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SITE40
HIGHWAY 848– DOROTHY EROSION SITES

SITE DATA – SUMMARY BINDER

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SECTION A

SECTION A – FILE REVIEW

Site Location

- This site is located along Highway 848, approximately 1.35 km west of Dorothy, Alberta, and 1.2 km southwest of the junction of Highway 848 and Highway 570, southwest of the Red Deer River.
- 4-27-17 W4M
- UTM Coordinates: Easting 406603, Northing 5681363 (NAD83, Zone 12U)
- NTS Mapsheet 82P/8

Chronological Background

Table 1A provides a chronological background for this site.

Site Geology, Hydrogeologic and Geomorphologic Setting

At the site location, Highway 848 is a two lane, undivided, gravel roadway at a hairpin segment of a switchback that winds up through a tributary valley. This region was sculpted by quaternary glaciers resulting in several steep-walled valleys caused by rivers creating new channels due to erosion of meltwater streams.

The site lies within an area mapped as the Upper Cretaceous Horseshoe Canyon Formation[1], a non-marine clayey sandstone with beds of bentonitic mudstone, carbonaceous shale, concretionary iron stone and minor limestone. It also falls within close proximity to a formation contact with the Paleocene and Upper Cretaceous Scollard Formation, a non-marine feldspathic sandstone, with bentonitic mudstones and thick coal beds. The slopes of the nearby Red Deer River valley are mapped as the Upper Cretaceous Bearpaw Formation, a marine shale.

The site area lies within a region mapped as cretaceous bedrock exposed by postglacial erosion with isolated lobes of quaternary alluvium[2]. These lobes consist of gravel till and are located on the west-most extent of the tributary valleys as they approach the Red Deer River. The upslope plateau regions are mapped as undulating to gently rolling ground moraine deposits.

There is no hydrogeologic information available with the exception of ponded water being observed in the upslope ditch, upslope (south) of the hairpin turn on several occasions.

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[1] Stalker, A.M., 1974: Surficial Geology of the Drumheller Area, Alberta. Geological Survey of Canada, Department of Energy, Mines and Resources, Memoir 370.
[2] Prest, V.K., 1968: Nomenclature of Moraines and Ice Flow Features as Applied to the Glacial Map of Canada, Geological Survey of Canada, Department of Energy, Mines and Resources, Paper 67-57.

Description of Past Site Problems and Investigations

Amec Foster Wheeler completed a desktop study in February 2016 which looked at air photos and LiDAR to better understand the site location. It was observed that documented erosional features were predominantly concentrated in erosion gullies which likely carried surface run off and precipitation downslope. This report can be located in Section G of this binder.

Description of Mitigative Measures Implemented

No records of previous repair were located during a file review for this site.

Table A1 – S40– Highway 848:02, Dorothy Erosion Sites

Chronological Background

Date	Description
November 2011	Site first inspected by AMEC as a call-out inspection after both AT and maintenance contractor personnel noted erosion damage in and around the road surface. It was described that the "sinkholes" developed without warning and were repaired by backfilling with gravel. Numerous 'sinkholes' were found in ditches and gullies at the site. Some appeared to connect to subsurface drainage tunnels. Two culvert outlets were observed along the slope towards the ravine north of the road. One culvert was broken near the outlet. Recommended risk level set at 56. Recommendations included repairing holes by backfilling with either dirty gravels or pumped grout, daily inspections by the MCI, warning signs and reduced speed limits, management of subsurface water. Repair options include excavating erodible soils and rebuilding with designed fill and geosynthetics or constructing pile supported slabs to span known void locations.
June 2012	Annual site inspection by AMEC and AT personnel. Approximately 17 sinkholes were identified. No damage to the road surface was noted. No major changes were observed to the two culvert outlets. Recommended risk level increased to 72. No change to recommendations with the exception of further study recommended.
May 2013	Annual site inspection by AMEC and AT personnel. An additional 7 new features were identified. A 'sinkhole' near the road edge appeared to have an erosion tunnel that ran beneath the road surface which had been partially filled by grading work. Recommended risk level increased to 80. No changes to recommendations.
May 2014	Annual site inspection by AMEC and AT personnel. An additional 2 new features were identified. The road shoulder at the location of the 2 new features had begun to become undermined and damaged. Several areas noted on the upper road upslope of the hairpin where water had pooled. No change to risk level or recommendations.
May 2015	Annual site inspection by AMEC and AT personnel. Main roadside features had been filled in and no new features were identified. Gully and sinkhole between the hairpin turn upslope of the main sinkholes showed fresh collapse and head cutting. No ditch was present due to recent grading. No change to recommended risk level or recommendations.
February 2016	Desktop study performed by AMEC in which air photos and LiDAR were reviewed. Study noted that most of the erosion features were concentrated within erosion gullies that likely channelled surface runoff and precipitation from upslope. Recommended a photogrammetry survey for detailed analysis of feature locations.