



CFIRE

Annual Report 2009–2010

**National Center for Freight & Infrastructure Research & Education
Grant Year 4 Annual Report**

October 1, 2009–September 30, 2010

University of Wisconsin–Madison

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Director's Message



I am pleased to present you with the third Annual Report for the National Center for Freight and Infrastructure Research and Education (CFIRE). This report summarizes our work from October 1, 2009 to September 30, 2010.

The importance of our nation's freight transportation system—to the economy and to our national security—increases

every year. This system currently moves an average of 52 million tons of freight per day. By 2020, domestic freight volume is projected to have increased 65 to 70 percent over 2003 levels. At the same time, an economic downturn makes funding for the repair, maintenance, and improvement of the aging transportation infrastructure in the United States more difficult. All transportation agencies are being asked to do more with less. At CFIRE, it's our mission to help advance the knowledge and expertise that will help create a sustainable and efficient freight infrastructure, which in turn will form the foundation of the success of the United States in the global economy of the 21st century.

In our fourth year as a national University Transportation Center (UTC), we have continued to expand our research, education, and training efforts to support CFIRE's mission to advance technology, knowledge, and expertise in the planning, design, construction, and operation of sustainable freight transportation infrastructure. We continue to work with five partner institutions, ten state departments of transportation, and other agencies, as well as an ever-growing group of researchers and students.

In this reporting period, we have funded an additional 26 research and outreach projects, all of which focus on our center's theme—Sustainable Freight Infrastructure and Systems—and fall under one of the center's four Signature Technical Areas of Research (STARs). We have also funded a number of new research projects under the auspices of the Mid-America Freight Coalition (formerly the Mississippi Valley Freight Coalition), which has been reauthorized for an additional two years, through 2012.

The CFIRE staff is actively engaged in professional outreach activities—presenting the results of the Center's research at conferences and meetings, organizing research collaborations, serving on committees of the Transportation Research Board and the Council of

University Transportation Centers, and working closely with the US Department of Transportation. We have also sponsored a number of conferences and hosted the Mississippi Valley Freight Coalition Conference and Annual Meeting and the Mid-Continent Transportation Research Forum.

The Center continues to help educate the next generation of transportation professionals. CFIRE supports and coordinates the UW Transportation Management & Policy program, an interdisciplinary graduate certificate program that includes students from the fields of engineering, urban planning, public policy, landscape architecture, and environmental studies. Many of these students work as research assistants on projects funded by CFIRE and its partners.

As efficient and sustainable freight transportation becomes ever more important to the success of the United States in the global economy, we at CFIRE continue to build on our successes in research, outreach, and education—while looking to future for the next challenge.

I'd like to thank all of the researchers, peer reviewers, Advisory and Executive Committee members, and project committee members who have unselfishly granted us their time over the past year. We're proud of our accomplishments and the dedicated people who staff these research projects and activities. The information in these pages, however, is but a partial testament to their labors. Thank you for another excellent year.

I hope that you find the Center's Annual Report useful and inspiring, as I do.

A handwritten signature in blue ink that reads 'Teresa Adams'.

Teresa Adams, PhD
Director, CFIRE

About **CFIRE**

Sustainable Freight Transportation Infrastructure and Systems

The Center conducts research, sponsors training opportunities, and develops academic coursework and continuing education programs reflecting the Center's Signature Technical Areas of Research (STARs). The Center also sponsors research on performance measurements, policy, economic effects, and emergency management across these specialties. The Center works with consortium partners at the University of Wisconsin–Milwaukee, University of Wisconsin–Superior, University of Illinois–Chicago, and the University of Toledo.

Mission

To advance technology, knowledge, and expertise in the planning, design, construction, and operation of sustainable freight transportation infrastructure through education, research, outreach, training, and technology transfer at the University of Wisconsin–Madison and its partner institutions.

Vision

The National University Transportation Center at the University of Wisconsin–Madison will be an internationally recognized authority and resource that creates knowledge, advances understanding, develops technologies, and prepares leaders to meet the nation's need for safe, efficient, and sustainable infrastructure for the movement of goods.

CFIRE Staff



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Member Institutions



University of Wisconsin–Madison (Lead Institution)

Principal Investigator: Teresa Adams, PhD

At the University of Wisconsin–Madison, transportation is studied in multiple departments in several colleges. CFIRE helps these departments work together on transportation research, education, and outreach. The Transportation Management and Policy Graduate Certificate Program has furthered the education of transportation students by providing a cross-disciplinary opportunity to study transportation. As the CFIRE lead institution, University of Wisconsin–Madison students and faculty gain from being at the center of cutting-edge interdisciplinary transportation research from various institutions.



University of Illinois–Chicago

Faculty Representative: Kazuya Kawamura, PhD

The Urban Transportation Center at the University of Illinois–Chicago works with national, state, regional and local transportation agencies, non-profits, industry, and other universities to address issues such as congestion and demand management, land-use and urban sprawl, transportation data and software, freight planning and forecasting, and social equity in mobility and accessibility of all sectors of urban populations.



University of Wisconsin–Milwaukee

Faculty Representative: Alan Horowitz, PhD

At the University of Wisconsin–Milwaukee, transportation is highlighted at the Center for Urban Transportation Studies (CUTS), an interdisciplinary group of faculty and students who share a common interest in the various aspects of transportation. Faculty associated with the Center for Urban Transportation Studies have participated in a wide range of outreach activities ranging from teaching of short courses, workshops, and institutes to the provision of online transportation information retrieval services.



University of Wisconsin–Superior

Faculty Representative: Richard Stewart, PhD

The University of Wisconsin–Superior, Wisconsin's public liberal arts college, offers an undergraduate major in Transportation and Logistics Management. This program was designed with the aid of business educators and industry leaders, and it is the first of its kind in Wisconsin. University of Wisconsin–Superior is also home to the Transportation and Logistics Research Center and the Great Lakes Maritime Research Institute.



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TOLEDO
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University of Toledo

Faculty Representative: Peter Lindquist, PhD

In addition to being a CFIRE consortium member, The University of Toledo University Transportation Center (UT-UTC), a Tier II UTC, focuses on economic development through transportation research and education. The initial plan for the Center was articulated by businesses that depend on transportation to compete successfully in a global economy. The University of Toledo is also the home of the Intermodal Transportation Institute, which develops technology-enabled intermodal transportation systems and supply chains that promote economic development and quality of life.

CFIRE Committees

Research Advisory Committee

Dr. Teresa Adams
University of Wisconsin–Madison

Dr. Jessica Guo
University of Wisconsin–Madison

Dr. Tracey Holloway
University of Wisconsin–Madison

Dr. Michael Oliva
University of Wisconsin–Madison

Dr. David Noyce
University of Wisconsin–Madison

Dr. Richard Stewart
University of Wisconsin–Superior

Michael Onder
Federal Highway Administration

Dan Murray
American Transportation Research Institute

Daniel Yeh
Wisconsin DOT

Keith Bucklew
Indiana DOT & Mid-America Freight
Coalition

Executive Committee

Dr. Teresa Adams
University of Wisconsin–Madison

Rep. Steve Kagen
US Congress WI-8

Rep. Thomas Petri
US Congress WI-6

Sec. Frank Busalacchi
Wisconsin Department of
Transportation

Gary Carr
Federal Railroad Administration

Patrick Goss
Wisconsin Transportation Builders
Association

Glen Nekvasil
Lake Carriers Association

Adolf Ojard
Duluth Seaway Port Authority

George Poirier
Federal Highway Administration

Allen Radliff (retired in 2010)
Federal Highway Administration

Craig Thompson
Transportation Development
Association of Wisconsin

John Duncan Varda
Central Corridors Freight Committee

Rep. Jeff Stone
Wisconsin Assembly

Sen. Jeff Plale
Wisconsin Assembly

Bill Browder
Federal Railroad Administration

Tony Furst
FHWA Office of Freight Management
and Operations

Dan Murray
American Transportation Research Institute

Tom Howells
Wisconsin Motor Carriers Association

Mark Oesterle
Federal Motor Carriers Safety
Administration

R.J. Pirlot
Wisconsin Manufacturers and
Commerce

Leon Hank
Michigan DOT & Mid-America
Association of State Transportation
Officials

Tom Vandenburg
Schneider International

Staff News

Wagner Joins CFIRE Staff



Steve Wagner has joined CFIRE as Communications Coordinator, bringing more than ten years of technical editing, web development, and communications experience to the Center.

Before joining CFIRE, Wagner served as an editor for NIATx at the University of Wisconsin–Madison, where he developed online learning kits, wrote and edited proposals and presentations, and drove the organization’s social networking efforts. He has also worked as a technical editor and web developer in both the telecommunications and software development industries. Wagner is responsible for all aspects of CFIRE communications, in print, and on the Internet.

Wagner holds a BA in Classics and English from the University of Wisconsin–Madison and a MA in English from the University of Virginia.

Adams Sabbatical at the US DOT



CFIRE Director Teresa Adams spent the 2009-2010 academic year on sabbatical from the Center, working for the US DOT as Visiting Professor and Analyst in the Office of the Assistant Secretary for Policy. In this position, she worked on the Economic Review Team of the Transportation Investment Generating

Economic Recovery (TIGER) discretionary grants program to evaluate the quality and outcome of the cost-benefit analysis of the 165 highly recommended TIGER grant proposals. She also worked on a plan for measuring the performance of the 51 selected TIGER projects and their progress toward the strategic goals of the TIGER program: state of good repair, economic competitiveness, livability, sustainability, and safety.

Adams also prepared several background papers for the Innovative Financing Working Group of the US–China Transportation Forum, entitled "Economic Recovery and Reinvestment, including High-Speed Rail and TIGER Discretionary Grants," "Private Involvement in Roads and Highways," and "Public Revenue for Roads and Highways."

Her experience at the US DOT will also help her further improve the performance of the Center and her role as Director. Adams returned to the Center in the Summer of 2010 and resumed teaching in the Fall of 2010.

Coalition News

Mid-America Freight Coalition

The Mississippi Valley Freight Coalition (MVFC) is now the Mid-America Freight Coalition (MAFC). The coalition’s Technical Committee voted on October 26, 2010 to change the name of the coalition to the Mid-America Freight Coalition (MAFC), effective immediately. This change is consistent with the new name of the American Association of State Highway Transportation Officials (AASHTO) region to which the coalition’s ten member states belong. Formerly the Mississippi Valley Conference (MVC), this AASHTO region is now known as the Mid-America Association of State Transportation Officials (MAASTO).

The ten coalition states share key interstate corridors, inland waterways, and the Great Lakes. These ten states are: Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. The MAFC is staffed by the National Center for Freight and Infrastructure Research and Education (CFIRE), a national University Transportation Center (UTC) at the University of Wisconsin–Madison, and coordinated in conjunction with the Wisconsin Department of Transportation (WisDOT).

"CFIRE is committed to working with the coalition state DOTs. The MAFC provides us with rich opportunities for research, education, and outreach activities of our national UTC," said CFIRE Director Teresa Adams.

The Mid-America Freight Coalition began in 2002 as the Upper Midwest Freight Corridor Study, operated as the Mississippi Valley Freight Coalition from 2006 to 2010, and has been authorized and funded through 2012. During the coming two-year period, the coalition will focus its research and outreach efforts on commercial vehicle operations training, economic analysis training, and the creation of a regional freight plan. The departments of transportation of the ten member states provide two thirds of the \$750,000 funding for the 2011-2012 MAFC program; one third is provided by CFIRE.

"The members and staff of the Coalition are energized to begin developing a regional freight plan that will combine the efforts of each of the states to define a vision of how freight could move through the region," said MAFC Facilitator Ernie Wittwer.

Even though the name of the coalition is changing, its mission remains the same. The MAFC will remain focused on the planning, operation, preservation, and improvement of freight transportation infrastructure and networks in the coalition’s ten member states.

CFIRE Research

CFIRE engages in innovative research with the aim of advancing freight knowledge to better meet current and future needs. CFIRE awards research projects across a wide range of freight-related topics, focused under four Signature Technical Areas of Research (STARs):

Design, Materials, and Construction Processes for Highway, Harbor, and Rail Infrastructure

Dr. Michael Oliva, Associate Director

Multimodal Systems Optimization and Planning

Dr. Jessica Guo, Associate Director

Traffic Operations and Safety

Dr. David Noyce, Associate Director

Energy and Environment

Dr. Tracey Holloway, Associate Director

Research at CFIRE is undertaken by an experienced and professional team of researchers from various disciplines and multiple institutions working in a collaborative manner in order to address our nation's issues in sustainable freight transportation infrastructure and systems.

MAFC Research



The Mid-America Freight Coalition (MAFC) is a regional effort for cooperation in the planning, operation, preservation, and improvement of transportation infrastructure in the Midwest. This region includes ten states

(Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Ohio, and Wisconsin) that share key Interstate corridors, rail infrastructure, and inland and Great Lakes waterways.

MAFC 2010–2012 Plan

In the Summer of 2010, the MAFC Executive Committee authorized the Coalition for an additional two years, through 2012.

The 2011-2012 MAFC program includes changes to the governance structure of the Coalition, to streamline the committees and involve more MPO representatives. During these two years, the MAFC will focus its research and outreach efforts in several areas:

- Commercial Vehicle Operations Training
- Economic Analysis Training
- Regional Freight Plan

Two thirds of the \$750,000 funding for the 2011-2012 MAFC program is provided by the ten member states; one third is provided by CFIRE.

CFIRE will continue to provide coordination and member support for the Coalition.

For more extensive descriptions of each of the CFIRE and MAFC projects, visit cfire.wistrans.org.

Completed Research Projects

These projects were completed in Grant Year 4:

- CFIRE 01-09: Operational Resilience of the I-90/94 Corridor
- CFIRE 02-05: 3D Design Terrain Models for Construction Plans and GPS Control of Highway Construction Equipment
- CFIRE 02-10: Assessment of Near-Term Strategies for Freight Transport Emission Reduction
- CFIRE 03-01: Consumer Adoption and Grid Impact Models for Plug-in Hybrid Electric Vehicles in Wisconsin
- CFIRE 03-02: Managing Challenges of Import Safety in a Global Market
- CFIRE 03-03: Compass 2008 Data Analysis and Reporting
- CFIRE 03-09: North/West Passage Corridor-Wide Commercial Vehicle Permitting
- CFIRE 03-23: Freight Corridor Performance in the Mississippi Valley Region
- CFIRE 04-02: Great Lakes Maritime Education for K-12 Teachers
- MVFC 05: Assessment of Multimodal Freight Bottlenecks and Alleviation for Upper Midwest Region
- MVFC 09: Develop Regional Recommendations for Reauthorization

These projects were completed prior to Grant Year 4:

- CFIRE 01-01: Trucker's Guide to Wisconsin: Regulations and Requirements for Wisconsin Motor Carriers
- CFIRE 01-02: Analysis of Permit Vehicle Loads in Wisconsin
- CFIRE 01-04: Low Cost Strategies to Increase Truck Parking in Wisconsin
- CFIRE 01-05: Costs and Benefits of Increasing Load Size for Certain Circumstances of Freight in Wisconsin
- CFIRE 01-06: Compass 2007 Data Analysis and Reporting

- CFIRE 01-07: Asset Management for Environmental Mitigation Projects
- CFIRE 01-10: 21st Century Workforce Development Summit
- CFIRE 02-01: Wisconsin Truck Size and Weight Study
- CFIRE 02-12: Implementation of GPS Controlled Highway Construction Equipment: Phase II
- CFIRE 02-13: Implementation of GPS Machine Controlled Grading: Phase III
- CFIRE 02-15: Innovative Bridge Research and Construction 2005
- CFIRE 03-21: Training on Automated Machine Guidance
- MVFC 01: Regional Freight Transportation Workshop and Meetings
- MVFC 02: Logistics for the Public Sector Training Course
- MVFC 03: Model Freight Planning Approaches
- MVFC 04: Mississippi Valley Freight Coalition Expanded Truck Parking
- MVFC 06: Mississippi Valley Freight Information Clearinghouse

Trucker's Guide to Wisconsin: Regulations and Requirements for Wisconsin Motor Carriers

Principal Investigator: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project created the *Trucker's Guide to Wisconsin: Regulations and Requirements for Motor Carriers* at the request of the Wisconsin DOT. This handbook serves as a reference for commonly requested information for dispatch operators and owner-operators.

CFIRE 01-01

Analysis of Permit Vehicle Loads in Wisconsin

Principal Investigator: Jian Zhao, Department of Civil Engineering and Mechanics, University of Wisconsin–Milwaukee

This project gathered and evaluated representative oversize and overweight (OSOW) vehicle configurations in Wisconsin, created a database with detailed vehicle configurations, and identified the configurations that best envelop the permit vehicles in Wisconsin. This information was used to propose modifications to Standard Permit Vehicles based on moment and shear in representative bridge spans caused by these vehicles; provide modifications to the Wisconsin Bridge Manual; establish guidelines for future evaluation and adaptation of permits to evolving OSOW vehicle configurations; and, document the existing state-of-practice of OSOW permit issuance.

CFIRE 01-02

Low Cost Strategies to Increase Truck Parking in Wisconsin

Principal Investigators: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison; Bruce (Xiubin) Wang, Texas Transportation Institute, Texas A&M University

This project provided a detailed examination of overnight parking options for trucks in Wisconsin (outside of all Wisconsin Interstate highways) and identified optimal locations and low-cost strategies for providing truck parking. This project produced an inventory of designated truck parking facilities along state highways and provided the information that allowed the state of Wisconsin to increase short-term truck parking where it is needed most.

CFIRE 01-04

Costs and Benefits of Increasing Load Size for Certain Circumstances of Freight in Wisconsin

Principal Investigator: Jason Bittner, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project identified and quantified the impacts of increasing the gross vehicle load limit for international containers to above 80,000 pounds in Wisconsin. Researchers examined container vehicle load limit regulations in Wisconsin and its neighboring states, identified the key barriers and motives that determine vehicle load limits, and conducted case studies on select freight corridors and select commodities of local and regional interest.

CFIRE 01-05

Compass 2007 Data Analysis and Reporting

Principal Investigator: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project provided data analysis and reporting for the 2007 Compass Report. Specifically, researchers provided data reduction and prepared data tables and figures for two reports: 1) Compass Wisconsin State Highway 2007 Maintenance, Traffic, and Operations Conditions Executive Overview Report and 2) Compass Wisconsin State Highway 2007 Maintenance, Traffic, and Operations Conditions Operational Report.

CFIRE 01-06

Asset Management for Environmental Mitigation Projects: Tool for Tracking Environmental Commitments

Principal Investigator: Jason Bittner, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project created an inventory of and a tool for tracking environmental mitigation projects constructed in conjunction with transportation projects in Wisconsin. Researchers collected documentation on existing cultural resources, hazardous materials, wetlands, and wildlife accommodation commitments throughout Wisconsin; reviewed the state of the practice in other states and municipalities for collecting and tracking environmental commitments; investigated the reports contained in the WisDOT Transportation Synthesis Report; developed an electronic inventory and asset management tool to assist WisDOT managers in collecting this information; and, provided recommendations for additional inventory features.

CFIRE 01-07

Operational Resilience of the I-90/94 Corridor

Principal Investigator: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project evaluates the resiliency of the I-90/94 corridor from Beloit to Hudson, Wisconsin. Researchers will provide information to help the Wisconsin DOT ensure reliable function of this major corridor while maintaining the corridor's normal pass-through capacity. They will also provide recommendations for areas in need of enhancement and strategies for shifting traffic to alternate routes in times of need.

CFIRE 01-09

21st Century Workforce Development Summit

Principal Investigator: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project coordinated the 21st Century Transportation Workforce Summit, which focused on the needs of the next generation of transportation professionals and how to maintain high quality employees. Researchers conducted pre-summit surveys of state and Federal Highway Administration (FHWA) divisions, universities, and consultants with respect to workforce challenges; prepared an assessment of current workforce status; sampled best practices for current and future workforce development and recruitment; and coordinated with ongoing activities

of the Council of University Transportation Centers (CUTC) and the FHWA.

CFIRE 01-10

Wisconsin Truck Size and Weight Study

Principal Investigator: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project conducted a comprehensive review of Wisconsin's truck size and weight regulations in the light of changing patterns of economic growth and logistics, continued increases in truck traffic, and numerous requests for changes to the regulations. Researchers participated in the Stakeholder Outreach and Advisory Committee activities of the Size and Weight Study, coordinated the peer review process, and developed a performance-based process for evaluating and administering Wisconsin truck size and weight laws.

CFIRE 02-01

3D Design Terrain Models for Construction Plans and GPS Control of Highway Construction Equipment

Principal Investigator: Awad Hanna, Construction and Materials Support Center, University of Wisconsin–Madison

This project aided transportation organizations in developing strategies to overcome institutional, cultural, and legal impediments to the adoption of 3D design terrain models and creation of more seamless data and work flows from design through construction. Researchers described the state of the art in adoption of 3D transportation design and construction technologies; described potential benefits and productivity gains from using 3D technologies in transportation design and construction; identified and characterized technological, institutional, cultural, and legal impediments to adoption of 3D design and construction technologies; suggested strategies to overcome identified impediments; and incorporated aspects of this research in the educational program of the Department of Civil and Environmental Engineering at the University of Wisconsin–Madison.

CFIRE 02-05

Assessment of Near-Term Strategies for Freight Transport Emission Reduction

Principal Investigator: Paul Meier, Energy Institute, University of Wisconsin–Madison

This project evaluated the costs and benefits of limited biodiesel blending and speed-of-travel reductions of heavy duty diesel vehicles to reduce emissions from Midwest freight transportation. Researchers used MARKAL to



simulate proposed models and quantify the system-wide effects of these changes in order to consider potential adverse impacts, infrastructure requirements, barriers to implementation, and opportunities to maximize air quality and human health benefits. This analysis provided spatially explicit quantification of the net changes in ozone precursor, particulate matter, and greenhouse gas emissions.

CFIRE 02-10

Implementation of GPS Controlled Highway Construction Equipment: Phase II

Principal Investigator: Awad Hanna, Construction and Materials Support Center, University of Wisconsin–Madison

This project built on the specification and procedures developed in 2006 by the Wisconsin DOT and the Construction and Materials Support Center (CMSC) for GPS machine guidance on highway grading operations. In this phase, researchers planned and conducted five pilot projects that used GPS machine control for grading on Wisconsin DOT highway projects; collected and analyzed structured data of the pilot projects' experiences; and, applied these results to the refinement of the specification and field procedures for future phases.

CFIRE 02-12

Implementation of GPS Machine Controlled Grading: Phase III

Principal Investigator: Awad Hanna, Construction and Materials Support Center, University of Wisconsin–Madison

This project built on the specification and procedures developed in 2006 by the Wisconsin DOT and the Construction and Materials Support Center (CMSC) for GPS machine guidance on highway grading operations. In this phase, there are five grading contracts that were selected by the regions as good candidates for GPS machine guidance and specifications, and an additional project that will be part of the 2008 pilot program.

CFIRE 02-13

Innovative Bridge Research and Construction 2005

Principal Investigator: Michael Oliva, Construction and Materials Support Center, University of Wisconsin–Madison

This project aimed to design and construct an effective and efficient system of precast substructure elements and precast superstructure elements. Researchers assessed the overall costs and risks of these structures in the state

of Wisconsin by comparing the proposed system to existing slab bridge systems. The results are applicable to future bridge systems. The cost benefit analysis included traffic and freight impacts.

CFIRE 02-15

Consumer Adoption and Grid Impact Models for Plug-in Hybrid Electric Vehicles in Wisconsin

Principal Investigator: Giri Venkataramanan, Department of Electrical and Computer Engineering, University of Wisconsin–Madison

This project assessed the demand for plug-in hybrid electric vehicles (PHEV) in Wisconsin and its economic impacts on the state's energy market and the electric grid. Researchers assessed the market potential for PHEVs and estimated the associated vehicle charging patterns, electricity consumption, and infrastructure needs.

CFIRE 03-01

Managing Challenges of Import Safety in a Global Market

Principal Investigator: Vicki Bier, Center for Human Performance and Risk Analysis, University of Wisconsin–Madison

This project examined market, regulatory, and hybrid approaches to managing risk from deliberate or intentional contamination of imported commodity projects, including mass-produced, unspecialized products, such as foods, bulk chemicals, spices, and nutritional supplements, which are often produced at substantially lower prices abroad, by small suppliers who can enter and exit the market easily.

CFIRE 03-02

Compass 2008 Data Analysis and Reporting

Principal Investigator: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project provided data analysis and reporting for the 2008 Compass Report. Specifically, researchers provided data reduction and prepared data tables and figures for two reports: 1) Compass Wisconsin State Highway 2008 Maintenance, Traffic, and Operations Conditions Executive Overview Report and 2) Compass Wisconsin State Highway 2008 Maintenance, Traffic, and Operations Conditions Operational Report.

CFIRE 03-03

North/West Passage Corridor-Wide Commercial Vehicle Permitting

Principal Investigators: Ernie Wittwer and Bob Gollnik, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project aimed to identify how the states of the North/West Passage Corridor coalition might pursue a regional permitting agreement, what such an agreement would mean for each state's Department of Transportation, and the level of industry demand in the eight states for regional permitting services.

CFIRE 03-09

Training on Automated Machine Guidance

Principal Investigator: Awad Hanna, Construction and Materials Support Center, University of Wisconsin–Madison

This project built on the specification and procedures developed in 2006 by the Wisconsin DOT and the Construction and Materials Support Center (CMSC) for GPS machine guidance on highway grading operations. These new specifications and procedures created the need for training field staff to administer contracts involving GPS machine guidance. These training materials introduced operating principles of the Global Navigation Satellite System (GNSS), the Global Positioning System (GPS), and Automated Machine Guidance (AMG); conveyed the practical experiences of AMG pilot project engineers; and provided field demonstrations and hands-on use of GPS and AMG technology.

CFIRE 03-21

Freight Corridor Performance in the Mississippi Valley Region

Principal Investigator: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project uses data from the Freight Performance Measurement (FPM) system to assess the performance of significant freight corridors in the ten states of the Mid-America Freight Coalition (formerly the Mississippi Valley Freight Coalition).

CFIRE 03-23

Great Lakes Maritime Education for K-12 Teachers

Primary Investigator: Joan Chadde, Michigan Technological University

This project aims to increase K-12 teachers' understanding of shipping on the Great Lakes, and increase their ability

to teach their students about Great Lakes Maritime Transportation in the core subjects of science, math, language arts, and social studies.

CFIRE 04-02

Note: Prior to October 2010, the Mid-America Freight Coalition (MAFC) operated as the Mississippi Valley Freight Coalition (MVFC). Projects originating in this period refer to the Mississippi Valley Freight Coalition and are designated with the MVFC prefix for the purposes of continuity and historical consistency.

Regional Freight Transportation Workshop and Meetings

Principal Investigator: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project examined the role of the federal government in freight activities, the need for freight-specific funding, and a multi-modal approach to freight investment in preparation for testimony at the 2007 field hearings of the National Surface Transportation Policy and Revenue Study Commission. This effort also further defined the strategic direction of the Mississippi Valley Freight Coalition and helped prioritize near-term projects for the MVFC Pooled Fund.

MVFC 01

Logistics for the Public Sector Training Course

Principal Investigators: Ernie Wittwer, National Center for Freight and Infrastructure Research and Education; Bruce Wang, Texas Transportation Institute, Texas A & M University

This project developed a two-day course to teach public agency staff members the concepts of logistics that are common to private sector shippers and carriers so that they can better understand the needs of the freight community. The course is now available on the CFIRE website.

MVFC 02

Model Freight Planning Approaches

Principal Investigator: Jessica Guo, Transportation and Urban Systems Analysis Laboratory, University of Wisconsin–Madison

This project gathered best practices related to the task of freight planning for medium- and large-size Metropolitan Planning Organizations (MPOs) and their affiliated state DOTs to provide better tools to the public sector staff who work with freight providers or in freight planning.



Researchers produced a guidebook that state and MPO planners can use to assist them in preparing the freight components of their long-range plans. The guidebook is also available as a series of audio-enhanced PowerPoint presentations.

MVFC 03

Mississippi Valley Freight Coalition Expanded Truck Parking

Principal Investigator: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project provided a detailed examination of overnight parking options for trucks on Interstate highways in the ten states of the Mississippi Valley Freight Coalition. Researchers supplied states with information about whether parking facility improvements are most needed and why, along with important characteristics for new facilities.

MVFC 04

Mississippi Valley Freight Information Clearinghouse

Principal Investigator: David Noyce, Traffic Operations and Safety Laboratory, University of Wisconsin–Madison

This project designed and implemented the basic structure of a reliable traveler information clearinghouse for the ten-state Mississippi Valley region that provides information that commercial vehicle operators and associated industries can use to improve region-wide mobility and safety.

MVFC 06

Assessment of Multimodal Freight Bottlenecks and Alleviation for Upper Midwest Region

Principal Investigator: Jessica Guo, Transportation and Urban Systems Analysis Laboratory, University of Wisconsin–Madison

This project developed an inventory of freight bottlenecks on regionally significant routes and modes, including highway, rail, and water. Researchers identified these bottlenecks, rank them within each mode, assessed bottleneck rankings across the multiple transportation modes, developed an inventory of planned projects for addressing these bottlenecks, and recommended additional solutions for the region.

MVFC 05

2008 Workshop on Responding to National Transportation Initiatives

Principal Investigator: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project identified key areas of interest for the Mississippi Valley Freight Coalition in the work of the National Commission on Surface Transportation Policy and Revenue and National Surface Transportation Infrastructure Finance Commission, as well as AASHTO's transportation vision, and ARTBA's Critical Commerce Corridors Proposal. Members of the MVFC discussed these issues and conducted needed coalition business.

MVFC 07

Develop Regional Recommendations for Reauthorization

Principal Investigators: Teresa Adams and Ernie Wittwer, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project evaluated, documented, and obtained consent from the ten member states for freight-specific positions of the MVFC on reauthorization. Researchers considered the needs for adequate investment in the freight transportation system, for freight-specific revenue sources, for strong national leadership in freight policy development, for new institutional arrangements, for an integrated, multi-modal freight system, for a national rail policy, for increased maritime investment, and for the creation and implementation of performance measures. Supporting materials outlined these positions and their rationale.

MVFC 09

Assessment of Near-Term Strategies for Freight Transport Emission Reduction

Spotlight: Completed Research Project (CFIRE 02-10)

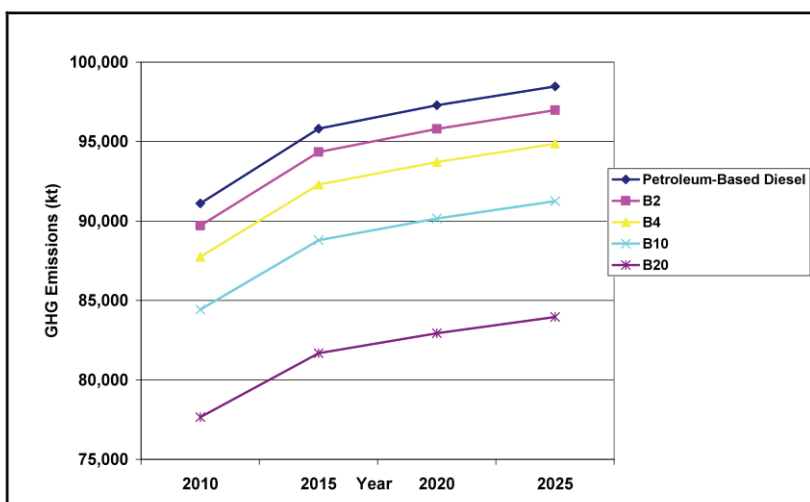
According to the “Assessing the Effects of Freight Movement on Air Quality at the National and Regional Level” study, published by the FHWA in April 2005, heavy duty vehicles are the largest contributors to US freight-related nitrogen oxide and particulate emissions, emitting approximately 33 percent and 25 percent of all mobile-source nitrogen oxide and particulate matter emissions, respectively. These emissions pose risks to both public health and the environment. In addition, greenhouse gas emissions from trucking increased by 80 percent between 1990 and 2007, while greenhouse gas emissions from all transportation activities increased only 29 percent during the same period.

One possible near term alternative solution to these problems is to increase the blending of biodiesel. This project—Assessment of Biodiesel Scenarios for Midwest Freight Transport Emission Reduction (CFIRE Project 02-10)—was conducted by Paul Meier (principal investigator), Anjali Sauthoff, and Tracey Holloway and was funded by CFIRE and the UW Energy Institute. This study addressed the potential emissions benefits of biodiesel blending for use in heavy-duty diesel vehicles in Illinois, Indiana, Michigan, Ohio, and Wisconsin, and examined whether these biodiesel blends offer a potential short-term, low-cost way to reduce freight-related emissions. The project team evaluated transportation end-use emissions to quantify particulate matter and nitrogen oxide and greenhouse gas emissions from heavy-duty diesel vehicles, assuming biodiesel blending replaced an increasing percentage of the petroleum-based diesel projected for freight transport. This study evaluated four scenarios of biodiesel blending, with blend percentages ranging from 2 percent to 20 percent, which can be used in current, unmodified diesel engines without maintenance and performance issues. Emissions from these scenarios were compared to a reference case scenario in which heavy duty transport was fueled by 100 percent petroleum diesel.

The results of this study suggest that the use of biodiesel blends may only slightly reduce particulate matter emissions and may have little impact on nitrogen oxide emissions.

“Identifying the appropriate emission factors requires more research attention. Much of the newly emerging heavy duty vehicle technologies have yet to be tested in the context of biodiesel blend use,” commented Meier.

Still, the estimated effect of biodiesel blends on these pollutants was limited relative to the larger emissions reductions anticipated from technology and fuel mandates. Over the entire transportation sector, major reductions in particulate matter and nitrogen oxide emissions are anticipated between 2010 and 2025 as a result of improvements to vehicle exhaust controls, vehicle efficiency, and fuel modifications. Over this same time period, however, emissions of greenhouse gases are projected to increase.



Projected GHG emissions from region 3 heavy duty diesel vehicle fleet reflecting an increase in total emissions from 2010 to 2025.

The study showed that biodiesel blends may be effective in diminishing greenhouse gases based evaluation using the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model. The challenge lies in producing adequate quantities of biodiesel in a sustainable manner, as current projections for soy-based biodiesel are limited.

“Greenhouse gas benefits are currently difficult to incentivize given the absence of regulation to address climate change. In the meantime, other multi-pollutant strategies, such as improving trucking fleet fuel efficiency, reducing freight idling, more fuel-efficient modes of freight movement, or some combination of these alternatives should be considered,” said Meier.

For more information about this project and others, visit cfire.wistrans.org.

North/West Passage Corridor-Wide Commercial Vehicle Permitting

Spotlight: Completed Research Project (CFIRE 03-09)

The North/West Passage Corridor Coalition includes the eight states along the I-90/94 Interstate corridor from Washington to Wisconsin. The coalition is dedicated to integrating traveler information, promoting cross-border cooperation and coordination of operations, maintenance of ITS infrastructure, and the integration of ITS projects for planning and programming.

The states of the North/West Passage Corridor, recognizing the importance of the efficient movement of freight-hauling trucks along the corridor, recently conducted a review the available methods for a regional permitting process for oversize and overweight (OSOW) trucks.

MAFC Facilitator Ernie Wittwer and CFIRE Researcher Bob Gollnik led a project—North/West Passage Corridor-Wide Commercial Vehicle Permitting (CFIRE 03-09)—funded by the North/West Corridor Coalition to investigate the available methods for a regional OSOW permitting process in these states.

The project team employed a multi-pronged methodology for evaluating the potential for a regional OSOW permitting process. They conducted a thorough literature review and analyzed the websites of the Western Association of State Highway and Transportation Officials (WASHTO), the Southeastern Association of State Highway and Transportation Officials (SASHTO), and the New England Transportation Consortium (NETC) to understand the workings of each compact and how they issue OSOW permits.

In addition to this review and analysis, researchers identified a set of questions that they used during interviews and to construct an online survey. These questions focused on the details of the permitting process from an agency perspective, and focused on the legal, administrative, and technical aspects of participation in a regional permitting compact. The project team surveyed 14 states in WASHTO, SASHTO, and NETC. They also surveyed the State of Missouri, which provided the perspective of an agency not currently participating in a permitting compact. All of the eight states in the North/West Passage Corridor Coalition where interviewed in order to better understand their permitting processes and their concerns about change.

The project team also contacted truckers or trucking associations in all of the states participating in this study. Truckers were asked questions designed to elicit a better understanding of their views of the permitting

process, including what works well and where there are opportunities for improvement.

The project team identified three technically feasible approaches to implementing a regional OSOW permitting process in the states of the North/West Passage Corridor Coalition.

1. Expand WASHTO. The Western Association of State Highway and Transportation Officials (WASHTO) is a regional permitting compact made up of 12 states in the west and south, including three of the eight states



in the North/West Passage Corridor. While this is clearly the most immediately feasible approach, the non-WASHTO states have raised a number of concerns about the approach used by WASHTO. For some, it would be a step backward technologically. For others it may have an impact on workload. For still others, the envelope approach to allowable loads is too restrictive. In short, none of the five non-WASHTO states seem willing to embrace this approach in its current form.

2. Use a common system, such as the Bentley GOT Permits system, used by South Dakota and Nebraska (as well as Alabama, New Jersey, and West Virginia). While this is by far the most technologically elegant option because it allows self-issued permits for a wide range of loads, it also comes with a high cost. A reasonable estimate puts that cost at \$1–3 million per state.

3. Use a virtual system, such as the approach being taken by Minnesota and Wisconsin in their effort to better share resources between states. This effort centers upon an open-source interface that would allow carriers to apply for permits from several states simultaneously. The states would then process the permits individually and return them to the applicant. The drawback of this system is that it has not yet been developed; as such, the cost cannot be accurately determined.

Each of these options has its attractions and its drawbacks. However, there are still a number positive actions that could be taken in the near term, all of



which involved improved communication and planning among the states. Based on the interview and survey responses from both the states and truckers, the project team recommends two approaches to bridge the OSOW permitting gaps between the two AASHTO regions (WASHTO and the MAASSTO) in the North/West Passage Corridor Coalition.

- Harmonizing regulations among the states could provide a significant savings to specialized carriers that move large loads across the states. Some of the issues at hand seem manageable, not requiring legislative action in most states.
- Harmonizing curfews and holidays so that restrictions tend to blend at the state line will prevent crews from sitting idle as they wait for the curfew to pass. This is most obvious in those states adjacent to major urban areas, such as the Twin Cities or Denver. These cities

- want loads to move at night in off-peak traffic periods. Could those adjacent states provide some exceptions to haulers who are moving through these urban areas?
- Harmonizing escort requirements will also save time and money. Consider a load that went through two states, a park, and a reservation, requiring four different escort arrangements. Did this improve the safety of the movement, or did it simply add needless costs?
- Standardizing signing and lighting requirements is also manageable. States should be able to agree on the message and the dimension of the signs to best deliver that message.
- Standardizing available permitting requirements and other information will also help truckers. Some states now have a large amount of information available online in an understandable language and format. Others have much less information available, and it is often much less understandable.
- A common user interface will significantly increase customer comfort and satisfaction. Coupling this with an effort to standardize the required information would go even farther.

These items are relatively simple and provide a solid foundation for further improvements to the regional permitting process in the North/West Passage Corridor Coalition.

“This project demonstrates an understanding on the part of the Northwest Passage states that public sector rules and requirements can produce unintended costs for the trucking industry. This project is one step toward reducing those costs,” said Wittwer.

The project team also recommends a dual-track method for improving communications among the states and with the trucking industry. In one track, state representatives could begin to discuss the potential for expanding WASHTO and how some of the problems might be addressed. On another track, these representatives could engage carriers in order to identify the regulatory issues where change might have the greatest benefit. Following these parallel tracks will produce progress over time and lay the groundwork for greater improvements in the future.

For more information about this project, consult the final report at cfire.wistrans.org.

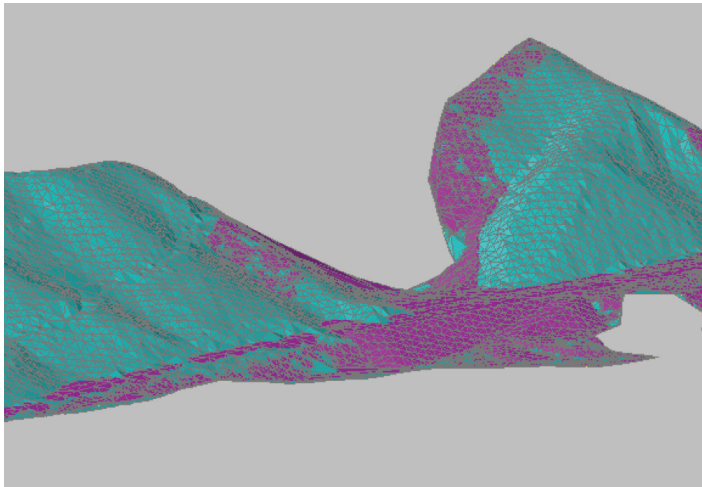
3D Design Terrain Models for Construction Plans and GPS Control of Highway Construction

Completed Research Project (CFIRE 02-05)

Automated Machine Guidance (AMG) uses three-dimensional (3D) digital models of design surfaces to guide construction equipment in the field. AMG has a number of clear benefits, including lower construction costs, greater accuracy, less repeat work, and less staking. Contractors report productivity gains as high as 40 percent.

AMG and 3D design software have developed rapidly in recent years. However, adoption of these technologies has been much slower, slowed in part by their spatial nature and increased complexity. However, there are also institutional, cultural, and legal obstacles to the implementation of 3D design technologies at State Highway Agencies (SHAs).

This study—3D Design Terrain Models for Construction Plans and GPS Control of Highway Construction Equipment (CFIRE Project 02-05)—was funded by CFIRE and the Construction and Materials Support Center. Dr. Awad Hanna was the principal investigator; the project team also included Alan Vonderohe and Cassie Hintz.



A 3D View of Short, Hilly Section Surfaces

This research aimed to identify and articulate the benefits of, and impediments to, the adoption of 3D design and AMG by the transportation industry. Building on the work of the National Cooperative Highway Research Program (NCHRP) and others, the project team added their own experience from recent work with the Wisconsin DOT to develop and implement a specification for AMG construction of highway subgrade.

The project consisted of four parts. Researchers conducted a nationwide survey of all SHAs and seven class I railroads. Based on the results of these surveys, three SHAs—Minnesota, Wisconsin, and North Carolina DOTs—were selected for case studies. The project team then compared earthwork calculations done with 2D data

(average-end-area) and 3D data (surface-to-surface). This study also included a description of 3D design software to help guide SHAs when evaluating software for implementation.

Survey Results

The survey was divided into three sections (design, contracting, and construction) and was administered to all fifty SHAs and seven class I railroads. Multiple responders were allowed from each organization so that they could reply only to questions in their area of expertise. The survey response rate was 70 percent.

Eighty-two percent of responding SHAs use AMG, but only 32 percent of these have specifications. Automated machine guidance requires 3D digital models of design surfaces and 80 percent of responding SHAs give contractors primary responsibility for producing these models from 2D plans. Only 19 percent of all responding SHAs have fully adopted design methods that produce a 3D model. Furthermore, 60 percent of respondents assert that engineering consultants rarely or never provide 3D digital data to construction contractors to aid in 3D model development. Survey respondents recognize 3D design model issues as the most important impediment to wider use of AMG.

Although the majority of SHAs have not fully implemented 3D design methods, many agencies are in the process of planning for adoption of them. There are significant benefits associated with 3D design methods beyond support for AMG. The highest ranked additional benefit is detection and elimination of design errors prior to construction, followed by improved visualization, and having a more comprehensive representation of design intent.

However, significant impediments must be overcome by agencies prior to adoption of 3D design methods. The majority of respondents recognize lack of resources, agency lack of knowledge, entrenched business practices, lack of functionality in currently installed software, and required staff training as major obstacles. Ongoing technological advances are addressing lack of functionality, but the other identified impediments beg for education, training, and shared perspectives of agency missions. In addition, translation of data across different software platforms has historically been a problem, but AASHTO and TRB continue to strive for data compatibility standards and vendors have reported to be cooperating.

Legal factors also hinder the transfer of 3D digital data between designers and construction contractors. Only 11

ction Equipment

percent of responding SHAs provide any legal standing for 3D digital data in contract documents. Primary issues include electronic signatures, transfer of liability as related to data exchange, data security, and auditability of plans. Professional licensure for those responsible for 3D model development is also an issue. Although the long-term goal of seamless data transfer might not be realized until 3D design models have legal standing equal to that of 2D plans, there are many other aspects of achieving the goal that are less complex, less fraught with obstacles, and far easier to address in the short term.

There are significant differences in the extent of use of AMG among regions. In the Mississippi Valley Region, 100 percent of responding SHAs use it. On the contrary, only one-third of Northeast Region respondents indicate that they do. There is also considerable variation in the adoption status of 3D design methods among regions. In the Southeast and West Regions, there is a fairly even distribution in the number of agencies that have fully adopted, are planning for adoption, or are considering adopting 3D design methods. However, in the Northeast Region, there are far more agencies in the process of adopting 3D design methods than there are in other categories of adoption status. Also, there are more agencies in the Mississippi Valley Region planning for adoption of 3D design methods than there are in other categories of adoption status.

Case Studies

Case studies of the Minnesota, North Carolina, and Wisconsin DOTs revealed several keys to overcoming impediments to adoption of 3D design methods: buy-in and support from upper-level management; cross-cutting, well-executed implementation planning, with short-term and long-term objectives; management-level oversight and coordination of large, interdependent initiatives; champions: individuals or small groups with vision and commitment who take leadership roles and are persistent at moving forward; timely, well-designed, and delivered education and training at multiple levels within the SHA; and internal and external stakeholder participation in planning and implementation processes.

Earthwork Calculations

The majority of SHAs are still using the average-end-area method to compute earthwork quantities. The surface-to-surface method is possible when 3D models are available, and this method is considered to be more accurate than average-end-area. Moreover, if 3D models are available, the surface-to-surface method is easier than average-end-area because there is no need to generate cross sections.

The project team compared earthwork quantities calculated using the surface-to-surface and average-end-area methods for six different sites, using data provided by the North Carolina and Wisconsin DOTs and two construction contractors from Wisconsin. They computed volumes using the average-end-area method at cross section intervals ranging from 10 to 100 feet to determine effects of cross section interval on the difference between surface-to-surface and average-end-area results. In most cases, researchers found that increasing the cross section interval used in average-end-area earthwork calculations led to larger percentage differences between average-end-area and surface-to-surface results. For large projects, differences in earthwork quantity estimates are large enough to cause considerable cost discrepancies among methods, particularly when 100-foot cross section intervals are used. Cross section intervals of 50 or 100 feet are commonly used in practice when computing earthwork quantities using average-end-area.

Software Descriptions

Means for describing various aspects of 3D design software must be available when assessing alternative choices for implementation. Factors such as support for improved work flows and objectives, ease of use, and software and database structures and relationships need to be considered as well as cost, training, and complexity of implementation (technological and institutional). The project team described a software system using three methods (i.e., user interface, business process hierarchy, and software and database architectures) and provided examples.

Recommendations

Based on the findings of this study, the project team developed recommendations for SHAs in the following stages of implementing AMG and 3D design: seeking buy-in and commitment from upper management; seeking specification development for AMG; moving towards adoption of 3D highway design technology; seeking to develop or improve 3D data flows from design to construction; or seeking broader integration of multiple 3D technologies. For each context, researchers provide a series of recommended actions, tuned to their specific phase in the adoption of AMG and 3D design technologies.

For more information about this project, consult the final report at cfire.wistrans.org.

Assessment of Multimodal Freight Bottlenecks and Alleviation for Upper Midwest Region

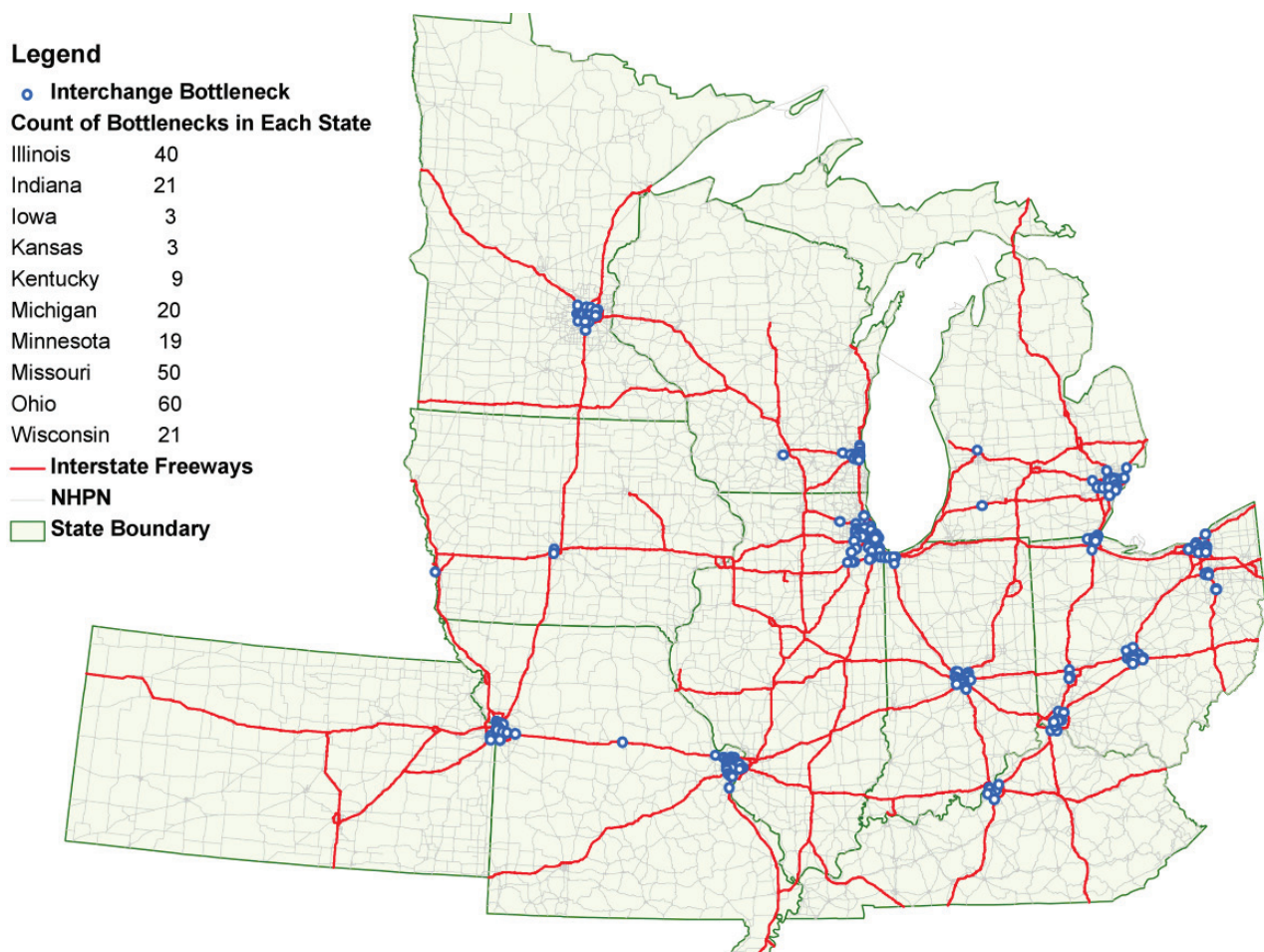
Spotlight: Completed Research Project (MVFC 05)

In 2002, 2.5 billion tons of truck-borne freight traveled through the ten states of the Mississippi Valley region. Current estimates indicate that truck traffic will increase by 62 percent nationwide. Regional freight bottlenecks effect the efficiency of the freight network and create additional costs for shippers, carriers, and the general public.

The Assessment of Multimodal Freight Bottlenecks and Alleviation Strategies for the Upper Midwest Region (MVFC 05) project, conducted by CFIRE Associate Director Jessica Guo, aimed to identify high priority freight bottlenecks in the Mississippi Valley region, assess their relative severity, and recommend strategies for alleviating these bottlenecks.

As a result of this project, researchers recommended a number of steps to support the study and analysis of freight bottlenecks in the Mississippi Valley region. The lack of suitable data is a major obstacle for freight bottleneck research on the rail and maritime modes. The researchers recommended the development of freight advisory committees to improve data collection for freight planning efforts, the establishment of federal requirements for reporting and collecting freight modal data, and the creation of a regional data standardization project to support corridor planning.

Researchers also see the need for additional research about the size and type of commodities carried by trucks



The research team used both quantitative and qualitative data to create an inventory of regional freight bottlenecks and determine where potential future bottlenecks exist. This process produced an inventory of truck bottlenecks on urban and rural freeways and other principal arterials, rail bottlenecks, heavily trafficked ports, and delays in the lock network.

in order to quantify the types, amounts, and values of goods stuck at bottleneck locations; this would allow for a more precise and refined categorization of the severity of bottlenecks backs on economic impact.

For information about this and other CFIRE research projects, visit cfire.wistrans.org.

Ongoing Research Projects

These projects were ongoing at the end of Grant Year 4:

- CFIRE 01-03: Assessing Environmental Impacts Associated with Bases and Subgrades Stabilized with Coal Combustion Products (CCPs)
- CFIRE 01-08: Effective Depth of Soil Compaction in Relation to Applied Contactive Energy
- CFIRE 02-02: Rapid Replacement and Construction of Bridges
- CFIRE 02-03: Bridge Analysis and Evaluation of Effects under Overload Vehicles
- CFIRE 02-04: Reconstruction of Railroads and Highways with In-Situ Reclamation Materials
- CFIRE 02-06: Understanding and Modeling Freight Stakeholder Behavior
- CFIRE 02-07: Understanding Freight Land Use Interrelationships
- CFIRE 02-09: Sustainable Freight Infrastructure to Meet Climate and Air Quality Goals
- CFIRE 02-11: Implementing DTMs for Construction Plans and Earthwork Quantities
- CFIRE 02-14: Great Lakes Timber Professionals
- CFIRE 02-16: Rapid Repair and Replacement Techniques for Transportation Infrastructures Damaged From Natural and Man-made Disasters
- CFIRE 02-17: Deck Truss Monitoring
- CFIRE 02-18: Analytical Model Development and Analysis of the McCleary Bridge
- CFIRE 02-19: Structure B-37-364: McCleary Bridge
- CFIRE 02-20: Rational System for Rating Wisconsin Bridges for Truck Loads
- CFIRE 02-21: Policy Issues in Cruise Line Operations on the Great Lakes
- CFIRE 02-22: Optimization of Log Truck Operations and Regional Log Superyards
- CFIRE 02-23: Establishing Intermodal Service on the Prince Rupert Gateway
- CFIRE 02-24: Evaluation of Air Emission Modal Models
- CFIRE 02-25: Using the Supply Chain Operations Reference (SCOR) in Supply Chain Education
- CFIRE 02-26: Using a Rail Simulator in Teaching Land Transportation
- CFIRE 02-27: Writing a Land Transportation Textbook
- CFIRE 02-28: Making Truck-Rail Intermodal Competitive
- CFIRE 02-29: Freight Planning Support System for Northeast Illinois
- CFIRE 02-30: The Cost of Shipping Commodities
- CFIRE 02-31: Freight Origin-Destination Patterns
- CFIRE 02-32: The Transshipment Problem
- CFIRE 02-33: Midwest FreightView
- CFIRE 03-04: Recycled Unbound Materials
- CFIRE 03-05: Evaluation of Wisconsin Bridges for Truck Loads
- CFIRE 03-06: Low Carbon Logistics through Supply Chain Design and Coordination
- CFIRE 03-07: Developing a Local Roads Website Compendium of Best Practices
- CFIRE 03-08: Freight Model Improvement Project for ECWRPC
- CFIRE 03-10: An Innovative Approach on Highway Bridge Approach Slabs
- CFIRE 03-11: Applying Lean Techniques in Delivery of Transportation Infrastructure Projects
- CFIRE 03-12: A Novel Abutment Construction Technique for Rapid Bridge Construction: Controlled Low Strength Materials (CLSM) with Full-Height Concrete Panels
- CFIRE 03-13: Nanoporous Thin-Film Additives to Improve Precast Concrete Construction of Transportation Facilities
- CFIRE 03-14: Broad Economic Benefits of Freight Transportation Infrastructure Improvement
- CFIRE 03-15: Assessing the Value of Delay to Rank Order Congestion Cost in Freight Movement Performance Evaluation
- CFIRE 03-16: Enhancing Behavioral Realism of Urban Freight Demand Forecasting Models
- CFIRE 03-17: Aligning Oversize and Overweight Truck (OSOW) Permit Fees and Policies with Agency Costs
- CFIRE 03-18: Understanding the Economic, Environmental, and Energy Consequences of the Panama Canal Expansion on Midwest Grain and Agricultural Exports
- CFIRE 03-19: Environmental and Energy Benefits of Freight Delivery Consolidation in Urban Areas
- CFIRE 03-20: WisDOT Major Highway Cost Estimating Workgroup
- CFIRE 03-22: WisDOT Geotechnical Manual Development
- CFIRE 03-24: AASHTO Mechanistic-Empirical Pavement Design Guide Parametric Study
- MVFC 07: 2008 Workshop on Responding to National Transportation Initiatives
- MVFC 08: MVFC Outreach Materials
- MVFC 10: Transportation Profiles for MVFC Commodities
- MVFC 11: Performance Measures for Evaluating Multi-state Projects

Assessing Environmental Impacts Associated with Bases and Subgrades Stabilized with Coal Combustion Products (CCPs)

Principal Investigators: Tuncer Edil and Craig Benson, Recycled Materials Support Center, University of Wisconsin–Madison

This project examines the use of coal combustion products (CCPs) to stabilize bases and subgrades and upgrade highway infrastructure while using recycled materials.

Researchers are using WiscLEACH to assess groundwater impacts caused by the leaching of trace elements from pavement materials stabilized with CCPs, to analyze how different pH conditions affect leaching from CCP materials, and to prepare a report describing the findings from the leaching tests and the modeling efforts.

CFIRE 01-03

Effective Depth of Soil Compaction in Relation to Applied Contactive Energy

Principal Investigator: Dante Fratta, Department of Civil and Environmental Engineering, University of Wisconsin–Madison

This project re-evaluates the 8-inch lift embankment construction requirement in Wisconsin and develops energy and compaction data to determine if lift thickness limitations can be increased while maintaining construction quality and embankment performance, and while also reducing construction costs. This information will help the Wisconsin DOT officials to propose revisions to the current construction specifications and to improve construction operations by creating more stable and economical subgrade structures.

CFIRE 01-08

Rapid Replacement and Construction of Bridges

Principal Investigator: P.J. Sriraj, Urban Transportation Center, University of Illinois–Chicago

This project develops a bridge replacement and construction decision-making framework using the Analytical Hierarchy Process (AHP) to exploit innovative methods for accelerated construction of highway and railway bridges that explicitly address materials, design, and prefabrication of bridge elements, and construction machinery for assembling the structural components. The results of this research will be integrated into a graduate-level course in transportation asset management at the University of Illinois–Chicago and the Illinois Institute of Technology.

CFIRE 02-02

Bridge Analysis and Evaluation of Effects under Overload Vehicles

Principal Investigator: Michael Oliva, Construction and Materials Support Center, University of Wisconsin–Madison

This project develops a simplified analysis method to predict the effects of overload vehicles on the bridge system—including deck, girders, bearings, diaphragms, joints, and other major components. This method will provide state and local agencies with an efficient method

for evaluating the effect of overload vehicles on these structures.

CFIRE 02-03

Reconstruction of Railroads and Highways with In-Situ Reclamation Materials

Principal Investigator: Tuncer Edil, Recycled Materials Resource Center, University of Wisconsin–Madison

This project develops methods for in-situ strengthening of transportation roadbeds and rail corridors by reclaiming existing materials in a manner that will be able to sustain heavier loads, have a long life, be economical, minimize energy consumption, minimize greenhouse gas generation during production and transportation, and not introduce new toxic materials into the environment.

CFIRE 02-04

Understanding and Modeling Freight Stakeholder Behavior

Principal Investigator: Jessica Guo, Transportation and Urban Systems Analysis Laboratory, University of Wisconsin–Madison

This project develops a conceptual model of private-sector freight stakeholder decisions and interactions that impact freight demand and that are impacted by policy variables and system conditions. Using East Central Wisconsin as a study area, empirical models will be estimated for selected elements of this conceptual model that are fundamentally significant to the production, attraction, spatial distribution, and modal split of freight movements. The empirical results will be used to formulate recommendations to the East Central Wisconsin Regional Planning Commission (ECWRPC) on freight planning and demand model enhancement.

CFIRE 02-06

Understanding Freight Land Use Interrelationships

Principal Investigator: Kazuya Kawamura, Urban Transportation Center, University of Illinois–Chicago

This project examines the effects of land use on freight transportation and vice-versa to expand the understanding of land use decisions on the efficiency of freight movement and the increased economic competitiveness of a region. Researchers will document the effects of the performance of freight movements on regional economic indicators and location decisions of various types of businesses, as well as the effects of land use on the efficiency of freight movement for different components of most common types of supply chains, and the effects of land use and

socioeconomic characteristics of a region on the demand for freight transportation.

CFIRE 02-07

Sustainable Freight Infrastructure to Meet Climate and Air Quality Goals

Principal Investigator: Tracey Holloway, Center for Sustainability and the Global Environment, University of Wisconsin–Madison

This project quantifies the air quality and climate benefits from the expanded use of railroad freight transport by evaluating the potential environmental and freight transport benefits of the Midwest Regional Rail Initiative (MWRRI). Researchers will use current and projected 2020 freight transport data from the Freight Analysis Framework, EPA emissions models including MOBILE6 and GREET, and the CMAQ model to perform this analysis.

CFIRE 02-09

Implementing DTMs for Construction Plans and Earthwork Quantities

Principal Investigator: Awad Hanna, Construction and Materials Support Center, University of Wisconsin–Madison

This project assists the Wisconsin DOT in the preliminary stages of identifying the relevant design and construction work process for the use of Digital Terrain Models (DTMs) for construction plans and earthwork quantities. This research will help the Wisconsin DOT to answer numerous cultural, legal, and work process questions before beginning to distribute DTMs as contractual documents, eliminate traditional cross sections, use them as a basis for determining final quantities, and allow contractors to construct directly from them.

CFIRE 02-11

Great Lakes Timber Professionals

Principal Investigator: Michael Oliva, Construction and Materials Support Center, University of Wisconsin–Madison

This project develops guidelines for evaluating whether highway bridges need truck load limits and what limits are appropriate. Removal of non-essential load ratings will save the Wisconsin trucking industry many thousands of dollars in fuel costs and reduce truck emissions by shortening haul routes. Researchers will collaborate with the Great Lakes Timber Professionals Association (GLTP), the Wisconsin DOT, and county highway officials.

CFIRE 02-14

Rapid Repair and Replacement Techniques for Transportation Infrastructures Damaged From Natural and Man-made Disasters

Principal Investigator: Michael Oliva, Construction and Materials Support Center, University of Wisconsin–Madison

This project will identify very rapid construction and contracting techniques used by other State Highway Agencies (SHAs), the railway industry, and internationally to repair and replace damaged bridges and other structures; evaluate the identified procedures for applicability by the Wisconsin DOT and the Wisconsin construction industry; and, recommend potential construction and procurement processes for future use by the Wisconsin DOT.

CFIRE 02-16

Deck Truss Monitoring

Principal Investigator: Michael Oliva, Construction and Materials Support Center, University of Wisconsin–Madison

The I-35W Mississippi River bridge was an eight-lane steel truss arch bridge that carried 140,000 vehicles daily across the Mississippi River in Minneapolis, Minnesota. On August 1, 2007, the bridge collapsed. This accident has led to additional emphasis on bridge performance monitoring across the nation. This project helps organize a plan for monitoring the performance of deck truss bridges in Wisconsin.

CFIRE 02-17

Analytical Model Development and Analysis of the McCleary Bridge

Principal Investigator: Michael Oliva, Construction and Materials Support Center, University of Wisconsin–Madison

The I-35W Mississippi River bridge was an eight-lane steel truss arch bridge that carried 140,000 vehicles daily across the Mississippi River in Minneapolis, Minnesota. On August 1, 2007, the bridge collapsed. This accident has led to additional emphasis on bridge performance monitoring across the nation. This project provides the Wisconsin DOT with bridge failure warning signs so that a disaster can be avoided.

CFIRE 02-18

Structure B-37-364: McCleary Bridge

Principal Investigator: Michael Oliva, Construction and Materials Support Center, University of Wisconsin–Madison

The I-35W Mississippi River bridge was an eight-lane steel truss arch bridge that carried 140,000 vehicles daily across the Mississippi River in Minneapolis, Minnesota. On August 1, 2007, the bridge collapsed. This project develops construction guidelines for use in obtaining the vertical road profile over bridge piers by accounting for deflections during construction.

CFIRE 02-19

Rational System for Rating Wisconsin Bridges for Truck Loads

Principal Investigator: Michael Oliva, Construction and Materials Support Center, University of Wisconsin–Madison

This project develops guidelines for evaluating whether highway bridges need truck load limits and what limits are appropriate. Removal of non-essential load ratings will save the Wisconsin trucking industry many thousands of dollars in fuel costs and reduce truck emissions by shortening haul routes. Researchers will collaborate with the Great Lakes Timber Professionals Association (GLTP), the Wisconsin DOT, and county highway officials.

CFIRE 02-20

Policy Issues in Cruise Line Operations on the Great Lakes

Principal Investigator: Richard Stewart, Transportation and Logistics Research Center, University of Wisconsin–Superior

This project evaluates US and Canadian maritime policies that impact the cruise industry on the Great Lakes and the future expansion of the cruise market. Researchers will publish and present a paper that provides recommendations for how to reduce regulatory constraints on the Great Lakes cruise industry while meeting the goals of both nations' policies.

CFIRE 02-21

Optimization of Log Truck Operations and Regional Log Superyards

Principal Investigator: Richard Stewart, Transportation and Logistics Research Center, University of Wisconsin–Superior

This project is a preliminary examination into the potential for optimizing log truck operations and establishing regional log superyards to increase loaded capacity and reduce the production of greenhouse gasses and carbon emissions.

CFIRE 02-22

Establishing Intermodal Service on the Prince Rupert Gateway

Principal Investigator: Richard Stewart, Transportation and Logistics Research Center, University of Wisconsin–Superior

This project investigates the potential establishment of new intermodal services to the Twin Cities region from the Prince Rupert Gateway on routes that serve the Twin Cities through Chicago, Illinois and the Twin Ports of Duluth, Minnesota and Superior, Wisconsin. Researchers will examine transit time, terminal availability, drayage, corridor congestion, asset utilization, interest inventory costs, freight rates, growth potential, circuitry, and transloading on both routes.

CFIRE 02-23

Evaluation of Air Emission Modal Models

Principal Investigator: Mei Cao, Transportation and Logistics Research Center, University of Wisconsin–Superior

This project evaluates the net benefit in the reduction of greenhouse gasses from optimization of log movements. Researchers will consider factors in the vehicle operating environment that may affect modal emissions such as external conditions, vehicle fleet characteristics, vehicle activities, vehicle gasoline specifications, inspection and maintenance programs, and anti-tampering programs. The EPA MOBILE6 model will be used to predict gram per mile emissions of greenhouse gasses based on average speeds for each fleet type under various conditions.

CFIRE 02-24

Using the Supply Chain Operations Reference (SCOR) in Supply Chain Education

Principal Investigator: Mei Cao, Transportation and Logistics Research Center, University of Wisconsin–Superior

This project integrates the Supply Chain Operations Reference (SCOR) into the Supply Chain Management class at the University of Wisconsin–Superior. This will provide students a comprehensive examination of the SCOR model and offer students the methodology for using the SCOR model.

CFIRE 02-25

Using a Rail Simulator in Teaching Land Transportation

Principal Investigator: Mei Cao, Transportation and Logistics Research Center, University of Wisconsin–Superior

This project investigates the use of the rail simulator, a train simulation game which brings the railways to life for students, in a Land Transportation class at the University of Wisconsin–Superior.

CFIRE 02-26

Writing a Land Transportation Textbook

Principal Investigator: Mei Cao, Transportation and Logistics Research Center, University of Wisconsin–Superior

This project creates a land transportation textbook that describes the functions and purposes of land transportation systems, and how they relate to the needs of the shipping and traveling public. The textbook will cover the objectives of transportation and how they are managed, freight and passenger transportation on the rail and highway systems, the function of pipeline systems, and how intermodal systems benefit all facets of the transportation system.

CFIRE 02-27

Making Truck-Rail Intermodal Competitive

Principal Investigator: Kazuya Kawamura, Urban Transportation Center, University of Illinois–Chicago

This project identifies the trends and markets for truck-rail intermodal shipping by examining the relationship between the characteristics of commodities and market segments that include: origin-destination, shipping distance, and value.

CFIRE 02-28

Freight Planning Support System for Northeast Illinois

Principal Investigator: Kazuya Kawamura, Urban Transportation Center, University of Illinois–Chicago

This project develops a policy analysis tool to help public agencies formulate effective strategies for the Chicago region and the Midwest to cope with the anticipated changes in both the volume and the flow pattern of freight traffic in the long term. This analysis tool follows that of the traditional commodity-based freight demand forecasting model, consisting of commodity flow generation, mode choice, and route choice modules. However, each module is developed using a novel approach that addresses the shortcomings of the existing methods.

CFIRE 02-29

The Cost of Shipping Commodities

Principal Investigator: Matthew Petering, Department of Industrial and Manufacturing Engineering, University of Wisconsin–Milwaukee

This project develops a cost model to estimate the cost of shipping a quantity of a commodity between two locations, which will aid public sector decision makers in determining the economic benefits of infrastructure improvements or determining the impacts on the private sector of various policies and operational strategies. Researchers will use the inventory cost model to evaluate the data with shipment cost information to build a cost model for one mode and for several varied commodities carried by that mode.

CFIRE 02-30

Freight Origin-Destination Patterns

Principal Investigator: Alan Horowitz, Center for Urban Transportation Studies, University of Wisconsin–Milwaukee

This project explores the techniques for disaggregating freight origin-destination tables, including information from toll transponders, weigh station transponders, and single-station origin-destination surveys. Researchers will produce workable methods for disaggregating origin-destination tables and solve computational issues associated with very large tables.

CFIRE 02-31

The Transshipment Problem

Principal Investigator: Alan Horowitz, Center for Urban Transportation Studies, University of Wisconsin–Milwaukee

This project develops a model for better macroscopic understanding of transshipment of commodity shipments and its implications for the provision of public infrastructure. Researchers will study transshipment using travel forecasting models that predict the probability that commodities flowing between two points are transshipped at an intermediate point.

CFIRE 02-32

Midwest FreightView

Principal Investigator: Peter Lindquist, Intermodal Transportation Institute, University of Toledo

This project creates and maintains the Midwest FreightView and Great Lakes Maritime Information Delivery System, a detailed data repository consisting of vessel movements and commodity flows, port and dock functions, regional economic activity, regional population and socioeconomic patterns, and environmental impacts.

This information is delivered via the Internet to state transportation agencies, regional planning agencies, port authorities, and economic development organizations, as well as other interested decision makers and stakeholders within the region.

CFIRE 02-33

Recycled Unbound Materials

Principal Investigator: Tuncer Edil, Department of Civil and Environmental Engineering, University of Wisconsin–Madison

This project monitors a controlled field experiment at the Minnesota Road Research Facility (MnROAD) using test cells constructed with recycled materials in the granular base layers, including those blended with virgin materials and those with 100 percent recycled materials. Researchers will monitor material properties during construction and throughout the pavement life to verify mechanistic-empirical design inputs, especially their variation with changing seasons and moisture regimes.

CFIRE 03-04

Evaluation of Wisconsin Bridges for Truck Loads

Principal Investigator: Michael Oliva, Construction and Materials Support Center, University of Wisconsin–Madison

This project evaluates the impact that existing regulations and possible new size and weight limits will have on freight transportation, particularly in the timber industry, over local and state trunk roads in Wisconsin. This project is part of ongoing work to evaluate whether highway bridges need to have truck load limits and what limits are appropriate.

CFIRE 03-05

Low Carbon Logistics through Supply Chain Design and Coordination

Principal Investigator: Saif Benjaafar, Center for Supply Chain Research, University of Minnesota

This project develops a supply chain-wide view of reducing carbon emissions in logistics operations. Researchers will draw on methods from a wide range of disciplines, including supply chain management, transportation science, environmental studies, public policy, and economics, among others.

CFIRE 03-06

Developing a Local Roads Website Compendium of Best Practices

Principal Investigator: Jason Bittner, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project creates the Local Roads website, an Internet clearinghouse and compendium of best practices for selected local road issues important to the interests of local transportation stakeholders. This compendium will provide efficient access to existing manuals, reports, articles, best practices, and projects pertaining to local roadway issues. It will also provide a collection of known experts in each topic area to encourage interaction between local roads managers and those with applicable specialized knowledge.

CFIRE 03-07

Freight Model Improvement Project for ECWRPC

Principal Investigators: Jessica Guo, Transportation and Urban Systems Analysis Laboratory, University of Wisconsin–Madison; Jason Bittner, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project provides data and field verification to evaluate and improve the Northeast Region Travel Demand Model so that it can be used for calibrating freight use in the East Central Wisconsin Regional Planning Commission (ECWRPC) region. Researchers will use aerial photography, GIS data, mapping projects, and other data obtained by the ECWRPC to complete a freight-specific land use inventory.

CFIRE 03-08

An Innovative Approach on Highway Bridge Approach Slabs

Principal Investigator: Michael Oliva, Construction and Materials Support Center, University of Wisconsin–Madison

This project develops design methods for highway bridge approach slabs as beam elements that allow rapid construction, improved durability, and have design procedures that are based on a rational understanding of the characteristics of the embankment backfill acting as a slab foundation system.

CFIRE 03-10

Applying Lean Techniques in Delivery of Transportation Infrastructure Projects

Principal Investigator: Awad Hanna, Construction and Materials Support Center, University of Wisconsin–Madison

This project examines the benefits of the use of Lean Techniques in the delivery of transportation projects, potential impediments to the adoption of these techniques, and implementation strategies for using Lean Techniques at State Highway Agencies (SHAs). Researchers will develop a management plan for SHAs to use when adopting and implementing Lean Techniques for transportation projects.

CFIRE 03-11

A Novel Abutment Construction Technique for Rapid Bridge Construction: Controlled Low Strength Materials (CLSM) with Full-Height Concrete Panels

Principal Investigator: Sam Helwany, Department of Civil Engineering and Mechanics, University of Wisconsin–Milwaukee

This project examines the Controlled Low Strength Materials (CLSM) integrated bridge system by performing an instrumented, large-scale laboratory test on a CLSM bridge abutment to investigate its performance due to the application of a monotonically increasing sill (foundation) pressure. The size of the proposed CLSM abutment test is approximately 9 cubic feet.

CFIRE 03-12

Nanoporous Thin-Film Additives to Improve Precast Concrete Construction of Transportation Facilities

Principal Investigator: Marc Anderson, Department of Civil and Environmental Engineering, University of Wisconsin–Madison

This project examines the benefit and practicality of using nanoporous thin-film coatings to improve the adhesion between grouts and already hardened concrete surfaces in joints between precast pieces of highway and rail bridges; and, the performance of pre-stressed concrete bridge components by decreasing pre-stress loss due to shrinkage and creep, and by minimizing the cement content without compromising mechanical properties.

CFIRE 03-13

Broad Economic Benefits of Freight Transportation Infrastructure Improvement

Principal Investigator: Kazuya Kawamura, Urban Transportation Center, University of Illinois–Chicago

This project develops an analytical framework for quantifying third-order and induced benefits of transportation infrastructure projects. Researchers will use the Field of Influence technique to extend the FHWA Highway Freight Logistics Reorganization Benefits Estimation Tool to estimate the re-organization benefits that are directly caused by changes in the efficiency of truck freight movements.

CFIRE 03-14

Assessing the Value of Delay to Rank Order Congestion Cost in Freight Movement Performance Evaluation

Principal Investigator: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project develops models to derive the value of delay for freight movements and apply the estimated value of delay to evaluate congestion and rank order bottlenecks and congestion areas for improvement. Researchers will survey truckers, carriers, and shippers for their stated preference, and conduct interviews, case studies, and simulations to corroborate the survey findings.

CFIRE 03-15

Enhancing Behavioral Realism of Urban Freight Demand Forecasting Models

Principal Investigator: Jessica Guo, Transportation and Urban Systems Analysis Laboratory, University of Wisconsin–Madison

This project develops a behavior-oriented freight demand model with improved sensitivity to policy variables and system conditions. The model will be implemented and applied to metropolitan areas in East Central Wisconsin and be evaluated against the conventional trip-based models used in the same study area.

CFIRE 03-16

Aligning Oversize and Overweight Truck (OSOW) Permit Fees and Policies with Agency Costs

Principal Investigator: Bob Gollnik, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project analyzes the broad impacts of oversize and overweight (OSOW) truck operations on Midwest states

and establishes a framework for linking fee structures with the public policy decision-making process. Researchers will review current permitting practices and fee structures and outline preliminary outlooks for OSOW demand in the foreseeable future.

CFIRE 03-17

Understanding the Economic, Environmental, and Energy Consequences of the Panama Canal Expansion on Midwest Grain and Agricultural Exports

Principal Investigator: Jason Bittner, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project develops up-to-date assessments and recommendations for Midwest grain and agricultural export industries based on the economic, environmental, and energy consequences of the forthcoming expansion of the Panama Canal. Researchers will analyze data from a variety of sources, summarize industry and public sector interviews, and conduct surveys to develop an understanding of the changing transport decisions that the expansion could cause.

CFIRE 03-18

Environmental and Energy Benefits of Freight Delivery Consolidation in Urban Areas

Principal Investigator: Jane Lin, Urban Transportation Center, University of Illinois–Chicago

This project examines the effectiveness of delivery consolidation in terms of air pollutant emissions, energy use, and costs to businesses. Researchers will consider the benefit/cost of delivery consolidation, the social benefit from reduced emissions and energy consumption, whether delivery consolidation should be eligible for a subsidy, and how the benefit/cost is affected by delivery vehicle size, fleet turnover rate, long-term fuel prices, and the use of biodiesel.

CFIRE 03-19

WisDOT Major Highway Cost Estimating Workgroup

Principal Investigator: Awad Hanna, Construction and Materials Support Center, University of Wisconsin–Madison

This project provides support for the Major Highway Cost Estimating Workgroup (MHCEW) of the Major Highway Program (MHP) of the Wisconsin DOT as this workgroup

works to improve the cost-estimating procedures for projects under consideration for enumeration by the MHP.

CFIRE 03-20

WisDOT Geotechnical Manual Development

Principal Investigator: Awad Hanna, Construction and Materials Support Center, University of Wisconsin–Madison

This project develops a new edition of the Geotechnical Manual for the Wisconsin DOT. Researchers will develop the new manual based on an existing draft, as well as existing bulletins, memos, past studies, current policy documents, and other departmental information. Charts, tables, maps, checklists, analysis examples, guidelines, and text will be developed as needed to provide a complete and comprehensive manual.

CFIRE 03-22

AASHTO Mechanistic-Empirical Pavement Design Guide Parametric Study

Principal Investigator: Steven Cramer, Wisconsin Structures and Materials Testing Laboratory, University of Wisconsin–Madison

This project helps the Wisconsin DOT implement the Mechanistic-Empirical Pavement Design Guide (MEPDG) for rigid pavements. The MEPDG provides engineers and contractors with advanced tools, improvements in conservation, management, and conditions for users, and significant economic savings.

CFIRE 03-24

Note: Prior to October 2010, the Mid-America Freight Coalition (MAFC) operated as the Mississippi Valley Freight Coalition (MVFC). Projects originating in this period refer to the Mississippi Valley Freight Coalition and are designated with the MVFC prefix for the purposes of continuity and historical consistency.

Transportation Profiles for MVFC Commodities

Principal Investigators: Teresa Adams and Ernie Wittwer, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project develops commodity flow profiles for a selected number of agricultural and industrial products generated in the Mississippi Valley region. Researchers will create narratives and illustrations for each commodity, establish each commodity's routes, and develop micro-simulations of commodities based on freight volume, economic activity, and probabilities. The results of this

project will demonstrate methods that can be applied to future work.

MVFC 10

Performance Measures for Evaluating Multi-state Projects

Principal Investigators: Teresa Adams and Ernie Wittwer, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

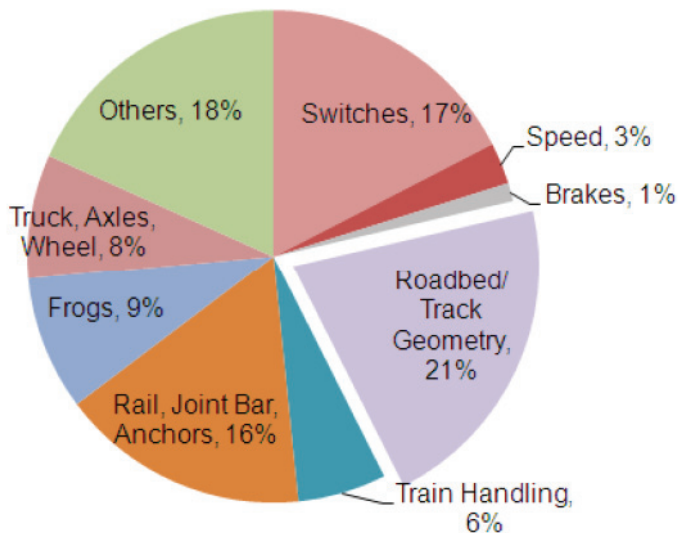
This project develops freight-focused performance measures for multi-state alliances and interstate corridor projects. Researchers will explore the transferability of performance indicators across different multi-state efforts and provide recommendations for establishing performance measures for multi-state freight projects.

MVFC 11

A Novel Approach to Mitigating Ballast Fouling and Enhancing Rail Freight Capacity

Spotlight: In Progress Research Project (CFIRE 04-07)

Railways play an integral role in multimodal freight transport. There is also great potential for the expansion of the freight rail system. However, increases to railway car tonnages, speed limitations due to poor track conditions, and maintenance costs associated with degradation of rail track substructures all limit expansion. Ever increasing volume, tonnage, and speeds on our nation's rail system are stressing rail substructure to levels never before evaluated or considered in depth. Existing ballast is composed of palm-sized rocks ranging from 35-70 mm in diameter with sharp edges and angular geometry. This ballast serves as a crucial material for structural support of rail tracks and trains and provides fast drainage during precipitation. The structural integrity of seriously fouled ballast (i.e., containing fine particles) can compromise track stability and ultimately cause train derailments. According to the Freight Rail Administration's 2007 Railroad Safety Statistics report, poor track bed and track geometry caused 21 percent of 1,980 derailments in the United States in 2007.

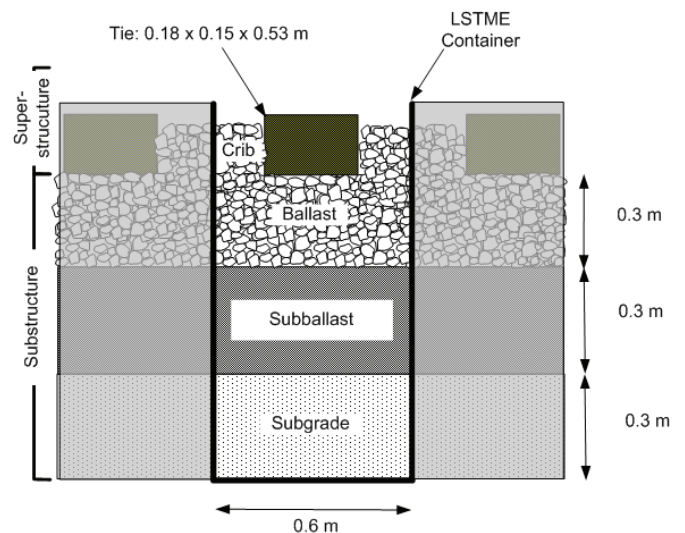
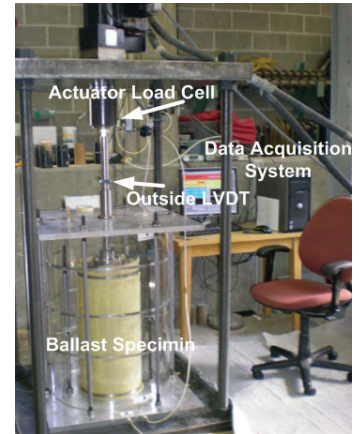


These derailments cost \$256 million. Consequently, costly ballast maintenance activities are routinely performed, especially on tracks serving heavy-axle-load unit trains. Despite advancements in maintenance technology, railroads annually invest billions of dollars in maintenance activities, including the removal and replacement of ballast. This cost is about \$500 million annually for Class 1 freight track in the United States.

The first phase of this project identified the mechanistic effects of fouling on railroad ballast and its application to predict railway maintenance planning. The research team includes Dr. Tuncer B. Edil (PI), Dr. James Tinjum, and graduate research assistant Ali Ebrahimi. Undergraduate

research assistant Andrew Keene joined the research team for the second phase of the project.

Researchers designed and constructed a large-scale testing device to systematically characterize ballast behavior under traffic loading. As a result their initial tests, researchers broadened scope of this project to incorporate a prototype large-scale track model (LSTME) that would allow testing of a simulated cross-section of a railway track and substructure.

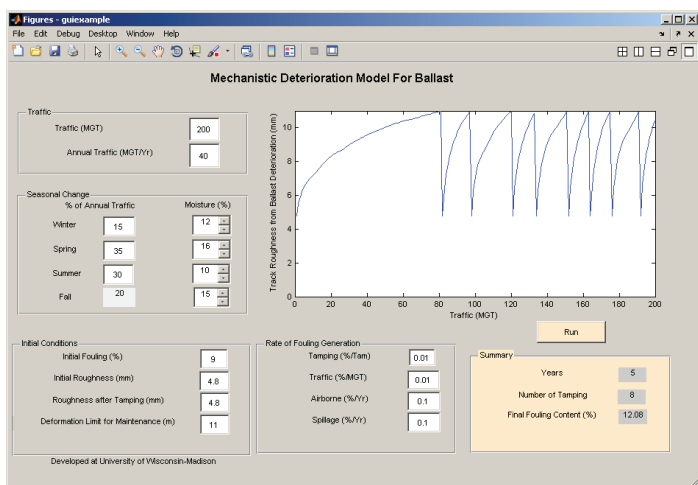


Due to the success of the LSTME, the project team developed a protocol for the testing method to be submitted for publication in the American Society for Testing and Materials (ASTM) *Geotechnical Testing Journal*.

After a year of experimental work and over 120 tests that simulated traffic loading over railway tracks, researchers developed comprehensive look into ballast fouling and its effect on maintenance planning. This data set incorporated several types of ballast containing varieties of fouling contents, fouling types, moisture, and loading schemes. The project team found that unexpected failure and extreme deformational behavior of rail substructure occurred when excessive fouling and moisture was present. The results of this study were recently presented as "Controlling Parameters Affecting Deformational Behavior of Ballast in Railway Track" at the 2010 American

Railroad Engineering and Maintenance-of-way Association (AREMA) Conference and the 2010 Mid-Continent Transportation Research Forum and published in the conference proceedings.

To make this empirical data useful to the rail industry, the project team created software that predicts ballast lifetime and the maintenance intervals required to mitigate ballast-fouling conditions for various track conditions.



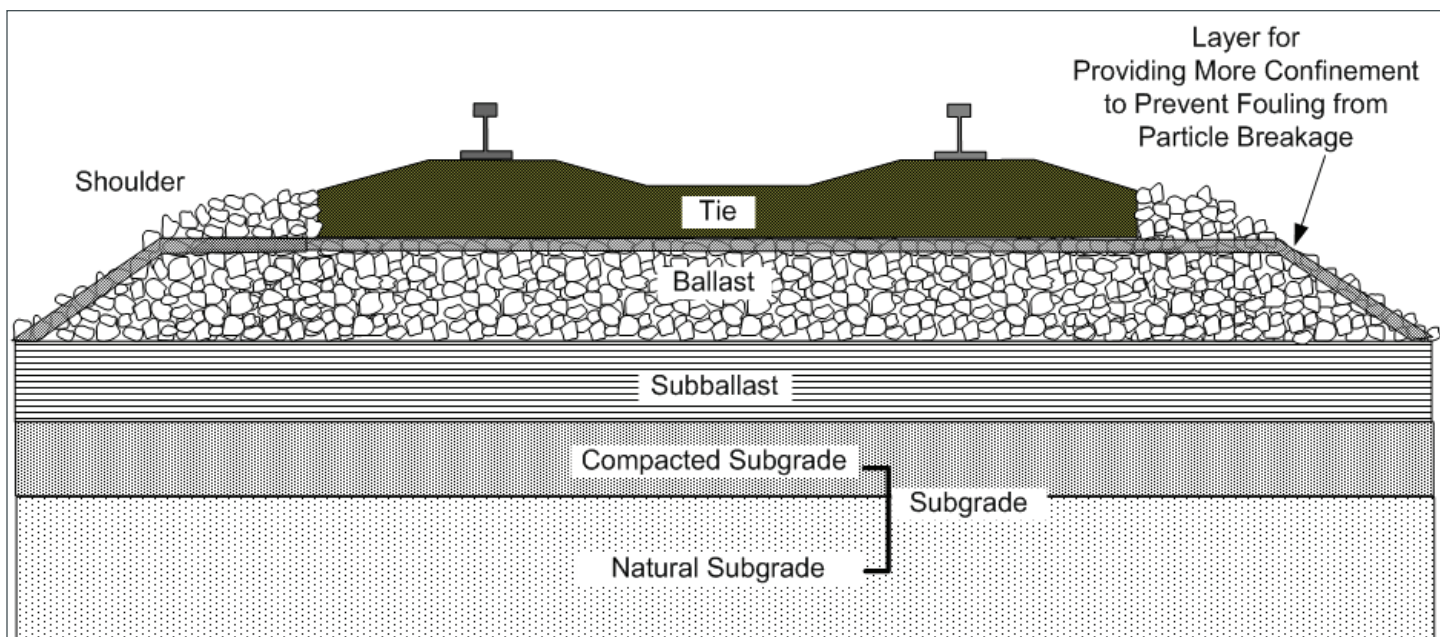
In addition, researchers collaborated with Dr. Dante Fratta to detect continual change of fines (fouling) and moisture in a rail track. As a result of this study, a coupled time domain reflectometry (TDR) method to couple with ground penetrating radar was proposed for accurate detection of moisture and fouling in ballast. The results of this study were also presented as “Fouling Detection of Ballast by

Electromagnetic Surveying” at the 2010 AREMA 2010 Conference and published in the conference proceedings.

The project team will use these results as the basis for the next research phase: “A Novel Approach to Mitigating Ballast Fouling and Enhancing Freight Rail Capacity” (CFIRE 04-07). This CFIRE-funded project seeks to analyze methods and procedures for strengthening and enhancing the resiliency of ballast structure, while leaving current methods for track construction intact. In this phase of the project, researchers will assess the feasibility of strategically placed urethane reinforced layers within the ballast structure to mitigate ballast fouling and fines intrusion, thus reducing maintenance life cycle costs and increasing load capacity. These urethane layers are thought to enhance the structural capacity of ballast, in addition to providing a direct method of halting the fouling infiltration and generation process. Urethane layers of appropriate thickness (e.g., 5 to 10 cm) can be strategically placed within the ballast layer to mitigate the different mechanisms of fouling. Injecting urethane polymer foam in the voids of the ballast—called “urethane foam void filling and particle bonding”—creates this type of urethane layer.

A particular focus of this study has been a life cycle cost analysis and environmental impact assessment of the scenarios developed during research.

For more information about this and other CFIRE projects, visit cfire.wistrans.org.



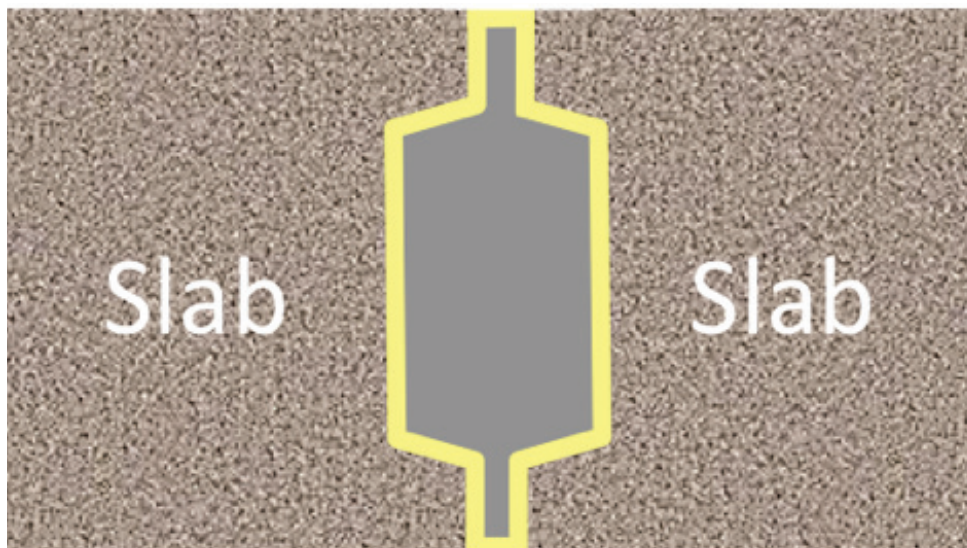
Nanoporous Thin-Film Additives to Improve Precast Concrete Construction of Transportation Facilities

Spotlight: In Progress Research Project (CFIRE 03-13)

Studies show the advantages of using precast slabs in construction of bridges, but there are still problems and limitations related with connecting precast concrete units. The existing grouted joints often create a precracked condition due to low grout bond adherence with the hardened concrete and grout shrinkage. Failures lead to the development of leaking, freeze-thaw pockets, and a gradual degradation of the joints. These problems lead to intensive and costly maintenance operations.

Additionally, even though precast concrete components represent high quality final products, major opportunities exist for improving their performance. New high strength prestressed components often demand excessively high early strength to allow early prestress application, in less than a day after casting, often achieved by high cement contents. With the high cement content these mixes may also exhibit high shrinkage and creep that are undesirable in precast production.

This project—Nanoporous Thin-film Additives to Improve Precast Concrete Construction of Transportation Facilities (CFIRE 03-13)—is investigating both the ability of nanomaterials to improve the bonding strength of grout to finished concrete surfaces in joints between precast bridge components and the strength of the interfacial transition zone (ITZ) in the concrete itself. The project team is led by Dr. Marc Anderson (PI) and includes Dr. Michael Oliva, Dr. Isabel Tejedor, and graduate research assistant Jessica Sanfilippo.



Configuration of the female-female joint.

To address the first problem of grout bonding strength, the research team is currently investigating the ability of nanoparticle solutions to form a reactive film on the surface of the precast concrete allowing grout to better

bond to the finished surface. At this point, they have tested several different application methods of the materials and determined that by liberally painting these materials onto the slabs allows the material to access the pores of the concrete surface in a slip-casting manner. This method of application allows ample reactive materials to exist at the interface of the grout and precast concrete for increased bonding strength.

The researchers have also previously found that the same nanoparticle solutions will increase early compression, tension, and flexure strengths as the interfacial transition zone (ITZ) is improved by changing the composition of this important region of concrete. A hypothetical increase in early strength should require less cement in the mixes, which in turn will decrease the high shrinkage and creep seen in current production.

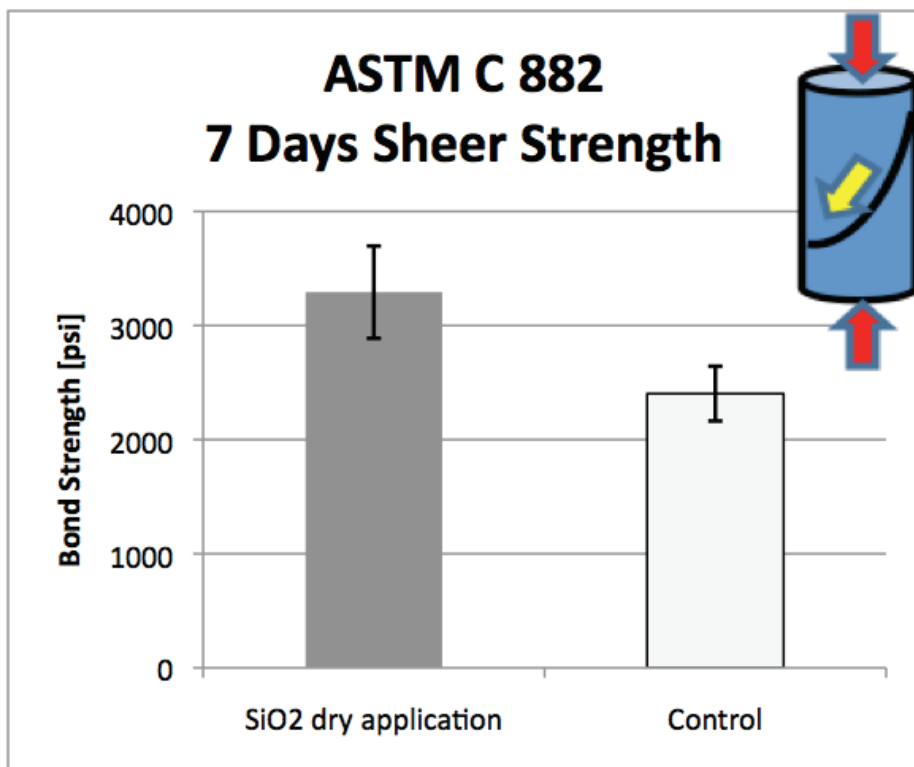
At the time of writing, the research team has preliminary results to support the conclusion that the nanomaterials can increase the bond strength between grout and precast specimens. They have conducted two types of shear tests to determine changes in bonding strength. First we conducted ASTM C 882 tests using 3x6 cylinders cut at an angle and rejoined by grout. These specimens were then subjected to compressive loading to test the shear and compression strength.

Secondly, the project team fabricated L-shaped cubic blocks that they joined together in the same fashion as in the previous test. These shape factors allowed them to better test only shear strength. Furthermore, these specimens are easier to manufacture and cut than the 3x6 cylinders. By comparing the results of the ASTM standardized test to this shear test, they were able to determine the accuracy of their test. The researchers found that by using their nanomaterials, they are able to increase the strengths in both tests.

To date, preliminary results in the research team's efforts to determine the ability of these nanoparticulate materials to improve the precast

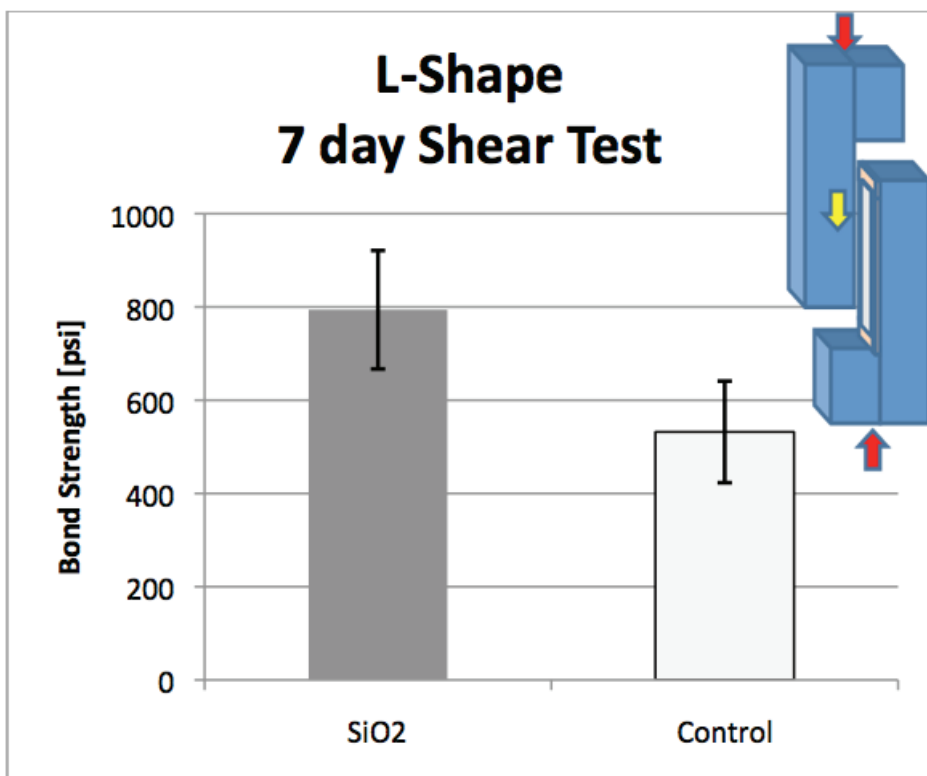
specimens themselves have been inferior to their previous findings with concrete pavements. Their previous studies—presented at the First International Conference in North America on Nanotechnology in Cement and Concrete—

Portation Facilities



7 day slant shear results from ASTM C 882 test.

used gravel aggregates while this study employs dolomite limestone aggregates. They have found the effectiveness of their materials to improve the ITZ depends greatly on the type of aggregate used in the concrete. These results were found by comparing previously conducted shear and compression strength tests at early ages using ASTM C 496 and ASTM C 39 respectively. The researchers have determined that based on the composition of the dolomite limestone aggregate, the film that is applied is consumed by the Calcium in the dolomite limestone leaving no reactive material left on the surface when the cement comes in contact with the aggregate during the mixing process. To address this issue, they employed a secondary nanoporous film as a barrier between the reactive layer and the aggregate. Unfortunately, this procedure did not improve strengths in either compression or tension.



7 day shear results utilizing ASTM C 39 load specifications.

Next, the project team will add a durability test to determine the efficacy of their coating applications. In particular, they are interested in freeze-thaw durability as it pertains to grout adhesion. They will run ASTM C 666 in order to determine if their materials, when applied to the interface, can improve the durability of the joint. They will also continue mechanical testing to determine the parameters that produce the greatest improvement in joint bonding. For example, the number of coatings applied, the time devoted to drying, and lastly the time allowed for application in advanced. At this point, they are transitioning into larger scale testing since the research has narrowed our material testing needs.

For more information about this project, visit cfire.wistrans.org.

New Research Projects

These projects were initiated and ongoing in Grant Year 4:

- CFIRE 04-01: Compass 2009 Data Analysis and Reporting
- CFIRE 04-02: Great Lakes Maritime Education for K-12 Teachers
- CFIRE 04-03: Best Practices Guidance for Workforce Transition and Succession Planning
- CFIRE 04-04: Southeast Wisconsin Freight Access and Mobility Study
- CFIRE 04-05: Addressing Elderly Mobility Issues in Wisconsin
- CFIRE 04-06: Impact of Overweight Vehicles (with Heavy Axle Loads) on Bridge Deck Deterioration
- CFIRE 04-07: A Novel Approach to Mitigating Ballast Fouling and Enhancing Rail Freight Capacity
- CFIRE 04-08: Feasibility Study for a Freeway Corridor Infrastructure Health Monitoring Instrumentation Testbed
- CFIRE 04-09: Superhydrophobic Engineered Cementitious Composites for Highway Bridge Applications: Phase I
- CFIRE 04-10: Improving Log Transportation with Data Based Monitoring and Analysis in Northern Wisconsin and Upper Peninsula of Michigan
- CFIRE 04-11: Air Cargo in the Mid-America Freight Coalition Region
- CFIRE 04-12: Freight Routing for Efficient, Sustainable and Reliable Travel
- CFIRE 04-13: A GPS-Based Survey of Freight Movements in the Midwest Region
- CFIRE 04-14: Measuring Shippers' Value of Delay on the Freight System
- CFIRE 04-15: Developing Safety Risk Index for Truck Preferred Arterial Corridors
- CFIRE 04-16: Development of an Areawide Estimate of Truck Freight Value in the Urban Mobility Report
- CFIRE 04-17: Heavy Vehicle Performance During Recovery from Forced-flow Urban Freeway Conditions Due to Incidents, Work Zones, and Recurring Congestion
- CFIRE 04-18: Development of Next Generation Intersection Control
- CFIRE 04-19: Evaluation of the Effect of Gate Strategies in Drayage Related Emissions
- CFIRE 04-20: Freight From Space: Evaluating Freight Activity and Emissions Trends from Satellite Data
- CFIRE 04-21: Cone Penetrometer Comparison Testing
- CFIRE 04-22: Does Natural Gas Make Sense for Freight? Environmental and Resource Implications of the "Pickens Plan"
- CFIRE 04-23: Maximizing Freight in Local Food Movements
- CFIRE 04-24: System-Wide Large Truck Safety Analysis in Wisconsin

- CFIRE 04-25: Farm Based Bioenergy Infrastructure for Wisconsin
- CFIRE 04-26: HMA Long Joint Deterioration Investigation

Compass 2009 Data Analysis and Reporting

Primary Investigator: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project provided data analysis and reporting for the 2009 Compass Report. Specifically, researchers provided data reduction and prepared data tables and figures for two reports: 1) Compass Wisconsin State Highway 2009 Maintenance, Traffic, and Operations Conditions Executive Overview Report and 2) Compass Wisconsin State Highway 2009 Maintenance, Traffic, and Operations Conditions Operational Report.

CFIRE 04-01

Great Lakes Maritime Education for K-12 Teachers

Primary Investigator: Joan Chadde, Michigan Technological University

This project aims to increase K-12 teachers' understanding of shipping on the Great Lakes, and increase their ability to teach their students about Great Lakes Maritime Transportation.

CFIRE 04-02

Best Practices Guidance for Workforce Transition and Succession Planning

Primary Investigators: Teresa Adams and Ernie Wittwer, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project aims to develop tools and techniques that will help ease the workforce transition at the Wisconsin DOT as the baby boomer generation departs and younger professionals take roles of responsibility.

CFIRE 04-03

Southeast Wisconsin Freight Access and Mobility Study

Primary Investigator: Jason Bittner, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project will conduct a feasibility assessment to determine what infrastructure enhancements are needed to improve multimodal freight access and mobility in

the Greater Milwaukee area. Researchers will inventory infrastructure in the greater Milwaukee area, compile inventory of commodities that are being shipped via the Great Lakes, identify factors impeding movement of goods and assess the need for improvements, identify cost thresholds, and then use this information to recommend, prioritize, and locate needed geometric improvements and to provide an analysis of existing regulatory and operational barriers.

CFIRE 04-04

Addressing Elderly Mobility Issues in Wisconsin

Primary Investigator: Jason Bittner, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison

This project aims to help the Wisconsin Department of Transportation increase the efficiency and improve the performance of elderly transit services in Wisconsin. Researchers will review current practices, conduct a demographic analysis, collect input from elderly residents, compile an inventory of best practices, and publish a set of recommendations.

CFIRE 04-05

Impact of Overweight Vehicles (with Heavy Axle Loads) on Bridge Deck Deterioration

Primary Investigators: Jian Zhao and Habib Tabatabai, University of Wisconsin–Milwaukee

This project will investigate the impact of overweight vehicles, especially those with heavy axle loads on the deterioration of concrete bridge decks. Researchers will conduct durability tests on concrete specimens that have undergone compressive stress and establish the effects of on typical bridges under overweight vehicles with high axle loads.

CFIRE 04-06

A Novel Approach to Mitigating Ballast Fouling and Enhancing Rail Freight Capacity

Primary Investigator: Tuncer Edil and James Tinjum, Construction Materials Resource Center, University of Wisconsin–Madison

This project will assess the feasibility of strategically placed urethane reinforced layers within the ballast structure used for the structural support of railway beds in order to mitigate ballast fouling and fines intrusion, thus reducing maintenance life cycle costs and increasing load capacity of these beds.

CFIRE 04-07

Feasibility Study for a Freeway Corridor Infrastructure Health Monitoring Instrumentation Testbed

Primary Investigator: Hani Titi, University of Wisconsin–Milwaukee

This project will evaluate the feasibility of initiating a health monitoring network for highway infrastructure. Researchers will develop health monitoring data elements, identify construction project restraints, and develop an acquisition/installation plan for this network.

CFIRE 04-08

Superhydrophobic Engineered Cementitious Composites for Highway Bridge Applications: Phase I

Primary Investigator: Konstantin Sobolev, Habib Tabatabai and Jin Zhao, University of Wisconsin–Milwaukee; Michael Oliva, Construction and Materials Support Center, University of Wisconsin–Madison

This project aims to develop superhydrophobic engineered cementitious composite (ECC) material to replace normal concrete and achieve a service life of 120+ years. The proposed concept will produce a new generation of concrete with significantly improved ductility, durability, and sustainability through a longer life and less maintenance.

CFIRE 04-09

Improving Log Transportation with Data Based Monitoring and Analysis in Northern Wisconsin and Upper Peninsula of Michigan

Primary Investigator: Richard Stewart, Transportation and Logistics Research Center, University of Wisconsin–Superior; Pasi Lautala, Michigan Technological University

This project examines the use of inexpensive GPS tracking devices to further the understanding of inefficiencies in current log truck movements and to use the data to improve the performance of log transportation system in northern Wisconsin and the Upper Peninsula of Michigan.

CFIRE 04-10

Air Cargo in the Mid-America Freight Coalition Region

Primary Investigator: Jason Bittner, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison; Jeffrey Warner and Jeffrey Borowiec, Texas Transportation Institute, Texas A&M University

This project aims to better understand the operations and current activity levels of the air cargo industry in the Mid-America Freight Coalition (MAFC) region in order to



better accommodate state and local needs, provide for a more efficient transportation network, better utilize general aviation facilities, and provide for economic development across the region.

CFIRE 04-11

Freight Routing for Efficient, Sustainable and Reliable Travel

Primary Investigator: Tito Hollem-de-Mello, University of Illinois at Chicago; Marco Nie, Northwestern University

This project aims to develop, implement, and evaluate novel methods for optimal freight routing, which will allow for more efficient, reliable and sustainable travel by taking into consideration the disruptions and emissions that are an inherent part of road travel.

CFIRE 04-12

A GPS-Based Survey of Freight Movements in the Midwest Region

Primary Investigators: Kouros Mohammadian and Kazuya Kawamura, Urban Transportation Center, University of Illinois–Chicago

This project will conduct a new disaggregate GPS survey with specific focus on the Midwest region that can facilitate analysis of the freight shippers in the region, their decision making process, route choice, and their interactions with the rest of the country.

CFIRE 04-13

Measuring Shippers' Value of Delay on the Freight System

Primary Investigators: Teresa Adams, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison; Bruce Wang, Texas Transportation Institute, Texas A&M University

This project will develop a model for estimating the value of delay (VOD) for highway freight shippers. Researchers will conduct a small number of case studies of representative shippers, conduct a survey of shippers, and use Logit to model collected data.

CFIRE 04-14

Developing Safety Risk Index for Truck Preferred Arterial Corridors

Primary Investigators: Xiao Qin, South Dakota State University; David Noyce, Traffic Operations and Safety Laboratory, University of Wisconsin–Madison

This project will develop a safety risk index for truck preferred arterial corridors. Researchers will identify truck

preferred arterial corridors, prototype an innovative data collection method to enhance safety asset management for trucks, identify heavy vehicle involved crash causal factors, examine and review currently available cutting-edge access management methodologies, and develop an arterial corridor safety risk-based index.

CFIRE 04-15

Development of an Areawide Estimate of Truck Freight Value in the Urban Mobility Report

Primary Investigators: Jessica Guo, Transportation and Urban Systems Analysis Laboratory, University of Wisconsin–Madison; William Eisele and David Schrank, Texas Transportation Institute, Texas A&M University

This project will create and test a methodology for generating truck freight values for inclusion in the Urban Mobility Report, with a particular focus on facilitating the transferability between regions so that freight value estimates can be developed for all 100 urban areas in the report.

CFIRE 04-16

Heavy Vehicle Performance During Recovery from Forced-flow Urban Freeway Conditions Due to Incidents, Work Zones, and Recurring Congestion

Primary Investigators: Yue Liu and Alan Horowitz, Center for Urban Transportation Studies, University of Wisconsin–Milwaukee; Alex Drakopoulos, Marquette University

This project seeks to establish how heavy trucks influence urban freeway congestion during forced-flow conditions. Researchers will collect a large vehicle classification dataset and calibrate simulation models to establish the influence of truck traffic in these conditions.

CFIRE 04-17

Development of Next Generation Intersection Control

Primary Investigators: Madhav Chitturi & David Noyce, Traffic Operations and Safety Laboratory, University of Wisconsin–Madison; Mihalis Golias, University of Memphis

This project will develop a next generation intersection control system called Autonomous Control of Urban Traffic (ACUTA) for operation of isolated intersections. ACUTA can provide real-time optimal route guidance to the trucks resulting in fewer stops and lesser delay for freight traffic. This would also reduce the delay caused to the other vehicles and result in significant reduction in emissions and fuel consumption.

CFIRE 04-18

Evaluation of the Effect of Gate Strategies in Drayage Related Emissions

Primary Investigator: Mei Cao, Transportation and Logistics Research Center, University of Wisconsin–Superior

This project will develop a simulation model capable of implementing different gate strategies at an intermodal marine container terminal and to estimate the amount of the emissions produced by drayage trucks.

CFIRE 04-19

Freight From Space: Evaluating Freight Activity and Emissions Trends from Satellite Data

Primary Investigator: Tracey Holloway, Center for Sustainability and the Global Environment, University of Wisconsin–Madison

This project will use satellite data to analyze and quantify freight activity and emission trends. Researchers will employ a roadway-by-roadway truck emissions inventory and develop a complimentary line-by-line rail inventory in order to model atmospheric concentrations of emitted and chemically formed pollutants using the EPA CMAQ model. This project will produce the first satellite analysis of ground-based transportation emissions.

CFIRE 04-20

Cone Penetrometer Comparison Testing

Primary Investigator: James Schneider, Department of Civil and Environmental Engineering, University of Wisconsin–Madison

This project aims to engineers and geologists in within the Wisconsin Department of Transportation to understand the mechanisms controlling cone penetration test readings so that they can decide when the testing method is appropriate for use, know how to design an appropriate exploration program, and rapidly interpret the results of the tests for more efficient and reliable engineering.

CFIRE 04-21

Does Natural Gas Make Sense for Freight? Environmental and Resource Implications of the “Pickens Plan”

Primary Investigator: Paul Meier, Energy Institute, University of Wisconsin–Madison

This project will evaluate whether natural gas powered freight transport makes sense as a cost-effective strategy to reduce greenhouse gases, meet air quality objectives, and allocate this valuable domestic fossil fuel. Researchers will develop natural gas usage scenarios and calculate the fuel use and emissions for each in order to compare costs

and evaluate ground-level air quality changes associated with each model.

CFIRE 04-22

Maximizing Freight in Local Food Movements

Primary Investigators: Bob Gollnik, National Center for Freight and Infrastructure Research and Education, University of Wisconsin–Madison; Michelle Miller, Center for Integrated Agricultural Systems, University of Wisconsin–Madison

This project will identify how the local food supply and distribution system functions in Upper Midwest States and the means by which local food transportation movements can become more efficient.

CFIRE 04-23

System-Wide Large Truck Safety Analysis in Wisconsin

Primary Investigator: David Noyce, Traffic Operations and Safety Laboratory, University of Wisconsin–Madison

This project will perform a system-wide review of existing large truck safety concerns and address current problematic areas using truck crash data. Researchers will identify vulnerable locations for large truck crashes and recommend engineering countermeasures.

CFIRE 04-24

Farm Based Bioenergy Infrastructure for Wisconsin

Primary Investigator: Carol Barford, Center for Sustainability and the Global Environment, University of Wisconsin–Madison

This study will define the optimal scale of bio-based heat and power infrastructure development in Wisconsin, and describe the physical, financial and ecological constraints on the bioenergy life cycle.

CFIRE 04-25

HMA Long Joint Deterioration Investigation

Primary Investigator: Awad Hanna, Construction and Materials Support Center, University of Wisconsin–Madison

This project will review both good and poor performing notch-wedge longitudinal joints constructed in HMA pavements and make recommendations for changes to the current WisDOT specifications to eliminate or reduce the deterioration.

CFIRE 04-26

CFIRE Educational Programs

CFIRE's educational goal is fostering a multidisciplinary program of course work and experiential learning that reinforces the transportation theme of the Center.

CFIRE promotes greater understanding of freight and intermodal systems in its traditional transportation engineering curriculum. This is accomplished by using the Transportation Management and Policy Graduate Certificate Program Curriculum to highlight freight-related projects. The STAR Associate Directors and Consortium Partner representatives each weave freight-focused activities into their courses.

The programs are interdisciplinary in nature, in cooperation with the School of Business Grainger Center for Supply Chain Management and Industrial Engineering's RFID Center.

Together with all Consortium Partners, there are thirteen Masters level and eight Doctoral level transportation-related degree programs offered at CFIRE institutions. In addition to traditional Civil Engineering programs, other programs include a Masters of Business Administration with a focus on supply chain management, Public

Affairs, programs in Urban Planning, and Computer Science. University of Wisconsin-Superior also offers an undergraduate major in Transportation Management and Logistics through its Business and Economics program.

CFIRE also promotes student and faculty excellence through its programs. Each year, the Center nominates one Student of the Year to be honored at the Transportation Research Board's Annual Meeting. CFIRE encourages students to compete in various fellowship programs including the FHWA's Eisenhower Graduate Fellowship in Transportation and the Eno Transportation Fellowship. Faculty excel in research and have won many awards for their contribution to the transportation field.

Education is the core of academic institutions, and CFIRE continues to promote programs that foster transportation leaders for 21st Century transportation needs. Through course offerings, encouraging academic excellence in transportation, and promoting transportation curricula, CFIRE will continue to lead in fostering transportation professionals and scholars.



Students in the Spring 2010 TMP Colloquium and Practicum present the results of their projects.

Transportation Management & Policy

About the Program

The Transportation Management and Policy Program (TMP) was created in 2002 to satisfy the demand for transportation professionals who understand multiple dimensions of mobility management and planning, enabling them to make choices leading to more environmentally and socially sustainable transportation systems now and in the future.

TMP integrates studies of environmentally sensitive transportation planning and development with studies of the economic, political, and social dimensions of transportation development. The program is closely associated with the National Center for Freight and Infrastructure Research and Education (CFIRE).

Graduate students who complete the program receive a certificate in TMP to supplement their graduate degree. TMP is not available as a stand-alone graduate degree. The program is housed within the Nelson Institute for Environmental Studies and administered by CFIRE staff.

TMP Practicum

In order to complete the TMP Certificate, students are required to take a practicum course where they work on a solution for a real-world transportation-related problem.

Students in the Spring 2010 TMP Practicum focused on one of two projects:

- *Assessing the Yahara Region's Transportation Needs* examined the results and preliminary analyses of a survey designed and administered by the group that gathered information about the use of public transit in Dane County. The data and results of this survey will be made available to the newly formed Dane County Regional Transit Authority.
- *Cost Estimation for Charter Street Biomass Supply Chain* detailed a transportation analysis of the supply chain for biomass for the Charter Street plant at the University of Wisconsin–Madison. This plant is in the process of converting from coal-fired boilers to natural gas and biomass. This group also created a MS Excel tool for performing cost estimations for three different types of biomass.

Students presented their practicum project results to faculty, students, staff and members of public sector agencies at the TMP program's Spring reception.

TMP Colloquium

Students are also required to take two one-credit colloquium modules as part of their TMP curriculum. These colloquia are opportunities to gather in a small setting and discuss various transportation issues with leaders in the field. Each semester's topic varies, as do the guests who are invited.

The objectives of this colloquium are to introduce some key issues and concepts to students of transportation; to provide an opportunity for those students to interact with people who are active in the transportation professions; and to provide an opportunity for transportation students from various departments to interact with other transportation students.

Each semester, the TMP Colloquium has a unique theme:

- Fall 2009: Passenger Rail
- Spring 2010: Hazardous Materials Transportation
- Fall 2010: Livability and What it Means for Transportation

Students in these colloquia had the opportunity to interact with transportation professionals who provided vivid perspectives.

Student Awards

2009 CFIRE Student of the Year



Jessica Sanfilippo was named the CFIRE 2009 Student of the Year. Sanfilippo holds a BS in Materials Science from the University of Wisconsin–Madison and is a PhD candidate in the Materials Science program.

Her CFIRE research work—Nanoporous Thin-film Additives to Improve Precast Concrete Construction of Transportation Facilities, under the direction of principal investigator Dr. Marc Anderson—examines the use of nanoparticles for improving the bonding in the joints between pre-cast concrete bridge decks. In particular, she's interested in the chemistry of the interface between the film of nanoparticles and the surface of the concrete aggregate.

In addition to her course work and research, Sanfilippo teaches undergraduates about research in the Undergraduate Research Scholars Program, is an active member of the American Society of Mechanical Engineers, and also works with Solar Kleen Technologies, LLC.

Note: Nominations for the 2009 award take place in late 2009; the award was presented in January 2010.

Andrew Muzi Yellow Jersey Fellowship



Adam Smith was awarded the 2010 Andrew Muzi Yellow Jersey Fellowship. Smith's passion for bicycling, his volunteer work on the UW Campus Transportation Committee and the Bus Pass Advisory Committee, his work on campus transportation sustainability projects at Carlton College, and his internship with the Rails-to-Trails Conservancy all contributed to the winning of this award.

Smith is currently working toward completion of a dual Masters degree in Urban and Regional Planning and Public Affairs at the University of Wisconsin–Madison. After he graduates, he intends to embark upon a career path where he can help shape livable, sustainable communities where bicycles and the people who ride them can flourish.

CFIRE awards this \$500 scholarship, sponsored by the Dane County Bicycle Association, to a bicycling enthusiast and student in the Transportation Management and Policy Program.

Student Assistants

CFIRE sponsors the education of many undergraduate and graduate students, of many disciplines and departments through assistantships at the Center. Graduate level project assistants receive tuition-remission at the University of Wisconsin–Madison. Students work at the Center on various programs and projects, applying research, their disciplinary knowledge, and varied experiences to transportation problems. Many of the funded projects outlined in the Research section were completed with the assistance of our students. CFIRE also sponsors interns at the Wisconsin Department of Transportation.

The Center considers the students at CFIRE to be the future of transportation leadership, and is committed to their education through funding and opportunities to work on cutting-edge research.

The following is a list of student assistants that worked at the Center during this reporting period. This list does not represent all of the students that work on projects funding by CFIRE, whether in other departments at the University of Wisconsin-Madison or at other institutions.

We also congratulate our students graduated during this period.

Fall 2009 Graduates

Kaushik Bekkem

Civil and Environmental Engineering, MS

Spring 2010 Graduates

Spencer Gardner

Urban and Regional Planning, MS

Matthew Johnston

Environmental Studies, PhD

Edwin Toledo-Duran

Civil and Environmental Engineering, MS

Erik Viel

Lafollette School of Public Affairs, MPA

Degrees In Progress

Tim Baird

Political Science, BS

Byron DeLuke

Lafollette School of Public Affairs, MPA

Feras El Zarwi

American University of Beirut

Civil Engineering, BS

Patrick Fuchs

Lafollette School of Public Affairs, MPA

Dadit Hidayat

Environmental Studies, PhD

Scott Janowiak

Urban and Regional Planning, MS

Emil Rezandi Juni

Civil and Environmental Engineering, PhD

Myung Ook Kang

Civil and Environmental Engineering, PhD

Daniel Kleinmaier

Lafollette School of Public Affairs, MPA

Rosa Kozub

Urban and Regional Planning, MS

Joshua Levine

Urban and Regional Planning, MS

Anthony Massaad

American University of Beirut

Civil Engineering, BS

Ravi Theja Pavuluri

Civil and Environmental Engineering, MS

Bickey Rimal

Lafollette School of Public Affairs, MPA

Kanisa Rungjang

Civil and Environmental Engineering, PhD

Adam Smith

Urban and Regional Planning, MS

Megan Scherer

Civil and Environmental Engineering, BS

Mamata Shrestha

Civil and Environmental Engineering, MS

WisDOT Field Studies

Christopher Marcum

Civil and Environmental Engineering, BS

Rachael Hager

Civil and Environmental Engineering, BS

Adam Kraus

Civil and Environmental Engineering, BS

Timothy Borowski

Civil and Environmental Engineering, BS

CFIRE Outreach Programs

CFIRE's outreach goal is to provide research results to potential users in a form that can be directly implemented, utilized or otherwise applied. Additionally, the Center fosters a culture of being active in the community and reaching out to the public.

CFIRE is involved with a number of outreach activities. During the past year, CFIRE hosted several workshops, conferences, and symposia. In addition, CFIRE publishes a quarterly newsletter that is distributed to over 4000 transportation professionals.

Staff and students of CFIRE are active participants in the Transportation Research Board. Most students submit papers to be presented at the TRB Annual meeting. Many of those papers are selected for publication in the *Transportation Research Record*, the Journal of the Transportation Research Board.

The staff and students of CFIRE are active participants in the academic and professional transportation community. They have attended various national conferences, and hosted others. CFIRE Director Teresa Adams continues to promote participation with the outside community in order to increase the public benefit of the Center.

Outreach is vital to the mission of CFIRE. As an academic institution, the Center ensures to communicate findings to other professionals and the public in order to enhance societal benefits of our funded research. In this way, the Center can promote better solutions to transportation problems and encourage dialogue among professionals and academics.

Hosted & Sponsored Events

8th National Conference on Asset Management October 19-21, 2009, Portland, Oregon

The 8th National Conference on Asset Management, subtitled "Putting the Asset Management Pieces Together," explored emerging issues in transportation asset management including trade-off analysis, optimization, system management, and safety.

This conference examined emerging issues in transportation asset management in three thematic tracks. The safety track explored the use of crash data analysis with road assets and traffic records to determine and prioritize highway safety needs, identify and implement strategies, develop performance measures, evaluate system performance, and integrate safety solutions into planning and programming projects. The pavement management track examined emerging methods and technologies in the measurement and use of network-

level pavement data, including methods of analyzing pavement performance from pavement management data, the relationship between preventive maintenance and pavement management data, pavement preservation, life-cycle costing, and trade-offs with other types of infrastructure. The data and information infrastructure track investigated how transportation organizations introduce and use innovative data programs to guide funding and resource allocation for infrastructure investments, project selection, rehabilitation strategies, and safety improvements.

MAFC Facilitator Ernie Wittwer attended this conference and presided over a session entitled "Overcoming Challenges to Implementing Asset Management" that focused on the experiences of government agencies in introducing asset management. Wittwer also gave a presentation entitled "Refocusing Efforts on Asset Management" that discussed the progress of asset management in the transportation field and how progress might be accelerated in the future.

CFIRE Deputy Director Jason Bittner served as the program chair for this conference and participated in the Executive Committee. CFIRE co-sponsored this conference and CFIRE staff participated extensively in the planning of the conference.

Freight Research at University Transportation Centers: Integrating Efforts

October 20, 2009, Long Beach, California

Freight Research at University Transportation Centers: Integrating Efforts, a one-day workshop held in conjunction with the METTRANS National Urban Freight Conference, brought together national leaders from the freight transportation community and educational institutions to explore opportunities for collaborative research in freight, to identify colleagues and contacts for continued cooperation, to define existing barriers and challenges for freight research and information dissemination, and to explore the institutional arrangements needed to meet the research and training needs of the future. The US DOT has called for better coordination of research efforts and this workshop answered that call, building on a similar event held in 2007.

Facilitated working groups focused on four broad research areas formed the centerpiece of the Integrating Efforts workshop. Teresa Adams (University of Wisconsin-Madison) and Denver Tolliver (North Dakota State University) facilitated the Freight Economics working group. Joe Petrolino (National Transportation Research Center, Inc.) facilitated the Freight Planning, Logistics, and Supply Chain group. Larry Rilett (University of



Nebraska) led the Environment and Emissions discussion. Marty Lipinski (University of Memphis) facilitated the Infrastructure and Materials working group.

The workshop started with research updates from key UTCs: Mid-America Transportation Center (University of Nebraska), Minnesota Traffic Observatory (University of Minnesota), Center for Intermodal Freight Transportation Studies (University of Memphis), METRANS (California State University–Long Beach), Great Lakes Maritime Research Institute (University of Wisconsin–Superior), and the National Center for Freight and Infrastructure Research and Education (University of Wisconsin–Madison).

The workshop also included a successful speed-networking event. Each attendee was able to make a half-dozen new connections with freight research colleagues from other UTCs and other agencies.

CFIRE and the workshop convener plan to use the results of this workshop to create the foundation for a national dialogue on freight research topics and for creating a system for UTCs to collaborate more effectively on freight research. A summary report of the input and ideas from the working groups and other discussions was published in the Fall of 2010 at cfire.wistrans.org.

This workshop was organized by CFIRE staff and funded by CFIRE. The entire CFIRE staff participated in this event.

Note: Prior to October 2010, the Mid-America Freight Coalition (MAFC) operated as the Mississippi Valley Freight Coalition (MVFC). Events from this period refer to the Mississippi Valley Freight Coalition (MVFC) and for the purposes of continuity and historical consistency.

2010 Mississippi Valley Freight Coalition Conference and Annual Meeting

April 27-29, 2010, Cincinnati, Ohio

The Mississippi Valley Freight Coalition (MVFC) Conference and Annual Meeting brings together the representatives of the ten states of the MVFC, MPOs, university freight researchers, and transportation professionals from public and private sector agencies to discuss freight from the perspective of the Mississippi Valley region.

The 2010 Mississippi Valley Freight Coalition Conference and Annual Meeting was held on April 27-29 at the Millennium Hotel in the Queen City of Cincinnati, Ohio.

More than eighty representatives from MVFC state DOTs, MPOs, academia, and the private sector attended this year's conference, which was hosted by the Ohio DOT, the Indiana DOT, and the Kentucky Transportation Cabinet. The conference was organized by the CFIRE staff.

The conference started with two parallel sessions about current MVFC projects. Peter Lindquist from the University of Toledo gave a presentation on Midwest FreightView. CFIRE Director Teresa Adams and project assistant Kaushik Bekkem talked about Corridor Resiliency.

Attendees then reconvened for the first general session, during which CFIRE Director Teresa Adams and Deputy Director Jason Bittner welcomed attendees and

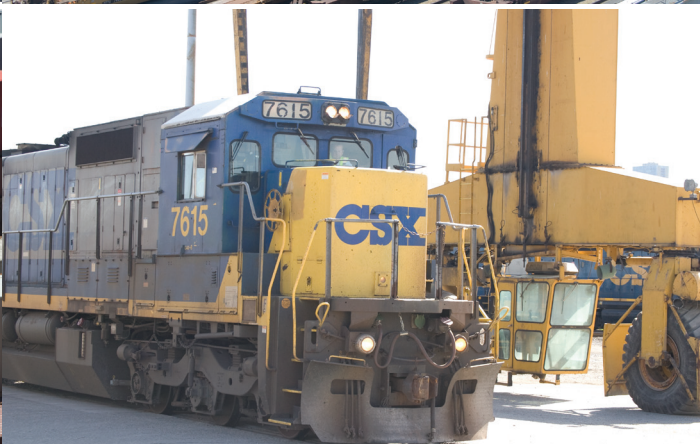


talked about the MVFC and CFIRE. MVFC Facilitator Ernie Wittwer reviewed the agenda for the rest of the conference, and got attendees out of their seats to introduce themselves to their peers.

Mark Policinski, Director of the OKI Regional Council of Governments, gave the conference's first keynote address. After lunch, attendees once again split up to attend one of two parallel sessions. Peter Lindquist from the University of Toledo and Kazuya Kawamura and Jane Lin from the University of Illinois-Chicago talked about the Commodity Profiles project. CFIRE Researcher Bob Gollnik and Ernie Wittwer led an interactive workshop that sought feedback about the freight outreach materials now in production for the MVFC.

The rest of the afternoon was devoted to presentations and discussion about freight from a national perspective.

Chris Smith from AASHTO talked about the upcoming reauthorization of surface transportation legislation. Adrienne Gildea provided the perspective of CAGTC on funding freight infrastructure in the context of reauthorization. Teresa Adams talked about her experience working at the US DOT on one of the TIGER grant selection teams. Dennis Falkenburg from Appian, Inc. gave a presentation about the impact of reauthorization on freight in the Midwest.



After a short break, representatives from state DOTs and MPOs convened for a working dinner that provided them with the opportunity to network and to learn about how other agencies are incorporating freight into their planning and programming activities, as well as how they advance freight planning in their agencies.

The second day of the 2010 MVFC Conference and Annual Meeting was devoted panel discussions about different aspects of freight transportation.

The panel on water transportation was moderated by Rich Cooper from the Port of Indiana and included Bob Goodwin (MARAD), Rick Morgan (USACE), and Patrick Donovan (West Virginia Public Port Authority). The panel on freight rail was moderated by Matt Dietrich from the Ohio Rail Development Commission and included Greg Levy

(Wheeling & Lake Erie Railway Company), Chris Luebbers (Norfolk Southern), and Carl Warren (CSX Intermodal).

Ohio DOT Director Jolene Molitoris gave the conference's second keynote address. After lunch, attendees gathered for a panel discussion economic development and transportation. This panel was moderated by Joanna Pinkerton from the Ohio DOT and included David Holt (Conexus Indiana), Ed Wolking (Great Lakes Manufacturing Council), and Dan Ricciardi (Columbus Region Logistics Council).

The second day of the conference was rounded out by a tour of the historic Union Terminal Tower A museum and the CSX Queensgate Yard, where attendees viewed intermodal container movements.

The third day of this conference was devoted entirely to the MVFC business meeting. Ernie Wittwer facilitated a discussion about the current state and future direction of the MVFC.

The final program and presentations from the 2010 Conference and Annual Meeting are available at mississippivalleyfreight.org.

Mid-Continent Transportation Research Symposium August 19-20, 2010, Madison, Wisconsin

The 2010 Mid-Continent Transportation Research Forum was held on August 19-20 in Madison, Wisconsin. More than 200 transportation researchers attended the forum, which included more than 60 presentations on a wide array of transportation research topics ranging from regional freight transportation and economic development to rapid construction of bridges. Speakers provided private, local, state, and federal perspectives.

The forum opened with welcoming remarks from CFIRE Director Teresa Adams, WisDOT Research and Communication Services Section Chief Daniel Yeh, and FHWA Wisconsin Division Administrator George Poirier. US DOT Chief Economist Jack Wells and SHRP 2 Implementation Coordinator Jerry DiMaggio each gave keynote addresses during the opening plenary session. Joshua Coran, Director of Operations for Talgo, Inc., gave the lunchtime keynote address. David Kuehn, Program Manager for the FHWA Exploratory Advanced Research Program, gave the forum's closing address.

The 2010 Mid-Continent Transportation Research Forum was sponsored by CFIRE, the Construction and Materials Support Center, the Wisconsin Traffic Operations and Safety Laboratory, and the Wisconsin Transportation Center in conjunction with the Institute for Transportation, the Great Lakes Maritime Research Institute, Materials in Sustainable Transportation Infrastructure Center, the



Clockwise from upper-left: Teresa Adams, Jack Wells, Jerry DiMaggio, Joshua Coran, George Poirier, and Daniel Yeh.

Transportation Development Association of Wisconsin, the Wisconsin Highway Research Program, the Wisconsin Department of Transportation, and the Iowa Department of Transportation.

This year's forum also included two special features, both of which were available to all forum attendees. Special topic forums focused on how to better implement and disseminate research results in five areas: freight; environment, sustainability, and planning; pavements, materials, and construction management; maintenance and infrastructure asset management; and, safety and traffic operations. The Transportation Engineering and Road Research Alliance (TERRA) hosted an Innovation Day series event that provided alternate programming for attendees on day two of the forum.

CFIRE staff and students, in collaboration with the University of Wisconsin–Madison Department of Engineering Professional Development, coordinated the conference. Many WisDOT staff members, as well as staff and faculty from the University of Wisconsin–Madison, served as session moderators.

For more information about the 2010 Mid-Continent Transportation Research Forum, including the final program and proceedings, visit the forum website at mrtc.org/midcon.

Kohl Aide Visits CFIRE

August 24, 2010, Madison, Wisconsin

On August 24, 2010, CFIRE hosted a meeting with Christopher Hickling, legislative assistant for transportation for Senator Herb Kohl (D-WI). CFIRE Deputy Director Jason Bittner gave an overview of the Wisconsin Transportation Center and CFIRE research, outreach, and education efforts. Dr. Michael Corradini provided an overview of the UW Energy Institute and Dr. Tuncer B. Edil talked about the work of the Recycled Materials Resource Center.



The group, which also included COE Associate Dean Deanna Dietrich, CFIRE researcher Bob Gollnik, and CFIRE Communications Coordinator Steve Wagner, discussed upcoming transportation legislation, funding for energy research, truck size and weight regulations, and the use of recycled materials in transportation infrastructure projects.

Event Participation

Trucking Industry Mobility & Technology Coalition Annual Meeting

October 6-7, 2009, Las Vegas, Nevada

The TIMTC annual meeting provides an opportunity for public and private sector stakeholders to discuss and collaborate on programs and technology solutions for addressing the many challenges facing the trucking industry today.

CFIRE Researcher Bob Gollnik attended this meeting.

ARTBA National Convention

October 6-9, 2009, Charleston, South Carolina

The 2009 National Convention of the American Road and Transportation Builders Association included policy sessions that focused on the status of the federal surface transportation authorization bills, environmental, legal and safety issues, and a transportation construction market economic report.

CFIRE Director Teresa Adams attended this meeting, and also participated in the Executive Meeting of the Council of University Transportation Centers (CUTC), held concurrently.

MVC Committee on Highway Transport Conference

October 14-16, 2009, Springfield, Illinois

The 2009 conference of the Mississippi Valley Committee on Highway Transport brought together representatives from across the region to discuss overweight and over-dimension transportation issues.

CFIRE Deputy Director Jason Bittner attended this conference and gave a presentation entitled "Containerization Policy: Considering Increased Load Weight for Certain Circumstances of Freight in Wisconsin" in conjunction with CFIRE project 01-05.

METRANS Urban Mobility Conference

October 19-20, 2009, Long Beach, California

The METRANS National Urban Freight Conference affords researchers and practitioners a unique opportunity to consider the "urban side" of freight across many disciplines.

CFIRE Director Teresa Adams and CFIRE Researcher Bob Gollnik attended this conference.

6th Annual sySTEMnow Conference

October 20-21, 2009, Milwaukee, Wisconsin

The sySTEMnow conference brings together more than 350 attendees from a wide variety of backgrounds including K-12 education, higher education, and the science, technology, engineering, and mathematics (STEM) workforce in order to develop, promote, and implement STEM partnerships.

CFIRE Research and Education Coordinator Greg Waidley attended this conference.

8th National Conference on Transportation Asset Management

October 19-21, 2009, Portland, Oregon

The 8th National Conference on Transportation Asset Management—Putting the Pieces Together was designed to explore emerging issues in transportation asset management including trade-off analysis, optimization, system management, and safety. This conference was co-sponsored by CFIRE.

CFIRE Deputy Director Jason Bittner served as the program chair for this conference, and moderated a poster session.

MAFC Facilitator Ernie Wittwer attended this conference and gave a presentation entitled "Putting Management Back in Asset Management." Wittwer also assisted with a pre-conference workshop entitled "Transportation Asset Management (TAM) Implementation," moderated a session entitled "Overcoming Challenges to Implementing Asset Management" and attended the Transportation Asset Management Committee meeting.

WisDOT Annual Freight Railroad Conference

November 3, 2009, Madison, Wisconsin

This WisDOT-sponsored event brought together representatives from the state, the rail industry, and academia to discuss freight rail issues, and the impact of high-speed passenger rail on freight service.

CFIRE Research and Education Coordinator Greg Waidley and CFIRE Researcher Bob Gollnik attended this meeting.

Presenting Data and Information

November 10, 2009, Boston, Massachusetts

This workshop taught by Edward Tufte presents fundamental strategies of analytical design, creation, and presentation of information-rich presentations and visualizations.

CFIRE Researcher Bob Gollnik attended this workshop.

Engineering Fundamentals of Rail Freight Terminals, Yards, and Intermodal Facilities

November 11-12, 2009, Madison, Wisconsin

This course, conducted by the University of Wisconsin–Madison Department of Engineering Professional Development, provided a practical introduction to the fundamentals of rail freight train yards, terminals, and intermodal facilities for a wide range of conditions.

CFIRE Research and Education Coordinator Greg Waidley attended this course.

Developing a Research Agenda for Transportation Infrastructure Preservation and Renewal

November 12-13, 2009, Washington, DC

This TRB-sponsored conference is designed to explore infrastructure preservation problems, needs, and achievements, with the goal of identifying potential opportunities for research in managing and preserving surface transportation infrastructure.

MAFC Facilitator Ernie Wittwer attended this conference.

Intermodal Association of North America Expo

November 14-16, 2009, Anaheim, California

The Intermodal Association of North America Expo brings together representatives from all sectors of the transportation industry with a combined interest in intermodal freight.

CFIRE Deputy Director Jason Bittner attended this conference and participated in a meeting of the FHWA Intermodal Freight Technology Working Group.

ARTBA Central Regional Meeting

December 10, 2009, Chicago, Illinois

The American Road and Transportation Builders Association annual meeting for its central region assembled representatives from federal, state, regional, and local governments, the transportation industry, and academia to consider transportation policy and economics, with special consideration for high-speed rail in the Midwest and the CREATE program.

CFIRE Research and Education Coordinator Greg Waidley attended this meeting.

Transportation Policy & Finance Summit

December 13-15, 2009, Washington, DC

The Transportation Policy & Finance Summit, held by the International Bridge, Tunnel, and Turnpike Association, brought together representatives from federal, state, and

local governments, academia, and industry to consider issues in transportation policy and governance.

CFIRE Deputy Director Jason Bittner attended this conference.

Transportation Research Board Annual Meeting

January 10-14, 2010, Washington, DC

CFIRE is an active participant in the Transportation Research Board Annual Meeting. Many students, staff, and faculty members are involved in TRB committees and others presented the results of their research.

The following sessions presented research supported by CFIRE:

- New Approach to Developing Conceptual Cost Estimates for Major Highway Projects (Mounir El Asmar, Awad S. Hanna & Gary Whited)
- Equivalency-Based Design and Mechanical Properties of Recycled Roadway Materials With or Without Fly-Ash Stabilization (Tuncer B. Edil, Ali Ebrahimi, Brian Koostra & Craig H. Benson)
- Containerization Policy: Considering Increased Load Weight for Certain Circumstances of Freight in Wisconsin (Jason Bittner, Daniel K. Kleinmaier, Teresa Adams & Martin S. Schilling)
- Development of Asset Management Tool for Collecting and Tracking Commitments on Selected Environmental Mitigation Features (Stacy M. Cook & Jason Bittner)
- Great Lakes Maritime Information Delivery System: Resource for Intermodal Freight Transportation Planning and Analysis in the Upper Midwest (Sarah E. Schafer & Peter S. Lindquist)
- Online Freight Shipment Survey in the United States: Lessons Learned and Nonresponse Bias Analysis (Amir Samimi, Abolfazl Mohammadian & Kazuya Kawamura)
- Work-Zone Queue Length and Delay Methodology (Madhav V. Chitturi & Rahim F. Benekohal)
- Modeling Urban Commercial Vehicle Daily Tour Scheduling Using the Texas Commercial Vehicle Survey Data (Minyan Ruan, Jie (Jane) Lin & Kazuya Kawamura)
- Planning Implementation of 3-D Technologies for Design and Construction at the Wisconsin Department of Transportation (Alan Vonderohe, Jerry Zogg & Gary Whited)
- Plug-in Hybrid Electric Vehicles: Assessing Readiness for the Electrification of Personal Vehicle Transportation (Anthony Smick, Jessica Y. Guo, Megan Mallette, Chris Getter & Giri Venkataraman)
- Quantitative Assessment of Environmental and Economic Benefits of Using Recycled Construction Materials in Highway Construction (Tuncer B. Edil, Jin Cheol Lee, James M. Tinjum & Craig H. Benson)

- Origin-Destination Table Disaggregation Using Fratar Biproportional Least Squares Estimation (Alan J. Horowitz).
- Getting the Most Out of a Transit Onboard Survey: Results from Madison, Wisconsin (Anurag Komanduri & Kimon Proussaloglou)
- A Spatial Econometrics Approach to Integration of Behavioral Biases in Travel Demand Analysis (Oleg A. Smirnov)
- Synthesis Framework for Generating County-Level Freight Data Using Public Sources for Spatial Autocorrelation Analysis (Minyan Ruan & Jie (Jane) Lin)

CFIRE also co-sponsored the Wisconsin Transportation Reception at the 2010 TRB Annual Meeting. This reception provides an opportunity for Wisconsin transportation professionals from the public and private sectors to network with each other and with others from across the nation.

2010 Wisconsin Regional Future City Competition January 23, 2010, Milwaukee, Wisconsin

The Future Cities Competition helps students develop interest in science and engineering by creating a model city of the future.

CFIRE Research and Education Coordinator Greg Waidley attended the competition, served as a judge, and presented a CFIRE-sponsored award for "Best Freight Transportation Network."

Shifting International Trade Routes January 26, 2010, Tampa, Florida

The 2010 Shifting International Trade Routes conference was hosted by the American Association of Port Authorities and focused on a variety of aspects of global trade and shipping.

CFIRE Deputy Director Jason Bittner attended this conference, where he also participated in project meetings related to the Understanding the Economic, Environmental, and Energy Consequences of the Panama Canal Expansion on Midwest Grain and Agricultural Exports (CFIRE 03-18) project.

Communicating the Value of Research Webinar January 27, 2010, TRB Online

The TRB Webinar: Communicating the Value of Research provided a report on the NCHRP Report 610: Communicating the Value of Transportation Research and related issues.

CFIRE Director Teresa Adams gave a presentation as part of this webinar entitled "Defining the Role of a

Communications Specialist at a UTC." The rest of the CFIRE staff participated in the webinar.

The Road Gang January 28, 2010, Washington, DC

The Road Gang is an informal group of business and government executives, highway engineers and consultants, press and public relations specialists, company representatives, and trade association officials from the highway transportation industry in the Washington, DC area.

CFIRE Director Teresa Adams attended a presentation by Tom Lynch, staff director, Senate Environment and Public Works Subcommittee on Transportation and Infrastructure.

SCRA Specialized Transportation Symposium March 3-5, 2010, Addison, Texas

The Specialty Carriers and Riggers Association Specialized Transportation Symposium brings together experts from across the field of oversized and overweight transportation.

CFIRE Researcher Bob Gollnik and MAFC Facilitator Ernie Wittwer attended this symposium.

WisDOT Freight Issues Committee Meeting February 11, 2010, Madison, Wisconsin

The Freight Issues Committee of the Wisconsin Department of Transportation (WisDOT) met to discuss statewide freight planning and other issues.

CFIRE Director Teresa Adams and research assistant Kaushik Bekkem attended this meeting and gave a presentation on the Operational Resilience of the I-90/94 Corridor (CFIRE 01-09) project.

51st Annual Transportation Research Forum March 11-13, 2010, Arlington, Virginia

The Transportation Research Forum provides an interdisciplinary forum for the exchange of ideas among practitioners, researchers, and government officials regarding all modes of transportation, focusing on both domestic and international issues.

CFIRE Deputy Director Jason Bittner attended this conference and gave a presentation entitled "Containerization Policy: Considering Increased Load Weight for Certain Circumstances of Freight in Wisconsin," related to (CFIRE 01-05).

Linking Freight Planning and the Environment

April 7-8, 2010, Minneapolis, Minnesota

This two-day course sponsored by the National Highway Institute provides transportation, environmental, and freight planners and engineers in both the public and private sectors with skills to better integrate freight and environmental considerations throughout the planning.

MAFC Facilitator Ernie Wittwer attended this course.

ASPA Annual Meeting

April 11-13, 2010, San Jose, California

The American Society for Public Administration 2010 Annual Conference brought together academics and practitioners to build more effective public and private institutions that give people a government they deserve.

CFIRE Deputy Director Jason Bittner attended this conference and gave a presentation entitled "Innovative Mechanisms for Tracking and Reporting the Spending of American Recovery and Reinvestment Act Funds in State Departments of Transportation" in the "Taking Stock of the Stimulus—Intergovernmental Management on the Firing Line" session. Bittner also serves on the transportation section executive committee of the ASPA.

GLTEI Transportation Research and Data Management Showcase

April 19, 2010, Milwaukee, Wisconsin

This one-day meeting sponsored by the Great Lakes Transportation Enterprise Institute focused on a number of data-rich transportation projects in the Midwest.

CFIRE Research and Education Coordinator Greg Waidley attended this event.

Southeast Regional Transportation Workforce Development Conference

May 11, 2010, Nashville, Tennessee

The Southeast Regional Transportation Workforce Development Conference, sponsored by the Southeast Transportation Center, is one of a series of regional transportation workforce development conferences conducted around the US and hosted by University Transportation Centers (UTCs).

CFIRE Research and Education Coordinator Greg Waidley attended this event.

Toward Better Freight Transportation Data: A Research Roadmap

May 18-19, 2010, Irvine, California

The Toward Better Freight Transportation Data workshop focused on methods, technologies, and organizational strategies for improving the quality, reliability, and availability of freight data for public- and private-sector management, planning, and policy making.

CFIRE Deputy Director Jason Bittner attended this meeting as a Research Roadmap invitee for the "Sharing Freight Transportation Data" panel.

Enhancing and Evaluating Researcher Performance: WisDOT RD&T Peer Exchange

May 18-20, 2010, Madison, Wisconsin

The Wisconsin Department of Transportation Research & Library Unit hosted a peer exchange with representatives from six state DOTs joined representatives from WisDOT, University of Wisconsin–Madison, and Federal Highway Administration – Wisconsin Division to share experiences in tracking and enhancing researcher performance.

CFIRE Research and Education Coordinator Greg Waidley attended this meeting as an invited peer exchange member representing the Center.

WisDOT Rail Plan 2030 Workshop

May 26, 2010, Stevens Point, Wisconsin

The Wisconsin Department of Transportation hosted this one-day workshop with invited participants from a full range of rail stakeholder groups. The day provided stakeholders an overview of the rail plan development effort.

CFIRE Researcher Bob Gollnik attended this workshop as the Center's invited participant.

CAGTC Annual Meeting

May 26-28, 2010, Washington, DC

The annual meeting of the Coalition for America's Gateways and Trade Corridors brought together representatives from federal, state, and local governments to consider freight policy and the funding of freight in the US.

CFIRE Director Teresa Adams and MAFC Facilitator Ernie Wittwer attended this meeting and also met with congressional staff.

CUTC Summer Meeting

June 7-9, 2010, College Station, Texas

The 2010 Council of University Transportation Centers (CUTC) Summer Meeting brings together representatives from university transportation centers (UTCs) across the country for a lively and interactive discussion of a wide range of transportation research topics.

CFIRE Director Teresa Adams and CFIRE Deputy Director Jason Bittner attended this meeting and participated in discussions and committee work.

2010 NASCO Conference

June 15-17, 2010, Des Moines, Iowa

The 2010 conference of the North American Super Corridor Coalition provided a dynamic overview of the most pressing trade and transportation concerns and featured insights on some of the brightest opportunities to reignite cross-border trade and streamlined freight transport between the three North American nations allied in commerce on the NASCO Corridor.

CFIRE Researcher Bob Gollnik attended this conference.

Mississippi Valley Conference Annual Meeting

July 7-9, 2010, Des Moines, Iowa

The 2010 annual meeting of the AASHTO Mississippi Valley Conference brought together transportation professionals from state departments of transportation, federal agencies, academia, and the private sector to examine and discuss transportation, freight, and economic issues that affect states in the Mississippi Valley.

CFIRE Director Teresa Adams attended this meeting and participated in discussions regarding the reauthorization of funding for the Mississippi Valley Freight Coalition (MVFC).

MAFC Facilitator Ernie Wittwer attended this meeting and gave a presentation entitled "Regional Freight Planning and the Blueprint for Reauthorization" and also met with the MVC Board of Directors.

TRB Joint Summer Meeting

July 11-14, 2010, Minneapolis, Minnesota

The 2010 TRB Joint Summer Meeting: Planning and Performance Measurement for All Modes featured individual meetings and joint collaborative sessions on transportation research, planning, and performance measurement. CFIRE provides sponsorship for this meeting.

CFIRE Director Teresa Adams gave an invited presentation to the Transportation Economics Committee and

a presentation in the Strategic Research Needs in Multimodal Freight session. She also attended the Intermodal Freight Transport Committee meeting.

CFIRE Deputy Director Jason Bittner attended this meeting in his capacity of co-chair of the TRB Conduct of Research committee.

AASHTO RAC Meeting

July 26-30, 2010, Kansas City, Missouri

The 2010 American Association of State Highway and Transportation Officials (AASHTO) Research Advisory Committee (RAC) National Meeting brings together researchers and program administrators to discuss management, funding, and direction of transportation research in the US.

CFIRE Deputy Director Jason Bittner attended this conference and organized and moderated a session on research and Web 2.0. Bittner also participated in the AASHTO RAC Liaison Group, Coordinator and Collaboration Task Force.

CFIRE Communications Coordinator Steve Wagner attended this conference and gave a presentation entitled "Collaboration in the Cloud: Online Tools for Transportation Research."

GLTEI Transportation Workshop

July 30, 2010, Brown Deer, Wisconsin

This workshop sponsored by the Great Lakes Transportation Enterprise Institute focused on industry-university collaboration, sustainability, real-time traffic operations applications, and emergency response solutions.

CFIRE Research and Education Coordinator Greg Waidley attended this workshop.

Transportation Asset Management Committee

August 31-September 1, 2010, Washington, DC

The 2010 meeting of the Transportation Research Board's Transportation Asset Management Committee brought together representatives from the federal government, state departments of transportation, academia, and the private sector to consider several aspects of transportation asset management research and implementation.

CFIRE Deputy Director Jason Bittner attended this meeting as a member of the TAM committee. Bittner also organized and moderated a breakout session that focused on developing methods for effective stakeholder communication.

MAFC Facilitator Ernie Wittwer attended this meeting and participated in the TAM committee's strategic planning efforts.

Ohio Conference on Freight

September 14-15, 2010, Toledo, Ohio

The Ohio Conference on Freight brings together professionals from all modes of transportation to focus on the movement of goods through Ohio and the Great Lakes region. Over 200 attendees from 14 states and provinces come to share information and dialogue and learn about new developments in rail, ground, air, and sea transportation.

MAFC Facilitator Ernie Wittwer attended this conference and gave a presentation entitled "Educational Needs for Public Employees in Supply Chain Management."

NCHRP Synthesis 42-06 Project Panel Meeting

September 20, 2010, Washington, DC

The National Cooperative Highway Research Program (NCHRP) Synthesis Topic 42-06: Performance Based Highway Maintenance and Operations Management panel members met to discuss this project.

CFIRE Director Teresa Adams serves as a member of this panel and attended this meeting.

Tools of the Trade: Transportation Planning in Small and Medium Sized Communities

September 22-24, 2010, Williamsburg, Virginia

The Tools of the Trade conference provides ready-to-use, economical, and practical techniques for transportation planning professionals in small (under 50,000) and medium sized (50,000 to 250,000) communities.

CFIRE Deputy Director Jason Bittner attended this conference and gave a presentation entitled "Transportation of Wind Energy Components: Planning for Growth in the Heartland" in the "Freight Planning Tools" session.

Great Lakes Wind Collaborative Annual Meeting

September 19-21, 2010, Cleveland, Ohio

The Great Lakes Wind Collaborative (GLWC) is a multi-sector coalition of wind energy stakeholders working to facilitate the sustainable development of wind power in the binational Great Lakes region. The GLWC annual meeting brings together students, researchers, and professionals from across the wind energy industry.

CFIRE research assistants Joshua Levine and Daniel Kleinmaier attended this conference and presented a poster entitled "Transportation of Wind Energy Industry Components: Planning for Growth in the Heartland."

GLMRI Annual Meeting

September 23-24, 2010, Superior, Wisconsin

The 2010 annual meeting of the Great Lakes Maritime Research Institute included research presentations by GLMRI primary investigators and affiliate universities.

CFIRE Director Teresa Adams and MAFC Facilitator Ernie Wittwer attended this meeting. CFIRE is university affiliate of GLMRI.

Critical Challenges in Aggregating, Processing, and Distributing Local Foods

September 28, 2010, Madison, Wisconsin

This event program highlighted the findings of a two-year research project focused on the transportation and distribution needs for local and regional food.

CFIRE Researcher Bob Gollnik attended this event in conjunction with his work on the Maximizing Freight in Local Food Movements (CFIRE 04-23) project.

Professional Outreach



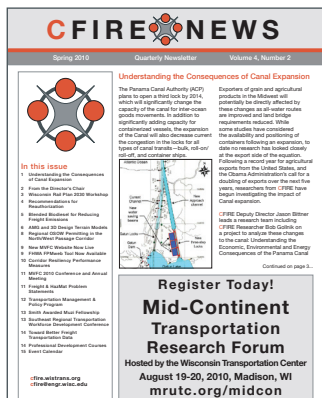
Gollnik Joins Inland Water Transportation Committee

In late 2009, CFIRE Researcher Bob Gollnik joined the Transportation Research Board's Inland Water Transportation Committee as a young member.

This committee, chaired by Dr. Larry Bray from the University of Tennessee, considers research related to the movement of freight and passengers by inland, intra-, and intercoastal waterways. This includes planning, financing, management, vessels, ports and port facilities, environmental considerations, and engineering and operational aspects. The committee also focuses on the intermodal aspects of inland water transportation and intermodal systems integration.

At the 2010 Transportation Research Board Annual Meeting, Gollnik was selected to be the committee's communication facilitator. He is now in the process of assembling the committee website.

CFIRE News Revamped



CFIRE News, the quarterly newsletter of the National Center for Freight and Infrastructure Research and Education, was completely redesigned and expanded for the 2010 publication year.

Each issue of the CFIRE News includes articles about new, ongoing, and complete research projects, upcoming and past events, and information about CFIRE's

outreach and education activities. Each issue also includes commentary from the desk of the CFIRE Director.

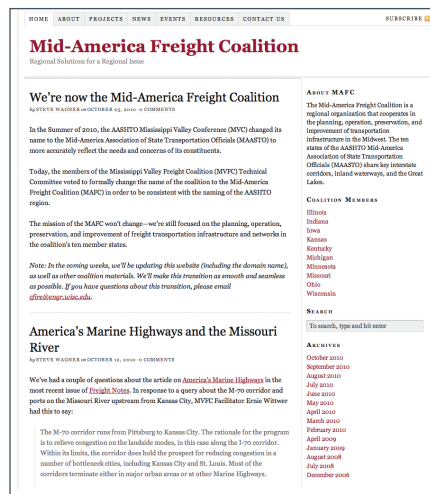
For back issues of the CFIRE News, visit cfire.wistrans.org.

New MAFC Website

The website of the Mid-America Freight Coalition underwent a major overhaul in Spring 2010, just in time for the 2010 Conference and Annual Meeting.

The centerpiece of the new MAFC website is a new blog, which the CFIRE and MAFC communications staff uses to provide updates about events, research, and news relevant to the ten coalition states and the freight community. You

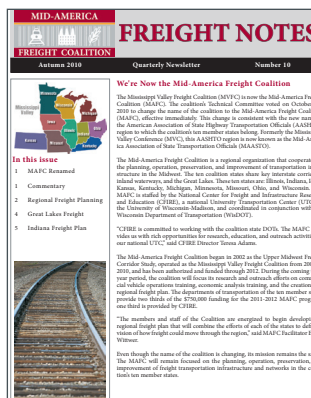
can read this blog on the website itself, or subscribe to the RSS feed. Updates to the blog are also automatically pushed to the CFIRE Twitter time line.



In addition to the new blog, the website has a simpler design that both makes more readable and easier to navigate. The entire website is also now searchable.

Visit the MAFC website at midamericafreight.org.

Freight Notes Revamped



Freight Notes, the quarterly newsletter of the Mid-America Freight Coalition, was completely redesigned for the 2010 publication year.

Each issue of Freight Notes includes articles ongoing and recently completed research projects, as well as information about MAFC outreach activities. Each issue also includes commentary by the MAFC Facilitator.

For back issues of Freight Notes, visit midamericafreight.org.

CFIRE on TRB Committees

Many CFIRE staff and affiliated faculty serve on Transportation Research Board committees

- Teresa Adams: Intermodal Freight Transport; NCHRP Project Panel on Communicating the Value of Research; NCFRP Project Panel on Operational and Low-Cost Improvements to Freight Transportation System Performance.
- Hussain Bahia: Committee on Characteristics of Bituminous-Aggregate Combinations to Meet Surface

Requirements; NCHRP Project Panel on Superpave Support and Performance Models Management.

- Jason Bittner: Conduct of Research (Co-Chair); Transportation Asset Management; NCHRP Transportation Pooled Fund Research Program Website.
- Bob Gollnik: Inland Water Transportation.
- Jessica Y. Guo: Transportation Demand Forecasting; Geographic Information Science and Applications.
- Alan J. Horowitz: University Representative.
- Kazuya Kawamura: Transportation and Economic Development.
- David Noyce: Operations Section; Traffic Control Devices (Chair); NCHRP Project Panel on Identification of Factors Related to Serious Injuries in Crashes of Motorcyclists into Traffic Barriers (Chair); University Representative.
- Michael Oliva: NCHRP Project Panel on Evaluation of CIP Reinforced Joints for Full-Depth Precast Concrete Bridge Decks.
- Howard Rosen: Transportation History.
- Richard Stewart: Ports and Channels, Marine Environment.
- Gregory Waidley: Intermodal Freight Terminal Design and Operations.
- Gary Whited: Long-Term Pavement Performance; NCHRP Project Panel on Performance-Related Specifications for Hot-Mix Asphalt Construction.
- Ernie Wittwer: Transportation Asset Management; Freight Planning.

a team from the Holy Apostles School in New Berlin, Wisconsin. The winning team's city was called Striker City.

CFIRE Research and Education Programs Coordinator Greg Waidley represented the Center at the 2010 Future Cities Competition. Waidley served as a competition judge and presented the Best Transportation Network award.

First Lego League

FIRST LEGO League (FLL) is a global program created to get children excited about science and technology. A hands-on program for ages 9 to 14, FLL uses challenges based on real-world scientific problems to engage children in research, problem solving, and engineering. The core values of this program emphasize friendly sportsmanship, learning, and community involvement.



Community Outreach

2010 Wisconsin Regional Future City Competition January 23, 2010, Milwaukee, Wisconsin



In the Future City Competition, students faced a challenge that impacts many of today's countries—how to provide affordable green housing for low to middle income families after an economic or natural disaster. With innovative solutions like exercise-powered

energy and magnetic transit systems, students produced imaginative cities that were eco-friendly and emphasized community.

A CFIRE special award was given during the regional competition, which took place at the Kern Center of the Milwaukee School of Engineering (MSOE). The special award “Best Freight Transportation Network” went to

Each yearly challenge has two parts: the Project and the Robot Game. Working in teams of three to ten, guided by at least one adult coach, teams have eight weeks to:

- Build an autonomous robot to carry out pre-designed missions in 2 minutes and 30 seconds.
- Analyze, research, and invent a solution to a real-world problem.

The culmination of all that hard work for many teams is the participation in an FLL event—much like a high energy sporting event. Referees monitor and score the Robot Game. Judges review team presentations. An FLL event is a pumped-up environment with music and excitement that celebrates the work the children have done throughout the season.

CFIRE provided sponsorship for two southern Wisconsin teams: Franklin-Randall Elementary in Madison, WI and Brown Deer Elementary in Brown Deer, WI.

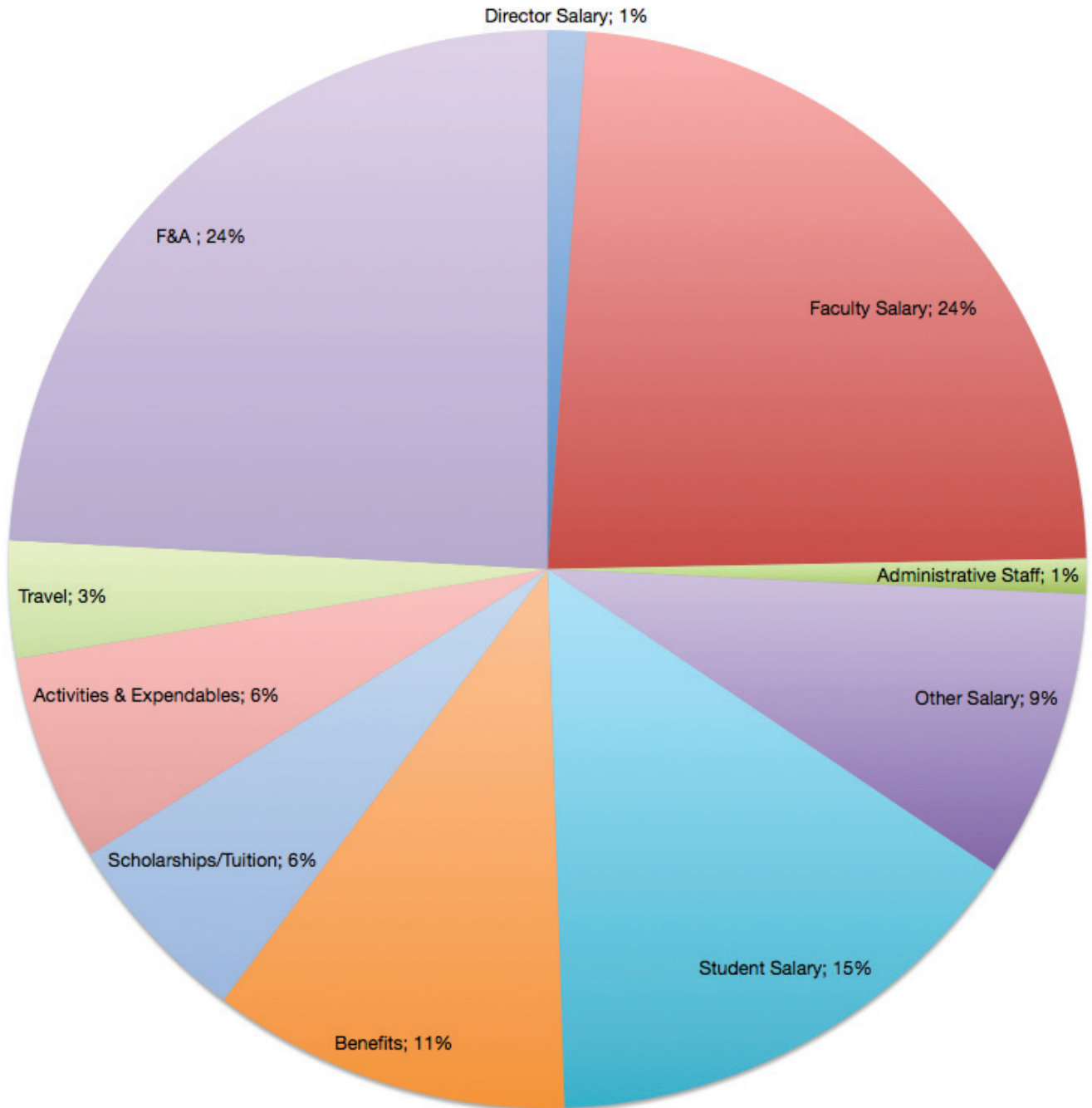
Adopt-a-Highway

CFIRE, as part of the Wisconsin Transportation Center (WisTrans) adopted a three-mile stretch of WI-19 near Indian Lake County Park in northwestern Dane County.

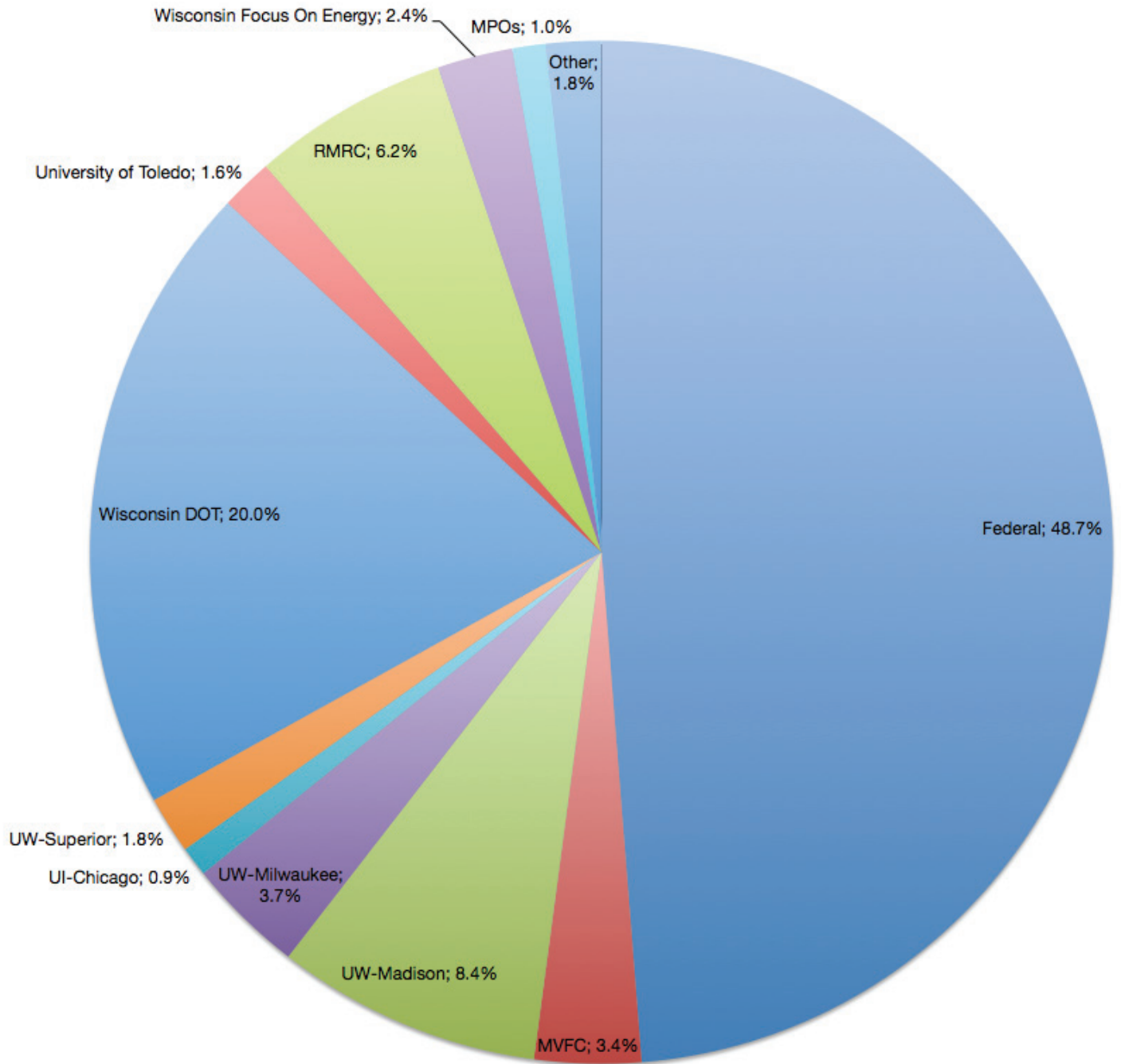


As part of the Adopt-a-Highway program, CFIRE takes responsibility for litter control on approximately a three mile segment of state highway. The group picks up litter on this segment at least three times per year. The Wisconsin Department of Transportation furnishes safety vests, a safety training video, trash bags, trash bag pick-up and disposal, and two signs marking adopted segment of highway.

Expenditures by Category: Grant Year 4



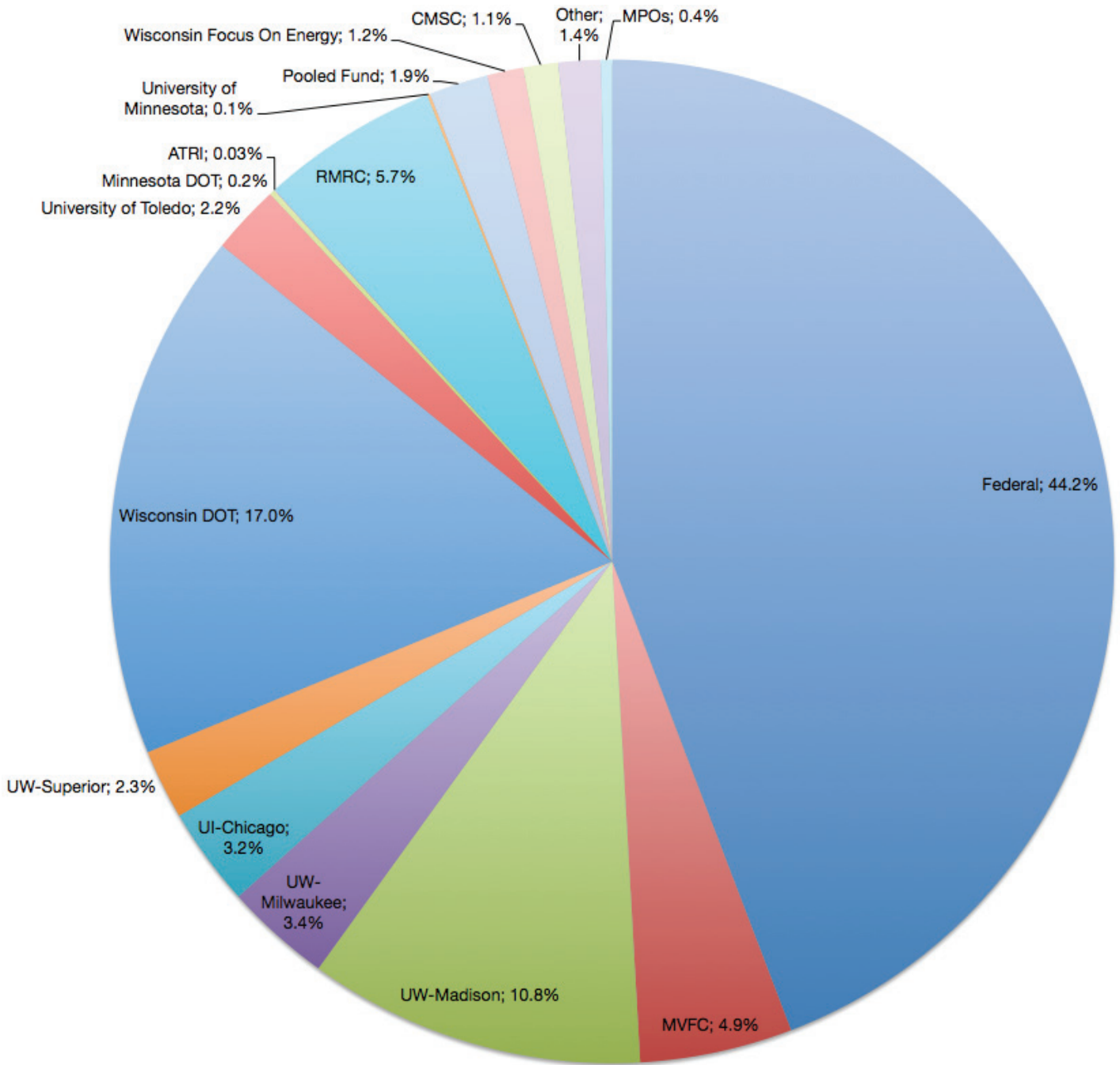
Funding Sources: Grant Year 4



Legend

- MVFC: Mississippi Valley Freight Coalition
- RMRC: Recycled Materials Resource Center
- MPOs: Metropolitan Planning Organizations

Funding Sources: Grant Years 1-4



Legend

- ATR: American Transportation Research Institute
- CMSC: Construction Materials Resource Center
- MVFC: Mississippi Valley Freight Coalition
- RMRC: Recycled Materials Resource Center
- MPOs: Metropolitan Planning Organizations

Acknowledgements

The staff of CFIRE wishes to thank its academic partners at the University of Illinois–Chicago, University of Wisconsin–Milwaukee, University of Wisconsin–Superior, and the University of Toledo for their contributions to this report.

Uncredited photos are from the CFIRE, Wisconsin DOT, and the University of Wisconsin–Madison Department of Civil and Environmental Engineering collections. The entire CFIRE staff contributed to the content of this report.







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