

APPENDIX S3
Cochrane

1.0 Site Visit

The Annual Inspection site visit was conducted on May 28, 2001. At the time of the visit, the weather was clear and calm.

2.0 Significant Observations

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

- The liner in the ditch in the downslope side of the road has been repaired as recommended during the spring 2000 site assessment.
- No indications of the slide extending above the highway ditch were observed. No slide related damage to the paved surface was observed.
- The landslide mechanism appeared to be primarily translational and limited to a few meters depth – as was the case during the previous annual inspection. Previous slope inclinometer readings are consistent with this mechanism.
- The slope inclinometer readings since the previous assessment have not shown any significant movement.
- Local scarps within the slide mass (previously noted to be active) were weathered, indicating that movements have not occurred recently.

3.0 Changes from Previous Visits

There appears to be relatively little change at this site since the previous assessment in June, 2000. Slope inclinometer readings indicate that movement of the slide is ongoing at a very slow/negligible rate.

4.0 Discussion

The instability at this site appears to be confined to an approximately 50 m² area on the steep slope below the highway. Movements of up to 20 mm per year have been recorded in the past and may be a combination of natural movements on the steep slope as well as movement of side cast fill material from the construction of the highway. Uncontrolled surface drainage from the highway ditch entering the slide area may have also increased the magnitude and rate of movements in the past. Recent repairs to the ditch liner above the slide area have improved local drainage control and may be reducing the movement.

It is likely that damage to the highway in the near future can be minimized by continuing to carefully control the surface water runoff conditions. The repairs to the ditch liner last summer are an example of such measures, and appear to be helping to keep the movement under control so far. At some point in the future it may be required to implement structural support options. Eventual relocation of the highway may be required.

5.0 Assessment

The large slope extending below the slide area contains numerous shallow landslides, likely associated with a slow, natural retrogression of the slope. Although the site appears to be currently inactive, small changes to surface or groundwater conditions may reactivate movements. It is not considered feasible to mitigate this entire slide area. However, there was no evidence of any active landslide extending below the road surface, although slope indicators in the ditch adjacent to the road are showing movements. On this basis the Probability Factor with respect to this slide is taken as 7 (reduced from 10 in the previous year) since there is a high probability of movements being reactivated adjacent to the highway.

It is likely that in the short term continued movements of the current slide will not impact the highway in the foreseeable future provided that surface water is controlled to minimize water flow into the slide area. Given the shallow nature of the slide mechanism, potential impacts in the highway, should they occur, are expected to be relatively small and gradual. Significant losses to the highway would not be expected to occur rapidly. On this basis a Consequence Factor of 2 is assigned to this slide.

Based on the above, the Risk Level at this site is calculated as 14.

6.0 Recommendations

The monitoring programs currently in place should be continued. It is suggested that the slope indicators that have been sheared off be replaced. At least two new slope indicator locations on the north shoulder of the road are recommended to verify movements do not extend to below the road surface.

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

The ditches preventing surface water from draining into the slide area should be monitored on a regular basis by maintenance personnel and repaired as necessary in the future.

**Cochrane
Figures and Photographs
Spring 2001**



Photo 1 – Ditch along downslope edge of highway showing area where ditch liner was repaired in summer 2000. Effective drainage should be maintained to minimize the amount of surface drainage entering the slide area.



Photo 2 – June 2000 photo showing damaged ditch liner. The damage to the liner likely allowed surface drainage to flow into slide area, possibly exacerbating movements.



Photo 3 – Panorama across slide area, as seen from downslope edge of road. Note fenceline distorted by shallow movements. Bow River in background separated from toe of overall slope by a low level river terrace.

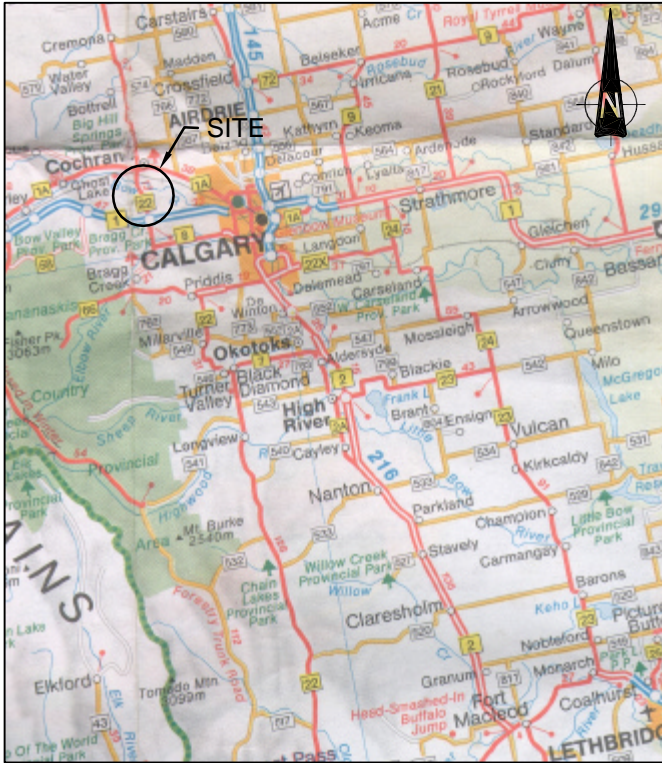


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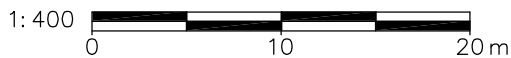
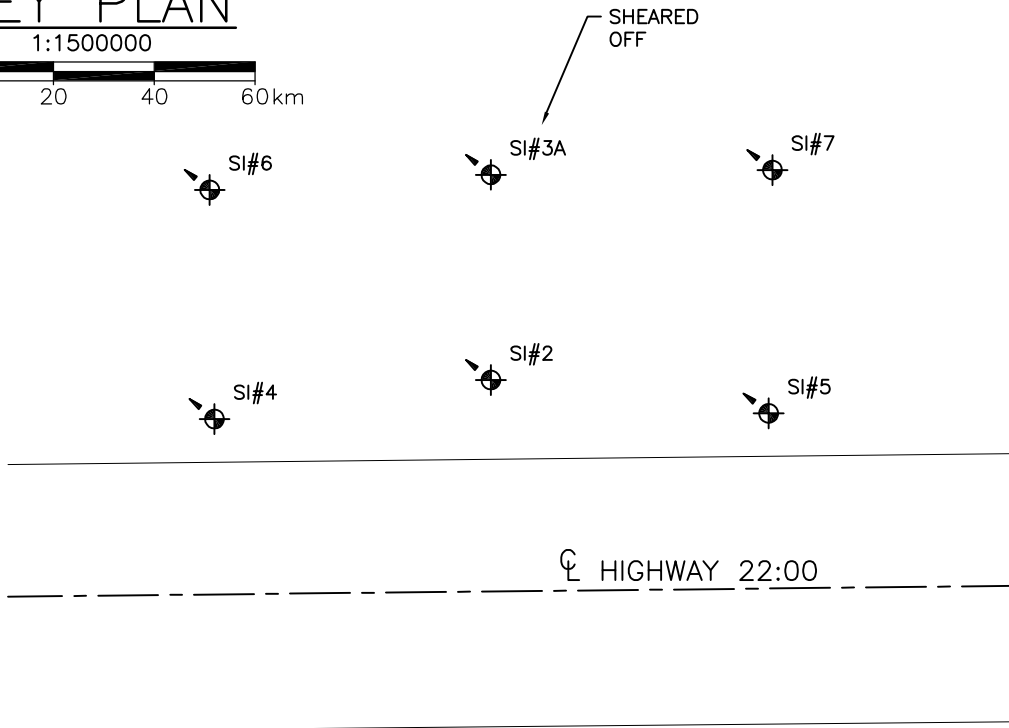
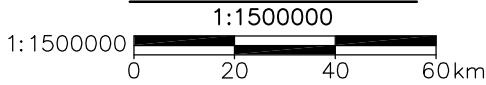
Alberta Transportation
Southern Region Landslide Monitoring Program
Spring 2001 Assessment Report

Site S3 – Cochrane





KEY PLAN



LEGEND

SI#5 SLOPE INCLINOMETER WITH A-GROOVE ORIENTATION RELATIVE TO MAGNETIC NORTH.

AMEC Earth & Environmental Limited

PROJECT:	SOUTHERN REGION LANDSLIDE MONITORING			
TITLE:	INSTRUMENTATION SITE PLAN HWY 22:00 COCHRANE SLIDE AREA			
CLIENT:	ALBERTA TRANSPORTATION			
DATE:	JOB No.:	CAD FILE:	FIGURE No.:	REV.
OCTOBER 2001	CG25132	25132R03.DWG	FIGURE I-S3	A