

SITE NUMBER AND NAME: NC067 – Anthony Henday Bridge	HIGHWAY AND KM: 216:06, km 10.528	PREVIOUS INSPECTION: August 16, 2023	CURRENT INSPECTION: June 20, 2024
LEGAL DESCRIPTION: SE 4-52-25-W4	NAD83 COORDINATES: UTM12U 5926734N 326219E		RISK ASSESSMENT: PF: 7 CF: 10 Total: 70
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 82,460 (2023)		CONTRACTOR MAINTENANCE AREA (CMA): AHD	

SUMMARY OF INSTRUMENTATION: 7 slope inclinometers, 23 pneumatic piezometers, and 25 vibrating wire piezometers functional	INSPECTED BY: Stantec: Leslie Cho, Sonja Pharand TEC: Kristen Tappenden
LAST READING DATE: May 17, 2024	
PRIMARY SITE ISSUE: Erosion along the lower slope of the land piers at the north abutment. Slumping adjacent to outfall at south abutment.	
APPROXIMATE DIMENSIONS: North abutment: 50 m wide x 20 m long. Outfall slump: 8 m wide x 25 m long x 1.2 m deep.	
DATE OF ANY REMEDIAL ACTION: Armorflex channel south of bridge repaired in 2015. Riprap extended on outside edges of both sides of highway on upper embankments as part of bridge widening works in Fall 2020/Spring 2021. Erosion control matting and straw wattles installed on sections of the head slopes as part of bridge widening works in Spring 2023.	

ITEM	CONDITIONS EXIST		DESCRIPTION AND LOCATION	NOTICEABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Crack in the asphalt trail on the north slope below the north abutment of the NBL and on the south slope below the south abutment of the NBL.		X
Slope Movement	X		SI2 and SI7 previously showed movement in fill layer. Retrogression of slump at outfall west of south abutment. Progression of slumping at the north land piers, along the north river bank.	X	
Erosion	X		Erosion around north abutment piers spanning both bridge structures. Four erosion gullies/ scour holes adjacent to the downslope side of the pedestrian trail at the north abutment under the northbound lane (NBL). Erosion gully at north bank abutment on north slope causing riprap to settle. Erosion/sedimentation on the west side of the north slope of the SBL. Erosion gullying directly downslope from the SBL north abutment.	X	
Seepage	X		Seepage within the slumping at the north abutment piers and in erosion gullies on north bank below NBL.		X

Bridge/Culvert Distress	X		Outfall pipe separated behind outlet. Ponding under separated pipe. Beveled end separated with about 50 mm gap.		X
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COMMENTS

North Side:

- Aside from ongoing erosion and slumping at the north abutment piers, the site appeared mostly unchanged.
- Significant erosion/slumping was observed at the land piers of the north bank (Photos 1 to 3). Ongoing erosion/slumping may be due to river scour and high intensity precipitation events. The extent of erosion increased resulting in additional loss of soil support around the piers and a call-out inspection in August 2023. Minor change was observed since the 2023 call out inspection. In discussion with TEC, bridge piers are typically designed without lateral support, to account for soil loss.
- Seepage was observed within the erosion and slumping at the north abutment piers, carrying fines to the river (Photos 1 and 2).
- The slope above the westernmost land pier has been completed, with the upper portion recently graded and lacking vegetation (Photo 4). A concrete drainage trough has been installed at the west side of the SBL abutment, to direct water off the bridge to the riprap on the headslope.
- Water draining from the west side of the north NBL bridge abutment appears to be flowing off the waterproofing membrane behind the abutment wall and missing the trough which is leading to erosion of the slope. The erosion gully below the NBL north abutment, on the west edge of the riprap appears to be in similar condition as the 2023 call out inspection (Photo 5). The erosion gully is undermining the geotextile, and riprap has fallen into the gully.
- The four large erosion gullies / scour holes downslope of the pedestrian trail below the NBL appeared to be similar in size as the 2023 call out inspection. The gullies are up to 1.3 m deep and 1.1 m wide (Photo 6). The material within the westernmost erosion gully was wet.
- Minor trail loss and pavement cracking appeared unchanged from the 2023 inspections (Photo 7).
- Erosion gullies up to 0.4 m wide and 0.6 m deep directly downslope from the trail between the two bridge alignments are unchanged since the 2022 site inspection.
- A depression was observed between the NBL and SBL, on the downslope side of a trail between the two abutments. The depression was approximately 300 mm deep, and 1 m wide.
- SI2 and SI7 previously showed movement in the fill. SI2 was installed in the pile wall and showed an average rate of movement of about 3 mm/yr in the upper zone (~3 m depth) since 2014 prior to being destroyed in 2022 during construction activities. SI7 showed a similar rate of movement as SI2 for the middle movement zone (~7 m depth) since 2009 and a slightly higher rate of movement than SI2 for the upper zone (4 mm/yr at about 3 m depth). An increase in movement rate to 32 mm/year was observed in the upper zone of SI7 during the 2022 instrument reading cycle which was likely due to excavations and spoil pile placed around the SI. SI7 was sheared at approximately 6 m below the top of the pipe during the 2023 spring reading cycle. SI1 and SI3, installed in the pile wall, have shown no discernable movement in the pile wall aside from pile wall deformation, but do show movement in the fill (~2.5 m depth) with current rates of movement of less than 1 mm/yr and 6 mm/yr, respectively. Approximate SI locations are shown on Figure 2.
- The pneumatic piezometers on the north bank below the AHD showed little change from the previous readings aside from one piezometer which indicated a 2 m decrease in piezometric elevation.
- The culvert inlet in the west ditch northwest from the SBL north abutment was observed to be clear of debris and dry.
- The catch basin located in the ditch between the SBL and NBL approximately 20 m northwest from the crest of the headslope appeared to be relatively clear of debris, with minor sedimentation in the surrounding ditch.

South Side:

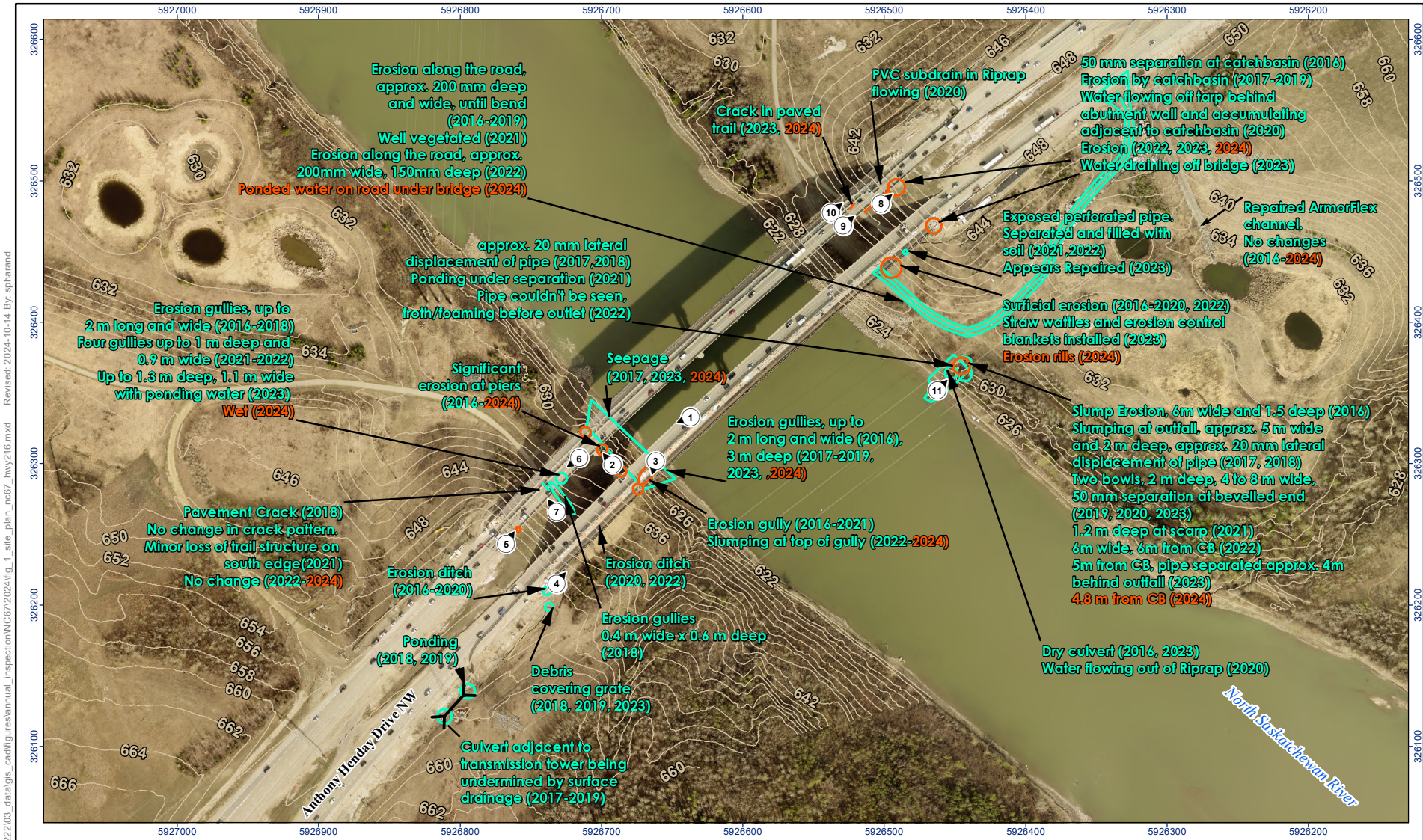
- Erosion is ongoing down the informal biking/ walking trail approximately below the southbound lane.
- Ponding water was observed along the access road below the bridge.
- Ongoing erosion was observed on the south slope below the abutment of the NBL. Water was previously observed to be flowing off a waterproofing membrane behind the abutment wall, missing the trough that would direct water to a catch basin, and flowing downslope resulting in erosion of the head slope. A slight separation was observed between the catch basin and the underlying riser ring which could be allowing water flow onto the headslope. Furthermore, it appears that the catch basin is not connected to an underground drainage system (Photo 8). The gully is up to 0.6 m deep and 0.6 m wide (Photo 9).
- The crack across the paved trail observed on the south slope below the NBL appeared relatively unchanged since 2023 (Photo 10).

- The erosion/slumping adjacent to the outfall at the south abutment appeared to have progressed since the 2023 site inspection. The scarp is still 6 m wide but has retrogressed 0.2 m southeast and is currently 4.8 m from the catch basin (Photo 11).

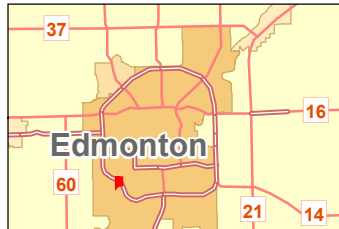
RECOMMENDATIONS

- The site should be regularly monitored by the MCI and/or current Southwest Anthony Henday Drive (SWAHD) Lane Widening team until the following recommended remediation can be undertaken.
- Pavement cracks along the pedestrian trail should be sealed to reduce surface water infiltration into the slope.
- The waterproofing membrane behind the abutment walls on the NBL should be repaired to direct water into the drainage trough on both sides of the river. Any associated catch basins/ drainage chutes should be checked for blockage and cleaned as necessary.
- The erosion gullies should be regraded and reseeded to improve erosion protection and reduce the risk of additional loss of trail. At the north side, the undermined geotextile should be removed and replaced followed by backfilling with additional riprap. Alternatively, a concrete trough could be installed to direct water down the headslope. A concrete trough could also be considered for the erosion gully along the northbound lane abutment on the south side. Stantec submitted two tender packages for site remediation in 2019:
 - North abutment slope: remediation includes flattening the slope to 2.5H:1V and armoring the slope with riprap. Additional surface drainage improvements will also be constructed. The estimated cost for construction is approximately \$1,575,000, excluding engineering costs. Construction was previously scheduled for 2024 and was rescheduled to 2026.
 - Outfall remediation as part of NC79 work: Replace separated sections of pipe with 750 mm reinforced concrete pipe. Reline storm sewer with cured-in-place pipe installed at 5% slope. The estimated cost for construction is approximately \$950,000, excluding engineering costs. Construction has been rescheduled for 2026.
 - The above should be reviewed for feasibility due to ongoing changes at the site and updated to be in accordance with recent updates to TEC specifications.
- Site inspections should continue annually.
- Instrumentation monitoring should continue semi-annually.

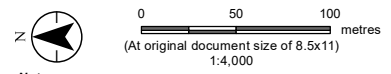
PREPARED BY: Sonja Pharand, P.Eng.	REVIEWED BY: Leslie Cho, M.Eng., P.Eng.	PERMIT TO PRACTICE



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- Photo Number and Direction
- Previous Observation
- 2024 Observation
- Ground Elevation Contours (m AMSL, LiDAR April-May 2018)
- Culvert



- Notes**
- Coordinate System: North American 1983 CSRS UTM Zone 12N
 - Data Sources: Geogratis, ©Department of Natural Resources Canada,
 - Background: City of Edmonton 2023.

Project Location
 03/04-052-25 W4M
 City of Edmonton, Alberta

Client/Project
 Transportation and Economic Corridors
 Geohazard Monitoring Program
 NC67 Anthony Henday Bridge

Figure No.
1

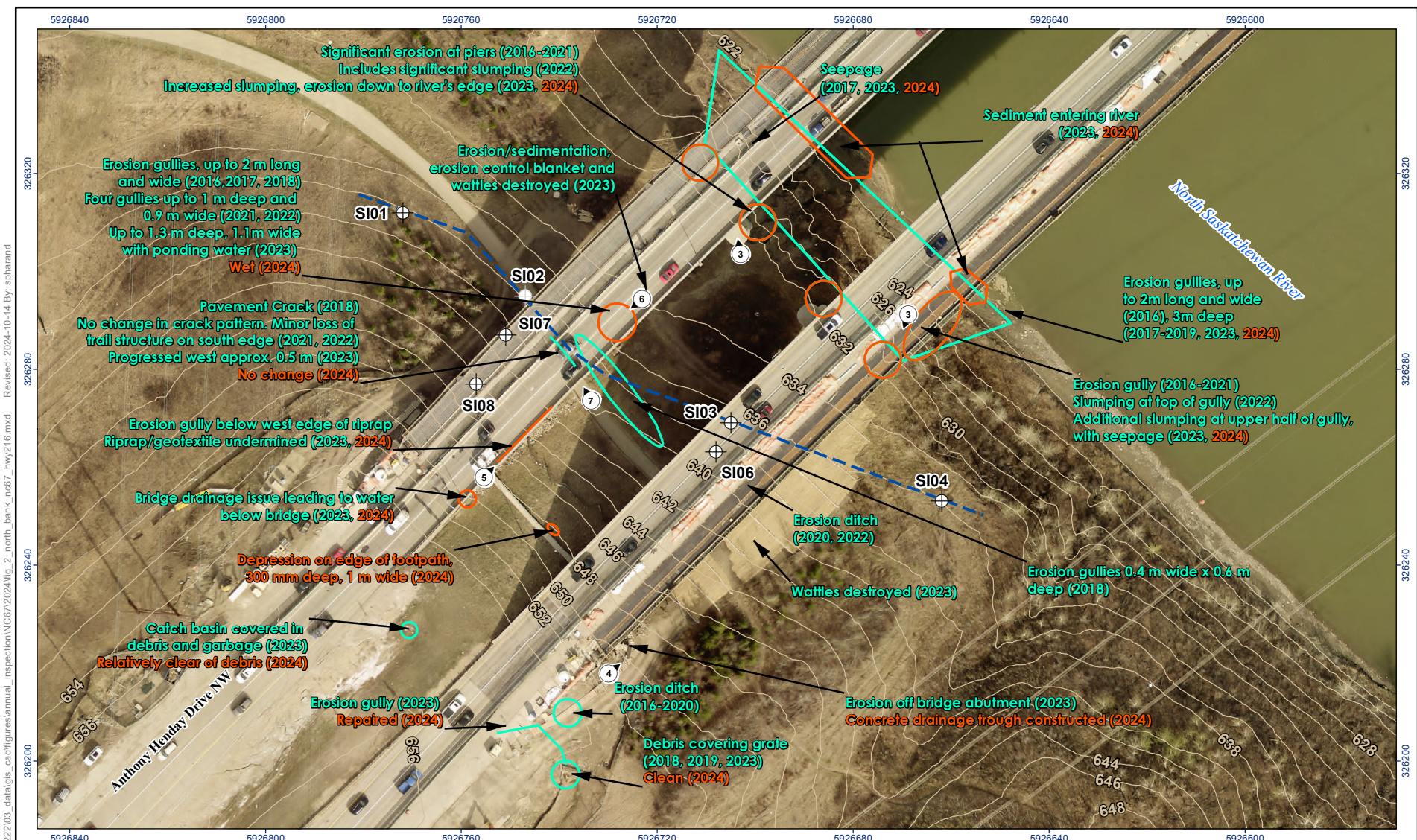
Title
Site Plan

Prepared by SP on 2024-10-13
 QR by SP on 2024-10-13
 IR by LC on 2024-10-13

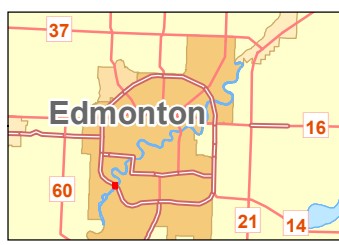
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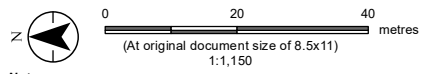
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 Revised: 2024-10-14 By: spharand



- Previous Observation
- 2024 Observation
- Approximate Location of Pile Wall
- Ground Elevation Contours (m AMSL, LIDAR April-May 2018)
- ⊕ Approximate Slope Inclinometer Location
- ⊕ Previous Slope Inclinometer Location
- ⊙ Photo Number and Direction



- Notes**
1. Coordinate System: North American 1983 CSRS UTM Zone 12N
 2. Data Sources: Geogratis, ©Department of Natural Resources Canada,
 3. Background: City of Edmonton 2023.

Project Location: 03/04-052-25 W4M
 City of Edmonton, Alberta
 Client/Project: Transportation and Economic Corridors
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 NC67 Anthony Henday Bridge
 Prepared by SP on 2024-10-13
 QR by SP on 2024-10-13
 IR by LC on 2024-10-13
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Figure No. **2**
 Title **Site Plan - North Bank**



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2024 Site Inspection Photos at NC067



Photo 1: Erosion of land piers at the north bank. Looking north.



Photo 2: Loss of soil support at pier. Looking northeast.

2024 Site Inspection Photos at NC067



Photo 3: Erosion at outermost pier of southbound lane. Looking northwest.



Photo 4: View from top of north slope, down to northwestern pier. Drainage trough installed at SBL north abutment. Looking southeast.

2024 Site Inspection Photos at NC067



Photo 5: Erosion gully on west edge of riprap on the north bank under the NBL. Looking southeast.



Photo 6: Four scour holes downslope of pedestrian trail under NBL. Looking northwest.

2024 Site Inspection Photos at NC067



Photo 7: No change to trail crack pattern. Minor loss of trail. Looking northeast.



Photo 8: Catch basin on west side of NBL south abutment, not connected to an underground drainage system. Looking southeast.

2024 Site Inspection Photos at NC067



Photo 9: Erosion below the NB abutment on the south slope due to damaged waterproof membrane on abutment. Looking southeast.



Photo 10: Crack in the paved trail below the NB lane of south abutment. Looking southeast.

2024 Site Inspection Photos at NC067



Photo 11: Two slumps adjacent and behind the outfall on the south bank of the river. Looking southeast.