

## 5.2.1

### Using GIS to evaluate the risk of truck impact hazards for overpasses

#### **Presenter**

**Zhao Shen**

Research Assistant  
South Dakota State University  
zhao.shen@sdstate.edu

#### **Co-Presenter**

**Xiao Qin**

Assistant Professor  
South Dakota State University  
Xiao.Qin@sdstate.edu

In recent years, the oil boom in North Dakota and accelerated economic recovery has substantially increased freight activities on the state's highway system in South Dakota. A great amount of the increased traffic is heavy vehicles. The surge of heavy vehicles escalates the probability of the collision between trucks and bridge columns. In spite of extremely low odds, this kind of collisions can lead to catastrophic structural failures for the majority of overpass bridges on South Dakota interstate highways designed and constructed in early years, did not meet the requirements of the latest AASHTO-LRFD Bridge Design Specifications. It is essential to identify the vulnerable infrastructure at critical location and develop appropriate mitigation plans.

In this study, every overpass bridge on I-29 and I-90 will be surveyed using GPS equipped devices such as portable GPS units. Bridge location and condition information will be assembled using GIS technologies along with other business data such as bridge construction plans, bridge images, traffic and crash data. The data interfaced with GIS will provide a powerful presentation of at-risk locations and facilitate the development of a risk index of truck collision with bridge columns. Furthermore, GIS based network analysis tools will assist in calculating the road user costs associated with detour as a result of bridge collapse, a significant factor of quantifying the consequence of impact hazard.

In summary, the study is expected to develop a truck collision risk index for assessing existing and future bridges, provide the SDDOT with current risk scores for all the interstate highway overpasses, and assist DOT in preventing or mitigating any catastrophic social-economic losses due to bridge collapses.

#### **Bio(s):**

Mr. Shen is a graduate research assistant in the Civil and Environmental Engineering at the South Dakota State University.

Dr. Xiao Qin is a Civil and Environmental Engineering Assistant Professor at South Dakota State University. Research interests are traffic operations and safety, statistical modeling/application in transportation, and GIS/GPS application and spatial data.