

***CACHE CREEK
TO THE
ROCKIES PROGRAM***

**Trans Canada Highway
Existing Conditions Report**

**APPENDIX 2
GEOTECHNICAL CONDITIONS**

Fall, 1998



**BRITISH
COLUMBIA**

**Ministry of Transportation
and Highways**

**TRANS CANADA HIGHWAY
CACHE CREEK TO THE ROCKIES PROGRAM**

**APPENDIX 2
PAVEMENT CONDITION, NATURAL HAZARDS, GEOTECHNICAL ISSUES
Table of Contents**

SECTION	TITLE	PAGE NO.
	INTRODUCTION	1
1.0	CACHE CREEK TO MONTE CREEK	
	Segment 0920, LKI 0.00 to Segment 0925, LKI 25.90.....	1-1
	Geotechnical Consultant: Thurber Engineering Ltd.	
	1.1 PDI / RCI	1-1
	1.2 Natural Hazards	1-1
	1.3 Geotechnical Issues	1-1
2.0	MONTE CREEK TO SORRENTO WEST	
	Segment 0935, LKI 0.00 to Segment 0935, LKI 47.31.....	2-1
	Geotechnical Consultant: Golder Associates Ltd.	
	2.1 PDI / RCI	2-1
	2.2 Natural Hazards	2-4
	2.3 Geotechnical Issues	2-5
3.0	SORRENTO WEST TO FORD ROAD	
	Segment 0935, LKI 47.31 to Segment 0935, LKI 63.85.....	3-1
	Geotechnical Consultant: Thurber Engineering Ltd.	
	3.1 PDI / RCI	3-1
	3.2 Natural Hazards	3-1
	3.3 Geotechnical Issues	3-1
4.0	FORD ROAD TO CANOE	
	Segment 0935, LKI 63.85 to Segment 0950, LKI 7.30.....	4-1
	Geotechnical Consultant: Thurber Engineering Ltd.	
	4.1 Introduction	4-1
	4.2 Pavement and Geotechnical Conditions	4-2
	4.2.1 Pavement Conditions	4-2
	4.2.2 Geotechnical Conditions	4-3
5.0	CANOE TO TAFT ROAD	
	Segment 0950, LKI 7.30 to Segment 0960, LKI 32.03.....	5-1
	Geotechnical Consultant: EBA Engineering Consultants Ltd.	
	5.1 PDI / RCI	5-1
	5.2 Natural Hazards	5-2
	5.3 Geotechnical Issues	5-3

SECTION	TITLE	PAGE
6.0	TAFT ROAD TO VICTOR LAKE	
	Segment 0960, LKI 32.03 to Segment 0960, LKI 53.67.....	6-1
	Geotechnical Consultant: Klohn – Crippen Consultants Ltd.	
6.1	PDI / RCI.....	6-1
6.2	Natural Hazards.....	6-2
6.3	Geotechnical Issues.....	6-8
7.0	VICTOR LAKE TO MT. REVELSTOKE NATIONAL PARK WEST GATE	
	Segment 0960, LKI 53.67 to Segment 0975, LKI 18.28.....	7-1
	Geotechnical Consultant: EBA Engineering Consultants Ltd.	
7.1	PDI / RCI.....	7-1
7.2	Natural Hazards.....	7-2
7.3	Geotechnical Issues.....	7-5
8.0	MT. REVELSTOKE NATIONAL PARK WEST GATE TO DONALD	
	Segment 0975, LKI 30.55 to Segment 0985, LKI 30.00.....	8-1
	Geotechnical Consultant: Golder Associates Ltd.	
8.1	PDI / RCI.....	8-1
8.2	Natural Hazards.....	8-3
8.3	Geotechnical Issues.....	8-5
9.0	DONALD TO ROTH CREEK	
	Segment 0985, LKI 30.00 to Segment 0990, LKI 12.00.....	9-1
	Geotechnical Consultant: Golder Associates Ltd.	
9.1	PDI / RCI.....	9-1
9.2	Natural Hazards.....	9-1
9.3	Geotechnical Issues.....	9-5
10.0	ROTH CREEK TO BRAKE CHECK	
	Segment 0990, LKI 12.00 to Segment 0990, LKI 17.40.....	10-1
	Geotechnical Consultant: Golder Associates Ltd.	
10.1	PDI / RCI.....	10-1
10.2	Natural Hazards.....	10-1
10.3	Geotechnical Issues.....	10-3
11.0	BRAKE CHECK TO YOHO PARK	
	Segment 0990, LKI 17.40 to Segment 0990, LKI 26.00.....	11-1
	Geotechnical Consultant: Geotech & Materials Engineering, Region 3, MoTH	
11.1	PDI / RCI.....	11-1
11.2	Natural Hazards.....	11-1
11.3	Geotechnical Issues.....	11-2

INTRODUCTION

REFERENCE LOCATION

The geotechnical and pavement conditions for the area are referenced by Landmark Kilometre Inventory (LKI). The LKI values include the segment number and offset value, measured in kilometres. The appendix provides more detailed information on the features identified on the strip charts within the Existing Conditions report.

PAVEMENT CONDITIONS

Pavement condition is defined in terms of the Pavement Distress Index (PDI) that indicates the surface distress condition, and the Riding Comfort Index (RCI) that is a measure of the roughness of the road. These are derived from the Roadway Pavement Management System (RPMS). The strip charts show a generalized average of PDI and RCI, in that order, for sectors within the overall section of highway.

The PDI is calculated from a combination of pavement distress features based on their severity and density. This distress score is based on a declining condition scale from 10 (best) to 0 (worst). The RCI is determined using a high-speed, automated, road profile measuring device. The RCI uses the same rating scale as is used for PDI.

The pavement condition based on PDI can be subdivided into three broad categories: Good (10 to 7), Fair (7 to 5), and Poor (< 5). The categories for RCI are: Smooth (10 to 7), Moderate (7 to 5), and Rough (< 5). Trigger levels for both PDI and RCI have been established by the Ministry to ensure that the pavement condition is evaluated and rehabilitation planned before excessive deterioration has occurred. The trigger levels are as follows:

- Surface Distress when a road drops into fair surface distress (PDI < 7)
- Roughness midway point of moderate roughness (RCI < 6).

GEOTECHNICAL CONDITIONS

The Geotechnical Conditions are considered under two categories: Natural Hazards and Geotechnical Issues. The Natural Hazards category provides information on the geological hazard to the present highway users and incorporates the rockfall data from the Rockfall Hazard Rating System (RHRS). The hazards related to processes other than rockfall are also summarized in this report according to the type of process and

the severity. The hazard types and severity ratings used for the geotechnical conditions are given following.

Hazard Type

Process	Symbol
Avalanche	A
Debris Torrent	D
Erosion Fall	E
Icefall	I
Rockfall	R

Severity		
RHRS	Hazard	Symbol
A	high	◇
B	moderate	□
C	low	○

Where RHRS numerical ratings are available (on most A rated slopes), they are included in the detailed information presented in this Appendix. Areas rated as Class C are generally not noted in the existing conditions report, unless field inspection indicates that a higher rating is advisable. If, in the opinion of the rater, a hazard warrants a different rating than indicated by the RHRS, this is noted in the Existing Conditions Report with **+** or **-**, to signify an increased or decreased rating. Information of specific rockfall events and hazards other than rockfall are based on information from District Offices, Snow Avalanche Programs, or others sources.

The geotechnical issues category summarizes the stability and road maintenance issues that may impair the serviceability of the existing highway. The geotechnical issues have been subdivided into 5 processes based on the site features and available information. Information has generally been obtained from District or Regional sources. Each of the processes is characterized by a severity rating and symbol as follows:

Geologic Process

Process	Symbol
Highway	D
Frost Heave	F
Icing of Highway	I
Mass Movement	M
Seepage	S

Severity	Symbol
high	◇
moderate	□
low	○

SECTION 1.0

CACHE CREEK TO MONTE CREEK

SECTION 1.0

CACHE CREEK TO MONTE CREEK

1.1 PDI / RCI

PDI and RCI values from MoTH have been presented to USL in graphical and numerical form for presentation on the mosaics. The reporting segments have been selected on the basis of relatively uniform values. We have not superseded the MoTH PDI/RCI values in any location. In the 2 sections currently under reconstruction, Segment 0921, LKI 16.7 to 21.7 and LKI 24.5 to Monte Creek, we have assigned PDI and RCI values of 10.0 and 9.5 respectively.

We understand from Shawn Landers that MoTH has established threshold (trigger) values of PDI=7 and RCI=6 for initial concern regarding the pavement condition by MoTH. There are evidently several sections of Segment 0920 in which the PDI falls below the threshold, or is very close to it. We propose to carry out a further inspection of the road and to discuss the pavement conditions with District staff in early January prior to finalization of the Existing Conditions Report (ECR). Any additional comments will then be forwarded to you immediately.

1.2 NATURAL HAZARDS

The RHRS Summary Report provided by MoTH for this section of the TCH identifies few rock cuts with a Class A rating. These are listed on Table 1. No scores were presented. We intend to discuss the summary information with District staff shortly to establish if further data can be presented in the ECR. No remedial work was identified on the RHRS Report.

We have classified the high soil slope at LKI 32.52 - 32.54 (Segment 920) as an erosion fall of potentially high severity. We will confirm this with District staff.

1.3 GEOTECHNICAL ISSUES

Issues such as highway distortion, frost heave, icing and seepage, were not evident during our road inspections. However, we will shortly review these items with District staff.

Table 1

TRANS-CANADA HIGHWAY - CACHE CREEK TO MONTE CREEK

NATURAL HAZARDS

		LKI						
Id #	Type	Segment	Offset			Right/Left	Severity	Comments
1	Rockfall	920	20.35	-	20.47	Left	High	High soil slope
2	Erosion Fall	920	32.52	-	32.54	Right	High	
3	Rockfall	920	38.10	-	38.21	Right	High	
4	Rockfall	920	38.60	-	38.69	Right	High	
5	Rockfall	920	43.01	-	43.05	Right	High	
6	Rockfall	920	43.56	-	43.59	Right	High	
7	Rockfall	920	43.82	-	43.91	Right	High	
8	Rockfall	920	43.97	-	44.06	Right	High	
9	Rockfall	920	45.14	-	45.20	Right	High	

SECTION 2.0

MONTE CREEK TO SORRENTO WEST

SECTION 2.0

MONTE CREEK TO SORRENTO WEST

2.1 PDI / RCI

Id #	LKI		PDI/RCI	Comments
	Segment	Offset		
1	0935	0.000 - 0.650	9.2 / 7.6	
2	0935	0.650 - 0.800	6.7 / 8.7	
3	0935	0.800 - 0.950	8.5 / 8.3	
4	0935	0.950 - 1.550	6.3 / 8.0	
5	0935	1.550 - 1.700	8.5 / 6.8	
6	0935	1.700 - 4.200	8.6 / 8.3	
7	0935	4.200 - 4.250	8.5 / 1.8	
8	0935	4.250 - 12.200	8.3 / 8.5	11.600 Start of New 4 Lane Highway
9	0935	12.200 - 12.250	8.6 / 6.7	
10	0935	12.250 - 12.600	8.5 / 7.9	
11	0935	12.600 - 12.650	8.7 / 6.9	
12	0935	12.650 - 18.050	8.8 / 8.1	14.000 End of New 4 Lane Highway
13	0935	18.050 - 18.100	9.4 / 6.7	
14	0935	18.100 - 18.550	8.7 / 8.3	
15	0935	18.550 - 18.700	8.4 / 6.3	
16	0935	18.700 - 20.000	9.2 / 8.2	
17	0935	20.000 - 20.100	6.2 / 7.5	
18	0935	20.100 - 20.350	8.5 / 7.6	
19	0935	20.350 - 20.400	6.6 / 8.2	
20	0935	20.400 - 20.600	7.4 / 8.5	
21	0935	20.600 - 20.650	5.7 / 8.1	
22	0935	20.650 - 20.750	7.9 / 7.8	
23	0935	20.750 - 20.850	6.7 / 7.6	
24	0935	20.850 - 21.350	8.0 / 8.1	
25	0935	21.350 - 21.550	6.7 / 8.2	
26	0935	21.550 - 22.100	8.6 / 8.1	
27	0935	22.100 - 22.200	6.7 / 8.3	
28	0935	22.200 - 22.500	7.9 / 8.2	
29	0935	22.500 - 22.550	6.9 / 8.3	
30	0935	22.550 - 23.600	8.3 / 8.1	
31	0935	23.600 - 24.050	6.0 / 8.2	
32	0935	24.050 - 25.100	8.1 / 8.4	
33	0935	25.100 - 25.200	6.4 / 7.7	
34	0935	25.200 - 25.350	8.2 / 6.7	

2.1 PDI / RCI (CONT'D)

Id #	LKI		PDI/RCI	Comments
	Segment	Offset		
35	0935	25.350 - 25.650	6.3 / 6.8	Patch
36	0935	25.650 - 26.100	8.5 / 7.0	
37	0935	26.100 - 26.200	5.3 / 7.0	
38	0935	26.200 - 26.300	7.4 / 6.8	
39	0935	26.300 - 26.550	6.1 / 6.6	
40	0935	26.550 - 27.350	7.8 / 6.4	
41	0935	27.350 - 27.400	6.8 / 7.1	
42	0935	27.400 - 27.550	6.8 / 6.3	
43	0935	27.550 - 28.000	8.1 / 6.5	
44	0935	28.000 - 28.050	5.7 / 6.8	
45	0935	28.050 - 29.100	8.4 / 6.8	
46	0935	29.100 - 29.150	6.6 / 6.7	
47	0935	29.150 - 29.400	8.2 / 6.6	
48	0935	29.400 - 29.450	6.6 / 7.0	
49	0935	29.450 - 29.900	7.9 / 6.7	
50	0935	29.900 - 29.950	5.7 / 7.1	
51	0935	29.950 - 30.000	7.3 / 6.5	
52	0935	30.000 - 30.050	6.9 / 6.3	
53	0935	30.050 - 30.150	8.3 / 6.8	
54	0935	30.150 - 30.250	6.8 / 6.6	
55	0935	30.250 - 30.550	8.0 / 6.5	
56	0935	30.550 - 31.550	6.6 / 6.4	
57	0935	31.550 - 31.700	6.4 / 7.5	
58	0935	31.700 - 31.850	5.3 / 6.8	
59	0935	31.850 - 31.950	5.5 / 7.6	
60	0935	31.950 - 32.050	5.2 / 6.4	
61	0935	32.050 - 32.500	7.4 / 6.9	
62	0935	32.500 - 32.600	5.1 / 7.1	
63	0935	32.600 - 32.850	7.8 / 6.8	
64	0935	32.850 - 32.900	6.6 / 6.9	
65	0935	32.900 - 34.650	7.9 / 6.8	
66	0935	34.650 - 34.950	5.8 / 6.5	
67	0935	34.950 - 35.100	7.3 / 6.5	
68	0935	35.100 - 35.150	6.8 / 6.5	
69	0935	35.150 - 35.800	7.8 / 6.6	
70	0935	35.800 - 35.900	9.1 / 1.6	
71	0935	35.900 - 36.050	9.7 / 5.6	
72	0935	36.050 - 36.700	5.4 / 6.8	
73	0935	36.700 - 37.000	7.8 / 6.8	

2.1 PDI / RCI (CONT'D)

Id #	LKI		PDI/RCI	Comments
	Segment	Offset		
74	0935	37.000 - 37.250	4.1 / 6.3	
75	0935	37.250 - 38.200	7.9 / 7.1	
76	0935	38.200 - 38.300	6.5 / 7.4	
77	0935	38.300 - 38.750	7.9 / 7.5	
78	0935	38.750 - 38.900	6.3 / 7.5	
79	0935	38.900 - 38.950	8.2 / 7.9	
80	0935	38.950 - 39.100	5.6 / 7.5	
81	0935	39.100 - 39.700	7.9 / 7.5	
82	0935	39.700 - 39.800	7.7 / 6.7	
83	0935	39.800 - 39.850	7.6 / 0.9	
84	0935	39.850 - 39.950	7.8 / 6.6	
85	0935	39.950 - 40.100	8.4 / 7.5	
86	0935	40.100 - 40.500	8.7 / 6.7	
87	0935	40.500 - 40.600	9.0 / 7.3	
88	0935	40.600 - 40.650	9.0 / 6.1	
89	0935	40.650 - 40.700	9.0 / 7.2	
90	0935	40.700 - 41.000	9.2 / 6.2	
91	0935	41.000 - 41.050	7.1 / 7.2	
92	0935	41.050 - 41.100	5.7 / 7.4	
93	0935	41.100 - 42.050	5.9 / 6.7	
94	0935	42.050 - 42.100	6.6 / 7.4	
95	0935	42.100 - 42.450	7.6 / 7.4	
96	0935	42.450 - 42.500	5.5 / 5.5	
97	0935	42.500 - 42.900	7.9 / 7.0	
98	0935	42.900 - 43.750	5.4 / 6.8	
99	0935	43.750 - 43.850	7.4 / 6.9	
100	0935	43.850 - 43.900	6.4 / 6.5	
101	0935	43.900 - 44.000	8.5 / 6.8	
102	0935	44.000 - 44.100	5.7 / 6.4	
103	0935	44.100 - 44.800	7.9 / 6.7	
104	0935	44.800 - 44.850	6.7 / 6.2	
105	0935	44.850 - 45.000	7.2 / 6.3	
106	0935	45.000 - 45.150	6.2 / 6.5	
107	0935	45.150 - 45.250	8.5 / 6.4	
108	0935	45.250 - 45.600	4.6 / 6.5	
109	0935	45.600 - 45.900	7.8 / 6.5	
110	0935	45.900 - 46.000	6.1 / 5.6	
111	0935	46.000 - 46.300	4.3 / 6.4	
112	0935	46.300 - 46.500	7.5 / 6.5	

2.1 PDI / RCI (CONT'D)

Id #	LKI		PDI/RCI	Comments
	Segment	Offset		
113	0935	46.500 - 46.700	6.1 / 6.0	
114	0935	46.700 - 46.850	4.8 / 5.9	
115	0935	46.850 - 46.900	5.3 / 0.8	
116	0935	46.900 - 47.250	8.1 / 6.5	
117	0935	47.250 - 47.300	6.6 / 6.6	
118	0935	47.300 - 47.600	8.0 / 6.7	
119	0935	47.600 - 47.800	5.8 / 6.7	
120	0935	47.800 - 48.000	1.7 / 6.6	New Overlay

2.2 NATURAL HAZARDS

Id #	Hazard Type	LKI		Right/Left	Severity	Comments
		Segment	Offset			
1	Rockfall	0935	3.700-3.788	Right	Medium	Existing Rock Cut
2	Avalanche	0935	16.840-17.000	Right	Very Low	Hoffman Bluff (No observed avalanches have reached road)
3	Rockfall	0935	17.050-17.400	Right	Medium	Rock Fences Rock Bolting
4	Rockfall	0935	17.800-18.600	Right	Medium	-
5	Rockfall	0935	24.840-24.960	Right	Medium	-
6	Rockfall	0935	27.160-28.300	Right	Medium	-
7	Rockfall	0935	29.490-29.750	Right	High	Rock Catchment Wall in Place
8	Avalanche	0935	29.490-29.750	Right	Medium	-
9	Rockfall	0935	29.750-29.970	Right	High	Rock Catchment Wall in Place
10	Avalanche	0935	29.750-29.970	Right	Medium	-
11	Rockfall	0935	29.970-30.270	Right	High	-
12	Avalanche	0935	29.970-30.270	Right	Medium	-
13	Rockfall	0935	30.270-30.500	Right	High	-
14	Rockfall	0935	31.600-31.900	Right	Medium	-
15	Rockfall	0935	32.100-32.200	Right	Medium	-
16	Rockfall	0935	32.600-33.200	Right	Medium	-
17	Rockfall	0935	33.500-33.600	Right	Medium	-
18	Rockfall	0935	33.900-34.350	Right	Medium	-
19	Rockfall	0935	36.500-36.550	Right	Medium	-
20	Rockfall	0935	36.600-36.800	Right	Medium	-
21	Rockfall	0935	40.900-41.350	Right	Medium	-

2.2 NATURAL HAZARDS (CONT'D)

Id #	Hazard Type	LKI		Right/Left	Severity	Comments
		Segment	Offset			
22	Rockfall	0935	42.000-44.000	Right	Medium	-
23	Rockfall	0935	44.000-44.100	Right	High	-
24	Rockfall	0935	44.100-44.300	Right	Medium	-

2.3 GEOTECHNICAL ISSUES

Id #	Geotechnical	LKI		Right/Left	Severity	Comments
		Segment	Offset			
1	Mass Movement	0935	4.70-4.72	Right	Medium	-
2	Seepage (flooding)	0935	6.30-6.68	Right	Medium	-
3	Mass Movement	0935	7.25-7.35	Right	Medium	-
4	Mass Movement	0935	8.00-9.36	Right	Medium	-
5	Seepage (flooding)	0935	9.96	Right	Medium	-
6	Mass Movement	0935	28.10	Right	Medium	-
7	Mass Movement	0935	32.20-32.60	Right	Medium	-

SECTION 3.0

SORRENTO WEST TO FORD ROAD

SECTION 3.0

SORRENTO WEST TO FORD ROAD

3.1 PDI / RCI

PDI and RCI values from MoTH have been presented to McElhanney in graphical and numerical form for presentation on the mosaics. We have extended the data to LK 163.35, the end of McElhanney's design section. The reporting segments have been selected on the basis of relatively uniform values. We have not superseded MoTH's PDI/RCI values in any location.

We understand from Shawn Landers that MoTH has established threshold (trigger) values of PDI=7 and RCI=6 for initial concern regarding the pavement condition by MoTH. In the section LKI 52.5 - 54.5, the PDI falls below the threshold. We propose to carry out a further inspection of the road and to discuss the pavement conditions with District staff in early January prior to finalization of the Existing Conditions Report (ECR). Any additional comments will then be forwarded to you immediately.

3.2 NATURAL HAZARDS

The RHRS Summary Report provided by MoTH for this section of the TCH identifies no soil or rock cuts with a Class A or B rating. We intend to discuss the summary information and the slide area near White Lake Road (LKI 59.85 to 60.05) with District staff shortly to establish if further data is available. No remedial work was identified in the RHRS Report.

3.3 GEOTECHNICAL ISSUES

Issues such as highway distortion, frost heave, icing and seepage, were not evident during our road inspections. However, we will shortly review these items with District staff.

SECTION 4.0

FORD ROAD TO CANOE

SECTION 4.0 FORD ROAD TO CANOE

4.1 INTRODUCTION

This Appendix forms part of the Existing Conditions Report for the section between Balmoral and Canoe. It summarizes the existing conditions with respect to the pavement and geotechnical features along the Trans Canada Highway from Ford Road to just east of the Canoe Mill entrance. A short summary of the Rockfall Hazard Rating System (RHRS) and the Roadway Pavement Rating System (RPRS) is given at the end of the report.

The following table indicates the limits of the assessment.

Segment	From	To
0935	63.85, Ford Road	85.72, Hwy. 97B Intersection
0935	0.00, Hwy. 97B Intersection	7.30, east of Canoe Mill

The following information has been reviewed in preparing this report:

- MoTH LKI Listing
- 1:16,000 scale aerial photos (September 1998) provided by McElhanney Engineering Services Ltd.
- 1:10,000 scale trim mapping of study area.
- Fulton, R.J. 1968. 1:126,700 scale mapping of Surficial Geology, GSC Map 1244A.
- Rockfall Hazard Rating System (RHRS) Summary Report (for Segments 935 and 950).
- Rockfall Report for a 200 m³ rockfall near Knault Hill which occurred Nov 30, 1998.
- Maintenance Contractor's Rockfall Report Summary (1993-1997).
- Detailed RHRS score for an "A" rated slope near LKI 935, offset 75.
- Roadway Pavement Management System (RPMS) data from 1996.

- Discussion with MoTH Area Manager regarding maintenance issues, icing and frost heaves.
- Meeting with Regional Geotechnical Staff and review of files pertaining to study area.
- Site inspection carried out on November 18, 1998.

The pavement and geotechnical conditions are summarized on the strip charts in the Existing Conditions Report and in Tables 4-1 to 4-3.

4.2 PAVEMENT AND GEOTECHNICAL CONDITIONS

4.2.1 Pavement Conditions

Table 4-1 shows the pavement condition along the entire section of highway, subdivided into sectors of approximately similar PDI and RCI. The following procedure was used in making the assessment:

1. A 5 point running average was used to smooth out both the PDI and RCI data and make it easier to break the road into sectors of roughly similar condition.
2. The averaged PDI and RCI data was plotted by LKI (km) and the sectors were determined visually from the plots, using sector lengths not less than 0.5 km.
3. The average of the PDI and RCI values were determined for each sector as shown in columns 3 & 4 of Table 4-1.

Three graphs (Figures 4-1 to 4-3) illustrating the PDI and RCI conditions are attached.

TABLE 4-1: PAVEMENT CONDITIONS

Id #	LKI		PDI	RCI	
	Segment	Offset			
1	0935	63.9 - 66.7	8.0	7.4	
2	0935	66.7 - 67.8	7.4	6.8	
3	0935	67.8 - 78.5	8.4	8.0	
4	0935	78.5 - 78.9	8.3	6.4	
5	0935	78.9 - 81.2	8.1	7.6	
6	0935	81.2 - 82.2	6.9	6.5	
7	0935	82.2 - 84.7	9.0	9.0	New construction completed in 1998. PDI/RDI are based on visual inspection.
8	0935	84.7 - 85.7	7.5	6.4	

**TABLE 4-1: PAVEMENT CONDITIONS
(CONT'D)**

Id #	LKI		PDI	RCI	
	Segment	Offset			
9	0950	0.0 - 1.3	8.9	8.4	
10	0950	1.3 - 1.6	6.3	7.9	
11	0950	1.6 - 5.7	8.0	8.2	
12	0950	5.7 - 7.3	6.2	7.9	

4.2.2 Geotechnical Conditions

The geotechnical conditions are evaluated from two aspects:

- hazards, that include sites where public safety from slope movement is an issue; and
- other geotechnical issues, either existing or potential, that could affect the functional performance of the highway (e.g. slope movement, road distortion).

4.2.2.1 Hazards

This category includes those locations where rapid movement of a slope, generally involving rock particles, could cause a sudden hazard to the road user. The geotechnical hazard information summarized in Table B-2 is based on the available RHRS information, supplemented by rockfall reports and information collected during the field inspection.

TABLE 4-2 NATURAL HAZARDS

Id #	Type	LKI Location		Right/ Left	Severity (Note 1)	Comments
		Seg.	Offset			
1	Erosion fall	0935	67.0 - 67.9	Right	low (C)	20-30 m high cutslope in soil, at 1.5H:1V, rare activity, no obvious signs of recent falls
2	Rockfall	0935	69.0 - 69.5	Right	low (C)	3-4 m high rock cutslope, little sign of activity
3	Rockfall	0935	69.7 - 70.1	Right	high (A) (Note 2)	10 - 40 m high rock cutslope, 2 football-sized rocks on road in 1994, and rock slide on Nov.30, 1998, estimated volume 200 m ³ , blocks to 8m max. dimension, 2 lanes closed
4	Rockfall	0935	70.4 - 71.0	Right	moderate (B)	5-10 m high rock cutslope adjacent to viewpoint 15 m right of highway

**TABLE 4-2 NATURAL HAZARDS
(CONT'D)**

Id #	Type	LKI Location		Right/ Left	Severity (Note 1)	Comments
		Seg.	Offset			
5	Rockfall	0935	75.1 - 75.3	Right	high (A)	10 - 20 m high rock cutslope, RHRS Rating =140, average block size is 0.6 m, no rockfall recorded since 1993

- Notes: 1. RHRS rating in parenthesis
2. Rating has been modified from the MoTH designation.

The *preliminary* RHRS values shown in parenthesis are a qualitative estimate of the potential for rockfall on the highway. RHRS categories that have been modified from the MoTH ratings indicated in the table. The detailed RHRS numerical rating is based on a quantitative assessment and provides a more objective rating of the rockfall hazard than the preliminary rating. Note that only ID No. 5 has been rated in detail, and the rating of 140 is lower than indicated by the preliminary rating of "A".

4.2.2.2 Geotechnical Issues

The existing geotechnical issues are summarized in Table 4-3. The information presented in this table was compiled from a review of the files in the Regional office, aerial photographs and a field inspection of features along the highway.

TABLE 4-3 GEOTECHNICAL ISSUES

Id #	Type	LKI Location		Right/ Left	Severity	Comments
		Seg.	Offset			
1	Mass movement	0935	65.5 - 65.8	Right	low	shallow slumps along edge of road fill ~15 m right of highway
2	Mass movement	0935	68.3 - 68.5	Left	moderate	slumping and erosion of steep fillslope, recent activity, seepage related
3	Distortion	0935	70.4 - 70.7	Left	low	asphalt cracks related to settlement of high rock fill, no recent patches
4	Mass movement	0935	74.0 - 74.4	Right	low	shallow scallop slumps in toe of steep 20 m high cutslope, fissured clay, seepage related
5	Mass movement	0935	76.55 - 76.85	Right	low	slumping of 3 - 5 m high clay cutslope, power poles leaning downslope

**TABLE 4-3 GEOTECHNICAL ISSUES
(CONT'D)**

Id #	Type	LKI Location		Right/ Left	Severity	Comments
		Seg.	Offset			
6	Mass movement	0935	76.85 - 77.0	Both	moderate	<i>Gleneden Slide:</i> asphalt cracks and recent patches related to slow movements of slide area, recurved trees indicate movement on both sides of highway
7	Distortion	0935	77.0 - 81.5	Both	low	asphalt distress, cracking related to settlement of pockets of compressible alluvial sediments and high water-table
8	Mass movement	0935	82.7 - 82.8	Right	low	<i>Webb slide:</i> old soil slide in clay cutslope, horizontal drains installed to mitigate slope movements
9	Distortion	0935	4.8 - 5.0	Right	low	asphalt cracking and recent patches related to settlement of alluvial soil adjacent to Canoe Creek
10	Mass movement	0950	5.0 - 7.3	Right	moderate	extensive slumping of clay cutslopes, seepage discharge along ditch

Fig. 4-1: PDI & RCI: BALMORAL - CANOE

Seg. 0935: Ford Road - Mill Entrance

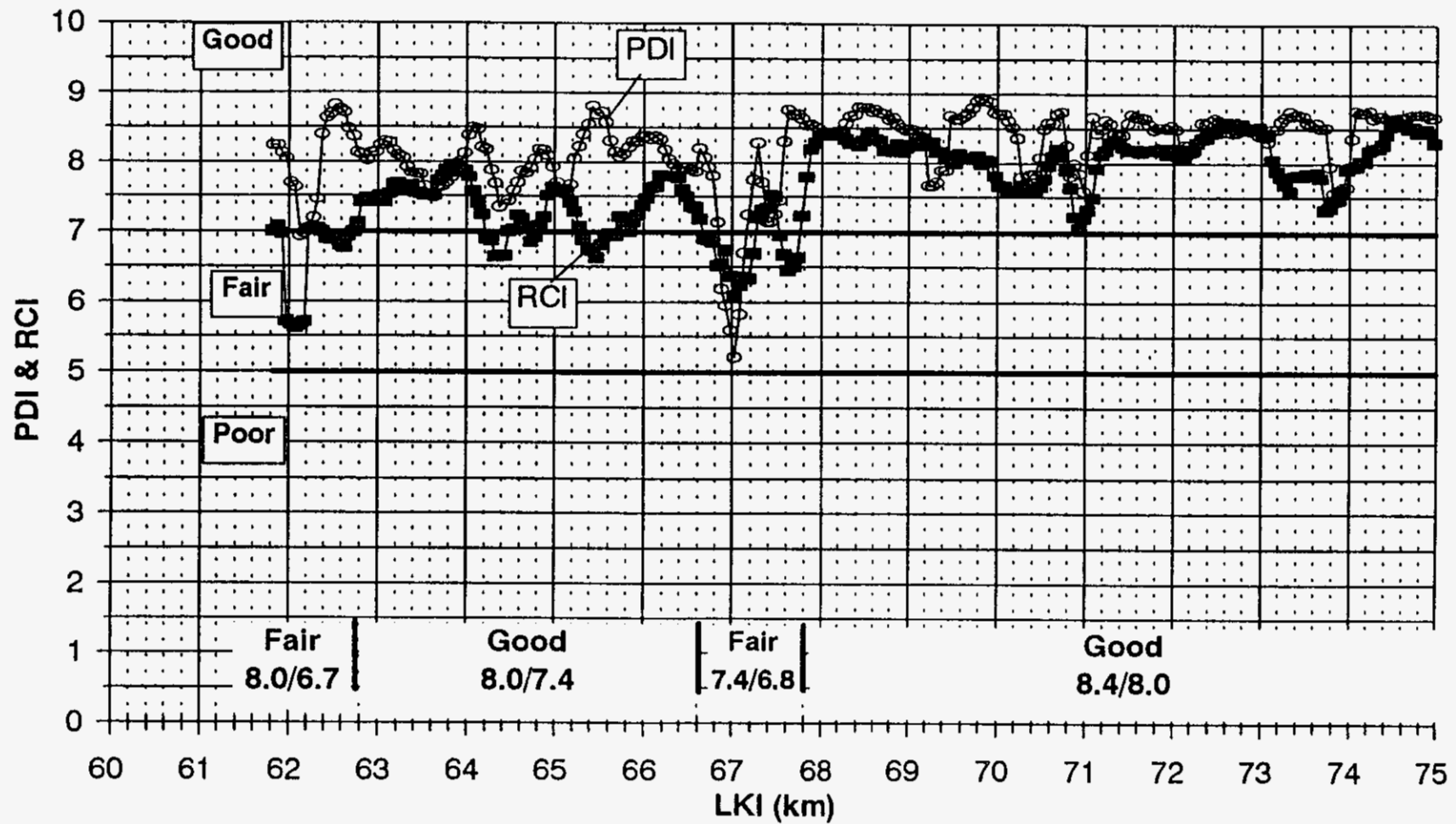


Fig. 4-2: PDI & RCI: BALMORAL - CANOE

Seg. 0935: Ford Road - Mill Entrance

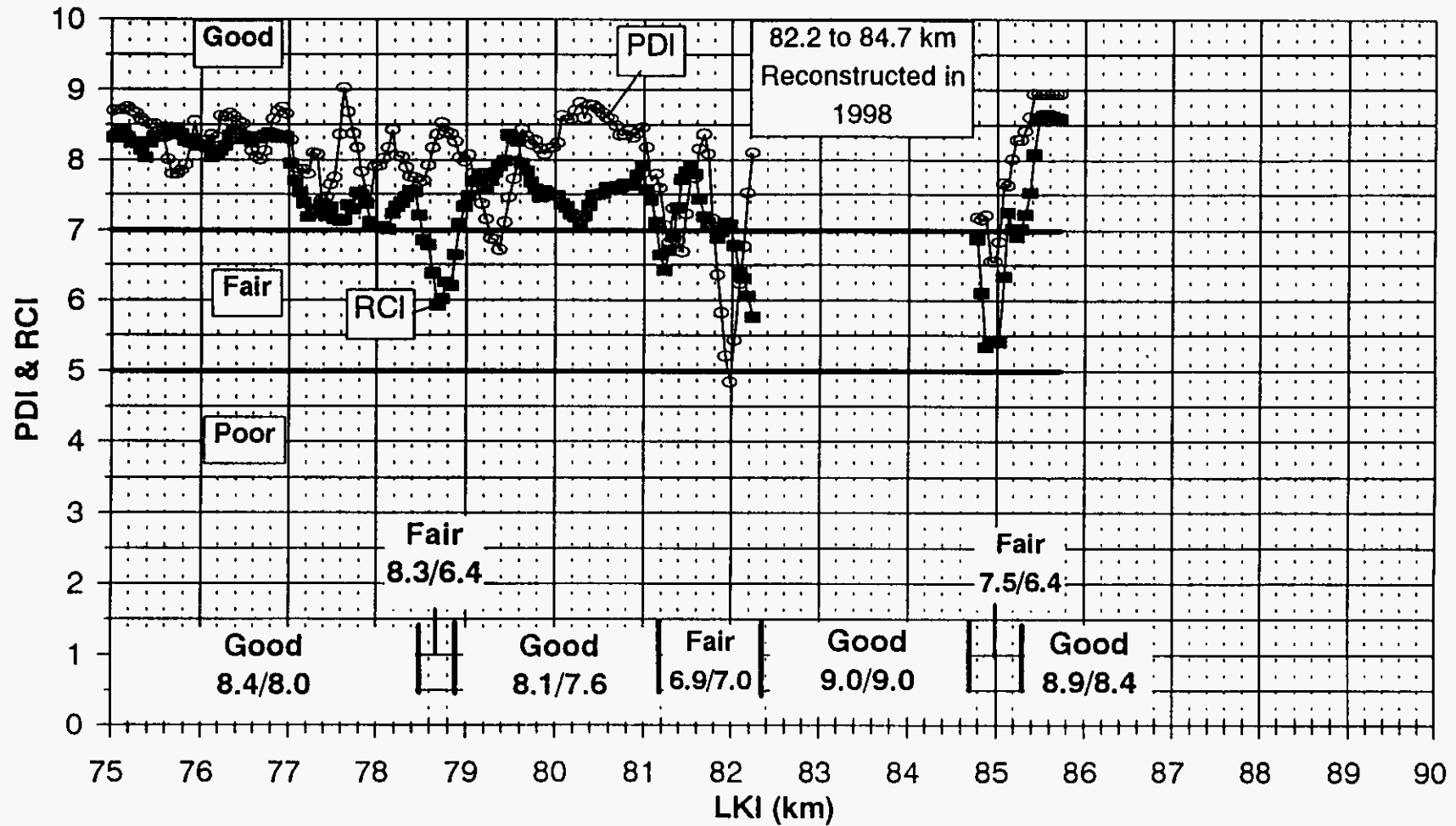
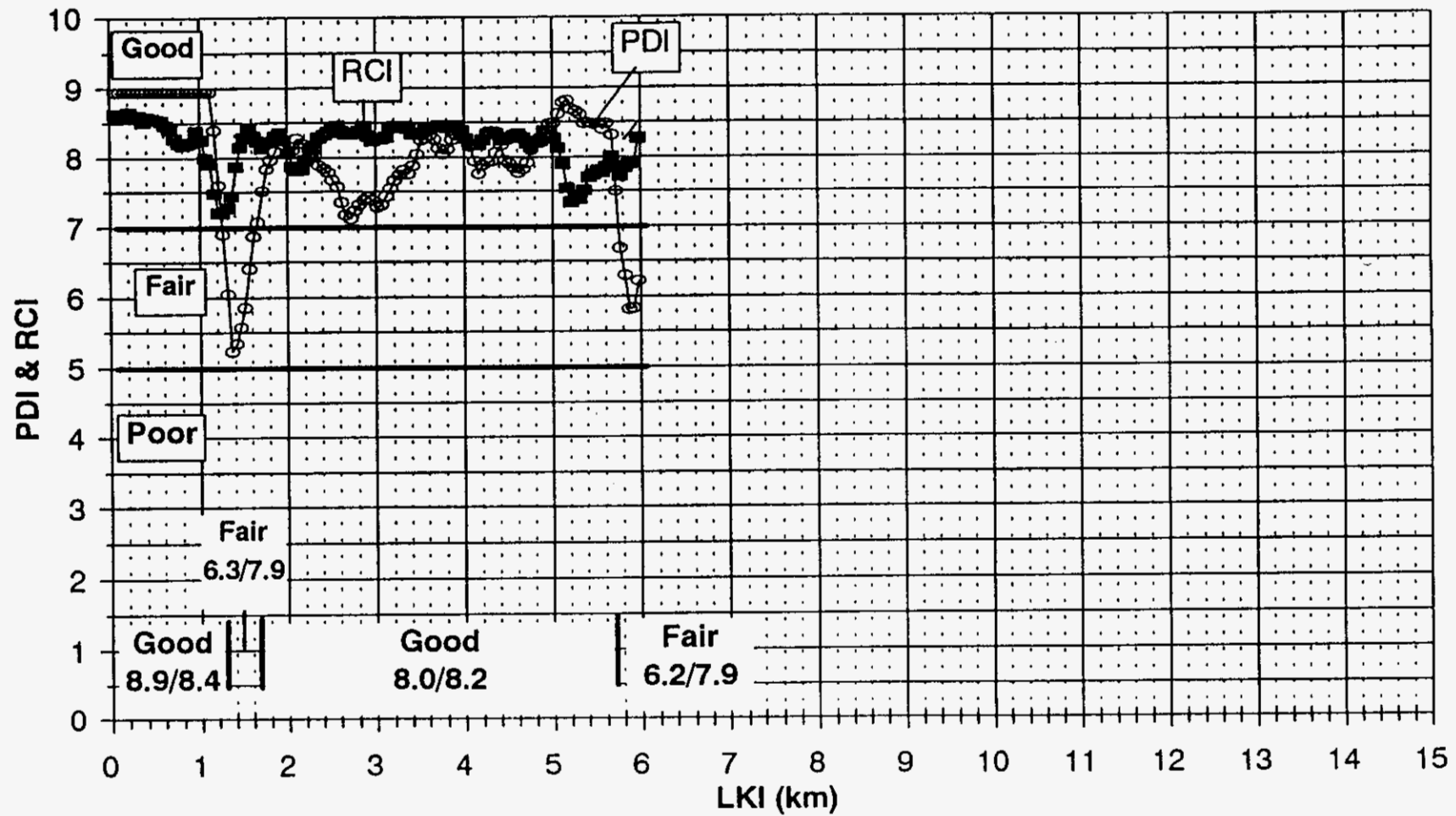


Fig. 4-3: PDI & RCI: BALMORAL - CANOE

Seg. 0950: Ford Road - Mill Entrance



SECTION 5.0

CANOE TO TAFT ROAD

SECTION 5.0 CANOE TO TAFT ROAD

5.1 PDI / RCI

Id #	LKI		Average Indices		Comments
	Segment	Offset	PDI	RCI	
	950	7.30 - 8.15 8.15 - 9.00 9.00 - 10.00 10.00 - 10.95 10.95 - 12.05 12.05 - 13.20 13.20 - 14.60 14.60 - 16.00 16.00 - 17.40	9.1 9.2 9.2 9.1 9.2 9.0 9.3 9.3 9.3	8.5 8.3 8.3 8.5 8.5 8.8 8.4 8.2 8.3	LKI o/s 7.30 to 17.61: Existing pavement condition is reasonably represented by PDI & RCI values (data recorded October 1, 1996).
	950	17.40 - 23.50	5.7*	5.7*	LKI o/s 17.61 to 23.35: Existing PDI and RCI values are lower than indicated by October 1, 1996 data. Average values from 1996 ranged from 7.9 - 9.1 (PDI) and 7.1 - 8.0 (RCI). Current values (PDI and RCI) estimated to range from 5.0 to 6.4 (average 5.7) with local areas <5.0.
	950	23.50 - 25.20	9.0*	9.0*	LKI o/s 23.35 to 25.35: New (1998) Sicamous Climbing lane. RPMS data (October 1, 1996) no longer valid. Current values (PDI and RCI) estimated to be 9.0.
	950	25.20 - 26.20 26.20 - 27.20	6.4* 6.4*	6.5 6.4	LKI o/s 25.35 to 27.19: Current PDI and RCI values are estimated to be marginally more or less than 6.4. PDI data from Oct. 1, 1996 (average 7.8 to 8.8) appears high; RCI data from Oct. 1, 1996 appears reasonable.
	960	0.00 - 2.40	6.4*	6.4*	LKI o/s 0.00 to 2.30: Current PDI and RCI values are estimated to be marginally more or less than 6.4. The data from Oct. 1, 1996 (PDI average of 8.1 to 8.3 and RCI average of 7.7 to 8.3) are no longer considered to be valid.
	960	2.40 - 3.25 3.25 - 4.75 4.75 - 6.00 6.00 - 7.00 7.00 - 8.00 8.00 - 8.50 8.50 - 9.50 9.50 - 10.40 10.40 - 11.50	8.4 7.8 8.5 7.7 8.4 8.9 8.6 8.5 8.5	8.0 7.2 7.4 7.3 6.8 7.2 7.0 7.1 6.8	LKI o/s 2.30 to 11.6: Sealcoated section. PDI and RCI data from Oct. 1, 1996 is still considered to be reasonable.

5.1 PDI / RCI (CONT'D)

Id #	LKI		Average Indices		Comments
	Segment	Offset	PDI	RCI	
	960	11.50 - 12.50	8.7	6.2	LKI o/s 11.6 to 20.3: Four lane divided highway section. PDI and RCI data from Oct. 1, 1996 is still considered to be reasonable.
		12.50 - 13.85	8.8	6.9	
		13.85 - 15.00	8.9	6.8	
		15.00 - 16.00	8.7	6.8	
		16.00 - 16.80	8.4	6.9	
		16.80 - 17.80	8.4	6.9	
		17.80 - 19.00	8.4	7.1	
		19.00 - 20.00	8.7	7.2	
	960	20.00 - 20.80	8.7*	6.9*	LKI o/s 20.3 to 29.0 (Perry River): PDI and RCI values from Oct. 1, 1996 appear to be excessively high. New values were not estimated at the present time.
		20.80 - 22.00	8.9*	6.6*	
		22.00 - 23.00	8.9*	7.7*	
		23.00 - 24.30	8.9*	7.1*	
		24.30 - 25.30	8.9*	7.0*	
		25.30 - 26.30	8.9*	7.1*	
		26.30 - 27.05	8.9*	7.0*	
		27.05 - 27.85	8.7*	7.0*	
	960	27.85 - 29.00	8.6*	7.2*	
		29.00 - 29.10	10.0*	6.0*	LKI o/s 29.0 (Perry River) to 32.03 (Taft Road): PDI and RCI values from July 25, 1997 appear to be excessively high. New values were not estimated at the present time.
		29.10 - 30.15	9.2*	7.9*	
		30.15 - 31.17	9.5*	7.7*	
		31.17 - 32.03	9.7*	7.9*	

Note: RCI and PDI values with asterisks indicate that deviations from the most recent RPMS data were noted by EBA. Such deviations are described in the Comments column.

5.2 NATURAL HAZARDS

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
1	E erosion fall	950	9.47 - 9.78	R	Medium	
2	R rockfall		9.84 - 9.93	R	Medium	
3	E erosion fall		9.84 - 9.93	R	Medium	
4	R rockfall		19.48 - 19.50	R	Medium	
5	R rockfall		19.61 - 19.73	R	High	RHRS = 229
6	R rockfall		20.05 - 20.07	R	Medium	
7	R rockfall		20.07 - 20.13	R	High	RHRS = 233
8	R rockfall		20.13 - 20.38	R	Medium	
9	R rockfall		20.38 - 20.53	R	High	RHRS Rating not available.
10	R rockfall		20.53 - 20.62	R	Medium	
11	E erosion fall		20.62 - 20.72	R	Medium	
12	R rockfall		20.86 - 20.89	R	Medium	

5.2 NATURAL HAZARDS (CONT'D)

Id #	Type		LKI		Right / Left	Severity	Comments
			Segment	Offset			
13	R	rockfall		20.93 - 21.13	R	Medium	
14	R	rockfall		21.71 - 21.86	R	Medium	
15	R	rockfall		22.13 - 22.21	R	Medium	
16	R	rockfall		22.44 - 22.82	R	Medium	
17	E	erosion fall		22.53 - 22.64	R	Medium	
18	R	rockfall		22.91 - 23.52	R	High	RHRS = 443
19	A	avalanche		23.35 - 24.50	R	Very Low	Possible avalanche hazard from high cutslopes. No occurrences recorded to date.
20	R	rockfall		23.84 - 23.89	R	Medium	
21	A	avalanche		24.60 - 25.00	R	Very Low	Possible avalanche hazard from high cutslopes. No occurrences recorded to date.
22	R	rockfall		25.18 - 25.61	R	Medium	
23	R	rockfall	960	4.45 - 4.60	R	Medium	
24	R	rockfall		7.04 - 7.07	R	Medium	
25	R	rockfall		8.81 - 8.94	R	Medium	
26	A	avalanche		10.60 - 11.45	R	Very Low	Possible avalanche hazard from high cutslopes and bluffs. No occurrences recorded to date.

5.3 GEOTECHNICAL ISSUES

Id #	Type		LKI		Right / Left	Severity	Comments
			Segment	Offset			
1	M	Mass Movement	950	6.50 - 6.70	R	Medium	Seepage from soil cutslope. 8 Horizontal drains installed in ~ 1958. Seepage and movement (slumping) noted in 1983.
2	M	Mass Movement	950	8.10 - 8.20	R	Low	Seepage and slumping of cutslope. Some PVC piping is present, either for water collection or to provide slope drainage.
3	M	Mass Movement	950	8.35 - 8.70	R	Low	Seepage and surficial sloughing of soil cutslope.
4	M	Mass movement	950	14.92 - 14.93	L	Low	Localized failures (10 - 20 m ³) along crest of fill; suspect poor compaction. No hazard to road.
5	M	Mass Movement	950	18.31 - 18.32	L	High	Fill slope failure (~100 m ³). Crest at edge of asphalt. Investigation (1995) suggests seepage erosion of silt soils at base of shot rock fill materials. Considerable seepage from low cut on right (south) side of highway was also noted.
6	S	Seepage	960	3.70 - 3.85	L	Low	Eagle River meander is truncated at oblique angle by highway fill. Long term potential for erosion.
7	S	Seepage	960	4.35 - 4.73	L	Low	Eagle River meander is truncated at oblique angle by highway fill. Long term potential for erosion.

5.3 GEOTECHNICAL ISSUES (CONT'D)

Id #	Type		LKI		Right / Left	Severity	Comments
			Segment	Offset			
8	S	Seepage	960	11.10 - 11.40	L	Low	Eagle River meander is truncated at oblique angle by highway fill. Long term potential for erosion.
9	S	Seepage	960	24.52 - 24.75	R	Low	Groundwater seepage and instability during fill placement. Investigated in 1982 and drainage measures recommended / installed. Concern noted that drainage system may plug and require further work in 10 to 30 years.

SECTION 6.0

TAFT ROAD TO VICTOR LAKE

SECTION 6.0 TAFT ROAD TO VICTOR LAKE

6.1 PDI / RCI

Id #	Segment	LKI		PDI	RCI	Comments
		Offset (Start)	Offset (End)			
1	960	32.00	32.65	9.5	7.8	
2	960	32.65	32.85	9.6	6.6	
3	960	32.85	33.40	9.1	7.8	
4	960	33.40	33.75	8.3	6.0	
5	960	33.75	34.15	7.3	7.5	
6	960	34.15	34.90	9.2	7.2	
7	960	34.90	35.05	6.7	6.9	
8	960	35.05	35.60	8.7	6.2	
9	960	35.60	35.75	6.3	6.3	
10	960	35.75	36.25	8.8	6.2	
11	960	36.25	36.55	9.2	5.4	
12	960	36.55	36.95	9.4	7.6	
13	960	36.95	37.30	9.0	6.6	
14	960	37.30	37.75	9.2	7.0	
15	960	37.75	39.05	7.9	6.2	
16	960	39.05	39.45	9.6	7.3	
17	960	39.45	40.00	8.8	6.3	
18	960	40.00	40.30	7.6	6.1	
19	960	40.30	40.75	9.4	6.9	
20	960	40.75	41.10	9.4	5.8	
21	960	41.10	42.35	8.5	7.2	
22	960	42.35	42.70	4.8	6.3	
23	960	42.70	43.00	8.5	7.4	
24	960	43.00	43.25	6.5	6.9	
25	960	43.25	44.20	8.6	7.3	
26	960	44.20	44.70	9.0	6.4	
27	960	44.70	45.20	8.2	6.8	
28	960	45.20	45.35	9.1	7.0	
29	960	45.35	45.55	4.1	6.7	
30	960	45.55	46.20	6.6	6.7	
31	960	46.20	46.75	8.5	6.5	
32	960	46.75	46.90	4.4	6.5	
33	960	46.90	47.15	8.1	6.8	
34	960	47.15	47.55	9.5	7.5	
35	960	47.55	47.85	8.5	5.6	
36	960	47.85	48.00	4.1	5.2	
37	960	48.00	48.60	7.6	6.5	
38	960	48.60	48.90	5.5	6.0	

6.1 PDI / RCI (CONT'D)

Id #	Segment	LKI		PDI	RCI	Comments
		Offset (Start)	Offset (End)			
39	960	48.90	49.15	8.0	6.4	
40	960	49.15	49.30	5.5	7.0	
41	960	49.30	49.50	7.8	6.3	
42	960	49.50	49.85	6.3	6.0	
43	960	49.85	50.10	5.3	6.2	
44	960	50.10	50.75	7.8	6.3	
45	960	50.75	51.90	6.5	6.1	
46	960	51.90	52.10	5.3	5.4	
47	960	52.10	52.55	7.4	6.0	
48	960	52.55	53.20	5.2	5.4	
49	960	53.20	53.40	8.6	5.6	
50	960	53.40	53.75	6.5	7.5	

Note: Ratings are from a 1997 driven survey by MoTH sub-contractor, and have been averaged over zones for presentation.

6.2 NATURAL HAZARDS

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
1	Debris Torrent	960	35.320	35.340	L	H	Cullus Creek crossing - 1991 debris torrent derailed 4 CPR cars and required extensive maintenance to keep culvert open at Highway 1.
2	Debris Torrent	960	36.330	36.480	R	L	Kay Creek crossing - no evidence of debris torrent levees, risk of creek avulsion and culvert blocking; Thurber rating = 2.
3	Erosion Fall	960	36.513	36.588	R	M	RHRS = B; Exposed overburden scarp with boulder fall.
4	Avalanche	960	36.513	36.730	R	L	Kay Falls - Avalanche Path No. 37.0; avalanches from overburden cut adjacent to Highway 1; 2 avalanches since 1974; size = 1.
5	Erosion Fall	960	36.705	36.730	R	H	RHRS = A-293; Exposed overburden scarp with boulder fall

6.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
6	Debris Torrent	960	37.800	37.890	R	M	Turnout Creek - Evidence of recent debris torrents to within 50 m of Highway 1, debris torrent levees further up fan; risk of creek avulsion; Thurber rating = 3.
7	Avalanche	960	37.950	38.050	R	L	Mitikan Creek #2 - Avalanche Path No. 35.0; Avalanches from cut adjacent to highway, just east of Turnout Creek; 1 avalanche since 1981; size = 1.
8	Rock Fall	960	38.125	38.240	R	M	RHRS rating = B; Rock fall from cut adjacent to highway
9	Debris Torrent	960	38.570	38.645	R	L	Mitikan Creek - Log jams in upper catchment; risk of creek avulsion at highway; Thurber rating = 2.
10	Avalanche	960	38.700	38.900	R	L	Mitikan Creek #1 - Avalanche Path No. 33.0; Avalanches from overburden cut adjacent to highway, just east of Mitikan Creek; 4 avalanches since 1981; avg. size = 1
11	Erosion Fall	960	38.859	38.900	R	H	RHRS Rating = A-214; Boulder fall from overburden cut adjacent to highway, just east of Mitikan Creek.
12	Erosion Fall	960	38.900	39.005	R	M	RHRS Rating = B; Rock fall from overburden cut adjacent to highway.
13	Avalanche	960	39.100	39.300	R	L	Enchanted Forest #1 and #2 - Avalanche Path Nos. 32.2 and 32.3; Avalanches in creek bottoms; 32.2 has had 3 avalanches since 1972; 32.3 has had 1 avalanche since 1981.
14	Debris Torrent	960	39.100	39.300	R	M	Enchanted Forest #1 Creek: forested debris torrent levees at lower colluvial fan - Thurber rating = 4; Enchanted Forest #2: forested debris torrent levees/fresh deposits near Highway 1 from 1983/86 events, impact Frontage Rd. first; Thurber rating = 3.
15	Erosion Fall	960	42.433	42.467	L	M	RHRS Rating = B; Exposed overburden cut, ravelling of rounded cobble and boulders.

6.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
16	Debris Torrent	960	43.260	43.390	L	H	Camp Creek crossing; 1968 debris torrent caused by upstream landslide in till, covered the bridge killing four people in a car; 75,000 m ³ estimated debris volume; channel has low storage volume resulting in high impact potential; Thurber rating = 2.
17	Rock Fall	960	43.776	43.930	L	H	RHRS rating = A-216; Rock cut in fractured gneiss
18	Avalanche	960	44.380	44.470	L	L	Griffin Hill - Avalanche No. 25.0; Avalanches from overburden cut slope; 35 avalanches since 1972, average size = 1.2
19	Erosion Fall	960	44.380	44.470	L	H	RHRS rating = A-315; Boulder fall from glacial till; 5 rockfalls reported in 1997-1998, max. 0.03-0.1m ³
20	Debris Torrent	960	44.600	44.800	L	H	Big Griffin Creek - Debris torrent in 1967 blocked culvert and crossed highway; high frequency landslides in upper catchment; risk of future blocking of culvert; Thurber rating = 3.
21	Erosion Fall	960	45.105	45.163	L	H	RHRS rating = A-191; Boulder fall from overburden cut with veneer of glacial till over gneiss.
22	Erosion Fall	960	45.163	45.192	L	M	RHRS rating = B; Boulder fall from overburden cut with veneer of glacial till over gneiss
23	Erosion Fall	960	45.254	45.303	L	M	RHRS Rating = B; Boulder fall from low overburden cut
24	Rock Fall	960	48.188	48.263	R	M	RHRS Rating = B; Minor rock fall from cut slope in disturbed gneiss
25	Erosion Fall	960	49.880	50.190	R	M	RHRS Rating = B; Tree covered overburden slope, local boulder falls
26	Avalanche	960	49.880	50.030	R	L	South Pass Creek #1 - Avalanche No. 20.4; Avalanches from overburden cut slope; 3 avalanches since 1981; average size = 1.5
27	Avalanche	960	50.080	50.500	R	M	South Pass Creek #2 - Avalanche No. 20.2; Avalanches from overburden cut slope; 5 avalanches since 1978; average size = 1.3

6.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
28	Erosion Fall	960	50.190	50.250	R	H	Exposed overburden scarp with boulders up to 2200 mm diameter perched at slope crest; ditch 5 m wide and stacked no-post barriers 1 m high at base; boulders to 1000 mm diameter have jumped barrier and blocked Highway 1; 4 rockfalls reported in 1997-1998 KC has revised RHRS to an A rating - previous MoTH RHRS rating = B with moderate severity.
29	Erosion Fall	960	50.250	50.350	R	M	Regenerating overburden scarp with scrub alder, local boulder falls. KC has revised RHRS to a B rating - previous MoTH RHRS rating = B with moderate severity from 50.272 to 50.305 plus an A-251 rating from 50.305 to 50.350.
30	Erosion Fall	960	50.350	50.525	R	M	RHRS rating = B; Tree covered overburden overlying rock; risk of boulder fall
31	Rock Fall	960	50.481	50.541	R	M	RHRS rating = B; Forested natural rock cliffs; blocky colluvium below cliffs catches most debris
32	Rock Fall	960	50.541	51.240	R	H	RHRS rating = A - 656; High rock fall hazard from cut face; blocks are bounded by vertical joints and sub-horizontal foliation; limited or no ditch; total volumes greater than 5 m ³ possible; 16 rockfalls reported in 1997-1998, max. 1.0-5.0m ³
33	Avalanche	960	50.620	51.105	R	H	Three Valley Gap Bluff #6 - Avalanche No. 19.9; Avalanches from cliff face; 97 avalanches since 1981; average size = 2.1
34	Avalanche	960	51.105	51.355	R	H	Three Valley Gap Bluff #5 - Avalanche No. 19.7; Avalanches from cliff face; 448 avalanches since 1972; average size = 1.5
35	Rock Fall	960	51.240	51.708	R	H	RHRS rating = A- 656; High rock fall hazard from natural cliffs; blocks are bounded by vertical joints and sub-horizontal foliation; limited or no ditch; total volumes greater than 5m ³ possible; 16 rockfalls reported in 1997-1998

6.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
36	Avalanche	960	51.355	51.410	R	H	Three Valley Gap Bluff #4 - Avalanche No. 19.6; Avalanches from cliff face; 226 avalanches since 1972; average size = 1.5
37	Avalanche	960	51.410	51.520	R	H	Three Valley Gap Bluff #3 - Avalanche No. 19.5; Avalanches from cliff face; 312 avalanches since 1972; average size = 1.3
38	Avalanche	960	51.540	51.620	R	H	Three Valley Gap Bluff #2 - Avalanche No. 19.4; Avalanches from cliff face; 223 avalanches since 1972; average size = 1.5
39	Erosion Fall	960	51.607	51.695	R	H	RHRS rating = A-168; Boulder fall from shallow gully in natural cliff; limited or no ditch
40	Avalanche	960	51.640	51.708	R	H	Three Valley Gap Bluff #1 - Avalanche No. 19.3; Avalanches from cliff face; 17 avalanches since 1981; average size = 1.8
41	Ice Fall	960	51.640	51.708	R	M	Shallow rock gully with creek, expect moderate ice accumulation; confirmed by MoTH district staff.
42	Erosion Fall	960	51.695	51.780	R	H	RHRS rating = B by Klohn-Crippen; Boulder fall from shallow gully in natural cliff; limited or no ditch
43	Avalanche	960	51.708	51.820	R	H	Three Valley Gap Motel #2 - Avalanche No. 19.2; Avalanches from cliff face; 61 avalanches since 1981; average size = 1.8
44	Rock Fall	960	51.708	51.808	R	H	RHRS rating = A-346; Natural cliffs above road, 100 to 140 m from pavement; colluvial slope below cliffs will catch small rockfall; large rockfall could damage 3 Valley Hotel; 3 rockfalls reported in 1997-1998
45	Erosion Fall	960	51.780	51.930	R	M	RHRS rating = B; Blocky colluvial slope adjacent to Highway 1
46	Debris Torrent	960	51.880	51.920	R	H	Three Valley Gap Motel Creek #1; September 1997 debris torrent deposited rock debris on highway; very low storage volume and high risk of additional debris deposition on Highway 1; Thurber rating = 1.

6.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
47	Avalanche	960	51.880	52.030	R	H	Three Valley Gap Motel #1 Creek - Avalanche No. 19.1; Avalanches from cliff face; 70 avalanches since 1972; average size = 2.2
48	Avalanche	960	52.490	52.620	R	L	Eagle River Creek - Avalanche No. 18.4; No recorded avalanches affecting Highway 1, air photo evidence of avalanches higher in catchment
49	Debris Torrent	960	52.530	52.570	R	M	Eagle River Creek; Recent debris torrent came within 30 m of Highway 1; risk of culvert blocking and debris deposition at highway; Thurber rating = 3.

NOTES: 1. Rockfall Hazard Rating (RHRS) ratings were received from MoTH District staff in November, 1998. Thurber ratings are from Thurber's 1988 study, and are presented for information only.

2. We have visually confirmed the existence of potential debris paths, but not the accuracy of Thurber's ratings. The reader is referred to the Thurber report for details on the rating criteria – in general the ratings indicate the following potential activity:

Rating

Class 1: Rockfalls and raveling dominate, plus minor debris torrents.

Class 2: Major debris torrents.

Class 3: Major debris torrents, plus major debris floods.

Class 4: Debris floods.

Class 5: Alluvial activity.

Paths or creeks with Class 5 potential have not been recorded herein.

3. Avalanche records have been compiled from BC Avalanche Atlas and from records received from MoTH District staff.
4. Severity of hazards has been based on visual observations or records obtained from MoTH District staff. Records include maintenance, rockfall and avalanche records, and anecdotal discussions with District Manager. Consequently, severity ratings are subjective and should be considered qualitative.

6.3 GEOTECHNICAL ISSUES

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
1	Icing	960	34.440	37.000	L/R	M	Based on signage and discussion with District staff.
2	Icing	960	37.000	39.000	L/R	M	Based on signage and discussion with District staff.
3	Icing	960	39.000	39.400	L/R	M	Based on signage and discussion with District staff.
4	Icing	960	39.400	39.800	L/R	M	Based on signage and discussion with District staff.
5	Seepage	960	39.600	39.850	L	H	Flooding of highway from Eagle River (approximately 1:5 to 1:10 year event), as based on discussions with District staff.
6	Mass Movement	960	44.380	44.470	R	M	Debris slides in glacial till veneer over gneiss, visually observed and confirmed by District staff.
7	Seepage	960	47.010	47.610	R/L	H	Area of high pore pressures under road causes seepage on road surface, as indicated by District staff.
8	Icing	960	47.010	47.610	R/L	H	Area of high pore pressures under road causes icing on road surface, as indicated by District staff.
9	Distortion	960	47.010	47.610	R/L	H	Subgrade is settling from erosion of fines or consolidation. Frequent patching is required (District information).
10	Frost Heave	960	47.670	49.750	R/L	L	About 50% of the road has cracks from frost heaves, as confirmed by MoTH district. Cracks are generally limited to one lane or are longitudinal, and are mostly sealed or repaired. There is approximately 400 m of relatively new pavement in this segment.
11	Seepage	960	49.550	49.700	R	L	Ditchline carries large flow which misses cross culvert drain at 49.65, as observed by Klohn-Crippen; some ditchline erosion observed.
12	Mass Movement	960	49.880	50.190	R	M	Tree covered overburden slope has local shallow debris slides in sand, gravel, cobbles and boulders. Slides may not fully reach highway, based on Klohn-Crippen observations.

6.3 GEOTECHNICAL ISSUES (CONT'D)

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
13	Mass Movement	960	50.190	50.250	R	H	Debris slide with exposed overburden scarp with boulders up to 2200 mm diameter at slope crest; ditch 5 m wide and stacked no-post barriers 1 m high at base; boulders up to 1000 mm diameter have jumped barrier; originated as fill pit in the 1970's. Severity rating is based on observations, District records and discussions with District staff.
14	Mass Movement	960	50.250	50.350	R	M	Debris slide with regenerating overburden scarp with scrub alder, local shallow debris slide scars in sand, gravel, cobbles and boulders.
15	Mass Movement	960	50.525	50.555	R	H	Cut slope in gneiss; rock slide on July 12, 1997 failure of 600 m ³ ; remedial works comprised ditch widening and excavation to improve catchment; detached blocks are currently perched at headscarp. Pillar and block rock units tilt towards highway due to outward dipping joint sets.
16	Mass Movement	960	50.555	50.650	R	H	Rock slides from cut slope in gneiss; cliff with several fractured, detached slabs, high risk of rock slides greater than 500 m ³ ; ditch was improved by widening and excavation in 1997. Survey monuments noted in rock mass.
17	Frost Heave	960	49.750	51.840	R/L	L	About 90% of the road has cracks from frost heaves, as confirmed by MoTH district. Cracks are generally limited to one lane or are longitudinal, and are mostly sealed or repaired.
18	Icing	960	49.750	51.840	R/L	L	Based on discussion with District staff.
19	Mass Movement	960	50.650	51.240	R	H	Rock slides in cut slope in gneiss; several overhanging slabs, greater than 100m ³ , bounded by joints and foliation; limited or no ditch. Rock bolts and possible overhang trims noted.
20	Distortion	960	50.700	51.570	R/L	M	Settlement of fill in lake, causing circular and alligator cracks. Differential settlement. MoTH District reports frequent repatching and filling of site.

6.3 GEOTECHNICAL ISSUES (CONT'D)

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
21	Mass Movement	960	51.170	51.740	R	H	Potential for rock slides originating from natural rock slope; limited or no ditch.
22	Mass Movement	960	51.740	51.810	R	H	Rock slide on April 10, 1993 failure - on natural rock slope; remedial works included debris cleanup, limited trimming and bolting; wedge of rock perched at headscarp presents high long term hazard.
23	Frost Heave	960	51.840	52.880	R/L	M	About 50% of the road surface has numerous cracks extending across the road in both lanes (mostly sealed or repaired), caused by frost heaves, as indicated by MoTH District. There is approximately 100 m of new pavement in this segment.
24	Icing	960	51.840	52.880	R/L	L	Based on discussion with District staff.
25	Frost Heave	960	52.880	53.330	R/L	M	About 90 to 100% of the road surface has numerous cracks extending across the road in both lanes (mostly sealed or repaired). Cracking is caused by frost heaves, as indicated by MoTH staff.

NOTES: 1. Severity of Issue has been based on visual observations or records obtained from MoTH District staff. Records include maintenance and rockfall records and anecdotal discussions with District Manager. Consequently, severity ratings are subjective and should be considered qualitative.

SECTION 7.0

**VICTOR LAKE TO
MT. REVELSTOKE
NATIONAL PARK
WEST GATE**

SECTION 7.0

VICTOR LAKE TO MT. REVELSTOKE NATIONAL PARK WEST GATE

7.1 PDI / RCI

Id #	LKI		PDI	RCI	Comments
	Segment	Offset			
	960	53.67 54.87 56.03 57.04 58.00 59.01	54.87 56.03 57.04 58.00 59.01 60.02	6.2 8.2 8.6 8.9 8.4 8.7	7.2 7.0 6.6 6.3 6.2 6.5
	960	60.02	63.46	6.4*	<5.0*
	960	63.46	65.27	8.5*	8.5*
	960	65.27 66.03 67.04 68.07 68.86 69.26 70.17 70.51	66.03 67.04 68.07 68.86 69.26 70.17 70.51 70.88	8.1 8.4 8.8 8.0 6.4 7.9 7.5 8.3	7.7 7.7 7.7 7.0 7.0 7.4 6.8 6.5

7.1 PDI / RCI (CONT'D)

Id #	LKI		PDI	RCI	Comments	
	Segment	Offset				
	960/975 975	70.88	0.30	8.0	7.0	LKI o/s 0.00 - 16.11: The July 25, 1997 RPMS data generally appears to represent the current pavement condition however, some of the indicated values appear to be unrealistically high. Areas where PDI or RCI values were anomalously low and indicate that treatment may be required include ... PDI: 71.13 - 0.05 (5.2), 0.40 - 0.45 (5.0). RCI: 0.05 - 0.10 (5.4), 0.20 - 0.25 (4.5), 0.40, 0.45 (4.3), 1.41 - 1.46 (5.8), 15.5 - 15.55 (3.6).
		0.30	1.26	8.8	7.8	
		1.26	2.02	8.7	7.8	
		2.02	3.03	9.4	8.2	
		3.03	4.14	9.0	8.0	
		4.14	4.98	8.7	8.1	
		4.98	6.01	8.5	8.4	
		6.01	7.02	8.8	8.1	
		7.02	8.03	9.5	8.0	
		8.03	9.04	9.4	8.4	
		9.04	10.00	9.7	8.3	
		10.00	11.01	9.9	8.0	
		11.01	12.02	8.8	8.0	
		12.02	13.03	8.2	7.4	
		13.03	13.94	9.3	8.5	
		13.94	15.00	9.1	8.5	
		15.00	16.11	8.3	8.4	
34	975	16.11	18.28	9.0*	9.0*	LKI o/s 16.11 - 18.28: New Four lane "Parkgate" section; Pavement placed in two separate operations: bottom lift placed in September 1997; upper lift placed in April 1998. RPMS data collected July 25, 1997 is not representative; these average values were 9.1 / 7.8 (PDI / RCI). Current values estimated to be 9.0 / 9.0 (PDI / RCI).

Note: RCI and PDI values with asterisks indicate that deviations from the most recent RPMS data were noted by EBA. Such deviations are described in the Comments column.

7.2 NATURAL HAZARDS

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
1	avalanche	960	53.70	53.81	L	Very Low	Path 17.0
2	rockfall		53.75	53.83	L	Medium	
3	erosion fall		53.95	54.24	L	Medium	
4	avalanche		54.04	54.18	L	Low	Path 16.3
5	avalanche		54.49	54.79	L	Medium	Path 16.1
6	debris torrent		54.48	54.55	L	Medium	Eagle Pass #2 Crk (o/s 54.70), indirect impact area.

7.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
7	debris torrent		54.55 54.78	L	High	Eagle Pass #2 Crk (o/s 54.70). 15,000 m ³ design volume, 10 yr. return interval, historic culvert and hwy blockages.
8	debris torrent		54.94 54.99	L	High	Eagle Pass #1.5 Crk (o/s 54.96). 3,500 m ³ design volume, 15 yr. return interval, debris flow would flow onto highway.
9	debris torrent		54.99 55.04	L	High	Eagle Pass #1 Crk (~o/s 55.01). 10,000 m ³ design volume, 10 yr. return interval, frequent culvert blockage in the past.
10	debris torrent		55.04 55.29	L	Medium	Eagle Pass #1 Crk (~o/s 55.01), indirect impact area.
11	avalanche		54.99 55.34	L	Very Low	Path 15.0
12	rockfall		55.67 55.89	L	Medium	
13	debris torrent		55.90 55.99	L	Medium	Victor Crk. W. Channel (~o/s 55.93), indirect impact area. Gradient likely to low near hwy for debris flow to reach hwy however, debris flood is likely to reach hwy.
14	debris torrent		55.99 56.08	L	High	Victor Crk. E. Channel (o/s 56.12). 30,000 m ³ design volume, 25 yr. return interval, no historic blockage.
15	debris torrent		56.08 56.12	L	Medium	Victor Crk. E. Channel (o/s 56.12), indirect impact area.
16	rockfall		56.13 56.37	L	Medium	
17	avalanche		56.23 56.98	L	High	Path 14.4
18	erosion fall		56.26 56.36	L	High	RHRS = 336
19	erosion fall		56.36 56.48	L	Medium	
20	rockfall		56.51 56.65	L	High	RHRS = 316
21	rockfall		57.16 57.22	L	High	RHRS = 387
22	debris torrent		57.46 57.49	L	High	Clanwilliam W. Crk (o/s 57.48). 25,000 m ³ design volume, 10 yr. return interval, blockage of concrete box culvert has occurred in the past.
23	debris torrent		57.49 57.59	L	Medium	Clanwilliam W. Crk (o/s 57.48), indirect impact area.
24	debris torrent		57.59 57.69	L	High	Clanwilliam W. Crk (o/s 57.48), direct impact area if avulsion occurs during debris flow event
25	debris torrent		57.82 57.89	R	Medium	Eagle Summit Crk (o/s 58.06), indirect impact area.

7.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
26	debris torrent		57.89	58.08	R	High	Eagle Summit Crk (o/s 58.06). 25,000 m ³ design volume, 10 yr. return interval, evidence of 2 debris flows in last 30 years.
27	debris torrent		58.08	58.11	R	Medium	Eagle Summit Crk (o/s 58.06), indirect impact area.
28	avalanche		~58.1 8	~58.2 4	R	High	Path 12.8
29	avalanche		58.28	58.48	R	High	Path 12.6
30	avalanche		58.48	58.56	R	High	Path 12.3
31	erosion fall		58.28	58.59	R	Medium	
32	avalanche		58.66	58.80	R	Medium	Path 12.1
33	rockfall		58.67	59.02	R	Medium	
34	avalanche		58.88	58.91	R	High	Path 11.8
35	avalanche		58.98	59.08	R	High	Path 11.7
36	erosion fall		59.02	59.04	R	High	RHRS = 299
37	avalanche		59.82	60.00	L	Low	Path 10.8
38	avalanche		60.00	60.08	L	Low	Path 10.7
39	avalanche		60.08	60.13	L	Medium	Path 10.6
40	avalanche		60.13	60.19	L	Low	Path 10.5
41	debris torrent		59.63	59.84	L	High	Tonkawatla Crk (o/s 60.02). 30,000 m ³ design volume, 10 yr return interval. Impact onto highway very likely.
42	debris torrent		59.84	60.02	L	Medium	Tonkawatla Crk (o/s 60.02), indirect impact area.
43	debris torrent		60.02	60.18	L	High	Clanwilliam Crk #1 (~o/s 60.14). 5000 m ³ design volume, 15 yr. return interval. Impact of hwy possible.
44	erosion fall		60.03	60.06	L	Medium	
45	erosion fall		60.39	60.44	L	Medium	
46	erosion fall		61.70	61.77	L	Medium	
47	avalanche		61.76	62.14		Medium	Path 8.8
48	debris torrent		62.27	62.33	L	Medium	Mica Sawmill W. Crk. (o/s 62.41), indirect impact area.
49	debris torrent		62.33	62.46	L	High	Mica Sawmill W. Crk. (o/s 62.41), 10,000 m ³ design volume, 10 yr. return interval, several historic culvert blockages.
50	debris torrent		62.55	62.65	L	High	Mica Sawmill E. Crk. (~o/s 62.59), 3000 m ³ design volume, 10 yr. return interval.

7.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
51	debris torrent		62.70	62.82	L	Medium	Burner Crk (o/s 62.84), indirect impact area.
52	debris torrent		62.82	62.87	L	High	Burner Crk (o/s 62.84). 5000 m ³ design volume, 10 yr. return interval.
53	debris torrent		62.87	63.02	L	Medium	Burner Crk (o/s 62.84), indirect impact area.
54	erosion fall		63.32	63.49	L	Medium	
55	avalanche		66.10	66.22	L	Very low	Path 4.0
56	avalanche		66.37	66.47	L	Very low	Path 3.9
57	rockfall		68.35	68.40	L	Medium	
58	rockfall		68.47	68.56	L	Medium	
59	rockfall	975	0.66	0.93	L	Medium	
60	rockfall		0.96	1.08	L	Medium	
61	rockfall		2.28	2.34	L	Medium	
62	rockfall		5.31	5.40	L	Medium	
63	rockfall		5.70	5.80	L	Medium	
64	rockfall		10.03	10.08	L	Medium	
65	rockfall		14.93	15.45	L	Medium	

7.3 GEOTECHNICAL ISSUES

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
1	Highway distortion	960	56.67	57.38	R & L	Low	Minor vertical distortion of embankment east of Victor Lake. Likely to be post construction settlement of soft / organic subgrade soils.
2	Mass movement	960	67.40	67.52	R	High	Big Eddy Rd. Slide. Settlement of E/B lane 50 mm per yr. Inclinator shows +20 mm lateral movement per yr. Drains installed but movement continuing.
3	Mass movement	975	1.90	2.80	R	Medium	CPR Hill Slide. Flow slide down slope below highway during construction (1959) caused fatalities. Large area of potential instability. Drainage measures were installed to reduce potential for recurrence.

7.3 GEOTECHNICAL ISSUES (CONT'D)

Id #	Type	LKI			Right / Left	Severity	Comments
		Segment	Offset				
4	Mass movement	975	11.87	11.90	R	High	Embankment side slope failure; 30 m wide x 2 m thick. Crest @ edge of asphalt; toe ~ 20 m down slope. Crest regression will impact shoulder lane.
5	Mass movement	975	12.10	12.11	R	High	Embankment side slope failure; 10 m wide x 3 m(+) thick. Crest @ edge of asphalt. Culvert discharge has eroded 10 m deep x 100 m long gully which undermined embankment. Regression of crest will impact shoulder lane.

SECTION 8.0

**MT. REVELSTOKE
NATIONAL PARK
WEST GATE TO
DONALD**

SECTION 8.0 **MT. REVELSTOKE NATIONAL PARK WEST GATE TO DONALD**

8.1 PDI / RCI

Id #	LKI			PDI	RCI	Comments
	Segment	Offset				
1	975	30.550	33.000	8.3	7.3	
2	975	33.000	33.150	6.8	7.4	
3	975	33.150	34.400	7.9	7.4	
4	975	34.400	34.700	6.7	7.6	
5	975	34.700	35.450	7.5	7.8	
6	975	35.450	35.500	4.3	7.4	
7	975	35.500	36.200	8.4	6.3	
8	975	36.200	36.500	9.0	6.6	Asphalt rehab. Previous PDI=4.9
9	975	36.500	36.600	8.0	6.5	Asphalt rehab. Previous PDI=5.2
10	975	36.600	36.850	8.0	5.5	Asphalt rehab. Previous PDI=4.0
11	975	36.850	36.900	8.0	6.2	Asphalt rehab. Previous PDI=5.2
12	975	36.900	37.500	8.2	6.6	
13	975	37.500	38.500	6.0	6.6	Wheel track and meander cracking. Previous PDI=8.2
14	975	38.500	38.850	8.2	6.6	
15	975	38.850	38.900	7.0	6.5	Asphalt rehab. Previous PDI=5.7
16	975	38.900	39.000	7.0	7.1	Asphalt rehab. Previous PDI=4.1
17	975	39.000	39.600	7.9	6.8	
18	975	39.600	39.650	4.9	7.0	
19	975	39.650	40.500	7.6	7.6	
20	975	40.500	40.600	5.0	7.6	Transverse cracks severe. Previous PDI=7.6
21	975	40.600	40.750	5.1	7.7	
22	975	40.750	41.300	5.0	7.5	Transverse cracks severe. Previous PDI=7.7
23	975	41.300	41.350	5.0	7.0	Condition not as bad as RPMS rating. Previous PDI=3.8
24	975	41.350	41.500	5.0	7.7	Transverse cracks severe. Previous PDI=7.9
25	975	41.500	41.650	7.9	7.7	
26	975	41.650	41.750	6.8	7.5	
27	975	41.750	47.000	8.2	7.2	
28	975	47.000	47.850	5.0	7.2	Alligator cracking. Previous PDI=8.2
29	975	47.850	48.300	8.2	7.2	
30	985	0.000	0.200	5.8	7.2	
31	985	0.200	0.400	5.6	7.9	
32	985	0.400	0.500	5.0	7.9	Alligator cracking. Previous PDI=8.1
33	985	0.500	1.000	8.0	8.0	Asphalt rehab. Previous PDI=4.2

8.1 PDI / RCI (CONT'D)

Id #	LKI			PDI	RCI	Comments
	Segment	Offset				
34	985	1.000	1.300	7.0	8.0	Asphalt rehab. Previous PDI=4.2
35	985	1.300	2.500	8.4	8.0	
36	985	2.500	3.000	5.0	8.0	Frost problems - undulation and cracking. Previous PDI=8.4
37	985	3.000	4.000	6.4	7.4	
38	985	4.000	4.200	6.0	7.5	Meander cracking not as severe as RPMS rating. Previous PDI=3.8
39	985	4.200	4.500	6.0	7.5	
40	985	4.500	4.600	7.6	7.9	
41	985	4.600	4.700	3.8	7.9	
42	985	4.700	4.800	7.8	7.9	
43	985	4.800	5.500	5.7	7.9	
44	985	5.500	5.600	4.0	7.9	Frost problems - undulation and cracking. Previous PDI=5.7
45	985	5.600	5.900	4.0	7.9	Frost problems - undulation and cracking. Previous PDI=8.4
46	985	5.900	6.000	4.0	7.1	Frost problems - undulation and cracking. Previous PDI=6.5
47	985	6.000	6.500	7.0	8.7	Asphalt rehab. Previous PDI=3.5
48	985	6.500	6.600	3.5	8.7	
49	985	6.600	6.800	6.3	8.7	
50	985	6.800	7.000	5.0	8.7	Side slope failure, tension cracks. Previous PDI=8.1
51	985	7.000	7.200	6.4	8.7	
52	985	7.200	7.400	7.9	8.5	
53	985	7.400	7.600	5.9	7.5	
54	985	7.600	8.300	8.5	7.5	
55	985	8.300	8.500	6.0	7.5	
56	985	8.500	8.600	5.6	7.1	
57	985	8.600	8.700	3.5	7.0	
58	985	8.700	9.100	8.5	8.1	
59	985	9.100	9.200	8.0	8.1	Asphalt rehab. Previous PDI=4.4
60	985	9.200	10.400	7.7	8.1	
61	985	10.400	10.500	6.7	8.3	
62	985	10.500	10.900	8.2	8.3	
63	985	10.900	11.000	7.9	7.5	
64	985	11.000	11.500	4.0	7.5	Frost problems - undulation and cracking. Previous PDI=7.9
65	985	11.500	11.900	7.9	7.5	
66	985	11.900	12.000	8.0	7.4	Asphalt rehab. Previous PDI=3.6
67	985	12.000	13.000	8.2	8.1	
68	985	13.000	13.600	6.0	8.1	Severe meander cracking. Previous PDI=8.2
69	985	13.600	14.200	8.2	8.1	

8.1 PDI / RCI (CONT'D)

Id #	LKI		PDI	RCI	Comments
	Segment	Offset			
70	985	14.200 14.400	7.0	6.9	Distress not as bad as RPMS rating. Previous PDI=4.5
71	985	14.400 15.300	8.1	7.7	
72	985	15.300 16.600	9.0	7.7	Asphalt rehab. Previous PDI=5.3
73	985	16.600 17.100	6.0	7.7	Transverse and meander cracking. Previous PDI=8.4
74	985	17.100 21.600	8.4	7.7	
75	985	21.600 21.800	6.0	7.7	Transverse and meander cracking. Previous PDI=8.4
76	985	21.800 22.000	6.5	7.7	
77	985	22.000 22.100	6.0	7.4	Transverse and meander cracking. Previous PDI=8.2
78	985	22.100 22.300	8.0	7.4	Asphalt rehab. Previous PDI=4.8
79	985	22.300 23.500	8.6	6.9	
80	985	23.500 23.600	9.0	6.9	Asphalt rehab. Previous PDI=4.5
81	985	23.600 27.700	8.5	7.6	
82	985	27.700 28.000	9.0	8.0	Asphalt rehab. Previous PDI=6.0
83	985	28.000 28.100	8.4	8.3	
84	985	28.100 28.200	9.0	7.9	Asphalt rehab. Previous PDI=5.4
85	985	28.200 30.000	8.1	8.2	
86	985	30.000 30.900			
87	985	30.900 31.400			
88	985	31.400 31.900			
89	985	31.900 32.800			

8.2 NATURAL HAZARDS

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
1	Rockfall	975	31.285-31.496	Left	Medium	Rock slope
2	Rockfall	975	31.496-31.821	Left	High	Rock slope, score 637
3	Rockfall	975	31.504-31.725	Left	High	Soil slope
4	Avalanche	975	31.50-32.05	Left	High	Observed frequency 1.00 to 6.21/yr. Up to 6 m depth on hwy.
5	Rockfall	975	31.821-31.838	Left	High	Soil slope
6	Rockfall	975	31.838-31.930	Left	Medium	Soil slope
7	Avalanche	975	32.05-32.25	Left	Medium	Observed frequency 0.13 and 0.25/yr. Up to 3 m depth on highway.
8	Rockfall	975	32.364-32.407	Left	Medium	Soil slope
9	Rockfall	975	32.475-32.530	Left	Medium	Rock slope

8.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
10	Rockfall	975	37.125-37.224	Left	Medium	Soil slope
11	Rockfall	975	37.225-37.497	Left	Medium	Rock slope
12	Avalanche	975	37.20-37.65	Left	High	Observed frequency 4.50/yr. 0.85 to 6.0 m depth on highway.
13	Icefall	975	37.48	Left	Medium	Potential for ice to fall on road from adjacent slope
14	Icefall	975	37.98	Left	Medium	Potential for ice to fall on road from adjacent slope
15	Rockfall	975	37.942-38.085	Left	Medium	Rock slope
16	Rockfall	975	38.085-38.287	Left	High	Rock slope, score 363
17	Avalanche	975	38.30-38.70	Left	Medium	Observed frequency 0.08 to 0.4/yr. Up to 5.5 m depth on highway
18	Avalanche	975	39.05-39.18	Left	High	Observed frequency 0.92/yr. 1.76 to 6.9 m depth on highway
19	Avalanche	975	39.58-39.82	Left	Medium	Observed frequency 0.21/yr. 0.92 to 3.0 m depth on highway. Snow dust events once per year
20	Debris Torrent	975	42.65-42.85	Left	Medium	Not active recently
21	Icefall	975	44.2	Left	Medium	Potential for ice to fall on road from adjacent slope
22	Debris Torrent	975	45.65-46.80	Left	Medium	
23	Avalanche	975	45.78-45.92	Left	Medium	Observed frequency 0.75/yr. 3.5 to 10.5 m depth on highway. Snowshed reduces direct effect to the highway
24	Rockfall	975	46.065-46.242	Left	Medium	Rock slope
25	Avalanche	975	46.20-46.24	Left	High	Observed frequency 1.13/yr. 1.52 to 7.5 m depth on highway.
26	Rockfall	975	46.539-46.655	Left	Medium	Rock slope
27	Avalanche	975	46.77-47.07	Left	High	Observed frequency 2.46/yr. 1.88 to 7.5 m depth on highway. Snowshed reduces direct effect to the highway
28	Avalanche	975	47.50-47.74	Left	Medium	Observed frequency 0.54 to 0.71/yr. Up to 10 m depth on highway. Snowshed reduces direct effect to the highway
29	Avalanche	975	47.61-48.06	Right	Medium	Observed frequency 0.25/yr. 2.23 to 5.0 m depth on highway. Snow dust events four times a year
30	Debris Torrent	975	47.25-47.65	Left	Medium	

8.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
31	Rockfall	985	4.528-4.680	Right	Medium	Rock slope
32	Rockfall	985	5.737-5.927	Right	Medium	Rock slope
33	Debris Torrent	985	16.7-17.2	Right	Medium	

8.3 GEOTECHNICAL ISSUES

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
1	Frost Heave	985	2.500-3.000	Right/ Left	Medium	Undulation and cracking
2	Mass Movement	985	4.0	Right	Medium	Heather Hill Slide, along the highway shoulder. Slide being monitored. Movements generally noted in the spring.
3	Frost Heave	985	5.500-6.800	Right and Left	Medium	Undulation and cracking
4	Distortion	985	6.8	Right	Low	Minor depression of fill embankment
5	Frost Heave	985	11.0-11.5	Right and Left	Medium	Undulation and cracking
6	Erosion	985	13.28		Medium	Erosion noted at the Quartz Creek Bridge foundation support.
7	Distortion	985	15.0	Right	Medium	Crack in highway shoulder indicating embankment displacement
8	Seepage	985	19.9	Left	Low	Rock placed against slope in seepage area
9	Frost Heave	985	22.0	Right and Left	Low	Minor maintenance required occasionally
10	Distortion	985	25.9	Right	Low	Highway pavement depressed in fill area
11	Seepage	985	27.3	Left	Low	Seepage from left slope.
12	Mass Movement	985	29.66		Medium	Columbia River Bridge West embankment. Embankment stability being monitored. Significant groundwater flow through horizontal drains

SECTION 9.0

DONALD TO ROTH CREEK

SECTION 9.0 DONALD TO ROTH CREEK

9.1 PDI / RCI

Id #	LKI		PDI	RCI	Comments
	Segment	Offset			
1	985	32.950 - 33.000	4.5	8.2	Wheel track cracking, tension cracks from side slope failure. Previous PDI=6.2
2	985	35.250 - 35.650	6.0	7.7	Wheel track cracking, tension cracks from side slope failure. Previous PDI=8.0
3	985	41.450 - 41.950	7.0	7.8	Mill and inlay. Previous PDI/RCI values = 5.8/7.5, 4.7/7.8, 6.3/7.8, 4.3/7.2
4	985	47.900 - 48.200	5.0	7.3	Frost heave distortion and cracking. Previous PDI=7.5
5	985	49.500 - 50.500	6.5	7.4	Wheel track cracking and meander cracking. Previous PDI = 9.5
6	985	50.500 - 51.050	7.0	7.4	Wheel track cracking and meander cracking. Previous PDI = 9.5
7	985	51.050 - 51.500	5.9	7.4	Frost heave distortion and cracking. Previous PDI=9.5
8	985	51.500 - 51.850	7.0	7.4	Frost heave distortion and cracking. Previous PDI=9.5
9	985	52.450 - 52.700	8.1	7.4	Moderate frost heave. Previous PDI=9.5
10	985	52.900 - 53.100	7.0	7.4	Rutting and wheel track cracking. Previous PDI=9.5
11	990	9.350 - 13.000	9.0	7.0	Asphalt rehab. Previous PDI/RCI values = 4.8/5.7, 7.6/6, 2.9/5.9, 7.2/6.4, 6.4/6.0, 3.9/5.8, 5.5/5.8, 7.0/5.7, 4.4/7.1, 6.4/7.0, 8.2/7.1, 6.0/7.6, 3.3/6.4, 5.9/7.0, 7.6/7.1, 4.6/4.6, 7.3/6.5, 3.8/6.5, 6.3/6.9

9.2 NATURAL HAZARDS

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
1	Erosion fall	0990	2.521-2.595	Left	Medium	Soil slope
2	Rockfall	0990	2.68-2.815	Left	Medium	Rock slope
3	Rockfall	0990	3.17-3.198	Left	Medium	Rock slope
4	Rockfall	0990	3.352-3.393	Left	Medium	Rock slope

9.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
5	Erosion fall	0990	3.851-4.011	Left	Medium	Soil slope
6	Erosion fall	0990	4.047-4.335	Left	Medium	Soil slope
7	Rockfall	0990	4.565-4.947	Left	High	Rock slope, 424 to 525 (RHRS)
8	Erosion fall	0990	4.810-4.852	Left	High	Soil slope, 399 (RHRS)
9	Avalanche	0990	4.8	Left	Medium	From open broken slope with gully on east side. The maximum length of highway affected is 85 m. On average, four events/year affects highway. These events are point releases, which only affect a small portion of the entire area. Average depth on highway is 0.66 m.
10	Debris flow	0990	4.9	Left	Low	Recent small scale debris flow in channel, and in a small gully 25 m to the east.
11	Rockfall	0990	4.947-4.984	Left	Medium	Rock slope
12	Erosion fall	0990	5.029-5.221	Left	Medium	Soil slope
13	Avalanche	0990	5.3	Left	Medium	From open talus slope below rock bluffs. Length of highway affected to 400 m. On average 3.8 events/year affects highway. Average depth on highway is 0.58 m. These events are point releases which only affect a small portion of the entire area.
14	Rockfall	0990	5.29-5.374	Left	Medium	Rock slope
15	Erosion fall	0990	5.221-5.508	Left	High	Soil slope
16	Rockfall	0990	5.374-5.848	Left	High	Rock Slope, 575 (RHRS)
17	Rockfall	0990	5.848-5.872	Left	Medium	Rock slope
18	Rockfall	0990	5.872-6.068	Left	High	Rock slope 533 (RHRS)
19	Rockfall	0990	6.34-6.413	Left	Medium	Rock slope
20	Rockfall	0990	6.413-7.178	Left	High	Rock slope, 653 (RHRS) This area comprises the Blackwall Bluffs (rock bluffs). Recent placement of rockfall protection (suspended mesh system) along the top of road cut within portions of this section has decreased the rockfall hazard.

9.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
21	Avalanche	0990	6.9	Left	Medium	From steep rock bluff above highway (Blackwall Bluffs). Length of highway affected is 650 m. On average 8.4 events/year affects highway. Average depth on highway is 0.49 m. These events are point releases which only affect a small portion of the entire area.
22	Avalanche	0990	7.2	Left	Medium	Confined in narrow gully at highway. Length of highway affected is 30 m. Average 0.6 avalanche events/year and one snow dust event every 2 years. Average depth on highway is 0.77 m. Average maximum depth is 1.17 m.
23	Debris flow	0990	7.2	Left	High	Confined in narrow gully at highway.
24	Rockfall	0990	7.217-7.327	Left	Medium	Rock slope
25	Erosion fall	0990	7.235-7.267	Left	Medium	Soil slope
26	Avalanche	0990	7.3	Left	Medium	Track confined to gully at highway and length of highway affected is 50 m. Average 0.8 events/year. Average depth on highway is 1.13 m and average maximum depth is 1.88 m.
27	Debris flow	0990	7.4	Left	High	Numerous debris flow events have impacted the highway at this location with one previous fatality. Average one event/year onto highway.
28	Avalanche	0990	7.4	Left	Medium	Avalanche and debris flow activity. Confined to gully at highway and length of highway affected is 30 m. Average of 0.4 avalanche events/year and one snow dust event every 2 years. Average depth on highway is 1.2 m and average maximum depth is 2.3 m.
29	Rockfall	0990	7.358-7.417	Left	High	Rock slope
30	Erosion fall	0990	7.406-7.452	Left	High	Soil slope, 430 (RHRS)
31	Rockfall	0990	7.456-7.687	Left	Medium	Rock slope
32	Avalanche	0990	7.6	Left	High	Track confined to gully at highway and length of highway affected is 30 m. Average of 2.8 events/year. Average depth on highway is 0.81 m and average maximum depth is 1.35 m.

9.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
33	Avalanche	0990	7.62	Left	High	Length of highway affected is 160 m. Average of 1.6 events/year. Average depth on highway is 0.99 m and average maximum depth is 1.5 m
34	Avalanche	0990	7.7	Left	Low	Confined in gully at highway and length of highway affected is 35 m. Average of one event every 5 years. Average depth on highway is 0.7 to 2 m.
35	Debris flow	0990	7.7	Left	Low	Confined in gully at highway.
36	Erosion fall	0990	7.601-7.775	Left	High	Soil slope, 499 (RHRS)
37	Erosion fall	0990	7.775-7.841	Left	Medium	Soil slope
38	Erosion fall	0990	7.841-7.906	Left	High	Soil slope, 291 (RHRS)
39	Erosion fall	0990	8.212-8.345	Left	High	Soil slope, 270 (RHRS)
40	Erosion fall	0990	8.345-8.541	Left	Medium	Soil slope
41	Rockfall	0990	8.467-8.953	Left	High	Rock slope, 618 (RHRS)
42	Erosion fall	0990	8.541-8.949	Left	High	Soil slope
43	Avalanche	0990	8.3-9.45	Left	High	Open slopes broken by numerous small gullies on west end of Yoho bridge. Length of highway affected is 1.2 km. On average 5.8 events/year. Average depth on highway is 0.68 m and average maximum depth is 1.12 m. These events are point releases which only affect a small portion of the entire area.
44	Rockfall	0990	8.953-9.03	Left	Medium	Rock slope
45	Erosion fall	0990	9.645-9.938	Right	Medium	Soil slope
46	Avalanche	0990	9.7-10.1	Right	Low	An open cut slope at the east end of Yoho Bridge. Length of highway affected is 400 m. On average 0.6 avalanche events/year and one snow dust event every 2 years. Average depth on highway is 0.83 m and maximum depth to 1.5 m.
47	Rockfall	0990	9.96-10.162	Right	High	Rock slope, 355 (RHRS)
48	Rockfall	0990	10.25-10.376	Right	Medium	Rock slope

9.2 NATURAL HAZARDS

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
49	Icing	0990	10.5	Right	Low	Icing from wet cut slopes
50	Rockfall	0990	10.49-10.565	Right	Medium	Rock slope
51	Avalanche	0990	11.3	Right	Low	From open slopes below rock bluffs. Length of highway affected is 55 m. Average of one event every 7 years and average depth on highway is 1 m.
52	Rockfall	0990	11.268-11.42	Right	Medium	Rock slope
53	Avalanche	0990	12.9	Right	Very Low	From open slopes below rock bluffs. Length of highway affected is 45 m. Average of one event every 10 years.

Notes:

1. Rockfall and Erosion Fall severity rating taken from MOTH Rockfall Hazard Rating System.
2. Avalanche information compiled by MOTH, Avalanche Section, Victoria, B.C.

9.3 GEOTECHNICAL ISSUES

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
1	Highway distortion	0985	35.28-35.32	Right	Low	Tension cracks along outside edge of road above steep side slopes, distortion due to movement of fills.
2	Frost heave	0985	36.20-36.30	Right/ Left	Medium	Road undulating and cracking, moderate to severe heave, isolated to one area.
3	Seepage	0985	38.26-39.05	Left	Medium	Sloughing and some erosion along base of cut slope.
4	Highway distortion	0985	38.7-38.85	Right	Medium	Tension cracks and depression in road surface due to movement of fills.
5	Seepage	0985	40.75-40.85	Right/ Left	Medium	Alligator cracks at bridge approaches due to poor subgrade drainage.
6	Seepage	0985	41.36-42.00	Left	Medium	Sloughing, erosion and seepage at base of cut.
7	Highway distortion	0985	45.82-46.75	Right	High	Longitudinal cracks in shoulder of road due to fill movement.
8	Frost heave	0985	46.20-46.35	Right/ Left	High	Severe frost heave, intermittent along this section, causing poor riding quality.
9	Highway distortion	0985	46.75-46.90	Right	Medium	Tension cracks and depression in road surface due to fill settlement.

9.3 GEOTECHNICAL ISSUES (CONT'D)

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
10	Frost heave	0985	47.90-48.20	Right/Left	Medium	Moderate to severe heaving resulting in cracking and poor riding quality, extending over large area of this section.
11	Seepage	0985	49.37-50.50	Left	Medium	Sloughing, erosion and seepage at toe of cut.
12	Frost heave	0985	51.02-51.40	Right/Left	Medium	Moderate to low heave, intermittent over this section.
13	Frost heave	0985	51.40-51.85	Right/Left	Low	Low frost heave widely spread over this section.
14	Frost heave	0985	52.4-52.70	Right	High	
15	Mass movement	0990	4.050-4.150	Left	Medium	Old landslide below highway, extends down to Kickinghorse River and CPR tracks. Site of large uncompacted fills subject to continual movement during spring freshet.
16	Seepage	0990	4.050-4.550	Left	Medium	Rill erosion and sloughing from silty cut slopes during wet weather.
17	Mass movement	0990	5.000-5.200	Right	High	Old ancient landslide some 200 m wide which extends down to Kickinghorse River and CPR tracks. Reactivated upper section of slide in 1970's during road widening. Is a continual maintenance problem.
18	Highway distortion	0990	7.3 to 7.5	Right	High	Approaches to creek prone to surficial movement causing shoulder settlement and cracks. Some bin/crib walls constructed but movements still persist. Toe of fills that support bin wall at crossing of creek are being continuously eroded by creek, causing retrogressive movement of the slope.

SECTION 10.0

ROTH CREEK TO BRAKE CHECK

SECTION 10.0

ROTH CREEK TO BRAKE CHECK

10.1 PDI / RCI

Id #	LKI		PDI	RCI	Comments
	Segment	Offset			
1	990	11.900 - 13.250	9.0	7.0	Asphalt Rehab. Previous PDI/RCI values = 5.9/7.0, 7.6/7.1, 4.6/4.6, 7.3/6.5, 3.8/6.5, 6.3/6.9, 8.2/7.0
2	990	15.200 - 15.300	7.5	7.0	Asphalt Rehab. Previous PDI/RCI = 4.8/5.9
3	990	15.300 - 16.450	8.0	7.0	Asphalt Rehab. Previous PDI/RCI values = 8.2/6.7, 3.2/6.1, 6.2/7.2, 4.2/6.1
4	990	16.700 - 17.000	6.0	7.0	Previous PDI/RCI = 4.0/5.6, too low. Only distress transverse cracking
5	990	17.100 - 18.000	5.5	7.0	Frost heave more extensive. Previous PDI/RCI values = 7.6/7.1, 3.2/6.3, 7.0/6.7

10.2 NATURAL HAZARDS

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
1	Avalanche	0990	12.9	Right	Very Low	From open slopes below rock bluff. Length of highway affected is 45 m. Average of one event every 10 years.
2	Rockfall	0990	13.063-13.193	Right	Medium	Rock slope
3	Avalanche	0990	13.2	Right	Very Low	From several shallow gullies. Length of highway affected is 210 m. Average of one event every 15 years.
4	Avalanche	0990	13.4	Right	Very Low	From a small bowl containing two gullies. Length of highway affected is 120 m. Average of one event every 20 years.
5	Erosion fall	0990	13.29-13.88	Right	Medium	Soil slope
6	Erosion fall	0990	13.965-14.038	Right	Medium	soil slope
7	Avalanche	0990	14.2	Right	High	A steep broken slope which feeds into numerous shallow gullies. Length of highway affected is 175 m. Average of 13.4 events/year affect the highway. Average depth on highway is 0.97 m and average maximum depth is 1.49 m. These events are point releases which only affect a small portion of the entire area.

10.2 NATURAL HAZARDS (CONT'D)

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
8	Avalanche	0990	14.3	Left	Medium	A steep open slope. Length of highway affected is 20 m. Average of 0.4 events/year affect the highway. Average depth on highway is 0.90 m and average maximum depth is 1.25 m. These events are point releases which only affect a small portion of the entire area.
8	Rockfall	0990	14.346-14.54	Left	Medium	Rock slopes
9	Erosion fall	0990	14.386-14.448	Left	Medium	Soil slopes
10	Avalanche	0990	14.5	Left	Medium	East end of Park Bridge. A steep rock bluff with open slopes. Length of highway affected is 240 m. On average 0.8 events/year affects the highway. Average depth on highway is 0.5 m and average maximum depth is 1.0 m. These events are point releases which only affect a small portion of the entire area.
11	Erosion fall	0990	14.448-14.544	Left	High	Soil slope, 307 (RHRS)
12	Avalanche	0990	14.7	Left	Medium	Open talus slope. Length of highway affected is 70 m. Average depth on highway is 0.93 m and average maximum depth is 1.0 m. These events are point releases which only affect a small portion of the entire area.
13	Rockfall	0990	14.84-14.853	Left	Medium	Rock slope
14	Rockfall	0990	14.853-15.024	Left	High	Rock slope, 220 (RHRS)
15	Avalanche	0990	15.3	Left	High	Open talus slope. Length of highway affected is 300 m. On average 11 events/year affect the highway. Average depth on highway is 0.75 m and average maximum depth is 1.15 m. These events are point releases which only affect a small portion of the entire area.
16	Rockfall	0990	15.946-16.295	Left	High	Rock slope, 353 (RHRS)
17	Debris flow	0990	16.9-17.1	Left	High	Two culverts regularly require maintenance due to debris being transported down creek.

Notes:

1. Rockfall and Erosion Fall severity rating taken from MOTH Rockfall Hazard Rating System.
2. Avalanche information compiled by MOTH, Avalanche Section, Victoria, B.C.

10.3 GEOTECHNICAL ISSUES

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
1	Mass movement	0990	14.3-14.5	Left	Low	Old landslide at east end of Park Bridge during initial road construction. A 48 inch drainage culvert was subsequently installed beneath the slide and appears to have arrested slide movement.
2	Seepage	0990	14.3-14.5	Left	High	Erosion/sloughing of large exposed soil slopes causes continual maintenance problems.
3	Seepage	0990	15.0-15.2	Left	Low	Many small sloughs along this section, no road closures but high maintenance.
4	Frost heave	0990	15.15-15.3	Right / Left	Low	Moderate frost heave, isolated in small area.
5	Highway distortion	0990	15.7-16.5	Right	Low	Large side cast fills prone to surficial movement. Some low retaining walls have been installed and are performing adequately. Steep slopes down to CPR line and Kickinghorse River.
6	Frost heave	0990	17.1-17.5	Right / Left	Medium	Frequent, moderate frost heave resulting in poor ride quality and cracking.

SECTION 11.0

BRAKE CHECK TO YOHO PARK

SECTION 11.0 BRAKE CHECK TO YOHO PARK

11.1 PDI / RCI

Id #	LKI		PDI	RCI	Comments
	Segment	Offset			
1	990	16.98 – 18.70	6.4	6.8	*Severe transverse cracking, moderate to severe longitudinal cracking, low to moderate distortion and rutting, minor ravelling
2	990	18.70 – 19.20	8.3	7.6	*Low to moderate longitudinal cracking and rutting, minor distortion
3	990	19.20 – 20.14	7.5	6.7	*Moderate to severe longitudinal and transverse cracking, moderate distortion, centerline joint cracking and edge cracking, minor ravelling
4	990	20.14 – 20.70	8.1	7.2	*Low to moderate longitudinal cracking and rutting, minor distortion and edge cracking
5	990	20.70 – 24.58	5.3	6.5	*Moderate to severe transverse cracking and rutting, moderate longitudinal cracking, distortion and edge cracking, minor ravelling
6	990	24.58 – 25.82	3.4	6.0	*Moderate to severe edge cracking and rutting, moderate longitudinal and transverse cracking, minor ravelling and distortion

* The PDI and RCI values presented above were obtained from RPMS and they appear to not accurately reflect the roadway condition based on our visual observations which are shown in the column labeled 'Comment'. The present roadway condition appears to be inferior to what the RPMS numbers would indicate, this is reflected by heavy patching which has been completed due to severe shoulder distortion. The RPMS data was likely collected in the summer months when roadway distortion is minimized. Due to the winter conditions we were unable to record data required for the recalculation of the PDI and RCI.

11.2 NATURAL HAZARDS

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
1	Debris torrent	0990	21.97 – 21.99	Left	Low	Vacation Creek crossing – no recorded event
2	Debris torrent	0990	23.25 – 23.28	Left	Low	Palliser East - no recorded event, trash rack located off of highway
3	Avalanche	0990	23.25 – 23.28	Left	Low	Palliser East – Avalanche No. 23.3; No recorded avalanches (since '74)

11.3 GEOTECHNICAL ISSUES

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
1	Distortion	0990	17.22-17.32	Right	Low	Movement of fill causing shoulder cracking
2	Distortion	0990	17.25-17.30	Left	High	Shoulder distortion due weak base or sub-base
3	Distortion	0990	17.40-17.43	Right	Low	Movement of fill causing shoulder cracking
4	Distortion	0990	17.50-17.76	Right	Low	Movement of fill causing shoulder cracking
5	Distortion	0990	17.52-17.58	Left	Medium	Shoulder distortion due weak base or sub-base
6	Frost heave	0990	17.70-17.74	Both	High	Cracking verified by MoTH, cracking is present in both lanes
7	Distortion	0990	17.96-18.74	Left	High	Shoulder distortion due weak base or sub-base
8	Frost heave	0990	17.97-18.04	Both	High	Cracking verified by MoTH, cracking is present in both lanes
9	Distortion	0990	18.22-18.48	Right	Low	Movement of fill causing shoulder cracking
10	Distortion	0990	18.48-18.66	Right	High	Movement of fill causing shoulder cracking
11	Distortion	0990	18.79-19.12	Left	High	Shoulder distortion due weak base or sub-base
12	Distortion	0990	19.12-19.18	Right	Low	Movement of fill causing shoulder cracking
13	Distortion	0990	19.22-19.40	Left	High	Shoulder distortion due weak base or sub-base
14	Distortion	0990	19.27-19.38	Right	Medium	Movement of fill causing shoulder cracking
15	Distortion	0990	19.82-20.02	Left	High	Shoulder distortion due weak base or sub-base
16	Distortion	0990	19.96-19.99	Right	High	Movement of fill causing shoulder cracking
17	Distortion	0990	20.06-20.16	Left	High	Shoulder distortion due weak base or sub-base
18	Distortion	0990	20.14-20.50	Right	Medium	Movement of fill causing shoulder cracking
19	Distortion	0990	20.34-20.52	Left	Medium	Shoulder distortion due weak base or sub-base
20	Distortion	0990	20.70-20.90	Left	High	Shoulder distortion due weak base or sub-base
21	Distortion	0990	20.80-20.92	Right	Low	Movement of fill causing shoulder cracking
22	Distortion	0990	20.90-21.10	Left	Medium	Shoulder distortion due weak base or sub-base
23	Distortion	0990	20.98-21.26	Right	Low	Movement of fill causing shoulder cracking
24	Distortion	0990	21.10-21.44	Left	High	Shoulder distortion due weak base or sub-base
25	Distortion	0990	21.42-21.50	Right	Low	Movement of fill causing shoulder cracking
26	Distortion	0990	21.95-21.98	Right	Low	Movement of fill causing shoulder cracking
27	Distortion	0990	21.95-21.98	Left	High	Shoulder distortion due weak base or sub-base
28	Distortion	0990	22.00-22.18	Right	Low	Movement of fill causing shoulder cracking
29	Distortion	0990	22.18-22.62	Right	High	Movement of fill causing shoulder cracking

11.3 GEOTECHNICAL ISSUES (CONT'D)

Id #	Type	LKI		Right / Left	Severity	Comments
		Segment	Offset			
30	Distortion	0990	22.50-22.70	Left	Medium	Shoulder distortion due weak base or sub-base
31	Mass movement	0990	22.70-22.76	Right	High	Extensive shoulder cracking caused by fill slope creeping, failing guardrail crib wall, frequent patching is required
32	Distortion	0990	22.80-23.05	Right	High	Movement of fill causing shoulder cracking
33	Distortion	0990	23.16-23.42	Right	Medium	Movement of fill causing shoulder cracking
34	Distortion	0990	23.28-23.81	Left	Medium	Shoulder distortion due weak base or sub-base
35	Seepage	0990	23.37	Left	Medium	Ditchline carries large flow, culvert recommended
36	Distortion	0990	23.58-23.84	Right	Low	Movement of fill causing shoulder cracking
37	Distortion	0990	23.84-23.93	Right	High	Movement of fill causing shoulder cracking
38	Distortion	0990	23.92-24.50	Left	Medium	Shoulder distortion due weak base or sub-base
39	Distortion	0990	23.96-25.08	Right	High	Movement of fill causing shoulder cracking
40	Distortion	0990	24.61-24.63	Left	Medium	Shoulder distortion due weak base or sub-base
41	Distortion	0990	24.82-25.00	Left	High	Shoulder distortion due weak base or sub-base
42	Distortion	0990	25.00-25.32	Left	Low	Shoulder distortion due weak base or sub-base
43	Frost heave	0990	25.11-25.14	Left	High	Cracking patterns verified by MoTH, generally limited to one lane
44	Distortion	0990	25.27-25.70	Right	High	Movement of fill causing shoulder cracking
45	Distortion	0990	25.32-25.68	Left	High	Shoulder distortion due weak base or sub-base