

Post-Disaster Management of Freight Transportation Networks Phase 2

A proposal to:

**FedEx Institute of Technology (FIT) and the
Intermodal Freight Transportation Institute (IFTI)**

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RESEARCH JUSTIFICATION

The Memphis Metropolitan Area (MMA) is a major intermodal transportation center. A major disaster such as an earthquake, hurricane, flood, or man-made hazard can have significant direct and indirect impacts on local, state, and national economies. The Memphis area transportation system relies heavily on numerous bridges many of which are old and in desperate need of retrofit. Furthermore, many bridges in central United States are inadequately designed to resist seismic loading.

Therefore, it is critically important to the post-disaster economic sustainability and recovery of the region to develop a post-disaster freight transportation model of the MMA. Using a geographic information system (GIS) incorporating estimates of hazard impacts on the transportation system and temperature-controlled logistics services demand (cold-chain logistics) a freight transportation model could identify deficiencies in the transport network and provide alternative re-routing for freight traffic. A viable freight transportation system, responsive to information and conditions on the ground after a disaster, could provide information to reduce the economic impact on the freight transportation system and help evaluate supply chain strategies for improving operation efficiency of the transportation system. This project will also provide invaluable information about the MMA bridge infrastructure which will be a focus of the new presidential administration.

Modeling the freight transportation system with a GIS can provide an accurate and timely methodology to evaluate and manage the MMA network. For example, timely assessments of the effects of local and regional hazards, such as transportation disruptions due earthquakes, flooding, or other manmade conditions on the network, would provide vital information to estimate critical freight transportation network characteristics such as the condition and accessibility of roadways and bridges. With information on the effects of hazards collected in a GIS and key transportation performance indicators estimated, critical routes within the system could be evaluated and re-routed if necessary to accommodate vehicle and driver capabilities, transportation network restriction (identified and assessed postdisaster), and customer demands.

In a post-disaster environment, a freight transportation network model could provide possible detours for freight traffic movements. In addition, this network model could be utilized as a framework for developing and implementing innovative multi-hazard strategies and methods for rapidly assessing economic impacts on temperature-controlled logistics services.