

# RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: 1st

Wisconsin Department of Transportation  
DT1241 2009

| <b>Research, Development and Technology Transfer</b>   |   |
|--|---|
| <b>Program:</b> (Choose One)   |   |
| <input checked="" type="checkbox"/> <b>Policy Research</b>                                       | <input type="checkbox"/> <b>Pooled Fund TPF #</b> |
| <input type="checkbox"/> <b>Wisconsin Highway Research Program</b>                               | <input type="checkbox"/> <b>Other</b>             |
| <b>Project Title:</b> Operational Resiliency of the Beloit to Hudson Interstate Highway Corridor |   |
| <b>Administrative Contact/Phone #:</b> 608/333-7563  | <b>WisDOT Project ID(s):</b> 0092-09-10           |
| <b>WisDOT Technical Contact/Phone #:</b> 608/266-0459  | <b>Other Project ID:</b> CFIRE 01-09              |
| <b>Project Investigator/Phone # (agency &amp; contact):</b> Teresa Adams/UW-Madison/608-263-3175 | <b>Approved Starting Date:</b> 10/1/2008          |
| <b>WisDOT Comments:</b>  | <b>Original End Date:</b> 12/31/2009              |
|  | <b>Current End Date:</b> 12/31/2009               |
| <b>Sponsor:</b> Wisconsin Department of Transportation   | <b>Number of Extensions:</b> 0                    |

**Schedule Status:**

- On schedule       Ahead of schedule  
 On revised schedule       Behind schedule (Please explain below)

| Total Project Budget | Expenditures Current Quarter | Total Expenditures | % Funds Expended | % Work Completed |
|----------------------|------------------------------|--------------------|------------------|------------------|
| \$33,000.00          | \$9,183.00                   | \$11,472.00        | 35%              | 25%              |

**Project Description:**

The Beloit to Hudson Interstate Highway corridor runs along I-94 from Hudson to Tomah Wisconsin and continues along I-90 to Beloit. The corridor plays a unique role as the critical backbone to freight and passenger mobility across the state.

The goal of this research project is to provide information that will help the state of Wisconsin ensure reliable function of the Beloit to Hudson I.H Corridor while maintaining the normal pass through capacity for the entire corridor. The project evaluates the resiliency of the corridor should a debilitating incident occur along one of its segments. The disrupting events like the February 2008 winter storm and spring 2008 are example of debilitating incidents.

Resiliency for this project focuses on the restoration and recovery of the state's economy as it is affected, enabled or disabled by the performance of the freight system. The objectives are:

- facilitate the recovery after an incident of the state freight economic activities by identifying critical sections and proposing enhancements.
- identify and create an inventory of critical sections of the Beloit-Hudson I.H. Corridor that are most vulnerable to disruption.
- develop the alternative routes for the critical sections of the corridor, and study their effect on the various traffic user groups both passenger and freight vehicles.

**Progress This Quarter:** (Includes project committee meetings, work plan status, contract status, significant progress, etc.)

The second quarter of the project included the following tasks:

1. Network Inventory
  - Network analysis along the Beloit to Hudson Interstate highway corridor.
  - WI State highway network involving the necessary attributes.
  - Segmentation of corridors for using in the GIS analysis.
  - Identification of alternative shortest paths using Dijkstra algorithm implementations.
  - Testing of methods for commodity flow analysis.
2. Quantifying the users.
  - Top commodity classification
  - Segmentation of commodity flows based on Origin –Destination flows.

The alternate routes for the critical segments were formulated using appropriate algorithms and the network analysis in ArcGIS. The network analysis extensions of Arc GIS® Network Analyst is being used to analyze the impacts of the temporary loss of each corridor section and the alternate shortest routes for the traffic. Also, the outcomes of the GIS analysis using TransCAD have been tested for capabilities of modeling commodity flows on the Wisconsin network.

The top commodities have been classified based on their economic impacts of Wisconsin. The county origin-destination flow data of the top commodities have been obtained. Steps are being taken to obtain the commodity flows over the Wisconsin network, and to model those flows on the Wisconsin state highway network.

One project committee meeting involving all the committee members took place during second week of January, and the progress & methodologies were discussed. There have been regular meetings involving a graduate student, and 2 senior research professors. There were a total of 3 meetings in this quarter, involving discussions about the data requirements & acquisition, GIS tools and network methodologies.

**Anticipated Work Next Quarter:**

Next steps involve the completion of Network analysis phase. This includes the completion of alternate routes analysis using GIS, and modeling the commodity flows involved on Beloit-Hudson IH corridor.

Later, the major work on Vulnerability assessment involves

- Analysis of effects of disruption of corridor segments on the alternate routes
- Analysis of commodity flow impacts
- Identification of Critical segments along the corridor
- Critical assets factors and estimation of counter measure costs

**Circumstances Affecting Progress and/or Budget:**

Majority of the data is to be obtained from WisDOT. A few data related issues have inhibited the research progress.

- Lack of sufficient information on the availability of assigned network flows of the commodities. The data sources are being verified, and steps have been in progress to acquire the data or the models required.
- Delay in availability of latest commodity flow data, and the freight network data. The newer data will include newer attributes of the network which can be used in the project.

**Gantt Chart:**

