Slide Name:	**(GP 26) Ditch Erosion South of Grande Cache** **(GP 27) Ditch Erosion North of Grande Cache**
Inspection Date:	**May 6, 2005**
Inspection by:	**Alberta Infrastructure & Transportation and EBA staff listed on Page 1**

1.0 BACKGROUND

The Town of Grande Cache is located on a plateau at the east fringe of the Rocky Mountains. The town is bounded by the Smoky River valley to the north and by the water bodies of Victor Lake and Grande Cache Lake to the south. To approach the town from both north and south directions, Hwy 40 was constructed with a steep 8% grade from the north and a 6.5% grade from the south. To improve traffic flow along the steep roadway at both the north and south approaches to town, the addition of climbing lanes were constructed in 1998 to 1999. The construction of climbing lanes encroached onto the backslope area and narrowed the width of ditches along this steep roadway. As a result, erosion occurred along the steep backslope ditches along both the north and south approaches to town.

Along the north approach to town, the steep ditch was constructed as a V-Ditch because of the constraint confined by the high steep backslope on one side and the steep highway sideslope on the opposite side. Ditch erosion has formed vertical scarps (1 to 1.5 m depths) along the roadway sideslope and the scarps have transgressed close to the roadway shoulder line. Such an abrupt drop of the sideslope along the shoulder line is a safety concern. Approximately 200 to 300 m of backslope ditch was adversely affected. The affected area is located along a straight stretch just north of a curve and positioned about 1.8 km north of town.

Along the south approach to town, the steep ditch was constructed as a flat bottom trapezoidal ditch with an erosion protection lining of shot rock and woven-geotextile underlay. The ditch subgrade comprises soft shale; however, the erosion along the ditch has incurred steep vertical erosion scarps (1 to 1.5 m deep) along the less resistant road fill subgrade resulting in an abrupt drop along the shoulder. The abrupt drop along the sideslopes is a safety concern. Approximately 200 to 300 m of backslope ditch was generally affected. Of the 200 to 300 m affected areas, about 100 m stretch has vertical erosion scarps (on road fill subgrade) along the sideslope shoulder. The affected area is located about 300 m to 400 m south from the south edge of town.

According to AIT highway mosaic, the approximate locations of severe ditch erosion are located at:

		Ditch Details
• North Approach	Station 34+300 (south) to Station 34+600 (north) 200 to 300 m stretch	8% grade; V-Ditch; 150 m with vertical erosion scarps along road grade
• South Approach	Station 30+800 (north) to Station 3)+500 (south) 200 to 300 m stretch	6.5% grade; Trapezoidal Ditch; 100 m with vertical erosion scarps along road grade

It is understood that the Town of Grande Cache has requested repair of the ditch erosion for both approaches to town. The site was inspected in an earlier occasion (November 2004) prior to the current site visit and the above background information was investigated from AIT records.

2.0 OBSERVATIONS

- Along the north approach
  - The affected ditch area is a 200 to 300 m stretch of steep grade V-ditch, of which about 150 m entails vertical erosion scarps along the shoulder line and sideslope.
  - The vertical scarps are a safety hazard for vehicles running off the road.
- Along the south approach
  - The affected ditch area is a 200 to 300 m stretch of steep grade V-ditch, of which about 100 m entails vertical erosion scarps along the shoulder line and sideslope.
  - The vertical scarps are a safety hazard for vehicles running off the road.

3.0 RISK ASSESSMENT

Not applicable.

4.0 ACTION

- A new ditch design should be considered. The possible design of drop structures to step down the steepness of the ditch grade and a new ditch cross-section design may be required. The use of hard armouring may be appropriate for this site.

Photo 1
Looking North Towards Town - Top End of South Ditch - Ditch flows south (downgrade) at Tourist Information Centre at south edge of town.

Photo 2
Looking North - Roadside erosion along side slope at south edge of town just before approach to Tourist Information Centre. Surface water flows to a catch basin (at right bottom of photo) to connect to a culvert across highway to outfall to right (west) side of road.

Photo 3
Looking Downgrade South - Minor erosion along roadside. Water flow to a catch basin into a culvert across road to outfall at side slope on right side of photo.

Photo 4
Outlet of culvert at side slope at right (west) side of road. Siltation requires maintenance clearout.

Photo 5
Looking downgrade south along east (backslope) ditch. Some surface water continues to flow from south edge of town down east (backslope) ditch along a curve.

Photo 6
Looking upgrade north. Surface water flows down a curve along a ditch lined with random rock and geotextile underlay. Ditch is in workable condition along 1st 300m stretch downgrade (to the 50km/hr signage) from south edge of town.

Photo 7
Looking upgrade north. Ditch erosion along 2nd 100 - 200m stretch downgrade (from 50km/hr signage). Steep erosion is severe and vertical scarp along highway subgrade is a safety

Photo 8
Looking downgrade south. Ditch erosion along 2nd 100 - 200m stretch downgrade. Steep erosion scarp along highway subgrade is a safety concern.

Photo 9
Looking downgrade south ditch erosion mildly severe along 3rd stretch of 100m downgrade.

Photo 10
Looking upgrade north ditch erosion mildly severe along 3rd stretch

Based on 1997 Aerial Photograph

0 800

SCALE (metres)

Figure 1

Site Location Plan

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