ALBERTA TRANSPORTATION
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION – HIGH LEVEL
2017 INSPECTION

THURBER ENGINEERING LTD.

Site Number	Location	Name	Hwy	km
PH045-1	North of Manning, AB	Meikle River (Pile Wall)	35:08	26.2
Legal Description		**UTM Co-ordinates**		
SW7-94-22-W5M		11U E 467,581	N 6,333,081	

	Date	PF	CF	Total
Previous Inspection:	11-June-2015	10	4	40
Current Inspection:	21-June-2017	7	4	28
Road AADT:	1720		**Year:**	2014
Inspected By:	Roger Skirrow, TRANS Ed Szmata, TRANS		Ken Froese, Thurber Don Proudfoot, Thurber	
Report Attachments:	☑ Photographs	☑ Plans	☐ Maintenance Items	

Primary Site Issue:	Slope movement and erosion affecting highway and sideslope	
Dimensions:	115 m pile wall	
Date of Remediation:	2016: Install H-pile and lagging formwork to backfill around existing cap beam with fillcrete; highway overlaid; new guardrail installed	
Maintenance:	2011: Pitrun placed to repair erosion at drain and repair elephant trunk Frequent patching of voids behind cap beam	
Observations:	**Description**	**Worsened?**
☑ Pavement Distress	Had been cracking and voids against pile wall; these were excavated and filled with grout	☐
☑ Slope Movement	North slide graben relatively unchanged since 2015	☐
☑ Erosion	Erosion beneath wall and around drain pipes repaired;	☐
☑ Seepage	Pile wall voids repaired; subdrain pipe in lower portion of slope exposed and extended	☐
☐ Bridge/Culvert Distress		☐
☑ Other	Sheet metal cover covering H-piles and timber lagging damaged by wind	☑

Instrumentation (as of Fall 2017):

Destroyed	SP10-2, 3, and -5 and VW10-1 and -2 were destroyed before or during construction in 2015.
Inclinometers	Three slope inclinometers (SI-49, -50 and -51) within the cap beam remain operational. Cumulative pile head movements are currently 66 mm to 149 mm with rate of movement of 2.2 mm/year to 5.0 mm/year which are similar to the previous few readings. Rate plots show continued movement in all three SI's corresponding to deflection of the cap beam with no immediately obvious effect from the recent repairs.

Assessment:

Site is subjected to ongoing creep movements of the slope which had been leading to the formation of voids behind the pile wall and cap beam and subsequent loss of material from below the highway and cap beam. During construction it was observed that the tie-back anchors shown on the drawing consisted of 100 mm diameter screw piles drilled at various depths and angles and are free-floating (not connected to the piles or cap beam). These anchors perhaps provide some minimal reinforcement of the slope but do not contribute to holding the wall in place. The excavation behind

the cap beam to clean out the voids was between 1.5 m to 2 m in width and 527 m^3 of grout was required to backfill the excavation. During excavation, there was a hard ledge of asphalt encountered about 1 m below the top of the cap beam from about 30 m to 57 m south of the north end of the cap beam that required an excavator-mounted jackhammer to break up. The pattern of highway surface repairs indicates that that area was likely the lowest point of previous failures. At some point, a base sandwich was required to repair the highway surface. It should be noted that the cap beam had variable thickness being 2 m on the face (downslope) and 1 m on the back (upslope) with the vertical transition occurring near the face downslope of the capped concrete piles.

The repairs undertaken to the wall were to protect against future void formation rather than to provide additional support against movement. It is anticipated that the wall will continue to deflect due to the creep movement of the slope. However, having grout adjacent to and below the cap beam should inhibit erosion and the subdrain installed below the highway GBC against the cap beam should capture and channel water better than occurred in the past.

Recommendations:

Short-Term:

- Repair the flashing along the top of the timber lagging wall. It may be possible to salvage some of the pieces. It is recommended that a sealant be used against the concrete and that more frequent sheet metal screws with larger washers be used to secure the flashing. It is also recommended that the bottom edge of the flashing be screwed or bolted to the timber lagging, particularly at the overlap of adjacent pieces, to provide additional resistance against wind.

Long-Term:

- It may become necessary to install tie-backs to limit movement of the wall to avoid failing the piles. A geotechnical investigation and analysis of pile-soil interaction will be necessary to design the tie-back system.

Ongoing Investigation:

- It is suggested that the annual GeoHazard inspections be carried out at least one more year and that bi-annual instrumentation readings should continue as scheduled.

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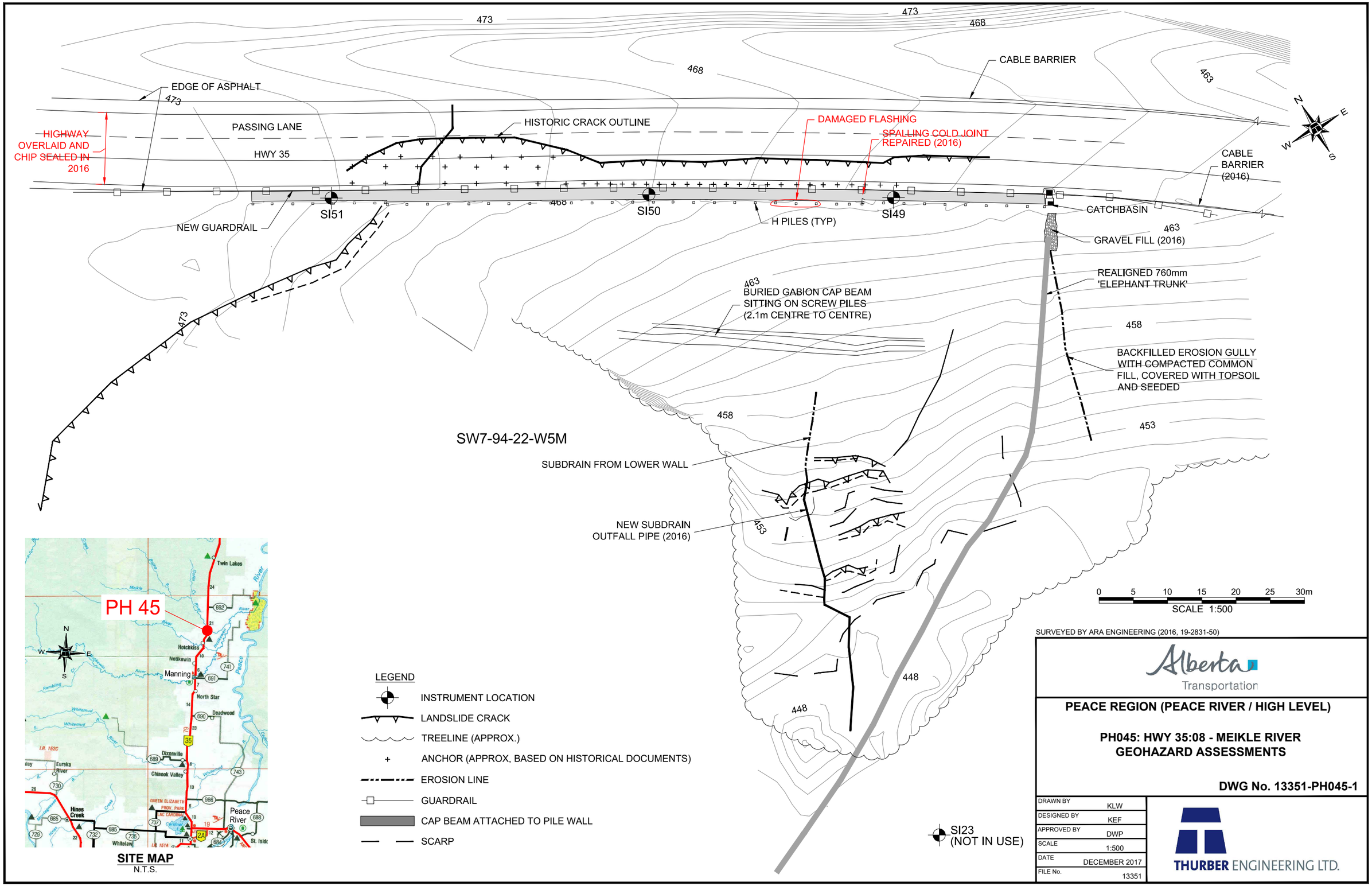

SITE MAP
N.T.S.

LEGEND

- INSTRUMENT LOCATION
- LANDSLIDE CRACK
- TREELINE (APPROX.)
- \+ ANCHOR (APPROX, BASED ON HISTORICAL DOCUMENTS)
- EROSION LINE
- GUARDRAIL
- CAP BEAM ATTACHED TO PILE WALL
- SCARP

SI23 (NOT IN USE)

SURVEYED BY ARA ENGINEERING (2016, 19-2831-50)

Alberta Transportation

PEACE REGION (PEACE RIVER / HIGH LEVEL)

PH045: HWY 35:08 - MEIKLE RIVER GEOHAZARD ASSESSMENTS

DWG No. 13351-PH045-1

DRAWN BY	KLW
DESIGNED BY	KEF
APPROVED BY	DWP
SCALE	1:500
DATE	DECEMBER 2017
FILE No.	13351

THURBER ENGINEERING LTD.

Photo 1 – Looking northwest at catch basin and pile wall.

Photo 2 – Catch basin inlet at south end of wall leading to the elephant trunk downpipe.

Photo 3 – Looking downslope at “elephant trunk” drain pipe.

Photo 4 – Looking northwest at repaired and overlaid asphalt surface. Note new bridge rail installed along the top of the cap beam and damaged flashing at about the center of the wall.

Photo 5 – Looking northwest at main section of damaged flashing.

Photo 6 – Looking southeast at repaired and overlaid asphalt surface. Note new bridge rail installed along the top of the cap beam.

Photo 7 – Looking northeast at subdrain in the lower part of the slope that was located and extended during 2016 construction.

Photo 8 – Looking north at graben block northwest of the wall.

Photo 9 – From the north end looking east at pile wall with scarp in foreground.