Alberta Transportation December 19, 2008
#301, 9621 – 96 Avenue
Bag 900, Box 29
Peace River, AB
T8S 1T4

Attention: Mr. Ed Szmata
Sr. Construction Technologist

Re: Peace Region (Grande Prairie) GeoHazard Assessment
(GP 33) HWY 40:36 South View Slide @Km 39.4 (culvert)
(43 km south of Kakwa River Bridge)
Sta. 43+600 to Sta. 43+850 (Culvert at Sta. 43+580)
AT Regional Geotechnical Contract 106/08
- **Part B – Annual Site Inspection (Slide Tour) Report**

In compliance with requirements of the captioned Contract, an annual site inspection of the site was carried out and a report (for 2008 year) is provided with this letter.

On July 4, 2008, Messrs. Karl Li and Shawn McArthur both of Karl Engineering Consultants Ltd. (KarlEng) under took the site inspection in the presence of Messrs. Ed Szmata, Roger Skirrow and Rocky Wang of Alberta Transportation (AT).

1.0 BACKGROUND

This slide is located about 43km distance south of Kakwa River Bridge and located at top verge of the valley slope of the Smoky River valley which forms part of the mountain slope of this valley system.

A research of highway mosaic indicates the site can be located at about Km 39.4 of Hwy 40:36 with the slide's west edge (Grande Cache direction) bounded by a centerline CSP culvert (Sta. 43+580) which accommodates flow from a stream inflow from the backslope (back-country flat area). Information on highway design mosaic indicated that this embankment is constructed along a sidehill terrain and seepage along fill footprint can be very possible.

2.0 OBSERVATIONS

2.1 CURRENT (2008) OBSERVATIONS

The conditions of the site can be noted from the attached 2008 site photos.

The site was observed to have not deteriorated much from that observed in previous year. However, it was observed that

- the inlet end of the culvert might has been severed to have possibly caused a wetting and seepage along the footprint of the highway fills. The wet ground conditions were observed at the adjacent areas of sideslope at downstream side beside the culvert outlet

area. (toward Grande Prairie direction). It is advisable to have local MCI and maintenance forces perform a detailed inspection of the culvert integrity conditions.

- There is a small scour drop hole at outfall channel area of the culvert outlet. It is advisable to in fill the scour drop hole with resistant rocky fill material to deter further downcut erosion of channel.

This site was reviewed not deteriorating.

- For future strategy of this site, it was discussed that this site will be categorized as INACTIVE for the time being.
- Should future deterioration of site be observed, site inspection assessment will be re-started when required.

2.2 PREVIOUS OBSERVATIONS

Observation in previous year indicated the following conditions.

- A headscarp crack is apparently under development and extends about 150m to 200m with portion of crack crossing the pavement centreline.
- The highway is located along the mid-to-top verge of the mountain terrain of Smoky River valley slope which heights can extend to about 200-300m (estimate only) from road elevation down to river level.
- The highway is constructed with common fill of about 1-2m (at 4H:1V to 5H:1V sideslope) along the sidehill of river valley.
- On the backslope side, there is a flat area of scarce shrub growth which might be a previous borrow excavation area as the area is definitely comprised of non-native sparse vegetation growth. A stream skirts around the upland area of this flat scarce shrub area and the flow is channeled across the highway via the culvert at Sta. 43+580. A source of groundwater feed from higher elevations is apparent for this area.
- The west edge (Grande Cache direction) of slide affected zone (150m to 200m) is bounded by this culvert (Sta. 43+580).
- To the east (Grande Prairie direction) of this culvert, wet subgrade ground can be observed along sideslopes of this low fill embankment. Apparently, seepage flow transverse to through below footprint of fill roadway can be occurring.
- The east edge of this slide affected area is bounded by small cut (estimated at Sta. 43+900).
- This affected area is located just north of the “historic” area where manholes were previously installed along highway ditch at time of 1980 original grading construction of this highway. This was the old area where groundwater seepage from mountain backcountry transverse to the highway was historically intercepted by a subdrain system along highway ditch along some sections of highway at top elevations of Smoky river valley slope.
  - Thus, this distress site fall in similar category of adverse groundwater influence and likely an active seepage area.

3.0 SITE AND RISK ASSESSMENT

PF (8) * CF(3) = 24

PF
- Active but with moderate rate of movement

CF
- Road embankment movement will affect roadway serviceability but should not invoke closure of roadway

Note:
- The risk assessment is provided based on a categorization of Hazard Probability Factor (PF) and Consequence Factor (CF) as provided by AIT's RFP 2000. The details are provided in Table II at front portion of this Report.

4.0 COMMENT and ACTION

For future strategy of this site, this site was reviewed not deteriorating. It was decided that
- this site will be categorized as INACTIVE for the time being. Should future deterioration of site be observed,
- Future site inspection assessment will be re-initiated in the event of future deterioration of site.
- Patch pavement to be carried out if and when required

5.0 CLOSURE

We appreciate the opportunity to provide the above information. Should you require further information, please contact the undersigned.

Karl Li, P.Eng.
Senior Geotechnical Engineer

cc. Roger Skirrow, P.Eng. AIT Twin Atria

Attachment
- Site Photos

Photo 1

Looking south (towards Grande Cache direction)
- Headscarp crack crossed centreline toward backslope ditch. Crack infill with tar.
- Slide occurs at minor sidehill fill at upper verge of the Smoky River valley slope.
- There is a centreline culvert at south flank of slide
- Stream flow from backslope side to inflow into centreline culvert

Photo 2

Headscarp crack
- Close-up

Photo 3

Looking north (towards Grande Prairie direction) at north flank of slide
- The slide area is just after transition from cut (rock cut at backslope)

Note: Photos taken on June 2008

Photo 4
Centreline culvert inlet at south flank of slide
- Steady water inflow from stream

Photo 5
Looking south along sideslope (towards Grande Cache direction)
- 1.5m high sidehill embankment fill along verge of Smoky River Valley slope

Photo 6
- Wet patches of sideslope fill adjacent to culvert outlet area can be observed. It can be indicative of seepage along base of fill
- Need to check if potential severing or breakage of culvert maybe cause of seepage

Photo 7
Culvert outlet
- A drop of ground at culvert outlet will cause vertical erosion at outlet. Need to be infilled with adequate size granular fill to provide a smooth outflow apron.
- De-icing pipe presnt

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