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Road Building and Landsliding on the Cincinnati Hillsides

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Columbia Avenue in 1930 will soon become Columbia Parkway after it is widened. Photo illustrates early "cut and fill" method of construction in association with a large landslide.

The Mill Creek and Ohio River valley walls hemmed in the early settlement of Cincinnati. Shortly after the settlement of Cincinnati in 1788 crude earthen roads were cleared and constructed up the hillside. Natural resources located on and above the hillsides became vital to the early growth of Cincinnati serving as a source of lumber, building stone, and agricultural land. Daniel Drake (1815) gave early evidence of the reliance on the local resources reporting that wood was the "chief article of fuel" and obtained from the "surrounding hills".

Road building was the first "cut and fill" human activity on the Cincinnati hillsides that can be associated with landsliding. Typical road building efforts involved "cutting" the up slope side of the road bed and "filling" the down slope portion of the road bed with the cut material. The road "cut" over steepened and removed lateral support for the up slope soils and the filling in of the down slope portion of the road unnaturally loaded the hillslope. Cut and fill activity associated with transportation routes have led to numerous landslides with and without engineering input (prior to 1990).

The City of Cincinnati attributed the bulk of the city's landslide remediation projects to pre-1940 roadways with improper embankment construction. Further, in 1873 the State Geologist, Edward Orton made a statement in reference to the colluvial hillslope and the underlying Kope shale:

"These shales have scarcely tenacity enough to hold their place in steep descents when acted on by water and by ice; still less when they have been removed from their original beds, can they be made to cohere; and they thus form treacherous foundations for buildings erected on them or for roadways constructed in them."

On the western side of the Mill Creek valley in lower Price Hill the pre-existing natural drainage pattern was substantially altered due to road construction. The early roads traversed the hillslope on a diagonal as a direct path up the hillslope was impractical due to the steep nature of the natural hillslope. These early roads acted as collectors of surface water, concentrating and intercepting the natural flow of the hillside

runoff and allowing saturation of the hillside due to scarification. This has important implications for hillside stability as excessive ground water introduced into the hillslope can trigger and accelerate creep and landsliding.



Lehman Road, constructed around the early 1800's, currently being improved along 1700 feet of roadway at a cost of \$1.3 million.

Lehman Road located in Price Hill on the western side of the Mill creek valley may have existed as early as 1805 affording the Lehman family access to their property on the hillside. Prior to 1800, there may have been an access trail near the present day Lehman Road as the first Ohio president, William Henry Harrison, had a hunting lodge above Lehman Avenue. Lehman Road has a history of instability and today is being improved at a cost of 1.3 million dollars with the placement of 199 piers.

The Warsaw-Waldvogel Viaduct in Price Hill located just below Maryland Avenue initiated a deep landslide in the 1950's when it was constructed. Monitoring equipment shows the deep landslide is still moving today. Expansion joints on the viaduct bridge decking have to periodically be replaced as the expansion joints close up.

Paper streets on the hillslope are prevalent on the present day Cincinnati plat maps and represent early attempts at road building. Rudolph Avenue (paper street) in Price Hill shows up on several maps dating from the 1800's. However, today Rudolph Avenue is indistinct for most of its length, except for a well-defined level topographic bench representing the last remnant of the roadway. Approximately 85% of street has become indistinct due to ground movement. Old roadbeds become loci for landsliding due to cut and fill activity.

Landsliding in Cincinnati, Ohio has been a long standing problem and will continue to be because of past human activity and future activity that continues to disrupt the fragile equilibrium of the colluvial hillslope. Through out Cincinnati's history, construction activity related to transportation routes can be strongly associated with landsliding. Other types of transportation routes associated with the destabilization of the hillslope include railroads, tunnels, inclines, canals, etc. Some early road building efforts are still driving landslides today. Presently, hillside roadway embankments are being stabilized while the landslide continues to move below the roadway. For economic reasons many of these early landslides have not been stabilized. *This is part of the Cincinnati legacy.* Source: www.OhioValleyLandslides.com ©2007 Tim Agnello