

**ALBERTA TRANSPORTATION  
GEOHAZARD ASSESSMENT PROGRAM  
NORTH CENTRAL REGION – ATHABASCA  
2019 INSPECTION**



Site Number	Location	Name	Hwy	km
NC 058-1 (NC58, Eastbound lane Landslide) NC058-2 (NC58A, Westbound lane Landslide)	6.5 km west of the junction between Hwy 881 and 858 to the north of Lac La Biche	North of Lac La Biche	858:02	45.85
Legal Description		UTM Co-ordinates		
SW- 30-68-13-W4M		1 2 N 6085029	E 436771	

	Date	PF	CF	Total
<b>Previous Inspection:</b>	NC58- May 9, 2018	8	3	24
	NC58A- May 9, 2018	11	3	33
<b>Current Inspection:</b>	NC58- June 12, 2019	7	3	21
	NC58A- June 12, 2019	7	3	21
<b>Road AADT:</b>	290		<b>Year:</b>	2018
<b>Inspected By:</b>	Tarek Abdelaziz, José Pineda (Thurber) Rishi Adhikari, Arthur Kavulok, Calvin Kissel, Jake Knudslein (TRANS)			
<b>Report Attachments:</b>	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input type="checkbox"/> Maintenance Items			

<b>Primary Site Issue:</b>	Active landslides occurred between 2008 and 2013 after heavy rainfall events, causing pavement distress on the eastbound and westbound lanes of the highway. <b>NC058</b> (eastbound lane landslide) was first noticed in 2008 and <b>NC058A</b> (westbound lane landslide) was first noticed in 2013.
<b>Dimensions:</b>	<b>NC058:</b> About 75 m along the highway and 30 m perpendicular to the highway centerline <b>NC058A:</b> About 95 m along the highway and 35 m perpendicular to the highway centerline
<b>Date of any remediation:</b>	<b>NC058:</b> The remedial measure, completed in July 2011 to stabilize the eastbound lane landslide, involved the construction of a 90 m long pile wall to retain the landslide mass. The pile wall consisted of 15 m long driven steel H piles (HP 310x110 piles), installed at a center-to-center spacing of 0.62 m. <b>NC058A:</b> The remedial measure, completed between October 2016 and May 2017 to stabilize the westbound lane landslide, involved the construction of a 120 m long pile wall to retain the landslide mass. The pile wall consisted of 15 m long driven steel H piles (HP 310x110 piles), installed at a center-to-center spacing ranging between 0.66 m and 0.8 m.
<b>Maintenance:</b>	ACP patch was placed on the highway eastbound lane in July 2011 after construction completion; highway eastbound and westbound cracks sealed in spring 2012; both highway lanes patched again in fall 2012; WBL open cracks sealed in spring 2012; ACP patch placed on the highway WBL surface in fall 2012 and fall 2013; ACP patch placed on the EBL and WBL in fall 2014. ACP patch placed on the WBL in September 2015; clay fill was used by AT to contour highway WBL side slopes after completion of the NC58A pile wall; ACP overlay placed on both lanes in the fall of 2016 and in the summer of 2018; crack sealing on both lanes in the spring of 2019

Observations:	Description	Worse?
<input checked="" type="checkbox"/> Pavement Distress	<b>NC058 and NC58A-</b> Highway surface overlaid in 2018 and open cracks sealed in May 21019	<input type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	<b>NC058 and NC58A –</b> Hairline reflective cracks	<input type="checkbox"/>
<input type="checkbox"/> Erosion		<input type="checkbox"/>
<input type="checkbox"/> Seepage		<input type="checkbox"/>
<input type="checkbox"/> Bridge/Culvert Distress		<input type="checkbox"/>
<input checked="" type="checkbox"/> Other	<b>NC58-</b> Voids formed along the pile wall alignment <b>NC58A-</b> Water ponding at the toe of the slope due to presence of a beaver dam to the east of the site (i.e. beaver dam impeding ditch flow); clearing beaver dam conducted in 2018; this area was dry in 2019	<input type="checkbox"/>
<b>Instrumentation: (NC58A: 3PNs)</b>		
<b>NC058A-</b> Slope inclinometers SI14-1 was sheared off at 5.2 m depth; SI14-2 was damaged during pile wall construction in October 2016. From the previous readings, ground water levels decreased by 0.28 m in PP10-3, increased by 0.07 m in PN14-2, remain constant in PN14-2, and ranged from 0.69 m to 1.76 m below existing ground surface.		
<b>Assessment</b> (Refer to attached Figure):		
The implemented remedial measures have been effective in stabilizing the EBL and WBL landslides. However, future crack sealing and/or patching (as needed) should be anticipated until the pile walls mobilize the full magnitudes of the landslide stabilizing forces.		
<b>Recommendations:</b>		
<b>NC058 and NC058A:</b> The local MCI should continue to monitor the site and watch closely for the development of any new cracks or depressions on the highway surface. As discussed, this site should be visited again in 2021 to confirm the effectiveness of the repair measures.		
Existing voids along the tops of the eastbound lane landslide piles should be filled with compacted clay or gravel to eliminate tripping hazards.		





Photo No.1 - General view of the highway lanes at the landslide locations (looking east); the highway was overlaid in July 2018



Photo No.2 - Looking east from the western flank of the eastbound landslide (NC58) at the 2019 crack seals



Photo No.3 - Looking west from the eastern flank of the EBL landslide (NC58) at the 2019 crack seals



Photo No.4 - Looking at a void formed along the tops of the piles (NC58)