Alberta Transportation

CENTRAL REGION
GEOHAZARD RISK ASSESMENT
SITE INSPECTION FORM

Klohn Crippen Berger

SITE NUMBER AND NAME	HIGHWAY & KM	PREVIOUS INSPECTION DATE	INSPECTION DATE
C063 Frost Heave	H11:12 km 24.734	March 2, 2017	**Feb 28, 2018**

LEGAL DESCRIPTION	NAD 83 COORDINATES	RISK ASSESSMENT
NE 24-38-1 W5	Northing 52°16.999' Easting 114°0.579'	PF: 8 CF: 3 TOTAL: 24

2017 Average Annual Daily Traffic (Ref. 70000488) (AADT): 16180 (westbound) 16420 (eastbound)	Contract Maintenance Area (CMA): 19

SUMMARY OF SITE INSTRUMENTATION:	INSPECTED BY:
3 vibrating wire piezometers 3 ground temperature cables LAST READING DATE: January 17, 2018	Chris Gräpel (KCB) Hanh Hong (KCB) Rocky Wang (AT) Tony Penney (AT) Dewayne Wlad (AT)

PRIMARY SITE ISSUE: Frost heave occurring in the westbound highway embankment. Frost heave exacerbated by the installation of 26 drains (8 in the west section, 18 in the east section) across the westbound highway embankment during the twinning of the highway in 2008. Differential heaving is occurring between frost susceptible highway fill and non-frost-susceptible drain backfill resulting in a "rolling" pavement surface

APPROXIMATE DIMENSIONS: West section is approximately 200 m long, east section is approximately 450 m long (westbound lanes only)

DATE OF ANY REMEDIAL ACTION:

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Transverse pavement cracking generally corresponds to locations of drains		X
Slope Movement		X			X
Erosion		X			X
Seepage		X			X
Culvert Distress		X			X

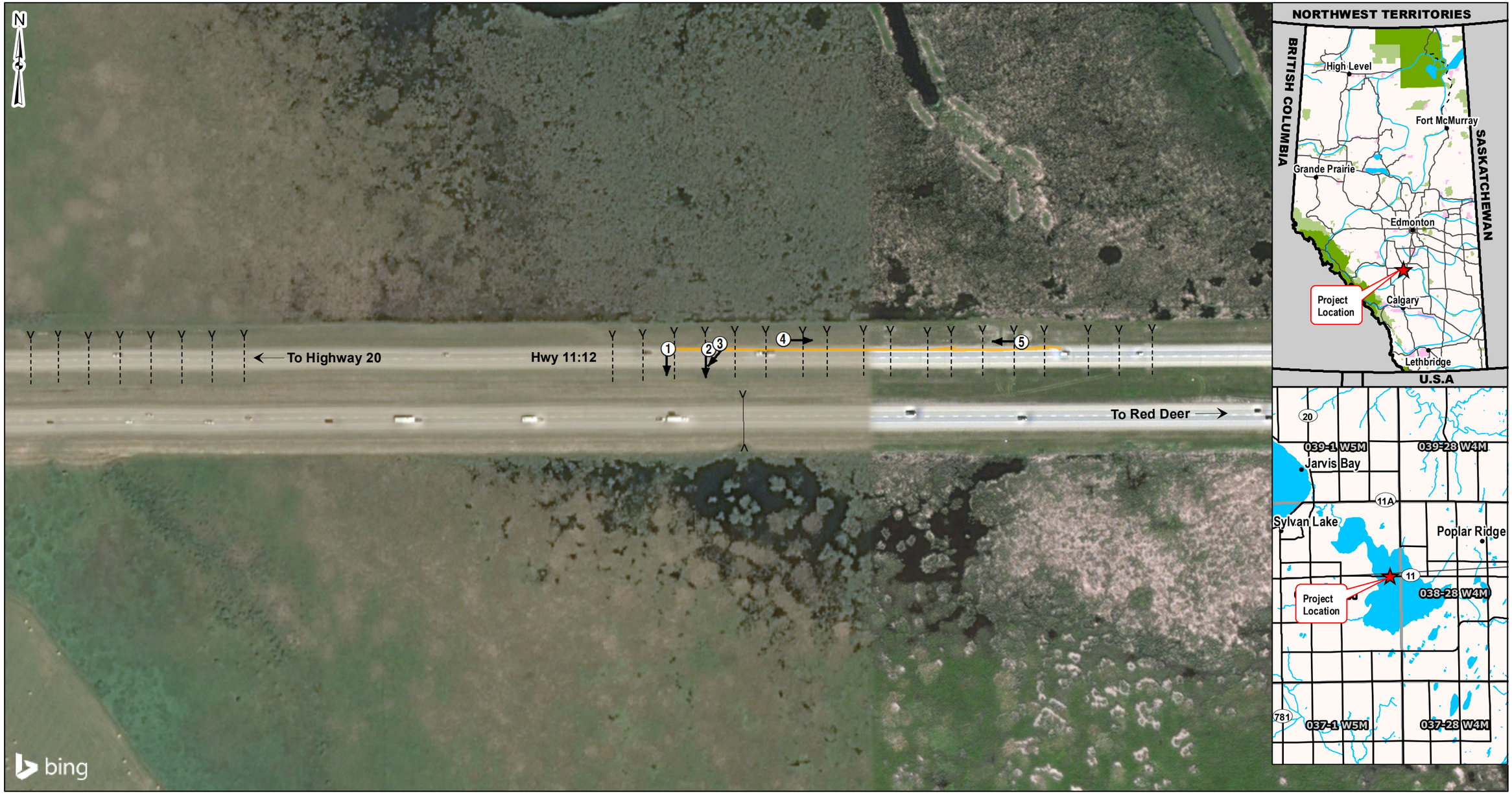
COMMENTS

Frost heaving on the highway appears to occur at the drain backfill locations. Frost heaving observed to have worsen as compared to the previous winter; with the west section heaving more than the east section. Frost heaving observed to be the worst near and west of the yellow rough pavement signs as shown in Photo 3.

A Preliminary Engineering Report was issued by KCB on September 19, 2017 that provided KCB's recommendations for repair work. 3 repair options were presented to AT.

AT prefers repair option 1 that involves excavating the non-frost-susceptible backfill above the drains and then backfilling the excavation with frost-susceptible material. Based on the variability in the existing highway fill, it may be difficult to match the frost-susceptibility of the trench backfill to the existing highway fill. Option 1 may have a high risk of not working and differential frost heave may still occur. KCB, therefore, recommends that a trail section be constructed in the west section to evaluate the performance of repair option 1.

In discussion with AT, KCB will arrange to have a winter pavement-LiDAR survey of the westbound lanes to locate the pavement dips.



Legend

- ① Photo Location
- Photo Direction
- GPS Track (February 28, 2018)
- Drain
- Culvert

0 100 Meters

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM Zone 11N
3. IMAGE SOURCE: Bing Maps 2018, Microsoft Corporation. Image dated September 2013
4. Site visit photos dated February 28, 2018

CLIENT: Alberta Transportation; Klohn Crippen Berger

PROJECT: CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM

TITLE: C063 - Site Inspection
Hwy 11:12, km 24.734

SCALE	PROJECT No.	FIG No.
1:2,500	A05115A02	1

Time: 15:25:16 PM
Date: March 05, 2018
File: Z:\AIEDM\A05115A02 ABT Central Region GRMP\400 Drawings\2018\2. Section B\1. 2018 Frost Heave Tour\MXD\C63_ 180301.mxd

Photo 1 **Transverse pavement cracking along westbound lane (east section). Cracking generally aligns with horizontal drains. Photo taken February 28, 2018 looking south.**

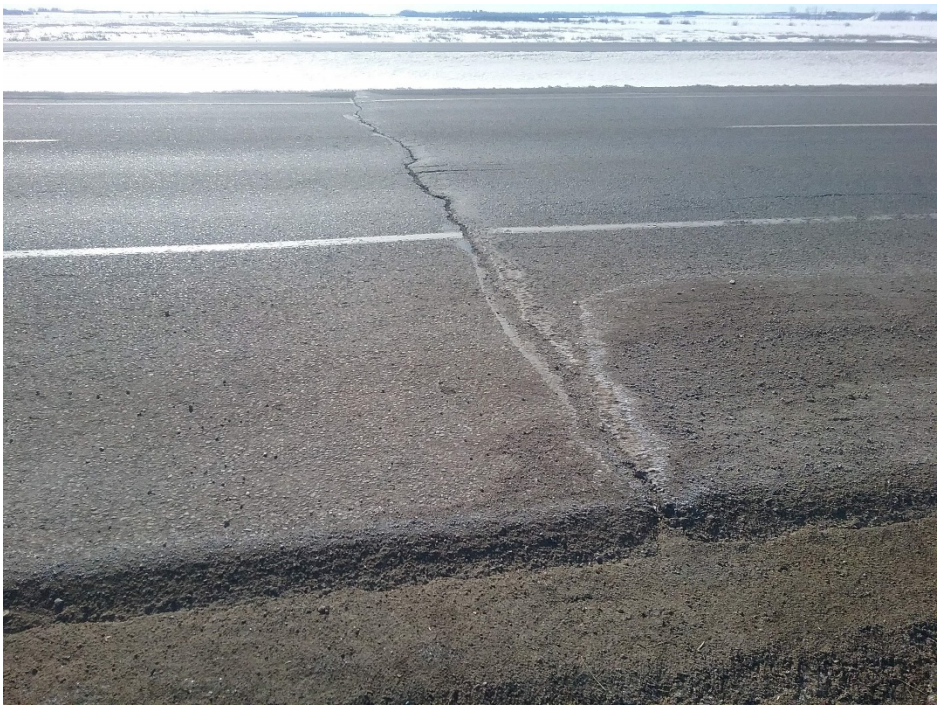


Photo 2 **Transverse pavement cracking and depression along westbound lane (east section). Photo taken February 28, 2018 looking south.**

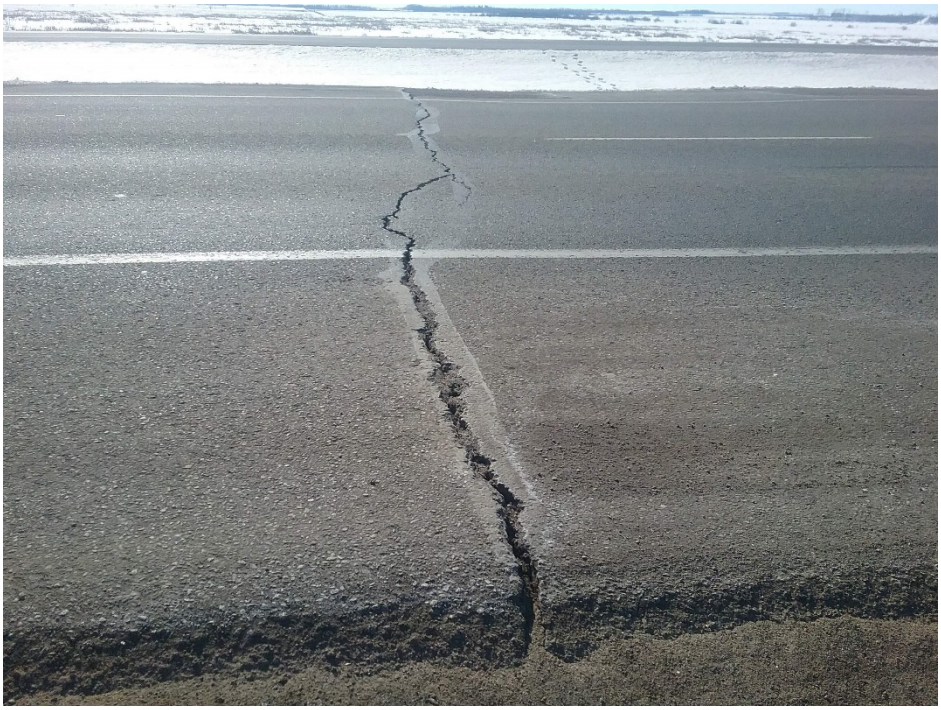


Photo 3 **Location of frost heave site (east section). Photo shows a rolling pavement condition. Photo taken on February 28, 2018 looking southwest.**

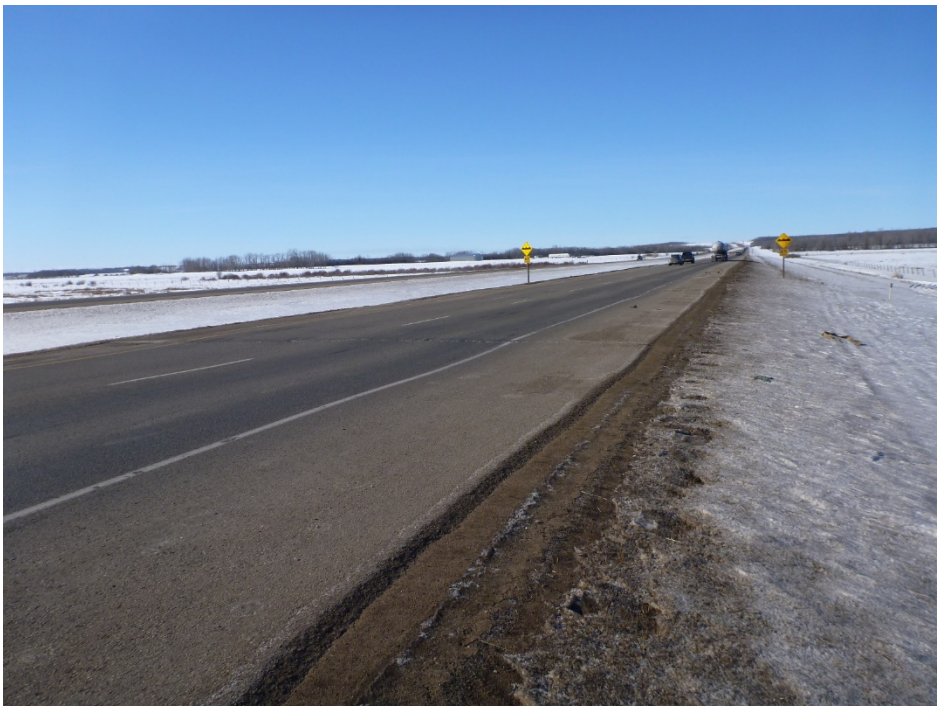


Photo 4 **Location of frost heave site (east section). Photo taken on February 28, 2018 looking east.**

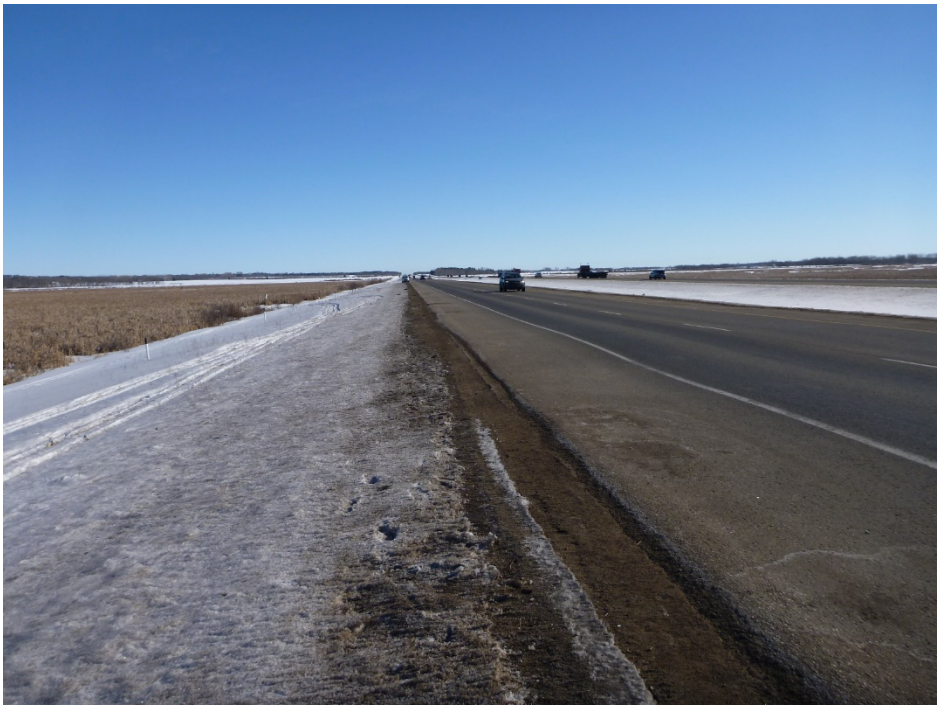


Photo 5 **Location of frost heave site (east section). White posts indicate drain outlets. Photo taken on February 28, 2018 looking west.**