

**ALBERTA TRANSPORTATION  
GEOHAZARD ASSESSMENT PROGRAM  
PEACE REGION – PEACE-HIGH LEVEL  
2020 INSPECTION**



<b>Site Number</b>	<b>Location</b>	<b>Name</b>	<b>Hwy</b>	<b>km</b>
PH072	Judah Hill	Sunshine Landslide	744:04	58.154
<b>Legal Description</b>		<b>UTM Co-ordinates</b>		
NE¼ 20-083-21 W5M		11U E 483150	N 6230060	

	Date	PF	CF	Total
<b>Previous Inspection:</b>	5-June-2019	5	5	25 (Highway)
<b>Current Inspection:</b>	10-June-2020	5	5	25 (Highway)
		13	2	26 (Downslope of wall)
		11	2	22 (Slide north of wall)
<b>Road WAADT:</b>	630		<b>Year:</b>	2019
<b>Inspected By:</b>	Rocky Wang, TRANS Ed Szmata, TRANS		Don Proudfoot, Thurber Tyler Clay, Thurber Bruce Nestor, Thurber	
<b>Report Attachments:</b>	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <span style="margin-left: 200px;"><input type="checkbox"/> Maintenance Items</span>			

<b>Primary Site Issue:</b>	In May of 2013, a new landslide developed that encompassed both lanes of the highway through a side hill fill that was located at the top of a high, steep valley slope. A cast-in place concrete pile wall supported with soil anchors was constructed to buttress the section of the road affected by the landslide; the highway embankment was rebuilt with expanded polystyrene light-weight fill and the roadway was reinstated to a gravel surface under AT Contract CON0015153 in 2014. This section of Hwy 744:04 was paved with ACP in June of 2016.
<b>Dimensions:</b>	<p>The 2013 landslide affected about 100 m of highway. The landslide was about 100 m by 140 m in plan size. The backscarp was partially located in the NBL ditch and in the backslope above the highway.</p> <p>New slide area observed in 2019 approximately 50 m west of the pullout north of the pile wall: current active slide scarp approximately 15 m in width and 65 m in length in plan size.</p>
<b>Maintenance:</b>	

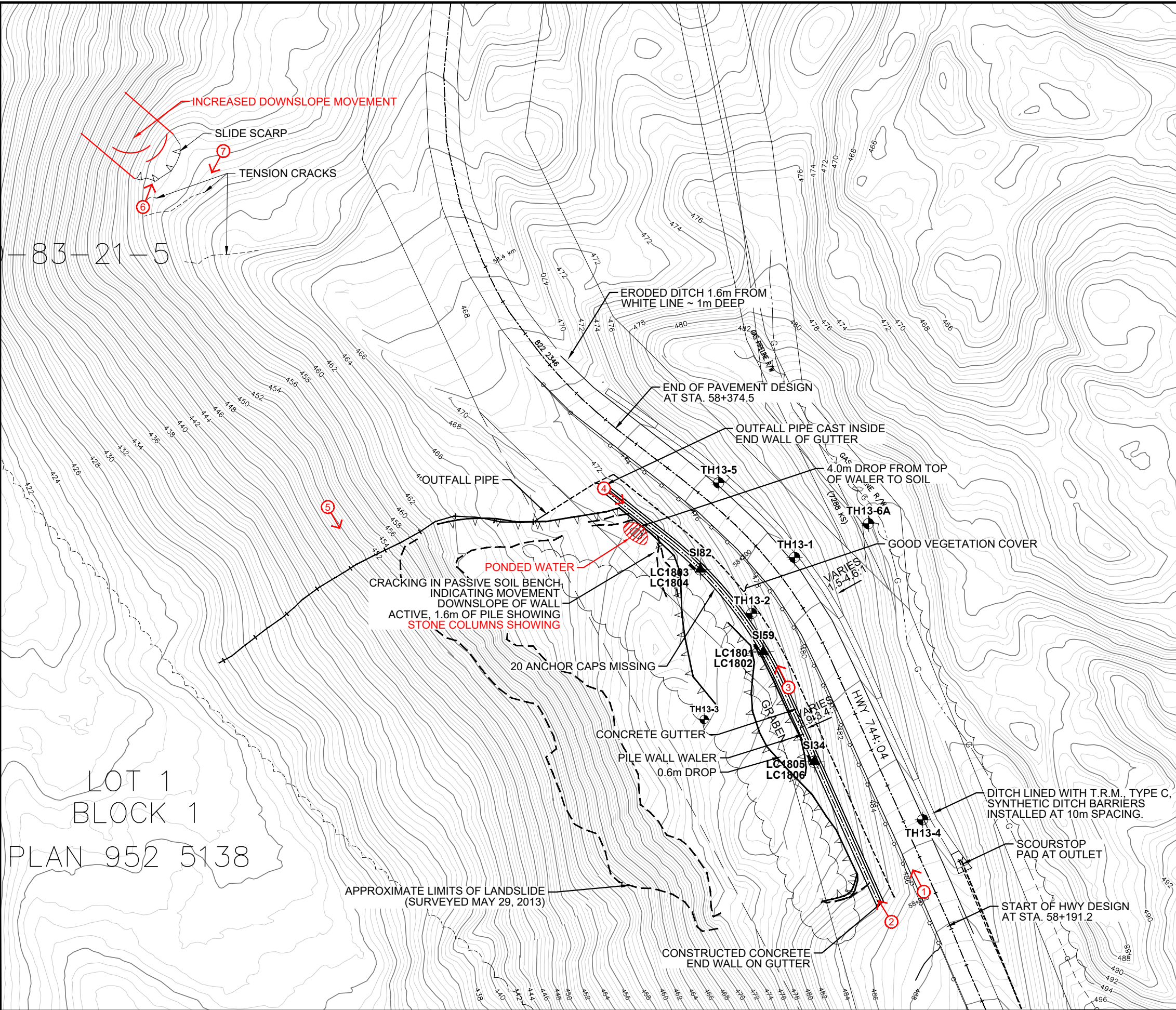
Observations:	Description	Worsened?
<input type="checkbox"/> Pavement Distress		<input type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	The passive support bench downslope of the newly constructed pile wall is showing signs of failure below the wall (Photos 2 to 4). The	<input checked="" type="checkbox"/>

	<p>cracking/ signs of visible movement in the passive soil bench below the pile wall has not changed significantly. Sliding in the lower slope appears active (Photo 5). Stone columns were visible on the soil bench at the NW side of the wall.</p> <p>Slide area (first observed in 2019) approximately 100 m northwest from the north end of the pile wall. 15 m wide scarp with tension cracks that are offset approximately 50 m from the west highway edge. No major change at the headscarp since the 2019 inspection. More movement downslope was noted. (Photos 6 and 7).</p>	
<input checked="" type="checkbox"/> Erosion	Scour was noted in previous inspections in the bottom of the NBL ditch at km 58.38 near the drain outlet. Ongoing erosion but no significant changes from 2019 condition.	<input type="checkbox"/>
<input type="checkbox"/> Seepage		<input type="checkbox"/>
<input type="checkbox"/> Bridge/Culvert Distress		<input type="checkbox"/>
<input checked="" type="checkbox"/> Other	The wall surface gutter drain periodically clogs with sediment and/or vegetation and needs to be cleaned on a regular basis.	<input type="checkbox"/>
<b>Instrumentation:</b>		
SI-34, 59 and 82	Three slope inclinometers were installed in retaining wall piles during construction. Since the final lock off the soil anchors in September of 2014, the slope inclinometers have shown about 2 mm to 5 mm of downslope movement in the pile wall. Spring 2020 movement rates are small and measure between 0 mm/yr to 2 mm/yr.	
Load Cells VC1802 to VC1806	<p>All soil anchors were initially locked off to 162 kN (0.8 of the design SLS load of 192 kN). Since their final lock off, the anchors have exhibited a slight 5 kN increase in load over the winter months, which then relaxes in the summer months.</p> <p>The battery in the datalogger was dead between November 14, 2018 to July 15, 2019 and between October 27, 2019 to June 11, 2020.</p> <p>Two anchors, VC1801 and VC1802 Installed in pile P60 near the center of the pile wall are carrying the highest load of 214 kN respectively, which is 22 kN above the design anchor service load of 192 kN. All other anchor loads are below the design anchor service load and have not measured a change above or below 5 kN in load since the previous reading (September 2019). One anchor, VC1806 within pile P34, is below the lock-off load at 138 kN.</p>	
<b>Assessment:</b>		
<p>The newly reconstructed highway embankment and supporting pile wall appear to be performing well. Recent movement observed in the passive soil bench below wall was anticipated and accounted for in the design.</p> <p>New slide area is expected to retrogress closer to the highway in the next 10 years. A new inspection site may eventually be required.</p>		

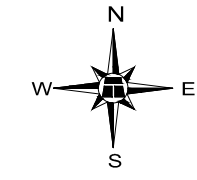
<b>Recommendations:</b>	<b>Cost</b>
New slide area should be monitored during the PH72 annual inspections or alternatively a new site should be created.	Monitoring
The slope inclinometers will continue to be read manually twice per year and the datalogger installed at the site will continue to take readings of the load cells twice daily as part of the Geohazard Assessment Program.	Monitoring
The pile wall surface drainage gutter will require to be regularly cleaned to continue to provide erosion protection for the partially buried pile wall and avoid clogging of its solid down drain evacuation pipe.	Maintenance
A small ditch should be dug to drain the ponded water from the soil bench downslope of the wall. This will help slow down the movements in the bench area.	Maintenance
The base of the NBL ditch should where a scour has formed should be excavated and rebuilt with compacted clay. Consideration should be given to placing a TRM Type C mat or a gabion mattress in the ditch to reduce the risk of further scouring.	\$25,000



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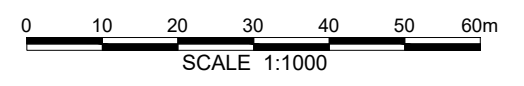



LOT 1  
BLOCK 1  
PLAN 952 5138



- LEGEND**
- SURVEYED GAS LINE
  - ESTIMATED CURRENT ALIGNMENT OF ATCO PIPELINE
  - TREE LINE
  - TREE LINE (ESTIMATED)
  - APPROXIMATE LIMITS OF LANDSLIDE (SURVEYED MAY 29, 2013)
  - NEW STRONG POST GUARD RAIL (2015)
  - GUARD RAIL
  - DIRECTION AND PHOTO NUMBER
  - SLOPE INCLINOMETER
  - TEST HOLE
  - LOAD CELL

**NOTE:**  
1. JUNE 10, 2020 OBSERVATIONS SHOWN IN RED.






**PEACE REGION (PEACE RIVER/HIGH LEVEL)  
PH072-1 SUNSHINE SLIDE**

**2020 PH072-1 INSPECTION PLAN**

DWG No. 13351-PH072-1

DRAWN BY	ML
DESIGNED BY	TTC
APPROVED BY	DWP
SCALE	1:1000
DATE	NOVEMBER 2020
FILE No.	13351



**THURBER ENGINEERING LTD.**





**Photo 1.**  
Looking northwest from the guardrail of the SBL of Hwy 744:04 at km 58.2 at the south end of the Sunshine pile wall. No signs of any damage in the ACP.



**Photo 2.**  
Looking northwest from south end of the Sunshine pile wall at km 58.200. Vegetation directly above the wall is well established. Some thicker vegetation growth noted directly below the wall relative to the previous inspection.





**Photo 3.**  
Looking northwest from below the pile wall at km 58.26. Slide in bench below wall is very active. Some piles are exposed up to 1.6 m in height (no change from 2019).



**Photo 4.**  
Looking southeast along the pile wall at km 58.33. The cracking/ signs of visible movement in the passive soil bench below the pile wall has not changed significantly. Sliding in the lower slope appears active. Water had increased ponding in graben area along the wall relative to the 2019 inspection.





**Photo 5.**  
Looking southeast at the lower slide area below the wall. Very active in lower slope.



**Photo 6.**  
New slide area (first observed in 2019) approximately 100 m NW of the north end of the pile wall. No major change at the headscarp since the 2019 inspection. More movement downslope was noted.





**Photo 7.**  
Same location as Photo 6 looking northeast at one of three tension cracks observed upslope from the slide scarp. Tension crack had a minimum offset of approximately 50 m from the highway, no change from the 2019 condition.