NORTH CENTRAL REGION GRMP
EDSON / STONY PLAIN
SITE INSPECTION FORM

SITE NUMBER AND NAME:	HIGHWAY AND KM:	PREVIOUS INSPECTION:	CURRENT INSPECTION:
NC052 – Pembina River Bridge	621:02, km 16.420	May 22, 2020	June 29, 2021
LEGAL DESCRIPTION:	**NAD83 COORDINATES:**		**RISK ASSESSMENT:**
SE 01-50-09-W5	UTM11U 5905008N, 621749E		PF: 10 CF: 10 Total: 100
AVERAGE ANNUAL DAILY TRAFFIC (AADT):		**CONTRACTOR MAINTENANCE AREA (CMA):**	
1,040 (2020)		509	

SUMMARY OF INSTRUMENTATION:	INSPECTED BY:
Four slope inclinometers, two pneumatic piezometers, three vibrating wire piezometers, and one standpipe piezometer functional **LAST READING DATE:** July 6, 2021	Stantec: Leslie Cho AT: Bernard Ching, Rishi Adhikari, Wilf Cousineau

PRIMARY SITE ISSUE:

Slope instability at east abutment. Artesian pressures at west abutments. Shallow groundwater table at east abutment. Bridge (BF74969) rotating with crushed bearing plates.

APPROXIMATE DIMENSIONS:

40 m wide by 60 m long.

DATE OF ANY REMEDIAL ACTION:

Winter 2014/2015 – Dewatering of east abutment using sub-horizontal drains.

Fall 2020 – Riprap placed on slope south of east abutment to about halfway down slope.

ITEM	CONDITIONS EXIST		DESCRIPTION AND LOCATION	NOTICEABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Transverse crack near SI13-01.		X
Slope Movement	X		Ground crack at toe of east abutment south of riprap channel.	X	
Erosion	X		Downslope of riprap south of east abutment.	X	
Seepage	X		Artesian flow from SI-1 on west abutment.		X
Bridge/Culvert Distress	X		Top of east pier rotating to the east. East abutment pushing into bridge deck. Through cracks in both abutment seats. Separation of guardrails at all four corners of bridge deck.	X	

COMMENTS

- Bridge rotation increased since 2020. The guardrails along the bridge deck have separated with 30 mm, 70 mm, 50 mm, and 20 mm of separation at the NE, SE, NW, and SW corners, respectively (Photos 1 to 4). The top of the guardrail at the SE corner is no longer connected to the post.
- Tiltmeter TW1 historically showed change in rotation between 0° and 0.025° since early 2014. The recent monitoring cycle on July 6, 2021, indicated that the rotation reversed to -0.025° prior to logger failure in November 2020. The change in rotation direction may be related to the increased bridge rotation observed. All tiltmeters are now non-functional.
- All the SIs show signs of creep except for SI13-3. Creeping is occurring at a rate of less than 1 mm/year.
- Piezometric levels at the site have been relatively stable since installing the horizontal drains.
- Concrete cracks at both east and west abutment seats appear unchanged. A 20 mm gap was written onto the crack at the west abutment at an unknown date. This same gap was measured to be 20 mm by Stantec since 2016. (Photos 5 and 7)

- The girders were in contact with the abutment backwall at the east abutment. The bearing plates appear to be crushed at both abutments. (Photo 6)
- The river level appears lower than what Stantec has observed during the previous 6 site inspections. Sediment appears to be depositing around SI14-01 forming a dam feature. (Photo 8)
- The drainage gallery was locked but water could be heard flowing. Minor flow of water was also observed at the gabion outfall. It is unknown who owns the lock to the drainage gallery.
- The ground crack south of the riprap channel lengthened to about 7 m long with vertical difference up to about 0.4 m high.
- The previously observed erosion channel south of the bridge at the east abutment slope was recently regraded with riprap placed. The riprap was placed about halfway downslope (Photo 9).
- The highway surface at the east abutment appears relatively unchanged (Photo 10).
- The nearest detour route to cross the Pembina River appears to be at Range Road 91 and Township Road 491A, approximately a 12-minute drive south of the site. This detour would require the use of gravel roads and may not be suitable for all types of traffic.

RECOMMENDATIONS

- The bridge should be inspected by a bridge engineer.
- The datalogger should be repaired/replaced at each tiltmeter to collect regular readings. Otherwise, regular survey of the bridge should be conducted to monitor its rate of rotation/movement.
- The riprap channel south of the bridge should be extended downslope to the river for increased erosion protection.
- Pavement cracks should be sealed to reduce surface water infiltration into the slope.
- Site inspections should continue annually.
- Instrumentation readings should continue to be read semi-annually.

PREPARED BY: Leslie Cho, M.Eng., P.Eng.	**REVIEWED BY:** Carrie Murray, M.Eng., P.Eng.
PROFESSIONAL ENGINEER ALBERTA LESLIE CHO 2021-10-08 ID# 139079	PERMIT TO PRACTICE STANTEC CONSULTING LTD. Signature Date 13-Oct-2021 PERMIT NUMBER: P 0258 The Association of Professional Engineers and Geoscientists of Alberta ID# 74389

2021 Site Inspection Photos at NC052

Photo 1: Guardrail separation at southeast corner of bridge. Looking southeast.

Photo 2: Guardrail separation at northeast corner of bridge. Looking north.

2021 Site Inspection Photos at NC052

Photo 3: Guardrail separation at northwest corner of bridge. Looking north.

Photo 4: Guardrail separation at southwest corner of bridge. Looking south.

2021 Site Inspection Photos at NC052

Photo 5: Cracking of east abutment. Looking east.

Photo 6: Girders in contact with east abutment. Movement of bearing plate. Looking south.

2021 Site Inspection Photos at NC052

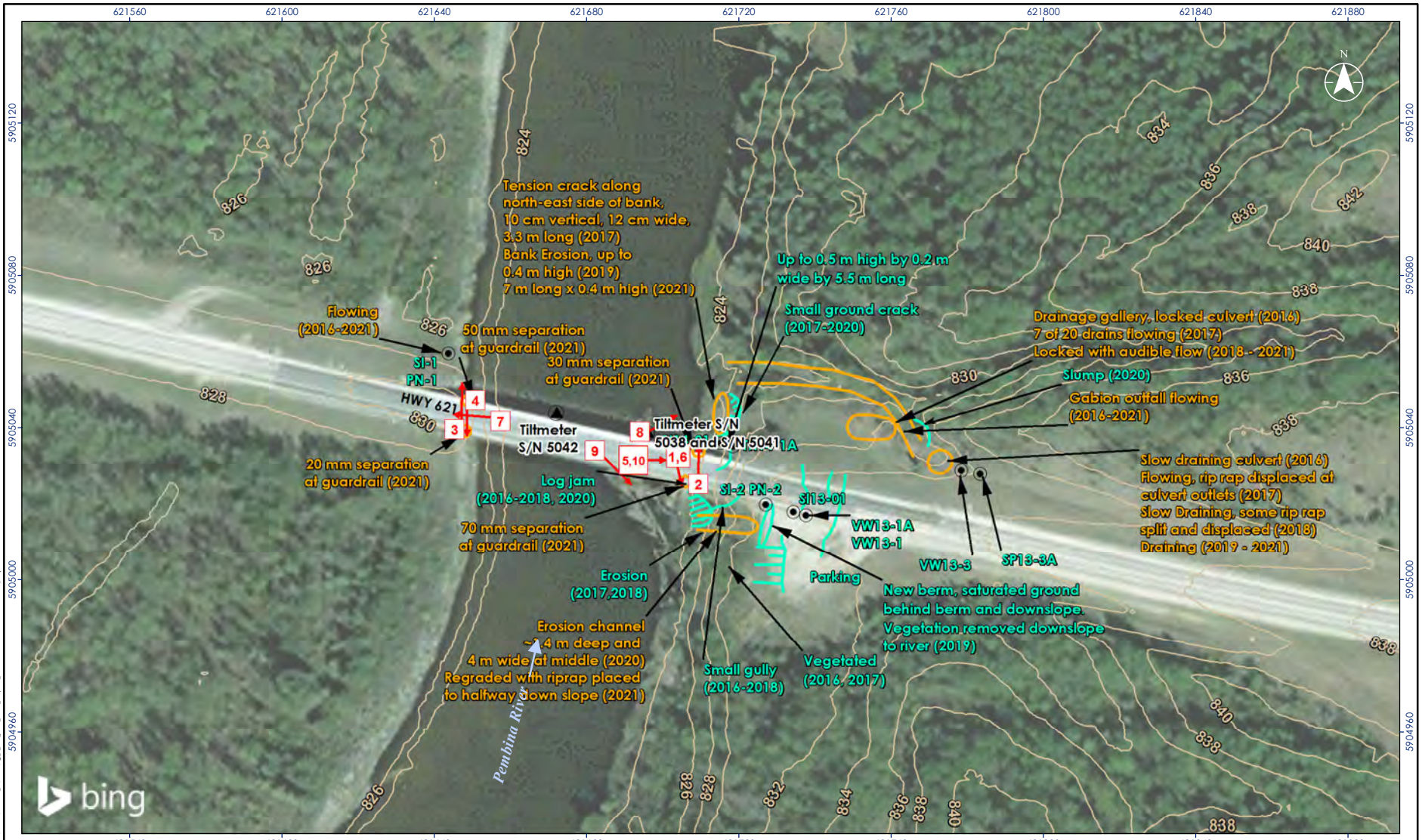
Photo 7: 20 mm crack at west abutment. Looking west.

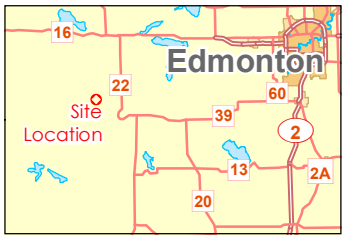
Photo 8: Riprap lined channel north of east abutment. Ground cracks near SI14-01. Looking northeast.

2021 Site Inspection Photos at NC052

Photo 9: New riprap placed south of bridge along previous erosion channel. Looking southeast.

Photo 10: Highway surface at east abutment. Looking east.





- Instrument Location
- Tiltmeter
- Previous Observation
- 2021 Observation
- Ground Elevation Contours (m AMSL, LiDAR June-Nov. 2012)
- Photo Number and Direction

0 25 50 metres

1:1,500 (At original document size of 8.5x11)

Notes
1. Coordinate System: NAD 1983 UTM Zone 11N
2. Base features: Geogratis, ©Department of Natural Resources Canada, All rights reserved.
3. Imagery: Microsoft Bing product screen shot(s) reprinted with permission from Microsoft Corporation.

Stantec

Project Location	123315222
Hwy 621:02	Prepared by AK on 2021-09-01
Alberta	Quality Review by LC on 2021-09-14
	Independent Review by CM on 2021-09-14

Client/Project
Alberta Transportation
Geohazard Monitoring Program
NC52 Pembina River Bridge on HWY 621:02

Figure No.
1

Title
Site Plan