Appendix A: Field Inspection Memo

City of Barrie

Culvert Inspection Memo

For

Hewitts Secondary Plan Area (SPA)

H353997
Rev. A
November 21, 2016

A-1 Introduction

Hatch was retained by the City of Barrie to undertake a Schedule C Clas Environmental Assessments (EAs) as part of the Growth Development Projects to evaluate design alternatives to accommodate project impacts to the year 2031.

The study is bounded by Huronia Rd to the West, Mapleview Dr to the north, 20th Sideroad to the East and Lockhart Rd to the South.

The proposed transportation improvement includes:

- Mapleview Drive East to be ultimately widened to seven (7) lanes from Huronia Road to Madeleine, 5 lanes from Madeleine to Prince William Way, and 3 lanes from Prince William Way to east of Collector 11
- Lockhart Road to be widened to 5 lanes from Mapleview Drive to Lockhart Road
- Yonge Street to be widened to 5 lanes from Mapleview Drive to Lockhart Road

There are four (4) major watercourse crossings can be located within the study area, includes:

- Two (2) Lover's Creek crossings
- Two (2) Hewitt's Creek crossings

Thus, the existing culvert structures need to be inspected from a physical perspective to aid in the drainage design for the post-development condition.

A-2 Purpose

This technical memorandum is aimed to:

- Outline the existing culverts and drainage outlet within the project area.
- Provide field observations to establish a design basis.
- Report inspected functional conditions of existing culverts crossings.

A–3 Observations

TABLE 1 summarizes the culverts materials and dimensions from field observation:

TABLE 1. CULVERT LOCATION ANALYSIS SUMMARY

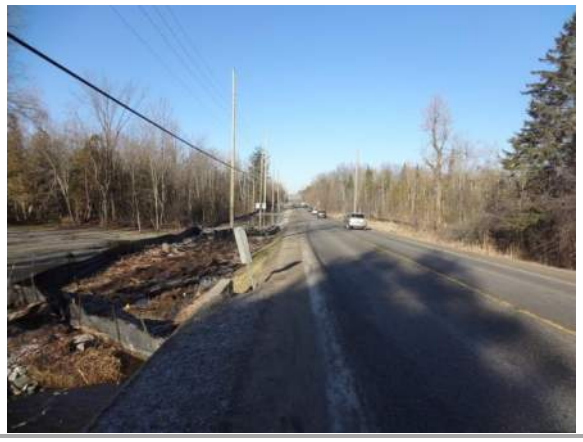
Culvert ID	Location Description	Material	Opening	Dimension [mm]	
				Span	Rise
MAP 1	Lover's Creek at Mapleview Dr.	Concrete	Box	6250	2000
MAP 2	Hewitt's Creek at Mapleview Dr.	Concrete	Box	4800	1650
MAP 3	CSP culvert along Mapleview Dr. (west of Royal Jubilee Rd.)	CSP	Circular	900	900
LOC 1	Lover's Creek at Lockhart Rd.	Concrete	Box	6100	2400
LOC 2	CSP Culvert along Lockhart Rd. (West of Yonge St.)	CSP	Circular	900	900
LOC 3	HDPE culvert along Lock hart Rd. (East of Yonge St.)	HDPE	Circular	900	900
LOC 4	Hewitt's Creek at Lockhart Rd.	CSP	Circular	2450	2450

A–4 Photo Documentation

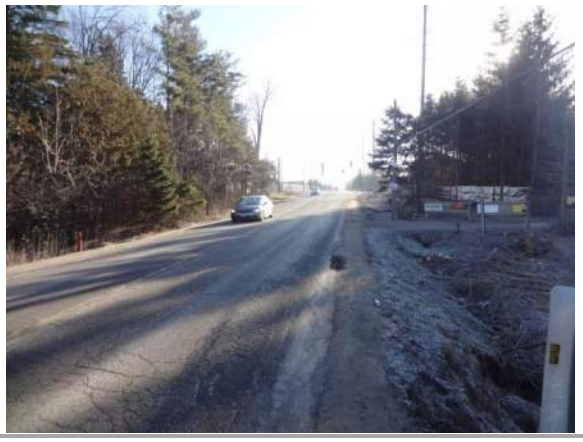
Culvert photos with inspection observation comments are documented below.

Lover's Creek @Mapleview Dr. (MAP1)

#1 – Mapleview Dr. Looking East

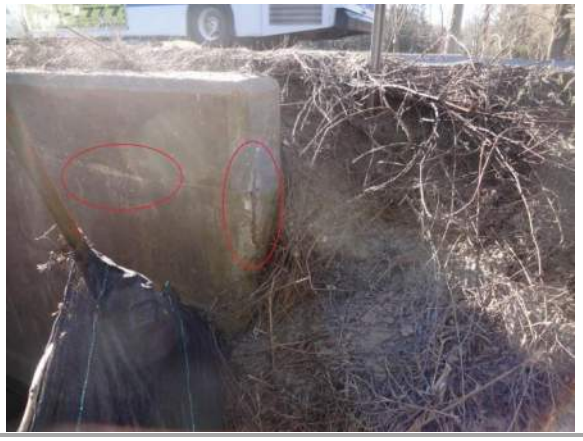


#2 – Mapleview Dr. Looking West

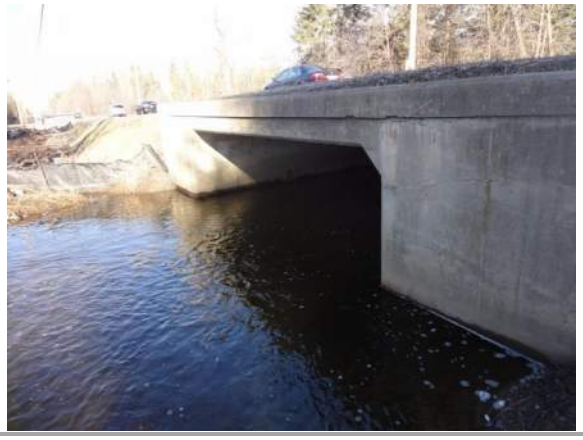


#3 – Inlet End

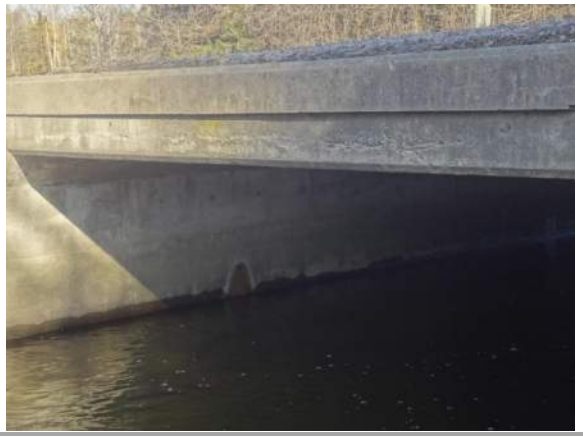
#4 – Exposed Rebars and Horizontal Cracks at Top Slab



#5 – Gabion Basket at outlet



#6 – Observed Spalling at Top Slab

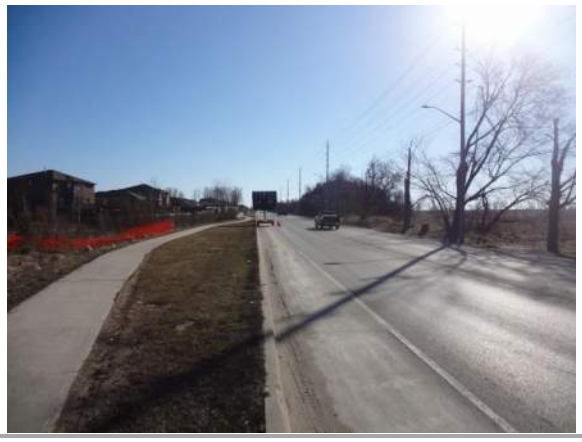


Comments:

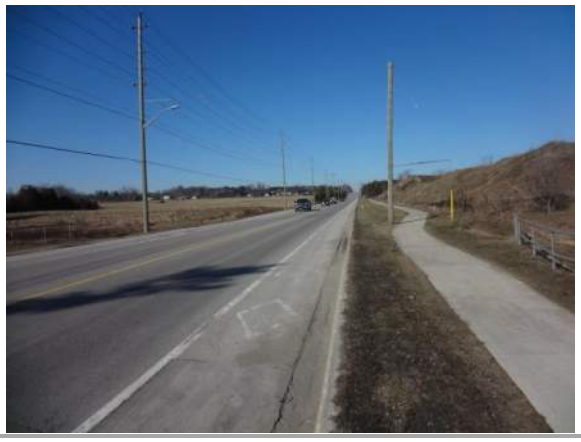
Open bottom concrete box culvert. Side wall thickness is around 2.5m. Top slap thickness is 0.3m. Insufficient depth of cover.
Observed cracks, buckling and spalling. Minor debris acculmulation at stream bed. Noted bank erosion and flow scour.
Recommend to repair erosion/scour.

Hewitt's Creek @Mapleview Dr. (MAP2)

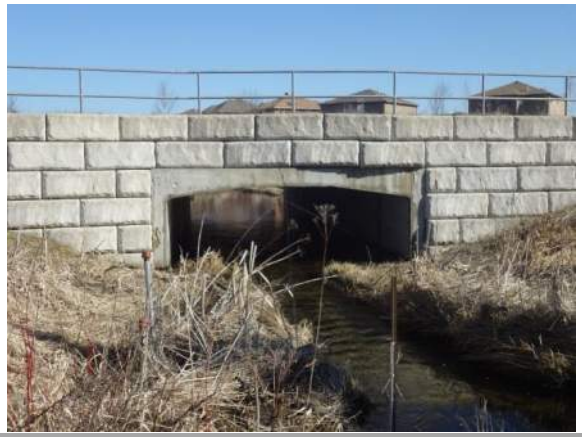
#1 – Mapleview Dr. Looking East



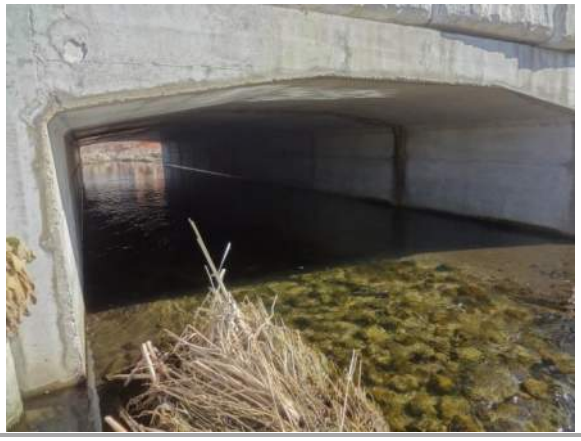
#2 – Mapleview Dr. Looking West



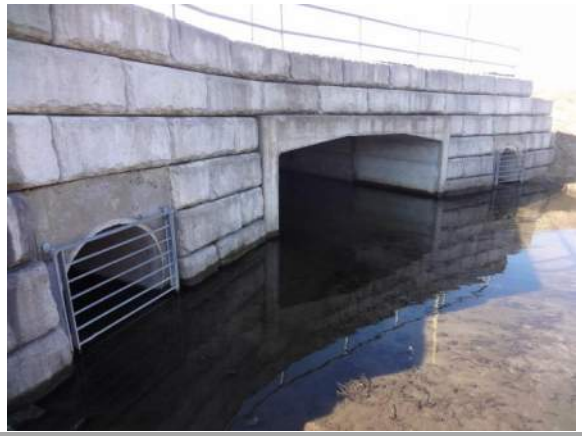
#3 – Inlet End



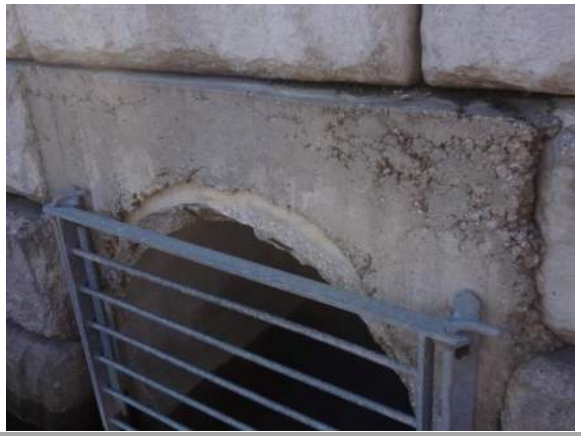
#4 – Looking Downstream End



#5 –Outlet End



#6 – Buckling and Spalling at Storm Sewer Outlets



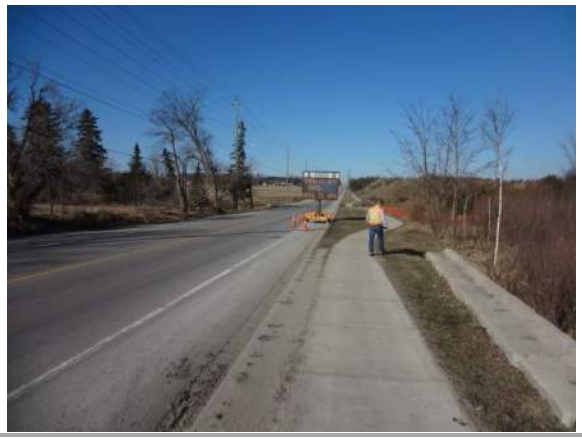
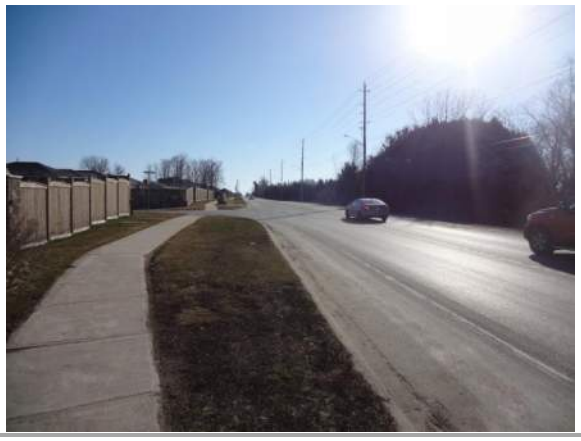
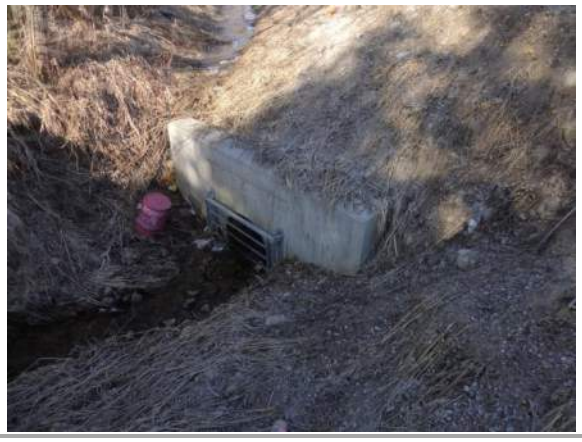
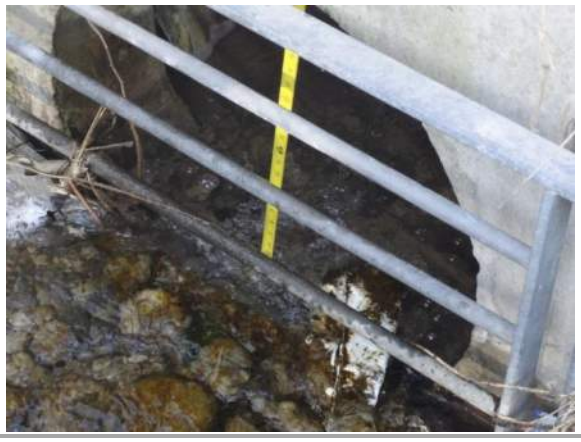
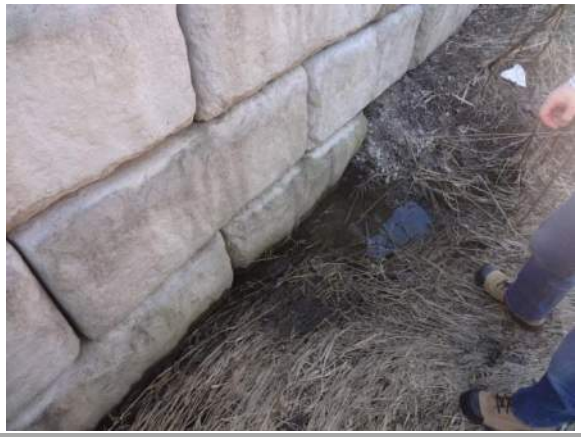
Comments:

Open bottom concrete box culvert has a dimension of 4267 mm W x 1630 mm H. Structure in good conditon with minor sign of corrosion and concrete deterioration, especially at the storm outlet.

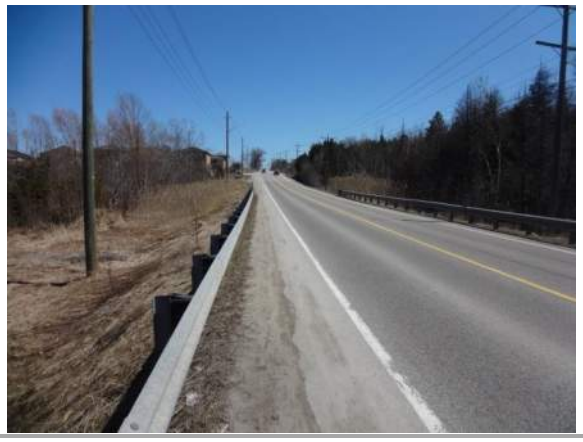
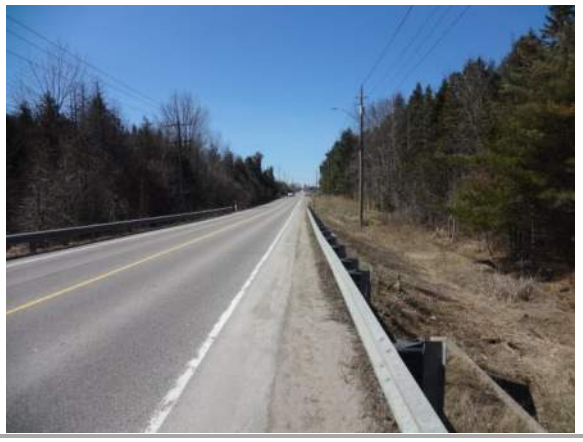
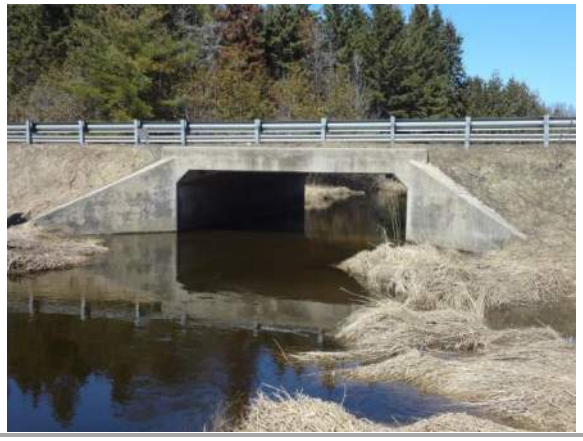
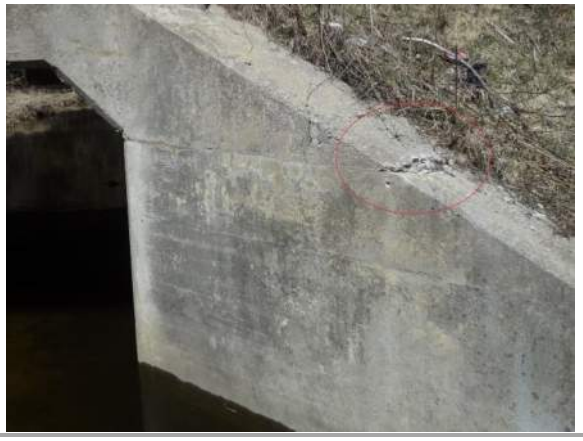
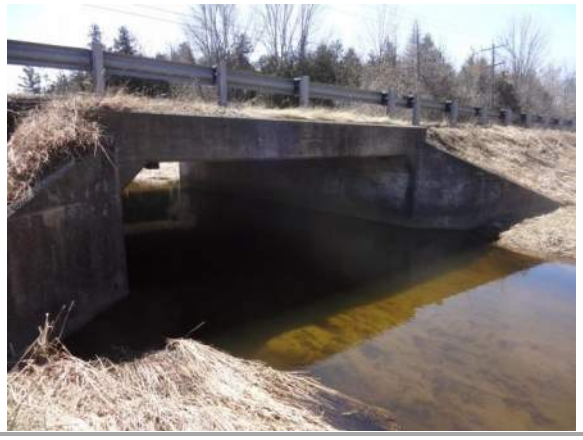
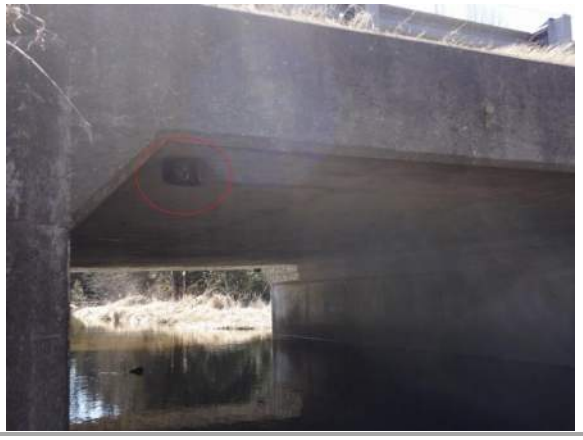
Top slap has a thickness of 0.5m. Side wall thinkness is measured to be 0.3 m. Measured water level at outlet is around 0.25m.

Observed bank erosion and flow line scour at inlet end.

Recommend to repair and extend.

CSP Culvert Along Mapleview Dr. West of Royal Jubilee Rd. (MAP3)	
#1 – Mapleview Dr. Looking East	**#2 – Mapleview Dr. Looking West**
	
#3 – Inlet End	**#4 – Heavy Debris Accumulation at Inlet**
	
#5 – Outlet End	**#6 – Excessive Water Seeping through the Retainning Wall**
	

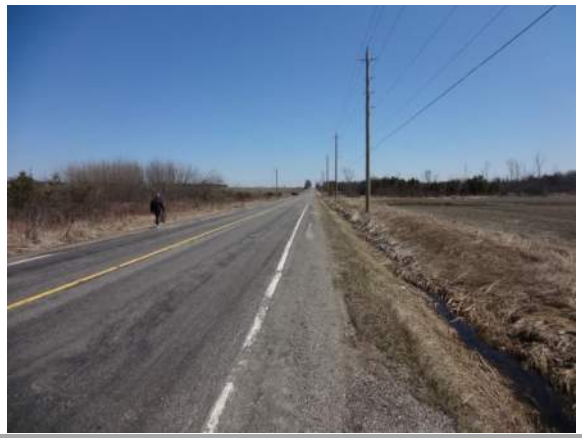
Comments:
External draiange ditch flow from super-critical to sub-critical condition. CSP extension at outlet are near fully submerged. Observed bank erosion and debri accumulation at inlet end.
Outlet are placed under a 1 meter height retainnning wall. Downstream bankful width of 1.2 m with measured water elevation around 0.3 m.
Recommend to be upsized.

Lover's Creek @Lockhart Rd. (LOC1)	
#1 – Lockhart Rd Looking East	**#2 – Lockhart Rd Looking West**
	
#3 – Inlet End	**#4 – Concrete Spalling at Inlet WingWall**
	
#5 –Outlet End	**#6 – Potential Storm Sewer Outfall**
	

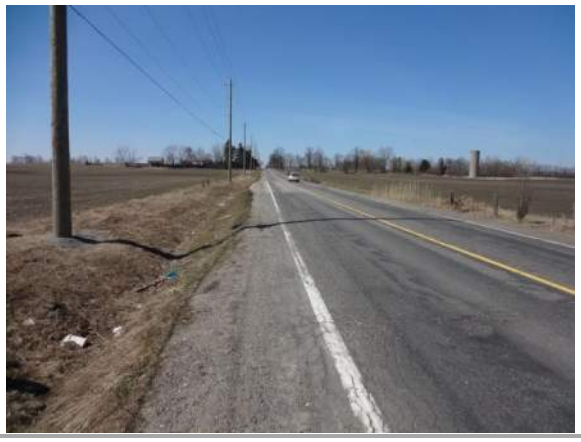
Comments:
Open bottom concrete box culvert with head wall and wing walls. Structure in good conditon with minor sign of rust or corrosion.
Measured water level at outlet is around 0.4m.
Observed bank erosion and flow line scour at inlet end.
Recommend to repair and extend.

CSP Culvert @Lockhart Rd. (LOC2)

#1 – Lockhart Rd Looking East

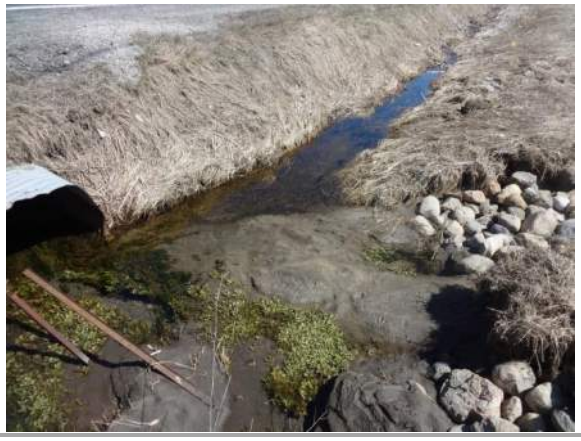


#2 – Lockhart Rd Looking West

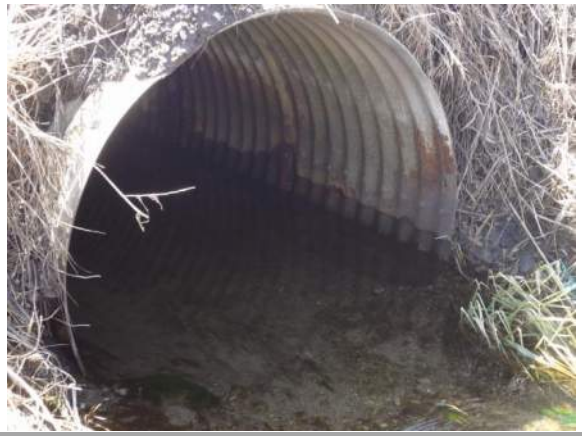


#3 – Inlet End

#4 – Erosion at Inlet End



#5 –Outlet End



#6 – At Outlet Looking Downstream

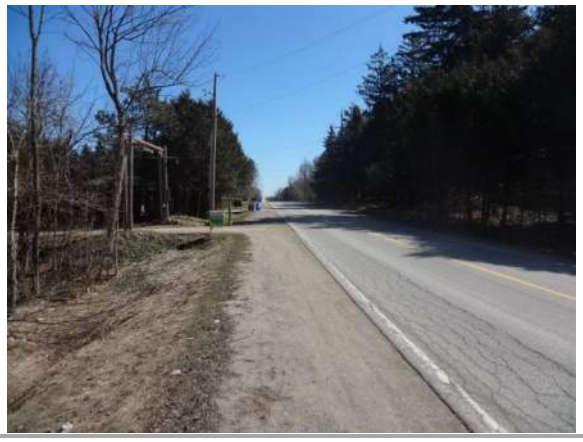
Comments:

900 mm diameter CSP culvert. Observed sever bank erosion. Evidence of over topping.

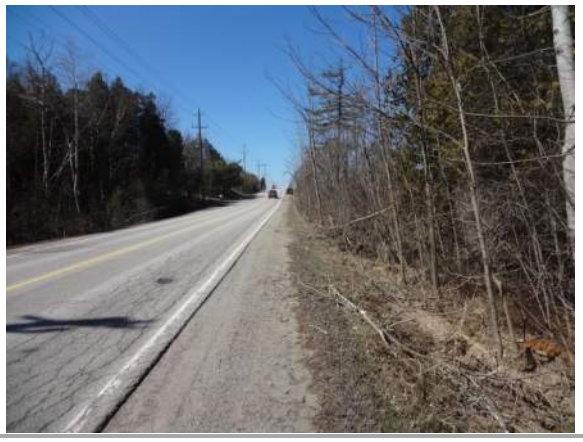
Recommend to replace.

HDPE Culvert @ Lockhart Rd. (LOC3)

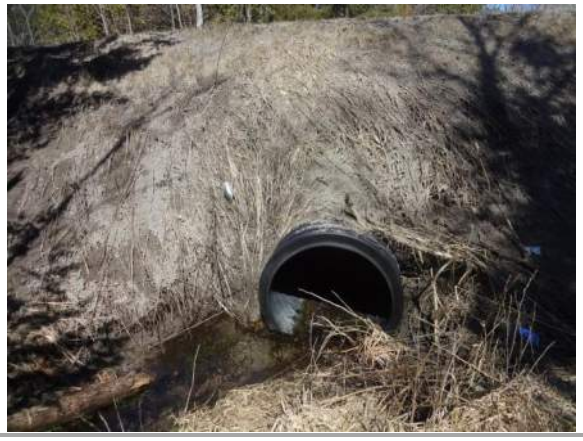
#1 – Lockhart Rd Looking East



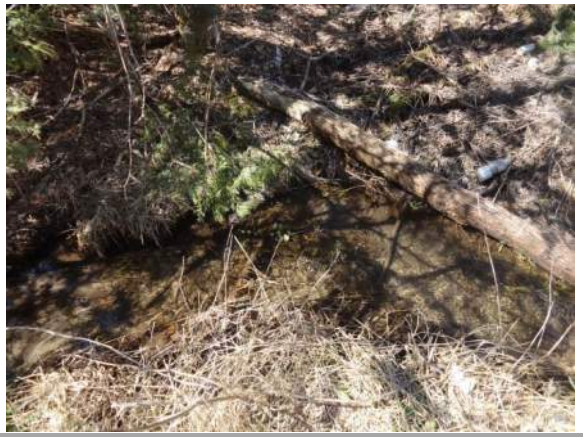
#2 – Lockhart Rd Looking West



#3 – Inlet End

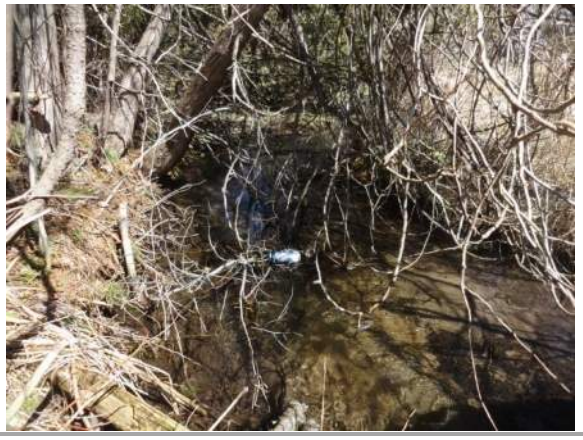


#4 – Heavy Vegetation Growth Near Inlet



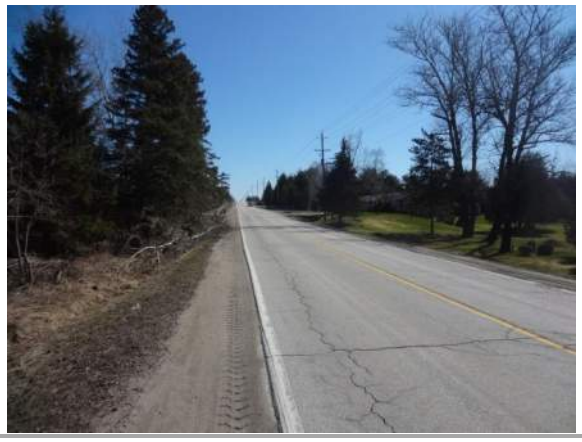
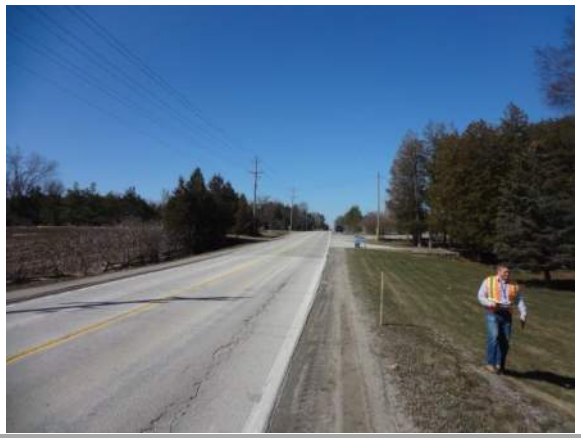
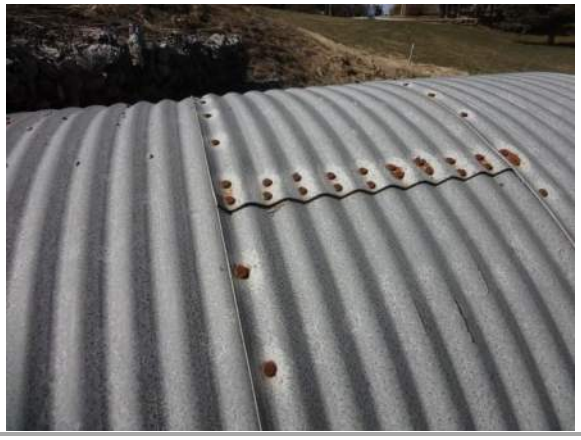
#5 –Outlet End

#6 – At Outlet Looking Downstream



Comments:

900 mm diamter HDPE pipe. Heavy vegetation growth noted near inlet.
Observed bank erosions nad flow line scour.
Recommend to retain and extend.

HDPE Culvert @ Lockhart Rd. (LOC4)	
#1 – Lockhart Rd Looking East	**#2 – Lockhart Rd Looking West**
	
#3 – Inlet End	**#4 – Deformation on Gabion Basket at Inlet End**
	
#5 –Outlet End	**#6 – Rusted Bolts Appears to be non-galvanized**
	

Comments:
2440 mm diameter CSP culvert. Observed deformation at garbion.
Minor sign of corrosion, botls appear to be non-galvanized and has potential to accelerating corrosion of the plates.
Recommend to repair/replace and Extend.

A–4 Recommendations

TABLE 2 summarizes the recommendations from the field inspection

TABLE 2 RECOMMENDATIONS

Culvert ID	Recommendation
MAP 1	Retain and extend
MAP 2	Repair and extend
MAP 3	Redesign or Upsize. Requires Hydraulic evaluation.
LOC 1	Repair and extend
LOC 2	Replace due to structural condition and cost- effectiveness reasons.
LOC 3	Retain and extend
LOC 4	Repair and extend

In conclusion:

- MAP 3 and LOC 2 are recommended to be replaced due to structural conditions. Hydraulic analysis is required for sizing recommendations.
- Repair and extend the other culverts.
- Repair bank erosion and flow line scour at the four (4) major water course crossings (MAP1, MAP2, LOC1 and LOC 4). Remove debris and potential blockages from inlets and outlets.