

**GEOHAZARD ASSESSMENT PROGRAM**  
**PEACE REGION – PEACE RIVER/HIGH LEVEL**  
**2014 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
<b>Previous Inspection:</b>	June 5, 2013	5	4	20 – South side
		7	4	28 – North side
<b>Current Inspection:</b>	June 19, 2014	5	4	20 – South side
		7	4	28 – North side
<b>Road AADT:</b>	540		<b>Year:</b>	2013
<b>Inspected By:</b>	Barry Meays, Don Proudfoot (Thurber) Ed Szmata, Ken Szmata, Rocky Wang (AT)			
<b>Report Attachments:</b>	<input checked="" type="checkbox"/> Photographs		<input checked="" type="checkbox"/> Plans	<input type="checkbox"/> Maintenance Items

<b>Primary Site Issue:</b>	Slide/Erosion on downstream (south) side; Slide on upstream side.	
<b>Dimensions:</b>	About 70 m long x 40 m wide (south, downstream); About 40 m long x 60 m wide (north, upstream).	
<b>Date of any remediation:</b>	Rehabilitation of both upstream and downstream slides - 2011	
<b>Maintenance:</b>	Asphalt patch on north (westbound) lane - October, 2008.	
<b>Observations:</b>	<b>Description</b>	<b>Worse?</b>
<input checked="" type="checkbox"/> Pavement Distress	Sealed crack reflecting through patch (north) that existed prior to the slide repairs. A new 100 mm wide crack was observed along the north edge of the highway	<input checked="" 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 checked="" 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 September, 2014.

NORTH SLIDE SI09-1: No Discernible Movement; SI09-2: Destroyed by Hwy Maint. Equipment in 2014 (Previously reading <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 = 2.6m BGS; SP09-2 Destroyed (Previous Reading at 2.3m BGS; SP09-3 Destroyed (Prev Rdng = 7m BGS).

SOUTH SLIDE SP09-4 dry at 14.5m BGS; SP09-5 Destroyed.

**Assessment:**

On the north (upstream) side: The single remaining inclinometer is not indicating any appreciable movement during the fall, 2014 readings (SI09-1 near the original toe was registering about 6mm/year at elevation 623m in 2013), and SI09-3 near the highway with the last reading prior to destruction of

4mm/year at elevation 628m). Over the last few years, the rates of movement steadily decreased, and based on the most recent reading in SI09-1 it has basically stopped. These movements were likely due to settlements as the soil reached 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 both the west and east sides, and on the west side 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 two years ago 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.

Repair the two gabion baskets that are torn.

North Embankment (Upstream on north side): Continue monitoring the remaining inclinometers/piezometers, the cracks/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 two torn gabion mattress wire areas on the west flank south of the fence. The transitions of the gabions/riprap should be repaired (see Photo 6 attached) 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 vertical 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 gabion mat 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. It was indicated by Mr. Ed Szmata that he would check with the bridge branch to see if they recommended repairs as part of their 2 year warranty period for bridges).







Photo 1 - Looking at a torn gabion mattress wire at the beginning of the west flank on the north side of the highway.



Photo 2 - Looking northeast at the toe of the upstream slope and south gabion leading to the culvert inlet of the north embankment.





Photo 3 - Looking northwest 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 4 - 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 5 - 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.

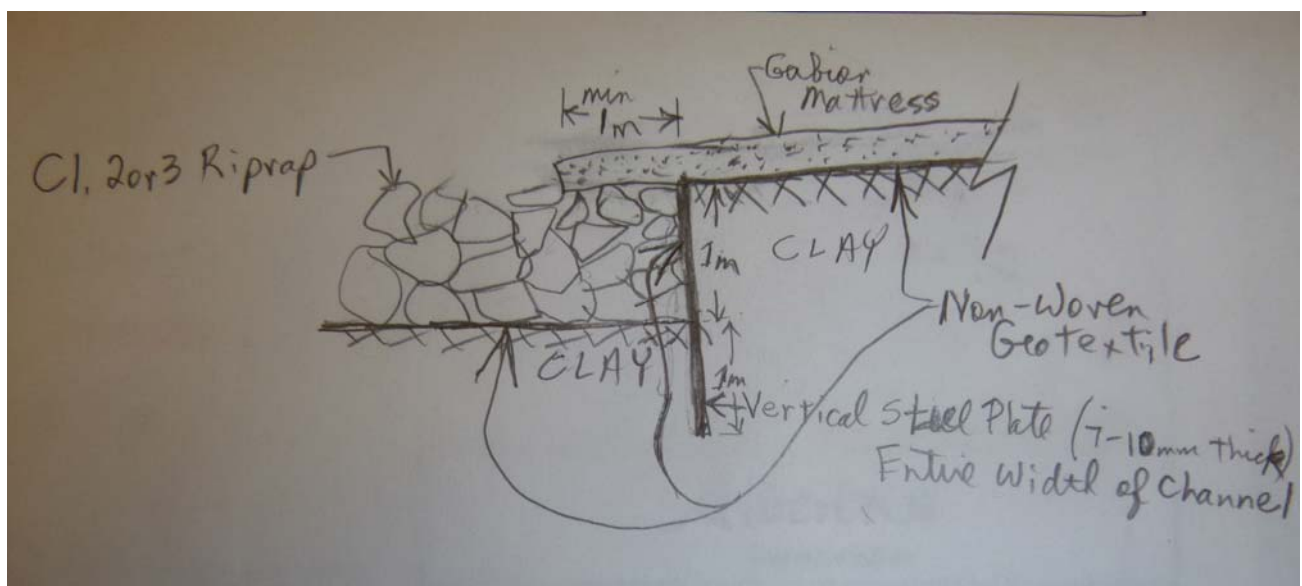


Photo 6 – A proposed repair sketch for the gabion to riprap transition areas.





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



Photo 8 – Looking west along the highway where the north embankment slide has affected the road. The crack along the OWP through the old patch has increased to 30 mm differential this year, and a new crack about 100 mm wide exists along the north edge.





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 south of the highway. 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 (unchanged from last year).



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





Photo 13 - Looking northwest at the culvert outlet area and downstream embankment slope. Note some of the smaller riprap has washed further downslope.



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