S13 – SHEEP RIVER SITE

Background

The Sheep River site is located on Secondary Highway 546:02, approximately 26 km west of Turner Valley (as measured along the road).

The road at this site is oriented roughly east/west along the north side of the Sheep River valley. The road crosses a deep fill embankment spanning a tributary creek gully that is eroded down into bedrock.

The first annual assessment of this site was performed by AT and AMEC personnel in July 2003. The 2003 assessment was performed in order to look at reported erosion along the downslope edge of the road.

Site Assessment

The site assessment was performed on May 25, 2004. The weather at the time of the site assessment was partly cloudy and calm.

Observations

The following points summarize the observations made during the site assessment. Please also refer to Appendix S13 for annotated photographs of the site.

- No repair measures have been made to the erosion into the south edge of the road since the 2003 assessment. The previously-noted gullying and surface erosion in the fill embankment slope face downslope (south) of the road has been continuing. The gully erosion has retrogressed slightly further (in the order of 0.5 m or less) into the eastbound lane of the road. Photos S13-1 to S13-4 illustrate the site conditions.

- There was a pile of rockfall debris from a rock cut to the east of this site stockpiled on the area downslope (south) of the guardrail on the east side of the creek, as shown in Photo S13-3. AMEC understands that this has been done in previous years prior to disposing of the debris by bulldozing it into the gully downstream of the road.

Discussion

The surface erosion of the fill embankment slope face below the road is continuing but does not appear to have worsened significantly since the 2003 assessment. The retrogression of one of the erosion gullies into the eastbound lane of the road is still evident but does not appear to have advanced significantly since the 2003 assessment.

Assessment and Risk Level

The rate of gully erosion into the eastbound lane was not estimated during the 2003 assessment because no previous assessments had been performed at this site and therefore there was no basis for comparison with previous years. Based on the visual observations from the 2004 assessment, the rate of gully erosion into the road surface is relatively slow and is

roughly estimated to have been less than 5 cm since the July 2003 assessment. Portions of the guardrail have been undermined but the guardrail itself has not been deflected to date. As noted in the 2003 assessment, the road surface is relatively wide at this location and it appears that the portion of the eastbound lane that has been lost to erosion to date is not within the traffic path. However any vehicles that pass close to the south guardrail are at risk of hitting the eroded and slightly undermined area. It is possible that the erosion into the southbound lane could be left unrepaired for several years without significant risk to the eastbound lane, however it would be preferable to repair the current damage, restore the full support to the guardrail posts and prevent it from happening again.

Therefore, AMEC recommends the following Risk Level factors for this site:

- The Probability Factor should be reduced from 7 to 5. This lower value more accurately reflects the slow rate of gully retrogression into the road surface during the time between the July 2003 and May 2004 assessments.

- The Consequence Factor should be kept at 4. This value is considered appropriate for this type of surface erosion in a major fill embankment, where if left unchecked a partial closure of the road (i.e. the eastbound lane) would eventually be required.

Based on the above, the Risk Level at this site is calculated as 20, which is a reduction from the value of 28 recommended after the 2003 assessment.

Recommendations

AMEC recommends the following future work for this site:

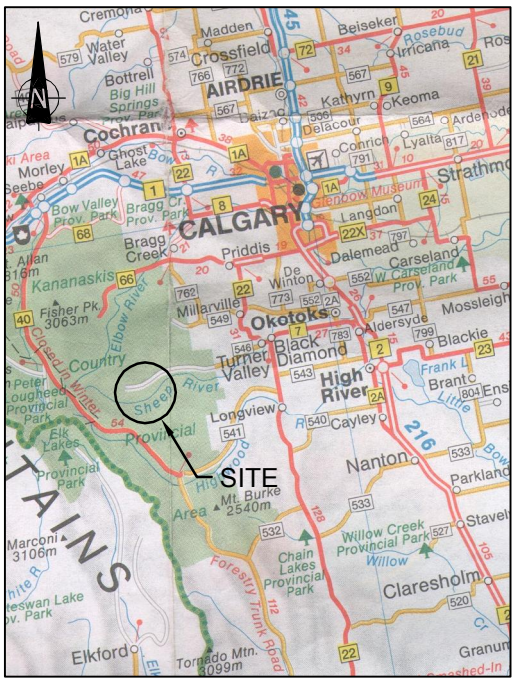
The occasional bulldozing/end-dumping of rockfall debris into the gully should be stopped. Aside from any environmental regulatory issues related to this practice, there is the potential that large rocks in the debris could strike and damage the exposed portion of the culvert at the base of the fill embankment.

The gullying on the fill slope below the road should be mitigated by improved control of the runoff from the road surface. AMEC recommends the following to achieve this (see Figure 2-S13 in Appendix S13 for a schematic illustration):

- Backfill and asphalt patch the eroded/undermined area on the south edge of the road.
- Construct a small berm of asphalt along the south edge of the road.
- Leave two gaps in the asphalt berm to allow runoff to leave the road surface.
- Flumes (half culverts) or even whole culverts should be installed at the gaps in the asphalt berm to carry the runoff down to the toe of the embankment slope, so that runoff does not flow on the steep slope face at all. It will be very important to have a good contact between the inlet of the flume/culvert and the gap in the asphalt berm, or else the runoff will simply be concentrated onto the slope face immediately around the inlet.

Alternatively, a drop-basin structure could be installed along the south edge of the road and connected to a culvert running down the slope face below the road.

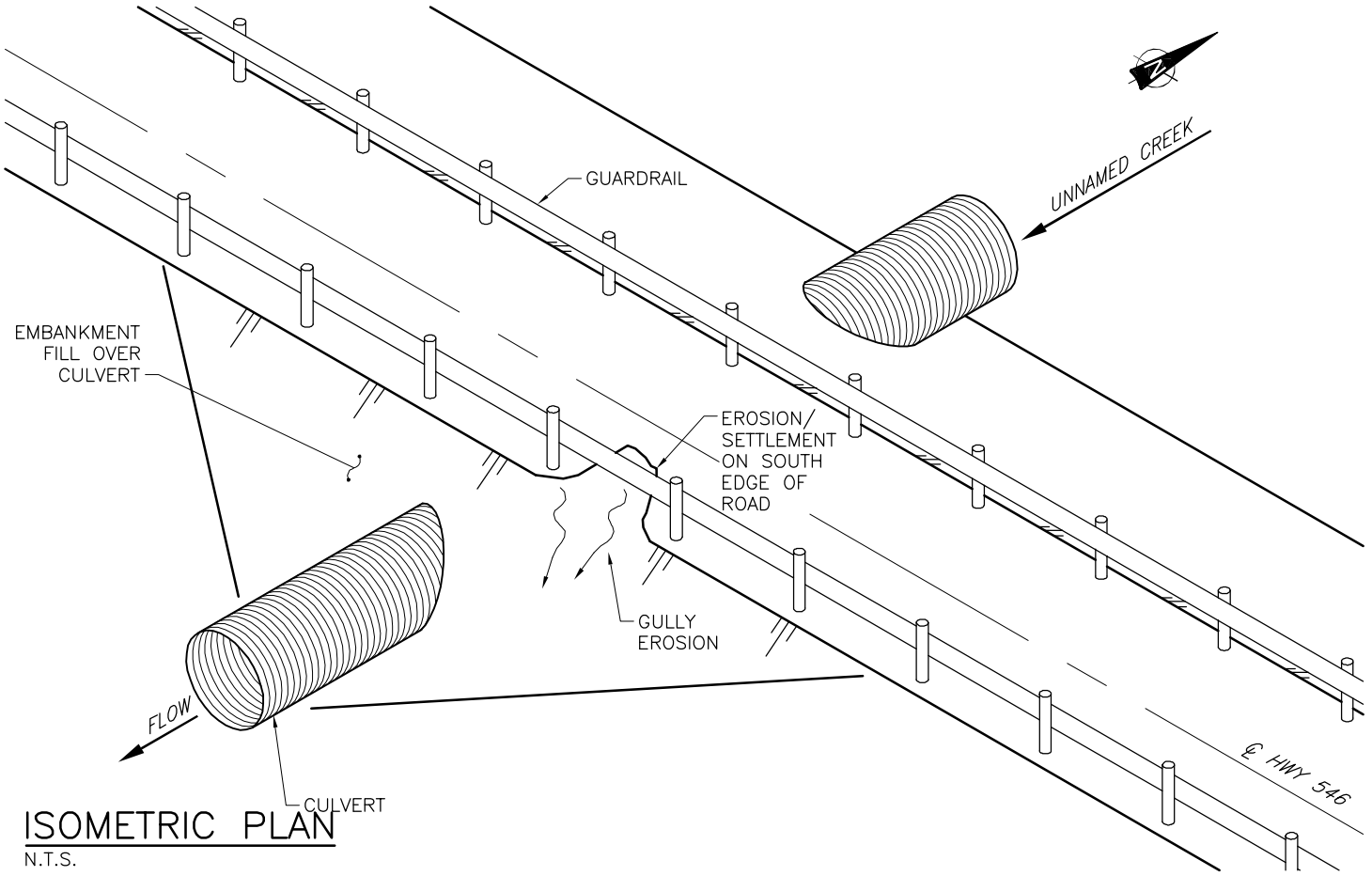
Annual assessments by AT geotechnical staff and the regional geotechnical consultant should be continued. If the remedial measures recommended above are judged to be successful, then the annual assessments can be discontinued.



KEY PLAN

SCALE 1:1 500 000

0 20 40 60 km



ISOMETRIC PLAN

N.T.S.

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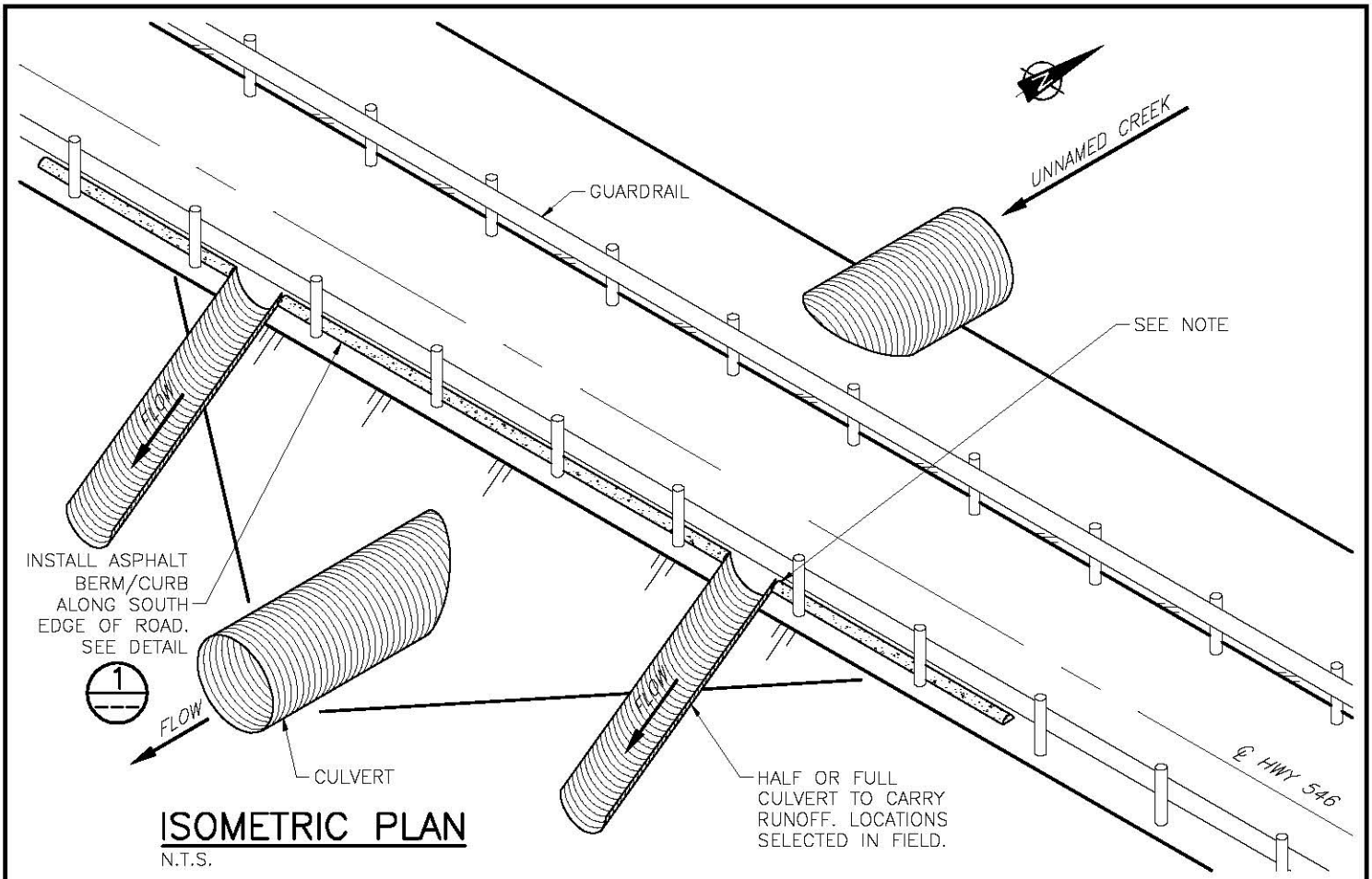
CLIENT: ALBERTA TRANSPORTATION

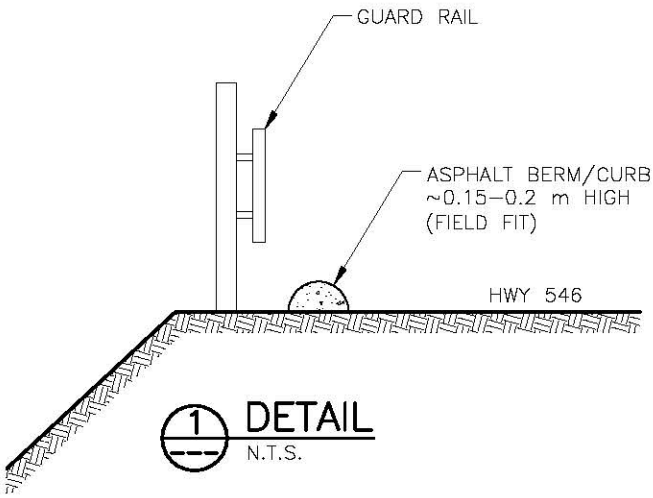
PROJECT: SOUTHERN REGION GEOHAZARD ASSESSMENT

TITLE: SCHEMATIC SITE PLAN
HIGHWAY 546: SHEEP RIVER SITE

DATE:	JOB No.:	CAD FILE:	FIGURE No.:	REV.
JUNE 2004	CG25190	25190M03.dwg	FIG 1-S13	A



ISOMETRIC PLAN
N.T.S.



1 DETAIL
N.T.S.

NOTE:

CONSIDER INSTALLING DROP–BASIN TO FEED INTO CULVERT, OR LEAVE GAP IN BERM FOR INLET OF CULVERT.
VERY IMPORTANT; ASPHALT MUST BE IN TIGHT CONTACT AROUND EDGES OF INLET SO RUNOFF DOES NOT BYPASS CULVERT AND FLOW INTO SLOPE FACE.

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CLIENT: **ALBERTA TRANSPORTATION**

PROJECT: **SOUTHERN REGION GEOHAZARD ASSESSMENT**

TITLE: **RECOMMENDED DRAINAGE CONTROL MEASURES SCHEMATIC SKETCH**

DATE:	JOB No.:	CAD FILE:	FIGURE No.:	REV.
JUNE 2004	CG25190	25190M03.dwg	FIG 2–S13	A

Photo S13-1 (upper left) – May 2004 – gully erosion retrogressing into the south edge of the road surface. There has been a slight retrogression (estimated less than 5 cm) of the erosion further back into the road since the July 2003 inspection. Compare with Photo S13-2.

Photo S13-2 (upper right) – July 2003 – same area as shown in Photo S13-1, as seen during the July 2003 inspection.

Photo S13-3 (lower left) – May 2004 – facing east across the site, showing the relative position of the gully erosion in the fill embankment slope face and the guardrail/road surface. Note the pile of rockfall debris that has been hauled from a site to the east and stockpiled here for later disposal into the gully downstream of the road.

Photo S13-4 (lower left) – May 2004 – facing upslope/northeast towards the road. Note the gully erosion visible in the fill embankment slope face below the guardrail.