



THURBER ENGINEERING LTD.

December 21, 2018

File: 13351

Alberta Transportation
Provincial Building
9621 – 96 Avenue
Peace River, Alberta
T8S 1T4

Attention: Mr. Ed Szmata

**GEOHAZARD ASSESSMENT PROGRAM
CALL-OUT INSPECTION REPORT
HWY 2:68 KM 12.30 TO KM 12.42
NE08-080-04-W6M
(PH001-2) DUNVEGAN NORTH SITE**

Dear Sir:

Under the Geohazard Assessment Program, Thurber Engineering Ltd. (Thurber) was requested by Mr. Ed Szmata of Alberta Transportation (AT) to conduct a Call Out inspection at the above noted geohazard site.

The Call Out was completed by Mr. Shawn Russell, P. Eng. and Mr. Don Proudfoot of Thurber with Mr. Szmata, Mr. Roger Skirrow, P.Eng. and Mr. Edgar Parreno of AT on May 15, 2018.

1. OBSERVATIONS

Selected photographs taken during the Call Out inspection are attached to the report. A plan showing site features, and an approximate cross-section through the highway backslope, are shown on DWG. No. 13351-PH001-CALLOUT 1.

A debris flow/rock slide geohazard was observed in the backslope of Hwy 2:68 between km 12.3 and km 12.42 of Hwy 2:68. At this location the grade of the highway is at about 7 percent and the overall backslope cut above the highway cut is about 24 m high with about 18 m of exposed bedrock in the lower part of the cut. The backslope cut is inclined at 1.5H: 1V in the bedrock and is at 2H: 1V in the colluvium overlying the bedrock in the upper part of the cut (Photos 2 and 4).

The debris flow/rockfall hazard measured 120 m in overall length and spanned between a natural drainage gully to the west (km 12.42) and the east limits of a natural drainage draw in the upper valley slope above the highway to the east (km 12.3). The outline of the debris flow/rock fall hazard recorded with a handheld GPS is shown on Drawing No. 13351-PH001-CALLOUT1.

The exposed stratigraphy in the backslope near the debris flow consists primarily of an upper 2 m thick ledge of sandstone bedrock underlain by weathered claystone and layered sandstone bedrock layers. Some light seepage was observed at the base of the upper sandstone ledge. The backslope and ditch bottom were littered with blocks of sandstone pieces (Photos 1 and 2) with several loose blocks of sandstone throughout.



Accumulated soil debris and sandstone blocks were partially obstructing the ditch water flow (Photo 2). The debris accumulated in the SBL ditch consisted primarily of small chunks and small to large sized slabs of silty weathered sandstone bedrock and colluvium soil mixed with peat, grass, shrubs and small trees. The largest observed sandstone block in the ditch was 0.5 m X 0.5 m X 2.1 m in size.

3. ASSESSMENT

In the past, similar landslides and debris flows in this area have typically occurred in the gullies due to the concentration of surface runoff water from heavy rain fall events.

This debris flow originally occurred in March 2018 during a period of rapid snow melt which cause a concentration of surface water runoff to flow through the natural draw in the valley slope immediately above this location. The primary concern for this site is the potential for further debris and weathered sandstone bedrock debris to continue to fall onto the highway causing a risk to public safety.

The maintenance contractor has removed some of the debris accumulated at the toe of the debris flow. However, there is still a risk that more slide debris could fall into the ditch or possibly onto the highway if it gets saturated during another heavy runoff event.

The latest available Average Annual Daily Traffic given by AT for this site is of 2800 vehicles/day for 2017.

The assessed Rock Fall risk level for this site, based on AT's guidelines is 48, given a Probability Factor of 12 (Active, one or two falls occur each year by annually occurring weather conditions with the frequency of falls increasing in comparison to equivalent time periods in recent years) and a Consequence Factor of 4 (Individual rocks or the total volume of rocks deposited on the road are large enough to damage vehicles or cause accidents and injure vehicle occupants, could require the use of a detour to cleanup with a risk of damage to the road surface).

The assessed Geohazard risk (Debris Flow) for this site, based on AT's guidelines is 40, given a Probability Factor of 10 (Active with moderate steady to increasing rate of movement) and a Consequence Factor of 4 (Historic rockfall hazards where a partial closure of the road or significant detours would be a direct and unavoidable result of a debris flow occurrence).

There are no available records of previous geotechnical investigations and there are currently no instruments installed at the site.

4. RECOMMENDATIONS

The loose hanging slide blocks and debris flow material should be carefully removed from the lower backslope area and ditch and hauled out of the valley for disposal. Due to the possibility of crumbling of the edge of the overlying sandstone bedrock layer, people should not be present in the ditch area unless they are protected within heavy equipment equipped with roofed cabs.



It is recommended that a concrete lock block wall be placed along the highway shoulder to act as a barrier wall to protect the highway from possible future rock falls and/or debris flows. A guardrail will be required to protect vehicles from crashes into the wall. The site should be regularly monitored for more activity and additional cleaning of the slide debris will be required over time.

Until the work is done, signs should be placed at the top and the bottom of the highway valley section warning traffic about the potential for a debris/rock flow that could affect the highway. Consideration should be given to posting a slower traffic speed through this area until the debris material has been dealt with.

5. CLOSURE

We trust this is the information you require at this time. If you have any questions, or if you require further information or recommendations, please contact us at your convenience.

Yours very truly,
Thurber Engineering Ltd.
Don Proudfoot, M.Eng., P.Eng.
Principal/Review Engineer

Shawn Russell, B.A.Sc., P.Eng.
Associate/Senior Engineer
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Attachments:

- Photos
- Figures



Photo 1: Looking northeast from the SBL shoulder at km 12.32 of Hwy 2:68 at sandstone blocks in the ditch and along the sideslope above the highway.



Photo 2: Looking southwest from the shoulder of the SBL from km 12.29 of Hwy 2:68 at the accumulated debris and sandstone pieces along the base of the debris flow.



Photo 3: Looking northwest from km 12.34 at dislodged landslide block from the upper sandstone outcrop hanging at midslope.



Photo 4: Looking northwest from shoulder of SBL at km 12.385 at the south end of debris flow.



Photo 5: Looking north at gully at west end of debris flow with small fan of wet material at the base in the SBL ditch at km 12.415.



Photo 6: Looking northeast along the base of the debris flow from the shoulder of the SBL at km 12.425.



Photo 7: Looking northeast from the shoulder of the NBL at km 12.45 towards the debris flow.

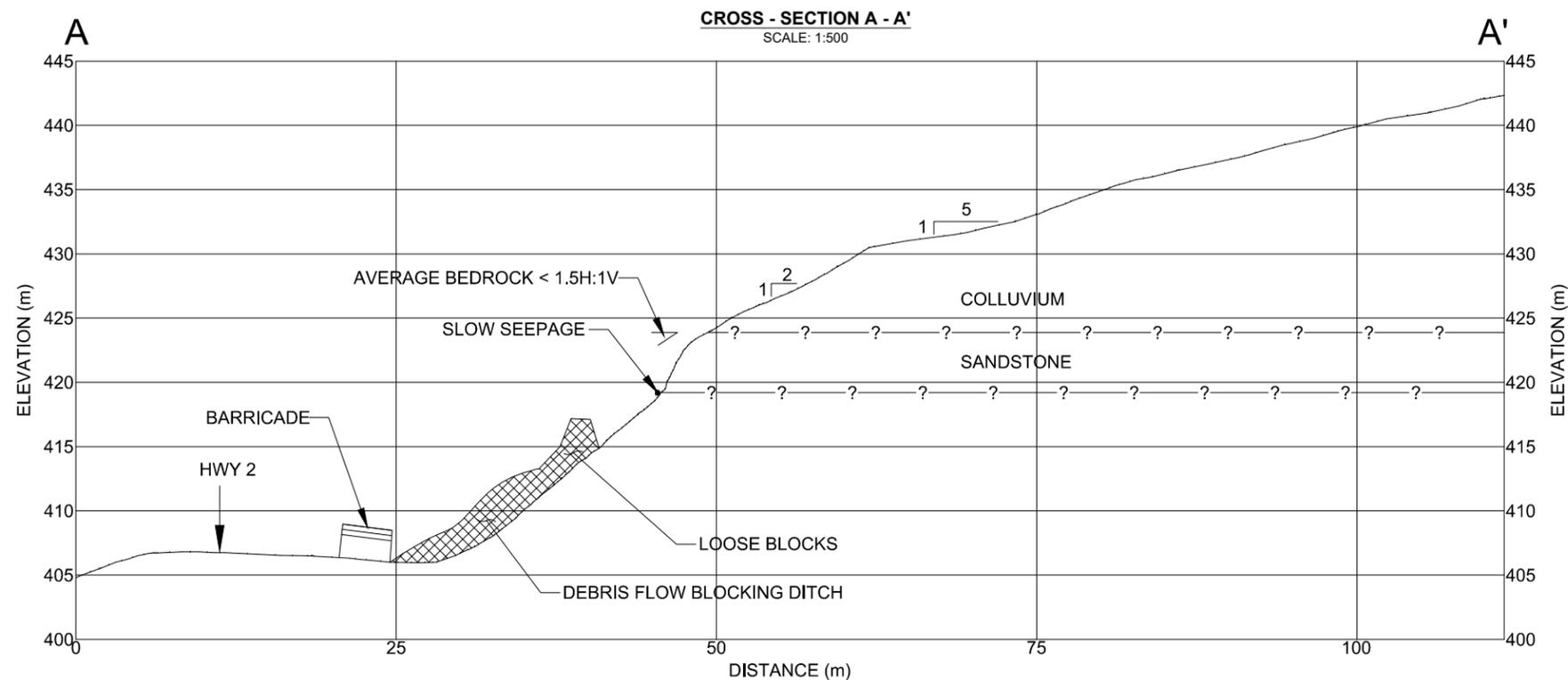
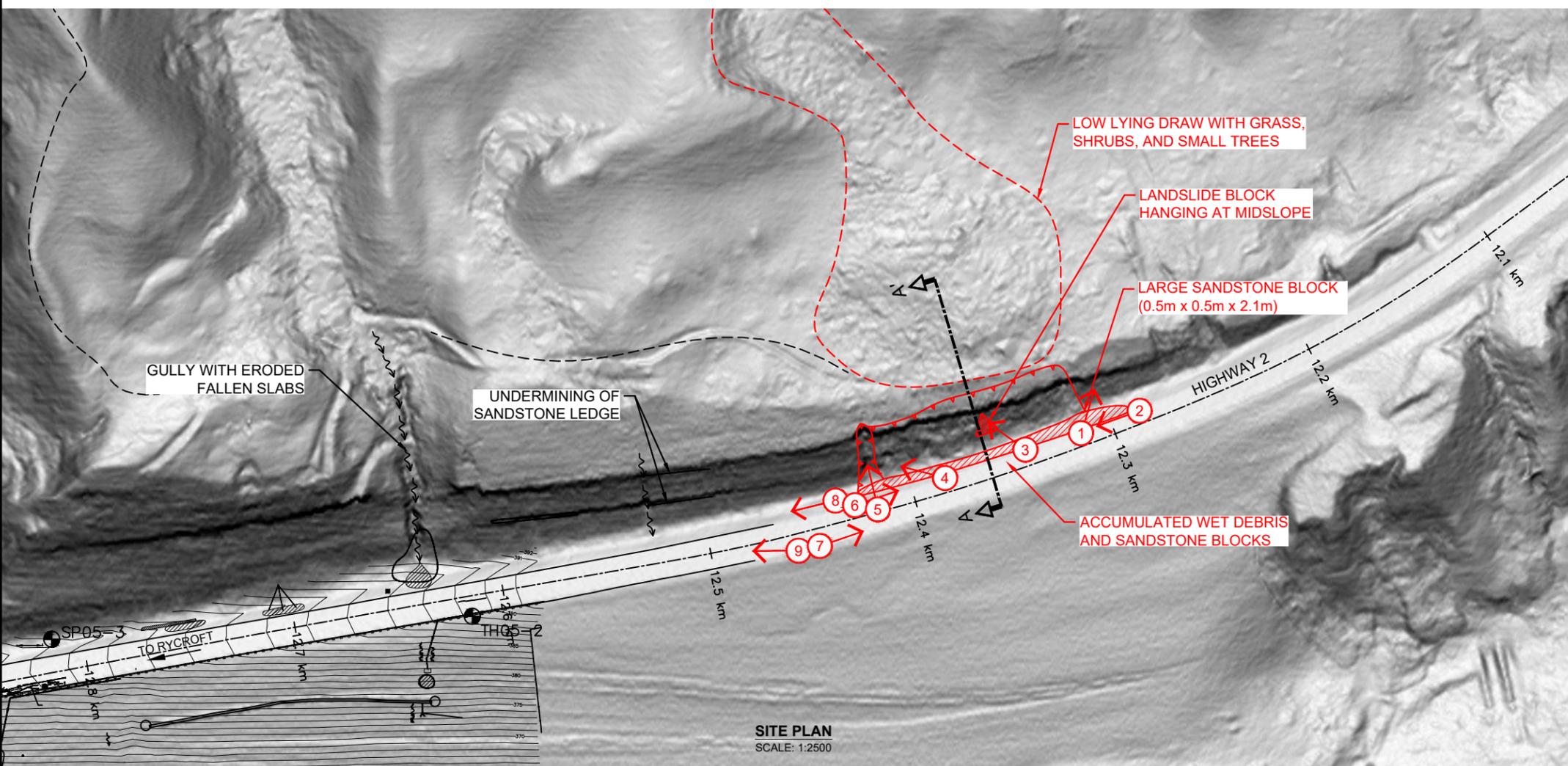


Photo 8: Looking southwest from the shoulder of the SBL at km 12.435 along the SBL at the staining in the backslope and the soil loss below the lower sandstone ledge.

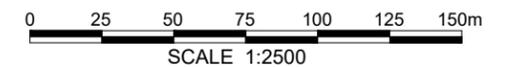


Photo 9: Looking NW from the guardrail at km 12.46 west of the debris flow at salt staining/soil loss below the lower sandstone ledge and an erosion gully in the backslope (May 15, 2018)

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- NOTES:**
1. LOCATION DATA RECORDED USING HAND HELD GPS RECEIVER. ALL LOCATIONS ARE APPROXIMATE AND ARE FOR ILLUSTRATIVE PURPOSES ONLY.
 2. MAY 15, 2018 OBSERVATIONS SHOWN IN RED.



Alberta

**PEACE REGION (PEACE RIVER/HIGH LEVEL)
PH001 DUNVEGAN NORTH**

2018 PH001 CALLOUT PLAN

DWG No. 13351-PH001-CALLOUT 1

DRAWN BY	KLW
DESIGNED BY	SGR
APPROVED BY	DWP
SCALE	AS SHOWN
DATE	DECEMBER 2018
FILE No.	13351

THURBER ENGINEERING LTD.