MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

RESEARCH SUMMARY

HIGHWAY ROCKCUT INVENTORY AND FAILURE POTENTIAL, ALLEGANY COUNTY, MARYLAND

WHAT WAS THE NEED?

MDOT SHA highways of Allegany County, Maryland pass through inclined bedrock of varying compositions. These rock cuts consist of changing steepness and weathering levels that provides potential failure susceptibilities for rockfall, rock roll, rockslide, or slumping. Slope instability and bedrock failures can enter the roadway travel lanes presenting substantial hazard to drivers, and expense and liability to roadway agencies. To better understand the inherent risks of slope failure in these rocks SHA contracted the Maryland Geological Survey to conduct an inventory of State-maintained road cuts in Allegany County, recording various metrics of intrinsic and extrinsic slope characteristics.

WHAT WAS THE GOAL?

The objective of this study was to conduct an inventory to assess rock cuts of MDOT SHA-maintained roads in Allegany County, Maryland. These inventory metrics will provide a baseline for future slope monitoring. The insights gleaned from the inventory helped assess their geologic and topographic character and the risks for slope failure.

WHAT DID THE RESEARCH TEAM DO?

One hundred and ninety-five rock cuts on MDOT SHA-maintained roads were located and inventoried. One hundred and eighty-nine of these rock cuts were located in Allegany County, while 6 were located in adjacent Garrett County. Inventory data was collected digitally using ESRI's Survey123 application on an iPad. Data acquired at each location included

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geographic coordinates, general description of slope, climate, and vegetation; and geologic character including bedrock failure planes, differential erosion, and rock type and orientation. Site location was determined by iPad GPS within Survey123, slope measurements were taken with a laser range finder, and bedrock and failure plane orientation were determined using a Brunton compass. A drone was used to obtain visible and infrared light imagery along MD 135 near Westernport, and at two locations on MD 51 near Spring Gap, to detect water and allow inspection of the upper slopes at these sites.

One of the main goals of the survey was to assess each road cut as to its potential for slope failure. Four types of potential slope failures were identified during the study: rock fall, rock roll, rock roll, and slump/rotation (Figure 1).

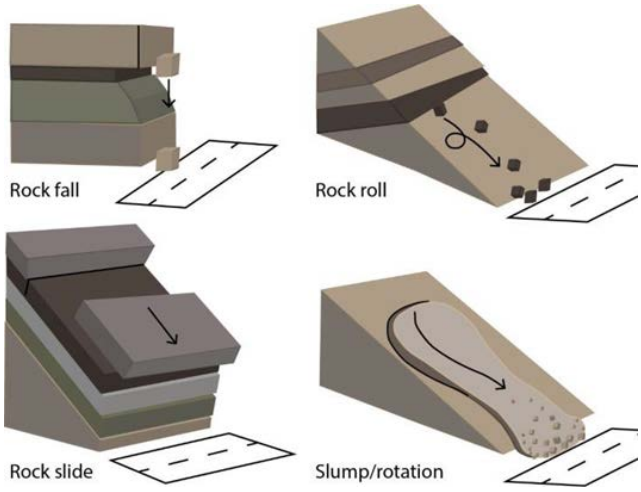

Figure 1. Types of slope failures utilized.

WHAT WAS THE OUTCOME?

The four types of slope failure identified (rock fall, rock roll, slides, and slumps) differed in numbers and prominence based upon four geologic factors (Figure 2). The main geologic factors creating potential slope failure are stratification, rock type, fracture character, and differential erosion.

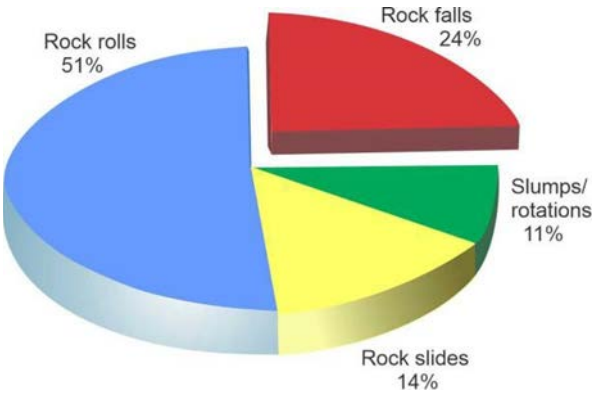

Figure 2. Percentage of potential slope failure types determined from this study.

HOW WILL MDOT SHA USE THE RESULTS?

MDOT SHA's Office of Materials Technology (OMT) will use the data collected in this inventory to help calculate an overall hazard score for each site, prioritize stabilization work, and continue monitoring over time. The procedures employed herein can be used as a template for future data collection by SHA.

LEARN MORE

To view the complete report, click here.