Project Name: A guidebook for freight transportation planning

Project Topic: Use of GPS based databases to enhance freight transportation planning

Project Description: Freight transportation planning is largely limited by the amount, quality and detail of truck trip data. Most truck movement data is reported at the inter-county level and is represented as aggregated tonnages that must be broken down to truck trips. Additionally, intra-county flows can be largely under-represented and commercially available commodity flow databases are prohibitively expensive. Surveying truck drivers (such as at truck stops or at terminal gates) and following trucks from terminals is time-consuming and requires a great amount of labor to geocode the trip origins and destinations. Truck trip traffic generated from these aforementioned sources relies on outdated and insufficient traffic generation data and models, shortest path algorithms and spot counts and the results are seldom validated. The proposed research is designed as a one year project and will develop a guidebook of how data from a tool can be developed to be utilized in long term transportation planning and operational transportation strategies in the State of TN. More specifically the proposed guidebook will develop methodologies, which utilizing data to achieve the following:

- Develop performance measures for transportation facilities and evaluate investment options.
- Provide key indicators of performance for freight intermodal terminals in TN;
- Develop maps with travel times and flows for intercity truck traffic;
- Determine Tennessee’s primary truck freight trading partners in the U.S. by zip code, along with the primary corridors that support these linkages;
- Analyze Tennessee’s truck corridors with a particular focus on travel times, flows and intracity truck traffic

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Project Name: FRATIS (Freight Advanced Traveler Information System)

Project Topic(s): Various topics which include: History of the C-TIP project revolving into FRATIS, a lesson in public / private partnerships, lessons learned, discussion on the three different pilot programs, technology component current and in the future, and future projects (or next steps) across the country using FRATIS as a starting point.

Project Description: Improving the efficiency of goods movement in and through an urban core is a high-priority for the U.S. DOT. The Freight Advanced Traveler Information System (FRATIS) is a bundle of three transformative applications that will provide operational solutions to this pressing issue. Being developed by FHWA and the Intelligent Transportation System Joint Program Office (ITS JPO), and in concert with the business community, the three applications are: (1) Freight Real-Time Traveler Information with Performance Measures: enhances traveler information systems to address specific freight needs and increase their use and effectiveness. (2) Drayage Optimization: Optimizes drayage operations so that load movements are coordinated among freight facilities – maximizes productive moves and seeks to eliminate unproductive ones. (3) Freight Dynamic Route Guidance: Utilizes real-time traveler information assets to provide best route options between freight facilities for carriers.

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Project Name: The Mid-America Freight Coalition (MAFC) Regional Freight Study (RFS)

**Project Topic:** Freight Corridor Development & Economic Competitiveness

**Project Description:** The Mid-America Freight Coalition (MAFC) Regional Freight study (RFS) is designed to address rapidly changing economic, logistics, and transportation policy and infrastructure issues in a multi-modal, multi-state approach that maximizes the economic benefit from the region’s freight transportation and logistics network. There are three broad trends that have amplified the relevance, need for, and timeliness of the MAFC RFS. First, there has been an increased awareness of freight transportation as a distinct user segment in transportation development and operations. Second there has been an elevated awareness of the relationship between economic development and jobs, and freight transportation quality and service. And third, both of these factors have in part, driven the development of the freight initiatives in MAP-21, for the first time placing a national freight policy in legislation.

An outcome of the RFS will be the identification and classification of highway corridors at the national, regional and rural scale. While national corridors are to be identified by MAP-21, the regional corridors will take into account emerging industries and new flow patterns that have emerged since the recession, including strategic industry initiatives in anticipation of Panama Canal expansion. Regional corridors, which by definition span more than one state, will serve as the framework for future economic development and collaboration among State DOTs and MPOs.

**PI/UTC:** Teresa Adams - UW-Madison

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Project Name: Evaluating the Hours-of-Service rule via GPS truck trip data

**Project Topic:** Truck Transportation

**Project Description:** Recently a number of new hours-of-service rules have been introduced by the Federal Motor Carrier Safety Administration, US-DOT that has produced some controversy. HOS rules address the number of hours that a commercial motor vehicle (CMV) driver may drive and be on duty before rest is required. The HOS rules also define a minimum amount of time required before a driver may return to duty and the total number of hours he may be on-duty in a week. To evaluate the effects of the new HOS rules the USDOT performed a study and results of the study are detailed in a report published December of 2011. The report presents a cost/benefit analysis including costs to the industry by the new HOS rules and benefits from accident and fatality reduction as well as the health benefits/costs the new rules will have. Although the report is quite extensive in its literature and methodology it does not address the issue of increased congestion that the new HOS rules may result. The objective of this project will be to propose a methodology to model the effects of the new HOS rules and perform a qualitative and quantitative analysis of any congestion and environmental effects. Although the report by USDOT already performs a cost/benefit analysis the research team will investigate if additional efforts in that direction with the new results from this study can be proven beneficial.

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Project Name: Mining Automatic Identification Systems (AIS) Data for Improved Vessel Trip Analysis Capabilities

Project Topic: Using AIS data to increase operational performance measures of the Great Lakes and Inland Waterways fleet and port infrastructure facilities.

Project Description: Automatic identification systems (AIS) provide communication between vessels and assist vessel traffic control functions in congested ports, locks and waterways. Vessels digitally broadcast information, including position, call sign, vessel name, course, speed, and navigation status. Publicly available waterway trip data is aggregated to protect business confidentiality of shippers. However, the level of aggregation renders the data unusable for a variety of applications, including waterway congestion, demand and risk analysis. CFIRE researchers at the University of Toledo (UT) and Vanderbilt University (VU) have independently conducted research into collecting and analyzing AIS data on the Great Lakes and inland waterways, respectively. The work completed by these researchers has demonstrated the feasibility of using shore-based AIS receivers to acquire, archive and analyze data on vessel movements. The integration of relational database management systems (RDBMS), geographic information systems (GIS) and custom software routines is a powerful combination of technology that is capable of leveraging the AIS data. This project will develop a methodology for processing AIS data from multiple sites in near real-time as well as develop a capability to support ad-hoc data query. Such analyses can identify high-risk and high-traffic locations, generate better travel time estimates, detect vessel arrivals, identify key traffic areas for investment and enhancement, enable terminal operators to better manage their operations, and in general lead to a better understanding of vessel traffic within a given area. Benefits of AIS automation include increased levels of information regarding boat location and trajectory which supports safer waterway operations, more efficient lock operation and lead times, and increased shipping efficiencies as waterway traffic is better understood and managed. Key research tasks include installing additional shore-based AIS antennas at strategically selected Great Lakes and inland waterway locations, and developing the server and database management system that can quickly receive and process the data from multiple sites.

PI/UTC: Principal investigators: James P. Dobbins (Vanderbilt University) and Peter S. Lindquist (University of Toledo)
Other researchers: Richard Stewart (University of Wisconsin-Superior) and Samir K. Dhar (University of Toledo)
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Project Name: Making Freight-Centric Communities More Livable: Measuring the Impact of Advanced Technologies

Project Topic: Communities that attract or retain industrial viability are considered less livable, but reducing, limiting, or mitigating freight operations have direct, measurable economic impacts. This research will measure benefits of advanced technologies and practices to safely blend freight with passenger, transit, bicycle, and pedestrian traffic including Safe Routes to School. These technologies could mitigate a community’s safety, noise, and environmental concerns and accelerate implementation of improved practices.
**Project Description:** This research involves scenario-based analyses to evaluate quantifiable livability benefits of adopting these technologies. Advanced technologies such as ITS, intersection management, dynamic mobility, dynamic route guidance, and drayage optimization will be reviewed for application suitability. As a case study, a selected subset of advanced ITS technologies will be applied in the Memphis area and evaluated for their sustainability, cost effectiveness, transferability to other regions, and safety impacts.

CFIRE partner institutions bring different research experiences and strengths that coalesce in the proposed research including cutting-edge modeling approaches in simulating the behavior of many elements of the freight transportation system, designing ITS travel information systems, and using GIS and related information technologies. Additionally, the Federal Highway Administration has shown a strong interest in using Memphis as a test bed for evaluating the application of advanced technologies to improve the efficiency of freight movement in an urban environment.

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**Project Name:** Enhancing Rail Connectivity to Underserved Rural Communities

**Project Topic:** Short Line railroads

**Project Description:** This research will identify the actions, practices, and policies needed to attract, continue or expand adequate short-line and or Class 1 and regional rail service to rural communities. Factors to be considered will include identification of the infrastructure needs for retaining or expanding viable rail operations, potential markets and market development approaches to support rail connectivity, beneficial operational characteristics, institutional, policy, program and incentives that have been successful used to attract and retain rail service. A number of factors (safety, shipping costs, roadway maintenance, pollution and congestion, business sustainability) will also be identified that offer benefits to the local communities and support livability, safety, sustainability and economic development opportunities from efficient operations of short-line railroads.

**PI/UTC:** Principal Investigators: Martin Lipinski and Mike Golias, University of Memphis

Other Researchers: Mike Anderson (University of Alabama – Huntsville), Richard Stewart (University of Wisconsin – Superior), Chad Miller and Tulio Sulbaran (University of Southern Mississippi)

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**Project Name:** METROFREIGHT

**Project Topic:** City logistics and urban freight

**Project Description:** 5-year Center of Excellence funded by the Volvo Research and Education Foundations with research, education and workforce development components focusing on freight movements within and through urban areas (last mile/city logistics) and gateway regions (ports, airports, intermodal centers). Project is based in Southern CA (METRANS) with partners in New York, Paris and Seoul. Research includes case studies of small package carriers in all four partner regions.

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