

S13 – Highway 546 Sheep River Site

The Highway 546 Sheep River site was visited on July 8, 2003. This was the first annual inspection for this site. Photographs from this site visit are included in Appendix S13, along with a schematic site plan and a detailed discussion of the visit.

Significant gully erosion was observed on the downstream face of a large fill embankment across a deep creek gully at this site. The head of this gully erosion has retrogressed into the downslope edge of the road surface. The rate of gully erosion was not clear, however it did not appear that gullies had occurred rapidly or during a single rainstorm, but had instead developed over time.

A Risk Level of 28 was assigned to this site. AMEC recommends that runoff control measures be installed along the south edge of the road and on the downstream face of the embankment. Please refer to Appendix S13 for further discussion.

APPENDIX S13
Highway 546 – Sheep River Site

1.0 Site Visit

The Annual Inspection site visit was conducted on July 8, 2003. At the time of the inspection, the weather was clear with a light breeze.

2.0 Significant Observations

- Significant gully erosion is visible on the downstream face of a large fill embankment across a deep creek gully (Photos 1, 2, 4 and 6). The gully erosion on the embankment face has retrogressed approximately 1 m past the guardrail and into an approximately 2 m length of the road surface (Photos 2 and 3).
- The exposed fill on the downstream side is steep and unvegetated, and appears to be relatively coarse with numerous to abundant gravel to cobble sized particles visible.
- The gully erosion appears to be due to runoff from the paved road surface flowing off the south edge of the road and onto the unvegetated, steep fill slope face.
- One of the guardrail posts was being undermined by the gully erosion, and two others were close to becoming undermined (Photos 2, 3, 4 and 5). However, the guardrail alignment has not been damaged so far.
- AMEC understands that on occasion, fill has been end-dumped down into the gully south/downstream of the road, onto the east side of the embankment fill slope. It appears that the culvert has been dented, but not seriously damaged, in a couple of places by large rocks being dumped and rolling down the slope into the gully.
- A minor gully is developing on the west side of the upstream face of the embankment fill (Photos 7, 8). The catchment area that feeds drainage into this gully is relatively small. The gully appears to be well armored by large, angular cobbles from the fill embankment and local native ground.

3.0 Changes from Previous Visit

This was AMEC's first annual inspection at this site.

4.0 Discussion and Assessment

The gully erosion on the downstream face of the fill embankment at this site is retrogressing into the south edge of the road surface. The rate of gully erosion is not clear as this was the first geotechnical inspection of this site. However, the general appearance of the gullies in the coarse fill material does not suggest that rapid erosion and retrogression is occurring. Portions of the guardrail have been undermined but the guardrail itself has not been deflected to date. 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/undermined area.

Based on the available information and the observations during the July 7, 2003 site visit, the Probability Factor for this site should be set at 7. This value reflects the active erosion of the gullies on the embankment slope face.

The Consequence Factor for this site should be set at 4. This value is considered appropriate for this type of surface erosion in a major culvert fill, 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 28.

5.0 Recommendations

The occasional end-dumping of fill into the gully should be stopped.

Runoff from the road surface should be prevented from flowing onto the fill slopes in an uncontrolled manner. AMEC recommends the following to achieve this (see Figure 2-S13 for schematic illustration):

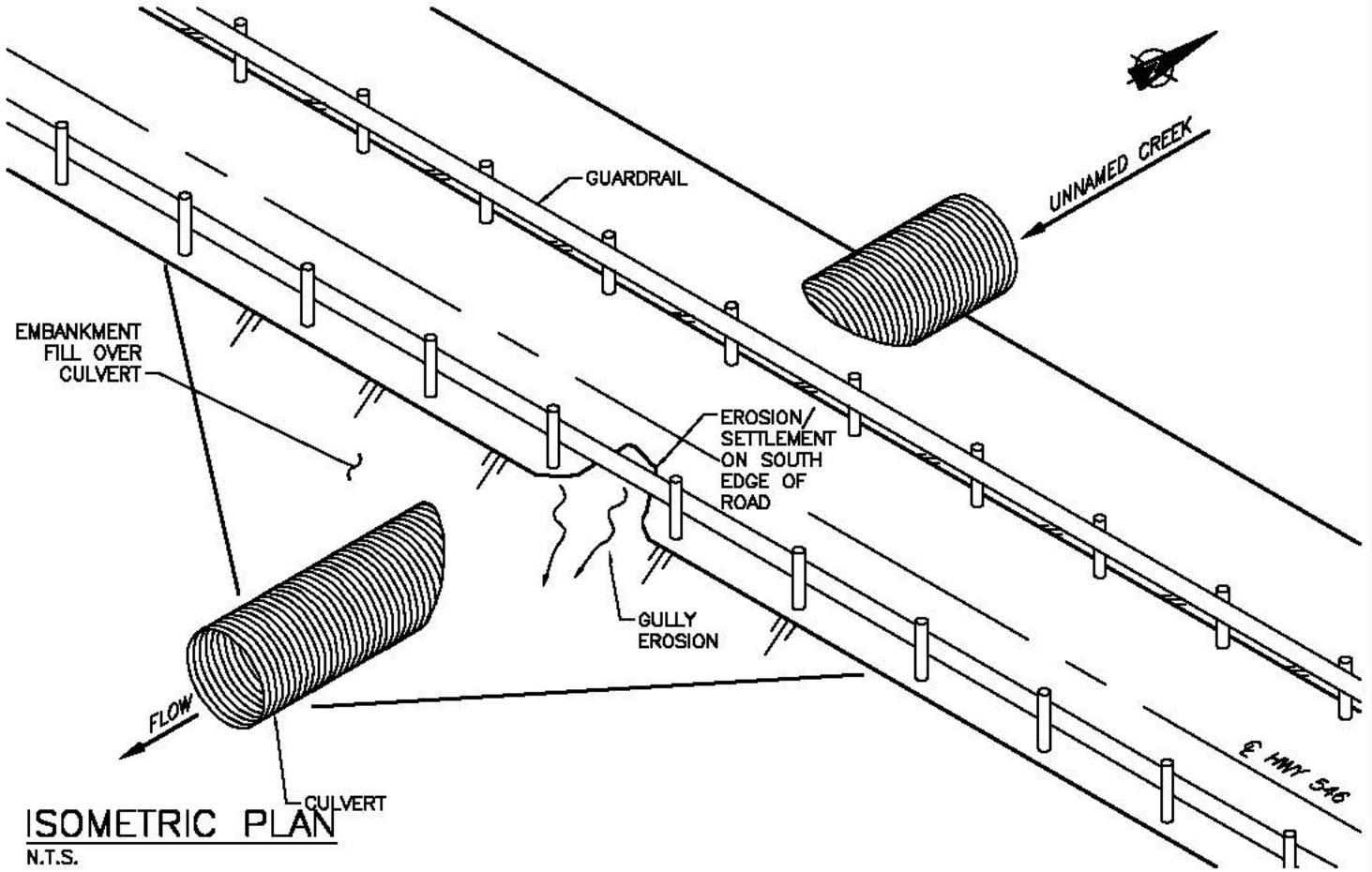
- Backfill and asphalt patch the eroded/undermined area on the south edge of the road.
- Construct a small berm of asphalt along the south edge of the road.
- Leave two gaps in the asphalt berm to allow runoff to leave the road surface.
- Flumes (half culverts) or even whole culverts should be installed at the gaps in the 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.

Annual inspections 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 inspections can be discontinued.



KEY PLAN

SCALE 1:1 500 000



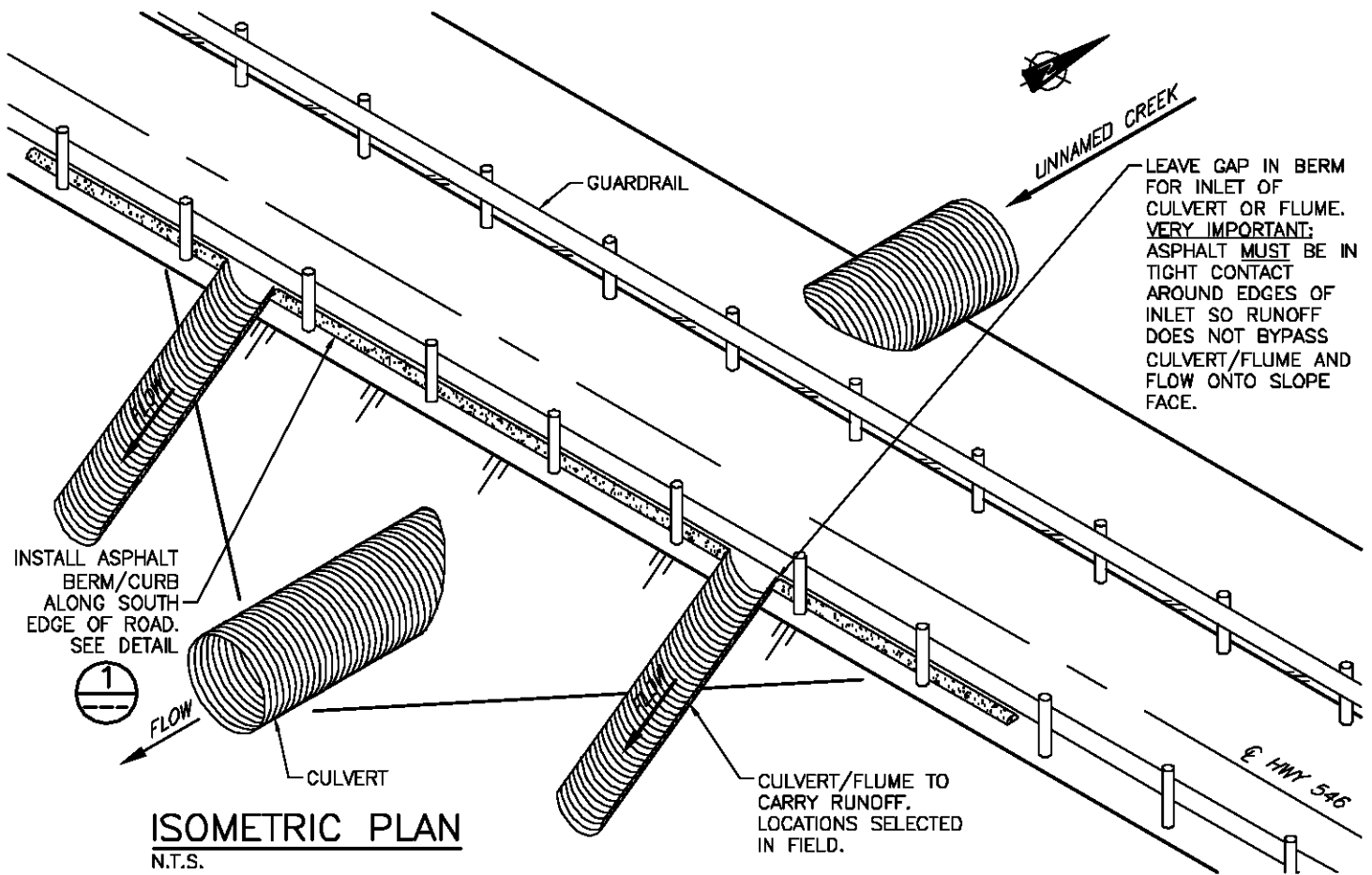
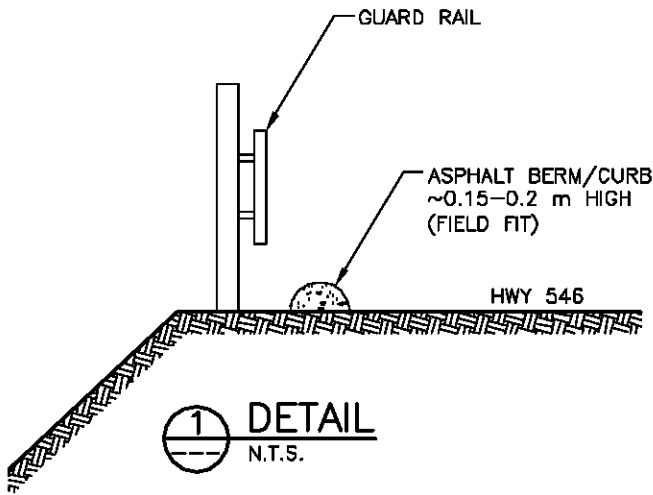
AMEC Earth & Environmental Limited

PROJECT: SOUTHERN REGION LANDSLIDE MONITORING

TITLE: SCHEMATIC SITE PLAN
HIGHWAY 546: SHEEP RIVER SITE

CLIENT: ALBERTA TRANSPORTATION

DATE: AUGUST 2003	JOB No.: CG25132.B	CAD FILE: 25132M00.dwg	FIGURE No.: FIG 1-S13	REV. A
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PROJECT: **SOUTHERN REGION LANDSLIDE MONITORING**

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

CLIENT: **ALBERTA TRANSPORTATION**

DATE: AUGUST 2003	JOB No.: CG25132.B	CAD FILE: 25132M00.dwg	FIGURE No.: FIG 2-S13	REV. A
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Photo 1 (top)
Facing northwest across the Highway 546 – Sheep River Site. Gully erosion on the downstream fill slope face is visible.



Photo 2 (lower left)
Facing west along the south guardrail. The gully erosion in the fill slope below the guardrail is visible, along with some erosion and settlement of the pavement surface along the south edge of the road.

Photo 3 (lower right)
Closer view of the gully erosion extending into the pavement surface along the south edge of the road.





Photo 4 (upper left)
Another view of the gully erosion immediately south of the guardrail, showing the proximity of the steep drop-off to the road.



Photo 5 (upper right)
View facing east along the south guardrail. Note the proximity of the steep fill slopes to the edge of the road.



Photo 6 (lower left)
Facing north from downslope of the road. The height of the fill embankment above the culvert is visible, along with the pronounced gully erosion of the fill material adjacent to the south guardrail.



Photo 7 (top)
 General view of the creek to the north of the highway. The culvert inlet is visible in the center, bottom of the photo. The point on the south guardrail shown in Photos 3 and 4 is as shown.



Photo 8 (bottom)
 Facing northwest across the north side of the highway/creek crossing. A minor gully is developing along the west margin of the fill embankment. This gully appeared to be well-armored by natural rock material, however it illustrates how uncontrolled runoff can erode into this fill material.