APPENDIX S5
Chin Coulee

1.0 Site Visit

The Annual Inspection site visit was conducted on May 30, 2001. At the time of the visit, the weather was clear and blustery.

2.0 Significant Observations

The following observations, considered to be relevant to the stability of the slope were made:

- The scarp area of the slide was directly adjacent to the north shoulder of the road. Photo 1 shows this feature.
- It was reported by maintenance personnel that the guardrail had been previously repaired, and fill had been placed on the downslope side of the guardrail. It was evident that at least portions of this fill had been lost downslope. There was some distortion to the guardrail, but it was not possible to determine if this was due to slope movement or was how the rail had been installed during realignment. See Photos 1 and 2, comparing the 2000 and 2001 assessments.
- One major longitudinal crack had been sealed in the eastbound lane adjacent to the slide. Horizontal displacements and distortion of the road surface were minimal. Refer to Photos 3 and 4.
- Separate slide blocks within the overall landslide area showed evidence of recent movements.
- Inspection of the area on the upslope side of the road indicated no evidence of deeper-seated movements.
- A terraced area upslope of the highway was concluded to be an old road fill.
- Maintenance personnel reported a possible tension crack located above the old road fill, however this are had since been cultivated and no cracks were visible during the assessment. A tension crack at that location would indicate that the slide is potentially active on a much larger scale and significant portions of the road could be lost.

3.0 Changes from Previous Visits

The following significant changes for the previous assessment were evident:

- Guardrail replaced. Note dip in guardrail – possibly as installed.
- Drainage improvements in the upslope ditch, with fill cast downslope.
- Recent crack sealing on road.

Movements of the previously noted landslide blocks well downslope from the highway continue but do not appear to be affecting the road at this time. This includes the slide block containing Slope Indicator GA98-3, which had previously sheared off at a depth of 15 m.

4.0 Discussion

This site is a major landslide complex, with the highway located directly adjacent to the active scarp area. No significant movement in the remaining slope inclinometer (in Borehole GA98-2) adjacent to the downslope edge of the road has been measured since the spring of 2000, although additional movement is essentially certain over time, likely in response to high precipitation events. Retrogression into the present road surface will be likely at some time.

The reports of some tension cracks upslope of the road are of concern as this could threaten the entire road surface. An additional slope indicator in the upslope ditch would be able to confirm any sheared zones in this area.

As part of a further scope of work AMEC is conducting further investigations of this slide and assessing realignment options. This will be reported under separate cover.

5.0 Assessment

The area downslope of the highway is a large active slide area. This includes a significant potion of the highway embankment. It is not considered feasible to mitigate this entire slide area.

Ongoing, relatively shallow movements are likely to cause damage to the road, however such types of movement will not likely result in closure of the entire road. However, the guardrail, shoulder and portions of the eastbound lane could be lost in single events.

A deeper seated type of failure, containing the entire road surface is considered to be possible, but less likely. The reports of tension cracks upslope of the road are of concern in this regard, and additional instrumentation should be installed to further monitor this mode.

On the basis that two separate modes of failure could affect this highway, two risk levels are provided.

For the shallow modes of failure, the Probability Factor is taken as 10 since the rate of movement is moderate and ongoing. A Consequence Factor of 2 is assigned to this slide type on the basis that only a portion of the road would be lost. Based on the above, the Risk Level for the relatively shallow movements at this site is calculated as 20.

For a deep-seated mode of failure, the Probability Factor is taken as 6 since the movement is inactive, but somewhat uncertain. A Consequence Factor of 5 is assigned to this slide type on the basis that a large portion of the road would be lost. Based on the above, the Risk Level for the deep-seated movements at this site is calculated as 30.

6.0 Recommendations

On the basis of the above, it is recommended that relocation of the highway be considered at this site. There does not appear to be an immediate risk to large portions of the highway, so such repairs could be delayed somewhat. However, in the interim, continued maintenance will be required, particularly in wet years and the likelihood of more significant failures will increase as time passes.

The monitoring programs currently in place should be continued. It is recommended that one additional slope indicator be installed on the upslope side of the highway to assess deep seated movements.

The surface conditions of the road at this location should be carefully monitored by maintenance personnel. This would be in conjunction with slope indicator and piezometer monitoring to provide as early detection of potential problems below the road as possible.

Chin Coulee
Figures and Photographs
Spring 2001

Photo 1 – View of downslope edge of the road above slide area (2001).
Note newly-installed guardrail and slide scarp visible downslope of road.

Photo 2 – Downslope edge of road as seen during the June 2000 assessment.

Photo 3 – Facing northeast along road through slide area. Note newly-installed guardrail.

Photo 4 – Facing southwest along road through slide area. Note newly-installed guardrail.

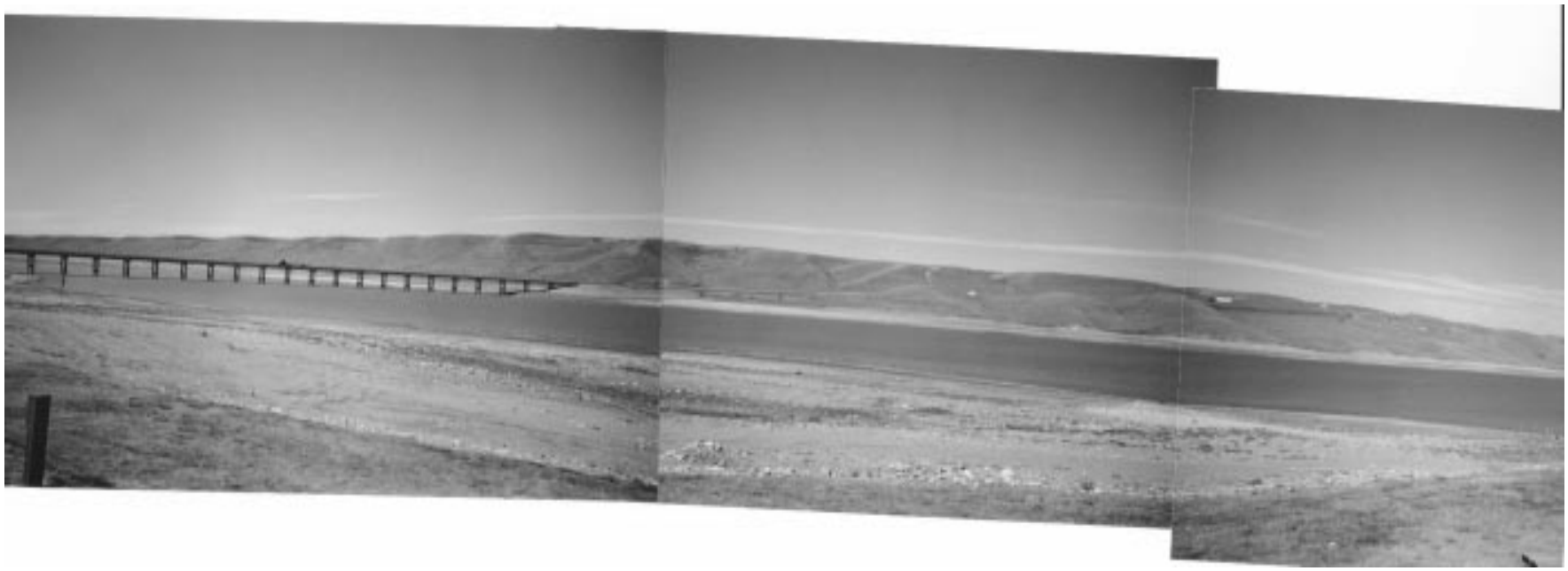

Photo 5 – View of Highway 36 on the north side of the Chin Coulee reservoir. The monitoring/assessment site is near the crest of the hill. Note landslide throughout the north valley wall.

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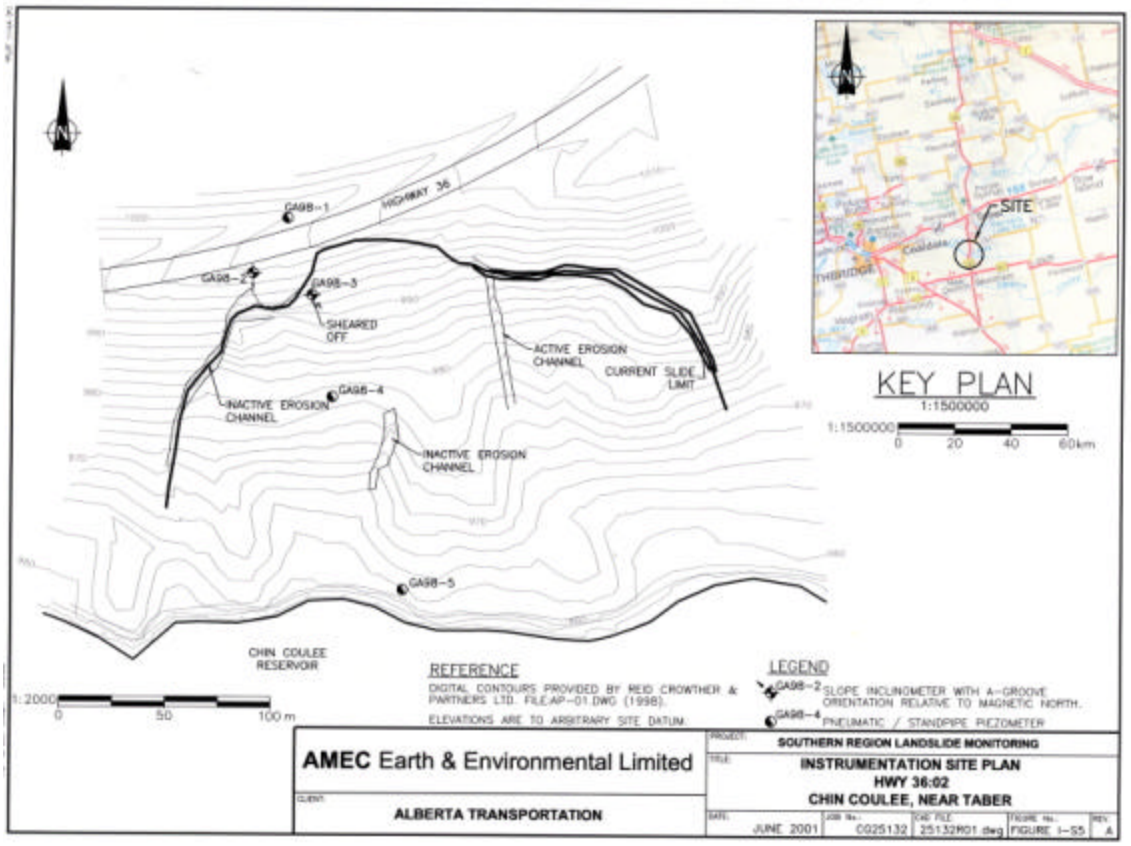
N
GA98-1
HIGHWAY 36
GA98-2
GA98-3
SHEARED OFF
ACTIVE EROSION CHANNEL
CURRENT SLIDE LIMIT
GA98-4
INACTIVE EROSION CHANNEL
INACTIVE EROSION CHANNEL
GA98-5
CHIN COULEE RESERVOIR
1:2000
0
50
100 m
REFERENCE
DIGITAL CONTOURS PROVIDED BY REID CROWTHER & PARTNERS LTD. FILE:AP-01.DWG (1998).
ELEVATIONS ARE TO ARBITRARY SITE DATUM.
LEGEND
GA98-2 SLOPE INCLINOMETER WITH A-GROOVE ORIENTATION RELATIVE TO MAGNETIC NORTH.
GA98-4 PNEUMATIC / STANDPIPE PIEZOMETER
N
SITE
Calgary
KEY PLAN
1:1500000
1:1500000
0
20
40
60km
AMEC Earth & Environmental Limited
CLIENT: ALBERTA TRANSPORTATION
PROJECT: SOUTHERN REGION LANDSLIDE MONITORING
TITLE: INSTRUMENTATION SITE PLAN
HWY 36:02
CHIN COULEE, NEAR TABER
DATE: JUNE 2001
JOB No.: CG25132
CAD FILE: 25132R01.dwg
FIGURE No.: FIGURE 1-S5
REV: A