

## **A Geomorphology-based Model for Vulnerability Assessment of Slopes in MnDOT**

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Slope failures can cause safety hazards to the public, damage roads, and be costly to repair. For example, a rainy season in June 2012 in Minnesota caused slope failures along MN Hwy 210 that cost approximately \$21.3 million dollars to repair. A current funded research project in MnDOT is looking into the development and implementation of a slope vulnerability assessment tool to assist engineers to proactively identify and mitigate slope risk along interstate highways.

The proposed geographic information systems (GIS) model uses the geomorphology of the site among other key parameters to provide a vulnerability rating score. Furthermore, the proposed model accounts for all failure types unique to varying geographic regions. During the development stage of the model, vulnerability factors including slope, terrain curvature, depth to groundwater, proximity to rivers and bedrock outcrops were statistically tested using multi-variate regression analysis. Developed GIS model has been validated with historical slope failure sites. MnDOT intends to use this model to enhance risk-based asset management decision making from project scoping to long range planning.