UNIVERSITY TRANSPORTATION CENTER

RESEARCH BRIEF

PROJECT TITLE: Quantifying Impact of Rockfall on Mobility of Critical Transportation Corridors

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INSTITUTION: MULTI-INSTITUTION PROJECT
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Background

Critical transportation corridors are essential for community well-being, resilience, commerce, and tourism. The mountainous states of Alaska, Washington, Idaho, and Oregon rank among the top five states by topographic relief, with transportation corridors located in areas of significant geohazards. These hazards include landslides, rockfall, debris flows, frozen debris lobes, or slope instability due to thawing permafrost. Rockfalls and rockslides recently closed major highways in Alaska, Washington, and Oregon.

During road closures, motorists and freight traffic are required to utilize limited, significantly lengthier alternative routes, which quickly become congested with increased traffic safety and efficiency. Moreover, mitigation, maintenance, and repair can take weeks to months.

Understanding the frequency and magnitude of geohazards affecting transportation is the goal of this research. We are building a practical, data-driven framework to assess the impacts of rockfall and debris slides on highway mobility. This data and framework can aid planners, engineers, and managers with tools to make better-informed, quantitative decisions regarding mitigation and potential closures for repairs and maintenance.

Research Project

Specifically, we are working towards the following with our data-drive framework:

Rockfall Impacts on Mobility (RIM) database focused on the quantification of mobility impacts from rockfalls. Utilizing data-mining techniques, we are building a database of unstable slopes. Data sources include historical records and trending news. Important to this database is mobility information such as closure times or mitigation strategies (rerouting).

Develop fragility curves relating rockfall and debris volume with closure times. The risks that rockfall pose to mobility of critical corridors will be established through the development of fragility curves relating rockfall debris volume and highway closure and detour times using data available from cooperators at ODOT, WSDOT, and AKDOT.

Assess the effectiveness of slope mitigation techniques quantitatively and rigorously. In previous PacTrans research, we developed detailed morphologic databases for sites that have been mitigated, and those adjacent sites that have not. Standards for mitigation techniques, such as “scaling” are often implemented and performed based on subjective judgement. Closure during these mitigation efforts can significantly impact mobility.

The data-driven approach will incorporate site data and mitigation strategies on corridor closures and impacts. This framework will provide planners with the necessary tools to make better-informed, quantitative decisions about mitigation and potential closures.

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