LANDSLIDES NEAR PEORIA*

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As most people associate landslides with mountainous, hilly, or rugged country, and as most of them also seem to be imbued with the misconception that Illinois is nothing but a flat, monotonous prairie, the statement that in this State landslides are very common generally occasions some surprise. Only those who through bitter experience have learned otherwise and those who have actually studied landslides appreciate fully the true situation. Despite the fact that landslides are common and do frequently present troublesome problems, they are not serious and possess no great potential dangers in Illinois. However, the prevalent false idea that they are non-existent engenders utter disregard, and this in turn does pave the way for preventable disasters.

The walls of the valley of Illinois River constitute an admirable locale for landslides, and in the vicinity of Peoria, where the Pennsylvanian system of rocks crops out and is overlain by glacial drift, landslides are numerous.

A particularly troublesome one occurs about two miles north of Sparland, about thirty miles north of Peoria. At this locality the material in the valley walls has been moving intermittently for a long while. The Chicago, Rock Island, and Pacific Railway, which runs along near the foot of the bluff, has been realigned several times at this place, and the total amount of its displacement is approximately twelve feet, as determined by comparing its present position with that of the original ballast. The telegraph poles have also been moved out of their original alignment.

When the State Bond Issue Highway Route No. 29 was constructed along the west side of Illinois Valley, it too crossed the landslide under discussion. The slab was not in position long until about two hundred feet of it was disturbed and cracked by the movement of the landslide and eventually it was disrupted, depressed, and moved out of line about five feet so that even when resurfaced it can be safely traversed at only slow speed.

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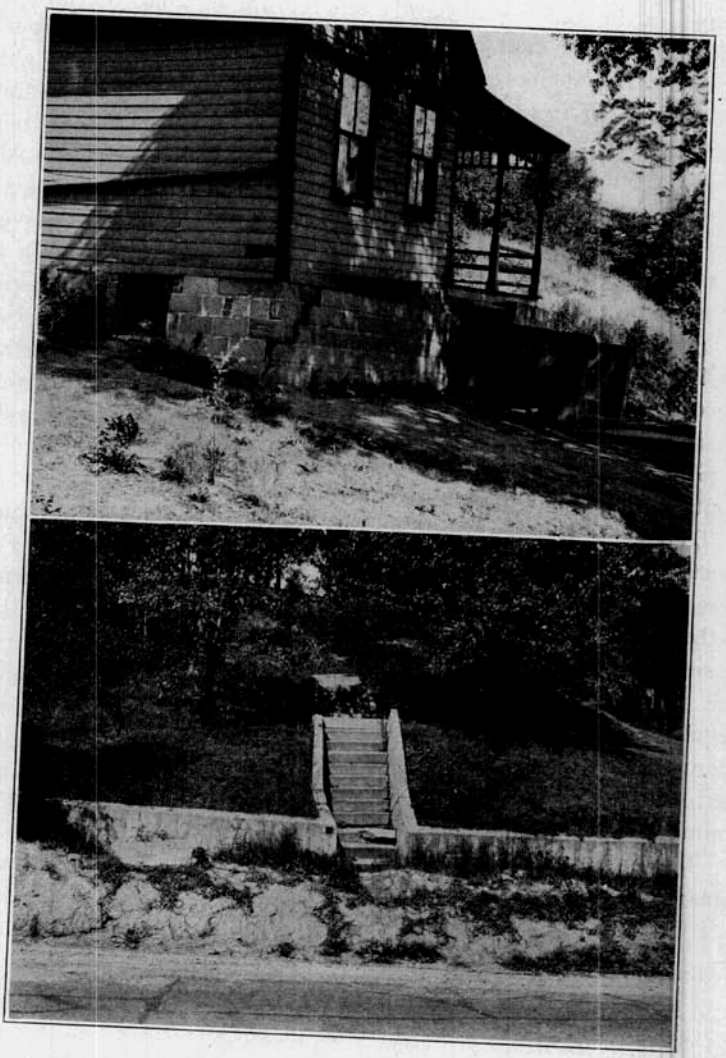

FIG. 1. *(Above)* Foundation of a house disjointed and displaced as a result of landslide movement. Note the tilted steps and handrail and the distance the foundation has settled away from the porch at the right-hand corner.

FIG. 2. *(Below)* Steps broken and dislocated by landslide movement. The house that formerly stood here had to be moved away on account of the same landslide movement. Note also cracks in the wall and in the pavement in the foreground.

A slightly depressed flat about 150 feet long and 50 feet wide developed in the valley-wall hardly ten feet higher than the pavement. Behind the depression there was exposed a sandstone layer about ten feet thick. The depression was wet and marshy, apparently fed by water seeping out from beneath the sandstone. Above the sandstone is another small flat in which there is minor seepage, and behind it there is a "bluff" about five feet high in which coaly shale is exposed. Above this there is another poorly developed flat, backed by a steep slope about thirty feet high in which silty or sandy shale is exposed. Above the silty shale is another poorly developed flattish zone, backed by a steep slope about forty feet high in which thinly bedded sandstone is exposed.

Depressions or flattened shelves alternating with slopes occur along the valley-wall for several hundred feet south of the location described. At one place particularly there is a long depression with a pressure ridge in front of it. The entire valley wall is a maze of depressions, low ridges, and slopes. Water stands in the depressions so that vegetation flourishes and contributes further to the maze.

The conditions described at this locality north of Sparland are almost duplicated at Bartonville, a few miles southwest of Peoria. There are practically no outcrops by which the strata can be determined, but there are two major horizons along which seepage and marshy depressions occur, and these are believed to be the same as those at Sparland. Everywhere the slope exhibits "eye-brow" landslips and the irregular alternation of arcuate ridges and crescentic depressions typical of landslide topography. Houses and other buildings on the slope have tilted and their foundations, the sidewalks, the pavement, and the retaining walls have been disrupted by the landslide movement (Fig. 2).

The strata at Sparland are correlated as follows:[1]

	Thickness in feet
Pennsylvanian system	
Gimlet cyclical formation	
Basal sandstone	40±
Sparland cyclical formation	
Farmington silty and sandy shale	30±
Black laminated shale	1±
Coal, No. 7	4±
Underclay, very plastic at top	0–6
Copperas Creek sandstone	10±
Brereton cyclical formation	
Shale	2±
Limestone	0–?
Black laminated shale	1±
Coal No. 6	0–3
Underclay	?
Sandstone	10±

[1] See H. R. Wanless' article, pp. 331-340.

The same strata are reported in the vicinity of Bartonville.[2]

The sandstones and coals are relatively pervious strata sandwiched between less pervious beds, so that the contacts between each sandstone and the underlying shale and between each coal and the underclay are potential horizons along which ground water may accumulate and seep out at favorable exposures. The contact of the glacial drift and bedrock is another potential horizon of seepage. The major seepages and consequent slumping both at Sparland and at Bartonville are believed to occur respectively at the base of the sandstone basal member of the Gimlet cyclical formation and at the base of coal No. 7. The disastrous sliding, which disrupts the pavement and other structures at both localities, is believed to occur in the combined shale and underclay zone between the Copperas Creek sandstone and the sandstone below coal No. 6, respectively the basal members of the Sparland and Brereton cyclical formations.

The ground water that seeps out at the contacts of the more porous above the less porous strata runs down over the surface and softens the clay and shale below it and also the talus already accumulated at the lower part of the slope. The softened, weathered clay and shale becomes plastic and may flow and slump if there is sufficient water. It has a low angle of repose and its equilibrium is easily disturbed. Thus the slips and slides are created. The overlying strata and talus may even slide bodily over the shale and underclay members when the latter are softened and lubricated by excess water.

The only real cure for these slides is drainage. However, it would be necessary to lay drains along each potential horizon of seepage and at the exact line and carry the water down the slope wherever there was a dip in the contact. The depressions would also have to be drained, and surface water would also have to be drained away. A system of drains sufficient for these purposes and the labor in determining the precise location for them as well as in laying them in talus material would be so expensive that the cost of drainage seems prohibitive. The most practical advice is to avoid such locations when considering construction of any kind.

[2] Udden, J. A., The geology and mineral resources of the Peoria quadrangle: U. S. Geol. Survey Bull. 506, pp. 31-44, Pl. I. 1912.