

## CULVERT CONDITION ASSESSMENT REPORT

### INVENTORY DATA

|                        |  |                                    |                          |
|------------------------|--|------------------------------------|--------------------------|
| Owner:                 | Town of Newmarket  |                                    |                          |
| Road Name:             | Millard Avenue   |                                    |                          |
| Location:              | Approximately 140 m East of Queen Street, at Haskett Park  |                                    |                          |
| Coordinates:           | Lat. 44° 03' 6" N (4878746 N)      Long. 79° 28' 21" W (622360 E)  |                                    |                          |
| Watercourse Name:      | Western Creek  |                                    |                          |
| Structure Number/Name: | N/A  | Roadway Type/Class:                | 2 – Lane Urban Collector |
| Structure Type:        | Concrete Ellipse / Multi-plate CSPA / CSP  | Posted Speed:                      | 40 km/hr                 |
| Structure Size:        | Various Sizes (see component info.)  | Direction of Structure:            | North/South              |
| Structure Length:      | ~46.5 m  | Number of Cells:                   | 2                        |
| Skew Angle:            | Varies   | Current Load Limit:                | N/A                      |
| Year Built:            | Various  | Year of Last Major Rehabilitation: | 2007                     |
| Other:                 | <ul style="list-style-type: none"> <li>Watercourse flows from south to north</li> <li>Structure consists of a twin pipe culvert of multiple construction types, constructed at various times</li> <li>Concrete ellipse (west pipe) was not able to be accessed due to pipe size and depth of flow</li> </ul> |                                    |                          |

### FIELD INSPECTION INFORMATION

|                     |                  |
|---------------------|------------------|
| Date of Inspection: | January 19, 2017 |
| Inspector:          | Steve Empey      |
| Others in Party:    |                  |
| Weather:            | Overcast         |
| Temperature:        | +2 °C            |

## COMPONENT INFORMATION

|                   |   |                               |  |                               |                                   |                                  |
|-------------------|---|-------------------------------|--|-------------------------------|-----------------------------------|----------------------------------|
| Component Name:   | West Pipe   |                               |  |                               |                                   |                                  |
| Condition Rating: | <input type="checkbox"/> Excellent  | <input type="checkbox"/> Good | <input checked="" type="checkbox"/> Fair | <input type="checkbox"/> Poor | <input type="checkbox"/> Critical | <input type="checkbox"/> Unknown |
| Comments:         | <ul style="list-style-type: none"> <li>• 1535 X 975 Horizontal Concrete Ellipse (based on construction drawings)</li> <li>• Condition based on visible portions (limited inspection of ends only)</li> <li>• Infiltration and displaced segments of pipe noted</li> <li>• Pipe has vertical bends near pipe outlet</li> <li>• Pipe does not pass through drop maintenance hole structure</li> </ul> |                               |  |                               |                                   |                                  |

|                   |  |                               |  |                               |                                   |                                  |
|-------------------|--|-------------------------------|--|-------------------------------|-----------------------------------|----------------------------------|
| Component Name:   | East Pipe – Section 1 (Inlet to Section 2 Pipe Connection)   |                               |  |                               |                                   |                                  |
| Condition Rating: | <input type="checkbox"/> Excellent   | <input type="checkbox"/> Good | <input checked="" type="checkbox"/> Fair | <input type="checkbox"/> Poor | <input type="checkbox"/> Critical | <input type="checkbox"/> Unknown |
| Comments:         | <ul style="list-style-type: none"> <li>• 2060 X 1520 Multi-plate corrugated steel pipe arch (based on construction drawings)</li> <li>• Hex nuts and bolts</li> <li>• Corrosion of invert</li> <li>• Deformation of soffit near inlet</li> <li>• Storm pipe penetration in wall of culvert with oversized cut and missing parging</li> </ul> |                               |  |                               |                                   |                                  |

|                   |  |                               |                               |  |                                   |                                  |
|-------------------|--|-------------------------------|-------------------------------|--|-----------------------------------|----------------------------------|
| Component Name:   | East Pipe – Section 2  |                               |                               |  |                                   |                                  |
| Condition Rating: | <input type="checkbox"/> Excellent   | <input type="checkbox"/> Good | <input type="checkbox"/> Fair | <input checked="" type="checkbox"/> Poor | <input type="checkbox"/> Critical | <input type="checkbox"/> Unknown |
| Comments:         | <ul style="list-style-type: none"> <li>• 1950 X 1470 Multi-plate corrugated steel pipe arch (based on construction drawings)</li> <li>• Square nuts and bolts noted</li> <li>• Corrosion of invert</li> <li>• Medium to severe crimping</li> <li>• Corrosion of bolt connections</li> <li>• Multiple perforations and leakage noted</li> </ul> |                               |                               |  |                                   |                                  |

|                   |  |                               |  |                               |                                   |                                  |
|-------------------|--|-------------------------------|--|-------------------------------|-----------------------------------|----------------------------------|
| Component Name:   | East Pipe Section 3 (Section 2 Pipe to Drop Maintenance Hole Structure)  |                               |  |                               |                                   |                                  |
| Condition Rating: | <input type="checkbox"/> Excellent   | <input type="checkbox"/> Good | <input checked="" type="checkbox"/> Fair | <input type="checkbox"/> Poor | <input type="checkbox"/> Critical | <input type="checkbox"/> Unknown |
| Comments:         | <ul style="list-style-type: none"> <li>• 2060 X 1520 Multi-plate corrugated steel pipe arch (based on construction drawings)</li> <li>• Hex nuts and bolts</li> <li>• Corrosion of invert</li> </ul> |                               |  |                               |                                   |                                  |

|                   |   |  |                               |                               |                                   |                                  |
|-------------------|---|--|-------------------------------|-------------------------------|-----------------------------------|----------------------------------|
| Component Name:   | Concrete Drop Maintenance Hole Structure  |  |                               |                               |                                   |                                  |
| Condition Rating: | <input type="checkbox"/> Excellent  | <input checked="" type="checkbox"/> Good | <input type="checkbox"/> Fair | <input type="checkbox"/> Poor | <input type="checkbox"/> Critical | <input type="checkbox"/> Unknown |
| Comments:         | <ul style="list-style-type: none"> <li>• East culvert pipe enters and exits drop maintenance hole structure</li> <li>• West culvert pipe does <u>NOT</u> pass through drop maintenance hole structure</li> <li>• 1350 mm diameter concrete storm pipe connects to drop maintenance hole structure</li> <li>• Large amount of granular noted within 1350 mm diameter storm pipe</li> </ul> |  |                               |                               |                                   |                                  |

|                   |  |                               |                               |                               |  |                                  |
|-------------------|--|-------------------------------|-------------------------------|-------------------------------|--|----------------------------------|
| Component Name:   | East Pipe – Section 4 (Drop Maintenance Hole Structure to Outlet)  |                               |                               |                               |  |                                  |
| Condition Rating: | <input type="checkbox"/> Excellent   | <input type="checkbox"/> Good | <input type="checkbox"/> Fair | <input type="checkbox"/> Poor | <input checked="" type="checkbox"/> Critical | <input type="checkbox"/> Unknown |
| Comments:         | <ul style="list-style-type: none"> <li>• 2000 mm diameter corrugated steel pipe (based on construction drawings)</li> <li>• Critical perforations and section loss due to rusting at waterline</li> <li>• Deformation of soffit near drop maintenance hole structure</li> <li>• Large amount of granular noted on east side of outlet</li> </ul> |                               |                               |                               |  |                                  |

#### OVERALL STRUCTURE NOTES

|                                |   |
|--------------------------------|---|
| Overall Comments:              | <ul style="list-style-type: none"> <li>• Culvert condition ranges from critical to fair</li> </ul>  |
| Estimated Remaining Life Span: | <ul style="list-style-type: none"> <li>• None</li> </ul>  |
| Recommendations:               | <ul style="list-style-type: none"> <li>• Camera inspection of concrete ellipse – (east pipe) to verify condition</li> <li>• Camera inspection of storm sewer beyond upstream MH and CBMH</li> <li>• Replace culverts and drop structure (URGENT)</li> </ul> |



Photo 1 – Inlet of West Culvert Pipe - Concrete Ellipse



Photo 2 – West Pipe (Concrete Ellipse) Looking Downstream





Photo 3 – West Pipe (Concrete Ellipse) Displaced Pipe Segment



Photo 4 – Inlet of East Culvert Pipe – Multi Plate Corrugated Steel Pipe Arch



Photo 5 –Corrosion of Culvert Invert near Inlet



Photo 6 – Oversized Cut and Missing Parging at Storm Pipe Penetration





Photo 7 – Looking Up Storm Pipe Penetration – Note Displaced Pipe Segments



Photo 8 – Deformation of Culvert Soffit near Inlet



Photo 9 – Connection between Section 1 and Section 2 of East Culvert Pipe



Photo 10 –Section 2 of East Culvert Pipe – Multi Plate CSPA Looking Towards Outlet





Photo 11 –Corrosion of Section 2 of East Culvert Pipe Invert



Photo 12 – Medium to Severe Crimping of Section 2 of East Culvert Pipe



Photo 13 – Corrosion of Bolt Connections of Section 2 of East Culvert Pipe



Photo 14 – Perforation of Section 2 of East Culvert Pipe





Photo 15 – Perforation & Leakage of Section 2 of East Culvert Pipe



Photo 16 –Section 3 of East Culvert Pipe – Multi Plate CPSA Looking Towards Inlet





Photo 17 – Connection between Section 2 and Section 3 of East Culvert Pipe



Photo 18 –Corrosion of Section 3 of East Culvert Pipe



Photo 19 – Concrete Drop Maintenance Hole Structure Looking from Section 4 (Outlet) of East Culvert Pipe



Photo 20 – Looking Up 1350 mm Diameter Storm Pipe Inlet from Drop Maintenance Hole Structure





Photo 21 – Section 4 of East Culvert Pipe – CSP (Looking Towards Outlet)

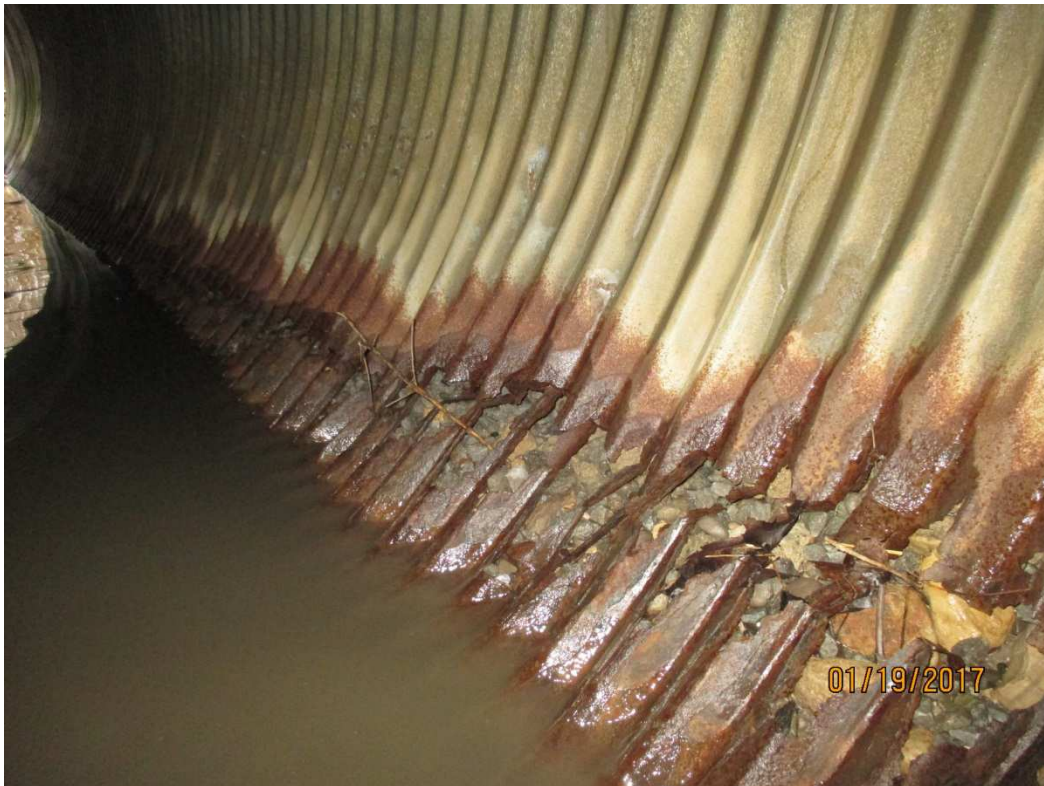


Photo 22 – Corrosion with Critical Perforations & Section Loss – East Side of Section 4 of East Culvert Pipe





Photo 23 – Corrosion with Critical Perforations & Section Loss – West Side of Section 4 of East Culvert Pipe



Photo 24 – Deformation of Culvert Obvert at Outlet of East Culvert Pipe