

GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION – PEACE RIVER/HIGH LEVEL
2013 INSPECTION



Site Number	Location	Name	Hwy	km
PH64	Southwest of Worsley	BF79554 Sideslope Instabilities	64:02	≈52.7
Legal Description		UTM Co-ordinates (NAD 83)		
SW17/NE8-85-8-W6		11 N 6248726	E 363151	

	Date	PF	CF	Total
Previous Inspection:	June 19, 2012	5	4	20 – South side
		7	4	28 – North side
Current Inspection:	June 5, 2013	5	4	20 – South side
		7	4	28 – North side
Road AADT:	420	Year:		2011
Inspected By:	Barry Meays, Don Proudfoot (Thurber) Ed Szmata, Ken Szmata, Rocky Wang (AT)			
Report Attachments:	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input type="checkbox"/> Maintenance Items			

Primary Site Issue:	Slide/Erosion on downstream (south) side; Slide on upstream side.	
Dimensions:	About 70 m long x 40 m wide (south, downstream); About 40 m long x 60 m wide (north, upstream).	
Date of any remediation:	Rehabilitation of both upstream and downstream slides - 2011	
Maintenance:	Asphalt patch on north (westbound) lane - October, 2008.	
Observations:	Description	Worse?
<input checked="" type="checkbox"/> Pavement Distress	Sealed crack reflecting through patch (north) that existed prior to the slide repairs.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	Fresh movement observed immediately on downslope side of the riprap beyond the culvert outlet and further downstream in channel.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	The erosion on the upstream (north) transitions where the gabions meet the riprap by the culvert inlet has increased.	<input checked="" type="checkbox"/>
<input type="checkbox"/> Seepage		<input type="checkbox"/>
<input checked="" type="checkbox"/> Bridge/Culvert Distress	Some undermining of the west side of the concrete collar at the culvert inlet is beginning to form from the liner transition erosion noted above.	<input type="checkbox"/>
<input type="checkbox"/> Other		<input type="checkbox"/>

Instrumentation: Last Read October, 2013.

NORTH SLIDE SI09-1: 6mm/yr at 6m (Elev 623m) & <0.5mm/yr at 8m; SI09-2: <1mm/yr at 11m (Elev 621m); SI09-3 Destroyed by Hwy Maint. Equipment in 2013 (Previously reading 4mm/yr at 6m (Elev 628m)); SP09-1 = 2.5m BGS; SP09-2 at 2.3m BGS; SP09-3 Destroyed (Prev Rdng = 7m BGS).
SOUTH SLIDE SP09-4 dry at 14.4m BGS; SP09-5 Destroyed.

Assessment:

On the north (upstream) side: The inclinometers are still indicating some movements (in particular SI09-1 near the original toe at 6mm/year at elevation 623m, and SI09-3 near the highway with the last reading prior to destruction of 4mm/year at elevation 628m). But these rates of movement appear to be steadily decreasing, and are significantly less than those recorded since the spring of 2012, and this suggests they may be due to settlements as the soil reaches equilibrium from the recent construction.

The erosion observed last year at the transitions between the gabions and the riprap near the culvert inlets has increased on the west side where it has migrated to create soil loss underneath the culvert inlet concrete collar.

On the South (downstream) side: The slide repair did not extend beyond the end of the riprap bowl at the culvert outlet, and significant slumping was observed on the channel walls further downstream of the riprap. It is possible the slide could eventually enlarge and extend back into the riprap bowl area. The erosion observed last year along the edge of and extending underneath the west ditch liner has diminished, and appears to be OK.

Recommendations:

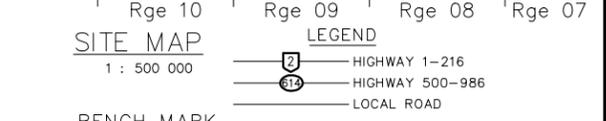
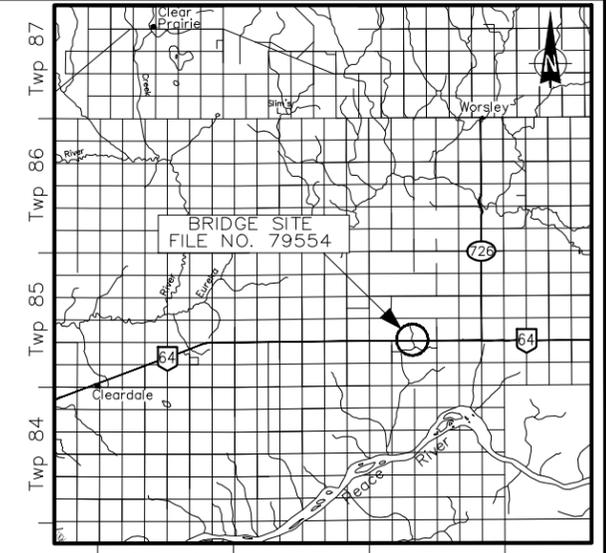
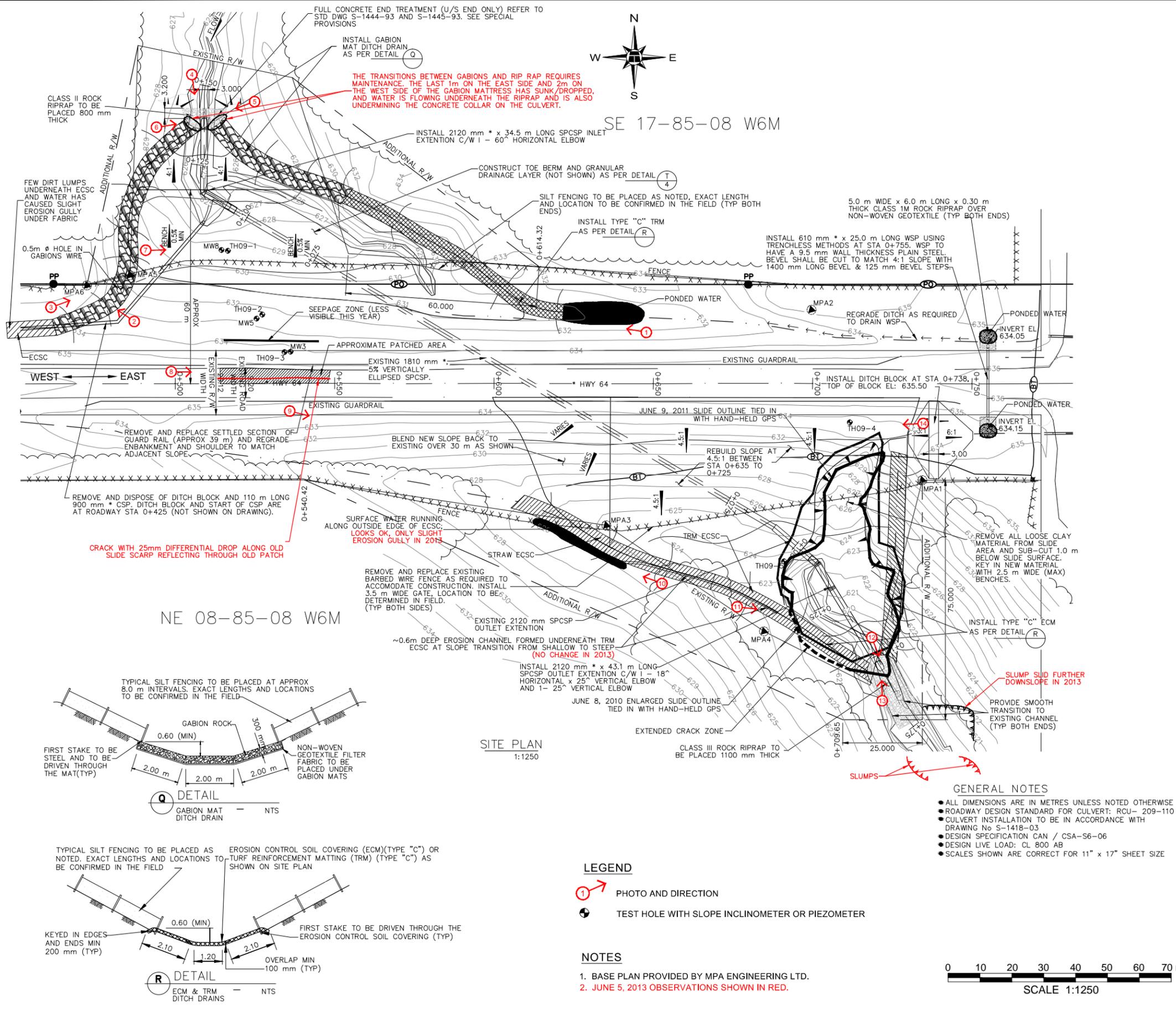
Maintenance:

Remove the silt fence from the 2011 repairs.

North Embankment (Upstream on north side): Continue monitoring the remaining inclinometers/piezometers, the crack/patch in the WB lane over the old slide, and the erosion at the transitions between the gabions/riprap near the culvert inlet. Patch the dip and seal the crack as required. Repair the 0.5m diameter hole in the gabion wire on the west flank just on the south side of the fence. The transitions of the gabions/riprap should be repaired by removing the riprap and damaged gabion baskets in the affected eroded areas, rebuilding the base with well compacted clay to form a ~1m vertical elevation drop at the new transition point of gabion to riprap and extending the compacted clay underneath the culvert collar to provide support, install a steel plate the entire width of the channel and extending at least 1m below the lower riprap base level, install new gabions with non-woven underlay on the compacted clay upper level, install new non-woven and additional riprap as required on the compacted clay lower level, and place the new gabions so that it extends a minimum lateral distance of 1m overtop the newly placed riprap at the compacted lower level.

South Embankment (Downstream or south side): Monitor the extent of the slide downstream of the riprap bowl and in the channel to see if it enlarges. Monitor the erosion on the west ECSC to ensure it has abated.

The site should be monitored for at least one more year to further assess the improvement to slope stability as a result of the recent remedial measures and any further need for maintenance of erosion issues.



- BENCH MARK**
- MPA1- Fd.I.P. LOCATED 30.24 m S OF * ROAD ALIGNMENT AT STATION 0+734.63, ELEVATION 633.29
 - MPA2- Fd.I.P. LOCATED 23.06 m N OF * ROAD ALIGNMENT AT STATION 0+699.65, ELEVATION 635.37
 - MPA3- Fd.I.P. LOCATED 44.37 m S OF * ROAD ALIGNMENT AT STATION 0+635.52, ELEVATION 625.11
 - MPA4- Fd.I.P. LOCATED 77.65 m N OF * ROAD ALIGNMENT AT STATION 0+685.09, ELEVATION 623.35
 - MPA5- Fd.I.P. LOCATED 34.03 m N OF * ROAD ALIGNMENT AT STATION 0+485.79, ELEVATION 631.67
 - MPA6- Fd.I.P. LOCATED 30.77 m N OF * ROAD ALIGNMENT AT STATION 0+472.35, ELEVATION 635.20
- SURVEY BY**
- MQT DATA, NOVEMBER 17, 2009

- HYDROTECHNICAL SUMMARY**
- DRAINAGE AREA = 13.0 km²
 - DESIGN DISCHARGE = 7.10 m³/s
 - MEAN OUTLET VELOCITY AT PROPOSED CULVERT FOR DESIGN DISCHARGE = 2.01 m/s
 - AVERAGE SURVEYED SLOPE OF STREAMBED = 0.039 m/m
- EXISTING STRUCTURE**
- 5% VERTICALLY ELLIPSED 1810 mm * SPCSP x 203.0 m INVERT LENGTH, EXTENDED ON D/S END WITH A 2120 mm * SPCSP x 17.8 m INVERT LENGTH
- PROPOSED STRUCTURE**
- EXTEND EXISTING CULVERT WITH 2120 mm * SPCSP OUTLET EXTENSION x 43.10 m INVERT LENGTH C/W 1 - 25° VERTICAL x 18° HORIZONTAL ELBOW AND 1 - 25° VERTICAL ELBOW
 - EXTEND EXISTING CULVERT WITH 2120 mm * SPCSP INLET EXTENSION x 34.50 m INVERT LENGTH C/W 1 - 60° HORIZONTAL ELBOW
 - SPCSP WALL THICKNESS IS 3.0 mm (910 gm/m² GALVANIZED COATING)
 - CORRUGATION PROFILE 152 x 51 mm

Alberta
Transportation

**PEACE REGION (PEACE RIVER/HIGH LEVEL)
PH 64 - WATERCOURSE CULVERT ON HWY 64,
22 KM SW OF WORSELY**

2013 PH64 INSPECTION PLAN

FIGURE PH64-1

DRAWN BY	KLW
DESIGNED BY	BDM
APPROVED BY	DWP
SCALE	1:1250
DATE	JUNE 5, 2013
FILE No.	15-16-283

THURBER ENGINEERING LTD.



Photo 1 – Looking northwest at the upstream (north) embankment sideslope and old slide area.



Photo 2 - Looking at the hole in the gabion mattress wire along the west flank just south of the fence. The unsecured area appears to have enlarged since last year.



Photo 3 - Looking northeast at the toe of the upstream slope and south gabion leading to the culvert inlet of the north embankment.



Photo 4 - Looking south at the culvert inlet and gabion/riprap transition areas. Note the erosion at the transitions between the gabion and riprap areas on both sides of the culvert.

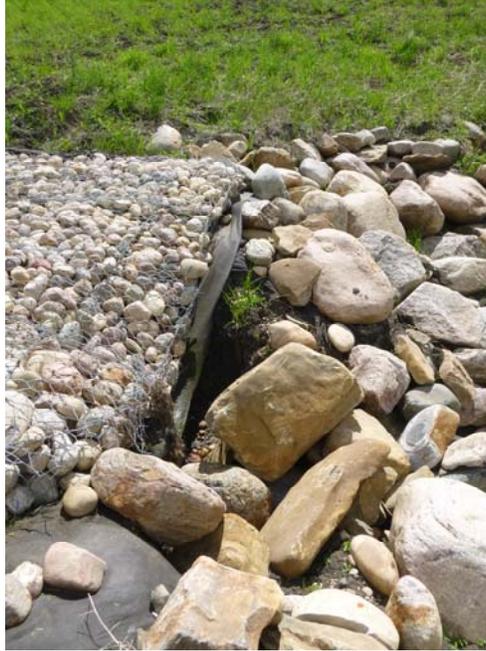


Photo 5 - Looking at the east gabion/riprap transition leading to the culvert inlet. Some more separation and undermining/erosion has occurred since last year, causing distress to the last 1m length of gabion baskets.



Photo 6 - Looking at the west gabion/riprap transition leading to the culvert inlet. More undermining/erosion has occurred since last year, causing subsidence to the last 2 m length of gabion baskets, and undermining the concrete collar of the culvert inlet.



Photo 7 - Looking east along the south embankment slope from the west end.



Photo 8 – Looking east along the highway where the north embankment slide has affected the road. The crack with 25 mm differential settlement still exists through the old patch.



Photo 9 – Looking southeast along the south embankment slope from the west end.



Photo 10 - Looking northwest at the west flank of the beginning of the erosion control soil covering (ECSC) liner. Note that the surface runoff erosion observed last year off of the outside edge of the ECSC liner has diminished and is now OK.



Photo 11 - Looking southeast along the ECSC liner towards the culvert outlet. Note that the erosion control liner has settled neatly overtop of the erosion gully that formed underneath the liner, and now appears to be functioning properly.



Photo 12 – Looking south at the culvert outlet area. Note the slumping on both sides of the drainage channel further downstream of the ripped area.



Photo 13 - Looking northeast at the culvert outlet area and downstream embankment slope.



Photo 14 - Looking west parallel to the highway along the well vegetated downstream embankment.