Alberta INFRASTRUCTURE AND TRANSPORTATION

CENTRAL REGION GEOHAZARD RISK ASSESMENT SITE INSPECTION FORM

Klohn Crippen Berger

SITE NUMBER AND NAME	HIGHWAY & KM	PREVIOUS INSPECTION DATE	INSPECTION DATE
H21:22 Pavement Distress	from km 16.4 to km 17.7		**May 15, 2007**

LEGAL DESCRIPTION	NAD 83 COORDINATES	RISK ASSESMENT
		PF: 9 CF: 4 TOTAL: **36**

SUMMARY OF SITE INSTRUMENTATION:	INSPECTED BY:
None LAST READING DATE:	PROFESSIONAL ENGINEER OF ALBERTA DARREN W. RATCLIFFE

PRIMARY SITE ISSUE: Pavement distress

APPROXIMATE DIMENSIONS:

DATE OF ANY REMEDIAL ACTION:

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Three areas of severe fatigue cracking in pavement, indicative of a soft subgrade.		X
Slope Movement		X			X
Erosion		X			X
Seepage		X			X
Culvert Distress		X			X

COMMENTS

Refer to attached photographs and description overpage.

Distress is observed in 3 areas: the 2 southernmost areas comprise one lane only and measure about 10 m long by 5 m wide. The area immediately south of the railway crossing is more extensive and measures about 50 m long by 10 m wide.

Areas of pavement distress are located about 1 km north of Highway 609 and south of the railway crossing in a low area. The road is used for a daily haul route to the Edmonton area. It is understood that the highway is to be overlain in the next 2 to 3 years.

This type of pavement failure generally occurs when the pavement has been stressed to the limit of its fatigue life by repetitive axle load applications. Fatigue cracking is often associated with loads which are too heavy for the pavement structure or more repetitions of a given load than provided for in design. The problem is often made worse by inadequate pavement drainage which contributes to this distress by allowing the pavement layers to become saturated and lose strength. Fatigue cracking is also often caused by repetitive passes with overweight trucks and/or inadequate pavement thickness due to poor quality control during construction. Fatigue cracking can lead to the development of potholes when the individual pieces of asphalt physically separate from the adjacent material and are dislodged from the pavement surface by the action of traffic. Potholes generally occur when fatigue cracking is in the advanced stages and when relatively thin layers of asphalt comprise the bound portion of the pavement (such as a patch).

Repair strategies for fatigue cracking typically involve sub-base removal and replacement. The fatigue cracking is often caused by high moisture content and a poor subgrade. The poor material should be removed and replaced with good material (possibly with the inclusion of geotextile reinforcement) and improving the drainage. Alternatively, a substantial overlay could be placed over the entire surface. Fatigue cracking is a load-associated failure and hence the thickness of the overlay must be structurally designed to carry the number of loads anticipated during the design life of the pavement. If thin overlays or patches are used, the overlays fail prematurely because the underlying layers are too weak and the thin surface does not provide enough thickness to withstand the high stresses produced by truck loadings.

We would recommend that a sub-base removal and replacement approach be adopted for this site. It is understood that the highway structure comprises the following:

- 75 mm GBC (1963)
- ?? mm ACP (1963)
- 230 mm OL (1991)

The GBC appears relatively thin compared to other lengths of the Control Section where the GBC is typically about 250 mm thick.

For the distressed pavement areas, it is recommended that the soft subgrade soils be excavated to a depth of about 1 m (or to a depth where a competent subgrade is encountered). A layer of woven geotextile with a minimum grab tensile strength of 1400N (e.g. Nilex Woven 2006 or equivalent) should be placed on the subgrade and the excavation backfilled with compacted pitrun gravel (Des. 80). A further layer of woven geotextile should be placed on the surface of the pitrun gravel followed by 250 mm of GBC and 250 mm of ACP. It is recommended that the excavation be inspection by a geotechnical engineer to evaluate the subgrade soils and modify the recommendations accordingly.

A cost estimate for the repair work is provided in the following table:

Description	Estimated Quantity	Unit Price	Total
Remove existing ACP and salvage existing base gravels	600 m²	$50	$30,000
Common Excavation	700 m³	$30	$21,000
Supply and Place Pitrun Gravel	700 m³	$50	$35,000
Supply and Install Woven Geotextile	1,200 m²	$25	$30,000
Supply and Place GBC	150 m³	$60	$9,000
Supply and Place ACP	350 tonnes	$75	$26,250
			$151,250