

**CFIRE**

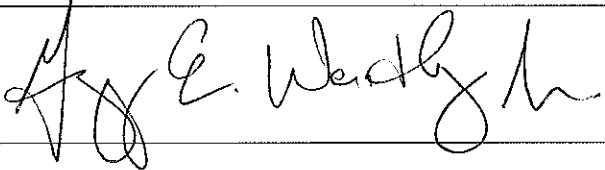
# Program Progress Performance Report (PPPR): January 1 to June 30, 2014

September 2014

National Center for Freight & Infrastructure Research & Education  
Department of Civil and Environmental Engineering  
College of Engineering  
University of Wisconsin–Madison

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Federal agency submitting to:	RITA, USDOT
Federal grant number:	DTRT12-G-UTC19
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Submission date:	September 26, 2014
DUNS and EIN numbers:	DUNS: 161202122; EIN: 396006492
Recipient organization:	University of Wisconsin-Madison
Grant period:	January 1, 2012 to January 31, 2016
Reporting period end date:	June 30, 2014
Report term:	January 1, 2014 to June 30, 2014
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This report covers CFIRE's efforts to collaboratively address research, education, workforce development, and technology transfer under DTRT12- G-UTC19 during the reporting period of January 1, 2014 to June 30, 2014.

1. Accomplishments

A. CFIRE's Goals

- i. **Research:** Through the strategic planning process, CFIRE is continuing its efforts with eight research initiatives that support the USDOT Strategic Goals and advance the state of practice in freight and freight infrastructure systems.
- ii. **Education and Workforce Development:** The partner institutions of CFIRE are actively engaged in education and workforce development at the local, state, and national levels. CFIRE has built upon established successful programs and continues support new collaborative initiatives. Our proposed education and workforce activities for university students and practicing professionals will develop skills and knowledge in multimodal freight transportation systems that reinforce our Center's theme.
- iii. **Technology Transfer:** Technology transfer is the process of transferring discoveries or innovations derived from university research into products and services that benefit the profession. CFIRE will engage the freight community in a cross-section of technology transfer initiatives. These will include both traditional and innovative approaches to disseminating information.
- iv. **Collaboration:** The CFIRE team has taken advantage of regional expertise by establishing both northern and southern hubs to help coordinate proposed education, training, and technology transfer efforts. The CFIRE team brings a wealth of experience and a history of collaborative work. We will leverage these assets to further develop relationships across a spectrum of initiatives that include both state and national-level collaborations.

B. Accomplishments under CFIRE's goals

i. Research Initiatives:

- **RI-1: A Multi-Modal Freight Safety, Security, and Environmental Routing Tool**  
USDOT Priorities: Safety/Sustainability  
Performing Institutions: University of Wisconsin – Milwaukee, University of Wisconsin - Superior, University of Alabama - Huntsville, and University of Southern Mississippi.  
Start Date: July 1, 2012      End Date: September 30, 2014
  - Major activities:
    - developed algorithms that enable user to impose routing rules to utilize and/or avoid certain locations
    - included additional feature layers describing political boundaries, land uses and assets in proximity to transport routes
    - continued coding to implement system design, including web user interface and analytical functions
    - applied quality control procedures to assist with data validation and verification
    - made improvements to web user interface
  - Major Objectives
    - complete methodological development and software programming in anticipation of beta testing
  - Significant results:
    - multiple freight transportation stakeholders will have access to a tool that allows for making more informed routing decisions taking into consideration impacts associated with efficiency, safety, security and environmental protection
  - Key outcomes or other achievements
    - Increased confidence that a comprehensive and practical decision-support tool can be implemented
  - Changes
    - Emphasis of research changed to entire continental US rather than just CFIRE states

- **RI-2: Making Freight-Centric Communities More Livable: Measuring the Impact of Advanced Technologies**  
USDOT Priorities: Livability/Economic Competitiveness  
Performing Institutions: University of Memphis, University of Wisconsin-Madison, and University of Toledo.  
Start Date: July 1, 2012      End Date: September 30, 2014
  - Major activities:
    - Two focus group/survey sessions were held in Memphis with assistance from Livable Memphis. Participation was low, so online format was used (with revised IRB approval) and this was administered through Livable Memphis, neighborhood associations, and through sample purchase option within Survey Monkey.
    - Industry questionnaire approved by Memphis IRB; online survey conducted.
    - Final policy maker questionnaire developed and administered
    - Visualization developed for Lamar Avenue corridor
    - Existing model of Lamar Avenue corridor was edited to simulate potential strategies for reducing freight impact
    - Final project report draft assembled
  - Major objectives:
    - The study was designed to determine perceptions related to impact of freight on livability, and to identify practices or technologies in use or under consideration by local industry that may alleviate some of the externalities of freight along the corridor.
  - Significant results:
    - Three focus group sessions held within the study area combined with multiple online campaigns yielded a set of 421 complete residential survey responses, with 76 within the freight-centric (FC) study area and 345 in non-freight-centric (NFC) locations in the Memphis metropolitan area.
    - Despite a statistically significant difference of overall opinions regarding the most important contributors to livability, it is also true that each group has the same four out of five of the most important contributors. This is interesting from the standpoint that while both groups value similar top contributors, the FC group emphasized the necessity of transportation options while the NFC group focused on housing within their community. This points to the inherent difference in community environment between FC and NFC areas. The overall results further the idea that the FC community sees significantly more negative externalities from the increased presence of freight in the community.
    - Further results will be available in the soon to be published final report.
  - Key outcomes:
    - University of Toledo team members made an invited presentation at the Ohio Society of Professional Engineers Spring Continuing Professional Development Conference and Annual Member Meeting in June 2014. They also published two papers for the 2014 TRB Annual Meeting and a symposium in Gulfport, MS.
  - Changes/Actual or anticipated problems or delays
    - IRB approval process and access to neighborhood meetings took much longer than expected. This resulted in an extended timeline for the project.
- **RI-3: Non-Destructive Technologies for Monitoring and Condition Assessment to Support Safety, Maintenance Programming, and Cost Allocation**  
USDOT Priorities: State of Good Repair  
Performing Institutions: University of Wisconsin-Madison; University of Wisconsin - Milwaukee  
Start Date: July 1, 2012      End Date: December 31, 2014
  - Major activities:

- Acquired information on existing and new techniques for non-destructive evaluation and structural health monitoring.
  - Developing a web-based expert system for the optimal selection of appropriate non-destructive methods for diagnosis and assessment of common signs of the structural distress and deterioration found in highway infrastructure systems and components.
  - Completed framework and flowcharts for wood structure NDT assessment in Logicnets.
  - Software developed to make the user management part of the system. Software modified so we can make the information collection logic trees that includes the structure, material, property etc.
  - Knowledge Center is ready for population by subject experts.
  - Software is designed now so that we can save and handle the information collected from the users to make up a database of past user cases.
  - Conducted training session with Logicnets in January for program participants in January 10, 2014.
- Specific objectives:
  - This research project evaluates the potential uses of new and existing NDT technologies for infrastructure monitoring and damage assessment. The research will produce practical methods to install sensors, collect and reduce data, and summarize results for both short- and long-term monitoring of critical freight infrastructure. The results of this investigation will provide local, state, and federal agencies with information sources and tools for structural health monitoring, non-destructive testing, developing risk management systems, and upgrading design standards.
- Significant results:
  - Nothing to report.
- Key outcomes:
  - Nothing to report.
- **RI-4: Mining Automatic Identification Systems (AIS) Data for Improved Vessel Trip Analysis Capabilities**

USDOT Priorities: Economic Competitiveness  
Performing Institutions: Vanderbilt, University of Toledo, and University of Wisconsin-Superior.  
Start Date: July 1, 2012      End Date: September 30, 2014

  - Major activities:
    - Algorithm for data thinning coded and tested on great lakes AIS data
    - Surveyed AIS service providers
  - Specific objectives:
    - Build a real-time spatial data viewer in GIS to display remote sensor data and weather and waterway information.
    - Explore the uses and capabilities of AIS for freight transportation and how to improve it.
  - Significant results:
    - Acquiring ancillary data (e.g. Vessel data) to rectify errors in AIS data prior to thinning the raw AIS data. The algorithm when implemented resulted in a near 98% reduction in the raw AIS data with all important and pertinent information intact.
  - Key outcomes:
    - Preparation of Doctoral Dissertation on Adaptation of AIS technology for vessel tracking in the Great Lakes, Samir Dhar, Ph.D. student.
  - Changes:

- Dr. Dobbins' departure from Vanderbilt prevents the linking of SQL server databases between Vanderbilt University and the University of Toledo.
- **RI-5: Estimating the Effects of Extreme Weather on Transportation Infrastructure**  
USDOT Priorities: Sustainability  
Performing Institutions: Vanderbilt University and University of Wisconsin-Madison.  
Start Date: July 1, 2012      End Date: September 30, 2014
  - Major activities:
    - Identified "hot spots" where the key freight corridors intersected areas of higher frequency of 2" average daily precipitation for multiple 15-year increments and across multiple climate model pairs. The identified "hot spots" were three counties in Arkansas: Jefferson, Lonoke, and Pulaski.
    - Continued development of a preliminary risk index that would link precipitation extremities to highway infrastructure damages and delays.
    - Began Hazus damage model simulations to estimate impacts/damages in Arkansas "hot spot" region to identify inundation areas for 100-yr, 500-yr, and 1000-yr flooding for three counties of interest.
  - Specific objectives:
    - Develop and pilot test a methodology for identifying highway infrastructure which is threatened by flooding events.
    - Estimate direct and indirect impacts of flooding on highway infrastructure
    - Define a risk index based on extreme weather threat and consequential impacts
  - Significant Results:
    - Hazus estimates a significantly greater amount of economic damage due to flooding than has traditionally been reported, due to consideration of impacts to transportation and utility infrastructure as well as indirect damages such as sheltering requirements.
    - Road closures do not appear to be an effective proxy measure for representing damage to highway infrastructure due to major precipitation events.
    - Hazus is best used as a screening-level tool to identify highly vulnerable areas and then a more refined hydrologic model is better suited to evaluate depth and extent of flooding in areas of specific transportation assets.
    - Using our criterion for "key precipitation events", tropical areas had 24-hour daily precipitation averages of over 30".
  - Key outcomes:
    - Assembling final report
  - Impact (on principal discipline)
    - A better understanding of the strengths and weaknesses of downscaling climate model forecasts to regional and local extreme weather scenarios and a better knowledge of the limitations of HAZUS.
- **RI-6: Realigning Multimodal Freight Networks in Response to International Capacity Expansion**  
USDOT Priorities: Economic Competitiveness  
Performing Institutions: University of Southern Mississippi, University of Alabama - Huntsville, University of Memphis, University of Illinois - Chicago, and University of Wisconsin - Superior.  
Start Date: July 1, 2012      End Date: September 30, 2014
  - Major activities:
    - Completed the networks and routing for all the difference assignments requested for the project.
    - Conducted economic development analysis.
    - Compiled whole report and conducted reviews.
    - Developed web based tool for scenarios display for stakeholders.

- Optimized distribution models from three coastal ports to CFIRE region
  - Completed what-if scenario analysis models for freight flows among 13 US ports and two major markets (Chicago & Memphis)
  - Models were developed for FAF regions and whole US
  - Web Tool Development:
    - Port-level scenarios – 9 maps
    - US interior optimized scenarios – 36 maps
    - Sensitivity analysis scenarios – 12 maps
  - Reviewed and updated intermodal routes, times and distances
- Specific objectives:
  - To identify the bottlenecks in transportation infrastructure and identify mitigation strategies to encourage efficient freight movement.
  - This study will include strategies for increasing modal freight shares on the inland waterways.
  - To develop transportation networks and perform routing based on various factors to display changes in freight movement (truck and rail) associated with the Panama Canal expansion.
  - To calibration and re-run models by scenarios with inclusion of an additional subject port, Gulfport, MS, since this port is recommended as a significant gateway for maritime trade along the Gulf Coast.
- Significant results:
  - We received output from these models that will provide information to transportation stakeholders to devise necessary policies that will minimize the negative impact of freight redistribution.
  - This research found that some port states will have to adjust their source ports for imports, but the impact on the overall regional economies will be insignificant. However, Chicago-North and other regions will have significant impacts from the Panama Canal and the Port of Prince Rupert expansions under all three scenarios. Based on the economic development models, this research found that some areas will see a large increase in traffic and are prime targets for intermodal development. The cities including Fargo, ND; Joplin, MO; Meridian, MS; Bellevue, NE; St. Cloud, MI; Farragut, TN; Goodlettsville, TN; Prattville, AL; East Ridge, TN; Effingham, IL; and Hattiesburg, MS are expected to see significant increases in freight volume.
- Key outcomes:
  - An optimized freight distribution model, which identified the routes, modes, and amount of freight movements from 14 ports to primarily two markets – Memphis and Chicago.
  - A scenario-based freight distribution model, which developed several scenarios (56 scenarios) based on individual port studies and identified the routes, modes, and amount of freight movements from 14 ports to primarily two markets – Memphis and Chicago.
- **RI-7: Enhancing Rail Connectivity to Underserved Rural Communities**

USDOT Priorities: Livability/Economic Competitiveness

Performing Institutions: University of Memphis, University of Wisconsin-Superior and Madison, University of Alabama in Huntsville, and University of Southern Mississippi.

Start Date: July 1, 2012      End Date: September 30, 2014

  - Major activities:
    - Data were collected from all participants and have been statistically analyzed. The universities that have participated in this survey managed to gather replies from twelve short lines and four of their customers.
  - Specific objectives:

- Main objective was to gather as much information as possible for the short line market within the CFIRE region.
    - Significant results:
      - The final report is currently finalized along with the template for case study analyses and the policy manual.
    - Key outcomes:
      - Although the report is still in development phase, the statistical analysis of the data validates most of the conclusions about the short line market environment, that former studies have indicated, but also gives a better insight to the key standings/opinions of the stakeholders.
    - Changes
      - Actual or anticipated problems or delays: Conducting in-person surveys with short line railroads and customers was proven unsuccessful (unwillingness to participate).
  - **RI-8: Beneficial Reuse of Dredging Materials Summit**  
USDOT Priorities: State of Good Repair  
Performing Institutions: University of Wisconsin-Madison, Milwaukee, and Superior.  
Start Date: August 1, 2012 End Date: June 30, 2014
    - Major activities:
      - Completed the final report, which has been posted on CFIRE and TRID websites and had been distributed per USDOT guidelines.
    - Specific objectives:
      - Nothing to report
    - Significant results:
      - Future research and outreach opportunities have been identified at the Summit and are being initiated, specifically in regards to geo-polymer materials
    - Key outcomes:
      - 8 Great lakes State DOT engineers as well as 12 other mid-western State DOT programs were introduced to the concept and availability of clean dredged material
- ii. Other Research
  - Evaluation of the Urban Freight Strategies (a consolidation of *Economic and Environmental Analyses of Urban Delivery Consolidation Strategies* and *Incorporating Environmental Measures into a Reliable Freight Routing Model*, which were listed as separate projects in the last PPPR):  
Performing Institutions: University of Illinois – Chicago
    - Major activities:
      - Investigating the feasibility of delivery cooperation using consolidation centers in US cities to reduce the negative impacts of “last mile” movement of freight.
      - Examining the relationship between the urban built environment and frequency and severity of conflicts between delivery trucks and other road and sidewalk users.
    - Specific objectives:
      - Developing a logistics cost model to quantify economic and environmental impacts.
      - Examine design and land use factors that affect congestion and safety of deliveries.
    - Significant results:
      - Under certain circumstances delivery consolidation would reduce cost, energy consumption and PM2.5 emissions.
      - Street design can reduce the number of truck parking citations in Chicago even in areas with heavy truck activity.
    - Key outcomes:
      - A dissertation based on this research has been defended and a Ph.D. has been awarded.



- Behavioral Micro-simulation Model of Multimodal Freight Movement:  
Performing Institutions: University of Illinois – Chicago
  - Major activities:
    - Expanding the large-scale freight activity-based model, FAME, by improving modeling components of the framework and implementing new components
  - Specific objectives:
    - Develop more detailed logistics choices at the disaggregate level of individual decision makers and implement them in the FAME framework
  - Significant results:
    - Literature review shows that mode and shipment size choice are strongly related and should be modeled together
    - Developed a model to determine suitability scores for each potential supplier
    - Developed a decision tree model for identifying characteristics of the “shipping chain” for different shipments
  - Key outcomes:
    - A dissertation based on this research has been defended and a Ph.D. has been awarded.
- Cost Savings of Ultra-heavy Trucks:  
Performing Institutions: University of Wisconsin – Milwaukee
  - Specific objectives:
    - The current regulation of the maximum gross vehicle weight on all axles in Wisconsin is 80,000 pounds. The ultra-heavy truck is proposed to have a much greater weight limitation – up to 140,000 pounds. This research calculates, using the CFIRE Truck Cost Model, the direct cost savings to the trucking industry that could be anticipated with ultra-heavy trucks.
  - Significant results:
    - Based on the cost analysis of 27 commodities using the Truck Cost model, freight using ultra-heavy trucks (100,000 pounds, 120,000 pounds, 140,000 pounds) is significantly cheaper than using the baseline 80,000-pound trucks.
      - For 100,000-pound trucks, the cost savings are \$499 million.
      - For 120,000-pound trucks, the cost savings are \$660 million.
      - For 140,000-pound trucks, the cost savings are \$762 million.
  - Key outcomes:
    - The cheaper transportation costs for commodities will affect not only the shipper, carrier and producer; it will affect the consumers and public. When the shipper and producer spend less on transportation costs, it will reduce the cost of the products for consumers, given the highly competitive nature of the freight industry.
- Evaluation of Employment Benefits of Ultra-Heavy Trucks in Wisconsin  
Performing Institutions: University of Wisconsin – Milwaukee
  - Specific objectives:
    - To conduct four distinct analyses, which evaluate employment growth due to cost savings, accessibility, mode shift, and industry restructuring.
  - Significant results:
    - Overall, implementing ultra-heavy trucks will not cause job losses for two reasons.
      - First, it will make the trucking industry more efficient, which further enhances its growth.
      - Second, it will expand growth of the whole economy through exports and more economic activities.
- Characterization of oversize/overload truck traffic and evaluation of impact on pavements  
Performing Institution: University of Wisconsin – Milwaukee
  - Major activities:



on transportation-related activities. Many self-guided, short hands on activities were also available. Student pre/post assessment data was collected, along with parent evaluation feedback, and suggestions from presenters and partner universities.

1. Created a Family Transportation event model with all support materials available online; created a Transportation Education Activity Kit; created new transportation education lessons; and created new transportation education posters.
  2. Introduced students & parents to the role of transportation in our daily lives, and the variety of careers in the transportation sector; Provide training and an event model for conducting a Family Transportation event; and Provide activities, lessons, and resources to facilitate teachers incorporating transportation education into their curriculum.
- University of Alabama – Huntsville
    - Participated in the student-industry symposium in Gulfport, MS.
  - University of Memphis:
    - IFTI hosted Assistant Secretary Susan Kurland in Memphis, TN for a day of workforce development centered on females in transportation. Kurland visited Wooddale High School in the morning. Wooddale is the transportation magnet high school for the Memphis area. While there, she was able to engage with high school students looking to gain a career in transportation. In the afternoon, Kurland met with professionals from across the tri-state area to discuss opportunities to increase the number of women wanting to enter in the transportation industry. Kurland served as the keynote speaker that night at the first annual Blue Pump Gala. She was able to share her thoughts on how we can do more at hiring and retaining women in the transportation industry.
    - Participated in the student-industry symposium in Gulfport, MS.
  - University of Southern Mississippi:
    - The University of Southern Mississippi's Center for Logistics, Trade and Transportation (CLTT) hosted the 2014 CLTT & CFIRE Logistics, Trade, and Transportation Symposium at the USM Gulf Coast Campus.
      1. On February 26-27<sup>th</sup> the CLTT and CFIRE hosted the symposium with 3 separate tracks (Industry, Student, and Professor).
      2. The symposium had 42 student/professors presenters presenting on 31 different topics.
      3. The symposium had 50 industry professional serve as panelists or moderators on 12 separate breakout sessions or lunch presentations.
    - Partnering with the Southeast Maritime and Transportation (SMART) Center. SMART is a National Science Foundation (NSF) Advanced Technological Education (ATE) Center in the maritime and transportation industry. Developing plans/MOU for USM/CLTT to host the 2015 SMART Institute in the June 2015.
  - University of Toledo:
    - Support was provided to the Maritime Academy of Toledo for student field trips and boating on-the-water education and experience from late April through early June. A total of 266 students participated in this educational experience.
  - University of Wisconsin – Madison:
    - Hosted the Mid-America Freight Coalition Annual Meeting in Chicago, IL.
    - CFIRE Scholarships for Engineering Professional Development Rail Short Courses
    - Taught Transportation Management and Policy Program classes
      1. Spring Colloquium – Topic: Health Impacts and Transportation
      2. Spring Practicum – Project: Environmental Compliance of the S.S. Badger and the Impact on Fares: A Travel Cost Comparison for Ferry versus Highway from Wisconsin to Michigan.

- Awarded the Best Freight Transportation Network award at the 2014 Milwaukee Regional Future City Competition in January.
  - University of Wisconsin – Milwaukee:
    - Provided graduate and undergraduate students education and training through freight short courses and symposia.
    - One student won the 2014 Mid-west ITE paper award (Martin Bruening Award): Peng Li, “A network enhancement model with integrated lane reorganization and traffic control strategies.”
  - University of Wisconsin – Superior:
    - Offering (and teaching courses for) an online certification program for industry
    - Amit Mokashi, Richard Stewart and Mei Cao taught courses on campus on transportation economics, international & intermodal logistics, port & terminal management and land transportation (pipelines, railroad and trucking).
    - Increased enrollment in the transportation and logistics management major
    - Student research was selected for presentation at the Posters On the Rotunda in Madison and the National Council of Undergraduate Research annual meeting in La Crosse, WI.
    - The Transportation and Logistics Management Major received a \$15,000 Scholarship from the Intermodal Association of North America to support student learning, research and activities in Transportation.
    - The Transportation and Logistics Research Center was granted full membership in the Council of University Transportation Centers (CUTC).
    - Amit Mokashi, Richard Stewart and Mei Cao conducted a tour of Conway, DART & DHL facilities in the twin cities region with 40 Transportation and Logistics (CTL) students of University of Wisconsin-Superior.
  - All CFIRE partner institutions sent students to TRB Annual Meeting and the CLTT Student-Industry Symposium in Gulfport, MS.
- iv. Technology Transfer - The following progress has been made on CFIRE’s commitments to T2:
- The Summit on the Beneficial Use of Dredge Materials provided an opportunity for researchers and industry to share new methods on the use of dredge materials and disseminate information on new technology using these advancements.
  - A University of Toledo student developing an intermodal routing system with an accompanying graphical user interface for the GIS data called PathWorld which can work with very large network datasets and should be commercialized and used by intermodal shippers once it is completed.
    - A freight demand analysis of the Great Lakes region using this software identified major congestion areas on highway links and proposed solutions to alleviate these problems.
  - A University of Toledo student developed a new MidWest FreightView DataViewer which allows the dissemination of a wide range of data to users.

C. Dissemination of Results

- i. Findings from UIC’s *Environmental Impact and Health Exposure of Highway Freight Vehicles* study was presented at the Transportation Research Board’s Particulate Matter Hot Spot Analyses: Research and Applications Workshop.
- ii. CFIRE partners (UW-Madison, University of Memphis, and University of Southern Mississippi) conducted a half day workshop at TRB entitled, *Understanding the Role of Benefit-Cost Analysis for Freight Transportation*. Sponsoring TRB committees included: Committee on Intermodal Freight Terminal Design and Operations (AT050); Committee on Intermodal Freight Transport (AT045); Committee on Urban Freight Transportation (AT025).

D. Next Reporting Period

- i. Research Initiatives: In the upcoming reporting period, all current research initiatives are scheduled to be completed.
- ii. Education and Workforce Development: Sponsoring of Railroad Engineering Courses at UW-Madison; GEE and TREC and Univ. of Memphis; Lac Courte Oreilles Tribal Summer Transportation Institute with UW-Superior; UAH Summer Transportation Institute Program; Great Lakes Transportation Teacher Institute with MTU
- iii. Technology Transfer: Mid-Continent Transportation Research Forum in Madison, WI; Ohio Conference on Freight; Intermodal Freight Conference at Univ. of Memphis.

## 2. Products

### A. Publications and conference papers:

- i. Schafer, S.E. and P.S. Lindquist. 2014. Moving Toward the IT Highway: Linking Public and Private Investments in Intelligent Transportation Systems to Supply Chain Performance and Livability, TRB 93rd Annual Meeting Proceedings, January, 2014.
- ii. Schafer, S.E. and P.S. Lindquist. 2014. Moving Toward the IT Highway: Linking Public and Private Investments in Intelligent Transportation Systems to Supply Chain Performance and Livability, Logistics, Trade and Transportation Symposium, Gulfport, MS, February, 2014.
- iii. Ozelkan, E., Sarder, MD., & Ali, A., (2014). Back to Fundamentals for a Successful Lean Six Sigma Enterprise Transformation: An Introduction to JET Special Issue, *Journal of Enterprise Transformation special issue on Lean Transformation*, Vol. 4, Issue 2.
- iv. Sarder, MD., Miller, C. & Adnan, Z. (2014). Understanding the Reshoring Decision-Making Process Using AHP Approach, *Proceeding of the Annual Industrial & Systems Engineering Research Conference (ISERC)*, Montreal, Canada.
- v. Sarder, MD., Rahman, M., & Eksioglu B. (2014). Risk Based HazMat Routing in a Supply Chain Network, *Proceeding of the Annual Industrial & Systems Engineering Research Conference (ISERC)*, Montreal, Canada.
- vi. Nakka, R. & Sarder, MD. (2014). Transforming Business Strategies of Manufacturing Industries through Reshoring, *Proceeding of the Annual Industrial & Systems Engineering Research Conference (ISERC)*, Montreal, Canada.
- vii. Sarder, MD. (2014). Improving Student Engagement in Online Courses, *Proceeding of the American Society of Engineering Education Conference (ASEE)*, Indianapolis, Indiana.
- viii. Sarder, MD. (2014). Innovative Uses of Classroom Tools & Technologies to Foster Students' Learning, *Proceeding of the American Society of Engineering Education Conference (ASEE)*, Indianapolis, Indiana.
- ix. Nakka, R., Monk, T., & Sarder, MD. (2014). Understanding Supply Chain Dynamics of Pharmaceutical Industries, *Proceeding of the CLTT Symposium*, Gulfport, Mississippi.
- x. Monk, T., & Sarder, MD. (2014). Quantifying Factors Applicable to the Health Impact Assessment of Freight Centric Communities, *Proceeding of the CLTT Symposium*, Gulfport, Mississippi.
- xi. Miller, Chad. (2014). "Institutional Legacy as the Driver of Port Development Strategy: The Case of the Port of Gulfport," *Public Works Management & Policy* 19 (1): 4-10.
- xii. Miller, Chad (2014). "Seventy-Five Years of Transportation Administration Becoming Public Administration," American Society of Public Administration (ASPA) Conference. March 14, Washington, DC.
- xiii. Marach, Alex, Adams, Teresa and Ernie B. Perry. Critical Rural Freight Corridors Designation: Implications of Truck Percentage Calculation. TRR Journal of the Transportation Research Board. (2014)
- xiv. Li, Q., Y. Nie, S. Vallamsundar, J. Lin, and T. Homem-de-Mello (2014) Finding efficient and environmentally friendly paths for risk-averse freight carriers, *Networks and Spatial Economics*, available On-line First, January 2014, DOI 10.1007/s11067-013-9220-8
- xv. Lin, J., Q. Chen, K. Kawamura (2014) Economic and Environmental Analyses of Urban Delivery Consolidation Strategies, *Networks and Spatial Economics*, available On-line First, April 2014, DOI 10.1007/s11067-014-9235-9

- xvi. Pourabdollahi, Z., Karimi, B., Mohammadian, A., and Kawamura, K. Shipping Chain Choices in Long Distance Supply Chains: Descriptive Analysis and a Decision Tree Model, *Transportation Research Records: Journal of the Transportation Research Board*, Washington D.C., forthcoming.
- xvii. K. Kawamura, P.S. Sriraj, H. R. Surat, and M. Menninger. "Analysis of Factors Affecting Truck Parking Violation Frequency in Urban Areas". *Transportation Research Records: Journal of the Transportation Research Board*, Washington D.C., forthcoming
- xviii. Stewart, Richard. "Climate Forward: A New Road Map for Wisconsin's Climate and Energy Future", *Wisconsin Academy of Sciences and Letters*, April 2014.
- xix. Zietlow, Ben. Marine Highways and Marine Freight Development in the MAFC. *Proceedings of the Mid-America Freight Coalition Annual Meeting*, April 2014.
- xx. Kurniati, Katrina Maria, "Evaluation of Employment Benefits of Ultra-Heavy Trucks: Wisconsin Case Study" (2014). *Theses and Dissertations*. Paper 467.
- xxi. Latifi, Valbon, "Evaluation of Pavement Performance Due to Overload Single Trip Permit Truck Traffic in Wisconsin" (2014). *Theses and Dissertations*. Paper 468.
- xxii. Titi, H. H., Coley, N., Latifi, V. and Matar, M. (2014). "Characterization of Overweight Permitted Truck Routes and Loads in Wisconsin," in press, *Journal of the Transportation Research Board*, National Research Council, Washington, D.C.
- xxiii. Zhao, J., Liu, Y., Ma, W., Yang, X., "Operation of Signalized Diamond Interchanges with Frontage Roads Using Dynamic Reversible Lanes," 93rd TRB Annual Meeting Proceedings CDROM (paper # 14-2077), Washington D.C., January 12-16, 2014.
- xxiv. Zhao, J., Liu, Y., Li, P., Ma, W., Yang, X., "Network Enhancement Model with Integrated Lane Reorganization and Traffic Control Strategies," 93rd TRB Annual Meeting Proceedings CDROM (paper # 14-2047), Washington D.C., January 12-16, 2014.
- xxv. Liu, Y., Liu, D., Yu, J., Li, X., Li, P., "Optimal conversion of an evacuation network to signalized and uninterrupted flow intersections," 93rd TRB Annual Meeting Proceedings CDROM (paper # 14-2261), Washington D.C., January 12-16, 2014.
- xxvi. An, J., Liu, Y., Yang, X., "Measuring Route-Level Passenger Perceived Transit Service Reliability with Agent-Based Simulation Approach," 93rd TRB Annual Meeting Proceedings CDROM (paper # 14-2386), Washington D.C., January 12-16, 2014.
- xxvii. Pan, S., Yu, J., Yang, X., Liu, Y., Zou, N., "Flexible Feeder Transit System for Chinese Cities: Service Area Determination and Feeder Route Planning," 93rd TRB Annual Meeting Proceedings CDROM (paper # 14-3043), Washington D.C., January 12-16, 2014.
- xxviii. Zhao, J., Ma, W., Liu, Y., Yang, X., "Integrated design and operation of urban arterials with reversible lanes," 93rd TRB Annual Meeting Proceedings CDROM (paper # 14-1408), Washington D.C., January 12-16, 2014.
- xxix. Sarder, MD., Mohammadian, K., Golias, M., Stewart, R., & Anderson, M. (2014). *Realigning Multimodal Freight Networks in Response to Panama Canal Expansion, Proceeding of the TRB Annual Conference*, Washington D.C., Poster, 2014.

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#### B. Presentations

- i. Dhar, S., Commercial Vessel Tracking in the Great Lakes using AIS, in *Logistics, Trade and Transportation symposium 2014*, Center for Logistics, Trade, and Transportation (CLTT) Gulfport, Mississippi.
- ii. Wang, Q. and S. Dhar, The Application of AIS in the Great Lakes System, in *Logistics, Trade and Transportation symposium 2014*, Center for Logistics, Trade, and Transportation (CLTT) Gulfport, Mississippi.
- iii. Mokashi, A.J. and R.D. Stewart, Expanding the capabilities and use of Automatic Identification Systems (AIS), in *Logistics, Trade, and Transportation Symposium 2014*, Center for Logistics, Trade, and Transportation (CLTT) Gulfport, Mississippi.
- iv. Doherty, M. Defining Metrics for Freight-Centric Communities. *Logistics, Trade, and Transportation Symposium*; Feb. 26-27, 2014. Gulfport, MS.

- v. Greenstreet, A. Freight Transportation and Conflicting Land Uses: Memphis, TN Interactive Website. Logistics, Trade, and Transportation Symposium; Feb. 26-27, 2014. Gulfport, MS.
- vi. Marach, Alex; Adams, Teresa and Ernie B. Perry. Critical Rural Freight Corridors Designation: Implications of Truck Percentage Calculation. Transportation Research Board Annual Meeting, Washington, D.C. January 13, 2014.
- vii. Schwartz, Andrew; Adams, Teresa and Ernie B. Perry. A Comparison of Oversize and Overweight Permit Carrier Fees and Agency Costs. Transportation Research Board Annual Meeting, Washington, D.C. January 13, 2014.
- viii. Perry, E. B. Panel Coordinator and Moderator: MAP-21 Implementation Panel - National State and Local Perspectives. Logistics, Trade and Transportation Symposium. Gulfport, MS. February 27, 2014.
- ix. Perry, E.B. Building Transporting and the Economy. Purdue Road School. West Lafayette, IN. February 12, 2014.
- x. Perry, E. B. Introduction to MAFC and Maritime Freight. MAFC Annual Meeting. Chicago, Ill. April 22, 2014.
- xi. Perry, E. B. Freight Advisory Committee meeting Facilitator for Identification of KS Freight Network. Kansa DOT Freight Advisory Meeting. Salinas, Ks. May 20-21, 2014.
- xii. Perry, E. B. Keynote speaker: Best Practices in Identifying Significant Freight Corridors. Kansa DOT Freight Advisory Meeting. Salinas, Ks. May 20-21, 2014.
- xiii. Zietlow, Ben. Marine Highways and Marine Freight Development in the MAFC (moderator). Mid-America Freight Coalition Annual Meeting, April 22, 2014.
- xiv. Pourabdollahi, Z., Karimi, B., Mohammadian, A., and Kawamura, K. Shipping Chain Choices in Long Distance Supply Chains: Descriptive Analysis and a Decision Tree Model, In the 93rd Annual Transportation Research Board Meeting, Washington D.C. 11-16, January, 2014.
- xv. Pourabdollahi, Z., Karimi, B., Mohammadian, A., and Kawamura, K. A Multi-Criteria Supplier Evaluation Model for Supply Chains, In the 93rd Annual Transportation Research Board Meeting, Washington D.C. 11-16, January, 2014.
- xvi. Strum, K. Pourabdollahi, Z., Mohammadian, A., and Kawamura GPS and Driver Log-Based Survey of Grocery Trucks in Chicago. In the 93rd Annual Transportation Research Board Meeting, Washington D.C. 11-16, January, 2014.
- xvii. Zhou, W., Chen, Q. and Lin, J. "Empirical Study of Urban Commercial Vehicle Tour Patterns in Texas". In the 93rd Annual Transportation Research Board Meeting, Washington D.C. 11-16, January, 2014.
- xviii. Chen, Q. and Lin, J., "Preliminary Investigation of Sustainable Urban Truck Routing Strategies Considering Cargo Weight and Vehicle Speed". In the 93rd Annual Transportation Research Board Meeting, Washington D.C. 11-16, January, 2014.
- xix. S. Vallamsundar. "Integrated Framework for Evaluating Population Health Exposure to Emissions from Transportation Sources". In the 93rd Annual Transportation Research Board Meeting, Washington D.C. 11-16, January, 2014.
- xx. Sakai, T., Kawamura, K., and Hyodo, T. "Findings from Tokyo Metropolitan Freight Survey: Reality of Goods Movement and Its Implications". Presented at the Logistics, Trade and Transportation Symposium. Gulfport, Mississippi at University of Southern Mississippi's Gulf Park Campus. February, 2014.
- xxi. Zhou, W. and Lin, J. "Empirical Study of Urban Commercial Vehicle Tour Patterns in Texas". Presented at the Logistics, Trade and Transportation Symposium. Gulfport, Mississippi at University of Southern Mississippi's Gulf Park Campus. February, 2014.
- xxii. Qifeng Wang, P.S. Lindquist. Modifiable Areal Unit Problem in Freight Demand Forecasting. Logistics, Trade and Transportation (LTT) Symposium, Gulfport, Mississippi, 2014.
- xxiii. Qifeng Wang, P.S. Lindquist. "RouteInfo" - A Python Based GIS System for Transportation Planning and Analyzing. 2014 AAG Annual Meeting, Tampa, Florida.

- xxiv. Nilsson, I., O. Smirnov and P. Lindquist (2014). Demand for Transportation Infrastructure and Strategic Interactions in Firm Location Choices, Proceedings of the CLTT Symposium, February 26-27, Gulfport, MS.
  - xxv. Mokashi, A.J. and R.D. Stewart, Expanding the capabilities and use of Automatic Identification Systems (AIS), in Logistics, Trade, and Transportation Symposium 2014, Center for Logistics, Trade, and Transportation (CLTT) Gulfport, Mississippi.
  - xxvi. Richard Stewart, Ph.D, CTL “Rail Served Intermodal Terminals in Rural Regions: Challenges and Opportunities” at the Logistics, Trade, and Transportation Symposium 2014, Center for Logistics, Trade, and Transportation (CLTT) Gulfport, Mississippi.
  - xxvii. Cao, Mei, Ph.D. “Effects of Culture and Inter-organizational System Use on Supply Chain Collaboration including Shippers and Carriers” at the Transportation Research Board (TRB) 93rd Annual Meeting, Washington DC, January 12-16, 2014.
  - xxviii. Richard D. Stewart, Ph.D., CTL. “Bringing Great Lakes Communities Together to Research Transportation Issues and Study Freight Transportation Systems”, Event 658 (Session 593) Transportation Research Board Annual Meeting, 1/15/2014 Washington, D.C.
  - xxix. Richard D. Stewart, Ph.D. CTL. “Serving Industrial Parks by Rail”, 2014 American Planning Association Wisconsin Chapter Conference Madison, WI; June 13, 2014 Chaired Panel and Presented.
  - xxx. Stewart, Richard, Ph.D. “Transportation and Logistics in a Global Market Place”; Duluth Chamber of Commerce Leadership Duluth Class, February 12, 2014.
  - xxxi. Stewart, Richard, Ph.D. “Transportation and Logistics in a Global Market Place” UMD Engineering Club, March 06, 2014.
  - xxxii. Stewart, Richard, Ph.D. “An overview of trucking issues” Superior Mayor’s Transportation Group. March 11, 2014.
  - xxxiii. Stewart, Richard, Ph.D. “Transportation of Crude, Safety Issues” Calumet Superior Refinery Community Advisory Panel (CAP), April 10, 2014.
  - xxxiv. Elhajar, R., and Qamhia, I., “A Kinematic and Acoustic Emission Methodology for Investigation of Progressive Damage Behavior of Triaxially Braided Regenerated Cellulose Composites”. 18th International Nondestructive Testing and Evaluation of Wood Symposium, Madison, Wisconsin, 2013, September 24-27.
  - xxxv. Titi, Hani. "Non-Destructive Technologies for Monitoring and Condition Assessment to Support Safety, Maintenance Programming, and Cost Allocation in Highway and Railway Systems." Logistics, Trade and Transportation Symposium, February 26-27, 2014, Gulfport, MS.
  - xxxvi. Sanghyeon Ko, Behzad Karimi, Kouros Mohammadian, *U.S. Containerized Import Freight Network with Peripheral Capacity Expansions: A Review*, TRB 93rd Annual Meeting in Washington D.C., Poster, 2014.
  - xxxvii. Sanghyeon Ko, Behzad Karimi, Kouros Mohammadian, *Scenario Analysis of Containerized Freight Distribution into the Midwest Region in Response with Capacity Expansions*, TRB 93rd Annual Meeting in Washington D.C., Poster, 2014.
- C. Websites (does not include the academic partner institution websites reported in the last PPPR):
- i. Beneficial Use Summit (RI-8): Includes a project summary, list of the steering committee members, draft Summit details and the current draft version of the Summit agenda <http://www.wistrans.org/cfire/events/dredging/>
  - ii. CLTT “Special Studies and Applied Research” webpage is a repository for freight transportation research. <http://www.usm.edu/logistics-trade-transportation/special-studies-applied-research>
  - iii. “Certified in Transportation and Logistics Online Program”, in collaboration with the American Society of Transportation and Logistics. [www.uwsuper.edu/ctl/](http://www.uwsuper.edu/ctl/); CFIRE provided matching support for the beta testing of two modules
  - iv. 2014 Mid-America Freight Coalition Annual Meeting (<http://midamericafreight.org/events/2014-annual-meeting/>) contains an archive of the agenda, presentations, and other materials from this event. Disseminated via the CFIRE and MAFC blogs, as well as multiple social media channels (mass email, Twitter, Facebook, etc.).



- v. Summit on the Beneficial Use of Dredged Materials (<http://www.wistrans.org/cfire/events/dredging/>) contains an archive of the agenda, presentations, and other materials from this event. Disseminated via the CFIRE blog, as well as multiple social media channels (mass email, Twitter, Facebook, etc.)
  - vi. CFIRE Scholarships for EPD Rail Short Courses are listed on the CFIRE website (<http://www.wistrans.org/cfire/education/epd-rail/>). Applicants apply for these scholarships via a webform, when scholarships for upcoming courses are available. Notifications of availability are disseminated via the CFIRE blog, as well as multiple social media channels (mass email, Twitter, Facebook, etc.).
  - vii. Lamar Corridor and Greater Memphis Interactive Map (RI-2): <http://www.wistrans.org/livability/MemphisLamarAve.htm>
  - viii. "Real-time Inland Marine Transportation Information."  
<http://transp40.vuse.vanderbilt.edu/slapps/realtimeinlandinfo/>
    - Username: aisuser; Password/Ingram
    - This site contains the AIS data from Paducah and Reserve, real-time weather data, lock performance data and means to query all data layers. Note that since Dr. Dobbins is leaving Vanderbilt, the data feed from Reserve and Paducah has been cut off.
  - ix. Maintained by the University of Wisconsin, this k-12 transportation education clearinghouse provides useful information for teachers and students, K-12 lessons and K-12 transportation events. Recent news postings are also shared.  
<http://www.wistrans.org/cfire/education/k-12/>
  - x. A web-based tool is being developed as part of the RI-3 project. The tool has two components: a) a "Knowledge Center" that contains summaries of all of the data and information collected during this project on non-destructive methods applicable to infrastructure systems and materials, and b) a decision-making expert system for selecting appropriate methods for diagnose and assessment of structural distress. Awaiting web address.
  - xi. As part of CFIRE RI-6 project, the team developed a dynamic web-tool for visualizing Panama Canal impact on US transportation network within the CFIRE region. The tool is available in the following website: <https://www.usm.edu/logistics-trade-transportation/ri-6-run-scenarios>
- D. Newsletters:
- i. The USM CLTT produces a monthly e-newsletter for over 5000 subscribers
    - <http://www.usm.edu/logistics-trade-transportation/news-and-events>
- E. Technologies/Inventions/Other Products:
- i. Database of OSOW single permitted trucks in Wisconsin from 2007 to 2013 is available at UWM
  - ii. The Midwest FreightView DataViewer runs on a Citrix server on the GISAG lab at the University of Toledo. Interested parties can obtain a unique login to gain access
  - iii. K-12 transportation lesson plans developed by our partner at Michigan Tech. Available at the k-12 website listed above.
3. Collaboration - The following progress has been made on CFIRE's commitments to collaboration.
- A. UW-Madison Course IES/CEE 970 Colloquium in Transportation Management and Policy. Thematic area for Spring 2014 semester was Health Impacts and Transportation. A partial list of the speakers included Dave Cieslewicz, Bicycle Federation of WI (former mayor of Madison); Maggie Grabow, UW Global Health Institute; Chris Dresser, USEPA (and former TMP student); Paul Meier, WI Energy Institute; Robert Hampshire, Carnegie Mellon; and Tom Howells, WI Motor Carrier Assn.
- B. Collaborating Organizations
- i. American Association of State Highway and Transportation Officials; DC; in-kind support
  - ii. American Society of Transportation and Logistics; Warrenton, VA; contributed to project
  - iii. Bülent Ecevit University; Zonguldak, Turkey; collaborative research
  - iv. Burlington Northern Santa Fe; Fort Worth, TX; in-kind, facilities
  - v. Canadian National Railway; Memphis, TN; financial, in-kind support, facilities

- vi. Center for Science & Environmental Outreach, Michigan Technological University; Houghton, MI; in-kind support, facilities, personnel exchange
- vii. Center for Transportation Studies – University of Minnesota; personnel exchanges
- viii. City of Chicago; Chicago, IL; in-kind support
- ix. Conway; facilities and research support
- x. Cornerstone Systems; in-kind support
- xi. Council of Supply Chain Management Professionals (Twin Cities and Northeast WI Roundtable); in-kind support, presentations
- xii. Duluth Seaway Port Authority; personnel exchanges
- xiii. Duluth Superior Transportation Association; Duluth, MN: in-kind
- xiv. Enbridge; Calgary, Alberta; in-kind support, facilities
- xv. Experience Aviation, Inc.; Miami, FL; in-kind support
- xvi. Federal Emergency Management Agency; Washington, DC; in-kind
- xvii. Federal Highway Administration Kentucky Division Office; Frankfort, KY; partner
- xviii. FedEx, Curt Heaslet; Memphis, TN; colloquium speaker
- xix. Fraser Shipyard; Superior, WI; in-kind, facilities
- xx. Great Lakes Commission, Ann Arbor, MI; in-kind support
- xxi. Great Lake Fleet; Superior, WI; in-kind, facilities
- xxii. Great Lakes and Seaway Shipping Online, Inc.; Port Huron, MI; in-kind support
- xxiii. Great Lakes Maritime Research Institute; Superior, WI; collaborative research
- xxiv. Halvor Trucking; Superior, WI; in-kind, facilities
- xxv. Illinois Department of Transportation; Springfield, IL; in-kind support
- xxvi. Indiana Department of Transportation; Indianapolis, IN; conference partner
- xxvii. Ingram Barge Company; Nashville, TN; financial, in-kind
- xxviii. Institute for Trade and Transportation Studies; New Orleans, LA; in-kind support
- xxix. Intermodal Association of North America (IANA) – financial, in kind
- xxx. Intermodal Transportation Institute, University of Toledo; Toledo, OH; in-kind
- xxxi. Kentuckiana Regional Planning and Development Agency; Louseville, KY; in-kind
- xxxii. Kentucky Transportation Cabinet; Frankfort, KY; conference partner
- xxxiii. Lake Carriers Association, Rocky River, OH; in-kind support, collaborative research
- xxxiv. Lake Superior Railroad Museum, Superior, WI; in-kind support, facilities
- xxxv. Livable Memphis; in-kind support
- xxxvi. LogicNets, Inc.; Washington, DC; consulting services
- xxxvii. Marten Transport; Mondovi, WI; in-kind support, facilities
- xxxviii. Mead & Hunt, Inc., Dawn Johnston; Madison, WI; colloquium speaker
- xxxix. Memphis City Schools; Memphis, TN; facilities, research, personnel
  - xl. Menards; Eau Claire, WI; Facilities and research support
  - xli. Metro Nashville Government; Nashville, TN; in-kind
  - xl.ii. Metropolitan Interstate Council; Superior, WI; in-kind, research support
  - xl.iii. Metropolitan Nashville- Davidson County Government; Nashville, TN; In-kind
  - xl.iv. Metropolitan Transportation Support Initiative at the Urban Transportation Center, Uiversity of Illinois – Chicago; Chicago, IL; in-kind support, personnel exchange
  - xl.v. Michigan Department of Transportation; Lansing, MI; in-kind
  - xl.vi. Michigan Tech Rail Program; Houghton, MI; personnel exchange
  - xl.vii. Midwest Terminals; Maumee, OH; in-kind support
  - xl.viii. Milwaukee Port Authority; Milwaukee, WI; in-kind support
  - xl.ix. Mississippi Department of Transportation; Jackson, MS; in-kind support
    - I. Missouri Department of Transportation; Jefferson City, MO; Conference partner
    - li. National Association of Purchasing Managers (Lake Superior Chapter) - in kind, facilities
    - lii. National Great Lakes Maritime Museum; Vermillion, OH; in-kind support
    - liii. National Oceanic and Atmospheric Administration (NOAA); Washington, DC; in-kind
    - liv. Neel-Schaffer, Inc.; Jackson, MS; conference partner

- iv. North American Regional Climate change Assessment Program; Boulder, CO; in-kind
- lvi. North Carolina A&T State University; Greensboro, NC; memorandum of understanding
- lvii. Ocean Springs Upper Elementary School; in-kind support
- lviii. Office of Naval Research; Arlington, VA; in-kind support
- lix. Peer Power; in-kind support
- lx. Port of Toledo; Toledo, OH; in-kind support
- lxi. Schneider National, Max Peitsch; Green Bay, WI; colloquium speaker
- lxii. St. Lawrence Seaway Development Corporation; Messena, NY; in-kind support
- lxiii. Temple, Inc.; Decatur, AL; conference partner
- lxiv. Tennessee Department of Transportation; Nashville, TN; financial support
- lxv. The Gateway to Wisconsin, Tom Rave; Milwaukee, WI; colloquium speaker
- lxvi. The Maritime Academy of Toledo; Toledo, OH; in-kind support
- lxvii. Twin Cities Transportation Club; Minneapolis, MN; in-kind support
- lxviii. University of Southern Alabama; Mobile, AL; research support
- lxix. University of Minnesota – Duluth; Duluth, MN; personnel exchanges
- lxx. US Army Corps of Engineers; St. Paul, MN; in-kind support
- lxxi. US Coast Guard; Cleveland OH; in-kind support
- lxxii. US Commercial Service; Washington, DC; conference partner
- lxxiii. US Environmental Protection Agency; Chicago, IL; in-kind support
- lxxiv. US Maritime Administration; Chicago, IL; in-kind support
- lxxv. UW-Madison Sea Grant Institute; Superior, WI; in-kind support
- lxxvi. Vaco Logistics; in-kind support
- lxxvii. Wayne State University, Department of Civil and Environmental Engineering; Detroit, MI; in-kind support
- lxxviii. Wisconsin Economic Development Corporation, Kathy Heady; Madison, WI; speaker
- lxxix. Wisconsin Department of National Resources; in-kind support
- lxxx. Wisconsin Department of Transportation; Madison, WI; financial support, in-kind
- lxxxi. Wisconsin & Southern Railroad, Ken Lucht; Milwaukee, WI; colloquium speaker
- lxxxii. North Shore Scenic Railway; Duluth, MN; in-kind, facilities
- lxxxiii. Wuzi University Beijing China - in kind, facilities
- lxxxiv. International Maritime University of Panama; Panama City, Panama; collaborative research
- lxxxv. Institute for Transportation, Iowa State University; Ames, IA; Donation
- lxxxvi. American Transportation Research Institute; Atlanta, GA; in-kind support

4. Impacts

- A. All of the research initiatives that began with the first year of funding through this grant are due to be completed during the upcoming period from July to December, 2014. I expect to receive reports regarding projects' impacts in the next reporting period.

5. Changes/Problems

- A. Nothing to Report.



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