

Multi-Modal Freight Transportation System Capacity and Diversion Assessment

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Transportation research activities at Vanderbilt University are facilitated through the Vanderbilt Center for Transportation and Operational Resiliency (VECTOR). VECTOR's mission is to improve the quality of life in our community, region, and nation through leadership and excellence in transportation research, education and outreach, using all of the resources of the university and strong partnerships with government and industry. Our work is governed by a commitment to objectivity, innovation, quality, timely delivery of cost effective results, and responsiveness to our stakeholders.

Facilities resident at Vanderbilt and within VECTOR are ample to support the proposed research. This includes state-of-the-art computational resources as well as access to GIS data/software and other information technology tools. Of particular note is Vanderbilt's relationship with ESRI, arguably the leading GIS platform developer worldwide. Through this agreement, VECTOR has access to the entire ESRI library of data and tools, as well as the availability of technical support, when needed.

Project scope and expected results. Tennessee's economic health relies heavily on the timely and efficient flow of commodities which is governed by a multi-modal freight transportation system. There is growing concern regarding the ability of such an interconnected system to withstand disruptive events and maintain the necessary level of commodity flow to support the economy and mitigate cascading impacts. Ideally, multi-modal transportation systems should provide redundancy in the network of freight movement to ensure effective diversion in the event of a disruption to one or more modes. Added complexity is introduced due to emerging interests in expanding commuter rail service by utilizing portions of the freight rail network. A case in point is the mobility challenge facing middle Tennessee, where the passenger rail option may be constrained by the nearly maximized capacity of CSX freight lines. These circumstances beg the following questions:

- 1) To what extent is the freight system in Tennessee operating at or near full capacity?
- 2) How does that impact the performance of freight transportation and opportunities for passenger rail service?
- 3) How capable is the system for handling freight diversion in the case of disruptive events?

The research will focus on a data-driven, comprehensive analysis of multi-modal freight system capacity to understand the system's capability to: 1) serve the anticipated demand for freight (and possibly passenger) traffic and 2) be able to accommodate additional commodity flow in the event that diversion is needed. Multiple data sources will be considered, including information maintained by TDOT, various agencies with the U.S. Department of Transportation, the U.S. Army Corps of Engineers, Bureau of the Census, and a variety of industry associations. The geographical focus will be the middle Tennessee region, a logical candidate with the area serving as a key east-west and north-south corridor, housing the third-largest switching hub in the CSX network, and experiencing considerable population and business growth. The first year will focus on developing and applying the methodology in the middle Tennessee area, with the anticipation that the work can be extended to include the entire Tennessee freight system as a future project expansion. The deliverable of this research will be a report that provides an assessment of current system capacity, as well as an indication of the challenges and opportunities TDOT and its partners face in providing an improved and sustained multimodal transportation system under anticipated conditions.