

Inspection note on Palzor Stadium Road Landslide, East District, Sikkim

By

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A shallow debris slide occurred in the morning of 23/04/2019 at Palzor stadium road, near Tamang monastery, Gangtok, East District, Sikkim (27°20'17.7''N and 88°36'32.8''E in Toposheet No. 78A/11). There was records of subsidence along Palzor stadium road near the landslide. Preliminary field investigation was carried out at the affected site on 24.04.2019 to assess the landslide and evaluate the causative factors.

Preliminary field observations confirmed that the Palzor stadium road landslide is characterised by a rapid to moderate sliding movement along a steep slope ($>65^\circ$) due to slope cutting for construction of a house. The slope modification during rainy season, when the debris on the slope was over saturated led to the slope failure. The landslide with 25 m width and length of 40 m is a shallow translational slide having depth of failure surface at nearly 5 m. The run out material is largely restricted by breast wall and extended up to 10 m. The landslide/subsidence is active, widening as well as advancing in nature. The area of landslide is marked by earlier subsidence zone with damaged wall. A few residential houses are located above the crown portion and periphery area might have contributed to the loading of slope. Some houses are hanging precariously due to removal of debris from their base. Hydrologically, the area is damp with few wet and dripping locations. Other damages include drainage and supply pipes. The leakage from the drainage pipes in the slope also added to the saturation of the slope material.

Geologically the area is characterised by highly weathered biotite schist of Daling Group with few quartz veins. The foliation and joint data is given below;

Foliation: $160^\circ/40^\circ \rightarrow E$

Joint Planes: J1: $250^\circ/48^\circ \rightarrow SS E$

Remedial measures: Proper provision of lined contour drain above the crown level connected to chute drains away from the affected zone needs on priority. Erection of staged gabion wall above the road level will be helpful in arresting the movement of the debris while allowing the water percolation through them. Concrete retaining wall should be constructed on valley side of road preferably on firm substratum.

The 42-point proforma for this landslide is attached.

42-Point Geo-parametric Attributes of Landslides (Causes, Remedial Measures & Others)

No	Field	Description
1	Slide No (LS .No.)	<i>State: Sikkim/District: East District/Toposheet: 78A/11/year: 2019/</i>
2	State	Sikkim
3	District	East District
4	Toposheet	78A/11
5	Name of the slide	Palzor Stadium road, Gangtok
6	NH/SH/Locality	Near Tamang Monastery, Palzor Stadium road, Gangtok
7	Latitude	<i>27°20'17.7''N</i>
8	Longitude	<i>88°36'32.8''E</i>
9	Length	<i>45m (from the road)</i>
10	Width	<i>25m</i>
11	Height	<i>40m (from the road)</i>
12	Area	<i>1125m²</i>
13	Depth	<i>5m</i>
14	Volume	<i>5625m³</i>
15	Run out distance	<i>10 meter and up to the breast wall</i>
16	Type of Material	<i>Debris slide</i>
17	Type of movement	<i>Slide/Subsidence</i>
18	Rate of movement	<i>Rapid to Moderate</i>
19	Activity	<i>Active</i>
20	Distribution	<i>Advancing and widening</i>
21	Style	<i>Single</i>
22	Failure mechanism	<i>Shallow translational</i>
23	History	<i>Date of initiation: 23/04/2019 at 5 AM</i>
24	Geomorphology	<i>The affected area is having steep slope within the urban settlements.</i>
25	Geology	<i>Weathered biotite schist with the intrusion of thin quartz vein.</i>
26	Structure	<i>Following trends have been identified in the rocks: Foliation: 160°/40° → E Joint Planes: J1: 250°/48° → SS E</i>

27	Land use/ Land cover	<i>Sparse bamboo trees within urban settlements.</i>
28	Hydrological condition	<i>Area is damp with dripping at few spots.</i>
29	Triggering Factor	<i>The area have subsidence zone below the road and the retention wall was already broken. The slope modification during rainy season caused over saturation of distressed debris material which led to the slope failure.</i>
30	Death of persons	<i>Nil</i>
31	People affected	<i>None</i>
32	Live stock loss	<i>Nil</i>
33	Communication	<i>Nil</i>
34	Infrastructure	<i>Under construction house and drainage pipe damaged</i>
35	Agriculture/forest/Barren	<i>Sparse bamboo trees within urban settlements.</i>
36	Geo-scientific Causes	<i>Unplanned cutting of slope for house construction</i>
37	Remedial measures	<ul style="list-style-type: none"> • <i>Proper provision of lined contour drain above the crown level connected to chute drains away from the affected zone.</i> • <i>Erection of staged gabion wall above the road level.</i> • <i>Concrete retaining wall should be constructed on valley side of road preferably on firm substratum.</i>
38	Remarks, if any	<i>Under construction house water pipes were damaged</i>
39	Photos. Sketch of Plan & section of the slide	<i>Attached with the Preliminary note.</i>
40	Summary/Abstract	<i>Attached with the Preliminary note</i>
41	Pdf	<i>Nil</i>
42	Landslide Category	<i>Type-III</i>