Transportation Network Assessment Tool for Hazardous Materials Cargo Routing: Health Risk, Delay Cost and Trucking Cost
Bahareh Inanloo¹, Advisor: Dr. Berrin Tansel¹

Background and Objectives
As a result of the highway crashes involving hazardous material shipments, societal cost of the impacts are estimated to be over $1 billion per year.
The objective of this study are to:
- Identify vulnerable segments of the transportation network for carrying hazardous materials.
- Investigate transportation networks in regards to different criteria, such as: trucking cost, health risk and cost of delay.

Materials and Methods
- Gaussian air dispersion model was used to assess the health risk followed by gasoline release of a tanker truck caused by an accident.
- ArcGIS paired with Python programming was used to estimate the health impact, travel cost and delay cost through scripting.
- Queuing approach employed for delay calculation.

Results
- Atmospheric condition (stability class) was identified based on the solar radiation and sky cover data maps according to the location of each road segment.
- Delay cost was calculated for each segment according to the data on the number of lanes, class of road, traffic volume using Python scripting.
- Trucking cost was identified based on the length of the segments.

Conclusions
1. The output network by this study can be used to establish a hazardous martial truck allowed segment network for cities and counties.
2. The proposed method and the output network is sensitive to the data and is location based, also is capable of modeling different chemicals other than gasoline.
3. The result of this study can be employed in decision making process to efficiently reroute hazardous material cargos to the paths with less environmental risks and less population involved, as well as, less delay cost and possibly less travel cost.
4. Based on the results, the cargo transport can be rescheduled, so that, not only the best route is identified but also the best time for the cargo to be transported be determined.

Acknowledgements
Funding for this research has been provided by Southeastern Transportation Research, Innovation, Development & Education Center STRIDE, University Transportation Center of University of Florida.