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Operational Resiliency of the I-90/94 Corridor

On February 6, 2008, a severe winter storm hit Wisconsin and dropped more than 13 inches of snow and ice. As the weather deteriorated, more than a thousand vehicles became stranded on a 17-mile segment of I-90 and brought movement through the corridor to a standstill. The National Guard was mobilized to deliver food and water to stranded drivers. In June of the same year excessive rains caused flooding and long detours along the I-90/94 corridor.

In 2008, Wisconsin's freight transportation system moved more than \$300 billion in goods. Freight volumes in Wisconsin are projected to increase another 70 percent by 2025. Disruptions to freight movements caused by unplanned emergencies, disruptions, and disasters in the state's transportation systems have a direct and immediate effect on the economy of Wisconsin, the Midwest, and the nation as a whole by constraining the efficient flow of commodities.

These disruptions and their potential economic impact clearly demonstrate both the vulnerability of sections of the corridor and the need for a recovery strategy that includes freight system resiliency plans.

The Operational Resiliency of the I-90/94 Corridor project, conducted by CFIRE in conjunction with the Wisconsin Department of Transportation, aims to provide information that will help the state of Wisconsin ensure reliable function of the major corridor between Hudson, Minnesota and Beloit, Wisconsin while maintaining the normal pass-through capacity for the entire corridor. The I-90/94 corridor supports high volumes of freight and passenger travel and serves as a critical backbone for both freight and passenger mobility and accessibility in Wisconsin, Illinois, and Minnesota.

Transportation infrastructure resilience provides a method for mitigating vulnerabilities in transportation systems, for fortifying against

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From the Director's Chair

My wife often recommends fiction for me to read, and I'm rarely disappointed with the books that she brings to my attention. She recently suggested *The Hunger Games*, a young-adult science fiction novel by Suzanne Collins. *The Hunger Games* portrays a violent and oppressive post-apocalyptic future in which the United States has disintegrated and North America has become divided into twelve districts with a centralized dictatorship run from a city called the Capitol. Resources are scarce and every year each district must send two youths to the Hunger Games, a reality TV show that pits them against each other in a fight to the death. Each of the twelve districts is organized around and expected to produce a specific commodity. It is what defines them and the entire population is focused on supporting and producing that specific commodity. One district is responsible for factories and electronics; another hosts all of the livestock and cattle production. One area (essentially Appalachia) produces coal and distributes it to the other districts.



Jason Bittner, Acting Director

One element of Collins' story—regional specialization—struck me as particularly relevant to freight transportation and economic competitiveness. This specialization, although fraught with the challenges of centralized command and control environments, forces each district to excel in what they produce. They are integrally linked to that commodity. Specialization also requires a highly efficient distribution network with exclusive freight movements to ship the products across the nation by rail. The global distribution network and other modes of freight transportation have all disappeared, though this is not explained. But, the infrastructure and specialization elements were intriguing and I began to ponder the larger implications of a society where upward mobility and interconnectedness is lost. At the same, I began to wonder whether adopting such a system of commodity specialization and freight distribution would improve the economic competitiveness of the United States in the global market.

The idea of consolidating the geographic locations of production is not new, but perhaps we might consider whether the United States might function more successfully in an interconnected global economy by making our production and distribution systems more specialized and localized. And while twelve districts are

too few to account for the wide variety of outputs in the US economy, it is time to recognize that not every community can be a new Silicon Valley focused on the latest high tech and technology focused jobs.

The freight village concept and the "Savannah model" of locating large retail distribution facilities near container ports both make it clear that wholly located environments improve production and distribution. We need to move beyond simply accepting that manufacturing will take place where the cost is least and transportation is not prohibitive. Specific commodities—automobiles, wind energy components, heavy machinery, etc.—could be consolidated in geographic regions with an eye toward efficiency, rather than spread out across the nation to reflect the availability of tax breaks.

Instead, regions compete against each other, which rarely improves the nation's gross domestic product. I've often joked that when I worked in city government that one city's urban sprawl was the neighboring community's economic development. Without a national plan, region competes against region in any number of industrial categories. A perverse set of incentives has encouraged us to spread development over an increasingly unsustainable geographical area while depending on imports of energy and manufactured goods. Uncertain fuel costs, expanding carbon footprints, a freight system at or beyond capacity, and increasing personal commute times are leading us to a critical point in American society. The USDOT's recent efforts to focus on sustainability, livability, a state of good repair, safety, and economic competitiveness are a step in the right direction. The time has come to consider the bigger picture and reexamine our larger network of production, distribution, and consumption.

The recently announced TIGER grants have started this process by recognizing the need for massive investments in the freight infrastructure. However, these investments will only be proven a wise use of public dollars if the regions that benefit from the investment capture the resulting efficiencies. The multi-state and regional nature of some of the largest of these projects hints at the importance of thinking outside of our typical jurisdictionally bound boxes. Simply improving the means by which goods travel from field and factory to market, however, will mean nothing if we do not make corresponding investments in people and local infrastructure.

CFIRE continues to lead efforts to improve regional freight transportation networks. We have recently issued our call for Grant Year 4 proposals to help initiate renewed discussions about how to improve our transportation networks in order to remain competitive in the global marketplace. This opportunity to better understand, model, and predict the decision-making processes for private

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 disruptions, and for recovering from major natural or man-induced disasters. Resiliency measures assess the availability of alternate routes, the reduction in total delay, the adaptive use of high occupancy vehicle lanes, and the ability to transfer passenger travel to other non-single occupancy vehicles to free highway capacity and maintain freight mobility.

In a freight context, resiliency is defined as the ability for the transportation system to absorb the consequences of disruptions, to reduce the impact of disruptions, and to maintain freight mobility in the face of such disruptions. CFIRE researchers have identified six properties of freight system resiliency. *Redundancy* promotes flexibility and supports the robustness of the freight transportation

system. The *autonomy of components* supports system operability when individual system components fail. *Collaboration* supports innovative problem-solving, reduces miscommunication, spreads risk across stakeholder groups, and promotes network optimization. *Efficiency* allows resources to be spent on activities or projects that provide the most benefit to system users. *Adaptability* also promotes flexibility and the robustness of the transportation system. *Interdependence* spreads risk across the entire system, promotes smooth transitions across parts of the system, and promotes system efficiency.

In order to study the resiliency of the I-90/94 corridor, CFIRE researchers divided the corridor into 45 segments based on the location of major state highway truck

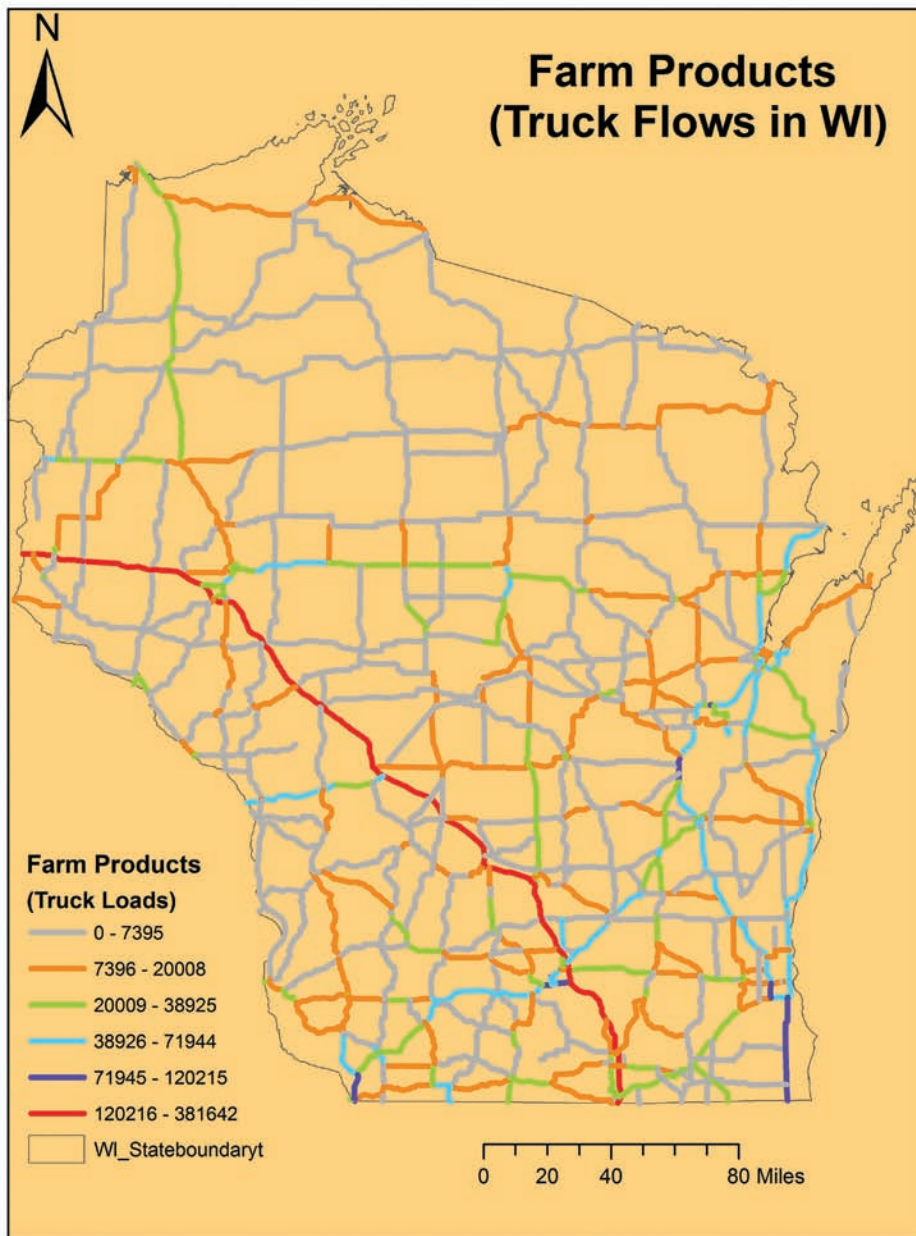
network interchanges. Each segment is the stretch of road between two such interchanges and is assigned the following attributes: route sign, length, one-way, county, annual average daily traffic, percentage of trucks, the direction or heading, and the commodity flows of the segment.

Commodity flows through the I-90/94 corridor and through each segment were ranked according to the number of truck loads per year, the number of truck tons per year, and the total goods value per year. The top 10 commodities were selected for further study based on value and the number of trucks flowing through the corridor. These commodities included non-metallic minerals; farm products; wood and lumber products; food and kindred products; clay, concrete, glass, or stone; pulp, paper, or allied products; petroleum or coal products; rubber or plastic products; primary metal products; and, chemicals.

Researchers performed a network analysis using ArcGIS to identify alternate routes and then scripted the analysis process to generate alternate routes for multiple segment disruptions. Alternate routes were generated for both contiguous and non-contiguous disruptions.

The vulnerability of each segment is assessed by analyzing the segment's components (bridges, culverts, and roadways) and probable failure modes

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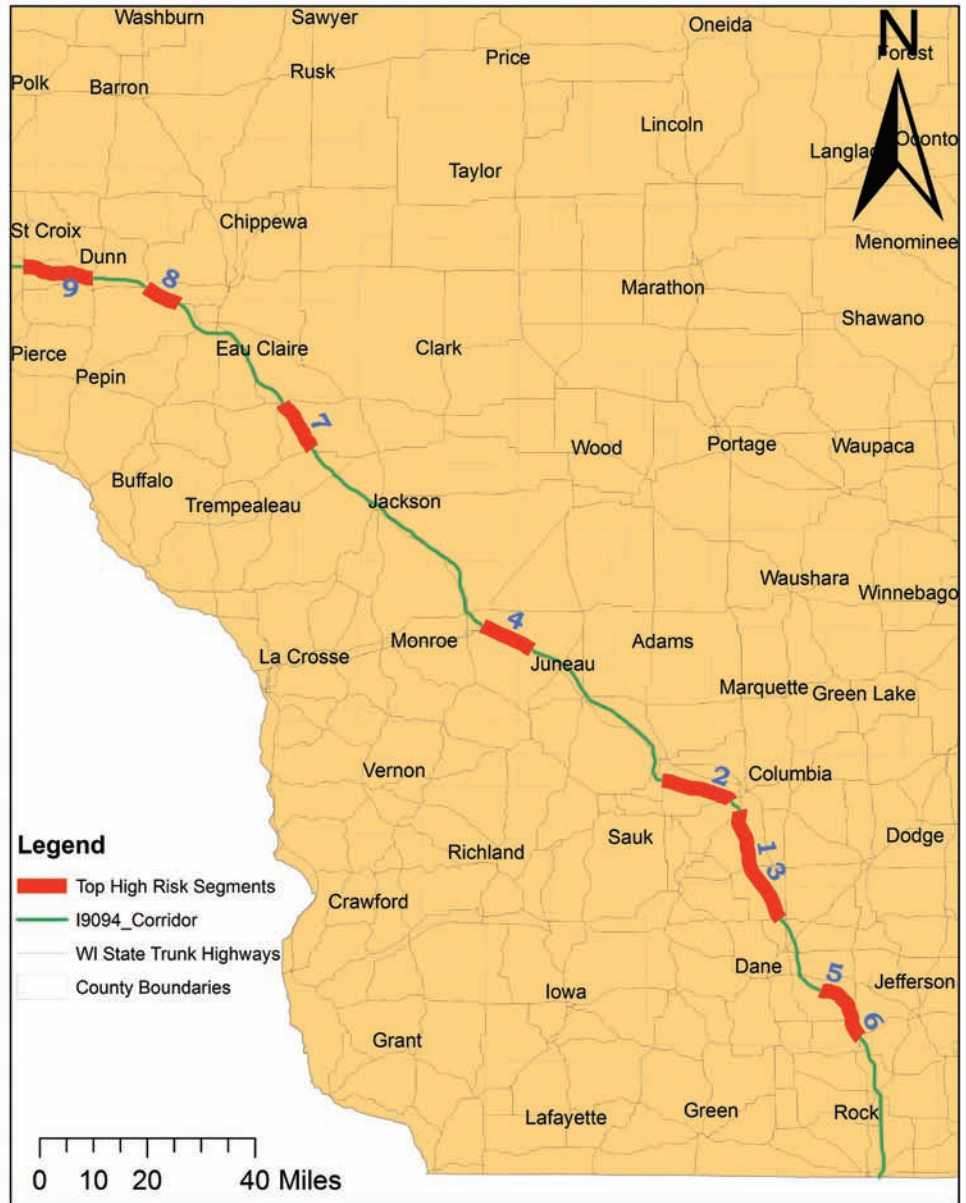
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 (hydrologic, overload, and weather) and the probable severity of disruption in order to compute a Risk Priority Number (RPN) on a scale of 1-10. This study considers hydraulic factors such as scouring and scouring due to floods, overload factors such as traffic volumes and bridge functional classifications, and functional factors such as snow and ice accumulation, snow storms, tornadoes, and severe winter storms.

The final resiliency score of a given segment is calculated using three variables: the value of the economic activity of the top 10 commodities flowing through the segment; the segment's RPN; and, the availability, length, and volumes of alternate routes. Based on these calculations, CFIRE researchers identified the 10 most vulnerable segments of the I-90/94 corridor.

CFIRE researchers presented a draft report of these results to the Wisconsin DOT in February 2010. In the light of these results, the working group will: review existing and pending agency plans and the emergency procedures of trucking companies; open a discussion with agency personnel at traffic management and emergency response centers; and, identify strategically weak sections of the corridor for future network enhancements.

This project also forms the basis for future research on the operational resiliency of the I-90/94 corridor and other freight transportation corridors. Some possible future research directions include: a comparison of commodity flow data with real-time data provided by the American Transport Research Institute (ATRI) during major disruption events; traffic routing models that account for origin-destination data and the actual flow of vehicles through the corridor; and, an analysis of the transfer of response to recovery to provide strategies for re-routing traffic during disruptions.

High Risk Corridor Segments



The 10 Most Vulnerable Segments of the I-90/94 Corridor

Rank	To Intersection	From Intersection
1	Lodi: E, M115, Columbia County	I-90: M108A, Columbia County
2	I-90: M108A, Columbia County	Lake Delton: SW, Sauk County
3	M131 Windsor, Dane County	Lodi: E, M115, Columbia County
4	New Lisbon: E, Juneau County	Tomah: ENE, Monroe County
5	I-90: M156, Dane County	I-90: M147, Dane County
6	Albion: SE, Dane County	I-90: M156, Dane County
7	Northfield: M098, Jackson County	Near Osseo: E, Trempeleau County
8	I-94: M90, Eau Claire County	Elk Mound: WNW, Dunn County
9	I-94: M041 Menomonie, Dunn County	I-94: M028 Spring Valley, St. Croix County
10	I-90: M142 Madison, Dane County	I-90: M138 Madison, Dane County

MVFC Project Updates

The Mississippi Valley Freight Coalition has four active projects in the current authorization period. Each of these projects is making good progress.

Reauthorization. Existing federal transportation authorizing legislation has a profound impact on the direction of transportation policy and investment; the past authority expired on October 1, 2009. In preparation for that reauthorization, the states of the Mississippi Valley Freight Coalition reviewed freight-related issues and formed conclusions about what policies would best meet the needs of moving freight through the region.

The coalition urged the adoption of policies that would bring planning for all modes closer together, make progress on performance management, recognize the importance of regional transportation organizations, and make the movement of freight more efficient. Investment should be increased and funds should be provided specifically for freight. The revenue stream for freight should be expanded beyond highways to include rail and water, in order to expand capacity and modernize those modes. This broader funding arrangement is in keeping with a vision of a truly interconnected intermodal transportation system.

The recommendations are now in the hands of policy staff from the several states. MVFC and CFIRE will publish the final report from this project in Spring 2010.

Transportation Profiles of Commodity Flows. This project seeks provide information about what products are moving across the region, where they are moving, and why they move as they do. To accomplish this goal without purchasing data, MVFC developed a collaboration of five universities: Universities of Wisconsin–Madison, Wisconsin–Milwaukee, and Wisconsin–Superior, University of Illinois–Chicago, and University of Toledo. Researchers from these five universities developed a four-pronged approach to the issue:

The Freight Analysis Framework (FAF), a tool and data system developed and supported by the Federal Highway Administration, was interrogated to extract relevant information.

The data in the FAF was disaggregated and assigned to routes to provide commodity specific information, which is now being added to the Midwest Freight View. At the MVFC Annual Meeting in April 2010, researchers from the University of Toledo and the University of Illinois–Chicago will demonstrate how this information can be accessed and manipulated.



Two case studies outline how specific industries move products. The first used the new Chrysler Jeep facility in Toledo to outline how materials and finished products are moved to and from this facility. The second examined the taconite industry of Northern Minnesota that uses Great Lakes shipping to support the steel industry in Michigan, Indiana, Ohio, and Pennsylvania.

Finally, we are developing a micro-simulation of commodity movements in the region. This approach, which uses base information on economic activity and knowledge about the operating procedures of industries to develop probabilities of how products will move, has been used at the small urban area level. It has never been done at the state or multi-state level. Initially, we are focusing on a few commodities as a proof of concept.

Performance Measures for Evaluating Multi-State Projects. This project aims to develop a tool and metrics to assign the benefits of an improvement to the transportation system to specific adjoining states.

We are using Chicago's CREATE project to demonstrate this tool with real-world rail and highway data. To date we have gathered much information on previous effort to define the benefits of projects and much information on CREATE. Over the next months, we will bring that information together to develop a method and apply that method to CREATE.

Outreach Materials to Enhance Freight Investments in the Mississippi Valley Region. This project aims to summarize production and distribution patterns for each of the selected commodity groups so that someone unfamiliar with freight transportation can easily understand how goods move throughout the MVFC region. MVFC member states decided to focus on grain, corn, machinery, wind energy components, retail distribution, and automotive supplies. We aim to produce a series of handouts, presentations, and a website based on data collected, further input from member states, surveys targeted at industry trade groups, and focus groups with the general public.

To date, the project team has reviewed dozens of federal, state, local, and private sources to assemble background data and information for the selected commodity groups. The team has collected nearly all of the data necessary for the agricultural groups for each county throughout the ten-state region and is in the process of creating maps for each. In the coming weeks the team will focus on accurately characterizing freight movements for the agricultural groups, as well as rounding out the machinery portion with data from the economic census, surveys, and querying other potential data sources.

Freight Origin-Destination Patterns

A vexing problem in transportation planning, particularly freight planning, is getting sufficiently detailed data on vehicle or commodity flows from one part of a region to another part of a region. Such data are very expensive to collect, so the available databases, for the most part, are comprised of much fewer data items than are desired. To eliminate lumpiness in the origin-destination (OD) flows and to hide individual responses, data-collection agencies routinely aggregate data into very large zones, sometimes as big as whole states. Users of these databases have developed many ad hoc methods to try to interpolate the OD flows to zone structures with many more, but smaller zones, such as counties. This process is called “disaggregating the OD table.”

A variety of supplementary data items are used for disaggregation purposes. However, none of the previous methods for creating these detailed OD flows have used individual “traffic counts,” a potentially rich source of information. A traffic count could be the number of trucks moving along a road or the number of tons of a commodity moving by barge along a section of river. Traffic counts were perhaps ignored in the past because of the extreme computational complexity required and the lack of software to handle such a large and difficult problem. Because a traffic count often comes from a geographically small object, such as an individual street, a sufficiently large set of such counts can allow for a very tidy disaggregation of freight flow data to rather small zones.

In a project conducted at the Center for Urban Transportation Studies (University of Wisconsin–Milwaukee) and supported by CFIRE, researchers set out to demonstrate how traffic counts could be used most effectively. A series of models were created, with each model having advantages and disadvantages, depending of the data source. Most of the models were tested on a real traffic network for Northfield, Minnesota and were found to work well.

Additional tests are continuing through the sponsorship of an undergraduate research program at the University of Wisconsin–Milwaukee. The undergraduate students are helping to gain more knowledge of the methods using a national truck database from the Federal Highway Administration and a national waterway database from the Army Corps of Engineers.

Researchers presented a paper on this project January 2010 at the Annual Meeting of the Transportation Research Board; this paper has been accepted for publication in *Transportation*.

For more information about this project, see [CFIRE Project 02-32](#).



The Transshipment Problem

Simulations of vehicle travel assist freight planning in the United States and elsewhere. A simulation model, for example, might forecast for some future year the number of trucks that use each road within a metropolitan area. Almost every simulation model in use today assumes that commodities are shipped directly from their point of production to their point of consumption. Many case studies document how individual commodities actually move across a region or a country; however, there are no theories that extend to the full range of commodities. Each commodity is understood to be unique; there are thousands of commodity groups. Consequently, models cannot be created that accommodate the peculiarities of each commodity group.

For planning purposes, a critical missing element in our models is how a commodity is transshipped. Many commodities are warehoused, repackaged, have their mode of travel changed, or are otherwise detoured from a direct path between where they are produced to where they are consumed. Transshipment changes the use of public infrastructure in potentially significant ways.

In a project conducted at the Center for Urban Transportation Studies (University of Wisconsin–Milwaukee) and supported by CFIRE, researchers are working to identify a unified framework for handling transshipment within a travel-forecasting model. Of concern are the number of transshipment points for any commodity and the nature and location of those transshipment points. The research is principally analyzing the Ontario Commercial Vehicle Survey, which is unusual in that the survey asked for information about the commodity origin and destination, as well as the truck origin and destination.

The analysis revealed that the large majority of goods are transshipped. However, some commodity groups (manufactured goods) are transshipped much more often than other groups (such as minerals). There are just six most-prevalent tour structures found in the dataset, so the amount of mathematics necessary to handle the vast majority of commodities within a model is potentially manageable. The tour structure varies with the overall distance that the commodity must travel and the size of the shipment. Transshipment points tend to be very close to the point of production or point of consumption or both, compared to the overall length of a commodity's journey.

Two working papers have already been written for this project and it is the subject of an ongoing master's thesis.

For more information about this project, see [CFIRE Project 02-31](#).

Using CCPs in Sustainable Infrastructures

The heavier loads, higher speeds, and higher freight volume of the present and future require pavement with greater structural capacity and a longer life-cycle. The use of coal combustion products (CCPs) in sustainable infrastructure construction helps increase structural capacity using the recycled by-products of coal-powered electricity generation while also reducing the energy required to manufacture construction materials. Pavement made with fly ash is both stiffer and more ductile than pavement made with the traditional formula. Combining fly ash with recycled roadway materials to serve as road base increases capacity and the life-cycle of the roadway while reducing both construction costs and the energy and materials required to construct the road.

In 2007, the United States produced more than 70 million tons of fly ash and 18 million tons of bottom ash, the most commonly recycled CCPs used in infrastructure construction applications. The American Coal Ash Association estimates that more than 31 million tons of fly ash and more than 7 million tons of bottom ash were recycled, with the majority used as a replacement for portland cement or as clinker for portland cement production. Recycled fly ash and bottom ash are also used in a range of roadway construction applications, including flowable fill, road base and sub-base, structural fills and embankments, and for soil stabilization and modification.

Using CCPs in sustainable construction provides significant environmental benefits. Energy consumption is reduced by 162 trillion BTUs, water consumption by 32 billion gallons, and greenhouse gas emissions by 11 million tons of CO₂; between \$5-10 billion is saved. Avoiding the disposal of CCPs also carries significant environmental benefits: 3.7 trillion BTUs of energy is saved (\approx 38,600 households) and CO₂ emissions are reduced by 0.3 million tons (\approx 46,300 automobiles) by not disposing CCPs in landfills. Avoiding disposal also saves between \$0.5-5.3 billion per year, depending on the disposal approach (i.e., on-site versus commercial) and the type of disposal facility.

Geotechnical applications at current rates realize smaller but significant savings in energy consumption, water consumption, and greenhouse gas emissions. Use of fly ash as a cement substitute saves annually more than 55 trillion BTUs of energy (\approx 600,000 households) and reduces greenhouse gas emissions by 9.6 million tons of CO₂ (\approx 1.7 million passenger cars). These savings are accrued directly because fly ash is used without additional transformation or processing, which thereby eliminates the consumption of energy and resources and the production of emissions associated with the production of construction materials. And, the resources required for the production of CCPs, because they are by-

products of electricity production, are accounted for in that process, regardless of whether they are recycled and used beneficially.

Even though CCPs are earthen materials, they are not inert and contain trace minerals, making it necessary to establish the environmental impact of using CCPs such as fly ash in infrastructure construction. In a project conducted by the Recycled Materials Resource Center (RMRC) and supported by CFIRE, researchers are assessing the groundwater impacts of pavement materials stabilized with CCPs and how pH conditions affect leaching from CCP materials. The research team selected three fly ashes that represent a range of conditions in the Midwest, observed leaching over a range of pH conditions that bracket conditions typically observed in the field, and then evaluated the normal conditions in which most constituents in fly ash leach at concentrations below water quality standards. Therefore, environmental impacts normally are not expected. However, the research findings permit site-specific assessments to address atypical conditions.

“The findings from our study will allow site-specific assessments for a broad range of conditions, thereby addressing environmental concerns relevant to a wide group of stakeholders,” said Dr. Craig Benson, Co-Director of the RMRC. “In nearly all cases, the benefits of using CCPs far outweigh the environmental risks,” added Benson, “CCPs allow us to build stronger, more durable pavements with a longer life span, while also reducing energy consumption and greenhouse gas emissions during construction.”

The RMRC research team presented two papers at the 2010 Transportation Research Board Annual Meeting about environmental and economic impacts of using CCPs in roadway construction: “Quantitative Assessment of Environmental and Economic Benefits of Using Recycled Construction Materials in Highway Construction,” Tuncer Edil; Jin Cheol Lee; James Tinjum; Craig Benson (TRB Paper #10-2505) and “Equivalency-Based Design and Mechanical Properties of Recycled Roadway Materials With or Without Fly-Ash Stabilization,” Tuncer Edil; Ali Ebrahimi; Brian Kootstra; Craig Benson (TRB Paper #10-3771).

The **Recycled Materials Resource Center** (RMRC) is a federal-university partnership that serves as a research and outreach facility for the highway community, and a catalyst for beneficial use of recycled materials. RMRC funding leverages CFIRE programs as part of CFIRE’s overall matching commitment to the USDOT.

For more information about this project, see **CFIRE Project 01-03**.



TIGER Grants a Big Win for Freight Infrastructure

On February 17, the US Department of Transportation announced the first round of TIGER grants, an innovative program that awards federal funding to projects that simultaneously address economic, environmental, and transportation issues. The TIGER grants award \$1.5 billion to 51 projects around the country.

Eleven freight rail projects received funding, with the stated goal of helping get freight off America's highways and onto rail. Three freight rail projects in the Midwest and Southwest topped the list of TIGER grants.

The Crescent Corridor is a Norfolk Southern project designed to divert freight from trucks to trains while upgrading passenger rail service in the Gulf Coast and Mid-Atlantic regions. The Alabama and Tennessee sections of the Crescent Corridor received \$105 million to support the construction of two new intermodal facilities in Memphis, Tennessee and Birmingham, Alabama. These new facilities include pad and support tracks, trailer and container parking areas, lead tracks, and related ancillary buildings and features. Norfolk Southern will present at the MVFC Conference and Annual Meeting in April 2010 on this and other corridor projects.

The Chicago Region Environmental and Transportation Efficiency Program (CREATE) is a partnership between the US DOT, the State of Illinois, the City of Chicago, Metra, Amtrak, and the nation's freight railroads. The CREATE program is a bundle of 78 projects aimed at reducing freight rail congestion in the Chicago area. CREATE received \$100 million to address its highest priority projects, including new traffic control systems, new rail bridge construction, and other significant improvements to signals, switches, roadways, sidewalks, and other components.

The National Gateway Freight Rail Corridor is a collection of rail infrastructure and intermodal terminal projects in three major freight rail corridors in the Midwest and along the Atlantic coast, all owned and operated by CSX. The improvements focus on increasing vertical clearances to allow trains to carry double-stacked containers. The \$98 million in TIGER funds awarded to this project will help complete a corridor project from Northwest Ohio to Chambersburg, Pennsylvania, through West Virginia and Maryland.

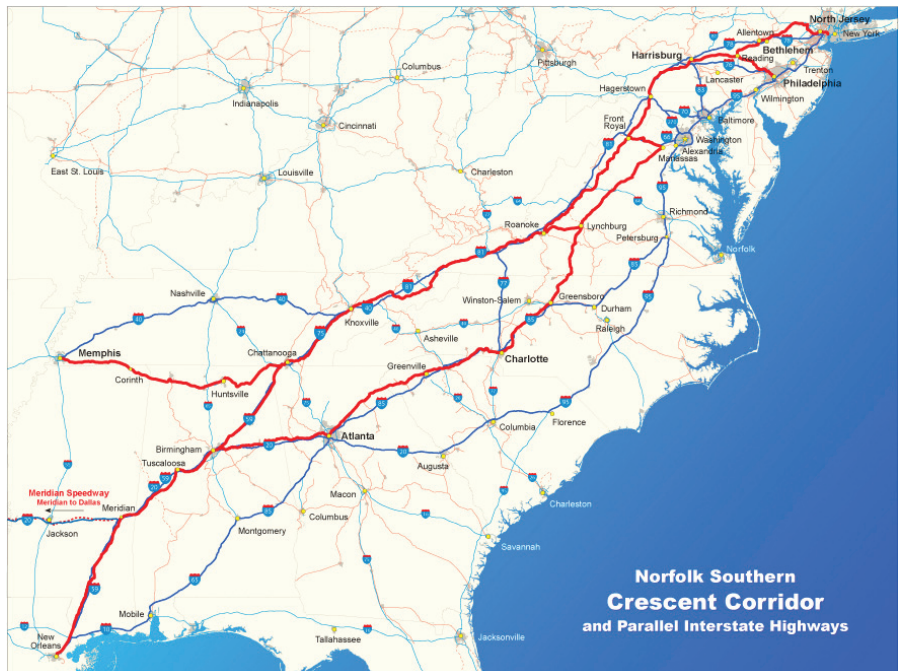
In addition to the three largest TIGER grants, several others are designed

to enhance the intermodal and multimodal freight infrastructure in the Midwest and across the country.

The Tri-City Regional Port District of Granite City, Madison, and Venice, Illinois was awarded \$6 million to build a public harbor on the Mississippi River for barge loading and unloading, primarily of liquid and dry bulk products. This public harbor is an integral part of the Southwestern Regional Intermodal Freight Transportation Hub, a project designed to create the northernmost ice-free port on the Mississippi River south of the US system of locks. Shippers in the Midwest, including agricultural shippers, will be able to move goods down the Mississippi River from southern Illinois to the Gulf of Mexico without using a lock.

The Port of Gulfport Rail Improvements project is public-private partnership between the Mississippi State Port Authority and KCS Railway Company. This partnership received \$20 million in TIGER funding to upgrade the infrastructure of KCS lines to accommodate double-stacked containers and increase maximum speeds from 10 mph to 49 mph, effectively connecting the Port of Gulfport to Chicago and Canada as well as to New Orleans and the Atlantic coast.

The California Green Trade Corridor is a collaborative partnership between three regional ports to develop a marine highway system for shipping freight from Oakland and inland by barge. This \$30 million grant funds a number of infrastructure improvements to the Ports of Oakland, Stockton, and West Sacramento.



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 investment is also a key piece of CFIRE's ongoing efforts. Enhancing the long-term growth and sustainability of our freight systems to support economic success in a global economy remains a critical mission of the Center. We can improve our economic competitiveness by focusing our strengths while recognizing that new opportunities should be grounding in our existing niche economic areas.

None of us want to live in society deeply divided by the scarcity of resources. Nor do we want to suffer under the oppressive control of a strong, centralized dictatorship. But, we might consider whether a little command and control in freight-related policy might be a good thing.

I encourage you to explore the pages of this edition of the CFIRE News and understand the vital mission that freight plays in our quality of life.

\$823 Million Awarded to Wisconsin High-Speed Rail Projects

In late January 2010, President Obama and Vice President Biden announced new funding for high-speed rail (HSR) projects as part of the American Recovery and Reinvestment Act (ARRA). As part of this funding, the corridor that stretches from Chicago to Milwaukee, Madison, and the Twin Cities of Minneapolis and Saint Paul received \$823 million for three projects.

Madison–Milwaukee. Intercity passenger rail service between Madison and Milwaukee will be established. This service will include stops in Brookfield, Oconomowoc, and Watertown and run at speeds of 100 mph. Service is expected to begin in 2013. This project includes upgrades of infrastructure along 80 miles of track, positive train control, and new and refurbished stations.

Milwaukee–Chicago. Improvements to stations, infrastructure, signals, and tracks between Milwaukee and Chicago will increase maximum speeds from 79 mph to 110 mph and eventually reduce travel time between these two cities by 30 percent.

Chicago–Twin Cities. Planning and environmental work will begin to lay the groundwork for a passenger rail line that connects Madison, Milwaukee, and Chicago with the Twin Cities at speeds of up to 110 mph.

These projects include 144 miles of upgraded track, 32 miles of new track, and an estimated 275 miles of planned track. Funding for these projects was awarded to the Wisconsin and Minnesota DOTs and benefit the states of Wisconsin, Illinois, and Minnesota.

This funding is an important first step in creating better transit connections for Wisconsin and the Midwest.

Communicating the Value of Research

In January 2009, the Transportation Research Board released National Cooperative Highway Research Program (NCHRP) Report 610: *Communicating the Value of Transportation Research*. This report outlines a recommended communications process, describes methods for communicating research to specific audiences, and includes case studies of good communication practices within and outside of the transportation community.

CFIRE's Teresa Adams, in company with Johanna Zmud (NuStats, LLC) and Ann Overton (Virginia Transportation Research Council), gave presentations on different aspects of these reports in a webinar on January 27, 2010.

Zmud gave an overview of NCHRP Report 610 and the communication process outlined in the report and discussed the relationships of context, strategy, content, channels, and style in the communications process.



Overton talked about the importance of involving communications professionals throughout the research process and how to use the expertise of a public affairs office to communicate the value of research in today's new media landscape.

Adams reviewed CFIRE's recent experience in defining a role for a new communications coordinator. She provided recommendations for integrating a such a person into your research group so that the communications coordinator functions as an integral part of the research team with the authority and responsibility for a broad range of communications tasks.

For information about communicating the value of transportation research, see [NCHRP Report 610](#).

Integrating Efforts a Success

On October 20, 2009, CFIRE hosted *Freight Research at University Transportation Centers: Integrating Efforts*, a one-day workshop that focused on defining more productive and efficient ways of collaborating on freight research at UTCs.

This national workshop and forum, held in conjunction with the METRANS 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 USDOT 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.

“By all of our measures, the workshop was a success. We had the opportunity to cover a lot of ground over the course of the day-long event, received very valuable input from all attendees, and we are looking forward to furthering collaboration efforts among UTCs in the near future,” said CFIRE Researcher Bob Gollnik.

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 is forthcoming and scheduled for publication in Spring 2010.

CFIRE Call for Proposals

CFIRE is soliciting the freight research community for proposals that reflect the theme of our Center: Sustainable Freight Transportation Infrastructure and Systems. The RFPs are organized into four Signature Technical Areas of Research (STARs):

- Design, Materials, and Construction Processes for Highway, Harbor, and Rail Infrastructure
- Multimodal Systems Planning and Optimization
- Traffic Operations and Safety
- Energy and Environment

Researchers eligible to submit proposals include qualified investigators at CFIRE’s partner institutions: University of Illinois–Chicago, University of Toledo, University of Wisconsin–Milwaukee, University of Wisconsin–Superior, and University of Wisconsin–Madison. Interested researchers from other institutions or firms are encouraged to collaborate with one or more of our consortium partners. Non-federal matching funding is strongly suggested. Priority will be given to research proposals submitted in partnership with a state department of transportation, the Federal Highway Administration (FHWA), and/or private industry.

For technical questions, please contact the chair of the appropriate STAR committee. For administrative questions, please contact Greg Waidley, CFIRE Research and Education Coordinator (gwaidley@engr.wisc.edu).

Go to cfire.wistrans.org for more information and to download the [proposal template](#) (required).

Proposals are due March 15, 2010

Colloquium on Transportation Management and Policy

The Colloquium on Transportation Management and Policy, held under the auspices of the Nelson Institute for Environmental Studies and CFIRE, is a core course in the Transportation Management and Policy program at the University of Wisconsin–Madison. Students meet weekly for presentations by industry experts and discuss a wide range of management, policy, logistics, and regulatory topics in all transportation modes.

The Spring 2009 colloquium focuses on critical infrastructure protection and hazardous materials transport. Each week's expert speaker is drawn from a different government agency or from the private sector. Speakers from the public sector include representatives from the Office of the Commissioner of Railroads, the Federal Motor Carrier Safety Administration, Wisconsin Emergency Management, Wisconsin State Patrol, and the Office of Hazardous Materials Safety, Pipelines, and Hazardous Materials Administration of the US Department of Transportation. Private sector speakers include representatives from the American Association of Railroads, Klemm Tank Lines, Kenan Advantage Group, Dairyland Power, JJ Keller and Associates, and Western Consulting.

As part of this course, students collaborate on a project and present their results at the end of the semester to faculty, staff, and students.

Practicum in Transportation Management and Policy

The Practicum in Transportation Management and Policy, taught under the auspices of the Nelson Institute for Environmental Studies and CFIRE, provides students with interdisciplinary team experiences in the analysis of transportation policies and transportation management decision-making. Students work collaboratively on real-world problems solicited from transportation agencies. In the Spring 2010 semester, student teams are working on two practicum projects.

Dane County RTA Transit Needs Assessment. Students will be conducting a needs assessment of the newly-created Dane County Regional Transit Authority (RTA). The group will use surveys and interviews throughout the service area to help the RTA identify gaps in transit service. Students will focus on areas in which potential transit demand is not satisfied by the current level of service.

Optimization of the Supply Chain Logistics of the Charter Street Heating Plant. The main goal of this project is to assist in the optimization of the supply chain logistics

associated with the conversion of the Charter Street Heating Plant (CSHP) from a coal burning facility to a biomass and natural gas burning facility. The optimization of the supply chain will include identifying various sources of biomass available along the transportation haul zone, identification of one or more storage and processing facilities along the haul zone, minimizing processing and handling of these biomass sources, and minimizing road transportation while maximizing rail transport. The optimization exercise will also attempt to minimize emissions along with costs.

Student teams present their results in a policy or management white paper aimed at agency senior management.

2009 CFIRE Student of the Year

Jessica Sanfilippo has been named the 2009 Student of the Year for the National Center for Freight and Infrastructure Research and Education (CFIRE). Sanfilippo holds a BS in Materials Science from the University of Wisconsin–Madison and is a PhD candidate in the Materials Science program. She currently works on three projects in the Structures and Materials Testing Lab, all involving concrete.



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 the course of this research, she fabricates the nanoparticles, creates the nanoporous thin film coatings, mixes and pours the concrete, and conducts mechanical performance tests.

Sanfilippo contributes to an MRUTC project funded by the Wisconsin Department of Transportation that studies concrete properties for implementation of the Mechanistic-Empirical Pavement Design Guide. She also works on a project funded by the Innovative Pavement Research Foundation that focuses on the use of de-icing compounds on airport pavements.

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.

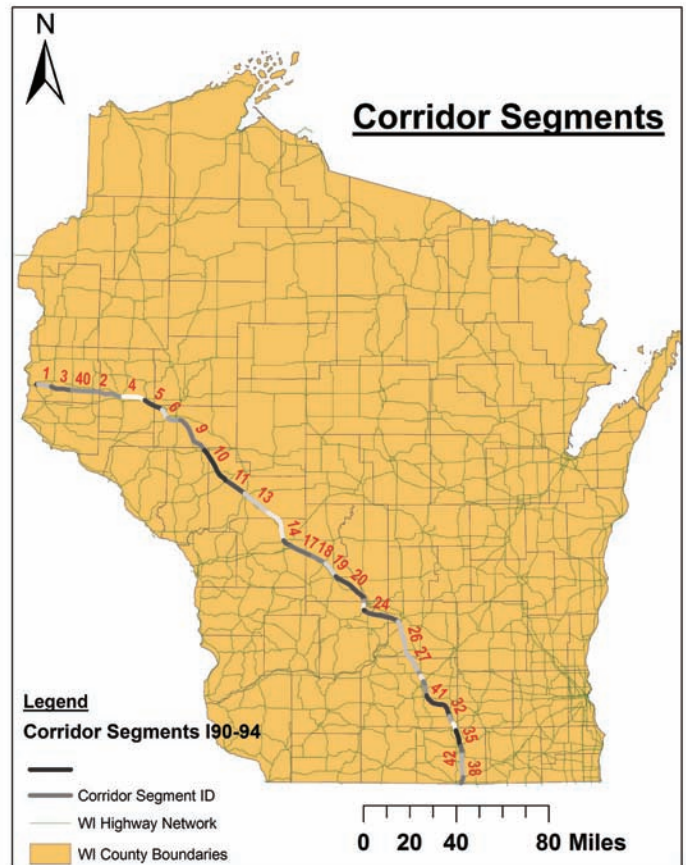
GIS Day Expo 2009

GIS Day is an international day of education about Geographic Information Systems (GIS) and geography. The 2009 GIS Day Expo at the University of Wisconsin–Madison, held on November 20, featured more than 40 organizations from the private and public sectors who demonstrated GIS applications and geospatial technologies. A number of different UW groups presented research projects in the areas of GIS, cartography, and remote sensing.

Bob Gollnik, Kaushik Bekkem, and Ravi Pavuluri from CFIRE attended the GIS Day Expo. In addition to the exhibit and a summary of all current CFIRE-sponsored projects, they presented an interactive display of a Google mapping application for the Mississippi Valley Freight Coalition Truck Parking project and the CFIRE Operational Resilience of the I-90/I-94 Corridor project (at right).

Gollnik reported that the GIS Day Expo was particularly valuable because it allowed them to connect with other UW organizations and state agencies with whom CFIRE may be able to collaborate in the future. Gollnik and the rest of the CFIRE staff are especially interested in exploring and expanding the center’s mapping and GIS capabilities for freight planning, operations, and analysis.

Interested in talking with CFIRE about freight-related GIS? Contact Bob Gollnik (gollnik@engr.wisc.edu).



An Introduction to Comprehensive Safety Analysis

Beginning in mid-2010, anyone operating a commercial motor vehicle (CMV) will be subject to an entirely new method of motor carrier enforcement: Comprehensive Safety Analysis (CSA 2010).

Currently, six states are conducting a pilot of this Federal Motor Carrier Safety Administration (FMCSA) initiative to reduce CMV crashes, fatalities, and injuries. The operational model for CSA 2010 features continuous monitoring and tracking of entities’ safety performance. Entities may be either carriers or drivers. All states should anticipate the enactment of this rule in mid-2010.

In December 2009, the University of Wisconsin–Superior’s Transportation and Logistics Research Center hosted a three-hour seminar to provide an in-depth review of CSA 2010. Dan Drexler, Division Administrator, FMCSA, and Captain Ken Urquhart, Minnesota State Patrol, served as instructors.



Modern Mass Transportation Systems

In November 2009, Dr. Mei Cao from the University of Wisconsin–Superior’s Transportation and Logistics Research Center attended a course entitled Light Rail—Rapid Transit—Commuter Rail: the Modern Mass Transportation Systems at the University of Wisconsin–Madison, supported in part by funding from CFIRE.

The course covered many of the engineering design, construction, and operational issues with transit systems, such as traction power systems, vehicle technology selection, layout and design of transit yard facilities, traffic control for highway-light rail transit grade crossings, and noise and vibration control. This course helped Dr. Cao stay at the forefront of current railway practice, regulations, and standards. It also provided Cao with opportunities for networking with rail transportation professionals from the public and private sector. She will apply lessons learned from this course in the classroom and to her research.

A Busy TRB for CFIRE Staff

The CFIRE staff were active participants at the 2010 Transportation Research Board Annual Meeting.

Acting Director Jason Bittner co-chairs the Committee on the Conduct of Research (ABG10) and is a member of the Transportation Asset Management Committee (ABC40). He also attended committee meetings for Transportation of Hazardous Materials (AT4040), International Trade and Transportation (AT020), and the Freight Subcommittee of the Freeway Operations (AHB20) committee. Bittner also chaired session 103–Everything You Need to Know About Web 2.0 and presented posters at session 248–Current Research on Intermodal Freight Issues and session 251–Systems Perspectives and Issues in Asset Management.

Bittner found session 607–Current Research on Commercial Vehicle Productivity, Pricing, and Enforcement to be particularly valuable. This session featured research in Texas on road pricing for infrastructure cost recovery. “While the session was principally focused on toll-roads, the application to permit rates and damage to infrastructure is clear,” said Bittner. The results from this research could serve as critical inputs to the CFIRE project on Aligning Oversize and Overweight (OSOW) Permit Fees and Policies with Agency Costs. Other work in this session focused on changes to international truck size and weight policies and their impact on safety and performance. This work paralleled efforts in the CFIRE/WisDOT study on truck size and weight in Wisconsin.

Wisconsin Transportation Reception at TRB

More than 200 people attended the 2010 Wisconsin Transportation Reception at the Transportation Research Board (TRB) Annual Meeting on January 10 in Washington, DC. CFIRE co-sponsored the reception, hosted by the Transportation Development Association of Wisconsin. WisDOT Deputy Secretary Ruben Anthony spoke to attendees. Ken Voight walked away the winner of the door prize drawing and is now the proud owner of a UW model truck.

And while the Packers could’t pull out a win, the reception proved a winner for the large and varied crowd of students and transportation professionals from both the private and public sectors.

MVFC Facilitator Ernie Wittwer is the secretary for the Freight Planning and Logistics committee (AT015). This committee meeting included a presentation on “Demystifying the Environmental Sustainability of Food Production and Transportation,” which explained the emissions implications of local growth and consumption versus traditional supermarket methods. Wittwer also served as a panelist in session 217–Future of Multistate Freight Coalitions: Reauthorization and Beyond, where he presented the perspective of the Mississippi Valley Freight Coalition and answered questions from the audience.

Wittwer singled out session 126–Strategies for Moving Towards a Performance-Based Organization as particularly relevant. “Several speakers made the case for moving transportation organizations to performance management systems, both to be in compliance with expected federal legislation and to become more transparent and accountable,” said Wittwer.

Research and Education Coordinator Greg Waidley serves as the communications facilitator for the Intermodal Freight Terminal Design and Operations (AT050) committee. Researcher Bob Gollnik serves on the Inland Water Transportation (AW020) committee as its communications facilitator. Communications Coordinator Steve Wagner attended TRB for the first time this year; he found the four-part series of sessions on What Lessons Has the Freight Transportation Sector Learned from the Global Economic Crisis to be a particularly useful introduction to current issues in the world of freight transportation.



Wagner joins CFIRE as Communications Coordinator

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 will be 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. In addition, he is currently enrolled in the School of Library and Information Studies at the University of Wisconsin–Madison.

You can reach him at swagner@engr.wisc.edu.



Gollnik joins Inland Water Transportation Committee

In September 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.

The Inland Water Transportation Committee will hold its next meeting as part of the TRB Joint Summer Meeting, held July 11-14, 2010 in Minneapolis, Minnesota.



Professional Development Courses

For more information about transportation-related professional development courses available through the UW Department of Engineering Professional Development, visit their website at epd.engr.wisc.edu/courses. Courses marked with an asterisk (*) are eligible for CFIRE scholarships.

Next Generation High Speed Rail (HSR) Systems: The Basics and Operations*
May 3-4, 2010, Madison, WI

Highway-Rail Grade Crossing Safety Course
May 4-5, 2010, Madison, WI

Successful Design and Maintenance of Railway Track Systems*
May 18-20, 2010, Houston, TX

Railway Track Systems: Engineering and Design*
June 14-15, 2010, Philadelphia, PA

Railway Bridge Engineering*
June 16-17, 2010, Philadelphia, PA

Fundamentals of Railway Train Control and Signaling, Including PTC Systems*
September 15-16, 2010, Philadelphia, PA

Highway Bridge Design
April 21-23, 2010, Madison, WI

Effective Roadway Lighting
April 26-28, 2010, Madison, WI

Contributors

Content for this edition of the CFIRE News was contributed by Kaushik Bekkem, Dr. Craig Benson, Jason Bittner, Spencer Gardner, Bob Gollnik, Dr. Alan Horowitz, Bickey Rimal, Jessica Sanfilippo, Steve Wagner, Greg Waidley, and Ernie Wittwer.

March 2010

AASHTO Standing Committee on Rail Transport
March 8-9, 2010, Washington, DC

www.transportation.org

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

www.trforum.org

ITE 2010 Technical Conference and Exhibit
March 17, 2010, Savannah, GA

www.ite.org

April 2010

ASPA Annual Meeting and Conference
April 9-13, 2010, San Jose, CA

www.aspanet.org

Current Issues in International Logistics
April 15-16, Houston, TX

ASCE Conference on Ports
April 25-28, 2010, Jacksonville, FL

content.asce.org/conferences/ports2010/

Minnesota Research Conference
April 27-28, 2010, St. Paul, MN

Mississippi Valley Freight Coalition Annual Meeting
April 27-29, 2010, Cincinnati, OH

www.mississippivalleyfreight.org

May 2010

American Short Line and Regional Railroad Association
May 1-4, 2010, Orlando, FL

www.aslrra.org

ITS America Annual Meeting
May 3-5, 2010, Houston, TX

www.itsa.org

Toward Better Freight Transportation Data
May 18-19, 2010, Irvine, CA

www.trb.org

Transportation Finance: Forging a Sustainable Future
May 19-21, 2010, New Orleans, LA

www.trb.org

North American Rail Shippers Association
May 26-28, 2010, Washington, DC

www.railshippers.com

June 2010

Environment and Energy in Transportation Summit
June 6-10, Raleigh, NC

www.trb.org

Council of University Transportation Centers Annual Meeting

June 7-9, College Station, TX

cutc.tamu.edu

NASCO Conference 2010
June 15-17, 2010, Des Moines, IA

www.nascoiowa2010.com

ASEE Annual Conference and Exposition
June 20-23, 2010, Louisville, KY

www.asee.org/conferences/annual/2010/

North American Travel Monitoring Exposition and Conference

June 21-24, 2010, Seattle, WA

www.trb.org

July 2009

Mississippi Valley Conference Annual Meeting
July 6-9, 2010, Des Moines, IA

www.mvc2010.com

Performance-Based Asset and Risk Management of the Highway Infrastructure System

July 11-15, Philadelphia, PA

TRB Joint Summer Meeting
July 11-14, 2010, Minneapolis, MN

www.trb.org

AASHTO Subcommittee on Maintenance
July 11-15, 2010, Savannah, GA

maintenance.transportation.org

AASHTO RAC Meeting
July 25-28, 2010, Kansas City, MO

research.transportation.org

August 2010

ITE 2010 Annual Meeting and Exhibit
August 8-11, 2010, Vancouver, BC

www.ite.org

Mid-Continent Transportation Research Forum
August 19-20, Madison, WI

www.mrutc.org/midcon/

About CFIRE

The National Center for Freight and Infrastructure Research and Education (CFIRE) at the University of Wisconsin–Madison is one of ten National University Transportation Centers. The CFIRE consortium includes the University of Wisconsin–Milwaukee, University of Illinois–Chicago, University of Toledo, and University of Wisconsin–Superior.

CFIRE's mission is 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. Our vision is to 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.

Call for Presentations

2010 Mid-Continent Transportation Research Forum

Hosted by the Wisconsin Transportation Center
August 19-20, 2010, Madison, WI

Researchers are encouraged to focus their efforts on projects that demonstrate a significant return on the investment of the sponsoring agencies, specifically state DOTs. Submitters are encouraged to partner and jointly present their material with practitioners. Please confine the abstract to one page, including the following information: Author(s) and affiliations(s), mailing address, email. Authors of accepted abstracts can prepare a complete paper for inclusion in the conference proceedings.

Abstracts for presentations are due March 19, 2010.
Papers are not required, but full papers are due June 18, 2010.
Submit abstracts to Jason Bittner (bittner@engr.wisc.edu).

www.mrutc.org/midcon

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