GEOHAZARD RISK MANAGEMENT PROGRAM
North Central Region – Edson / Stony Plain Area

2016 Inspection Report

Site Number	Site Name		Hwy	km
NC23	Landslide near Greenwood Lake Road		39:06	13.08
Legal Land Description	NE 4-49-5-W5M			
NAD 83 Coordinates	3TM 114	N5896868	E -44710	
Operational Site Instrumentation	**Slope Inclinometers**		5	
	Pneumatic Piezometers		11	
	Vibrating Wire Piezometers		0	
	Standpipe Piezometers		3	
Date of Last Instrumentation Readings	May 29, 2016			

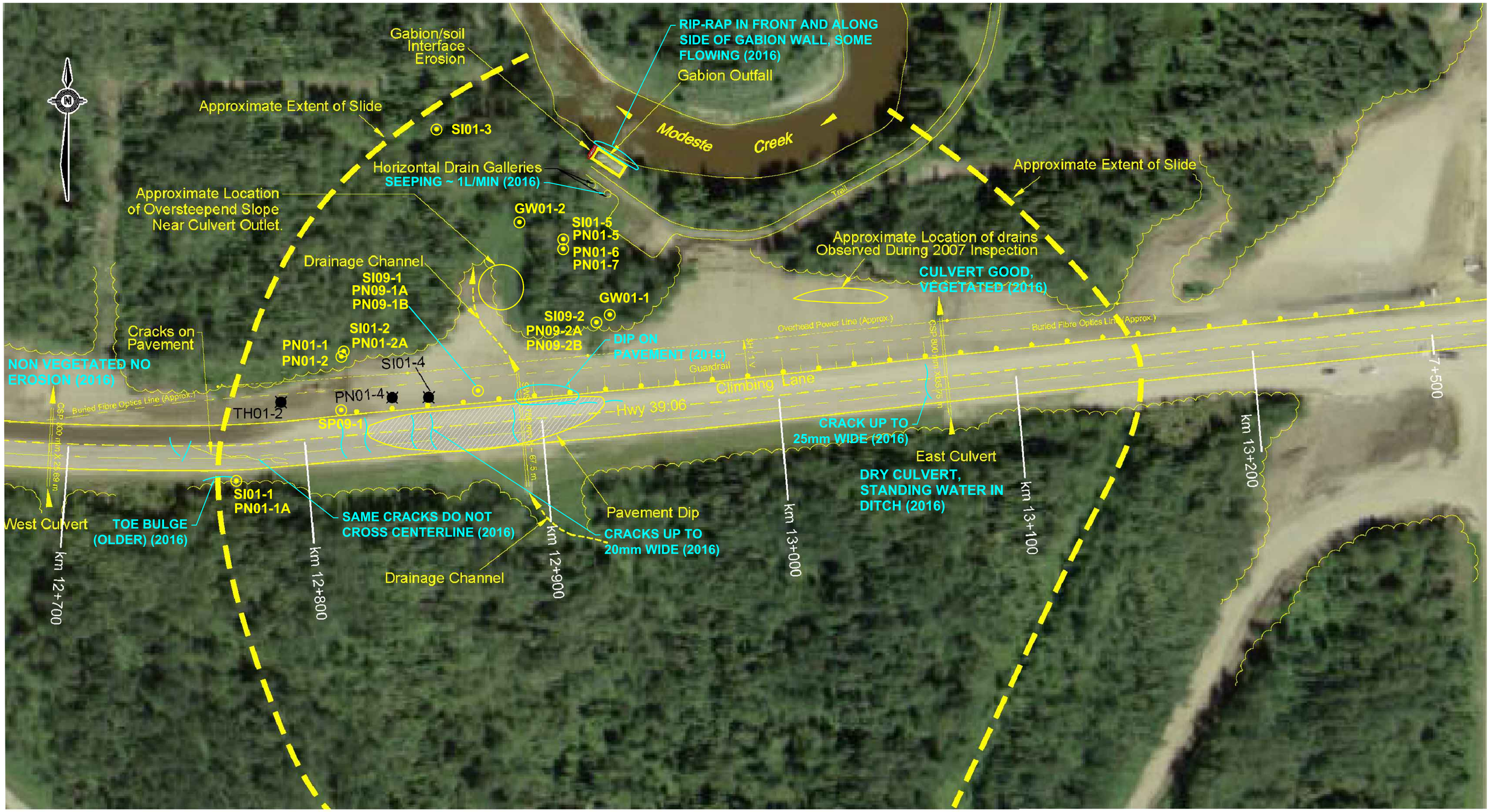
Risk Assessment	Date	PF	CF	Risk Ranking
Current Inspection	June 28, 2016	7	4	28
Previous Inspection	June 16, 2015	7	4	28
Report Attachments	☒ Photographs (12 photos)	☒ Site Plans (1 page)		

	Stantec	Alberta Transportation
Inspected By	Carrie Murray and Leslie Cho	Rishi Adhikari, Brennan Evans, and Wilf Cousineau
Date of Remediation	2005 – Horizontal drainage galleries and gabion walls constructed along Modeste Creek	

	2007 – French drains constructed to enhance subdrainage 2015 - riprap placed in front and around gabion outfall		
Recent Maintenance	2007 – Westbound passing lane constructed. Periodic sealing of pavement cracks		
Primary Site Issue	Site is situated within a large historic landslide failing toward Modeste Creek.		
Observations	**Description and Location**	**Change from Previous Inspection**	
☒ Pavement Distress	Pavement cracks at various locations along Highway 39. Dip in pavement at approximately km 12+900	☒ Yes	☐ No
☐ Culvert Distress		☐ Yes	☐ No
☐ Bridge Distress		☐ Yes	☐ No
☒ Slope Movement	Toe bulge near SI10-1 at approximately km 12+760	☐ Yes	☒ No
☐ Erosion		☐ Yes	☐ No
☐ Seepage		☐ Yes	☒ No
☐ Other		☐ Yes	☒ No

Discussion	Pavement cracking consisting of transverse and longitudinal cracks was observed at various locations at the site as shown in Photos 1 to 3. Cracks at the site had widths up to 25 mm with no vertical differential. A slight dip in the pavement was also observed at approximately km 12+900 as shown in Photo 4. The three culverts at the site appeared to be in good condition. The west culvert was observed to be draining. The east culvert at approximately km 13+100 was observed to be dry with standing water in the ditch. The disturbance on the sideslope near km 12+900 noted in the 2015 inspection was not observed during this current inspection. A toe bulge, was observed near SI01-1 as shown in photo 5. The toe bulge was well vegetated and appears to be older. No flow was observed in the east drainage gallery as shown in Photo 6. Two of the nine drainage pipes in the west gallery were flowing as shown in Photo 7. These observations were similar to the 2015 inspection. The gabion outfall along Modeste Creek appeared to be in good condition as shown in Photo 8. Some flow was observed at the gabion outfall. This outfall was observed to be eroding in 2015. Since then, rip rap was placed in front and around the gabion outfall. Vegetation has begun to grow through the recently installed turf mats as shown in Photo 9. Similar to the 2015 inspection, the drainage channel was observed to be wet with ponded water in front of the culvert outlet as shown in Photo 10. No signs of visual distress were observed within the north facing slope as shown in Photos 11 and 12.
Assessment	The piezometer measurements continued to remain stable with little change. However, piezometric levels at PN01-1, PN01-1A, and PN01-2 also remain high ranging from 1 m to 6 m below ground surface. The piezometric levels at PN01-5 to PN01-7 have been lowered since the drain construction in 2005 and remain stable indicating a functioning drain. Increased movements were observed at SI01-1 and may be due to the near artesian pore pressures observed at PN01-1A. The low rate of movements observed in the majority of the slope indicators are further indications that the drains are performing well. The east drain gallery has been noted to be not flowing for two consecutive annual inspections and may be an indication of damage. The south inlet at km 13+100 is too high causing water to pond in the ditch. The grades appear relatively flat near the culvert outlet at km 12+900 and may be hindering positive drainage away from the slope.

Recommendations	Pavement cracks should be sealed to reduce surface water infiltration into the slope and pavement structure. Regular inspections of the culverts should also be completed to ensure water is draining out of them instead of ponding in them to reduce the risk of water infiltration into the slope. The culvert inlet at km 13+100 should be infilled to allow for better drainage into the culvert and reduce ponding within the ditch. Re-grading of the culvert outlet at km 12+900 may also be considered to promote positive drainage away from the slope. Moreover, monitoring of the disturbance area noted in 2015 along the sideslope above this culvert should be continued. Instrumentation monitoring should continue to be completed semi-annually with site inspections completed annually.



LEGEND:

- ⊙ - INSTRUMENT LOCATION
- ✸ - INSTRUMENT LOCATION - DESTROYED

SI - SLOPE INCLINOMETER
PN - PNEUMATIC PIEZOMETER
SP - STANDPIPE PIEZOMETER

0 50 m

NOTE

1. **PREVIOUS OBSERVATIONS SHOWN IN YELLOW**
2. **2016 OBSERVATIONS SHOWN IN CYAN**

Stantec

STANTEC CONSULTING
10160-112 STREET
EDMONTON ALBERTA CANADA

ALBERTA TRANSPORTATION
GEOHAZARD MONITORING PROGRAM
NC-23 GREENWOOD LAKE ROAD, AB
SITE PLAN

DRAWN WW	CHECK CDM	APPROVE ID
DATE 25 JULY, 2016	SCALE AS SHOWN	PROJECT # 123312435

FIGURE - 1 -

Reference: 2016 Annual Inspection Photographs at NC23 – Landslide near Greenwood Lake Road
File Number: 123312435

Photo 1: Sealed pavement crack north of SI01-1 on eastbound lane. Looking northwest.

Photo 2: Transverse crack up to 70 mm wide. Looking north.

Photo 3: Transverse crack up to 100 mm approximately 10 m from the east culvert. Looking north.

Photo 4: Slight dip in pavement at approximately 12+900 km. Looking east.

Photo 5: Well vegetated toe bulge south of SI01-1. Looking west.

Photo 6: No flow in east drainage gallery.

Photo 7: Estimated flow of approximately 1L/min in the west drainage gallery.

Photo 8: Some flow was observed out of the gabion outfall. Looking southwest.

Photo 9: Vegetation growing through the turf mats. Looking north.

Photo 10: Ponded water at the culvert outlet near km 12+900.

Photo 11: Slope north of SI09-1. Looking east.

Photo 12: Slope north of SI09-1. Looking west.