |                 |              |                |         |
| Material:          | Concrete               |              | Count:              |                 |              |                |         |
| Element Type:      |                        |              | Total Quantity:     |                 |              |                |         |
| Environment:       | Severe                 |              | Limited Insp'n:     |                 |              |                |         |
| Protection System: |                        |              | -                   |                 |              |                |         |
| •                  | Units                  | Exc.         | Good                | Fair            | Poor         | Perform.       | Maint.  |
| Condition Data:    |                        |              | G000                | ı alı           | 1 001        | Deficiencies   | Needs   |
|                    | %                      |              |                     | 100             |              |                |         |
| Comments:          | Surface to slope drain | age is adequ | uate. There is very | y little crossf | all grade to | the wearing si | urface. |
| Recommended Work   | x: None                | 6-10 Years   | 1-5 Years           | < 1 Year        | Urgent       |                |         |

## **Element Data**

| Element Group:     | Sidewalks/cu                      | ırbs          | Length:           |             |            | •                     |                 |
|--------------------|-----------------------------------|---------------|-------------------|-------------|------------|-----------------------|-----------------|
| Element Name:      | Curbs                             |               | Width:            |             |            |                       |                 |
| Location:          |                                   |               | Height:           |             |            |                       |                 |
| Material:          | Concrete                          |               | Count:            |             |            |                       |                 |
| Element Type:      |                                   |               | Total Quantity:   |             |            |                       |                 |
| Environment:       | Severe                            |               | Limited Insp'n:   |             |            |                       |                 |
| Protection System: |                                   |               | •                 | -           |            |                       |                 |
| Condition Data:    | Units                             | Exc.          | Good              | Fair        | Poor       | Perform. Deficiencies | Maint.<br>Needs |
|                    | %                                 |               | 93                | 5           | 2          |                       |                 |
| Comments:          | The concrete is in goo equipment. | d condition v | with some observe | ed minor da | mage to en | ds from mainte        | nance           |
| Recommended Worl   | k: None                           | 6-10 Years    | 1-5 Years         | < 1 Year    | Urgent     |                       |                 |

| Element Group:  | Barriers   |            | Length:         |          |        |                       |                 |  |  |  |
|---|--|------------|-----------------|----------|--------|-----------------------|-----------------|--|--|--|
| Element Name:   | Railing Syste  | ems        | Width:          |          |        |                       |                 |  |  |  |
| Location:   |  |            | Height:         |          |        |                       |                 |  |  |  |
| Material:   | Steel (  |            | Count:          |          |        |                       |                 |  |  |  |
| Element Type:   | Box Beam T   |            | Total Quantity: |          |        |                       |                 |  |  |  |
| Environment:  | Severe   |            | Limited Insp'n: |          |        |                       |                 |  |  |  |
| Protection System:                                      |  |            |                 |          |        |                       |                 |  |  |  |
| Condition Data:   | Units  | Exc.       | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |  |  |
|   | %  |            | 95              | 5        |        | Yes                   |                 |  |  |  |
| Comments:   | Comments: There is currently no approach protection in place and the ends of the structure barrier pose a vehicular hazard. The structure barrier is code deficient (does not meet height requirements) and has no pedestrian/cyclist handrail. Minor corrosion of the galvanized railing has started. |            |                 |          |        |                       |                 |  |  |  |
| Recommended Work  | k: None  | 6-10 Years | 1-5 Years       | < 1 Year | Urgent |                       |                 |  |  |  |
| Install bridge and approach barrier protection to Code. |  |            |                 |          |        |                       |                 |  |  |  |

| Element Group:     | Barriers               | i               | Length:            |              |               |                   |            |
|--------------------|------------------------|-----------------|--------------------|--------------|---------------|-------------------|------------|
| Element Name:      | Posts                  |                 | Width:             |              |               |                   |            |
| Location:          |                        |                 |                    |              |               |                   |            |
| Material:          | Steel (                |                 | Count:             |              |               |                   |            |
| Element Type:      | I-Beam                 |                 | Total Quantity:    |              |               |                   |            |
| Environment:       | Severe L               |                 | Limited Insp'n:    |              |               |                   |            |
| Protection System: |                        |                 |                    |              |               |                   |            |
|                    | Units                  | Exc.            | Good               | Fair         | Poor          | Perform.          | Maint.     |
| Condition Data:    |                        | EXC.            | Good               | ган          | P001          | Deficiencies      | Needs      |
|                    | %                      |                 | 100                |              |               | Yes               |            |
| Comments:          | The end posts are un   | protected and l | hazardous to road  | l users. The | current co    | onfiguration does | s not meet |
|                    | code.                  |                 |                    |              |               |                   |            |
|                    |                        |                 |                    |              |               |                   |            |
| Recommended Wo     | ork: None              | 6-10 Years      | 1-5 Years          | < 1 Year     | Urgent        |                   |            |
|                    | Replace the structure  | barrier protect | ion to meet currer | nt code and  | l install app | roach barrier pr  | otection   |
|                    | with proper end termin | nation.         |                    |              |               |                   |            |

## Element Data

| Element Group:     | Abutmen                | ts            | Length:         |          |        |                          |                 |  |
|--------------------|------------------------|---------------|-----------------|----------|--------|--------------------------|-----------------|--|
| Element Name:      | Abutment V             | /alls         | Width:          |          |        |                          |                 |  |
| Location:          |                        |               | Height:         |          |        |                          |                 |  |
| Material:          | Concrete               | Э             | Count:          |          |        | 2                        |                 |  |
| Element Type:      | Т                      |               | Total Quantity: |          |        |                          |                 |  |
| Environment:       | Moderate I             |               | Limited Insp'n: |          |        |                          |                 |  |
| Protection System: |                        |               |                 |          |        |                          |                 |  |
| Condition Data:    | Units                  | Exc.          | Good            | Fair     | Poor   | Perform.<br>Deficiencies | Maint.<br>Needs |  |
|                    | %                      |               | 100             |          |        |                          |                 |  |
| Comments:          | Minor surface cracking | g was observe | d.              |          |        |                          |                 |  |
| Recommended Wo     | ork: None              | 6-10 Years    | 1-5 Years       | < 1 Year | Urgent |                          |                 |  |

| Element Group:     | Abutmen                      | ts            | Length:             |               |             |                |        |
|--------------------|------------------------------|---------------|---------------------|---------------|-------------|----------------|--------|
| Element Name:      | Wingwall                     | ls            | Width:              |               |             |                |        |
| Location:          |                              |               | Height:             |               |             |                |        |
| Material:          | Armour Stone / Field Stone ( |               | Count:              | 4             |             |                |        |
| Element Type:      | To                           |               | Total Quantity:     |               |             |                |        |
| Environment:       | Moderate L                   |               | Limited Insp'n:     |               |             |                |        |
| Protection System: |                              |               |                     |               |             |                |        |
|                    | Units                        | Exc.          | Good                | Good Fair Poo | Poor        | Perform.       | Maint. |
| Condition Data:    |                              | EXC.          | Good                |               |             | Deficiencies   | Needs  |
|                    | %                            |               | 50                  | 25            | 25          |                |        |
| Comments:          | The two wingwalls on         | west side are | armour stone and    | are in goo    | d condition | •              |        |
|                    | The two wingwalls on         | the east side | are fieldstone. The | e southeast   | wingwall h  | as been eroded | and is |
|                    | failing.                     |               |                     |               |             |                |        |
| Recommended Wo     | ork: None                    | 6-10 Years    | 1-5 Years           | < 1 Year      | Urgent      |                |        |
|                    | Repair southeast wing        | gwall.        |                     |               |             |                |        |

#### Element Group: Foundations Length: Element Name: Foundation (below ground level) Width: Location: Height: Material: Concrete Count: Element Type: Total Quantity: Environment: Moderate Limited Insp'n: Yes Protection System: Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs Yes Yes Comments: The south footings appear stable and are well protected. The northeast footing appears stable, but is poorly protected. The northwest footing is heavily undermined and poorly protected. **Recommended Work:** 6-10 Years None 1-5 Years < 1 Year Urgent Underpin and stabilize northwest footing and provide more rip-rap and rock protection to the northeast and northwest footings.

Structure:

11

#### **Element Data**

**Element Data** 

| Element Group:   | Embankments           | & Streams           | Length:            |         |      |                       |                 |  |
|--|-----------------------|---------------------|--------------------|---------|------|-----------------------|-----------------|--|
| Element Name:  | Streams and \         | Naterways           | Width:             |         |      |                       |                 |  |
| Location:  |                       |                     | Height:            |         |      |                       |                 |  |
| Material:  | Earth / Stone         |                     | Count:             |         |      |                       |                 |  |
| Element Type:  | 17                    |                     | Total Quantity:    |         |      |                       |                 |  |
| Environment:   | Moderate L            |                     | Limited Insp'n:    |         |      |                       |                 |  |
| Protection System:   |                       |                     |                    | -       |      |                       |                 |  |
| Condition Data:  | Units                 | Exc.                | Good               | Fair    | Poor | Perform. Deficiencies | Maint.<br>Needs |  |
|  | %                     |                     |                    | 100     |      |                       |                 |  |
| Comments:  | The watercourse is st | able with large sto | ne (boulders) thro | ughout. |      |                       |                 |  |
| Comments: The watercourse is stable with large stone (boulders) throughout.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                       |                     |                    |         |      |                       |                 |  |

| Element Group:   | Embankments | & Streams | Length:         |      |      |                       |                 |  |  |
|--|-------------|-----------|-----------------|------|------|-----------------------|-----------------|--|--|
| Element Name:  | Embankr     | nents     | Width:          |      |      |                       |                 |  |  |
| Location:  |             |           | Height:         |      |      |                       |                 |  |  |
| Material:  | ·           |           | Count:          | 4    |      |                       |                 |  |  |
| Element Type:  | Т           |           | Total Quantity: |      |      | 4                     |                 |  |  |
| Environment:   | Moderate L  |           | Limited Insp'n: |      |      |                       |                 |  |  |
| Protection System:   |             |           | •               |      |      |                       |                 |  |  |
| Condition Data:  | Units       | Exc.      | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |
|  | Each        |           |                 | 3    | 1    |                       |                 |  |  |
| Comments:  The slopes are stone and vegetated earth. The southeast quadrant has erosion and failure of the geotextile and rock protection. The southwest quadrant has minor erosion of the embankment. |             |           |                 |      |      |                       |                 |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Repair all erosion and place new geotextile and rip rap/rock slope protection.   |             |           |                 |      |      |                       |                 |  |  |

| Element Group:  | Signs                 |                | Length:            |           |      |                       |                 |
|---|-----------------------|----------------|--------------------|-----------|------|-----------------------|-----------------|
| Element Name:   | Signs                 |                | Width:             |           |      |                       |                 |
| Location:   |                       |                | Height:            |           |      |                       |                 |
| Material:   | Steel                 |                | Count:             |           |      |                       |                 |
| Element Type:   |                       |                | Total Quantity:    |           |      | 4                     |                 |
| Environment:  | Moderate L            |                | Limited Insp'n:    |           |      |                       |                 |
| Protection System:  |                       |                |                    |           |      |                       |                 |
| Condition Data:   | Units                 | Exc.           | Good               | Fair      | Poor | Perform. Deficiencies | Maint.<br>Needs |
|   | Each                  |                | 2                  | 2         |      | No                    | No              |
| Comments:   | Four end hazard signs | are in place a | and are in good co | ondition. |      | •                     |                 |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                       |                |                    |           |      |                       |                 |

| Element Group:     | Approach              | es             | Length:            |                     |                       |                       |                 |
|--------------------|-----------------------|----------------|--------------------|---------------------|-----------------------|-----------------------|-----------------|
| Element Name:      | Wearing Sur           | face           | Width:             |                     |                       |                       |                 |
| Location:          | ŀ                     |                | Height:            |                     |                       |                       |                 |
| Material:          | Gravel C              |                | Count:             |                     |                       |                       |                 |
| Element Type:      |                       |                | Total Quantity:    |                     |                       |                       |                 |
| Environment:       | Moderate Li           |                | Limited Insp'n:    |                     |                       |                       |                 |
| Protection System: |                       |                |                    |                     |                       |                       |                 |
| Condition Data:    | Units                 | Exc.           | Good               | Fair                | Poor                  | Perform. Deficiencies | Maint.<br>Needs |
| Condition Bata.    | %                     |                | 100                |                     |                       | Yes                   | Yes             |
| Comments:          | The approach wearing  | surface is sur | rface treatment in | fair conditi        | on.                   |                       |                 |
|                    | Cracking and settleme | ent observed a | t each end of the  | structure w         | // cold patc          | h observed on         | the north       |
| Recommended Worl   | Monitor settlement an | •              |                    | < 1 Year Consider r | Urgent<br>eplacing ro | oad base and p        | oaving          |
|                    | deck and approaches   | •              |                    |                     |                       |                       |                 |



Photo 11-2: View of east structure elevation, exterior soffit, barrier and embankments



Photo 11-3: View of exterior barrier protection, soffit and wingwalls



11-4: View of structure soffit



11-5: Rock slope protection and geotextile failure at the southeast quadrant



11-6: View of north abutment wall and soffit



11-7: View of structure wearing surface, barrier protection and end hazard signage



11-8: View of watercourse downstream



11-7: View of watercourse upstream



11-10: Minor erosion at the northwest structure quadrant



11-11: Structure wearing surface

Site Number 12 **Project Number** 221-12948-00 Northern Bruce Peninsula Stokes Bay Road Culvert Municipality **Structure Name** 30 02 **MTO Region Code** County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





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| Inventory Data                         |  |   |                                |
|--|--|---|--------------------------------|
| Structure Name                         | Stokes Bay Road Culvert  | Site Number   | 12                             |
| County                                 | Bruce  | Road Name   | Stokes Bay Road                |
| Municipality                           | Northern Bruce Peninsula   | Road Type   | Rural Coll.                    |
| Bridge or Culvert                      | Culvert  | Owner   | Northern Bruce Peninsula       |
| Structure Type                         | Steel - SP - SCP - PA  | AADT  | 350                            |
| Span (m)                               | 4.7 No. 1  | % Trucks  | 15%                            |
| Height (m)                             | 3  | Overall Structure Width (m)   | 22                             |
| Direction of Structure                 | East/West  | Roadway Width (m)   | 6.1                            |
| Year Built/Rehabilitated               | 1970   | Total Deck Length (m)   | 4.7                            |
| Current Load Limit                     | None   | Total Deck Area (s.m.)  | 103                            |
| Detour Length (km)                     | 4  | Heritage Des.   | None                           |
| Waterway                               | Old Woman's River (Fern Creek<br>Drain)  |   |                                |
| Inspection Data                        |  |   |                                |
| Date of Inspection                     | December 7, 2022   | Photos:<br>12-1 - Title Page  |                                |
| Name of Inspector                      | Evan Montreuil, P.Eng.   | 12-2 - View of culvert inlet in   | `                              |
| Equipment Used                         | Tape, pick, hammer   | 12-3 - View of culvert inlet in 12-4 - View of surface treatme 12-5 - View of culvert outlet in | nt wearing surface             |
| Weather Conditions                     | Overcast   | 12-6 - View of watercourse do<br>12-7 - View of watercourse up                                  |                                |
| Temperature                            | 4°C  | 12-8 - View of culvert barrel in 12-9 - View of culvert barrel co                               | nterior                        |
| Last Inpsection                        | October 30, 2020   | 12 y view of current ourier   | orrosion at the waterime (typ) |
| Additional Investigation<br>Required   | Complete annual inspections of the co  | ulvert barrel to monitor the deforma  | ation.                         |
| Total Rehabilitation                   | Install approach and barrier protection Install end hazard signs.              | n to Code. Repair erosion and plac  | e rip-rap erosion protection.  |
| Total Rehabilitation<br>Budget Costing | \$50,000   | Next Inspection   | December 2023                  |
| Justification                          | Due to the age and fair condition of the approach protection (for safety). Red |   |                                |

| Element Group:     | Decks  |                             | Length:           |                |             |                 |           |  |
|--------------------|--|-----------------------------|-------------------|----------------|-------------|-----------------|-----------|--|
| Element Name:      | Wearing Sur                                  | face                        | Width:            |                |             |                 |           |  |
| Location:          |  |                             | Height:           |                |             |                 |           |  |
| Material:          |  |                             | Count:            |                |             |                 |           |  |
| Element Type:      | Т  |                             | Total Quantity:   |                |             |                 |           |  |
| Environment:       | Severe                                       | Severe L                    |                   |                |             |                 |           |  |
| Protection System: |  | None                        |                   |                |             |                 |           |  |
|                    | Units  | Exc.                        | Good              | Fair           | Poor        | Perform.        | Maint.    |  |
| Condition Data:    | Offics                                       | LXC.                        | Good              | Fall           | F 001       | Deficiencies    | Needs     |  |
|                    | %  |                             | 75                | 25             |             |                 |           |  |
| Comments:          | The surface treatment path rutting observed. | wearing surf                | ace is in good to | fair condition | on with min | or settlement a | ind wheel |  |
| Recommended Work   | c: None Replace the surface tr               | 6-10 Years<br>reatment with | _                 | < 1 Year       | Urgent      |                 |           |  |

## **Element Data**

| Element Group:                                 | Barriers                   |                 | Length:           |            |             |                       |        |  |
|--|----------------------------|-----------------|-------------------|------------|-------------|-----------------------|--------|--|
| Element Name:                                  | Barrier                    |                 | Width:            |            |             |                       |        |  |
| Location:                                      | Each Sid                   | е               | Height:           |            |             |                       |        |  |
| Material:                                      | C                          |                 | Count:            |            |             |                       |        |  |
| Element Type:                                  |                            |                 | Total Quantity:   |            |             |                       |        |  |
| Environment:                                   | Severe                     |                 | Limited Insp'n:   |            |             |                       |        |  |
| Protection System:                             |                            | None            |                   |            |             |                       |        |  |
| Condition Data:                                | Units                      | Exc.            | Good              | Fair       | Poor        | Perform. Deficiencies | Maint. |  |
| Condition Data.                                | %                          |                 |                   |            |             | Yes                   | Needs  |  |
| Comments:                                      | There is currently no b    | parrier protect | ion in place. The | clear zone | is approxir | mately 3 m.           |        |  |
|  |                            |                 |                   |            |             |                       |        |  |
| Recommended Work                               | : None                     | 6-10 Years      | 1-5 Years         | < 1 Year   | Urgent      |                       |        |  |
|  | Install barrier protection | n to meet cur   | rent code require | ements. Re | duce the po | osted speed lin       | nit to |  |
| 45km/hr until barrier protection is installed. |                            |                 |                   |            |             |                       |        |  |

| Element Group:     | Culverts        |            | Length:         |          |        |                       |                 |
|--------------------|-----------------|------------|-----------------|----------|--------|-----------------------|-----------------|
| Element Name:      | Inlet Compo     | nent       | Width:          |          |        |                       |                 |
| Location:          | East End        | East End I |                 |          |        |                       |                 |
| Material:          | Stone and Earth |            | Count:          |          |        |                       |                 |
| Element Type:      |                 |            |                 |          |        |                       |                 |
| Environment:       | Moderate        | )          | Limited Insp'n: |          |        |                       |                 |
| Protection System: |                 | None       |                 |          |        |                       |                 |
| Condition Data:    | Units           | Exc.       | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |
|                    | %               |            |                 | 100      |        |                       |                 |
| Comments:          |                 |            |                 |          |        |                       |                 |
| Recommended Work   | : None          | 6-10 Years | 1-5 Years       | < 1 Year | Urgent |                       |                 |

| Outlet Compo<br>West End<br>Stone and E<br>Moderate   | d<br>arth | Width: Height: Count: Total Quantity: Limited Insp'n: |                           |                                    |   |   |  |  |  |  |
|---|-----------|---|---------------------------|------------------------------------|---|---|--|--|--|--|
| Stone and E   | arth      | Count: Total Quantity: Limited Insp'n:                |                           |                                    |   |   |  |  |  |  |
|   |           | Total Quantity:<br>Limited Insp'n:                    |                           |                                    |   |   |  |  |  |  |
| Moderate  | )         | Limited Insp'n:                                       |                           |                                    |   |   |  |  |  |  |
| Moderate  | )         |   |                           |                                    |   |   |  |  |  |  |
| 1   |           | None  |                           |                                    |   |   |  |  |  |  |
|   |           | 110110  |                           |                                    | None                                      |   |  |  |  |  |
| Units   | Exc.      | Good  | Fair                      | Poor                               | Perform. Deficiencies                     | Maint.<br>Needs                           |  |  |  |  |
| %   |           | 30  | 60                        | 10                                 | Yes                                       | Yes                                       |  |  |  |  |
| Comments: Some of the rip rap and rock slope protection has failed.                                 |           |   |                           |                                    |   |   |  |  |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Replace the missing stones and rip-rap. |           |   |                           |                                    |   |   |  |  |  |  |
|   | None      | None 6-10 Years                                       | None 6-10 Years 1-5 Years | None 6-10 Years 1-5 Years < 1 Year | None 6-10 Years 1-5 Years < 1 Year Urgent | None 6-10 Years 1-5 Years < 1 Year Urgent |  |  |  |  |

## **Element Data**

| Element Group:   | Culvert                             |                              | Length:         |          |        |                       |                 |
|--|-------------------------------------|------------------------------|-----------------|----------|--------|-----------------------|-----------------|
| Element Name:  | Barrel                              |                              | Width:          |          |        |                       |                 |
| Location:  |                                     |                              | Height:         |          |        |                       |                 |
| Material:  | Steel                               |                              | Count:          |          |        |                       |                 |
| Element Type:  | Pipe Arch                           |                              | Total Quantity: |          |        |                       |                 |
| Environment:   | Moderate                            |                              | Limited Insp'n: |          |        |                       |                 |
| Protection System:   | Galvanized                          |                              |                 |          |        |                       |                 |
| Condition Data:  | Units                               | Exc.                         | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |
|  | %                                   |                              | 40              | 50       | 10     | Yes                   |                 |
| Comments: Deformations are visible at the obvert, with corrosion and swelling near the water level. Section loss is 10% at most. |                                     |                              |                 |          |        |                       |                 |
| Recommended Wo   | rk: None<br>Monitor the deformation | 6-10 Years<br>ons and sectio |                 | < 1 Year | Urgent |                       |                 |

| Element Group:  | Foundation               |                 | Length:         |      |      |                       |                 |
|---|--------------------------|-----------------|-----------------|------|------|-----------------------|-----------------|
| Element Name:   | Foundation (below grade) |                 | Width:          |      |      |                       |                 |
| Location:   |                          |                 | Height:         |      |      |                       |                 |
| Material:   | Granula                  | Granular        |                 |      |      |                       |                 |
| Element Type:   |                          |                 | Total Quantity: |      |      |                       |                 |
| Environment:  | Moderat                  | Limited Insp'n: | Yes             |      |      |                       |                 |
| Protection System:  | None                     |                 |                 |      |      |                       |                 |
| Condition Data:   | Units                    | Exc.            | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |
|   |                          |                 |                 |      |      | Yes                   |                 |
| Comments: Limited inspection of the foundation due to cover. Erosion was observed under the pipe inlet.     |                          |                 |                 |      |      |                       |                 |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Place rip-rap on geotextile erosion protection. |                          |                 |                 |      |      |                       |                 |

| Element Group:     | Streams/Embar         | nkments         | Length:          |               |               |              |        |
|--------------------|-----------------------|-----------------|------------------|---------------|---------------|--------------|--------|
| Element Name:      | Streams and Wa        | aterways        | Width:           |               |               |              |        |
| Location:          |                       |                 | Height:          |               |               |              |        |
| Material:          | Stone/Sand (          |                 | Count:           |               |               |              |        |
| Element Type:      | -                     |                 | Total Quantity:  |               |               |              |        |
| Environment:       | Moderate              |                 | Limited Insp'n:  |               |               |              |        |
| Protection System: |                       | None            |                  |               |               |              |        |
|                    | Units                 | Exc.            | Good             | Fair          | Poor          | Perform.     | Maint. |
| Condition Data:    |                       | LXU.            | Good             | ı alı         | 1 001         | Deficiencies | Needs  |
|                    | %                     |                 |                  | 100           |               |              |        |
| Comments:          | Low velocity watercou | rse with no vis | ible obstruction | at the time o | of inspection | on.          |        |
| Recommended Work   | K: None               | 6-10 Years      | 1-5 Years        | < 1 Year      | Urgent        |              |        |

## **Element Data**

| Element Group:     | Streams/Embankments    |                 | Length:           |             |           |                       |                 |  |
|--------------------|------------------------|-----------------|-------------------|-------------|-----------|-----------------------|-----------------|--|
| Element Name:      | Embankment             |                 | Width:            |             |           |                       |                 |  |
| Location:          | Each Corner            |                 | Height:           |             |           |                       |                 |  |
| Material:          | Stone / Earth          |                 | Count:            | 4           |           |                       |                 |  |
| Element Type:      |                        |                 | Total Quantity:   | 4           |           |                       |                 |  |
| Environment:       | Moderat                | Limited Insp'n: |                   |             |           |                       |                 |  |
| Protection System: | None                   |                 |                   |             |           |                       |                 |  |
| Condition Data:    | Units                  | Exc.            | Good              | Fair        | Poor      | Perform. Deficiencies | Maint.<br>Needs |  |
|                    | Each                   |                 |                   | 2           | 2         |                       |                 |  |
| Comments:          | Heavily vegetated with | n some minor    | erosion at the no | rtheast and | southeast | quadrants.            |                 |  |
| Recommended Wor    | k: None                | 6-10 Years      | 1-5 Years         | < 1 Year    | Urgent    |                       |                 |  |

## **Element Data**

| Element Group:     | Signs             |                 | Length:         |      |      |                       |                 |
|--------------------|-------------------|-----------------|-----------------|------|------|-----------------------|-----------------|
| Element Name:      | Signs             |                 | Width:          |      |      |                       |                 |
| Location:          | Each Corner       |                 | Height:         |      |      |                       |                 |
| Material:          |                   |                 | Count:          |      |      |                       |                 |
| Element Type:      |                   |                 | Total Quantity: |      |      | 0                     |                 |
| Environment:       | Severe            | Limited Insp'n: |                 |      |      |                       |                 |
| Protection System: |                   |                 | None            | !    |      |                       |                 |
| Condition Data:    | Units             | Exc.            | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |
|                    | Each              |                 |                 |      |      | Yes                   |                 |
| Comments:          | No signs present. | -               | •               |      |      |                       |                 |
|                    |                   |                 |                 |      |      |                       |                 |

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent

Place rip-rap erosion protection.

Install required end hazard signage and speed limit signage.

| Element Group:   | Approaches            |               | Length:               |            |               |              |        |  |
|--|-----------------------|---------------|-----------------------|------------|---------------|--------------|--------|--|
| Element Name:  | Wearing Surface       |               | Width:                |            |               |              |        |  |
| Location:  | Each End I            |               | Height:               |            |               |              |        |  |
| Material:  | Surface Treatment     |               | Count:                |            |               |              |        |  |
| Element Type:  | ·                     |               | Total Quantity:       |            |               |              |        |  |
| Environment:   | Severe                |               | Limited Insp'n:       |            |               |              |        |  |
| Protection System:   |                       | None          |                       |            |               |              |        |  |
|  | Units                 | Exc.          | Good                  | Fair       | Poor          | Perform.     | Maint. |  |
| Condition Data:  |                       | LAU.          | Good                  | I all      | F001          | Deficiencies | Needs  |  |
|  | %                     |               | 75                    | 25         |               |              | Yes    |  |
| Comments:  | The surface treatment | is in good to | fair condition with r | minor whee | l path ruttir | ng observed. |        |  |
| Comments: The surface treatment is in good to fair condition with minor wheel path rutting observed.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Replace the surface treatment with road resurfacing. |                       |               |                       |            |               |              |        |  |



Photo 12-2: View of culvert inlet in elevation (north perspective)



Photo 12-3: View of culvert barrel interior



Photo 12-4: View of surface treatment wearing surface



Photo 12-5: View of culvert outlet



Photo 12-6: View of watercourse downstream



Photo 12-7: View of watercourse upstream



Photo 12-8: View of culvert barrel interior



Photo 12-9: View of culvert barrel corrosion at the waterline (typical)

Site Number 13 **Project Number** 221-12948-00 Northern Bruce Peninsula Bury Road Culvert Municipality **Structure Name** 30 02 MTO Region Code County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





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| Inventory Data                         |   |  |                               |
|--|---|--|-------------------------------|
| Structure Name                         | Bury Road Culvert   | Site Number  | 13                            |
| County                                 | Bruce   | Road Name  | Bury Road                     |
| Municipality                           | Northern Bruce Peninsula  | Road Type  | Rural Local                   |
| Bridge or Culvert                      | Bridge  | Owner  | Northern Bruce Peninsula      |
| Structure Type                         | Concrete Slab   | AADT   | 100                           |
| Span (m)                               | 6.1 No. 1   | % Trucks   | 15%                           |
| Height (m)                             | 2   | Overall Structure Width (m)  | 7.5                           |
| Direction of Structure                 | East/West   | Roadway Width (m)  | 5.5                           |
| Year Built/Rehabilitated               | 1960  | Total Deck Length (m)  | 6.4                           |
| Current Load Limit                     | 15 t  | Total Deck Area (s.m.)   | 48                            |
| Detour Length (km)                     | 8   | Heritage Des.  | None                          |
| Waterway                               | Old Woman's River<br>(Fern Creek Drain)   |  |                               |
| Inspection Data                        |   |  |                               |
| Date of Inspection                     | December 7, 2022  | Photos:<br>13-1 - Title Page   |                               |
| Name of Inspector                      | Evan Montreuil, P.Eng.  | 13-2 - View of structure from  | the north approach            |
| Equipment Used                         | Tape, pick, hammer  | 13-3 - Vew of curb<br>13-4 - Approach and structure<br>13-5 - Southwest structure with |                               |
| Weather Conditions                     | Overcast  | 13-6 - View of west structure north abutment wall                                      |                               |
| Temperature                            | 4°C   | 13-7 - View of structure soffit<br>13-8 - View of south abutmen                        | at wall and exposed footing   |
| Last Inspection                        | October 30, 2020  | 13-9 - View of watercourse up<br>13-10 - View of watercourse of                        | pstream<br>downstream         |
| Additional Investigation<br>Required   | Inspect Annually - Deck Soffit and Fo   | oundations, deck condition survey  |                               |
| Total Rehabilitation                   | Place approach and structure barrier place footing and foundation erosion repair  |  | Complete the concrete soffit, |
| Total Rehabilitation<br>Budget Costing | \$130,000   | Next Inspection  | December 2023                 |
| Justification                          | Due to the low traffic volumes and fa<br>Undertake rehabilitation to extend the<br>limit to 35 km/hr. as interim measure<br>structure annually to monitor condition | e service life (short term) versus re<br>until barrier protection is installed         | placement. Reduce speed       |

| Element Group:  | Decks    |                 | Length:           |              |              |                          |                 |  |
|---|----------|-----------------|-------------------|--------------|--------------|--------------------------|-----------------|--|
| Element Name:   | Deck Top | )               | Width:            |              |              |                          |                 |  |
| Location:   |          |                 | Height:           |              |              |                          |                 |  |
| Material:   | Concrete |                 | Count:            |              |              |                          |                 |  |
| Element Type:   |          |                 | Total Quantity:   |              |              |                          |                 |  |
| Environment:  | Moderate | Limited Insp'n: | Yes               |              |              |                          |                 |  |
| Protection System:  |          | Wearing Surface |                   |              |              |                          |                 |  |
| Condition Data:   | Units    | Exc.            | Good              | Fair         | Poor         | Perform.<br>Deficiencies | Maint.<br>Needs |  |
|   | %        |                 |                   | 80           | 20           |                          |                 |  |
| Comments:  The visible ends are in fair condition, the majority of the deck top is debris/gravel covered and not visible for inspection. Remove the granular cover and inspect the condition of the top deck. |          |                 |                   |              |              |                          |                 |  |
| Recommended Wor   | k: None  | 6-10 Years      | 1-5 Years         | < 1 Year     | Urgent       |                          |                 |  |
| Clear the debris and gravel along of deck top.  |          |                 | urb, perform a de | ck condition | n survey, aı | nd seal and wa           | terproof        |  |

#### **Element Data**

| Element Group:     | Decks                   |                 | Length:             |              |             |                   |            |
|--------------------|-------------------------|-----------------|---------------------|--------------|-------------|-------------------|------------|
| Element Name:      | Soffit - Thick          | Slab            | Width:              |              |             |                   |            |
| Location:          |                         |                 | Height:             |              |             |                   |            |
| Material:          | Concrete                |                 | Count:              |              |             |                   |            |
| Element Type:      | Т                       |                 | Total Quantity:     |              |             |                   |            |
| Environment:       | Moderate                | Limited Insp'n: |                     |              |             |                   |            |
| Protection System: |                         | None            |                     |              |             |                   |            |
| ·                  | Units                   | Exc.            | Good                | Fair         | Poor        | Perform.          | Maint.     |
| Condition Data:    | Offics                  | EXC.            | Good                | Ган          | P001        | Deficiencies      | Needs      |
|                    | %                       |                 |                     | 30           | 70          |                   |            |
| Comments:          | Spalling and delamina   | ated concrete   | with rebar expose   | ed on both s | sides at ab | utment walls. A   | n exterior |
|                    | soffit crack is develop | ing (possibly a | a shear failure) at | the northw   | est corner  | soffit exterior a | nd trough  |
|                    | curb.                   |                 |                     |              |             |                   |            |
| Recommended Wor    | k: None                 | 6-10 Years      | 1-5 Years           | < 1 Year     | Urgent      |                   |            |
|                    | Remove the delamina     | ited concrete,  | sand blast rebar    | and comple   | ete concret | e repair. Water   | proof the  |
|                    | deck top to prevent fu  | rther deteriora | tion. Monitor the   | crack annu   | ally.       |                   |            |

| Element Group:  | Barrier L              |                  | Length:             |        |      |                       |                 |
|---|------------------------|------------------|---------------------|--------|------|-----------------------|-----------------|
| Element Name:   | Railing Sys            | tem              | Width:              |        |      |                       |                 |
| Location:   | Each Side I            |                  | Height:             |        |      |                       |                 |
| Material:   | Concrete               |                  | Count:              |        |      |                       |                 |
| Element Type:   |                        | Total Quantity:  |                     |        |      |                       |                 |
| Environment:  | Severe                 | Limited Insp'n:  |                     |        |      |                       |                 |
| Protection System:  | None                   |                  |                     |        |      |                       |                 |
| Condition Data:   | Units                  | Exc.             | Good                | Fair   | Poor | Perform. Deficiencies | Maint.<br>Needs |
|   | %                      |                  |                     |        |      | Yes                   |                 |
| Comments:   | No structure or appro- | ach barrier pro  | otection current in | place. |      |                       |                 |
| Recommended Work: None 6-10 Years 1-5 Years <a href="#">&lt; 1 Year</a> Urgent Install structure and approach barrier protection to provide required vehicle safety. Reduce the |                        |                  |                     |        |      |                       |                 |
|   | speed limit to 35km/h  | r in the interim | ١.                  |        |      |                       |                 |

| Element Group:  | Abutments      |             | Length:         |          |        |                       |                 |  |  |
|---|----------------|-------------|-----------------|----------|--------|-----------------------|-----------------|--|--|
| Element Name:   | Abutment Walls | s/Wingwalls | Width:          |          |        |                       |                 |  |  |
| Location:   | Each Side      |             | Height:         |          |        |                       |                 |  |  |
| Material:   | Concrete       |             | Count:          |          |        |                       |                 |  |  |
| Element Type:   | 17             |             | Total Quantity: |          |        |                       |                 |  |  |
| Environment:  | Moderate L     |             | Limited Insp'n: |          |        |                       |                 |  |  |
| Protection System:  |                |             |                 |          |        |                       |                 |  |  |
| Condition Data:   | Units          | Exc.        | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |  |
|   | %              |             |                 | 50       | 50     | Yes                   | Yes             |  |  |
| Comments: Spalling and delamination observed throughout. Hairline cracks at cold joint where abutment/wingwall meets the soffit at the northwest corner. Cracking observed at earth of the south quadrants. Surface spalling and calcite deposits were observed on each wingwall. Southwest wingwall deteriorating. |                |             |                 |          |        |                       |                 |  |  |
| Recommended Wo  |                | 6-10 Years  | 1-5 Years       | < 1 Year | Urgent |                       |                 |  |  |
| Remove all poor concrete, clean the reinforcing steel, and replace concrete.  |                |             |                 |          |        |                       |                 |  |  |

#### **Element Data**

| Element Group:     | Foundat                                    | ions                    | Length:   |            |           |                       |                 |  |
|--------------------|--|-------------------------|-----------|------------|-----------|-----------------------|-----------------|--|
|                    | Foundation (below                          | ground level)           | Width:    |            |           |                       |                 |  |
| Location:          | Each E                                     | Each End                |           |            |           |                       |                 |  |
| Material:          | Concrete                                   |                         | Count:    |            |           |                       |                 |  |
| Element Type:      |  |                         |           |            |           |                       |                 |  |
| Environment:       | Modera                                     | Moderate Limited Insp'r |           |            |           | Yes                   |                 |  |
| Protection System: |  | None                    |           |            |           |                       |                 |  |
| Condition Data:    | Units                                      | Exc.                    | Good      | Fair       | Poor      | Perform. Deficiencies | Maint.<br>Needs |  |
|                    | %  |                         |           |            |           | Yes                   | Yes             |  |
| Comments:          | Some erosion surrour southwest corner. Nor |                         |           | ne downstr | eam end a | nd along south        | side and        |  |
| Recommended Wo     | rk: None Place erosion protection          | 6-10 Years              | 1-5 Years | < 1 Year   | Urgent    |                       |                 |  |

| Embankments                       | & Streams  | Length:  |   |   |   |   |
|-----------------------------------|--|--|---|---|---|---|
| Streams and V                     | Vaterways  | Width:   |   |   |   |   |
|                                   |  | Height:  |   |   |   |   |
|                                   |  | Count:   |   |   |   |   |
|                                   |  | Total Quantity:  |   |   |   |   |
| Modera                            | ate  | Limited Insp'n:  |   |   |   |   |
|                                   |  | None   |   |   |   |   |
| Units                             | Exc.   | Good   | Fair  | Poor  | Perform. Deficiencies   | Maint.<br>Needs   |
| %                                 |  |  | 80  | 20  | Yes   | Yes   |
|                                   |  |  |   | ow has shif   | ted against the   | south   |
| ork: None Place rip rap to prever | 6-10 Years<br>nt further erosion                     | 1-5 Years<br>and clear the sedi  | < 1 Year<br>ment depo   | - 3   |   |   |
|                                   | Units  Berosion and settlement abutment/footing with | Units Exc.  % Erosion and settlement were observed abutment/footing with a silt deposit aloute.  None 6-10 Years | Streams and Waterways  Width: Height: Count: Total Quantity: Limited Insp'n: None Units Exc. Good %  Erosion and settlement were observed at the structure ou abutment/footing with a silt deposit along the north abutm  ork: None 1-5 Years | Streams and Waterways  Width: Height: Count: Total Quantity: Limited Insp'n: None  Units Exc. Good Fair % 80  Erosion and settlement were observed at the structure outlet. The flabutment/footing with a silt deposit along the north abutment.  Ork: None  None  1-5 Years < 1 Year | Streams and Waterways  Width: Height: Count: Total Quantity: Moderate Limited Insp'n: None Units Exc. Good Fair Poor % 80 20 Erosion and settlement were observed at the structure outlet. The flow has shif abutment/footing with a silt deposit along the north abutment. | Streams and Waterways  Width: Height: Count: Total Quantity: Limited Insp'n: None  Units Exc. Good Fair Poor Perform. Deficiencies % 80 20 Yes  Erosion and settlement were observed at the structure outlet. The flow has shifted against the abutment/footing with a silt deposit along the north abutment. |

| Element Group:  | Embankments 8        | Length:         |                 |      |      |                       |                 |  |
|---|----------------------|-----------------|-----------------|------|------|-----------------------|-----------------|--|
| Element Name:   | Embankm              | ents            | Width:          |      |      |                       |                 |  |
| Location:   | Each Corner          |                 | Height:         |      |      |                       |                 |  |
| Material:   |                      |                 | Count:          | 4    |      |                       |                 |  |
| Element Type:   |                      | Total Quantity: |                 | 4    |      |                       |                 |  |
| Environment:  | Moderat              | e               | Limited Insp'n: |      |      |                       |                 |  |
| Protection System:  | None                 |                 |                 |      |      |                       |                 |  |
| Condition Data:   | Units                | Exc.            | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |
|   | Each                 |                 | 4               |      |      |                       |                 |  |
| Comments:   | Heavily vegetated em | bankments app   | ear stable.     |      |      |                       |                 |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                      |                 |                 |      |      |                       |                 |  |

#### **Element Data**

| Element Group:     | Approaches           |                  | Length:            |             |              |               |        |
|--------------------|----------------------|------------------|--------------------|-------------|--------------|---------------|--------|
| Element Name:      | Wearing Surface      |                  | Width:             |             |              |               |        |
| Location:          |                      |                  | Height:            |             |              |               |        |
| Material:          | Grave                | Count:           |                    |             |              |               |        |
| Element Type:      |                      |                  | Total Quantity:    |             |              |               |        |
| Environment:       | Severe               |                  | Limited Insp'n:    |             |              |               |        |
| Protection System: |                      |                  | None               |             |              |               |        |
|                    | Units                | Exc.             | Good               | Fair        | Poor         | Perform.      | Maint. |
| Condition Data:    | Office               | EXC.             | Good               | I all       | 1001         | Deficiencies  | Needs  |
|                    | %                    |                  |                    | 80          | 20           | Yes           | Yes    |
| Commontos          | Clear the debrie and | roactation build | d alana tha adaa a | f acab abou | ıldar ta aab | iovo droinogo | The    |

Comments: Clear the debris and vegetation build along the edge of each shoulder to achieve drainage. The

surface has minor potholes and wheel path rutting.

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent

Grade and clear the vegetation from the shoulder annually.

| Element Group:             | Accessor | ies             | Length:                |             |              |                     |              |  |
|----------------------------|----------|-----------------|------------------------|-------------|--------------|---------------------|--------------|--|
| Element Name:              | Signs    |                 | Width:                 |             |              |                     |              |  |
| Location:                  |          |                 | Height:                |             |              |                     |              |  |
| Material:                  |          |                 | Count:                 | 4           |              |                     |              |  |
| Element Type:              |          | Total Quantity: |                        |             | 4            |                     |              |  |
| Environment:               | Severe   | )               | Limited Insp'n:        |             |              |                     |              |  |
| Protection System:         |          | None            |                        |             |              |                     |              |  |
| Condition Data:            | 11.74    | _               |                        |             | _            | Perform.            | Maint.       |  |
| Condition Data:            | Units    | Exc.            | Good                   | Fair        | Poor         | Deficiencies        | Needs        |  |
| Condition Data:            | Units    | Exc.            | Good<br>4              | Fair        | Poor         |                     |              |  |
| Condition Data:  Comments: |          | o narrow struct | 4<br>ure and two speed | d reduction | signs in pla | Deficiencies<br>Yes | Needs<br>Yes |  |



Photo 13-2: View of structure from the south approach



Photo 13-3: View of curb



Photo 13-4: Approach and structure wearing surface





Photo 13-6: View of east structure elevation, exterior soffit and north abutment wall



Photo 13-7: View of structure soffit and north abutment wall



Photo 13-8: View of south abutment wall and exposed footing



Photo 13-9: View of watercourse upstream



Photo 13-10: View of watercourse downstream

Site Number 14 **Project Number** 221-12948-00 East Road Culvert Municipality Northern Bruce Peninsula Structure Name 30 02 **MTO Region Code** County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





1450 - 1st Avenue West, Suite 101 Owen Sound, Ontario N4K 6W2 Tel: 519-376-7612 Fax: 519-376-8008

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| Inventory Data  |  |   |                                  |  |  |
|---|--|---|----------------------------------|--|--|
| Structure Name  | East Road Culvert  | Site Number   | 14                               |  |  |
| County  | Bruce  | Road Name   | East Road                        |  |  |
| Municipality  | Northern Bruce Peninsula   | Road Type   | Rural Coll.                      |  |  |
| Bridge or Culvert   | Culvert  | Owner [   | Northern Bruce Peninsula         |  |  |
| Structure Type  |  | AADT [  | 350                              |  |  |
| Span (m)  | 3.7 No. 1  | % Trucks  | 15%                              |  |  |
| Height (m)  | 2.8  | Overall Structure Width (m)   | 20                               |  |  |
| Direction of Structure  | East/West  | Roadway Width (m)   | 5.5                              |  |  |
| Year Built/Rehabilitated  | 1975   | Total Deck Length (m)   | 3.7                              |  |  |
| Current Load Limit  | None   | Total Deck Area (s.m.)  | 74                               |  |  |
| Detour Length (km)  | 32   | Heritage Des.   | None                             |  |  |
| Vaterway  | Stokes River   |   |                                  |  |  |
| nspection Data  |  |   |                                  |  |  |
| Date of Inspection  | December 6, 2022   | Photos:   | ations from the goveth among all |  |  |
| Name of Inspector   | Evan Montreuil, P.Eng.   | 14-1 - Title Page - View of stru<br>14-2 - View of structure wearin |                                  |  |  |
| Equipment Used  | Tape, pick, hammer   | 14-3 - View of watercourse down 14-4 - View of watercourse ups      |                                  |  |  |
| Veather Conditions  | Overcast   | 14-5 - View of culvert barrel in 14-6 - View of culvert barrel in   | rel interior, obvert             |  |  |
| Semperature   | 5°C  | 14-7 - View of slope protection<br>14-8 - View of barrier (typical) |                                  |  |  |
| ast Inspection  | September 24, 2020   | 14-9 - View of culvert interior                                     |                                  |  |  |
|   | 1 / 1  |   |                                  |  |  |
| •   |  | None  |                                  |  |  |
| Additional Investigation  |  | None  |                                  |  |  |
| Additional Investigation<br>Required  | Tighten the barrier protection cables corrosion of the barrel (especially at | and repair the connection to the post                               |                                  |  |  |
| Additional Investigation Required  Fotal Rehabilitation  Fotal Rehabilitation  Budget Costing |  | and repair the connection to the post                               |                                  |  |  |

| Element Group:  | Decks                 |                 | Length:            |            |             |              |        |  |
|---|-----------------------|-----------------|--------------------|------------|-------------|--------------|--------|--|
| Element Name:   | Wearing Sur           | face            | Width:             |            |             |              |        |  |
| Location:   |                       |                 | Height:            |            |             |              |        |  |
| Material:   | Surface Treatment     |                 | Count:             |            |             |              |        |  |
| Element Type:   | 7                     |                 | Total Quantity:    |            |             |              |        |  |
| Environment:  | Severe                | Limited Insp'n: |                    |            |             |              |        |  |
| Protection System:  |                       | None            |                    |            |             |              |        |  |
|   | Units                 | Exc.            | Good               | Fair       | Poor        | Perform.     | Maint. |  |
| Condition Data:   | Office                | LXC.            | Good               | ı alı      | 1 001       | Deficiencies | Needs  |  |
|   | %                     |                 | 100                |            |             |              |        |  |
| Comments:   | The surface treatment | is in good co   | ndition with minor | wheel path | rutting obs | served.      |        |  |
| Comments: The surface treatment is in good condition with minor wheel path rutting observed.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                       |                 |                    |            |             |              |        |  |

#### **Element Data**

| Element Group:  | Barriers                                     |                 | Length:                         |                      |            | 230                   |                 |  |
|---|--|-----------------|---------------------------------|----------------------|------------|-----------------------|-----------------|--|
| Element Name:   | Barrier                                      |                 | Width:                          |                      |            |                       |                 |  |
| Location:   |  |                 | Height:                         |                      |            |                       |                 |  |
| Material:   | Steel Cable/Wood Posts                       |                 | Count:                          |                      |            |                       |                 |  |
| Element Type:   | 3-Cable Guiderail                            |                 | Total Quantity:                 |                      |            |                       |                 |  |
| Environment:  | Severe                                       | Limited Insp'n: |                                 |                      |            |                       |                 |  |
| Protection System:  |  | None            |                                 |                      |            |                       |                 |  |
| Condition Data:   | Units  | Exc.            | Good                            | Fair                 | Poor       | Perform. Deficiencies | Maint.<br>Needs |  |
|   | %  |                 |                                 | 95                   | 5          | Yes                   | Yes             |  |
| Comments:   | The east cables are losigns of rot at bases. | ose and deta    | ched at two posts               | . Some woo           | oden posts | are begining to       | show            |  |
| Recommended Work: None 6-10 Years Tighten the cable guiderail and rep |  |                 | 1-5 Years<br>air the post conne | < 1 Year ctions. Mon | Urgent     | oden post cond        | dition.         |  |

| Element Group:   | Culverts           |              | Length:            |            |      |                       |                 |
|--|--------------------|--------------|--------------------|------------|------|-----------------------|-----------------|
| Element Name:  | Inlet Compo        | nent         | Width:             |            |      |                       |                 |
| Location:  | East End           | East End H   |                    |            |      |                       |                 |
| Material:  | Stone C            |              | Count:             |            |      |                       |                 |
| Element Type:  |                    |              | Total Quantity:    |            |      |                       |                 |
| Environment:   | Moderate           | )            | Limited Insp'n:    |            |      |                       |                 |
| Protection System:   | None               |              |                    |            |      |                       |                 |
| Condition Data:  | Units              | Exc.         | Good               | Fair       | Poor | Perform. Deficiencies | Maint.<br>Needs |
|  | %                  |              | 100                |            |      |                       |                 |
| Comments:  | The embankments an | d haunches a | re stable and rock | protected. |      |                       |                 |
| Comments: The embankments and haunches are stable and rock protected.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                    |              |                    |            |      |                       |                 |

| Element Group:  | Culvert            | S              | Length:         |            |      |                       |                 |  |
|---|--------------------|----------------|-----------------|------------|------|-----------------------|-----------------|--|
| Element Name:   | Outlet Comp        | onents         | Width:          |            |      |                       |                 |  |
| Location:   | West E             | nd             | Height:         |            |      |                       |                 |  |
| Material:   |                    |                | Count:          |            |      |                       |                 |  |
| Element Type:   |                    |                | Total Quantity: |            |      |                       |                 |  |
| Environment:  | Modera             | te             | Limited Insp'n: |            |      |                       |                 |  |
| Protection System:  | None               |                |                 |            |      |                       |                 |  |
| Condition Data:   | Units              | Exc.           | Good            | Fair       | Poor | Perform. Deficiencies | Maint.<br>Needs |  |
|   | %                  |                | 100             |            |      |                       |                 |  |
| Comments:   | The embankments an | d haunches are | stable and rock | orotected. |      |                       |                 |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                    |                |                 |            |      |                       |                 |  |

#### **Element Data**

| te<br>Exc.  | Width: Height: Count: Total Quantity: Limited Insp'n: Galvanize | ed Fair                       | Poor                                     | Perform.  | Maint.  |
|---|---|-------------------------------|--|---|---|
|   | Count: Total Quantity: Limited Insp'n: Galvanize                |                               | Poor                                     |   |   |
|   | Total Quantity:<br>Limited Insp'n:<br>Galvanize                 |                               | Poor                                     |   |   |
|   | Limited Insp'n:<br>Galvaniz                                     |                               | Poor                                     |   |   |
| Exc.  | Galvaniz  |                               | Poor                                     |   |   |
| Exc.  |   |                               | Poor                                     |   |   |
| Exc.  | Good  | Fair                          | Poor                                     |   |   |
| EXC.  | l Good  | Fall                          | F 001                                    | l = 6   |   |
| LXC.  | Good  | ı alı                         | 1 001                                    | Deficiencies  | Needs   |
|   | 50  | 50                            |  |   |   |
| n were observ   | ed below the hig  | h water line                  | . At the inl                             | let end, minor s                                    | ection  |
| exceeding 5%.   | Monitor the sect  | tion loss as                  | it advances                              | S.  |   |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |   |                               |  |   |   |
| •   | xceeding 5%.  | xceeding 5%. Monitor the sect | xceeding 5%. Monitor the section loss as | xceeding 5%. Monitor the section loss as it advance | n were observed below the high water line. At the inlet end, minor s<br>xceeding 5%. Monitor the section loss as it advances.<br>6-10 Years 1-5 Years < 1 Year Urgent |

| Element Group:     | Streams/Emba                    | nkments         | Length:         |          |        |                       |                 |  |
|--------------------|---------------------------------|-----------------|-----------------|----------|--------|-----------------------|-----------------|--|
| Element Name:      | Streams and W                   | aterways        | Width:          |          |        |                       |                 |  |
| Location:          |                                 |                 | Height:         |          |        |                       |                 |  |
| Material:          | Earth / R                       | ock             | Count:          |          |        |                       |                 |  |
| Element Type:      |                                 |                 | Total Quantity: |          |        |                       |                 |  |
| Environment:       | Modera                          | te              | Limited Insp'n: |          |        |                       |                 |  |
| Protection System: |                                 | None            |                 |          |        |                       |                 |  |
| Condition Data:    | Units                           | Exc.            | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |
|                    | %                               |                 |                 | 100      |        |                       |                 |  |
| Comments:          | Debris buildup at upst          | ream end obstru | ucting flow.    |          |        |                       |                 |  |
| Recommended Wor    | <b>k:</b> None<br>Clear debris. | 6-10 Years      | 1-5 Years       | < 1 Year | Urgent |                       |                 |  |

#### **Element Data** Structure: 14 Element Group: Streams/Embankments Length: Element Name: Width: Embankment Each Corner Height: Location: Material: Stone Count: 6 Total Quantity: Element Type: 6 Environment: Limited Insp'n: Protection System: None Perform. Maint. Units Good Exc. Fair Poor **Condition Data:** Deficiencies Needs Each Corner 6 Comments: The embankments appear stable with no sign of erosion or movement of the rock protection. Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent **Element Data** Element Group: Signs Length: Element Name: Signs Width: Location: Height: Corner Material: Steel Count: 4 Element Type: Total Quantity: Environment: Severe Limited Insp'n: Protection System: None Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs Each 4 Yes Yes Comments: End of guiderail post marker signs are not plum or aligned with traffic. Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Straighten and align guiderail marker signs. **Element Data** Element Group: Approaches Length: Element Name: Wearing Surface Width: Location: Each End Height: Surface Treatment Material: Count: Element Type: Total Quantity: Limited Insp'n: **Environment:** Severe Protection System: None Maint. Perform. Units Exc. Good Fair Poor Deficiencies **Condition Data:** Needs 100 % Comments: The surface treatment is in good condition with minor wheel path rutting observed.

Recommended Work:

None

6-10 Years

1-5 Years

< 1 Year

Urgent



Photo 14-2: View of structure wearing surface



Photo 14-3: View of watercourse downstream



Photo 14-4: View of watercourse upstream

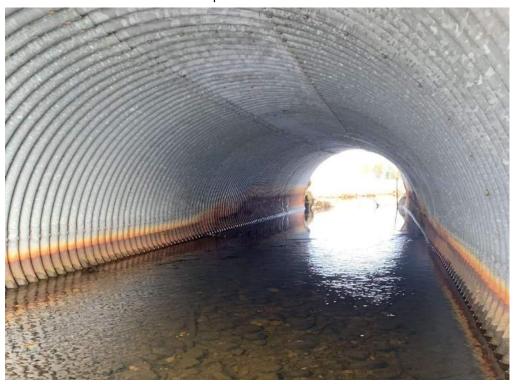


Photo 14-5: View of culvert barrel interior, obvert



Photo 14-6: View of culvert barrel interior



Photo 14-7: View of slope protection



Photo 14-8: View of barrier (typical)



Photo 14-9: View of culvert interior

Site Number 15 **Project Number** 221-12948-00 Concession 4 Culvert Municipality Northern Bruce Peninsula Structure Name 30 02 MTO Region Code County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





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| Inventory Data                         |  |   |  |
|--|--|---|--|
| Structure Name                         | Concession 4 Culvert   | Site Number   | 15   |
| County                                 | Bruce  | Road Name   | Concession 4                                     |
| Municipality                           | Northern Bruce Peninsula   | Road Type   | Rural Local                                      |
| Bridge or Culvert                      | Culvert  | Owner   | Northern Bruce Peninsula                         |
| Structure Type                         | Steel CSP (double)   | AADT  | 50   |
| Span (m)                               | 2.8, 0.9 No. 2   | % Trucks  | 10%  |
| Height (m)                             | 2.8 m, 0.6 m   | Overall Structure Width (m)   | 6 m  |
| Direction of Structure                 | East/West 45° skew   | Roadway Width (m)   | 4 + wide shoulder                                |
| Year Built/Rehabilitated               | 2014   | Total Deck Length (m)   |  |
| Current Load Limit                     | None   | Total Deck Area (s.m.)  |  |
| Detour Length (km)                     | N/A (Dead End)   | Heritage Des.   | None   |
| Waterway                               | Branch - Judges Creek  |   |  |
| Inspection Data                        |  |   |  |
| Date of Inspection                     | December 5, 2022   | Photos:<br>15-1 - Title Page  |  |
| Name of Inspector                      | Evan Montreuil, P.Eng.   | 15-2 - View of approach and   | structure wearing surface                        |
| Equipment Used                         | Tape, pick, hammer   | 15-3 - Rock protection at inlet<br>15-4 - View of west culvert er<br>15-5 - View of east culvert en | nd   |
| Weather Conditions                     | Overcast   | 15-6 - View of watercourse do   | ownstream  |
| Temperature                            | 5°C  | 15-7 - View of culvert barrel   | nterior  |
| Last Inspection                        | September 24, 2020   |   |  |
| Additional Investigation<br>Required   | None   |   |  |
| Total Rehabilitation                   | Install barrier protection and signage   | to code.  |  |
| Total Rehabilitation<br>Budget Costing | \$65,000   | Next Inspection   | December 2024                                    |
| Justification                          | Install barrier and approach protection to improve vehicular safety and reduce | •   | the interim, reduce the posted speed to 35 km/hr |

| Element Group:  | Decks                | ;                | Length:            |              |              |                          |                 |  |
|---|----------------------|------------------|--------------------|--------------|--------------|--------------------------|-----------------|--|
| Element Name:   | Wearing Sเ           | ırface           | Width:             |              |              |                          |                 |  |
| Location:   |                      |                  | Height:            |              |              |                          |                 |  |
| Material:   | Grave                | Gravel Co        |                    |              |              |                          |                 |  |
| Element Type:   |                      |                  | Total Quantity:    |              |              |                          |                 |  |
| Environment:  | Severe               | 9                | Limited Insp'n:    |              |              |                          |                 |  |
| Protection System:  |                      | Wearing Surface  |                    |              |              |                          |                 |  |
| Condition Data:   | Units                | Exc.             | Good               | Fair         | Poor         | Perform.<br>Deficiencies | Maint.<br>Needs |  |
|   | %                    |                  |                    | 100          |              | Yes                      | Yes             |  |
| Comments:   | The granular wearing | surface is uneve | en and requires gr | rading to ac | chieve drain | iage.                    |                 |  |
| Comments: The granular wearing surface is uneven and requires grading to achieve drainage.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Grade annually and clear vegetation from shoulders. |                      |                  |                    |              |              |                          |                 |  |

#### **Element Data**

| Element Group:   | Barrie     | r                | Length:         |      |      |                     |        |  |  |
|--|------------|------------------|-----------------|------|------|---------------------|--------|--|--|
| Element Name:  | Railing Sy | Railing System V |                 |      |      |                     |        |  |  |
| Location:  | Each Si    | Each Side H      |                 |      |      |                     |        |  |  |
| Material:  | Concre     | Concrete Co      |                 |      |      |                     |        |  |  |
| Element Type:  |            |                  | Total Quantity: |      |      |                     |        |  |  |
| Environment:   | Severe     | 9                | Limited Insp'n: |      |      |                     |        |  |  |
| Protection System:   |            | None             |                 |      |      |                     |        |  |  |
| Condition Data:  | Units      | Exc.             | Good            | Fair | Poor | Perform.            | Maint. |  |  |
|  | %          |                  |                 |      |      | Deficiencies<br>Yes | Needs  |  |  |
| Comments:  |            |                  | •               | •    | •    |                     |        |  |  |
| Pacammandad Work: None 6.10 Vegrs 1.5 Vegrs < 1 Vegr Urgent  |            |                  |                 |      |      |                     |        |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Install barrier protection to Code to provide required vehicle safety. |            |                  |                 |      |      |                     |        |  |  |

| Element Group:   | Culvert                           | ts                               | Length:                  |          |        |                       |                 |  |
|--|-----------------------------------|----------------------------------|--------------------------|----------|--------|-----------------------|-----------------|--|
| Element Name:  | Inlet Comp                        | onent                            | Width:                   |          |        |                       |                 |  |
| Location:  | East Er                           | nd                               | Height:                  |          |        |                       |                 |  |
| Material:  | Stone and Earth Co                |                                  | Count:                   |          |        |                       |                 |  |
| Element Type:  |                                   |                                  | Total Quantity:          |          |        |                       |                 |  |
| Environment:   | Moderate Li                       |                                  | Limited Insp'n:          |          |        |                       |                 |  |
| Protection System:   |                                   | None                             |                          |          |        |                       |                 |  |
| Condition Data:  | Units                             | Exc.                             | Good                     | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |
|  | %                                 |                                  | 100                      |          |        |                       |                 |  |
| Comments: The low level CSP pipe culvert is partilly submerged underwater. There is some observed erosion of the embankments at the culvert inlet. |                                   |                                  |                          |          |        |                       |                 |  |
| Recommended Wor  | rk: None<br>Repair erosion and ac | 6-10 Years<br>ld rip-rap slope բ | 1-5 Years<br>protection. | < 1 Year | Urgent |                       |                 |  |

#### Structure: **Element Data** 15 Element Group: Culverts Length: Element Name: **Outlet Components** Width: Location: West End Height: Stone and Earth Material: Count: Element Type: Total Quantity: Environment: Moderate Limited Insp'n: Yes Protection System: None Perform. Maint. Units Exc. Good Poor Fair **Condition Data: Deficiencies** Needs % 100 Comments: The low level CSP pipe culvert is partially submerged underwater. **Recommended Work:** None 6-10 Years 1-5 Years < 1 Year Urgent

#### **Element Data**

| Element Group:     | Culvert                 |            | Length:         |          |        |                          |                 |  |  |
|--------------------|-------------------------|------------|-----------------|----------|--------|--------------------------|-----------------|--|--|
| Element Name:      | Barrel                  |            | Width:          |          |        |                          |                 |  |  |
| Location:          |                         |            | Height:         |          |        |                          |                 |  |  |
| Material:          | Steel                   |            | Count:          |          |        |                          |                 |  |  |
| Element Type:      | Pipe Arch               |            | Total Quantity: |          |        |                          |                 |  |  |
| Environment:       | Moderate                |            | Limited Insp'n: |          | Yes    |                          |                 |  |  |
| Protection System: |                         | Galvanized |                 |          |        |                          |                 |  |  |
| Condition Data:    | Units                   | Exc.       | Good            | Fair     | Poor   | Perform.<br>Deficiencies | Maint.<br>Needs |  |  |
|                    | %                       |            | 100             |          |        |                          |                 |  |  |
| Comments:          | Low level culvert under | er water.  | -               | -        |        | -                        |                 |  |  |
| Recommended Wor    | k: None                 | 6-10 Years | 1-5 Years       | < 1 Year | Urgent |                          |                 |  |  |

| Element Group:     | Embankments &  | Streams     | Length:         |          |        | •                        |                 |  |  |
|--------------------|----------------|-------------|-----------------|----------|--------|--------------------------|-----------------|--|--|
| Element Name:      | Streams and Wa | aterways    | Width:          |          |        |                          |                 |  |  |
| Location:          |                |             |                 |          |        |                          |                 |  |  |
| Material:          | Earth/Sto      | Earth/Stone |                 |          |        |                          |                 |  |  |
| Element Type:      |                |             | Total Quantity: |          |        |                          |                 |  |  |
| Environment:       | Moderat        | Moderate    |                 |          |        |                          |                 |  |  |
| Protection System: |                | None        |                 |          |        |                          |                 |  |  |
| Condition Data:    | Units          | Exc.        | Good            | Fair     | Poor   | Perform.<br>Deficiencies | Maint.<br>Needs |  |  |
|                    | %              |             | 100             |          |        |                          |                 |  |  |
| Comments:          |                |             |                 |          |        |                          |                 |  |  |
| Recommended Worl   | k: None        | 6-10 Years  | 1-5 Years       | < 1 Year | Urgent |                          |                 |  |  |

#### **Element Data** Structure: 15 Element Group: Embankments & Streams Length: Element Name: **Embankments** Width: Location: **Each Corner** Height: Material: Earth/Stone Count: 4 Element Type: Total Quantity: 4 Moderate Environment: Limited Insp'n: Protection System: None Perform. Maint. Units Fair Good Poor Exc. **Condition Data: Deficiencies** Needs Each Comments: The slopes are partially vegetated with some rock protection. Rock protection has been placed at the inlet end. Embankments appear stable. None Recommended Work: 6-10 Years 1-5 Years < 1 Year Urgent **Element Data** Element Group: Signs Length: Width: Element Name: Signs Location: Height: Material: Steel Count: Element Type: Total Quantity: Environment: Severe Limited Insp'n: Protection System: Paint Perform. Maint. Units Fair Poor Exc. Good **Condition Data:** Deficiencies Needs Each Yes Yes Comments: There are no End Hazard signs currently in place. Recommended Work: 6-10 Years 1-5 Years < 1 Year Urgent None Install end hazard signs. **Element Data** Element Group: Approaches Length: Element Name: Wearing Surface Width: Location: Each End Height: Material: Gravel Count: Element Type: Total Quantity: Environment: Severe Limited Insp'n: Protection System: None Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs

100

1-5 Years

< 1 Year

Urgent

The granular wearing surface is uneven and requires grading to achieve drainage.

6-10 Years

Grade annually and clear vegetation from shoulders.

Yes

Yes

%

None

Comments:

Recommended Work:



Photo 15-2: View of approach and structure wearing surface



Photo 15-3: Rock protection at inlet end



Photo 15-4: View of west culvert end



Photo 15-5: View of east culvert end



Photo 15-6: View of watercourse downstream



Photo 15-7: View of culvert barrel interior

Site Number 16 **Project Number** 221-12948-00 Barrow Bay Road Culvert Municipality Northern Bruce Peninsula **Structure Name** 30 02 **MTO Region Code** County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





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| Inventory Data                         |  |   |  |  |  |  |
|--|--|---|--|--|--|--|
| Structure Name                         | Barrow Bay Road Culvert                                | Site Number   | 16                                       |  |  |  |
| County                                 | Bruce  | Road Name   | Barrow Bay Road                          |  |  |  |
| Municipality                           | Northern Bruce Peninsula                               | Road Type   | Rural Coll.                              |  |  |  |
| Bridge or Culvert                      | Culvert  | Owner   | Northern Bruce Peninsula                 |  |  |  |
| Structure Type                         | Steel - SP - CSP - PA multi-plate                      | AADT  | 350                                      |  |  |  |
| Span (m)                               | 7 No. 1  | % Trucks  | 15%                                      |  |  |  |
| Height (m)                             | 3.8  | Overall Structure Width (m)   | 21.8                                     |  |  |  |
| Direction of Structure                 | North/South  | Roadway Width (m)   | 6.1                                      |  |  |  |
| Year Built/Rehabilitated               | 1980   | Total Deck Length (m)   | 7  |  |  |  |
| Current Load Limit                     | None   | Total Deck Area (s.m.)  | N/A                                      |  |  |  |
| Detour Length (km)                     | 6  | Heritage Des.   | None                                     |  |  |  |
| Waterway                               | Judges Creek   |   |  |  |  |  |
| Inspection Data                        |  |   |  |  |  |  |
| Date of Inspection                     | December 5, 2022                                       | Photos:<br>16-1 - Title Page - Upstream e   | levation                                 |  |  |  |
| Name of Inspector                      | Evan Montreuil, P.Eng.                                 | 16-2 - View of culvert barrel in  | culvert barrel in elevation (outlet end) |  |  |  |
| Equipment Used                         | Tape, pick, hammer                                     | 16-3 - View of culvert barrel in elevation (intlet end) 16-4 - View of watercourse upstream |  |  |  |  |
| Weather Conditions                     | Overcast   | 16-6 - Culvert barrel interior  |  |  |  |  |
| Temperature                            | 5°C  | 16-7 - View of structure from a 16-8 - Loose cable on barrier p                             |  |  |  |  |
| Special Notes                          | November 12, 2020                                      | 16-9 - Wooden post (typical)  |  |  |  |  |
| Additional Investigation<br>Required   |  | None  |  |  |  |  |
| Total Rehabilitation                   | Place erosion protection at south slope,               | replace rotten barrier and repair c   | able.                                    |  |  |  |
| Total Rehabilitation<br>Budget Costing | \$9,000  | Next Inspection   | December 2024                            |  |  |  |
| Justification                          | Due to the good condition of this struct service life. | ure, improvements are recommend   | ded to maximise the safe                 |  |  |  |

| Element Group:   | Decks               |              | Length:          |             |            |                       |                 |  |
|--|---------------------|--------------|------------------|-------------|------------|-----------------------|-----------------|--|
| Element Name:  | Wearing Su          | rface        | Width:           |             |            |                       |                 |  |
| Location:  |                     |              | Height:          |             |            |                       |                 |  |
| Material:  | Surface Treatment C |              | Count:           |             |            |                       |                 |  |
| Element Type:  |                     |              | Total Quantity:  |             |            |                       |                 |  |
| Environment:   | Severe              |              | Limited Insp'n:  |             |            |                       |                 |  |
| Protection System:   | None                |              |                  |             |            |                       |                 |  |
| Condition Data:  | Units               | Exc.         | Good             | Fair        | Poor       | Perform. Deficiencies | Maint.<br>Needs |  |
|  | %                   |              | 85               | 10          | 5          |                       |                 |  |
| Comments:  | Some minor cracking | was observed | on shoulders. Mo | derate crac | ks on sout | h shoulder.           |                 |  |
| Comments: Some minor cracking was observed on shoulders. Moderate cracks on south shoulder.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                     |              |                  |             |            |                       |                 |  |

#### **Element Data**

| Element Group:   | Barriers    |        | Length:         |                    |      |                       |                 |
|--|-------------|--------|-----------------|--------------------|------|-----------------------|-----------------|
| Element Name:  | Barrier     |        | Width:          |                    |      |                       |                 |
| Location:  | Each Side   |        | Height:         |                    |      |                       |                 |
| Material:  | Steel/Wood  |        | Count:          | 20 posts - 3 cable |      |                       |                 |
| Element Type:  | 3-Cable Gui | derail | Total Quantity: |                    |      |                       |                 |
| Environment:   | Severe      |        | Limited Insp'n: |                    |      |                       |                 |
| Protection System:   | None        |        |                 |                    |      |                       |                 |
| Condition Data:  | Units       | Exc.   | Good            | Fair               | Poor | Perform. Deficiencies | Maint.<br>Needs |
|  | Ea.         |        | 20              |                    |      | Yes                   | Yes             |
| Comments: The three cable guide barrier is in fair overall condition. Some of the wooden posts are experiencing moderate rot and should be replaced for vehicle safety. Loose cable on south side. |             |        |                 |                    |      |                       |                 |
| Recommended Work: None 6-10 Years 1-5 Years <a href="#">&lt; 1 Year</a> Urgent Replace the rotten barrier posts. Re-attach and tighten loose cables.   |             |        |                 |                    |      |                       |                 |

| Culverts                          |                              | Length:  |  |  |   |   |
|-----------------------------------|------------------------------|--|--|--|---|---|
| Inlet Component                   |                              | Width:   |  |  |   |   |
| South Er                          | nd                           | Height:  |  |  |   |   |
| Stone                             | Stone                        |  |  |  |   |   |
| Stone Head                        | Stone Head Wall              |  |  |  |   |   |
| Moderat                           | Moderate                     |  |  |  |   |   |
| None                              |                              |  |  |  |   |   |
| Units                             | Exc.                         | Good   | Fair   | Poor   | Perform. Deficiencies   | Maint.<br>Needs   |
| %                                 |                              | 50   | 40   | 10   | Yes   | Yes   |
| Some erosion was ob               | served under t               | he large block sto   | ones protec  | ting the so  | uth slope.  |   |
| :: None<br>Place additional stone | 6-10 Years<br>blocks and rip | 1-5 Years<br>o-rap. Remove the   | < 1 Year<br>e debris at t  | Urgent<br>he inlet.  |   |   |
|                                   | Inlet Compo                  | South End Stone Stone Head Wall Moderate  Units Exc. % Some erosion was observed under to the stone of the st | Inlet Component  South End  Stone  Count:  Stone Head Wall  Moderate  Units  Exc.  Good  %  Some erosion was observed under the large block store  None  Index Component  Width:  Height:  Count:  Total Quantity:  Limited Insp'n:  None  None  1-5 Years | Inlet Component Width: South End Height: Stone Count: Stone Head Wall Total Quantity: Moderate Limited Insp'n: None Units Exc. Good Fair % 50 40 Some erosion was observed under the large block stones protect:  None 6-10 Years 1-5 Years < 1 Year | Inlet Component Width: South End Height: Stone Count: Stone Head Wall Total Quantity: Moderate Limited Insp'n: None Units Exc. Good Fair Poor % 50 40 10 Some erosion was observed under the large block stones protecting the so | Inlet Component  South End  Stone  Count:  Stone Head Wall  Total Quantity:  Moderate  Limited Insp'n:  None  Units  Exc.  Good  Fair  Poor  Perform.  Deficiencies  %  50  40  10  Yes  Some erosion was observed under the large block stones protecting the south slope. |

| Element Group:     | Culverts              |                 | Length:         |          |        |                          |                 |
|--------------------|-----------------------|-----------------|-----------------|----------|--------|--------------------------|-----------------|
| Element Name:      | Outlet Components     |                 | Width:          |          |        |                          |                 |
| Location:          | North En              | ıd              | Height:         |          |        |                          |                 |
| Material:          | Stone/Rip-Rap         | o/Earth         | Count:          |          |        |                          |                 |
| Element Type:      |                       |                 | Total Quantity: |          |        |                          |                 |
| Environment:       | Moderat               | е               | Limited Insp'n: |          |        |                          |                 |
| Protection System: | None                  |                 |                 |          |        |                          |                 |
| Condition Data:    | Units                 | Exc.            | Good            | Fair     | Poor   | Perform.<br>Deficiencies | Maint.<br>Needs |
|                    | %                     |                 |                 | 100      |        |                          |                 |
| Comments:          | The outlet slopes are | very steep, but | appear stable.  |          |        |                          |                 |
| Recommended World  | k: None               | 6-10 Years      | 1-5 Years       | < 1 Year | Urgent |                          |                 |

#### **Element Data**

| Element Group:   | Culvert    |            | Length:         |          |        |                       |                 |
|--|------------|------------|-----------------|----------|--------|-----------------------|-----------------|
| Element Name:  | Barrel     |            | Width:          |          |        |                       |                 |
| Location:  |            |            | Height:         |          |        |                       |                 |
| Material:  | Steel      |            | Count:          |          |        |                       |                 |
| Element Type:  | Pipe Arc   | h          | Total Quantity: |          |        |                       |                 |
| Environment:   | Moderat    | е          | Limited Insp'n: |          |        |                       |                 |
| Protection System:   | Galvanized |            |                 |          |        |                       |                 |
| Condition Data:  | Units      | Exc.       | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |
|  | %          |            |                 | 100      |        |                       |                 |
| Comments: Corrosion and swelling were observed at water level. No section loss. Monitor the corrosion. |            |            |                 |          |        |                       |                 |
| Recommended Wor  | k: None    | 6-10 Years | 1-5 Years       | < 1 Year | Urgent |                       |                 |

| Element Group:     | Foundation                    |                  | Length:              |              |            | •                     |                 |  |
|--------------------|-------------------------------|------------------|----------------------|--------------|------------|-----------------------|-----------------|--|
| Element Name:      | Foundation (below grade)      |                  | Width:               |              |            |                       |                 |  |
| Location:          |                               | , ,              |                      |              |            |                       |                 |  |
| Material:          | Stone/Gra                     | Stone/Gravel     |                      |              |            |                       |                 |  |
| Element Type:      |                               |                  | Total Quantity:      |              |            |                       |                 |  |
| Environment:       | Moderat                       | e                | Limited Insp'n:      | Yes          |            |                       |                 |  |
| Protection System: | None                          |                  |                      |              |            |                       |                 |  |
| Condition Data:    | Units                         | Exc.             | Good                 | Fair         | Poor       | Perform. Deficiencies | Maint.<br>Needs |  |
| Comments:          | The foundation is not stable. | visible for insp | ection due to high v | water level, | however th | ne structure app      | ears            |  |
| Recommended Wor    | rk: None                      | 6-10 Years       | 1-5 Years            | < 1 Year     | Urgent     |                       |                 |  |

| Element Data                |   |                  |                                |                          |                     | Structure:            | 16              |
|-----------------------------|---|------------------|--------------------------------|--------------------------|---------------------|-----------------------|-----------------|
| Element Group:              | Streams/Emba                                    | ankmente         | Length:                        |                          |                     |                       |                 |
| Element Name:               | Streams and Waterways                           |                  | Width:                         |                          |                     |                       |                 |
| Location:                   | Circuitis and Waterways                         |                  | Height:                        |                          |                     |                       |                 |
| Material:                   | Earth   |                  | Count:                         |                          |                     |                       |                 |
| Element Type:               | Editii  |                  | Total Quantity:                |                          |                     |                       |                 |
| Environment:                | Modera  | to.              | Limited Insp'n:                |                          |                     |                       |                 |
|                             | iviouera  | ile              | None                           |                          |                     |                       |                 |
| Protection System:          |   | I                | INOTIE                         | ı                        | 1                   | Perform.              | Maint.          |
| Condition Data:             | Units   | Exc.             | Good                           | Fair                     | Poor                | Deficiencies          | Needs           |
| Condition Data.             | %   |                  |                                | 100                      |                     | Deliciencies          | iveeus          |
| Comments:                   | 70  |                  |                                | 100                      |                     |                       |                 |
| Recommended Work            | K: None   | ] 6-10 Years     | 1-5 Years                      | < 1 Year                 | Urgent              |                       |                 |
| Element Data                |   |                  |                                |                          |                     |                       |                 |
| Element Group:              | Streams/Emba                                    | ankments         | Length:                        |                          |                     |                       |                 |
| Element Name:               | Embankn   | nent             | Width:                         |                          |                     |                       |                 |
| Location:                   | Each Corner                                     |                  | Height:                        |                          |                     |                       |                 |
| Material:                   | Stone/Earth                                     |                  | Count:                         |                          |                     | 6                     |                 |
| Element Type:               |   |                  | Total Quantity:                |                          |                     | 6                     |                 |
| Environment:                | Modera  | te               | Limited Insp'n:                |                          |                     |                       |                 |
| Protection System:          |   |                  | None                           | 1                        |                     |                       |                 |
| Condition Data:             | Units   | Exc.             | Good                           | Fair                     | Poor                | Perform. Deficiencies | Maint.<br>Needs |
|                             | Each  |                  | 3                              | 3                        |                     | Yes                   | Yes             |
| Comments:  Recommended Work | The embankments ar  t: None Repair the embankme | 6-10 Years       | 1-5 Years                      | ] < 1 Year               | Urgent              |                       |                 |
| Element Data                |   |                  |                                | _                        |                     |                       |                 |
| Element Group:              | Approac   |                  | Length:                        |                          |                     |                       |                 |
| Element Name:               | Wearing St                                      |                  | Width:                         |                          |                     |                       |                 |
| Location:                   | Each E  |                  | Height:                        |                          |                     |                       |                 |
| Material:                   | Surface Treat                                   | atment           | Count:                         |                          |                     |                       |                 |
| Element Type:               |   |                  | Total Quantity:                |                          |                     |                       |                 |
| Environment:                | Sever   | е                | Limited Insp'n:                |                          |                     |                       |                 |
| Protection System:          |   |                  | None                           |                          |                     |                       |                 |
| Condition Data:             | Units   | Exc.             | Good                           | Fair                     | Poor                | Perform. Deficiencies | Maint.<br>Needs |
|                             | %   |                  |                                | 100                      |                     |                       |                 |
| Comments:  Recommended Work | Some minor to model each barrier end.  None     | rate cracking of | oserved along sho<br>1-5 Years | ulders and t<br>< 1 Year | ransverse<br>Urgent | cracks observed       | l near          |
|                             | . 110116  | 1 0 10 10013     | 1 0 10013                      | · i i cai                | O. gont             |                       |                 |



Photo 16-2: View of culvert barrel in elevation (outlet end)





Photo 16-4: View of watercourse upstream





Photo 16-6: Culvert barrel interior



Photo 16-7: View of structure from approach



Photo 16-8: Loose cable on barrier protection



Photo 16-9: Wooden post (typical)

Site Number 17 **Project Number** 221-12948-00 Concession 4 Culvert N. of Structure Name Municipality Northern Bruce Peninsula Barrow Bay Road **MTO Region Code** 30 County Bruce Code 33 377 **MTO District Code** Geographic Twp Code





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| Inventory Data                         |  |   |                              |
|--|--|---|------------------------------|
| Structure Name                         | Concession 4 Culvert   | Site Number   | 17                           |
| County                                 | Bruce  | Road Name   | Concession 4                 |
| Municipality                           | Northern Bruce Peninsula   | Road Type   | Rural Coll.                  |
| Bridge or Culvert                      | Culvert  | Owner   | Northern Bruce Peninsula     |
| Structure Type                         | Steel - SP - CSP - PA  | AADT  | 250                          |
| Span (m)                               | 3.6 No. 1  | % Trucks  | 15%                          |
| Height (m)                             | 2.41   | Overall Structure Width (m)   | 18.4                         |
| Direction of Structure                 | East/West  | Roadway Width (m)   | 5.8                          |
| Year Built/Rehabilitated               | 1985   | Total Deck Length (m)   | 3.8                          |
| Current Load Limit                     | None   | Total Deck Area (s.m.)  | N/A                          |
| Detour Length (km)                     | 6  | Heritage Des.   | None                         |
| Waterway                               | Branch Judges Creek  |   |                              |
| Inspection Data                        |  |   |                              |
| Date of Inspection                     | December 5, 2022   | Photos:<br>17-1 - Title Page  |                              |
| Name of Inspector                      | Evan Montreuil, P.Eng.   | 17-2 - View of structure and a  |                              |
| Equipment Used                         | Tape, pick, hammer   | 17-3 - View of watercourse up<br>17-4 - View of watercourse do<br>end<br>17-5 - View of culvert in elev | ownstream and outlet culvert |
| Weather Conditions                     | Overcast   | 17-6 - View of embankment<br>17-7 - View of culvert barrel  | •                            |
| Temperature                            | 5°C  | 17-7 - View of earvert barrer   | interior                     |
| Last Inspection                        | September 24, 2020   |   |                              |
| Additional Investigation<br>Required   |  | None  |                              |
| Total Rehabilitation                   | Install barrier and approach protectio (35 km/hr). Place rip-rap slope prote | 9   | s and speed reduction signs  |
| Total Rehabilitation<br>Budget Costing | \$65,000   | Next Inspection   | December 2024                |
| Justification                          | Due to good condition, rehabilitation and approach protection. Maintain p    |   |                              |

| Element Group:     | Decks                 |              | Length:           |                |             |                       |                 |  |  |  |
|--------------------|-----------------------|--------------|-------------------|----------------|-------------|-----------------------|-----------------|--|--|--|
| Element Name:      | Wearing Sui           | face         | Width:            |                |             |                       |                 |  |  |  |
| Location:          |                       |              | Height:           |                |             |                       |                 |  |  |  |
| Material:          | Gravel                |              | Count:            |                |             |                       |                 |  |  |  |
| Element Type:      |                       |              | Total Quantity:   |                |             |                       |                 |  |  |  |
| Environment:       | Severe                |              | Limited Insp'n:   |                |             |                       |                 |  |  |  |
| Protection System: |                       | None         |                   |                |             |                       |                 |  |  |  |
| Condition Data:    | Units                 | Exc.         | Good              | Fair           | Poor        | Perform. Deficiencies | Maint.<br>Needs |  |  |  |
|                    | %                     |              |                   | 85             | 15          | Yes                   | Yes             |  |  |  |
| Comments:          | Some wheel path rutti | ng was obser | ved. Grade the we | earing surface | e annually. |                       |                 |  |  |  |
| Recommended Wo     | 1-5 Years<br>/.       | < 1 Year     | Urgent            |                |             |                       |                 |  |  |  |

#### Element Data

| Element Group:  | Barriers              |      | Length:         |      |      |                       |                 |
|---|-----------------------|------|-----------------|------|------|-----------------------|-----------------|
| Element Name:   | Barrier               |      | Width:          |      |      |                       |                 |
| Location:   | Each Side             |      | Height:         |      |      |                       |                 |
| Material:   |                       |      | Count:          |      |      |                       |                 |
| Element Type:   |                       |      | Total Quantity: |      |      |                       |                 |
| Environment:  | Severe                |      | Limited Insp'n: |      |      |                       |                 |
| Protection System:  |                       |      | None            |      |      |                       |                 |
| Condition Data:   | Units                 | Exc. | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |
|   | %                     |      |                 |      |      | Yes                   |                 |
| Comments:   | No barrier protection |      |                 | •    |      |                       |                 |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Install barrier to provide vehicle safety |                       |      |                 |      |      |                       |                 |

| Element Group:          | Culverts                            | ;                                    | Length:         |          |        |                       |                 |  |  |
|-------------------------|-------------------------------------|--------------------------------------|-----------------|----------|--------|-----------------------|-----------------|--|--|
| Element Name:           | Inlet Compo                         | nent                                 | Width:          |          |        |                       |                 |  |  |
| Location:               | End                                 | End H                                |                 |          |        |                       |                 |  |  |
| Material:               | Stone and E                         | Stone and Earth C                    |                 |          |        |                       |                 |  |  |
| Element Type:           | Stone Head Wall and                 | Stone Head Wall and Steel Culvert To |                 |          |        |                       |                 |  |  |
| Environment:            | Moderat                             | е                                    | Limited Insp'n: |          |        |                       |                 |  |  |
| Protection System:      |                                     | None                                 |                 |          |        |                       |                 |  |  |
| Condition Data:         | Units                               | Exc.                                 | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |  |
|                         | %                                   |                                      |                 | 100      |        |                       | Yes             |  |  |
| Comments:               | Minor erosion at corne              | ers.                                 |                 |          |        |                       |                 |  |  |
| De a servicio de di Mas |                                     | C 40 Va ava                          | 1 5 Vaara       | 44 Vaan  | Lumant |                       |                 |  |  |
| Recommended Wo          | ork: None<br>Place rip-rap slope pr | 6-10 Years                           | 1-5 Years       | < 1 Year | Urgent |                       |                 |  |  |

| Element Group:     | Culve                                      | rts                     | Length:         |            |        |                          |                 |
|--------------------|--|-------------------------|-----------------|------------|--------|--------------------------|-----------------|
| Element Name:      | Outlet Comp                                | oonents                 | Width:          |            |        |                          |                 |
| Location:          | West End                                   |                         | Height:         |            |        |                          |                 |
| Material:          | Stone and                                  | Earth                   | Count:          |            |        |                          |                 |
| Element Type:      | Stone and Ste                              | el Culvert              | Total Quantity: |            |        |                          |                 |
| Environment:       | Modera                                     | Moderate                |                 |            |        |                          |                 |
| Protection System: |  |                         | None            |            |        |                          |                 |
| Condition Data:    | Units                                      | Exc.                    | Good            | Fair       | Poor   | Perform.<br>Deficiencies | Maint.<br>Needs |
|                    | %  |                         |                 | 100        |        |                          | Yes             |
| Comments:          | Minor erosion at corne                     | ers.                    |                 | •          | •      |                          |                 |
| Recommended Wo     | <b>rk:</b> None<br>Place rip-rap slope pro | 6-10 Years<br>otection. | 1-5 Years       | ] < 1 Year | Urgent |                          |                 |

#### **Element Data**

| Element Group:     | Culve                 | rt                 | Length:         |          |        |                       |                 |
|--------------------|-----------------------|--------------------|-----------------|----------|--------|-----------------------|-----------------|
| Element Name:      | Barre                 | el                 | Width:          |          |        |                       |                 |
| Location:          |                       | ŀ                  |                 |          |        |                       |                 |
| Material:          | Stee                  |                    | Count:          |          |        |                       |                 |
| Element Type:      | Pipe A                | rch                | Total Quantity: |          |        |                       |                 |
| Environment:       | Modera                | Moderate L         |                 |          |        |                       |                 |
| Protection System: |                       |                    | Galvanize       | d        |        |                       |                 |
| Condition Data:    | Units                 | Exc.               | Good            | Fair     | Poor   | Perform. Deficiencies | Maint.<br>Needs |
|                    | %                     |                    | 50              | 50       |        |                       |                 |
| Comments:          | The west side has a s | light deformation. | •               | •        |        |                       |                 |
| Recommended Wo     | rk: None              | 6-10 Years         | 1-5 Years       | < 1 Year | Urgent |                       |                 |

| Element Group:            | Founda                         | tion                               | Length:           |              |                        |                          |                 |
|---------------------------|--------------------------------|------------------------------------|-------------------|--------------|------------------------|--------------------------|-----------------|
| Element Name:             | Foundation (be                 | low grade)                         | Width:            |              |                        |                          |                 |
| Location:                 |                                |                                    | Height:           |              |                        |                          |                 |
| Material:                 | Stone/Gi                       | avel                               | Count:            |              |                        |                          |                 |
| Element Type:             |                                |                                    | Total Quantity:   |              |                        |                          |                 |
| Environment:              | Modera                         | Limited Insp'n:                    |                   |              | Yes                    |                          |                 |
| Protection System:        |                                |                                    | None              |              |                        |                          |                 |
| Condition Data:           | Units                          | Exc.                               | Good              | Fair         | Poor                   | Perform.<br>Deficiencies | Maint.<br>Needs |
| Comments:  Recommended Wo | The foundation is not rk: None | visible for inspecti<br>6-10 Years | on, however the o | culvert appe | ears stable.<br>Urgent |                          |                 |

#### **Element Data** Structure: 17 Element Group: Streams/Embankments Length: Element Name: Streams and Waterways Width: Location: Height: Material: Count: Element Type: Total Quantity: Environment: Moderate Limited Insp'n: Protection System: None Perform. Maint. Good Units Exc. Fair Poor **Condition Data:** Deficiencies Needs % 50 50 Comments: Some silt deposits (outlet). 6-10 Years **Recommended Work:** None 1-5 Years Urgent < 1 Year **Element Data** Element Group: Streams/Embankments Length: Element Name: Embankment Width: Location: Each Corner Height: Material: Count: Element Type: Total Quantity: Environment: Limited Insp'n: Protection System: None Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs

50

50

#### **Comments:** Heavily vegetated with minor signs of erosion.

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent

| Element Group:  | Signs       |      | Length:         |      |      |                          |                 |  |  |
|---|-------------|------|-----------------|------|------|--------------------------|-----------------|--|--|
| Element Name:   | Signs       |      | Width:          |      |      |                          |                 |  |  |
| Location:   | Each Corner |      | Height:         |      |      |                          |                 |  |  |
| Material:   |             |      | Count:          |      |      |                          |                 |  |  |
| Element Type:   |             |      | Total Quantity: |      |      |                          |                 |  |  |
| Environment:  | Severe      | )    | Limited Insp'n: |      |      |                          |                 |  |  |
| Protection System:  |             | None |                 |      |      |                          |                 |  |  |
| Condition Data:   | Units       | Exc. | Good            | Fair | Poor | Perform.<br>Deficiencies | Maint.<br>Needs |  |  |
|   | Each        |      |                 |      |      | Yes                      |                 |  |  |
| Comments: No signs present at the time of the inspection.   |             |      |                 |      |      |                          |                 |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Install end hazard signs and speed limit signs prior to guiderail protection placement. |             |      |                 |      |      |                          |                 |  |  |

| Element Group:     | Approache                        | es                         | Length:                    |              |            |               |        |  |  |
|--------------------|----------------------------------|----------------------------|----------------------------|--------------|------------|---------------|--------|--|--|
| Element Name:      | Wearing Sur                      | face                       | Width:                     |              |            |               |        |  |  |
| Location:          | Each End                         | Each End H                 |                            |              |            |               |        |  |  |
| Material:          | Gravel                           |                            | Count:                     |              |            |               |        |  |  |
| Element Type:      |                                  |                            | Total Quantity:            |              |            |               |        |  |  |
| Environment:       | Severe                           |                            | Limited Insp'n:            |              |            |               |        |  |  |
| Protection System: |                                  | None                       |                            |              |            |               |        |  |  |
| _                  | Units                            | Exc.                       | Good                       | Fair         | Poor       | Perform.      | Maint. |  |  |
| Condition Data:    |                                  |                            |                            | 1 411        | 1 001      | Deficiencies  | Needs  |  |  |
|                    | %                                |                            | 100                        |              |            |               | Yes    |  |  |
| Comments:          | At the time of inspecti grading. | on, the weari              | ng surface was in o        | overall good | condition. | Continue annu | al     |  |  |
| Recommended Work:  | None<br>Continue annual main     | 6-10 Years<br>tenance (ann | 1-5 Years<br>ual grading). | < 1 Year     | Urgent     |               |        |  |  |



Photo 17-2: View of structure and approach wearing surface



Photo 17-3: View of watercourse upstream



Photo 17-4: View of watercourse downstream and outlet culvert end



Photo 17-5: View of culvert in elevation and inlet components



Photo 17-6: View of embankment



Photo 17-7: View of culvert barrel interior

# **Bridge/Culvert Inspection Report**

Site Number 18 **Project Number** 221-12948-00 10th Sideroad Culvert Municipality Northern Bruce Peninsula Structure Name 30 02 **MTO Region Code** County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





1450 - 1st Avenue West, Suite 101 Owen Sound, Ontario N4K 6W2 Tel: 519-376-7612 Fax: 519-376-8008 Website: www.wspgroup.com

## Bridge/Culvert Inspection Report

| <b>Inventory Data</b>                  |  |  |                          |  |  |  |  |  |  |
|--|--|--|--------------------------|--|--|--|--|--|--|
| Structure Name                         | 10th Sideroad Culvert  | Site Number  | 18                       |  |  |  |  |  |  |
| County                                 | Bruce  | Road Name  | 10th Sideroad            |  |  |  |  |  |  |
| Municipality                           | Northern Bruce Peninsula   | Road Type  | Rural Local              |  |  |  |  |  |  |
| Bridge or Culvert                      | Culvert  | Owner  | Northern Bruce Peninsula |  |  |  |  |  |  |
| Structure Type                         | Twin Steel - CSP   | AADT   | 150                      |  |  |  |  |  |  |
| Span (m)                               | 1.5 No. 2  | % Trucks   | 15%                      |  |  |  |  |  |  |
| Height (m)                             | 1.5  | Overall Structure Width (m)  | 11.1                     |  |  |  |  |  |  |
| Direction of Structure                 | North/South  | Roadway Width (m)  | 4.6                      |  |  |  |  |  |  |
| Year Built/Rehabilitated               | 1990   | Total Deck Length (m)  | 3.6                      |  |  |  |  |  |  |
| Current Load Limit                     | None   | Total Deck Area (s.m.)   | 40                       |  |  |  |  |  |  |
| Detour Length (km)                     | 6  | Heritage Des.  | None                     |  |  |  |  |  |  |
| Waterway                               | Branch Judges Creek  |  |                          |  |  |  |  |  |  |
| Inspection Data                        |  |  |                          |  |  |  |  |  |  |
| Date of Inspection                     | December 5, 2022   | Photos:  |                          |  |  |  |  |  |  |
| Name of Inspector                      | Evan Montreuil, P.Eng.   | 18-1 - Title Page 18-2 - View of structure wearing surface   |                          |  |  |  |  |  |  |
| Equipment Used                         | Tape, pick, hammer   | 18-3 - View of culvert in elever<br>components<br>18-4 - View of watercourse up<br>18-5 - View of watercourse do | ostream and inlet ends   |  |  |  |  |  |  |
| Weather Conditions                     | Overcast   | ends<br>18-6 - View of erosion of emb<br>18-7 - Erosion at the haunch of   |                          |  |  |  |  |  |  |
| Temperature                            | 5°C  | 18-8 - View of east culvert ba<br>18-9 - View of west culvert ba   | rrel interior            |  |  |  |  |  |  |
| Last Inspection                        | September 24, 2020   | 10 % Yiew of west current of   | arrel merior             |  |  |  |  |  |  |
| Additional Investigation<br>Required   |  | None   |                          |  |  |  |  |  |  |
| Total Rehabilitation                   | Install approach and barrier protection shrinkable fill in the armourstone voi   |  | tion and place non-      |  |  |  |  |  |  |
| Total Rehabilitation<br>Budget Costing | \$70,000   | Next Inspection  | December 2024            |  |  |  |  |  |  |
| Justification                          | Repair and install approach/barrier protection recommended due to current good condition to extend the safe service life of the structure. Maintain posted speed of 35 km/hr. until approach/barrier protection is installed. Install end hazard signs and repair erosion at both inlet and outlet ends. |  |                          |  |  |  |  |  |  |

| Element Group:     | Decks                                  |                              | Length:              |             |          |                          |                 |  |  |
|--------------------|--|------------------------------|----------------------|-------------|----------|--------------------------|-----------------|--|--|
| Element Name:      | Wearing Sur                            | face                         | Width:               |             |          |                          |                 |  |  |
| Location:          |  |                              | Height:              |             |          |                          |                 |  |  |
| Material:          | Gravel                                 |                              | Count:               |             |          |                          |                 |  |  |
| Element Type:      |  |                              | Total Quantity:      |             |          |                          |                 |  |  |
| Environment:       | Severe                                 |                              | Limited Insp'n:      |             |          |                          |                 |  |  |
| Protection System: |  | None                         |                      |             |          |                          |                 |  |  |
| Condition Data:    | Units                                  | Exc.                         | Good                 | Fair        | Poor     | Perform.<br>Deficiencies | Maint.<br>Needs |  |  |
|                    | %                                      |                              |                      | 100         |          |                          | Yes             |  |  |
| Comments:          | Minor wheel path rutti                 | ng and beginn                | ing stages of pot ho | oles were o | bserved. |                          |                 |  |  |
| Recommended Wor    | <b>k:</b> None<br>Grade the wearing su | 6-10 Years<br>rface annually | 1-5 Years            | < 1 Year    | Urgent   |                          |                 |  |  |

#### **Element Data**

| Element Group:     | Culverts   | 3          | Length:         |              |             | ·                     |                 |  |  |
|--------------------|--|------------|-----------------|--------------|-------------|-----------------------|-----------------|--|--|
| Element Name:      | Inlet Compo  | nent       | Width:          |              |             |                       |                 |  |  |
| Location:          | South End  |            | Height:         |              |             |                       |                 |  |  |
| Material:          | Stone and Ri                                       | p-Rap      | Count:          |              |             |                       |                 |  |  |
| Element Type:      |  |            | Total Quantity: |              |             |                       |                 |  |  |
| Environment:       | Moderat  | е          | Limited Insp'n: |              |             |                       |                 |  |  |
| Protection System: |  | None       |                 |              |             |                       |                 |  |  |
| Condition Data:    | Units  | Exc.       | Good            | Fair         | Poor        | Perform. Deficiencies | Maint.<br>Needs |  |  |
|                    | %  |            |                 | 80           | 20          | Yes                   | Yes             |  |  |
| Comments:          | Erosion was observed the barrel at the wate        |            |                 | t corner. Th | ere is obse | rved medium c         | orrosion of     |  |  |
| Recommended Wo     |  | 6-10 Years |                 | < 1 Year     | Urgent      |                       |                 |  |  |
|                    | Repair erosion and place rip rap slope protection. |            |                 |              |             |                       |                 |  |  |

| Element Group:  | Culverts                          | 3                          | Length:                          |                       |        |                       |                 |  |  |
|---|-----------------------------------|----------------------------|----------------------------------|-----------------------|--------|-----------------------|-----------------|--|--|
| Element Name:   | Outlet Compo                      | nents                      | Width:                           |                       |        |                       |                 |  |  |
| Location:   | North End                         |                            | Height:                          |                       |        |                       |                 |  |  |
| Material:   | Stone and Ri                      | p-Rap                      | Count:                           |                       |        |                       |                 |  |  |
| Element Type:   |                                   |                            | Total Quantity:                  |                       |        |                       |                 |  |  |
| Environment:  | Moderat                           | е                          | Limited Insp'n:                  |                       |        |                       |                 |  |  |
| Protection System:  |                                   |                            | None                             | •                     |        |                       |                 |  |  |
| Condition Data:   | Units                             | Exc.                       | Good                             | Fair                  | Poor   | Perform. Deficiencies | Maint.<br>Needs |  |  |
|   | %                                 |                            |                                  | 80                    | 20     | Yes                   |                 |  |  |
| Comments:  Large rocks (blocks) and rip-rap protect the embankment. There is a void between the pipes, a scour developing at the culvert end, and a void beneath the culvert ends. Medium corrosion with no section loss was observed at the waterline. |                                   |                            |                                  |                       |        |                       |                 |  |  |
| Recommended Wor   | k: None<br>Add rip-rap slope prot | 6-10 Years ection and fill | 1-5 Years<br>the void between th | < 1 Year<br>ne pipes. | Urgent |                       |                 |  |  |

| Element Group:  | Culvert               | Culvert Le        |                 |      |      |                       |                 |  |  |  |
|---|-----------------------|-------------------|-----------------|------|------|-----------------------|-----------------|--|--|--|
| Element Name:   | Barrel                |                   | Width:          |      |      |                       |                 |  |  |  |
| Location:   |                       |                   | Height:         |      |      |                       |                 |  |  |  |
| Material:   | Steel                 |                   | Count:          |      |      |                       |                 |  |  |  |
| Element Type:   | CSP (circu            | CSP (circular) To |                 |      |      |                       |                 |  |  |  |
| Environment:  | Moderate Li           |                   | Limited Insp'n: |      |      |                       |                 |  |  |  |
| Protection System:  |                       | Galvanized        |                 |      |      |                       |                 |  |  |  |
| Condition Data:   | Units                 | Exc.              | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |  |
|   | %                     |                   |                 | 100  |      |                       |                 |  |  |  |
| Comments:   | Minor corrosion was o | bserved near      | water level.    |      |      |                       |                 |  |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                       |                   |                 |      |      |                       |                 |  |  |  |

#### **Element Data**

| Element Group:     | Foundation              | on              | Length:            |              |             |              |        |  |  |  |
|--------------------|-------------------------|-----------------|--------------------|--------------|-------------|--------------|--------|--|--|--|
| Element Name:      | Foundation (belo        | w grade)        | Width:             |              |             |              |        |  |  |  |
| Location:          |                         |                 | Height:            |              |             |              |        |  |  |  |
| Material:          |                         |                 | Count:             |              |             |              |        |  |  |  |
| Element Type:      |                         |                 | Total Quantity:    |              |             |              |        |  |  |  |
| Environment:       | Moderate                | е               | Limited Insp'n:    |              | Yes         |              |        |  |  |  |
| Protection System: |                         | None            |                    |              |             |              |        |  |  |  |
| •                  | Units                   | Exc.            | Good               | Fair         | Poor        | Perform.     | Maint. |  |  |  |
| Condition Data:    |                         |                 | Good               | Fall         | FUUI        | Deficiencies | Needs  |  |  |  |
|                    |                         |                 |                    |              |             | Yes          | Yes    |  |  |  |
| Comments:          | The culvert appears s   | table however   | the outlet end pip | oes are und  | lermined wi | ith a void.  |        |  |  |  |
|                    |                         |                 |                    |              |             |              |        |  |  |  |
|                    |                         |                 |                    | _            |             |              |        |  |  |  |
| Recommended World  | k: None                 | 6-10 Years      | 1-5 Years          | < 1 Year     | Urgent      |              |        |  |  |  |
|                    | Fill the void beneath t | he outlet pipes | to protect from fu | urther erosi | on.         |              |        |  |  |  |
|                    |                         |                 |                    |              |             |              |        |  |  |  |

| Element Group:  | Streams/Embar        | kments       | Length:         |      |      |                       |                 |  |  |  |
|---|----------------------|--------------|-----------------|------|------|-----------------------|-----------------|--|--|--|
| Element Name:   | Streams and Wa       | aterways     | Width:          |      |      |                       |                 |  |  |  |
| Location:   |                      |              | Height:         |      |      |                       |                 |  |  |  |
| Material:   | Earth                |              |                 |      |      |                       |                 |  |  |  |
| Element Type:   |                      |              | Total Quantity: |      |      |                       |                 |  |  |  |
| Environment:  | Moderate             | 9            | Limited Insp'n: |      |      |                       |                 |  |  |  |
| Protection System:  |                      | None         |                 |      |      |                       |                 |  |  |  |
| Condition Data:   | Units                | Exc.         | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |  |
|   | %                    |              | 30              | 40   | 30   |                       |                 |  |  |  |
| Comments:   | Waterway bank erosic | n was observ | ed.             |      |      | •                     |                 |  |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Provide erosion protection. |                      |              |                 |      |      |                       |                 |  |  |  |

| Element Group:     | Streams/Embankments  |                            | Length:                        |      |      |                       |                 |  |  |  |  |
|--------------------|--|----------------------------|--------------------------------|------|------|-----------------------|-----------------|--|--|--|--|
| Element Name:      | Embankm  | nent                       | Width:                         |      |      |                       |                 |  |  |  |  |
| Location:          | Each Cor   | ner                        | Height:                        |      |      |                       |                 |  |  |  |  |
| Material:          | Earth / Rip  | Count:                     | 6                              |      |      |                       |                 |  |  |  |  |
| Element Type:      |  | Total Quantity:            |                                | 6    |      |                       |                 |  |  |  |  |
| Environment:       |  | Limited Insp'n:            |                                |      |      |                       |                 |  |  |  |  |
| Protection System: | None   |                            |                                |      |      |                       |                 |  |  |  |  |
| Condition Data:    | Units  | Exc.                       | Good                           | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |  |  |
|                    | Each   |                            |                                | 4    | 2    | Yes                   |                 |  |  |  |  |
| Comments:          | Comments: The embankments are heavily vegetated with signs of erosion upstream and downstream from culverts. There is erosion under the armour stone at the southeast quadrant, and between the north (outlet) culvert ends. |                            |                                |      |      |                       |                 |  |  |  |  |
| Recommended World  | k: None Add rip-rap to stabilize armour stone.   | 6-10 Years<br>the embankme | 1-5 Years<br>ent slope and non |      | J    | ]<br>neast corner ur  | nder            |  |  |  |  |

#### **Element Data**

Recommended Work:

| Element Group:     | Approa               | iches            | Length:               |             |             |                          |                 |  |  |  |
|--------------------|----------------------|------------------|-----------------------|-------------|-------------|--------------------------|-----------------|--|--|--|
| Element Name:      | Wearing Surface      |                  | Width:                |             |             |                          |                 |  |  |  |
| Location:          | Each End             |                  | Height:               |             |             |                          |                 |  |  |  |
| Material:          | Gravel               |                  | Count:                |             |             |                          |                 |  |  |  |
| Element Type:      |                      | Total Quantity:  |                       |             |             |                          |                 |  |  |  |
| Environment:       | Seve                 | Limited Insp'n:  |                       |             |             |                          |                 |  |  |  |
| Protection System: |                      | None             |                       |             |             |                          |                 |  |  |  |
| Condition Data:    | Units                | Exc.             | Good                  | Fair        | Poor        | Perform.<br>Deficiencies | Maint.<br>Needs |  |  |  |
|                    | %                    |                  |                       | 100         |             |                          | Yes             |  |  |  |
| Comments:          | Minor wheel path rut | tting and pot ho | les starting to devel | op at the t | ime of insp | ection.                  | _               |  |  |  |
|                    |                      |                  |                       |             |             |                          |                 |  |  |  |

1-5 Years

6-10 Years

Continue annual grading of the wearing surface.

None

Urgent

< 1 Year



Photo 18-2: View of structure wearing surface



Photo 18-3: View of culvert in elevation and outlet end components



Photo 18-4: View of watercourse upstream and inlet ends



Photo 18-5: View of watercourse downstream and outlet culvert ends



Photo 18-6: View of erosion of embankment and between pipes



Photo 18-7: Erosion at the haunch of the outlet pipe



Photo 18-8: View of east culvert barrel interior



Photo 18-9: View of west culvert barrel interior

# **Bridge/Culvert Inspection Report**

Site Number 19 **Project Number** 221-12948-00 Northern Bruce Peninsula Pike Bay Road Culvert Municipality **Structure Name** 30 02 MTO Region Code County Bruce Code **MTO District Code** 33 Geographic Twp Code 377





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## Bridge/Culvert Inspection Report

| Inventory Data                         |   |   |                             |
|--|---|---|-----------------------------|
| Structure Name                         | Pike Bay Road Culvert   | Site Number   | 19                          |
| County                                 | Bruce   | Road Name   | Pike Bay Road               |
| Municipality                           | Northern Bruce Peninsula  | Road Type   | Rural Coll.                 |
| Bridge or Culvert                      | Culvert   | Owner   | Northern Bruce Peninsula    |
| Structure Type                         | Steel SP-CSP-PA   | AADT  | 350                         |
| Span (m)                               | 4.5 No. 1   | % Trucks  | 15%                         |
| Height (m)                             | 3   | Overall Structure Width (m)   | 18.9                        |
| Direction of Structure                 | North/South   | Roadway Width (m)   | 6.7                         |
| Year Built/Rehabilitated               | 1990  | Total Deck Length (m)   | 4.5                         |
| Current Load Limit                     | None  | Total Deck Area (s.m.)  | N/A                         |
| Detour Length (km)                     | 6   | Heritage Des.   | None                        |
| Waterway                               | Judges Creek  |   |                             |
| <b>Inspection Data</b>                 |   |   |                             |
| Date of Inspection                     | December 5, 2022  | Photos:<br>19-1 - Title Page  |                             |
| Name of Inspector                      | Evan Montreuil, P.Eng.  | 19-2 - View of culvert in elev  | ation and inlet components  |
|  |   | 19-3 - View of culvert in elev  | ation and outlet components |
| Equipment Used                         | Tape, pick, hammer  | 19-4 - View of culvert barrel i   |                             |
| Weather Conditions                     | Overcast  | post 19-6 - Structure embankment  |                             |
| Temperature                            | 5°C   | 19-7 - View of structure barrie<br>19-8 - View of watercourse up<br>19-9 - View of watercourse do | ostream                     |
| Last Inspection                        | September 24, 2020  | 19-10 - View of structure and   |                             |
| Additional Investigation<br>Required   |   | None  |                             |
| Total Rehabilitation                   | Repair the 3-cable guiderail and place  | e rip-rap erosion protection. Realig  | gn and/or replace signage.  |
| Total Rehabilitation<br>Budget Costing | \$18,000  | Next Inspection   | December 2024               |
| Justification                          | Maintain safe barrier protection and ro<br>to maximize the lifespan of the culver |   | . Complete erosion repairs  |

| Decks  |  | Length:  |   |   |   |   |  |  |  |  |
|--|--|--|---|---|---|---|--|--|--|--|
| Wearing Surfa  | ace  | Width:   |   |   |   |   |  |  |  |  |
|  |  | Height:  |   |   |   |   |  |  |  |  |
| Surface Treatment  |  | Count:   |   |   |   |   |  |  |  |  |
| [7   |  | Total Quantity:  |   |   |   |   |  |  |  |  |
| Severe L   |  | Limited Insp'n:  |   |   |   |   |  |  |  |  |
|  | None   |  |   |   |   |   |  |  |  |  |
| Units  | Exc.   | Good   | Fair  | Poor  | Perform. Deficiencies   | Maint.<br>Needs   |  |  |  |  |
| %  |  | 90   | 10  |   | Yes   |   |  |  |  |  |
| Comments: Minor ponding directly above the culverts. Recent surface treatment completed. Approx. 25m long alligator cracking along WB pavement edge.  Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Regrade and compact the at next resurfacing to avoid ponding water. Consider installing a frost taper. |  |  |   |   |   |   |  |  |  |  |
|  | Surface Treatm Severe  Units % Minor ponding directly abo alligator cracking along Wik: None | Wearing Surface  Surface Treatment  Severe  Units Exc.  %  Minor ponding directly above the culverts alligator cracking along WB pavement ed  k: None 6-10 Years | Wearing Surface Width: Height: Count: Total Quantity: Limited Insp'n: None Units Exc. Good % 90 Minor ponding directly above the culverts. Recent surface tralligator cracking along WB pavement edge.  k: None Width: Height: Count: Total Quantity: Limited Insp'n: None  None  1-5 Years | Wearing Surface Width: Height: Count: Total Quantity: Limited Insp'n: None Units Exc. Good Fair % 90 10 Minor ponding directly above the culverts. Recent surface treatment coalligator cracking along WB pavement edge.  k: None Width: Height: Count: Total Quantity: Limited Insp'n: None  None  1-5 Years  1-5 Years  1-5 Years | Wearing Surface Width: Height: Count: Total Quantity: Limited Insp'n: None Units Exc. Good Fair Poor % 90 10  Minor ponding directly above the culverts. Recent surface treatment completed. A alligator cracking along WB pavement edge.  k: None  Midth: Height: Count: Total Quantity: Limited Insp'n: None  None  1-5 Years  1-5 Years  1-5 Years  1-5 Years  1-5 Years | Wearing Surface Width: Height: Count: Total Quantity: Severe Limited Insp'n: None Units Exc. Good Fair Poor Perform. Deficiencies 90 10 Yes  Minor ponding directly above the culverts. Recent surface treatment completed. Approx. 25m lor alligator cracking along WB pavement edge.  k: None  6-10 Years 1-5 Years  Vount:  Height:  Total Quantity:  Fair Poor Perform. Deficiencies Yes  Yes |  |  |  |  |

#### **Element Data**

| Element Group:     | Barriers                              |                   | Length:            |            |            |                       |                 |  |  |  |
|--------------------|---------------------------------------|-------------------|--------------------|------------|------------|-----------------------|-----------------|--|--|--|
| Element Name:      | Barrier                               |                   | Width:             |            |            |                       |                 |  |  |  |
| Location:          | Each Side                             |                   | Height:            |            |            |                       |                 |  |  |  |
| Material:          |                                       |                   | Count:             | 14 posts   |            |                       |                 |  |  |  |
| Element Type:      |                                       | Total Quantity:   |                    |            |            |                       |                 |  |  |  |
| Environment:       | Severe                                |                   | Limited Insp'n:    |            |            |                       |                 |  |  |  |
| Protection System: | None                                  |                   |                    |            |            |                       |                 |  |  |  |
| Condition Data:    | Units                                 | Exc.              | Good               | Fair       | Poor       | Perform. Deficiencies | Maint.<br>Needs |  |  |  |
|                    | %                                     |                   |                    | 50         | 50         | Yes                   | Yes             |  |  |  |
| Comments:          | 3-cable guiderail barrier p           | otection cable    | needs to be tighte | ned. Broke | n and loos | e posts on nort       | h side.         |  |  |  |
| Recommended Wor    | k: None<br>Repair the cable/post syst | 6-10 Years<br>em. | 1-5 Years          | < 1 Year   | Urgent     |                       |                 |  |  |  |

| Element Group:  | Culverts                   |                | Length:             |      |      |                       |                 |  |  |  |
|---|----------------------------|----------------|---------------------|------|------|-----------------------|-----------------|--|--|--|
| Element Name:   | Inlet Compone              | ent            | Width:              |      |      |                       |                 |  |  |  |
| Location:   | South End                  |                | Height:             |      |      |                       | Ī               |  |  |  |
| Material:   | Stone / Eart               | h              | Count:              |      |      |                       |                 |  |  |  |
| Element Type:   |                            |                | Total Quantity:     |      |      |                       | Ī               |  |  |  |
| Environment:  | Moderate                   |                | Limited Insp'n:     |      |      |                       |                 |  |  |  |
| Protection System:  |                            | None           |                     |      |      |                       |                 |  |  |  |
| Condition Data:   | Units                      | Exc.           | Good                | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |  |  |  |
|   | %                          |                | 50                  | 50   |      |                       | Ī               |  |  |  |
| Comments:   | Bevelled end, minor erosic | n. Minor corro | sion at water line. |      |      |                       |                 |  |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent Place rip-rap slope protection. |                            |                |                     |      |      |                       |                 |  |  |  |

#### **Element Data** Structure: 19 Element Group: Culverts Length: Element Name: **Outlet Components** Width: North End Location: Height: Material: Stone and Earth Count: Element Type: Stone Head Wall and Steel Culvert Total Quantity: Environment: Moderate Limited Insp'n: Protection System: None Perform. Maint. Units Poor Fair Exc. Good **Condition Data:** Deficiencies Needs % 50 50 Comments: Minor erosion was observed around the bevelled end, as well as minor corrosion of the barrel at the waterline. 6-10 Years 1-5 Years Recommended Work: None < 1 Year Urgent Place rip-rap slope protection. **Element Data** Element Group: Culvert Length: Width: Element Name: Barrel Location: Height: Material: Steel Count: Element Type: Total Quantity: Pipe Arch Environment: Moderate Limited Insp'n: Protection System: Galvanized Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs 50 50 Comments: Minor corrosion was observed at the water line. Recommended Work: 6-10 Years 1-5 Years Urgent None < 1 Year **Element Data** Element Group: Foundation Length: Element Name: Foundation (below grade) Width: Location: Height: Material: Gravel / Stone Count: Element Type: Total Quantity: Environment: Moderate Limited Insp'n: Yes Protection System: None Perform. Maint. Units Exc. Good Fair Poor **Condition Data:** Deficiencies Needs

Limited inspection due to cover, however the structure appears stable.

1-5 Years

< 1 Year

Urgent

6-10 Years

None

Comments:

Recommended Work:

| Element Group:  | Streams/Emban           | kments       | Length:         |       |       |              |        |  |  |  |  |
|---|-------------------------|--------------|-----------------|-------|-------|--------------|--------|--|--|--|--|
| Element Name:   | Streams and Wa          | terways      | Width:          |       |       |              |        |  |  |  |  |
| Location:   |                         |              | Height:         |       |       |              |        |  |  |  |  |
| Material:   |                         |              | Count:          |       |       |              |        |  |  |  |  |
| Element Type:   |                         |              | Total Quantity: |       |       |              |        |  |  |  |  |
| Environment:  | Moderate                | ;            | Limited Insp'n: |       |       |              |        |  |  |  |  |
| Protection System:  |                         | None         |                 |       |       |              |        |  |  |  |  |
| ·   | Units                   | Exc.         | Good            | Fair  | Poor  | Perform.     | Maint. |  |  |  |  |
| Condition Data:   |                         | LXC.         | G000            | ı alı | 1 001 | Deficiencies | Needs  |  |  |  |  |
|   | %                       |              | 50              | 50    |       |              |        |  |  |  |  |
| Comments:   | Heavy vegetation of the | ne stream em | nbankments.     |       |       |              |        |  |  |  |  |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent |                         |              |                 |       |       |              |        |  |  |  |  |

#### **Element Data**

| Element Group:     | Streams/Emban         | kments          | Length:             |          |        |              |        |  |  |
|--------------------|-----------------------|-----------------|---------------------|----------|--------|--------------|--------|--|--|
| Element Name:      | Embankme              | ent             | Width:              |          |        |              |        |  |  |
| Location:          | Each Corn             | er              | Height:             |          |        |              |        |  |  |
| Material:          |                       |                 | Count:              | 6        |        |              |        |  |  |
| Element Type:      |                       | Total Quantity: | 6                   |          |        |              |        |  |  |
| Environment:       |                       |                 | Limited Insp'n:     |          |        |              |        |  |  |
| Protection System: | None                  |                 |                     |          |        |              |        |  |  |
|                    | Units                 | Exc.            | Good                | Fair     | Poor   | Perform.     | Maint. |  |  |
| Condition Data:    | Offics                | EXC.            | Good                | Fall     | 1001   | Deficiencies | Needs  |  |  |
|                    | Each                  |                 | 6                   |          |        |              | Yes    |  |  |
| Comments:          | Heavily vegetated wit | h minor sign    | s of erosion observ | ved.     |        |              |        |  |  |
|                    |                       |                 |                     |          |        |              |        |  |  |
|                    |                       |                 |                     |          |        |              |        |  |  |
| Recommended Worl   | k: None               | 6-10 Years      | 1-5 Years           | < 1 Year | Urgent |              |        |  |  |

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent

Place rip-rap slope protection.

#### **Element Data**

| Element Group:     | Signs                     | Signs           |                    |              |              |                  |         |  |
|--------------------|---------------------------|-----------------|--------------------|--------------|--------------|------------------|---------|--|
| Element Name:      | Signs                     |                 | Width:             |              |              |                  |         |  |
| Location:          | Each Corner               |                 | Height:            |              |              |                  |         |  |
| Material:          |                           |                 | Count:             |              |              |                  |         |  |
| Element Type:      |                           | Total Quantity: | 3                  |              |              |                  |         |  |
| Environment:       | Severe                    | Limited Insp'n: |                    |              |              |                  |         |  |
| Protection System: |                           |                 | Non                | е            |              |                  |         |  |
|                    | Units                     | Exc.            | Good               | Fair         | Poor         | Perform.         | Maint.  |  |
| Condition Data:    | Office                    | LXC.            | Good               | I all        | 1 001        | Deficiencies     | Needs   |  |
|                    | Each                      |                 |                    | 3            |              | Yes              | Yes     |  |
| Comments:          | Guiderail markers: 3      | sign posts a    | re loose and requi | re straighte | ning vertica | ally and alignme | nt with |  |
|                    | traffic, 1 sign is missir | na.             |                    |              |              |                  |         |  |

Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent

Realign signage and replace missing sign. Consider replacing all 4.

| Element Group:  | Approaches        |      | Length:         |      |      |                       |                 |
|---|-------------------|------|-----------------|------|------|-----------------------|-----------------|
| Element Name:   | Wearing Surface   |      | Width:          | +    |      |                       |                 |
| Location:   | Each End          |      | Height:         | +    |      |                       |                 |
| Material:   | Surface Treatment |      | Count:          |      |      |                       |                 |
| Element Type:   | Canado meatment   |      | Total Quantity: |      |      |                       |                 |
| Environment:  | Severe            |      | Limited Insp'n: |      |      |                       |                 |
| Protection System:  | None              |      |                 |      |      |                       |                 |
| Condition Data:   | Units             | Exc. | Good            | Fair | Poor | Perform. Deficiencies | Maint.<br>Needs |
|   | %                 |      | 100             |      |      |                       |                 |
| Comments: Recently placed surface treatment is in good condition. |                   |      |                 |      |      |                       |                 |
| Recommended Work: None 6-10 Years 1-5 Years < 1 Year Urgent       |                   |      |                 |      |      |                       |                 |



Photo 19-2: View of culvert in elevation and inlet components



Photo 19-3: View of culvert in elevation and outlet components



Photo 19-4: View of culvert barrel interior



Photo 19-5: Impact damage to the northeast barrier protection post



Photo 19-6: Structure embankment



Photo 19-7: View of structure barrier protection (typical)



Photo 19-8: View of watercourse upstream



Photo 19-9: View of structure downstream



Photo 19-10: View of structure and approach wearing surface