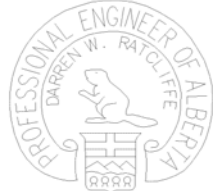


**CENTRAL REGION  
GEOHAZARD RISK ASSESMENT  
SITE INSPECTION FORM**

SITE NUMBER AND NAME <b>C20 H771:02 Pavement</b>		HIGHWAY & KM	PREVIOUS INSPECTION DATE May 23, 2003	INSPECTION DATE <b>May 12, 2004</b>
LEGAL DESCRIPTION SW 3-41-1-W5	NAD 83 COORDINATES N 5820026 E 698635	RISK ASSESMENT PF: 9 CF: 1 TOTAL: <b>9</b>		

SUMMARY OF SITE INSTRUMENTATION:  None	INSPECTED BY: 
LAST READING DATE:	
PRIMARY SITE ISSUE: Pavement distress/Frost Heave	
APPROXIMATE DIMENSIONS:	
DATE OF ANY REMEDIAL ACTION: Fall 2003 (Phase 1 – Ditch re-grading and culvert installation)	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Patch over new culvert	X	
Slope Movement					
Erosion					
Seepage	X		The previously observed areas of standing water are now draining	X	
Culvert Distress					
Frost Heave	X			X	

**COMMENTS**

Refer to previous reports and attached photographs

Over the last winter significant frost heave was observed south of the intersection in the area of the new culvert. Due to the granular fill around the new culvert, the culvert area did not heave to the same extent and resulted in a dangerous dip in the highway. The dip was patched and then trimmed off as the heave disappeared in the spring.

During the culvert installation work, the excavation was observed to be very wet and free water flowed from sand seams. Due to the work being completed late in the season, it is unknown if there was sufficient time for the area to drain into the new ditches prior to winter freeze-up.

To remediate the frost heave area, a material replacement program is required with appropriate material tapering to prevent sharp humps and dips. However, to determine the extent of the heaving areas, it is recommended that the section be monitored over the next winter. It is proposed to undertake an elevation survey this summer and again in February 2005.

Some clean up work is required in the ditches and it is understood that the contractor will complete the work this year.

## 1. SITE C20: H771:02 PAVEMENT DISTRESS

### 1.1 Background

At the intersection of SH771:02 with the township road 41-0, about 2 km north of Highway 20, the pavement is beginning to fail due to frost heave and/or softening of the road base. In 2003, the surface drainage of the area was modified by the re-grading of the ditches and the installation of a larger culvert at a deeper elevation. During the winter of 2003-2004, significant frost heave was observed in the area of the new culvert. Due to the presence of the granular material around the culvert, this zone did not heave to the same extent as the surrounding soil and a dip was created across the pavement.

During the culvert installation, water was observed seeping from sandy and silty zones of the subgrade. However, as the drainage modification work was done relatively late in the season it is considered that the subgrade had insufficient time to drain before freezing conditions occurred.

The recommended remediation for the pavement is the replacement of the native soils with well compacted granular material over a suitable length with appropriate tapering.

### 1.2 2004 Scope of Work and Cost Estimate

To determine the extent of the fill replacement, it is recommended that an elevation survey be conducted this summer and in the following winter (February 2005). The survey will comprise a minimum of five lines (right side, centre right lane, centreline, centre left lane, and left side) over a length of about 150 m. Elevations will be taken at 1 m intervals for a distance of 20 m each side of the culvert and at 3 m intervals for the remainder.

Based on the data collected a report will be prepared summarizing the data and recommending the extent of material replacement to be undertaken. Estimates of material quantities will be included.

It is understood that Klohn Crippen will provide the technical monitoring and support. Supervision will include the inspection of the exposed subgrade, excavation and backfilling. Two days of supervision has been included in the project estimate.

For budgeting purposes, we have estimated the costs based on the scope of work and provided a summary of man-hour and cost estimates in Table 1. As shown in Table 1, the total estimated cost is \$11,230 exclusive of GST.

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**Table 1      Cost Estimate for Site C20 Investigation**

Task	Description	Fees (\$)	Expenses (\$)	Total (\$)
1	Survey	220	5460	5680
2	Reporting	2530	300	2830
3	Construction Supervision	2220	500	2720
		4970	6260	<b>11230</b>





East ditch looking north over new culvert inlet.



Culvert inlet



East ditch south of intersection



Looking north at culvert outlet in west ditch.







Looking west.