

GEOHAZARD ASSESSMENT PROGRAM

NORTH CENTRAL REGION – ATHABASCA



2016 INSPECTION

Site Number	Location	Name	Hwy	km
NC017B-1	17.7 km north of the junction of Hwy 63 and Confederation Way	POPLAR CREEK CUT SLOPE	63:12	20.75
Legal Description		UTM Co-ordinates (NAD 83)		
Sec. 24 &25-91-10-W4M		12 N	471716 E	6308267

	Date	PF	CF	Total
Previous Inspection:	July 17, 2007	2	10	20 (Highway 63)
Current Inspection:	August 26, 2016	2	10	20 (Highway 63)
Road AADT:	18,440	Year:		2015
Inspected By:	Tarek Abdelaziz, José Pineda (Thurber) Roger Skirrow, Arthur Kavoluk, Margaret Boeske (AT)			
Report Attachments:	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input checked="" type="checkbox"/> Maintenance Items			

Primary Site Issue	Creep movement in the highway west back slope and erosion within the highway east and west side slopes
Dimensions:	Refer to attached drawings and notes below.
Site History:	<p>Twinning of the highway took place in 2000 and involved the construction of a 3H:1V benched back slope cut to the west side of the current highway location. Instabilities noted within the 44 m high west back slope were mitigated through drainage improvement and the construction of an earth fill toe berm at the toe of the highway east embankment. Slope inclinometers were installed in the west back slope to monitor the rate of movement and assess the impact of slope movement on the Suncor pipeline located behind the crest of the slope. The slope inclinometers continued to display creep movements after the implementation of the remedial measures.</p> <p>Major erosion occurred within the median and east and west side slopes and ditches of the highway between 2000 and 2002. The erosion was repaired as part of AT's Contact No. 6608/02 in 2002/2003. The erosion protection consisted mainly of the construction of a stilling basin at the base of the west ditch; improvement of the grate of the median ditch drop pipe; repair of east side slope erosion rills; topsoil placement and seeding of areas bare of vegetation; and lining the east, west, and median ditches with gabion mattresses and RECPs.</p> <p>Ongoing site monitoring continued to occur after construction and the site was last visited in 2007. Additional maintenance recommendations were provided in the past and included topsoiling and seeding of bare slope areas to the east and the west of the highway, blocking off existing quad trail at the bridge location, extension of the guard rail along the west ditch near station 16+280, and building a shallow topsoil berm or filterx sock near Station 16+220 to intercept flow and direct it to the gabion channel</p>

Observations:	Description	Worse?
<input type="checkbox"/> Pavement Distress		<input type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	Areas barren of vegetation in the highway west side slopes and in the highway east back slope above Stations M0+750 and M0+950; erosion rills near the north end of the new guardrail installed to the west side of the highway (between Stations L0+500 and L0+550); erosion rills in the highway east embankment side slope downslope of Station M0+625, erosion rills and gullies within the west back slope along the quad trail	<input type="checkbox"/>
<input checked="" type="checkbox"/> Seepage	Seepage was noted in the third bench of the west highway back slope; stilling pond is almost filled up with sediment.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Bridge/Culvert Distress	Quads running under highway northbound bridge continue to create a preferential runoff path that is causing erosion rills in head slopes around the abutment seat; disturbed/displaced riprap under the bridge due to quads; two erosion gullies near the abutment seat under the bridge.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Other	Gabion channel located west of the highway had localized damaged areas in the vicinity of Station L0+425 ; 300 mm of sediment accumulated above the base of the west ditch channel at Station L0+300; vegetation growth in the west ditch to the north of Station L0+500 and in the east highway ditch channel between Stations L0+275 and L0+050; vegetation continued to grow in the median ditch; minor trash around the bubble grate over the median drop pipe; existing 1200 mm diameter twin culverts were dry.	<input checked="" type="checkbox"/>
<p>Instrumentation (4SIs in the west back slope):</p> <p>Based on the fall 2016 instrumentation monitoring, SI-1 and SI-2 continued to show no discernible movement and SI-4 showed no discernible movement since the spring 2016 monitoring event. SI-3 showed a creep rate of movement of 2.9 mm/yr over 42.8 m to 45.9 m depth. The rate of movement increased in SI-3 by 3.3 mm/yr.</p>		
<p>Assessment (Refer to attached Figures):</p> <p>The site condition has not changed significantly since the 2007 site visit.</p> <p>There are no visible signs of slope instability in the highway east and west slopes. The highway west back slope continued to be perform well and is not currently affecting the highway condition.</p> <p>The remedial measures implemented in 2002/2003 have been effective in dealing with the past erosion issues . However, there are few maintenance issues that will need to be addressed by the Maintenance Contractor to prevent future deterioration of the site conditions. These maintenance items are shown on the site drawings and are described briefly in the following section.</p>		

Recommendations:

Since the site condition has not changed significantly since 2007, it is recommended to visit the site every second year. The next site visit should be completed in 2018.

Topsoil and seed all of the bare areas shown on the attached drawings where vegetation has not caught or absent. Salt resistant mix should be used in order to revegetate bare side slope areas adjacent to the highway. Hydroseeding and blown-in compost may also be considered onto the harder to reach high slope sections.

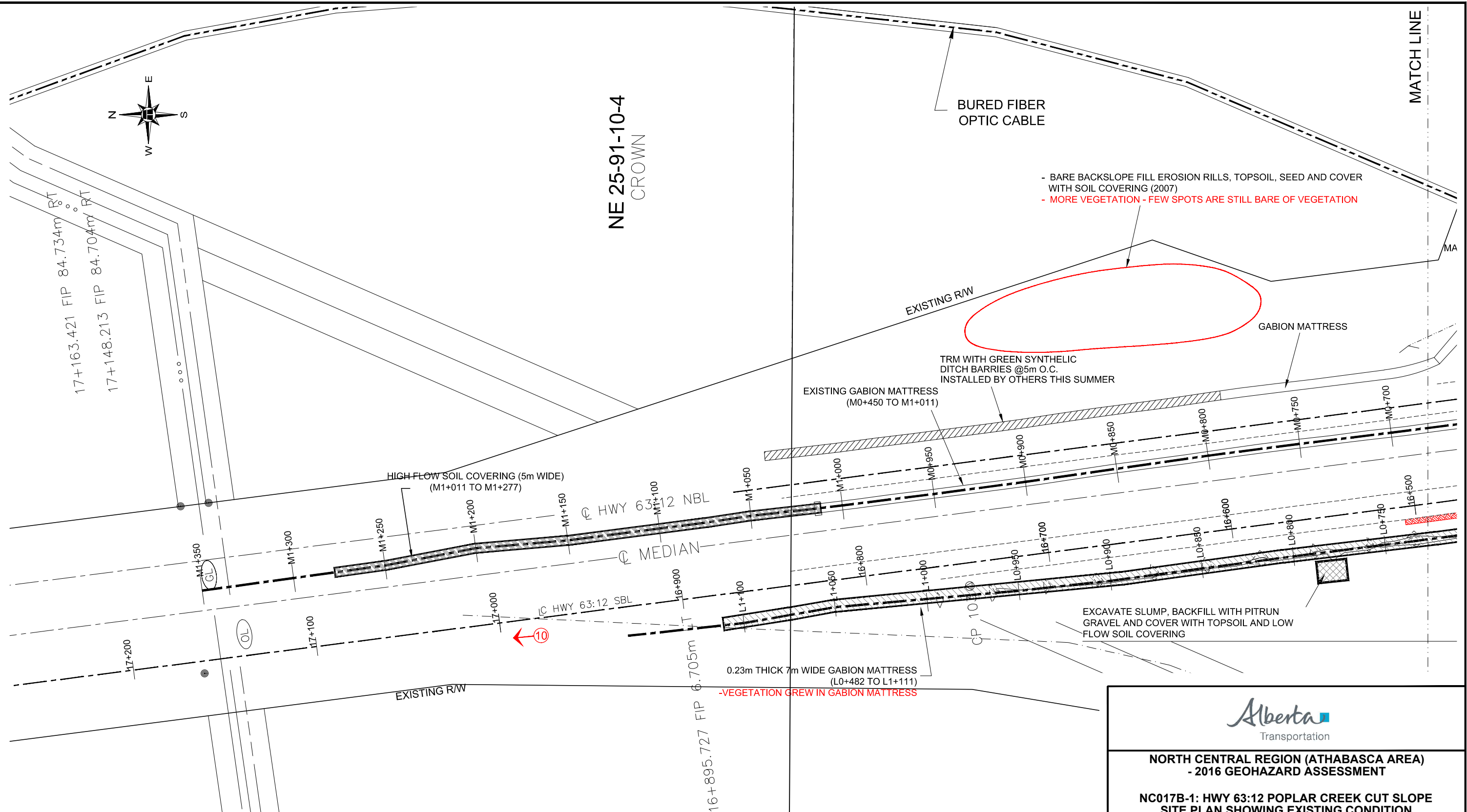
Prior to topsoil placement and seeding of bare slopes, any rilled slope areas should be bladed and track-packed in an up and down slope direction to establish an even slope surface that matches adjacent slopes. A suitable RECP should be used, where required, to protect the re-worked surface until vegetation catches up. A shallow earth fill berm or compost filter sock may be placed diagonally across the west side slope around Station 16+500 to intercept flow down the slope and direct it back into the gabion lined west ditch.

Existing quad trails below the bridge and along the west back slope should be blocked off to avoid future erosion issues and disturbance to the bridge head slope. The operation of the quad trail under the bridge has resulted in displacement of the riprap and the formation of minor erosion rills in the headslope around the abutment. The erosion rills should be repaired and new riprap should be placed to level the bridge headslope. The existing erosion gullies under the bridge by the abutment seat should be filled with gravel.






The stilling pond should be cleared off sediment to prevent the transport of silt into the twin culverts. Accumulated sediment should also be scrapped off the base of the west gabion channel. A wire mesh may be used to tie in the ruptured gabion basket in the west ditch; otherwise consideration may be given for using a new gabion basket filled with rocks to replace the damaged basket.

Excessive growth of vegetation within the gabion baskets/mattresses may damage these structures. Consideration should be given for clearing growing and mature trees within the gabion structures, which were more evident within the west ditch channel.

Trash should always be removed from above and around the median ditch bubble grate over the drop pipe.

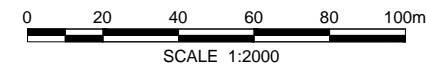



LEGEND

-  HIGH FLOW SOIL COVERING
-  LOW FLOW SOIL COVERING
-  GABION MATTRESS (TRAPEZOIDAL SECTION)
-  GABION BASKET / GABION MATTRESS (RECTANGULAR SECTION)
-  PHOTOGRAPH NUMBER, AND APPROXIMATE DIRECTION AND LOCATION

NOTES

1. FEATURE LOCATIONS ARE APPROXIMATE.
2. PREVIOUS OBSERVATIONS ARE SHOWN IN BLACK
3. OLD SILT FENCES HAVE BEEN REMOVED, EXCEPT AT POPLAR CREEK BRIDGE AREA.
4. **AUGUST 25, 2016 OBSERVATIONS ARE SHOWN IN RED.**
5. EROSION PROTECTION MEASURES WERE IMPLEMENTED IN 2002 UNDER ALBERTA TRANSPORTATION CONTRACT # 6608102.






**NORTH CENTRAL REGION (ATHABASCA AREA)
- 2016 GEOHAZARD ASSESSMENT**

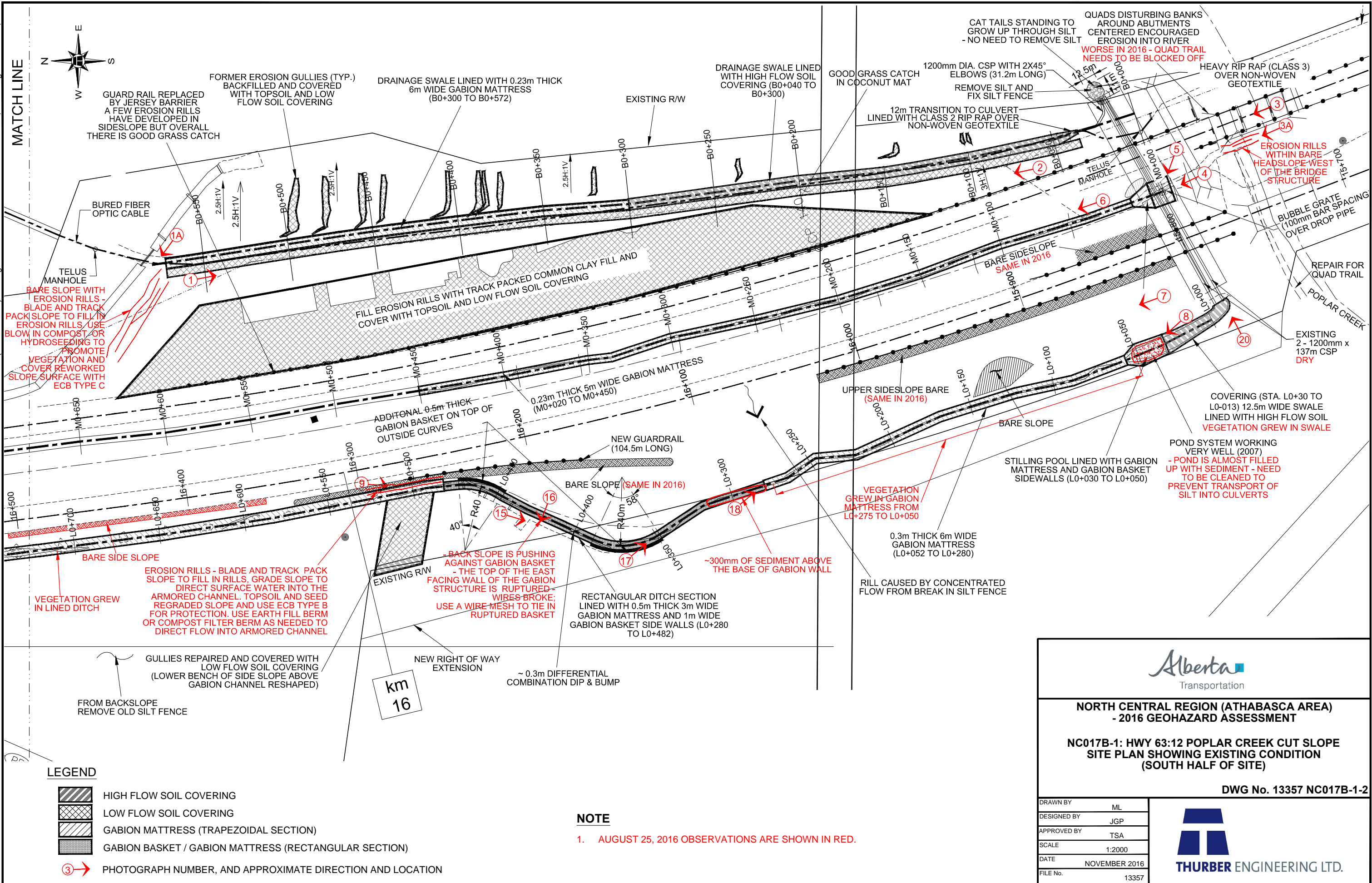
**NC017B-1: HWY 63:12 POPLAR CREEK CUT SLOPE
SITE PLAN SHOWING EXISTING CONDITION
(NORTH HALF OF SITE)**


DWG No. 13357 NC017B-1-1

DRAWN BY	ML
DESIGNED BY	JGP
APPROVED BY	TSA
SCALE	1:2000
DATE	NOVEMBER 2016
FILE No.	13357



THURBER ENGINEERING LTD.






NORTH CENTRAL REGION (ATHABASCA AREA)
- 2016 GEOHAZARD ASSESSMENT

NC017B-1: HWY 63:12 POPLAR CREEK CUT SLOPE
SITE PLAN SHOWING EXISTING CONDITION
(SOUTH HALF OF SITE)

DWG No. 13357 NC017B-1-2

DRAWN BY	ML
DESIGNED BY	JGP
APPROVED BY	TSA
SCALE	1:2000
DATE	NOVEMBER 2016
FILE No.	13357



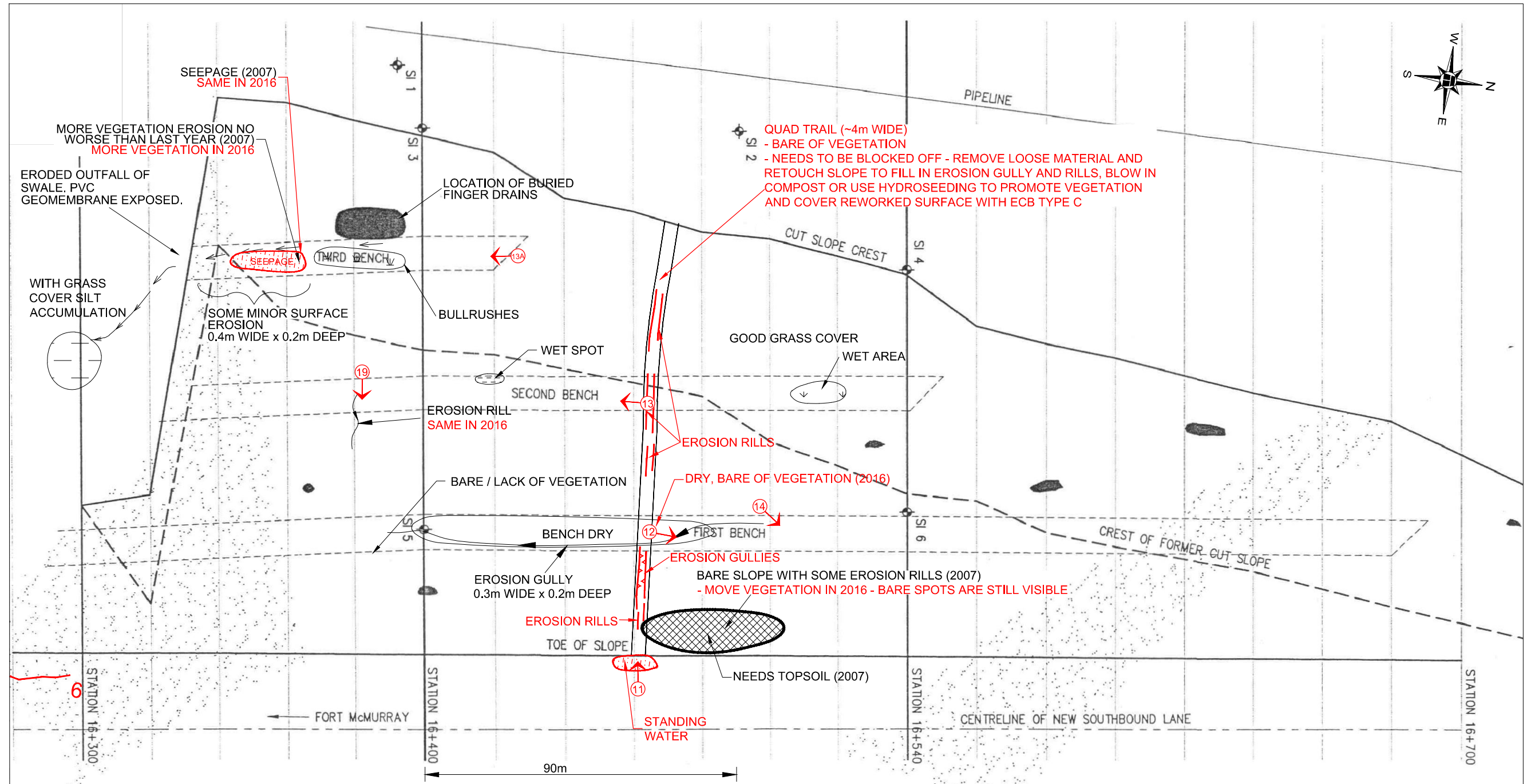
THURBER ENGINEERING LTD.

LEGEND





- HIGH FLOW SOIL COVERING
- LOW FLOW SOIL COVERING
- GABION MATTRESS (TRAPEZOIDAL SECTION)
- GABION BASKET / GABION MATTRESS (RECTANGULAR SECTION)
- PHOTOGRAPH NUMBER, AND APPROXIMATE DIRECTION AND LOCATION

NOTE

1. AUGUST 25, 2016 OBSERVATIONS ARE SHOWN IN RED.

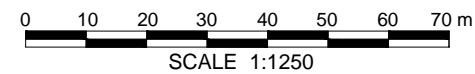


LEGEND

-  SAND ENCOUNTERED
-  WET SPOT
-  INCLINOMETER LOCATIONS
-  PHOTOGRAPH NUMBER, AND APPROXIMATE DIRECTION AND LOCATION

NOTES

1. OBSERVATIONS IN PREVIOUS YEARS SHOWN IN BLACK
2. AUGUST 25, 2016 OBSERVATIONS ARE SHOWN IN RED



**NORTH CENTRAL REGION (ATHABASCA AREA)
- 2016 GEOHAZARD ASSESSMENT**

**NC017B-1: HWY 63:12 POPLAR CREEK CUT SLOPE
SITE PLAN SHOWING EXISTING CONDITION
(DETAILS FROM STA. 16+300 TO 16+700)
- HWY WEST BACK SLOPE**

DWG No. 13357 NC017B-1-3

DRAWN BY	ML
DESIGNED BY	JGP
APPROVED BY	TSA
SCALE	1:1250
DATE	NOVEMBER 2016
FILE No.	13357





Photo #1 - Looking south at the gabion mattress from the upper part of east side slope



Photo #1A - Looking northwest at a strip bare of vegetation within the east side slope; note the presence of erosion rills on the exposed slope surface.



Photo #2 - Looking north at the lower part of the east side slope



Photo #3 - Erosion gullies near the abutment seat and displaced riprap under the highway northbound lane bridge.



Photo #3A - Erosion rills within the bare head slope located to the west of the bridge structure; looking north.



Photo #4 - Looking north along median ditch.



Photo #5 - Looking at median ditch drop pipe Grate; note the presence of minor trash around the grate; needs to be cleaned.



Photo #6 - Looking north at the median ditch; vegetation grew in the gabion mattress



Photo #7 - Looking north from the south end of the site along the highway west side slope; note the absence of vegetation in the highway side slope near the highway surface.



Photo #8 - Looking north at the stilling pond



Photo #9 - Looking South along west side slope from north end of existing guardrail; note the presence of erosion rills on the side slope; surface flow has been eroding the slope surface; the slope should be graded along with using compost filter berms as needed to direct water into the armored ditch.



Photo #10 - Looking north along the toe of the highway west back slope; note the absence of vegetation within a strip of the highway side slope.



Photo #11 - Looking west at a quad trail on the west back slope; note the presence of erosion rills on the quad trail and stagnant water near the toe of the slope.



Photo #12 - Looking north at the first bench of the west back slope; dry bench with spots bare of vegetation.



Photo #13 - Looking north at the second bench of the west back slope.



Photo #13A - Looking north at the third bench of the west back slope; seepage was noted within the northern limit of the bench.



Photo #14 - Looking northeast from the first bench of the west back slope at spots bare of vegetation within the highway east back slope.



Photo#15 - Looking southwest at the mouth of the steeply inclined gabion channel west ditch.



Photo#16 Looking west at a raptured gabion basket within the west ditch gabion channel; back slope is likely pushing against channel walls.



Photo #17 Looking south at the west ditch gabion channel; note the growth of mature vegetation in the base of the channel.



Photo #18 - Grass vegetation from Station L0+275 to L0+050.



Photo #19 - Looking east at old erosion rill covered with grass vegetation.



Photo #20 Looking inside one of the twin culverts from the inlet location.