S5 Chin Coulee

The Chin Coulee site was visited on 30 May 2002. Photographs from this site visit are included in Appendix S5, along with a site plan, air photograph, and a detailed discussion of the visit. This discussion has also been submitted in separate unbound sheets for inclusion in Appendix B of the Chin Coulee binder. The following is a brief summary of the assessment.

This site is a major landslide complex, with the highway located directly adjacent to the active scarp area. No significant movement in slope inclinometer GA98-2, adjacent to the downslope edge of the road but west of the visible slide area has been measured since the spring of 2000, although additional movement is essentially certain over time, likely in response to high precipitation events. A new slope inclinometer (2002-1) was installed in the upslope road ditch in March, 2002, and will be used to monitor for slope movement retrogressing through the existing road alignment.

The overall slope condition had not changed significantly since the 2001 inspection. Some additional gullying and piping erosion of the exposed soils in the shallow landsliding area below the road was noted.

As part of a separate scope of work, AMEC has submitted a design package to AT for upslope relocation of the road through the slide area. The decision on whether or not to relocate the road will be based on continued monitoring of the existing instruments.

The Risk Levels at this site were taken as 20 for shallower movements, and 30 for a possible deep seated movement. These values are unchanged from the 2001 assessment. AMEC recommends that the annual assessments and semi-annual monitoring at this site be continued. Please refer to Appendix S5 for further discussion.

1.0 Site Visit

The Annual Inspection site visit was conducted on 30 May 2002. At the time of the visit, the weather was clear and blustery.

Mr. Vern Singhroy of the National Research Council (NRC) accompanied the AT and AMEC personnel on the site visit in order to gather information for incorporating this site into the INSAR satellite based ground movement monitoring project.

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 (Photos 1 and 2). No fresh cracking was noted in the road surface.
- No significant new distortion of the guardrail was noted.
- Previously identified slide blocks below the road showed evidence of recent movements.
- Exposed soils in the shallow slide area downslope of the road showed signs of gullying and piping along the tension cracks of some of the shallow slide blocks (Photo 3).

3.0 Changes from Previous Visits

No significant changes were noted since the previous inspection. There is continued shallow landslide movement immediately downslope of the road. The potential for additional deep-seated movement encompassing the road is still present, but no movements have been noted since the previous inspection.

The erosion of exposed soils in the shallow landsliding area, in particular the gullying and piping along tension cracks, was generally worse than during previous inspections.

4.0 Discussion

This site is a major landslide complex, with the highway located directly adjacent to the active scarp area. No significant movement has been measured in the slope inclinometer GA98-2, which is located adjacent to the downslope edge of the road but west of the active slide area. The first reading (Spring 2002) of the new slope inclinometer (AMEC 2002-1) installed to approximately 45 m depth in the upslope road ditch (Photo 4) did not show any significant movement since installation in March 2002. However, retrogression into the present road surface in the future is likely. Therefore, the slope inclinometer 2002-1 will be valuable for monitoring for retrogression of the shallow landsliding through the road alignment, as well as checking for deeper-seated movement encompassing the road.

As part of a separate scope of work, AMEC has submitted a design package to AT for upslope relocation of the road through the slide area. The intent was to have a design package ready in the event of future retrogression of the landslide through the existing road. The decision on

whether or not to relocate the road will be based on continued monitoring of the existing instruments. The design includes shifting the centerline of the road upslope by approximately 10 m through the slide area. This design was developed with input from AT in order to somewhat minimize the design excavation volumes required for upslope relocation of the road, with the understanding that the design package may need to be updated if the amount of crest retrogression is greater than approximately 10 m.

5.0 Assessment

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

Ongoing, relatively shallow movements are likely to cause damage to the road but will likely not 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, encompassing the entire road surface, is considered to be possible but less likely. The new slope inclinometer installed in the upslope ditch of the road will be used to monitor for such movement.

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.

These Risk Levels are unchanged from the 2001 assessment.

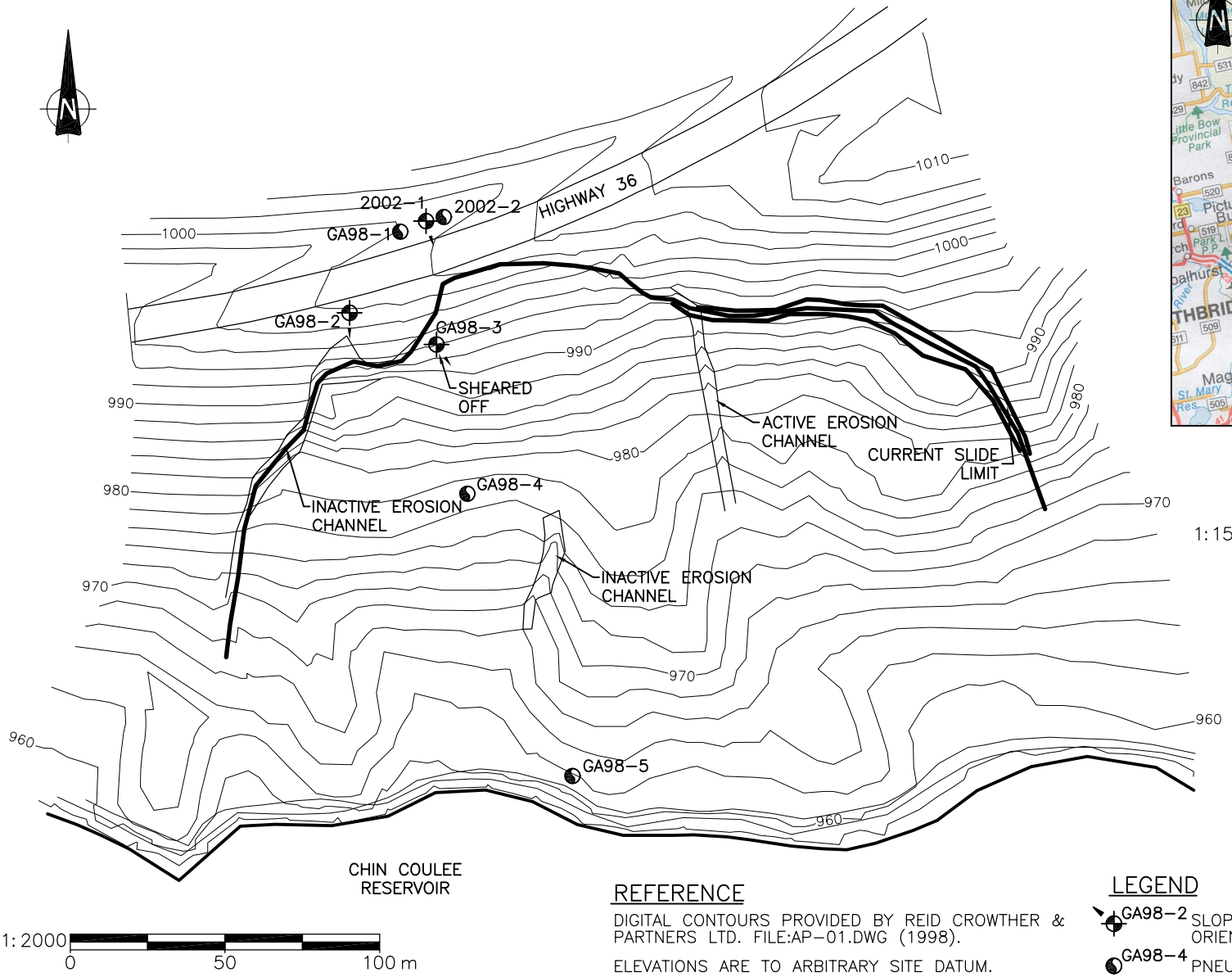
6.0 Recommendations

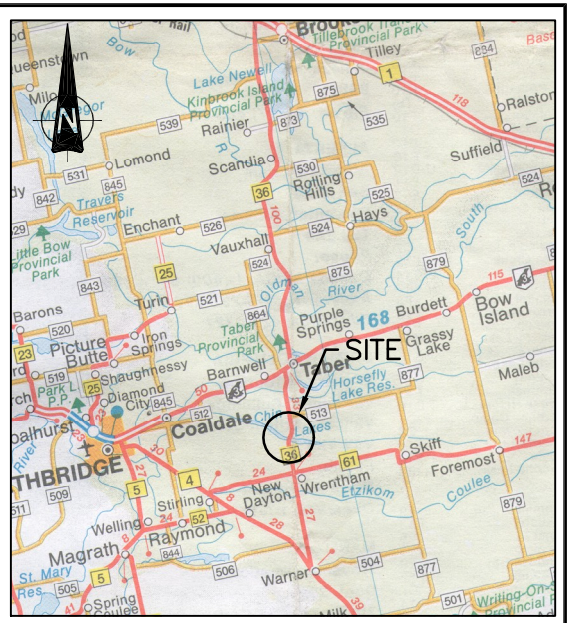
The monitoring programs currently in place should be continued. Particular attention should be paid to the future data from the slope inclinometer at 2002-1, as this will provide an indication of whether or not deep-seated slope movement encompassing the existing road is occurring.

Data from the NRC INSAR satellite based ground movement monitoring project should be incorporated into the monitoring program as soon as possible.

The Annual Inspections should be continued as planned.

Maintenance personnel should carefully monitor the surface condition of the road as well as the guardrail alignment. This would be in conjunction with slope indicator and piezometer monitoring to provide as early detection of potential problems below the road as possible.





KEY PLAN

1:1500000

1:1500000
0 20 40 60km

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

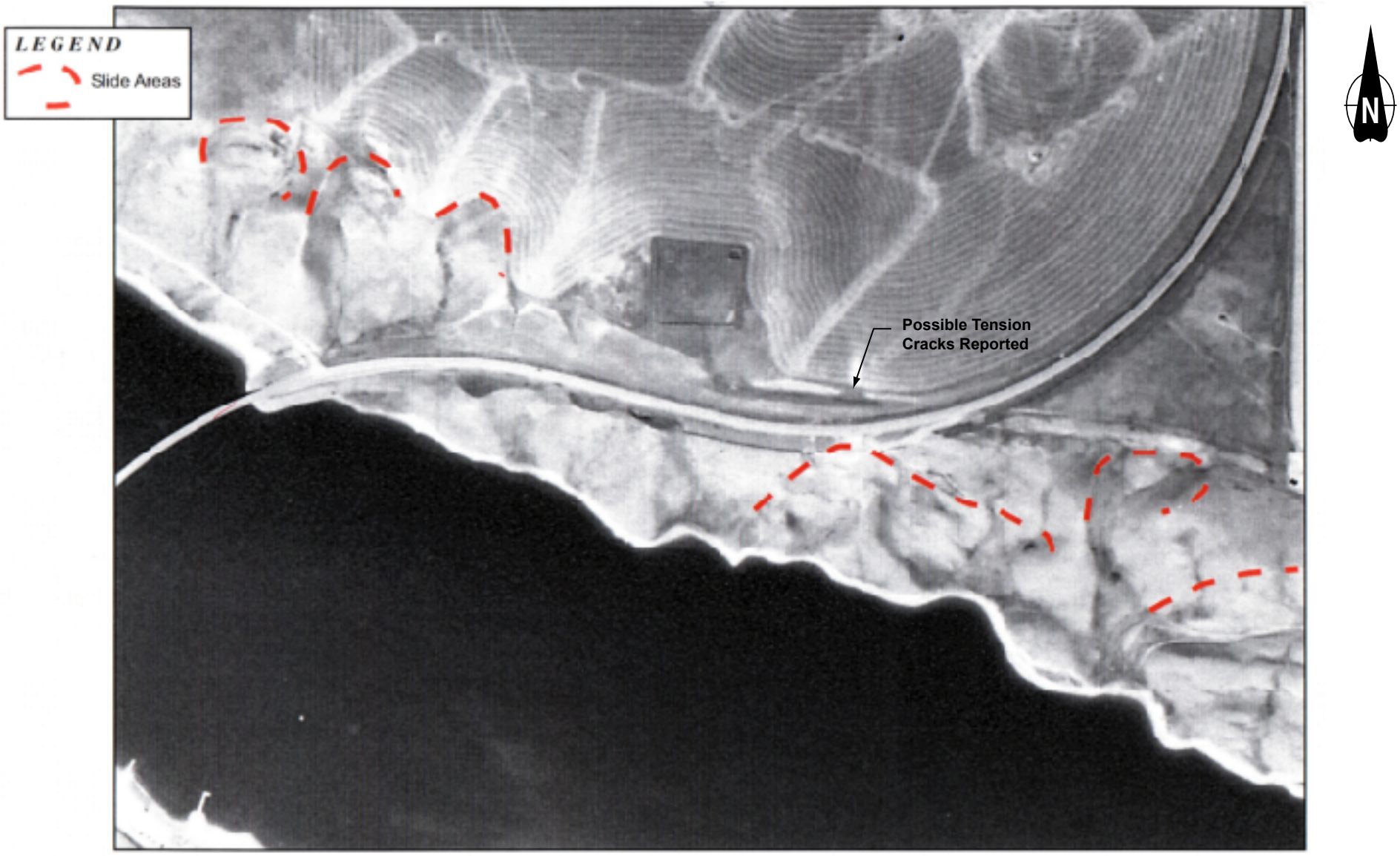
AMEC Earth & Environmental Limited

CLIENT: **ALBERTA TRANSPORTATION**

PROJECT: **SOUTHERN REGION LANDSLIDE MONITORING**

TITLE: **INSTRUMENTATION SITE PLAN**
HWY 36:02
CHIN COULEE, NEAR TABER

DATE:	JOB No.:	CAD FILE:	FIGURE No.:	REV.
JUNE 2002	CG25132	25132S00.dwg	FIGURE 1-S5	A



Enlarged View from Airphoto
AP 82H LN-15
As4955-257
May 6/99

Approx Scale: 1:6600

Alberta Transportation/S. Region Landslide Monitoring Program

Site S5 - Chin Coulee

Figure S5-1

Date:	Revision
Jun 2002	A

Job No. CG25132.B

File No: CR08AB03.ai

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