THURBER ENGINEERING LTD.

ALBERTA TRANSPORTATION GEOHAZARD ASSESSMENT PROGRAM
PART A: FILE REVIEW

PEACE REGION – PEACE-HIGH LEVEL

PH30 JUDAH HILL – LOOKOUT SLIDE

Legal Location:	SE¼20-083-21 W5M
Nearest Landmark:	2 km south along road from CNR crossing
Highway Control Section:	Hwy 744:04
Date of Initial Observation:	1984
Date of Last Inspection:	2008
Last Inspected By:	Thurber Engineering Ltd.
Instrumentation Installed:	None
Instrumentation Operational:	None
Risk Assessment: (as of last inspection)	PF = 8 CF = 3 Risk = 24

1. INTRODUCTION

The site is located 2 km south of the CN Rail level crossing (km 59.6) on Hwy 744 near the town of Peace River. The site includes the Sagitawa Lookout, a landscaped picnic area and asphalt-surfaced parking area at km 57.5, and extends along Hwy 744 north to km 57.7 near the margin of the Michelin Slide. The Heart River site (PH12) is just south of the Lookout site.

Highway 744 runs south from Peace River through Marie-Reine to Highway 683 and on to Highway 49 near Girouxville. For the first 2 km south of the town of Peace River, it climbs roughly 200 m up the valley wall of the Peace River to prairie level at elevation 545 m.

This site consists of four 5 m to 20 m wide slide bowls originating near the crest of the slope, with some indications of incipient slide movement further north. The upper portion of the slope is at around 38º, then flattens and becomes irregular as it descends towards the Peace River. Slide 1 is near the road, just north of the Lookout, and has a well defined lobe of debris extending downslope. Slide 2 is encroaching on the car park for the Lookout, while slides 3 and 4 are further south, near the picnic area. Slides 3 and 4 are relatively shallow features. Only Slide 1 directly affects the road.

The location of the site is shown on Figure 1, while site details are shown on Figure 2, based on the last inspection.

This section is a review of files made available by Alberta Transportation regarding this site, and has been conducted to update the previous Part A review, which covered all the Judah Hill sites.

2. BACKGROUND

2.1 Bedrock Geology

Based on the AGS 1:1,000,000 bedrock geology map of Alberta, the following bedrock units occur in the valley slope down to the Peace River:

- Dunvegan Formation – fine sandstone with hard calcareous beds, laminated siltstone, silty shale.

- Shaftsbury Formation – silty shale and shale, ironstone beds, bentonite partings, thin silty and sandy intervals.

- Peace River Formation – silty shale, fine sandstone, silty interbeds.

No rock is exposed at the immediate site – cross-sections presented on the published hydrogeological maps suggest a considerable thickness of surficial materials overlie the rock.

2.2 Surficial Geology

AGS Map 291 (Surficial geology of the Grimshaw area) indicates a local veneer of eolian sand and silt overlying glaciolacustrine fine sand, silt and clay on the upland, with mixed colluvial materials on the slopes. Coarser sand and gravel deposits have been noted in road cuts locally along Hwy 744.

2.3 Hydrogeology

The ARC 1:250,000 Hydrogeological map of Peace River does not show springs or flowing wells (mainly completed within glacial deposits) in this area. Perched aquifers are expected locally, associated with local pockets of sand and gravel. Such pockets can become confined where covered by colluvium or fill on slopes.

2.4 Geomorphology

The site is at the crest of the east valley slope of the Peace River, on a ridge formed between the Peace River and Heart River. Highway 744 runs down the west side of the ridge as it decreases in height and narrows northwards, towards the town of Peace River. The sides of the Peace River and Heart River valleys are characterised by extensive landslide activity. Common landslide mechanisms in this region include:

- Earthflows caused by sudden saturation of surficial material.

- Landslides with a base in the weak Shaftsbury Formation shales.

- Landslides within weak glaciolacustrine silts and clays.

At this site, other factors that might influence landslide occurrence include saturation of downslope road fill, and drainage off the impermeable road surface. There are two larger slides and some smaller skin failures near the crest of the valley slope. The general valley slope at this location is around 38 degrees.

- Slide1, to the north of the lookout, is likely what was referred to as Debris Slide 6 in previous reports. It is apparently inactive at present, having been active in 1997 and 1998, with repair in August 1998 consisting of reinforced granular and light weight fill and a drain. It is currently a roughly 30 m wide feature with a 2 m high apparently stable (vegetated) backscarp roughly 4 m away from the guardrail. The overall slope from the backscarp to the toe of the earthflow is roughly 22 degrees.

- The Lookout slide (slide 2) is a roughly 20 m to 30 m wide feature that has extended into the parking area by 1 m to 2 m, requiring a jog in the Armco barrier around the feature. The slide runout appears to be an earthflow type feature, and extends roughly 100 m downslope into an area of trees. The earthflow appears inactive, and is grassed, but there are still cracks and possible movement in the backscarp area of this slide.

- Slide 3 is a roughly 5 m wide skin failure (probably of the order of 0.3 m to 0.5 m deep) at the crest of the slope at the south end of Slide 2. It is currently 5.5 m back from the new fence around the lookout area.

- Slide 4 is just south of the lookout area and is a roughly 10 m wide shallow failure that doesn't appear to be currently active. It isn't of immediate concern to the lookout area, and is roughly 70 m away from the road.

These features appear to be related to surface runoff or near-surface seepage, with retrogression of the backscarp apparently related to higher rainfall years.

3. HISTORIC INFORMATION

3.1 Summary

Highway 744 was first paved in 1984, and shortly after this Alberta Transportation began noting stability problems. The main focus of work on Judah Hill has been the landslide at the CN Rail crossing at km 59.6 where several attempts were

made to stabilise the slope, culminating in the current pile wall. Other significant problems have occurred at the Fence slide (previously Zone B1) and at the Makeout and Michelin slides (Previously Zones D1 and D2).

Although there have been site investigations and site visits conducted for specific problems along Hwy 744, no test holes have been drilled at this site.

In 1997 the road alignment was shifted to the east from km 57.5 to km 58.2, including shifting the road away from Debris Slide 6 at km 57.55. Further movement and repairs occurred in 1998, with a geogrid reinforced gravel and lightweight (shredded tyre) fill slope constructed in August 1998. During 2006 and 2007 the picnic site was landscaped with a new metal fence constructed around the grassed area.

3.2 Chronology

1984	Hwy 744 first paved
1997	Road re-alignment from km 57.5 to 58.2, including shifting the road away from Debris Slide 6 at km 57.55 (based on the AMEC plan in 2000 Part A Review, this is assumed to be the slide to the north of the Lookout)
March 1998	Presentation of designs by Agra Earth and Environmental (AEE) for repairs of Debris Slides 1 and 6 (Lookout Slide 1) – reconstruction of the slopes with granular fill.
April 1998	Repair of Debris Slides 1 and 6 (Lookout Slide 1).
August 1998	Failure of the repaired slope at Debris Slides 1 and 6 (Lookout Slide 1). AEE proposed an alternate repair consisting of excavation of slide debris and re-grading of backslope, installation of perforated drain, placement of lightweight fill (shredded tyres) and geogrid-reinforced clay cap.
September 1998	Repair of Debris Slide 6 (Lookout Slide 1).
October 1999	Hwy 744 re-paved.
June 2005	Cracking in the asphalt car park at Slide 2 retrogressed since the 2004 inspections. Some cracks in the pavement noted in the roadway at Slide 1.
May 2007	Picnic site at Sagitawa Lookout has been landscaped prior to May 2007 inspection – ground surface has been re-graded

	eliminating low spots, new grass laid, concrete walkways and new picnic tables installed, steel post fence around the site. Some worsening of cracking in the roadway at Slide 1 and new cracks noted at km 57.7.
June 2008	Additional cracking in the roadway between km 57.7 and km 57.55 (at the culvert crossing) prior to the June 2008 inspection.

NOTES:

1 LOCATION DATA RECORDED USING HAND HELD GPS RECEIVER. ALL LOCATIONS ARE APPROXIMATE AND ARE FOR ILLUSTRATIVE PURPOSES ONLY.

0 100 200 300 400 500 m

DRAWN BY ICB	DESIGNED BY	APPROVED BY
SCALE 1:10 000	DATE OCTOBER 29, 2008	FILE No. 15-16-213A-C1A

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PEACE REGION (PEACE RIVER/HIGH LEVEL)
JUDAH HILL

KEY PLAN

FIGURE 1

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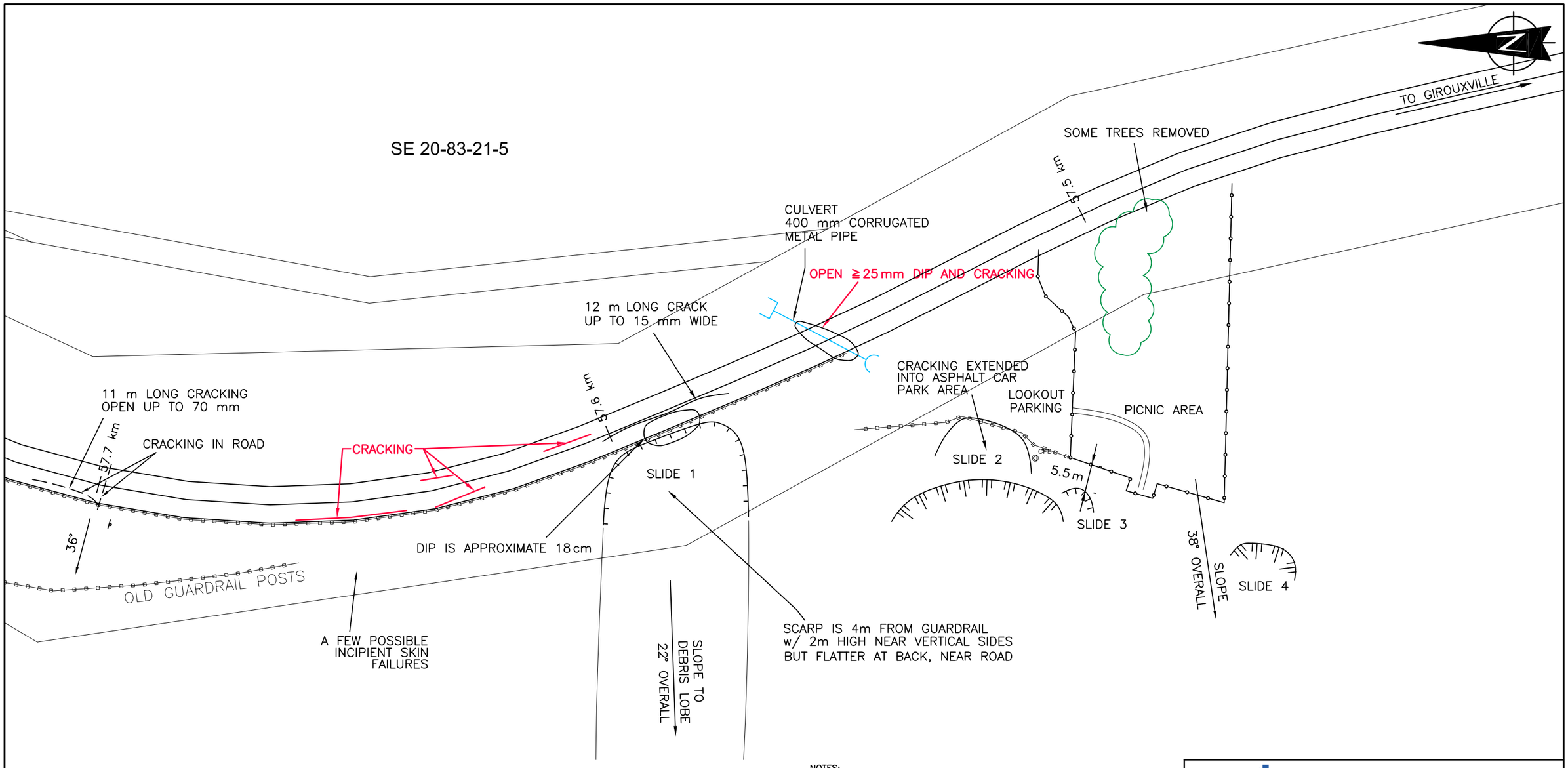

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2 2008 OBSERVATIONS SHOWN IN RED

0 10 20 30 40 50 m

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SCALE 1:750	DATE OCTOBER 29, 2008	FILE No. 15-16-213A-C0A	

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PEACE REGION (PEACE RIVER/HIGH LEVEL)
PH 30 LOOKOUT SLIDES

SITE PLAN

FIGURE 2

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