

Strategic Plan
National Center for Freight and Infrastructure Research and Education
(CFIRE)

University of Wisconsin-Madison

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CFIRE



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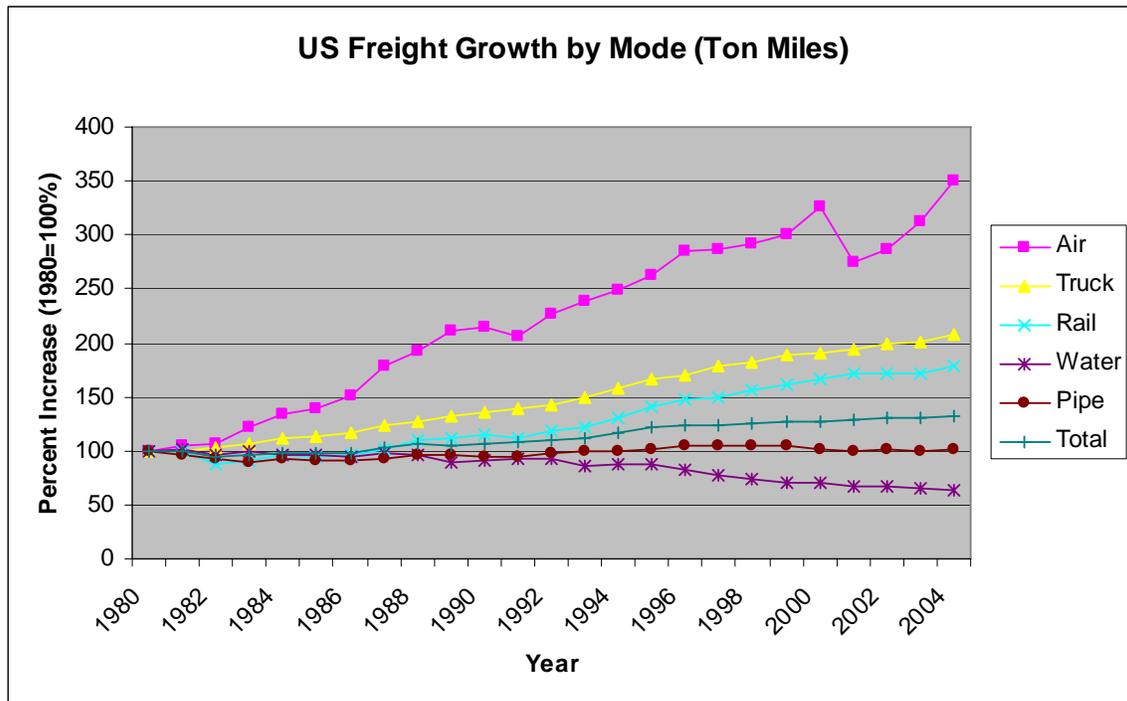
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A. Glossary

AASHTO	American Association of State Highway and Transportation Officials
APWA	American Public Works Association
ASCE	American Society of Civil Engineers
CEE	Civil and Environmental Engineering
CFIRE	National Center for Freight and Infrastructure Research and Education
CMSC	Wisconsin Construction and Materials Support Center
DOTs	State Departments of Transportation
EPD	University of Wisconsin Engineering Professional Development
FHWA	Federal Highway Administration
GCM	Gary Chicago Milwaukee Corridor
GLMRI	Great Lakes Maritime Research Institute
LTAP	Local Technical Assistance Program
MPO	Metropolitan Planning Organization
MRUTC	Midwest Regional University Transportation Center
MVFC	Mississippi Valley Freight Coalition
MVTOC	Mississippi Valley Traffic Operations Coalition
RFP	Request for Proposals
RITA	Research and Innovative Technologies Administration of USDOT
RLAC	WisDOT Research and Library Advisory Council
RMRC	Recycled Materials Resource Center
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: Legacy for Users
SPR	State Planning and Research
STAR	Signature Technical Area of Research
TIC	Transportation Information Center (Wisconsin LTAP)
TOPS	Wisconsin Traffic Operations and Safety Laboratory
TRB	Transportation Research Board
UIC	University of Illinois-Chicago
USDOT	United States Department of Transportation
UTC	University Transportation Center
UW	University of Wisconsin
WHRP	Wisconsin Highway Research Program
WisDOT	Wisconsin Department of Transportation

B. Center Theme

The Theme of this Center is *Sustainable Freight Transportation Infrastructure and Systems*. This Center will focus on issues of sustainability and freight transport as it advances technology, knowledge and expertise in the planning, design, construction and operation of sustainable freight transportation infrastructure and its associated systems. This will be accomplished through education, research, outreach, training and technology transfer and deployment, led by efforts at the University of Wisconsin – Madison with support from its partner institutions.



Source: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics: 1990-2003 data from the *Journal of Transportation and Statistics*, vol 8 no.1, 2005, Scott M Dennis, "Improved Estimates of Ton-Miles," pp 23-44; other data are tabulations from BTS using the same methodology.

America's freight transportation system makes critical contributions to the nation's economy, security, and quality of life. More than \$660 billion (about 6.4 percent of the US Gross Domestic Product) is spent annually to move freight, and the cost and volume of goods movement are crucial to the productivity of the entire US economy. By the year 2020, at even moderate rates of economic growth, the total domestic tonnage of freight carried by all U.S. freight systems is predicted to increase by nearly 70% and international trade may double. With ongoing growth in travel demand on virtually every system of transportation in the United States, transportation capacity is seriously inadequate. Congestion, reliability, safety, and system preservation will be major problems for the foreseeable future, despite improved operational efficiencies. The consequences of inaction are serious risk to our economic security and quality of life in the United States.

The critical crisis facing the nation's infrastructure system will significantly impact our nation's economic competitiveness in years to come. Other nations are increasingly investing additional resources in making products easier to get to new markets. For years, the economy of the nation has been reliant upon efficient transportation to ensure total price competitiveness. As foreign nations increase their transportation investments, US manufacturers become increasingly constrained by economic pressures. This Center will explore strategies to preserve the existing infrastructure, expand our economic competitiveness, and improve the nation's freight infrastructure.

UW-Madison and its consortium partners envision a proactive, internationally-recognized Center that identifies, defines, and addresses essential issues in **Sustainable Freight Transportation Infrastructure and Systems**. Sustainability of these freight transportation networks refers to the environmental sustainability of the built environment, enduring strategies that facilitate freight mobility, and safe and efficient operation of shared and intersecting passenger and freight networks. Sustainability and mobility are impacted by operating restrictions, weight and size limitations, noise and pollution regulations, innovations in work zone safety and performance, and similar activities. UW-Madison and its consortium partners have a track record for mutually supportive collaborative working relationships and will continue to work together with each other, state and federal transportation agencies, and industry partners to lead efforts in this important thematic area.

The very nature of critical transportation challenges requires a shift from reactive and prescriptive approaches to dynamic, broad, high-level problem definition and solving. A hallmark of the Center will be transformation. As freeways, waterways, and rail systems are pushed further beyond operating capacity, our national need for new and more effective ways to increase freight capacity becomes more apparent. Rather than making incremental refinements or optimizing current infrastructure and systems, the Center will identify and seed opportunities that explore and develop innovative strategies to construct, plan, operate, maintain and renew our existing freight transportation infrastructure network. The Center will target innovative and novel multidisciplinary research, educational, and technology transfer opportunities to prepare leaders for current and emerging transportation challenges. Research will focus on sustainable infrastructure that facilitates safe and efficient multimodal freight movements such as modern rail sidings, flyovers, truck lanes or other alternatives to separate freight and passenger traffic, improved port berths, river locks, and other strategies.

Sustainable and efficient freight transportation is of critical importance for America to enhance its economic competitiveness in the 21st century. Freight transportation is particularly important to the industrial and agricultural economies of the upper Midwestern region, dominating the economic environment for the Great Lakes states.

The state transportation agencies of the AASHTO Mississippi Valley region have signed an MOU agreement to a Mississippi Valley Freight Coalition (MVFC) to cooperate in exploring strategic initiatives, policy and planning decisions, and traffic operations to improve the flow of freight. The Center will leverage pooled funds and research

activities of the MVFC. The MVFC will provide a forum for the Center's efforts to provide guidance to the freight industry, metropolitan and regional planning organizations, and state freight coordinators.

The researchers and faculty participants of this center are prepared to provide research and education leadership in four **Signature Technical Areas of Research**. Participants in the strategic planning process representing public and private sector officials and academics identified priorities and needs for future research in these four areas:

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

In order to better define these focused areas, each is presented below in greater detail.

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

Maintaining, improving or expanding the physical infrastructure of freight transportation systems forms the basis of all activities in freight management. Recent interviews with trucking, rail, and shipping industry identified many deficiencies in infrastructure throughout our national highway network. Specific identified infrastructure improvements or conditions included: pavement conditions, deteriorating highway bridges, rail and rail bridges that cannot carry industry standard weights at reasonable speeds, and waterways that are losing market share due to inefficient lock and dam systems. The objective for development work in this area is not only to sustain existing freight movement, but to improve facilities for future freight demands. The activities in this signature area will focus on highways, railways, bridges, harbor facilities, and intermodal combinations. Topics in this area include: sustainable construction methods, durability, rapid construction or repair, security, construction productivity and contracting methods, and impact of increasing freight loads on facilities. Each of these is discussed in further detail below.

New methods of construction and construction materials need to be identified to provide "sustainable" infrastructure construction and systems. Materials that demand less energy usage in their production and less energy in maintenance need to be developed or adopted for use in freight infrastructures. Basic materials that are widely available, such as concrete, must be re-examined to find less energy intensive ways to manufacture the cements or new cements need to be identified. Materials that are less sustainable, because of scarcity, need to be replaced with readily available and recyclable materials. Infrastructure construction methods that reduce the short term (during construction) and long term (during operation) impact on the environment – air, surface and ground water, and land usage, should be developed.

Life cycle cost of infrastructure components is directly related to initial cost and durability. Durable new materials, obtained by adopting existing materials to new purposes or developing new components, are needed to provide extended life for portions of the freight infrastructure. Concrete, discussed above, has changed little in 75 years. It's been just in the past years that many new additives have been developed to change wet consistency, reduce porosity, increase strength and improve durability. Yet, the basic Portland cement is almost the same. Many new ideas for improved cements, asphalts, additives and alternate reinforcing that will extend service life are due. Totally new products, such as fiber reinforced polymers, have to be adopted and accepted for infrastructure use.

The transportation industry is well aware of the increasing age of many components of the transportation infrastructure and needs for repair or replacement. It is critical that future repair/replacement procedures be accomplished much more rapidly than in the past. The impact on our society's economy created by disruption of freight transportation during infrastructure construction projects is tremendous. Slowed or delayed deliveries mean lost time which translates to lost money. The highway and harbor freight systems must take lessons from the railway industry in developing new very rapid construction techniques. Facility closures of months need to be reduced to days. Research into use of prefabricated units, off site modular construction, lightweight and rapid curing materials, high productivity equipment, rapid quality and acceptance tests, and other innovative construction methods such as use of stay-in-place forms have the potential to decrease the time freight transportation systems are out of service.

Added disruption of freight movement is inherent in natural and man made disasters. Most critical infrastructure components have already been identified because of security concerns. Methods must be developed to allow rapid identification and implementation of alternate shipping routes accompanied by rapid repair/construction methods for replacing critical infrastructure components.

Improving the speed of the repair and replacement of freight transportation infrastructure systems requires not only improving construction productivity but also improving contract administration techniques and developing alternative project delivery strategies. The choice of contracting method can have a tremendous impact on the efficiency and effectiveness of which these projects are made available and the quality of their performance. A variety of alternative contracting methods have the potential to improve the delivery process. Design-build, construction manager at risk, performance contracting, alliance contracting, Lean Construction, best value techniques, and traditional design-bid-build each have certain advantages and disadvantages. Research into these and other techniques will provide a basis for selecting the contracting method best suited to the specific project needs and constraints.

Freight loads continue to increase, particularly on roadways. Increasing freight loads may require new approaches to future structure, pavement, and rail designs. The impact of increased loads and different load configurations on existing infrastructure must also be evaluated, especially in relation to durability, ratings, postings, and fatigue. Infrequent

“super loads” are often allowed on transportation systems. These super loads may structurally affect both the short and long term performance of components. The degree of impact of super loads on the system needs to be defined and a method of accurately tracking these loads as they move through the systems needs to be developed.

The Center will work closely with and leverage funding from the Recycled Materials Resource Center, the Innovative Bridge Research and Deployment Program, the Wisconsin Highway Research Program, and the Construction and Materials Support Center at the University of Wisconsin-Madison to facilitate cooperative efforts.

Within the broad category of structures research, the Center anticipates close collaboration with the Wisconsin Department of Transportation to explore a variety of projects. Some potential activities include analysis of the effects of increased axle loads on reinforced concrete decks, effects of increased freight loads on current inventory including posting, ratings, structure durability, and other issues, and research on trends in truck size and frequency for fatigue calculation calibrations.

Other structures research could include Super Loads and their effect on short and long term performance, new structural materials including, decks, super and substructure that perform superior to current technologies, new construction methodologies that facilitate shorter delays of freight traffic (accelerating construction), new technologies to allow pinpoint accuracy of super loads and the perspective structures they may be crossing, and new analysis methods comparing standard axles to typical trunion configurations.

Multimodal Systems Planning and Optimization

In response to the rapid growth of freight activities in this nation, transportation planning agencies at all levels are working towards better integrating freight into the traditional passenger-originated transportation planning and programming process. The goal is to examine the issues associated with *both* freight and passenger transportation; evaluate the potential impacts of alternative policies and projects for addressing these issues (such as those discussed in the other theme areas of CFIRE); develop plans and programs that represent the optimal allocation of resources; and ultimately provide effectively-integrated multimodal freight transportation systems that sustain economic competitiveness and quality of life.

However, freight planning efforts to date have been significantly hampered by the limited knowledge of the fundamental processes driving freight transportation patterns and the lack of appropriate analytical tools for evaluating freight-specific policies and projects. Institutional issues related to jurisdiction, infrastructure ownership and responsibility further hinder a coordinated approach to maximize the economic benefits associated with freight activities, while minimizing their negative environmental and other societal repercussion. In view of these challenges, CFIRE’s research activities in this theme area will focus on (a) gaining improved understanding of the decision-making processes of, and the inter-relationships among, various freight stakeholders; (b) developing analytical tools to support freight planning and resource optimization; (c) identifying policies and strategies that enhance the integration, efficiency, and resilience of multi-modal freight

transportation systems; and (d) facilitating the development of public-public and public-private partnerships that are often the key to successful policy implementation. Each of these research focuses is discussed in further details below.

The movement of goods is dependent on an often uncoordinated web of shippers, third party logistics providers, carriers across multiple modes, and governments across multiple jurisdictions. Decisions of individual private stakeholders may lead to negative externalities at the regional or global level. Meanwhile, public or regional-level goals may not address the market objectives of private or local-level stakeholders. The first step to successful freight planning is therefore to better understand the processes by which the different stakeholders arrive at their freight-related decisions and to integrate their perspectives into the freight planning process. To enhance this understanding, CFIRE will conduct interviews, survey, and round-table discussions with various stakeholders; identify their respective aspirations and concerns; and examine their decision-making processes and inter-relationships. CFIRE will leverage and expand the stakeholder network already established through the MVFC. Based on the enhanced understanding of freight decision making processes, key barriers and incentives associated with inter-modal freight movement will be identified and examined.

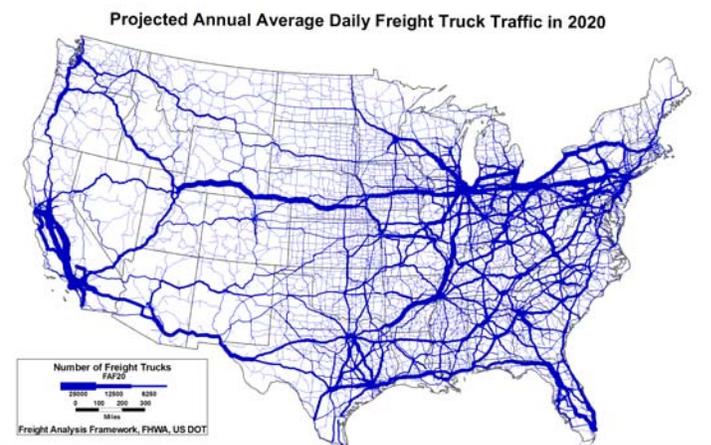
Data and information collected about the stakeholders' characteristics and decision-making processes will also provide the foundation for developing improved analytical tools to support freight planning. In particular, CFIRE will develop analytical tools for quantifying stakeholders' sensitivities to policy parameters such as travel time, reliability, safety, access controls, tolls and other costs. This is critical to the successful design of many freight strategies and improvement projects, such as truck tolls and user charges. Major research effort will also be devoted to improve freight demand forecasting, one of the primary components of transportation planning. Public agencies rely on accurate demand forecasts in order to provide the infrastructure needed to support future freight movement and to predict the potential impacts of any public policies or improvement strategies being considered. Private sectors rely on demand forecasts to draw up business plans regarding the equipment, labor, and other financial requirements. Researchers at CFIRE will build on existing expertise in demand modeling and logistics and develop advanced freight demand forecasting tools that are cognizant of global freight trends and representative of the underlying decision-making processes. These demand forecasting tools will help researchers working in the other theme areas assess the impacts of various technology-based improvements, congestion management strategies, government intervention policies, and alternative land use development and economic growth scenarios. Another type of analytical tools of interest to CFIRE is optimization models. These may range from models used by public sector officials to maximize the economic return and other societal benefits of projects, to models used by private sector analysts to minimize the costs associated with shipping goods.

The third research focus for this theme area entails applying the improved knowledge about the freight systems and the advanced analytical tools to plan for integrated, efficient, and resilient multi-modal freight transportation systems. Specifically, the applicability of integrative strategies such as city logistics, cooperative freight transport

systems, Freight Village developments, and truck-rail intermodal facilities will be examined. To address freight efficiency issues, the researchers will assess existing capacity of the nation's freight network and identify solutions to resolve the major bottlenecks found in the Mississippi Valley and other regions. In light of the nationally and internationally heightened security concerns, resilience of freight transportation systems is gaining importance as a planning goal. CFIRE will pursue multi-hazard mitigation research, with a focus on increased preparedness for hazardous events. Risk analysis, evaluation of redundancy and backup alternatives, the recovery strategies, and the economic impact of imposing security measures will be considered in this research area. The Center will explore partnerships with the new Homeland Security Innovation and Entrepreneurship Center at Northwestern University to conduct this type of work.

The above mentioned three research areas aim to enhance the current body of knowledge and toolset to aide the freight planning process. However, putting these knowledge and tools into practice often requires cross-jurisdictional collaborations and private-public partnerships. This is because a high proportion of freight movement takes place across multiple cities, states, regions, and countries and depends on operators and facilities of multiple modes. In view of the importance of coordination across modes and jurisdictions, CFIRE will build on the success to date with facilitating the MVFC. Continued efforts will be devoted into identifying and promoting improved models for private-public and public-public partnerships.

Traffic Operations and Safety



With growing numbers of personal vehicles sharing the roadways and an ever increasing number of trucks of larger size, freight traffic operational and safety issues become more and more important. Benefits of advanced infrastructure and operational system planning can only be realized through safe and efficient traffic operations.

Leveraging the existing research capability, this Center will explore effectiveness and safety impacts of alternative freight traffic management strategies. Major components of the Center's *Safety and Operations* research include regional freight traffic management, freight traffic safety, and application of information and communication technologies to improve freight mobility. Each of these key study areas will be detailed below.

Regarding regional freight operations, the Center will work with the MVTOC and neighboring corridors (such as the Gary-Milwaukee-Chicago Corridor, GCM, and Northwest Passage) as they explore issues and solutions to accelerate coordination of interstate highway system management and operations. The Center will undertake

activities that facilitate deployment of cross-jurisdictional programs and services, provide long-distance travel information to shippers and the traveling public, develop a mobility-oriented transportation operations, and create frameworks and guidelines to support investment decisions, among other efforts. Researchers will also collaborate with leading freight companies to develop and explore innovative safety management systems.

Freight traffic safety research in the Center involves two aspects: incident management and driver behavior study. When commercial vehicles are involved in a crash, the clearance of the traffic incident usually takes longer due to the need for specialized recovery and towing equipment, thereby increasing traffic congestion and the risk of secondary crashes. The Center will study innovative practices for traffic incident management involving Freight including the evaluation of emerging trends and technologies being used to clear traffic incidents that involve commercial vehicles. Simulation will be a useful tool in the studies. Operations enhancement to shift freight from roads to other modes will have positive impact on highway safety, which will be studied as well.

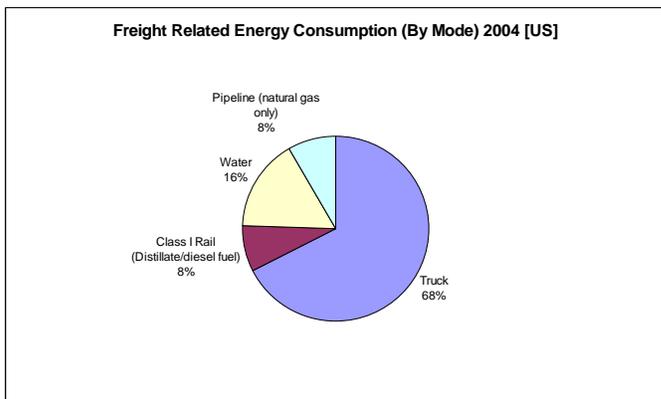
Driver behavior represents an important area of study with significant implications to both efficiency and safety. Numerous aspects of commercial vehicles can be assessed through human factor studies especially when coupled with the use of a simulator, one of the important study areas. A simulator (if developed) would be used to research and investigate freight-oriented human factors such as driver fatigue and drowsiness, effects of new medications and long-term driver sitting (in conjunction with the Medical School), effectiveness of experimental roadway features (e.g. signing, pavement marking, geometrics), driver comprehension of prototype telematics interfaces, vehicle operation in congested traffic and/or adverse weather, and evaluation of prototype new equipment (air seats, dash board layout, plowing equipment controls, etc.).

Development of information and communications technology has been creating new improvement opportunities for freight operations. The Center will investigate the development of commercial vehicle telematics which include, for instance, technologies that support vehicle to roadside and vehicle to vehicle dedicated short range communications (DSRC). Vehicle Safety and Motorist/Fleet Management Information are the two primary areas the Center will focus on. Examples of vehicle safety systems include rollover avoidance systems, safety monitoring systems to avoid crashes related to drowsy drivers, and automatic cruise control. Motorist/fleet management telematics focus on providing real-time information to the driver on real-time route conditions, motorist service areas, and availability of freight for returning trips to maximize carrier efficiencies. The Center will also encourage opportunities as they emerge with applications of new information and communications technologies.

The Center will work with the Traffic Operations and Safety Laboratory at the University of Wisconsin-Madison to conduct research in this signature area. The Center will leverage the existing WisTransportal Transportation Operations Data Hub to support freight-related traffic operations and safety research and data needs for research in the other CFIRE signature technical areas. The Transportal is a one-terabyte data warehouse

including freeway management data (from traffic detector data, traffic incident information, lane closure data, traffic camera video), transportation planning data including vehicle weights and classifications, weather information from 62 Road Weather Information System (RWIS) sites, 13 years of crash data, and Statewide Highway Network GIS Mapping.

Energy and Environment



Research in the area of *Energy and Environment* will form another major focus of the Center. There is significant demand for assessment of the impacts of different modes of transportation in areas such as air and water quality, land use, and wildlife. The impact of our freight transportation systems on climate change and the understanding of climate change on the

transportation network are also potential research subjects. The Center will use faculty expertise in engineering, air quality and public health to address these important concerns. As with all forms of transportation the increasing costs of petroleum based fuels and the potential environmental impact of petroleum based fuels leads to questions of sustainability. The study of alternative fuels, while not a primary focus for the center, will be considered in this signature area.

Freight transportation and a range of other natural and human activities emit chemicals into the atmosphere associated with risks to health, agricultural productivity, natural ecosystems, and man-made structures. Researchers at CFIRE are working to improve quantification of emission sources, and the impact of these emissions on pollutants of concern to the U.S., especially tropospheric ozone (O₃), fine particulate matter (PM_{2.5}), and their associated chemical precursors. Our work has applied state-of-the-art emission models from the U.S. EPA and the Lake Air Director's Consortium (LADCO) to Midwest truck traffic data developed by the MVFC. This approach is expected to provide an independent, best-estimate of regional emissions for current conditions, while allowing us to extend freight emission estimates in new directions.

Planned areas of study include projecting future emissions from HDDV, estimating emissions of speciated aerosols, especially organic and elemental carbon, and evaluating the emission benefits of control technologies and alternative fuels, especially biodiesel.

In the next 15 years, freight patterns and volumes will change, as will emission control technologies and fuel characteristics. Our emission calculation method, developed and tested for 1999 conditions, will consider how changes in traffic and technology will affect future emissions of nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), PM₁₀, and PM_{2.5}. These estimates will help public and private stakeholders adapt to

changing freight patterns and environmental goals. Our work connecting land use, freight patterns, and emissions is conducted in collaboration with the EPA-funded, joint UW-Madison—Georgia Tech research initiative on Projecting the Impact of Land Use and Transportation on Future Air Quality in the Upper Midwestern United States (PLUTO, <http://www.coa.gatech.edu/~stone/Pluto.htm>). Whereas the PLUTO project focuses on changes in residential transportation, CFIRE brings unique expertise in projecting key changes in freight transport.

Currently the U.S. EPA regulates total PM mass, which is a composite of carbon, sulfate, nitrate, ammonia, and crustal materials. Different emission sources contribute to different types of aerosols, but to date most national emission inventories focus on PM emissions by size class (PM₁₀ and PM_{2.5}), rather than by species type. Extending our analysis to characterize individual aerosol species will contribute to improved characterization of health impacts (*different aerosol species may have different health impacts*); improved characterization of interactions between weather and air pollution (*different aerosol types may have different impacts on cloud formation, rain, and temperature*); and improved decision-making (*chemical composition of aerosols informs the design of more efficient emission reduction policies*).

Table 1: U.S. Freight Transportation NOx and PM-10 Emissions by Mode, 2002

Freight Mode	NOx Emissions				PM-10 Emissions			
	Tons	Percent	As percent of:		Tons	Percent	As percent of:	
			All Mobile Sources	All Sources			All Mobile Sources	All Sources
Truck	3,782,000	66.8%	33.0%	17.9%	120,000	64.7%	23.3%	0.5%
Railroads	857,200	15.1%	7.5%	4.1%	21,300	11.5%	4.1%	0.1%
Marine	1,011,000	17.9%	8.8%	4.8%	44,000	23.7%	8.5%	0.2%
Air	8,200	0.1%	0.1%	0.0%	300	0.2%	0.1%	0.0%
Total	5,658,400	100%	49.4%	26.8%	185,600	100%	36.0%	0.8%

Source: U.S. EPA, National Emission Inventory; total mobile source emissions and total emissions obtained from state air quality agencies. Freight railroad emissions estimated as 96.4% of total railroad NOx emissions and 96.7% of total railroad PM-10 emissions, based on passenger locomotive fraction in U.S. EPA, *Locomotive Emissions Standards, Regulatory Support Document*, April 1998; Air freight emissions estimated as 10.1% of total aircraft emissions, based on air estimated aircraft departures attributable to air freight, as described in report text.

Liquid biofuels, renewable fuels derived from biomass, are one of the best positioned fuels to transition away from petroleum in the near-term and have made a recent resurgence in response to rising oil prices. However, while the technical details of biofuels have been thoroughly studied, there has been less focus on their environmental impacts and their strategic deployment on regional to international scales. Ongoing research in the economic, land use, and air quality impacts of expanded biodiesel use, conducted in collaboration with the UW-Madison Center for Sustainability and the Global Environment (SAGE, <http://www.sage.wisc.edu/biofuels/>), will be applied to the Midwest, with a focus on the viability of large-scale biodiesel use for domestic freight.

C. Director's Summary

By any measure (tonnage, value, volume) and in all modes (trucking, rail, air, water) freight transportation experienced tremendous growth and radical change over the past two decades. Conservative projections demonstrate that freight movements will grow by 50-75% over the next 20 years. Our current infrastructure systems for freight are not able to absorb that growth without significant impacts on system efficiency, economic health and competitiveness in world markets. Now more than ever, freight transportation is a critical issue.

“Bill Graves, President of the American Trucking Associations, cites the critical need to prepare for the sharp increase in freight traffic, both domestic and international. He urges use to consider the need for additional capacity, including such innovations as truck-only lanes to improve efficiency and safety. He tells us that the trucking industry is prepared to pay for improvements with increased taxes, but the taxes must be tied to strategic freight investments. Graves notes that the trucking industry is being asked to help solve problems of congestion, air quality, safety and other goals, and that productivity improvements would provide resources to do so.

John Ficker, President of the National Industrial Transportation League, agrees that support can be found for increased investment, so long as the revenues are focused on strategic improvements. He added that personal mobility and freight mobility are compatible concepts, and that transportation functions as the circulatory system of the economy.

Craig Rockey, Vice President, Policy and Economics, Association of American Railroads, notes that the nation's rail network is three times the size of the Interstate Highway System and that it carries 40 percent of the ton-miles of freight. But he warns there is no more excess capacity on the rail lines and that leveraging private investment is key to expanding the capacity needed to meet growing freight demand in the next few decades. He said the time is right for the adoption of a national rail policy that is substantive, achievable, fully funded, far-reaching and widely supported.”¹

In anticipation of near and longer term future demand for freight, we propose to establish the National Center for Freight and Infrastructure Research and Education (CFIRE) at the University of Wisconsin-Madison. Through collaborative efforts with academic partners, Departments of Transportation, and private sector interests in the freight community, CFIRE will be a nationally recognized provider of freight-focused research, training, and educational programs.

CFIRE's activities will span the gap between public and private sector interests and perspectives and be relevant to both. Freight moves by various modes on infrastructure that is owned and operated independently. For examples, multiple private companies own the rails and the last urban mile of roadway connecting freight to its destination is under the justification of a local transportation agency. The efficiency of freight movement

¹ The AASHTO Journal Weekly Transportation Report. Vol. 107, No. 21. May 25, 2007.

depends upon practices for coordinating among multiple private and public owners and the transport arrangements of shippers and logistics providers to utilize these facilities as a system. For-profit private sector opportunities and decisions are short term and dynamic while public investment in transportation facilities is capital intensive and must serve the long term. The business objects for public and private owners are inconsistent. Left to market forces, we do not have a single freight transportation system but rather several systems that are not adequately integrated across owners, modes, or jurisdictions and in many cases fail to compensate for each other. Good planning, innovative engineering and lots of money will help, but if we desire to maximize utilization, we must deal with the institutional issues that cause us to have incongruent systems. The Center's activities will recognize and address related effects of inefficiencies in the logistical and transportation networks. Despite previous research and the wealth of information on the importance of transportation investments to our economic health and well-being, significant debate continues on the link between specific infrastructure improvements or rehabilitation and economic performance. Furthermore, it is essential to understand the relative strength of these links to better influence decision making at all levels.

The National University Transportation Center at the University of Wisconsin is pleased to support and advance the national research, development, and technology priorities of the USDOT, as identified by the *Department of Transportation Strategic Plan* and the *U.S. Department of Transportation Research, Development, and Technology Plan*. It will do so by participating in national and regional freight focused efforts, TRB committees, and through regular cooperation and coordination with efforts of the FHWA Office of Freight Management and Operations. CFIRE is ready to fill an important national need.

In pursuing the research, outreach activities, and education programs in the areas outlined in our theme description, CFIRE will maintain awareness of the fundamental policy, economic, and social settings in which its products must be communicated and implemented. CFIRE will keep pace with the changing character and significance of the freight transportation industry in all modes. The faculty and staff associated with CFIRE will actively participate in state, regional and national activities designed to incorporate the vast array of freight interests. The Center will seek out opportunities to make significant transformational impacts on freight infrastructure development and operation. For example, the Center will pay close attention to what's happening on the National Surface Transportation Policy and Revenue Study Commission, chaired by Mary Peters, US Secretary of Transportation and look to the Commission's report expected by the end of the 2007 as input for relevant research direction and outreach topics. We anticipate that creative researchers and educators can contribute significantly to the development of the concepts and technologies needed to implement the commission's recommendations.

The signature technical areas described in the previous section represent key areas of expertise among our faculty and staff. The interests and expertise of the Center's faculty and staff span all phases of the infrastructure delivery process: planning, design, construction, operations, maintenance, and renewal. Many of the CFIRE researchers already work closely with state and local agencies to address current problems. In

addition to identifying and developing strategies needed to relieve congestion, improve serviceability, and increase efficiency on our nation's freight transportation infrastructure networks, the Center will offer researchers the opportunity to pursue activities that look ahead 50 years out and consider issues like sustainability of infrastructure, global mobility, and environmental justice. Our research selection process is designed to motivate multidisciplinary research and collaboration among the signature areas and research sponsors.

CFIRE will support and build human and intellectual capital. By leveraging existing programs at the University of Wisconsin-Madison such as the Wisconsin Traffic Operations and Safety Laboratory, the Construction Materials Support Center, the Recycled Materials Research Center, and the Wisconsin Highway Research Program and at its partner institutions such as the Great Lakes Maritime Research Institute, the Intermodal Transportation Institute at the University of Toledo and the Urban Transportation Center at the University of Illinois-Chicago, CFIRE can begin to immediately expand the knowledge base and seed pioneering research and education efforts. CFIRE will break down barriers to cross-institutional partnerships and collaboration leading to sustainable programs. In addition, CFIRE will assume a role in promoting coordination and communication among other academic freight research centers. Partnerships among public and private entities will lead to additional resources and sustainability of efforts.

Each University Transportation Center is responsible for providing training, continuing education and technology transfer for the next generation of transportation professionals. And CFIRE will target to prepare leaders for current and emerging transportation challenges. CFIRE's contribution to the workforce will be a diverse new group of transportation professionals in engineering, urban and regional planning, public affairs, environmental studies, transportation supply chain management and logistics, and business administration who understand the profound impact of freight movements on our nation's continued economic performance, public sector freight planning and operations, intermodalism, and the private industry's logistics and demands on the transportation system. This next generation will be able to address the challenges facing freight transportation because they understand and communicate the big picture and have the technical skills to develop solution.

The USDOT grant will be used to create a lasting essential resource for public and private freight infrastructure developers and operators, and the freight transportation community in general. CFIRE will be a resource to State DOTs alone and in regional and corridors as they work to understand and deal with freight transportation issues. CFIRE will provide forums for key multi-state partnerships and advanced research. Primary among these are the Mississippi Valley Freight Coalition (MVFC) and its related Mississippi Valley Traffic Operations Coalition, two multi-state partnerships of the Mississippi Valley Conference of the Association of American State Highway and Transportation Organizations (AASHTO). The Mississippi Valley Region DOTs have signed a Memorandum of Understanding indicating their desire to meet freight demand through regional cooperative efforts. CFIRE will provide management services,

facilitation, and overall administration of the MVFC pooled fund. In this partnership, CFIRE can facilitate strategic coalition initiatives, engage the private sector, and assist in pursuing the freight provisions of the SAFETEA-LU authorization. Priorities of the MVFC include developing ways to improve the flow of freight by reducing bottlenecks, both physical and regulatory, in the national transportation system, implementing regional freeway management technologies and developing model freight-related planning approaches. Goals of the MVFC include information sharing, coordinating activities to reduce and respond to non-recurring congestion and improve network reliability, reducing crashes and supporting emergency preparedness. The MVFC will serve as an important customer base for CFIRE's outreach activities and a real-world laboratory for CFIRE research activities. CFIRE's focus on freight-related issues and development of the MVFC will create a unique information clearinghouse and resource for transportation professionals considering local, state, federal and global issues.

The Center will operate as a consortium of the University of Wisconsin-Madison leading four other institutions, the University of Wisconsin-Milwaukee, the University of Wisconsin-Superior, the University of Illinois-Chicago, and the University of Toledo. Each of the partner institutions brings specific expertise that complements the research and teaching expertise at the University of Wisconsin-Madison. CFIRE will also cooperate with other research centers to eliminate duplicative and repetitive research, training, and education efforts and to create synergistic opportunities to better leverage limited federal, state, and industry research investments.

Communicating Research and Interaction with Other Programs

Communication of research results is critical for implementation and necessary change. To this end, the Center intends to continue hosting regular research forums and workshops which are co-sponsored by State Departments of Transportation and other universities as well as creating novel approaches to transportation research performance. As a National Center, CFIRE will regularly correspond with and help facilitate research and education activities among the other University Transportation Centers, develop a peer group of researchers working in common areas and help develop national priorities in freight transportation infrastructure and systems needs. This will include working with TRB's NCFRP and other organizations to advance freight research.

Education

Closely associated with the Center is the Transportation Management and Policy Program (TMP), a graduate certificate program open to students pursuing any graduate degree at the University of Wisconsin - Madison. Created in 2002 to satisfy the demand for transportation professionals who understand multiple dimensions of mobility management and planning, the TMP program integrates studies of environmentally sensitive transportation planning and development with studies of the economic, political, and social dimensions of transportation development. The program's curriculum gives students the knowledge necessary to make choices leading to more environmentally and socially sustainable transportation systems now and in the future. The TMP program will include freight focused activities in the student learning environment under CFIRE funding.

Sustainability of Center:

Strong partnerships and working relationships among academia, state agencies, USDOT, and others will be essential to building a permanent institution for the study of freight transportation infrastructure. Building strong working relationships and trust are key components of sustainability. Center staff and faculty will identify educational, research, and technology transfer priorities so that the Center quickly builds a reputation as a national leader in this area. The quality and value of the center's research and its applicability to practice will encourage additional funding from states and potentially could include funding from cities and counties within our region. This value is achieved by listening to customers, state DOTs, and others.

When federal seed money is discontinued, it will be state DOT agencies, industry, and academia which will need to fully fund the Center. It will be important to establish early successes and capture the attention of the leadership committees so they remain committed over the long term and can see real benefit in the Center's products. It is anticipated that the continued success of the Mississippi Valley Freight Coalition provides a catalyst for a lasting institution in the upper Midwest region.

General Center Management:

CFIRE will have an *Executive Committee* of distinguished industry representatives to provide guidance in developing the Center's education, training, technology transfer, and research programs and review progress in following the Center's strategic plan. This Executive Committee will meet annually. At the initiation of the Center, the following members will be invited to make up the Executive Committee:

Teresa M. Adams, Ph.D., Center Director, ex-officio
Tony Furst, Director, Office of Freight Management and Operations, FHWA
Rebecca Brewster, Director, American Transportation Research Institute
Division Administrator, FHWA-Wisconsin, FHWA
Tom Howells, Executive Director, Wisconsin Motor Carriers Association
Tom Vandenburg, Chief Executive Officer, Schneider National
Frank Busalacchi, Secretary, Wisconsin DOT
Cecil Selness, Representative, Mississippi Valley Conference AASHTO
Craig Thompson, Executive Director, TDA Wisconsin
John Duncan Varda, Central Corridors Freight Committee
R.J. Pirlot, Wisconsin Manufacturers and Commerce
Rep. Thomas Petri, US House of Representatives
Rep. Steve Kagen, US House of Representatives
Rep. Jeff Stone, Wisconsin Assembly
Sen. Jeff Plale, Wisconsin State Senate
Bill Browder, American Association of Railroads
Glen Nekvasil, Lake Carriers Association
Representative, US EPA Smartway Transport Partnership
TBD, Federal Railway Administration
Ray Lukesic, Federal Motor Carriers Safety Administration

A **CFIRE** *Research Advisory Committee* including technical experts from academia and industry will meet to award projects. The Research Advisory Committee includes the four STAR Chairs identified in Section II.

In addition, the four STAR Chairs will serve as the **CFIRE** *Management Advisory Committee*. The Center Director will meet regularly and as needed with the Management Advisory Committee to review and consult on general management and personnel decisions affecting **CFIRE** operations. This will interface directly with the Department of Civil and Environmental Engineering at UW-Madison.

SECTION II - PROGRAM ACTIVITIES.

A Research Selection.

“Research Selection Goal: an objective process for selecting and reviewing research that balances multiple objectives of the program.”

1. Baseline Measures. This information is included in the appended document entitled *Baseline Measures for University Transportation Centers*, referred to hereafter as “Appendix A”. Measures include number of transportation research projects selected for funding and total budgeted costs for these projects.

2. Research Selection Program Outcome. CFIRE’s research selection process will involve key individuals from the Federal Highway Administration, State Departments of Transportation, affiliated trade organizations, and other academics. The process will be tailored to coincide with activities of the State DOTs in the region with respect to Freight Transportation interests.

The Center will use a research selection process that reflects the priorities of the states involved in Center activities, the academic partners, and the US Department of Transportation. To this end, it is envisioned that research will be chosen following a formal peer reviewed process. From time to time, the Center Director can award research projects in response to strategic opportunities. These projects will be reported to the Advisory Committee at its annual selection meeting.

3a. Planned Activities. CFIRE staff and faculty have facilitated relationships with the State DOT and the industry partners identified in this proposal.

To select projects, the Center Director will appoint four Signature Technical Area of Research (STAR) Chairs to establish project panels and follow the process as outlined below. In addition, the Center Director will meet regularly with FHWA Office of Freight Management and Operations.

Each STAR chair will review responses to a research ideas suggestion box on the CFIRE website and work with related Committees of the Transportation Research Board to reflect the latest project topics and state or national needs.

CFIRE proposes using the following process for selecting research:

Project Selection Process Overview

Signature Technical Area of Research (STAR) Groups

Each signature area will have a technical review group. At a minimum, each group will be chaired by a University of Wisconsin-Madison faculty member and include one member from a consortium institution, a technical advisor from the Wisconsin DOT, and a representative from the USDOT. STAR groups will have the responsibility for developing Requests for Proposals in their specific area, coordinating peer reviews of Proposals and RFPs received, and prioritizing recommended activities to the Research

Advisory Committee. The STAR chairs will reference the Listening Sessions of the FMCSA and other similar activities as they develop research topics. FMCSA has been holding Listening sessions on several proposed rules regarding issues of interest – On-Board Electronic recording Devices (EOBR), and Intermodal Equipment (IME). As of this Plan’s submission in 2007, six public Listening sessions have been conducted. STAR Chairs will reference these session’s transcripts.

Each STAR chair will be responsible for identifying and recommending members to the Director. Each STAR can include up to nine (9) members. Each STAR Chair will be given the responsibility to assemble their groups based on the criteria included above.

At initiation of the Center, the four STAR Chairs will be:

- Dr. Michael Oliva: Design, Materials, and Construction Processes for Highway, Harbor, and Rail Infrastructure
- Dr. Jessica Guo: Multimodal Systems Optimization and Planning
- Dr. David Noyce: Traffic Operations and Safety
- Dr. Tracey Holloway: Energy and Environment.

Additional information on each of the individual STAR chairs is included in Section IIIC of this Strategic Plan.

Research Advisory Committee

The Center will create Research Advisory Committee that will include nine members. These members will include the four STAR chairs, the Research Administrator (or designee) of the Wisconsin DOT, a Member representing the Mississippi Valley Freight Consortium, one rotating member from the consortium institutions, a representative from industry, and a representative from the FHWA. The Center Director will serve as an ex-officio member and chair of the Committee.

The Research Advisory Committee is responsible for assisting the center in meeting its strategic and programmatic research goals. The Committee will make recommendations to the Center Director based on the prioritization and re-review of the proposals and research from the STAR Groups across the program.

It is anticipated that the WisDOT representative serving on the Research Advisory Committee will also be a member of the WisDOT Research and Library Advisory Council (RLAC) and serve as a liaison to RLAC.

At the start of the Center’s activities, in addition to the STAR chairs indicated previously, members of the CFIRE Research Advisory Committee will be:

- Wisconsin DOT: Nikki Hatch, Research Administrator
- Mississippi Valley Freight Consortium: John Tompkins, Minnesota Department of Transportation
- Rotating Consortium Partner: University of Wisconsin-Superior, Dr. Richard Stewart

- Freight Industry Representative: Rebecca Brewster, American Transportation Research Institute
- FHWA Office of Freight Management and Operations: Michael Onder

The Center Director will chair the Research Advisory Committee as a non-voting member.

Project Oversight Committees

Project Oversight Committees will be appointed by the Center Director for each research project recommended for funding by the Research Advisory Committee. The Project Oversight Committee will provide overall guidance to the project researchers, approve interim and final reports, consider modifications to budgets and timelines, and review project deliverables.

The WisDOT Technical Advisor will be responsible for recommending WisDOT representatives to the project committees on projects initiated by their respective STAR Group.

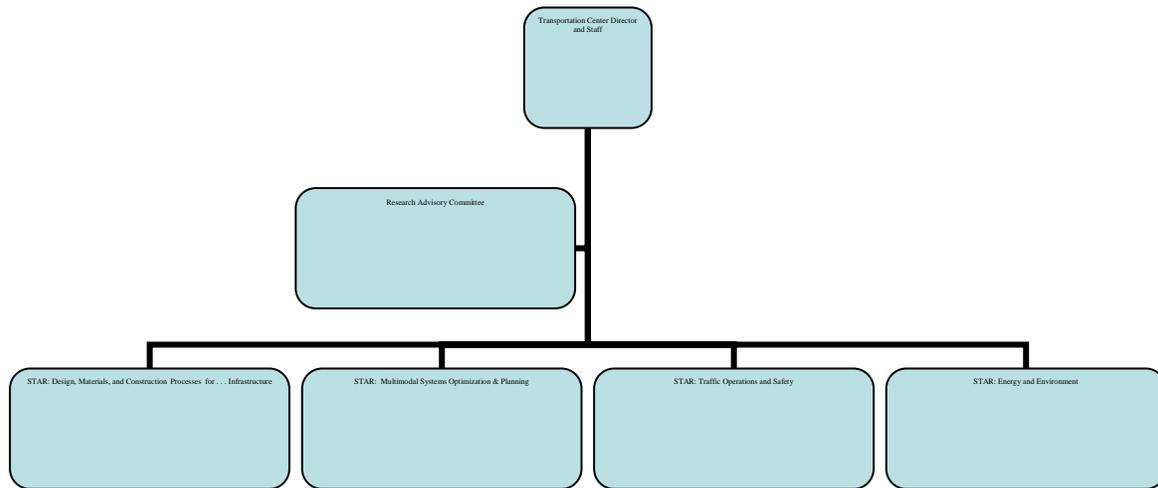
Specific Individual Roles and Descriptions for Research Selection Process

Center Director: The Center Director will take into account recommendations from the Research Advisory Committee in project award decisions. The Center Director will present potential project topics generated from a variety of sources as indicated above to STAR Groups and the Research Advisory Committee for potential inclusion in the research efforts. The Center Director will work with the STAR Chairs to make appointments on the STAR groups and Research Advisory Committee. The Center Director will chair Research Advisory Committee Meetings and provide updates at the meetings of the WisDOT RLAC, the WHRP, and other WisDOT efforts as requested and appropriate. The Center Director will also work with the CMSC, TOPS Laboratory, WHRP, GLMRI and other programs in the state to find opportunities for collaborative work.

WisDOT Technical Advisors: The Advisor is a representative of the WisDOT and will serve as a member of the STAR Group. The Advisor will coordinate internal project review within WisDOT and attend meetings of the STAR group he/she is assigned. The Advisor will also coordinate selection of the Project Oversight Committee representative from WisDOT, identifying and recommending members to be approved by the Center Director.

STAR Chairs: Each STAR Chair will be responsible for recommending appointees to the Center Director for membership of the STAR group, coordinating peer reviews of projects, drafting potential RFPs, and prioritizing annual lists of projects to the Advisory Committee. The STAR Chairs will serve on the Research Advisory Committee and the Management Advisory Committee. STAR chairs will be responsible for communicating and coordinating efforts with established research programs in their respective areas.

Project Selection Hierarchy



Proposed Schedule:

August: Project solicitations. Call for project idea statements and RFPs submitted to MVFC, FHWA, FMCSA, affiliated partners, and CFIRE faculty and staff. Affiliated partners and CFIRE faculty and staff will also provide potential pre-proposals at this stage. STAR Chairs develop contact lists and review STAR membership. WisDOT will also consider pooled fund requests and policy research topics during this time period.

October-November: Project Pre-proposals submitted to STAR Chairs for peer review, prioritization, and prepare recommendations to Research Advisory Committee through the Center Director.

December: Research Advisory Committee meets to invite full proposals; *Research Advisory Committee is given estimated budgets for each signature area based on leveraged funds from matching research activities.* Center Director requests selected full proposals based on Research Advisory Committee recommendations.

January-February: Invited researchers prepare full proposals. Center Director establishes Project Oversight Committees based on recommendations from STAR Chairs, STAR members, and Research Advisory Committee members.

March: Full proposals submitted to Center Director for review by STAR Chairs and Project Oversight Committees. Center Director makes final project awards at this point and necessary documentation submitted to USDOT RITA in accordance with reporting

requirements. The Center Director will make award decisions based upon the proposal review scores and comments, budget availability, and adherence to matching and programmatic requirements, and in consultation with the STAR chairs and designated Project Oversight Committees,.

April-May: Contract preparation and execution by CFIRE and Principal Investigators. Project websites created and posted.

July/August: Executive Committee meets to review progress on Strategic Plan, update strategic areas based on emerging National, Regional, and State priorities, and generate ideas for RFPs

July 1 or October 1: Projects start (progress monitored by quarterly reports and teleconferences, as needed)

Projects will be selected based on the following criteria, consistent with the national strategy for surface transportation research as identified by the report of the National Highway Research and Technology Partnership entitled *Highway Research and Technology: The Need for Greater Investment*:

- adherence to center’s theme and signature areas,
- reflection of national goals and strategic priorities,
- educational component of the proposed activity,
- feasibility of work plan,
- matching funding provided by the proposing research team,
- implementation plan,
- significant impact on practice/long-term significance for profession,
- conforms to definition of advanced research and/or addresses congestion chokepoints, and
- track record of the proposing researcher, including quality of previous research and adherence to reporting requirements.

TABLE 1: CFIRE Signature Areas and Addressed Elements of National Highway Research and Technology Partnership

Signature Area	Element of National Highway Research and Technology Partnership
Design, Materials, and Construction Processes for Highway, Harbor, and Rail Infrastructure	<p>Infrastructure Renewal--Pavements: Designs and Materials; Construction and Maintenance Techniques and Technologies; Safer, Environmentally Friendly Pavements; Education, Communication and Job Training; Promotion and Delivery of Innovation</p> <p>Infrastructure Renewal--Highway Structures: Enhanced Materials, Structural Systems, and Technologies; Efficient</p>

	Maintenance, Rehabilitation, and Construction; Safety Assurance of Highway Structures for Extreme Events; Assessment and Management of Bridges and Other Structures; Enhanced Specifications for Improved Structural Performance; Information and Automation for Structure Design, Construction and Maintenance
Multimodal Systems Optimization and Planning	Policy Analysis, Planning and Systems Monitoring: Improving Understanding of Interactions Between Transportation and Society; Enhancing Data-Driven Decision-making Tools; Improving Monitoring of Evolving Trends; Advancing Multimodal Transportation Planning
Traffic Operations and Safety	Safety: Safety Management and Data Systems, Driver Competency, High-Risk Driving, Light-Duty Vehicle Safety, Highway Infrastructure and Operations, Vulnerable Road Users, Heavy Truck and Bus Safety, Post-Crash Management
Energy and Environment	Planning and Environment: Human Health; Ecology and Natural Systems; Distributional Aspects; Emerging Technologies; Land Use; Planning and Performance Measures

CFIRE STAR groups closely parallel many of the primary focus areas of the National Highway Research and Technology Partnership and the U.S. Department of Transportation. CFIRE's research program focuses on these elements of the National Highway Research and Technology Partnership in the context of facilitating freight transportation.

The area of *Design, Materials and Construction Processes for Highway, Harbor and Rail Infrastructure*, which is the first of the Center's focus areas, is clearly in line with The National Highway Research and Technology Partnership's research priority of *Infrastructure Renewal* and with the work of the U.S. Dept. of Transportation's Volpe Center's research divisions of *Railroad Systems* and *Structures and Dynamics*.

Planning, Multimodal Systems Optimization and Multi-hazard Preparedness & Mitigation, the Center's second focus area, will be devoted to furthering research in areas covered by the U.S. DOT's strategic objectives in the areas of *Mobility, Security, and Global Connectivity*. This area of the center's research is also very closely related to the National Highway Research and Technology Partnership's research priority of *Policy Analysis, Planning and Systems Monitoring*.

Traffic Operations and Safety, the third of the Center's focus areas, will include research that is closely related to that being done at the Volpe Center's Human Factors Division and in keeping with both the National Highway Research and Technology Partnership and the U.S. DOT's strategic objectives in the area of safety.

CFIRE research in the area of *Energy and the Environment* will be in keeping with the U.S. DOT's strategic objective of *Environmental Stewardship*, the Volpe Center's

Environmental Programs, and the National Highway Research and Technology Partnership's research objectives in the area of *Planning and Environment*

National Leadership Role

As this is a National Center, CFIRE will assume a leadership role in coordinating freight related efforts among the UTC community. One of the planned activities is to identify and further explore mechanisms to facilitate better understanding of priorities in freight transportation research. The coordination activities, whether they be in routine teleconferences or symposiums, will provide less duplication in research efforts. This activity is also described in greater detail in the Director's Summary. At a minimum, CFIRE will plan to sponsor and host a dialogue specific to freight transportation among all of the UTCs in Grant Year 3.

3.b Recommended Activities.

In accordance with USDOT requests, CFIRE will conduct research that “involves and draws upon basic research results to provide a better understanding of phenomena and develop innovative solutions – sometimes referred to as exploratory research in order to convey its more fundamental character, its broader objectives, and the great uncertainty in expected outcomes compared to problem-solving research.” This Advanced Research will be considered in the selection process. Advanced research opportunities will also be featured in the coordination efforts that CFIRE will undertake as a National UTC.

4. Performance Indicators. The information that is required will be collected as projects are awarded and included in the routine quarterly reporting process described in the following part of this strategic plan.

To ensure that performance indicators are collected, an annual work plan will be submitted by each of the partner institutions. Prior to approval of the annual work plan, all required performance indicator data will need to be submitted to the lead institution.

II.B Research Performance. CFIRE will adopt the following “Research Performance Goal: an ongoing program of basic and applied research, the products of which are judged by peers or other experts in the field to advance the body of knowledge in transportation.”

CFIRE will also strive to include Advanced Research opportunities whenever possible.

1. Baseline Measures. Baselines 3 and 4 are provided in Appendix A. The measures include number of transportation research reports published and number of transportation research papers presented at academic/professional meetings.

2. Research Performance Program Outcome. CFIRE will contribute significantly to the body of knowledge through contributions to national peer reviewed journals and other publications. At the conclusion of its grant, CFIRE will have increased the number of transportation-related, peer-reviewed research reports published, transportation-related

research papers and presentations accepted for academic and professional meetings, and external awards for transportation-related research programs at the University of Wisconsin and its partner institutions. By achieving this research performance outcome, we can significantly increase the research in the freight thematic area, ensuring continued economic prosperity and competitiveness and providing significant impact on the profession.

3. Planned Activities.

In accordance with UTC program guidelines, all research conducted with UTC funding is subject to external, merit-based peer review. CFIRE plans to conduct peer review on both project proposals, and through the use of project committees as described in the previous section, ongoing peer review is evident throughout the project performance period. Technical reports will be subjected to a careful review and edit by CFIRE staff to enhance readability of the reports.

Multiple formats will be used to disseminate and implement research findings. These will include production of detailed project websites, brochures and posters, and similar efforts. The progress of each project will be tracked through committee. When appropriate, intermediate results will be posted on the CFIRE website. All projects will also be submitted to the TRB Research in Progress webpage.

Research Dissemination Strategy for Individual Projects

Each CFIRE research project will be assigned a Project Oversight Committee of academic, industry, and practitioner members responsible for the oversight of that project. Efforts will be made to attract Project Oversight Committee partners from local jurisdictions whenever possible. These committees will be able to assist in moving research to practice and will participate in a minimum of two teleconferences or videoconferences with the project Principal Investigators. By integrating these varied viewpoints into the research, the results are one step closer to being implemented and transferred into practice.

CFIRE will take a proactive approach and integrate a dissemination strategy into the life cycle of every research project. All research efforts will include statements defining dissemination opportunities during the entire life of the project, rather than only at project end. Required project reports will highlight dissemination outputs, potential media used, potential barriers to implementation, and suggested strategies for overcoming these barriers. Guidelines for proposal submission will include reference to dissemination plans that focus on varied media, target audiences, and levels of detail. These “implementation plans” will be reviewed at the earliest stages of the research selection process and will be scored by the reviewers.

CFIRE will use collaborative models of research dissemination whenever possible. Products will include traditional academic publication (as well as publication in magazines like TR News, Public Roads, Governing, and others) as well as research briefs (sometimes referred to as technical notes), summaries, and “trading cards.” By understanding the different audiences for each dissemination effort, research information and findings are adapted for immediate use and further development or customization as

needed. Researchers will prepare electronic versions of executive presentations and easy-to-understand summaries of results.

While these research performance and dissemination strategies certainly have individual limitations, the collected suite of options will help advance each project accordingly. Considering the increasing demands on the time of transportation professionals, it is increasingly important to tailor the specific dissemination strategy to the audience. The best packaging of research results will be the primary goal for research dissemination activities at the project level.

CFIRE will also coordinate freight related research with other UTCs looking at freight issues and ensure that results are disseminated.

4. Performance Indicators. The information that is required will be collected as projects are awarded and included in the routine quarterly reporting process described in the following part of this strategic plan.

As previously indicated, an annual work plan will be submitted by each of the partner institutions, and prior to approval of the annual work plan, all required performance indicator data will need to be submitted to the lead institution. An example of a consortium partner's annual work plan is included as Appendix B.

II.C Education. CFIRE will adopt as an “Education Goal” a multidisciplinary program of course work and experiential learning that reinforces the transportation theme of the Center.”

1. Baseline Measures. Appendix A contains the information called for as Baselines 5 and 6. These measures include number of courses offered considered part of the CFIRE transportation curriculum and number of students participating in transportation research projects.

2. Education Program Outcome. CFIRE will promote greater understanding of freight and intermodal systems in its traditional transportation engineering curriculum. This will be accomplished by using the Transportation Management and Policy Graduate Certificate Program Curriculum to highlight freight related projects. The STAR Chairs and Consortium Partner representatives each will weave freight focused activities into their courses. The programs will be interdisciplinary in nature, in cooperation with the School of Business Grainger Center for Supply Chain Management and Industrial Engineering's RFID Center.

3. Planned Activities. Among our enduring accomplishments would be:

- Development of a national model for collaborative project-based learning, including pilot programs using industry professionals on thesis committees;
- Exploration of restructured curricula to recognize global competitive needs through diverse and multidisciplinary student-led teams;

- Pilot and test new distance learning graduate and undergraduate courses and/or course components on Freight Transportation, such as Intermodal Freight Movements, and other technical applications;
- Design of specific undergraduate courses including safe and effective transportation of nuclear and other hazardous wastes as part of a larger interdisciplinary risk analysis curriculum' and,
- Creation of a pool of funding to allow the University of Wisconsin and its partners to secure and retain outstanding students' participation in transportation fields and bridge funding between projects.

The educational vision of CFIRE integrates a spectrum of educational customers, from the vocational/technical and community college level through traditional Ph.D. programs.

Faculty and staff will work with private sector and state partners to develop a freight planning internship program. Faculty and staff will also continue to use capstone courses and interdisciplinary student consultant projects to advance freight related needs of the states and local governments. The TMP Colloquium and Practicum projects will allow further cooperation with the freight community and include specific course project opportunities. In addition, CFIRE will also support continued development of public transportation focused colloquiums. These colloquiums will build upon the work established under the MRUTC, including a semester long colloquium on Public Transportation, exploring the history and challenges facing such systems. As part of its commitment to encourage sustainability and environmental awareness in transportation, the TMP program will include multimodal topics. CFIRE will also continue to support transit-focused activities during National Transportation Week and other outreach events, such as Engineering Expo. Examples may include: seminar presentations by transit agency representatives, sponsored demonstrations of bike on bus racks and joint sponsorship of activities encouraging modal choices.

CFIRE will work with its partners to create a program that will help provide for visiting professors in a faculty exchange model to advance key areas of freight system development and will target a new for-credit program in freight infrastructure management to non-traditional students (continuing professionals, certificate programs, and evening programs)

The Center is reflecting the National Highway Research and Technology Partnership entitled "Highway Research and Technology: The Need for Greater Investment" and the programs of the National Research and Technology Program of the Federal Transit Administration. Evidence of this is presented in the research selection process.

CFIRE will choose (or decline to choose) one outstanding student of the year. This student will be an undergraduate or graduate assistant at the University of Wisconsin-Madison. CFIRE will award its Student of the Year \$1000 and the costs for the student to attend an award ceremony in Washington, DC, during the annual winter meeting of the Transportation Research Board (TRB).

4. Performance Indicators. The information that is required will be collected as projects are awarded and included in the routine quarterly reporting process described in

the following part of this strategic plan.

An annual work plan will be submitted by each of the partner institutions, and prior to approval of the annual work plan, all required performance indicator data will need to be submitted to the lead institution. An example of a consortium partner's annual work plan is included as Appendix B.

II.D Human Resources. CFIRE will pursue the following Human Resources Goal: “Human Resources Goal: an increased number of students, faculty, and staff who are attracted to and substantively involved in the undergraduate, graduate, and professional programs of the Center.”

1. Baseline Measures. Appendix A contains the data for Baselines 7, 8, and 9. These measures include number of transportation-related advanced degree programs offered, number of students enrolled in these advanced degree programs, and number of students who received degrees in these programs.

2. Human Resources Program Outcome. CFIRE will significantly expand the number of students and faculty interested in freight and transportation related research and training. This will be accomplished by expanding the pipeline for incoming students and providing targeted opportunities for faculty and researchers to participate in a variety of activities.

3. Planned Activities.

As previously indicated, CFIRE will provide an ongoing allotment of funding for a retention program providing bridge funding for exceptional graduate students in advance of formal research project activities. In addition to this funding, and in lieu of additional staff funding, CFIRE will provide several assistantships to support the activities of the Center.

The Center and its consortium partners will continue to provide financial support to student organizations for their continued development and exposure to transportation topics. CFIRE will support candidates for the prestigious Eisenhower and Eno Fellowship program and each year, the Center will also provide additional funding to provide travel grants to students for attending the TRB Annual Meeting.

The Center will develop a Mentorships program with industry to encourage additional students to explore transportation professions. This program will be established initially at the graduate level through the TMP program. Consortium partner UW-Superior, through its “partnerships in education” program will work closely with the Port of Superior to develop a similar mentorship program. . Outside of the Mentorship program, the Center will reach out to middle and high school students to introduce them to the numerous disciplines and job descriptions within the transportation profession.

CFIRE will also support the Future Cities program, awarding a plaque to the State's best designed “freight transportation system” as part of the competition. Research and

Education Programs Coordinator Greg Waidley will be responsible for developing this effort.

4. Performance Indicators. The information that is required will be collected as projects are awarded and included in the routine quarterly reporting process described in the following part of this strategic plan.

An annual work plan will be submitted by each of the partner institutions, and prior to approval of the annual work plan, all required performance indicator data will need to be submitted to the lead institution. An example of a consortium partner's annual work plan is included as Appendix B.

II.E Diversity.

“Diversity Goal: students, faculty, and staff who reflect the growing diversity of the US workforce and are substantively involved in the undergraduate, graduate, and professional programs of the Center.”

1. Baseline Measures. In accordance with UTC Program guidance, CFIRE will not collect performance measurements regarding diversity.

2. Diversity Program Outcome. CFIRE will increase the number of students from underrepresented groups attending engineering and transportation programs by coordinating efforts with established entities at our program's campuses.

3. Planned Activities. None of the planned activities proposed below will exclude non-minorities and men.

The Diversity Affairs Office of the College of Engineering at the University of Wisconsin-Madison has embarked on a plan to improve the diversity of COE activities. CFIRE will participate in these programs as possible. CFIRE will work closely with the UW PEOPLE Program (Pre-College Enrichment Opportunity Program for Learning Excellence) that has been in operation for eight years with a mission to help students successfully transition from middle school to high school to college. Approximately 1,200 students participate at some level annually. This program makes college accessible to more students of color and/or those from low-income families. CFIRE will also support the McNair Scholars Program when possible.

CFIRE will continue to work with the Summer Undergraduate Research Experience program at UW-Madison, encouraging students to pursue advanced degrees following their undergraduate educations, and will also support sySTEM Now! (Strengthening our Youth in Science, Technology, Engineering, and Mathematics Now) through a partnership with Marquette University. CFIRE staff will support these activities and develop better opportunities to work with the Milwaukee public school system to build awareness of transportation professions in minority populations. A similar activity is planned to promote aviation specific programs.

Each partner institution will dedicate \$3000-\$4000 annually for development and support of Undergraduate research scholars programs. The University of Wisconsin-Milwaukee and UW-Madison are coordinating a student intern program in cooperation with the Summer Transportation Institute offered at Lac Courte Oreilles Ojibwa Community College and the Fond du Lac nation. The University of Toledo will participate in a transportation focused outreach program with the Toledo public school system. University of Illinois-Chicago will support the Lipinski Transportation Scholarship program.

In addition, the University of Wisconsin will work with Lac Courte Oreilles Ojibwa Community College to offer a freight transportation related course following the model of one developed on Geographic Information Systems under the MRUTC. This course will allow students teaching experience while providing an expert instructor in the community college environment.

4. Performance Indicators. Because of privacy concerns raised by grantees who received UTC Program grants in prior years, RITA no longer requires the collection of performance measurements regarding diversity. CFIRE will not collect this data.

II.F Technology Transfer. CFIRE will adopt the following “Technology Transfer Goal”: availability of research results to potential users in a form that can be directly implemented, utilized or otherwise applied.”

1. Baseline Measures. The Center will provide the information called for as Baselines 10 and 11 in Appendix A. These measures include the number of transportation seminars, symposia, distance learning classes, etc. conducted for transportation professionals and the number of transportation professionals participating in those programs.

2. Technology Transfer Program Outcome. CFIRE will be a premier source of freight related information and training through an array of activities, not limited to those listed below. CFIRE researchers and faculty will participate in national committees, project panels, expert review groups, and professional organizations and associations.

3. Planned Activities.

CFIRE will produce several professional short courses and interact with the Mississippi Valley Freight Coalition, a ten-state collaboration of the Mississippi Valley Conference of AASHTO on freight planning and operations.

Among the potential activities planned:

- Conference sessions (CFIRE staff and faculty will actively engage related professional associations to provide updates and reports on activities)
- Participation in needs identification and definition workshops and conferences
- Development of a listserv for freight infrastructure professionals and related fact sheets or similar brochures
- Build networks of freight focused professionals in both the public and private

sectors

- Comprehensive website and information clearinghouse, including the development of a Freight Community of Practice website
- Captured video/Powerpoint presentations at seminars and meetings
- Capacity building for government agencies (MPOs/RPCs) for freight planning and modeling (workshops, etc)
- Coordinated newsletters and flyers with the TIC, Wisconsin's LTAP, in Wisconsin.

3a. Required Activities.

3.a.1 Each Center is required to maintain an up-to-date Internet home page which contains, at a minimum, the information required by the UTC reporting requirements. CFIRE will fulfill this obligation.

3.a.2 The Center will be asked by DOT to participate in occasional meetings of UTC and/or DOT experts on high-priority topics, or to provide expert advice to DOT on technical or education topics. CFIRE will fulfill this obligation as requested and schedules allow.

4. Performance Indicators. The information that is required will be collected as projects are awarded and included in the routine quarterly reporting process described in the following part of this strategic plan.

An annual work plan will be submitted by each of the partner institutions, and prior to approval of the annual work plan, all required performance indicator data will need to be submitted to the lead institution. An example of a consortium partner's annual work plan is included as Appendix B.

SECTION III - MANAGEMENT APPROACH. This section of the Strategic Plan sets forth the Center Director's management plan for meeting the requirements of the grant and managing the personnel and activities of the Center.

III.A Institutional Resources.

The **University of Wisconsin-Madison (UW-Madison)** will administer the National Center for Freight and Infrastructure Research and Education through its Wisconsin Transportation Center, a facilitating unit for several transportation research programs. Other UW-Madison programs that will work in partnership with this Center are the Wisconsin Traffic Operations and Safety Laboratory, the Radio-Frequency Identification Lab (transportation applications of technology), the Wisconsin Highway Research Program (Materials research), the FHWA Recycled Materials Resource Center, the Construction Materials Support Center (construction management and innovative contracting processes), and a proposed Innovative Bridge Renewal and Design Research Center. In addition, UW-Madison is home to the Transportation Information Center, Wisconsin's LTAP program. These transportation research programs at UW-Madison have established cooperative language to work together on projects, share institutional resources and routinely coordinate activities.

UW-Madison's Department of Civil and Environmental Engineering has 26 full-time faculty, 400 undergraduate students of which 33% have expressed interest in transportation as a career, and nearly 175 graduate students of which 50-75 are working on transportation and transportation-related research in traffic engineering, safety, planning, asset management, construction, geotechnical engineering, information systems, geo-spatial information engineering, materials, and structures. Full-time transportation faculty members provide a range of transportation courses covering planning, operations, information systems, asset management, safety, highway design and materials. Other faculty members support the transportation program in geotechnical, structures, materials, and construction engineering and management areas.

Laboratory facilities for transportation research are available in the Transportation Computer Lab, which has the latest software for transportation planning, and traffic engineering research. The Geotechnical/Materials Lab has recently been upgraded with modern equipment for geosynthetics and asphalt material research. Equipment for research on concrete is available in the Structures and Material Testing Lab. PC's, workstations, GPS, and remote sensing equipment are used for GIS-T research. The Wendt Library in the College of Engineering provides a full-range of transportation journals and access to the literature through CD ROM search capabilities.

The Department of Engineering Professional Development conducts an active program of technology transfer in transportation with over 400 professional short courses offered annually.

Faculty participants and areas of expertise:

- Teresa Adams, Professor, Civil and Environmental Engineering: transportation asset management, data and information systems, freight transportation, bridge management

- Lawrence Bank, Professor, Civil and Environmental Engineering: collaborative knowledge management, mechanics of composite material structures, innovative bridge construction
- Craig Benson, Professor, Geological Engineering: geo-environmental engineering, reuse and recycled materials, fly-ash use in infrastructure applications
- Vicki Bier, Professor, Industrial and Systems Engineering: critical infrastructure protection, risk analysis, operations research, security
- Steven Cramer, Professor, Civil and Environmental Engineering: concrete mix design tradeoffs, aggregate coatings, aggregate gradations, timber structures
- Tuncer Edil, Professor, Civil and Environmental Engineering: geotechnical engineering, recycled materials
- Dante Fratta, Assistant Professor, Civil and Environmental Engineering: non-destructive inspection of transportation infrastructure
- Jessica Guo, Assistant Professor, Civil and Environmental Engineering: travel behavior analysis, land use and transportation interaction, urban systems, spatial analysis and GIS
- Awad Hanna, Professor, Construction Engineering Management: construction engineering and management, statistical quality control, work zone methods
- Donald Harmatuck, Professor, Operations and Information Management: transportation economics, cost and demand modeling,
- Tracey Holloway, Assistant Professor, Environmental Studies, Atmospheric & Oceanic Sciences and Civil & Environmental Engineering: air pollution chemistry
- David Noyce, Assistant Professor, Civil and Environmental Engineering: traffic safety, operations, and management
- Michael Oliva, Associate Professor, Civil and Environmental Engineering: reinforced-precast-prestressed concrete design, timber structures, structural design
- Jose Pincheira, Associate Professor, Civil and Environmental Engineering: non-destructive testing of steel structures, behavior of reinforced concrete systems
- Bin Ran, Professor, Civil and Environmental Engineering: Intelligent Transportation Systems, traffic operations, systems evaluation, and network modeling
- Jeffrey Russell, Professor, Civil and Environmental Engineering: construction management, contractor pre-qualification, constructability, maintainability, project delivery systems, risk
- James Schauer, Associate Professor, Air Resources Management Program: air quality monitoring, air pollution control strategies
- Dharmaraj Veeramani, Professor, Industrial and Systems Engineering: radio frequency identification (RFID) applications, quick response manufacturing
- Steve Ventura, Professor, Institute for Environmental Studies: geographic information systems, spatial process modeling, GIS in land use planning

Further details on the CFIRE faculty and research staff at the Consortium institutions is provided in III.D. Multiparty arrangements.

III.B Center Director. The Center Director will be Dr. Teresa M. Adams. Dr. Adams is responsible for implementing the Center’s Strategic Plan and ensuring compliance with all other UTC Program requirements. Dr. Adams will effectively direct and oversee the

Center's funds, personnel, and programs through the staff as outlined below. Dr. Adams will devote 50% of her effort to Directing the Center.

Teresa M. Adams, Ph.D., is a Professor of Transportation Engineering and City Planning in the Department of Civil and Environmental Engineering at the University of Wisconsin-Madison. She is Director of the National Center for Freight and Infrastructure Research and Education (CFIRE) and Director of the Midwest Regional University Transportation Center, both funded by the USDOT.

Dr. Adams has 17 years experience working with state and federal transportation agencies on freight transportation and infrastructure issues. She has conducted research for the seven states of the Upper Midwest Freight Corridor Coalition led by the Ohio Department of Transportation and is the principal investigator for the Mississippi Valley Freight Coalition, a ten-state coalition expanding on the Upper Midwest group to include Missouri, Kansas, and Kentucky.

Dr. Adams assisted the Wisconsin Department of Transportation in scoping an integrated enterprise application to manage the agency's oversize / overweight permit processing and built a geographic information system for automated routing and evaluation of bridge restrictions. She is currently coordinating the development of a guide for commercial truck drivers in Wisconsin and co-teaching the University of Wisconsin's Practicum on Transportation Management and Policy course focused on Freight Planning for Metropolitan Planning Organizations.

Dr. Adams is a member of the Board of Directors for the American Road and Transportation Builders Association, Research and Education Division and a member of the Committee on Intermodal Freight Transport for the Transportation Research Board. She is also Chair of the Transportation Management and Policy graduate certificate program and a faculty affiliate of the Gaylord Nelson Institute for Environmental Studies.

Dr. Adams will represent the Center and/or the UTC Program at external meetings and will participate in up to two annual meetings held by DOT with the directors of all of the University Transportation Centers.

III.C Center Faculty and Staff.

The Center's Deputy Director will be Jason Bittner. This position is formally an Associate Researcher position and will be 100% time. The Deputy Director will be responsible for managing the Center's budget, expanding its outreach efforts, overseeing the day-to-day management and operations as well as conducting independent freight related research.

The Center's Research and Education Programs Coordinator will be Greg Waidley. This position is formally an Administrative Program Specialist position and will be 100% time. Waidley is responsible for the research management activities of the center and will oversee project solicitation, review, and contracting. Waidley will also be primarily responsible for the Center's education programs, including coordination of colloquiums and seminars.

The Center will employ one full time (100%) researcher, Dr. Bruce Xiubin Wang. Dr. Wang will be responsible for the management of the multi-state corridor efforts, development of new opportunities for expanded multimodal research, and relationships with external vendors, shippers, carriers, trade associations, and other organizations. Dr. Wang was previously an Associate Professor at the University of Wisconsin-Superior.

The Center will have a half-time program assistant to provide assistance with necessary accounting paperwork and similar activities. Susan Karcher is currently in this role. During activities of Grant Year 1, Ms. Karcher will hold a 25% appointment with CFIRE. Ms. Karcher also works with the Wisconsin Traffic Operations and Safety Laboratory and the Midwest Regional University Transportation Center.

The four previously mentioned STAR Chairs will provide advice and direction to Center operations. This Management Advisory Committee will review annual budgets, provide input on Center activities, and meet regularly to connect CFIRE activities to the Department of Civil and Environmental Engineering as possible.

III.D Multiparty Arrangements.

The University of Wisconsin-Madison will lead the consortium of universities in CFIRE. The consortium partners will each receive one vote on the project selection committee and will be expected to annually contribute research ideas and proposals.

University of Wisconsin-Milwaukee

The Center for Urban Transportation Studies at the **University of Wisconsin-Milwaukee** (UWM) is an interdisciplinary research group that addresses a wide range of problems related to the design and deployment of multimodal transportation systems in urban areas. Areas of expertise include land use/transportation interactions, freight systems planning, urban mass transit planning and operations, energy and environmental constraints on transportation, travel demand forecasting, spatial analysis of transportation data, intelligent transportation systems, pavement management, and statewide transportation planning methods. The Center has helped to develop and implement a wide variety of continuing education programs for transit and transportation planning agencies.

The College of Engineering and Applied Science (CEAS) offers BS, MS, and PhD degrees in Civil Engineering with transportation concentrations. CEAS and the School of Architecture and Urban Planning jointly offer a MS/MUP program, specializing in transportation planning. The MS/MUP dual degree program requires a thesis.

Faculty participants and areas of expertise.

- Alan Horowitz, Professor, Department of Civil Engineering and Mechanics: Travel forecasting, freight systems planning, ITS, work zone safety, statewide planning methods
- Zhong-Ren Peng, Professor, Department of Urban Planning: Urban transportation planning, transit planning, ITS, land use policy, GIS, sustainable transportation systems

- Hani Titi, Associate Professor, Department of Civil Engineering and Mechanics: Pavement design, pavement management systems
- Edward Beimborn, Research Engineer, Center for Urban Transportation Studies: Urban transportation planning, mass transit planning and operations, technology transfer
- Michael Greenwald, Assistant Professor, Department of Urban Planning: Urban transportation planning, land use, travel behavior, geographic information systems

University of Wisconsin-Superior

The Transportation and Logistics Research Center works in conjunction with the **University of Wisconsin-Superior's** Transportation and Logistics Management Major. The University of Wisconsin-Superior has the only undergraduate Transportation and Logistics Management Major in the state of Wisconsin. The accredited program is one of the few in the United States. One of the critical elements of the curriculum for Transportation and Logistics Management Majors is an internship with a firm operating in the discipline.

The University of Wisconsin-Superior's Transportation and Logistics Research Center has cooperative research with many other academic institutions, including research with significant applications in air, trucking, rail, Intermodal, and other modes of transportation. Faculty participants and areas of expertise:

- Richard Stewart, Professor, Business and Economics - Director, Transportation and Logistics Research Center: maritime issues, transportation economics, Intermodal logistics and freight

The University of Wisconsin-Superior administers the Great Lakes Maritime Research Institute (GLMRI), a US Department of Transportation's Maritime Administration (MARAD) National Maritime Enhancement Institute (NMEI). The GLMRI is an important research center focused on enhancing transportation options on the Great Lakes.

University of Illinois Chicago.

The Urban Transportation Center (UTC) at the **University of Illinois-Chicago** seeks to understand and improve urban transportation through the creation, application and dissemination of transportation knowledge while also making use of the Chicago metropolitan area. UIC is located at the hub of major local, regional, national and international transportation systems. The University has made a major commitment to conduct research dedicated to improving the Chicago transportation system thereby enhancing the standard of living. Through emphasis on cutting edge research, the UTC at UIC fosters a creative atmosphere conducive to innovative thinking to address the problems facing transportation systems and society at large. In this manner, UIC conducts research, leads courses and produces graduates who go on to become influential individuals in the transportation community.

The UTC at UIC has an exceptionally unique advisory board. It includes the Chief Executive Officers of the principal organizations overseeing the planning and delivery of transportation services in the Chicago region. It includes the major planning organizations (the Chicago Metropolitan Agency for Planning) and the service providers

(Chicago Regional Transportation Authority, Chicago Transit Authority, Metra, Pace, and Illinois DOT) but also representatives of the private sector. The advisory board has effectively guided the research directions and will continue to be instrumental in ensuring its success under this partnership with CFIRE.

The University of Illinois Chicago has cooperative research with many other academic institutions, including research with applications in air, trucking, rail, Intermodal, and other modes of transportation. Faculty participants and areas of expertise:

- Kazuya Kawamura, Associate Professor: Transportation: Freight transportation, Transportation Economics, Congestion Pricing, Accessibility.
- Joseph DiJohn, Research Professor and Director, Metropolitan Transportation Support Initiative: railroad and airline industries, technical assistance and education on urban transportation issues.
- P.S. Sriraj, Assistant Research Professor: traffic flow simulation, land-use modeling and pedestrian analysis of corridors in downtown Chicago.
- Jane Lin, Assistant Professor of Civil and Materials Engineering and Institute for Environmental Science and Policy: Energy and Environment; sustainable transportation systems, data mining.
- Kouros Mohammadian, Assistant Professor of Civil and Materials Engineering and Associate Director of Center for Supply Chain Management and Logistics Research: microsimulation of urban travel, discrete choice modeling, decision making process and choice behavior, Traffic engineering, traffic flow theory, performance evaluation.
- Paul Metaxatos, Research Assistant Professor of Urban Transportation Center: Accuracy of Origin-Destination Freight Forecasts, Rail-Highway Crossings, Intelligent Transportation Systems.
- Piyushimita Thakuria (Vonu), Associate Professor of Transportation Planning, Urban Planning and Policy Program: urban transportation systems analysis, regional science, interactions between labor markets, economic development and transportation and Intelligent Transportation Systems.

University of Toledo

The Intermodal Transportation Institute at the **University of Toledo** is an important contributor to regional and national freight research. The purpose of the ITI is to work cooperatively with public and private sector partners in transportation, logistics, and supply chain management to increase economic opportunity and improve the quality of life. The Institute's purpose is strongly linked to the goals and objectives of the University of Toledo, which embrace learning, discovery, and engagement and which focus heavily on outreach and external constituents. The ITI builds upon the unique features of the region, it offers the potential for sustained external funding, and it is a way to access and assemble resources from various disciplines at UT to address opportunities defined with the help of its public and private sector partners.

The partnership with CFIRE will include close collaboration with the newly established University Transportation Center at the University of Toledo. The theme of this Center is *Transportation for Economic Security and Development: Alternate Energy, Infrastructure Utilization, and Supply Chains*. Safe, secure, and efficient transportation systems are essential to the economic viability, quality of life, and strength of our nation.

This Center focuses on three critical elements in the transportation system: alternate energy for transportation, infrastructure utilization, and supply chain management.

Faculty participants and their areas of expertise:

- Mark Vonderembse, Professor, College of Business Administration: Manufacturing strategy, time-based competition, product development, and logistics.
- Peter Lindquist, Professor, Geography and Planning: Digital Cartography Location Analysis, Transportation, Spatial Analysis, Geographic Information Science.

Mississippi Valley Freight Coalition



The Mississippi Valley Freight Coalition is a 10 state pooled fund effort focused on cooperative freight research, planning, and organization of the 10 state region. The Mississippi Valley Freight Coalition has built upon the work of the Midwest Regional University Transportation Center Upper Midwest Freight Corridor Study to establish a regional organization to cooperate in the

planning, operation, preservation, and improvement of transportation infrastructure in the Mississippi Valley region. The 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. In October 2006, the signing of a Memorandum of Understanding by these states' Departments of Transportation addressed the region's desire to meet freight demand through cooperative efforts. The Mississippi Valley Freight Coalition formed Executive, Technical, and a Customer Committees and provided technical assistance to the states.

The MVFC is an on-going and anchoring research and outreach entity of the center. CFIRE is committing fund to facilitate and support the MVFC activities. CFIRE will work closely with the 10 states of the MVFC to coordinate research and outreach activities. MVFC is managed by CFIRE staff and provides a important source of direct State DOT input to the CFIRE research selection process. A representative of the Coalition will have a voting seat on the proposed Research Advisory Committee. The MVFC includes a Customers Committee of private sector freight interests, a Technical Committee including a traffic operations specialist and a freight planning/policy representative from each state, and an Executive Committee that includes the Board of Directors members of AASHTO MVC. The direct access to the top executives in each Mississippi Valley state through the MVFC is a critical link to advancing CFIRE research, training, education, and outreach activities.

CFIRE will manage the MVFC website, coordinate meetings and provide staff services. The MVFC website is <http://www.mississippivalleyfreight.org>.

Resource Concentration at the Grantee University. A minimum of one-half of the

Center’s total budget shall be concentrated at the University of Wisconsin-Madison. The University of Wisconsin-Madison will provide funding to partners in the cumulative amount of \$400,000 maximum annually, based on final adjustments made to the overall program. Project funding will be allocated based on the recommendations of the Advisory Committee. No more than 75% of the available balance of funding will be allocated to awardable research and technology deployment applications.

The Mississippi Valley Freight Coalition will be actively engaged in the development of the Center’s work program. While not an exclusive arrangement, the MVFC will coordinate its efforts with the CFIRE to prohibit duplication of effort.

III.E Matching Funds. Grant funds are subject to a 100% non-Federal match. The center will work with its partners throughout the region to identify matching sources. The aforementioned Mississippi Valley Freight Coalition will provide \$450,000 in matching funding. At present, the Wisconsin Department of Transportation will provide a minimum of \$100,000 annually to support activities of the program. Approximately \$400,000 is available for CFIRE research activities through the Innovative Bridge Research and Deployment program and the WisDOT WHRP. The Recycled Materials Resource Center will provide program based matching funding. The Center will raise \$400,000 annually through its partner institutions and match approximately \$140,000 annually through the University of Wisconsin. The balance of remaining funding will come from other state DOTs, other universities, and the private sector.

Projects funded through the Center will require a 2 for 1 match, subject to modifications on a project by project basis by the Director.

SECTION IV - BUDGET DETAILS.

IV.A

CATEGORIES	Budgeted Amount	Explanatory Notes
Center Director Salary	\$40,263	
Faculty Salaries	\$507,920	
Administrative Staff Salaries	\$9,001	
Other Staff Salaries	\$369,201	
Student Salaries	\$232,138	Includes undergraduate student hourly and graduate assistants
Staff Benefits	\$364,668	37.5% of salary for staff/faculty // 27% of students + partner rates

Total Salaries and Benefits	\$1,523,191	
Scholarships/Tuition	\$315,944	Not subject to F&A
Permanent Equipment	\$0	
Expendable Property, Supplies, and Services	\$194,407	
Domestic Travel	\$169,090	
Foreign Travel	\$0	
Other Direct Costs (Specify)	\$0	
Total Direct Costs	\$2,202,632	
F&A (Indirect) Costs	\$983,810	
TOTAL COSTS*	\$3,186,442	
Federal Share	\$1,560,000	
Matching Share (if applicable)	\$1,626,442	

Institutional Budgets

CATEGORIES	Total	UW- Superior	UW- Milwaukee	UI- Chicago	Univ. of Toledo	UW- Madison
Center Director Salary	\$40,263	\$0	\$0	\$0	\$0	\$40,263
Faculty Salaries	\$507,920	\$41,628	\$59,300	\$25,000	\$61,100	\$320,892
Administrative Staff Salaries	\$9,001	\$0	\$0	\$0	\$0	\$9,001
Other Staff Salaries	\$369,201	\$0	\$19,300	\$17,200	\$34,000	\$298,701
Student Salaries	\$232,138	\$30,000	\$0	\$15,882	\$12,000	\$174,256
Staff Benefits	\$364,668	\$22,404	\$25,200	\$15,898	\$26,400	\$274,766
Total Salaries and Benefits	\$1,523,191	\$94,032	\$103,800	\$74,780	\$133,500	\$1,117,079
Scholarships/Tuition	\$315,944	\$21,124	\$29,320	\$39,500	\$18,000	\$208,000
Permanent Equipment	\$0	\$0	\$0	\$0	\$0	\$0

Expendable Property, Supplies, and Services	\$194,407	\$7,150	\$12,280	\$6,500	\$4,000	\$164,477
Domestic Travel	\$169,090	\$11,030	\$0	\$9,515	\$14,000	\$134,545
Foreign Travel	\$0	\$0	\$0	\$0	\$0	\$0
Other Direct Costs (Specify)	\$0	\$0	\$0	\$0	\$0	\$0
Total Direct Costs	\$2,202,632	\$133,366	\$145,400	\$130,295	\$169,500	\$1,624,071
F&A (Indirect) Costs	\$983,810	\$66,664	\$54,600	\$69,705	\$30,500	\$762,341
TOTAL COSTS*	\$3,186,442	\$200,000	\$200,000	\$200,000	\$200,000	\$2,386,442
Federal Share	\$1,560,000	\$100,000	\$100,000	\$100,000	\$100,000	\$1,160,000
Matching Share (if applicable)	\$1,626,442	\$100,000	\$100,000	\$100,000	\$100,000	\$1,226,442

IV.B. Grant Year. The CFIRE proposed grant year is October 1 through September 30. It is anticipated that Grant Years 1 and 2 will be concurrent ending on September 30, 2008.

APPENDIX A

BASELINE MEASURES FOR UNIVERSITY TRANSPORTATION CENTERS (UTCs)

Report for the most recently completed academic year and for the institution(s) comprising your UTC.

Research Selection

1. Number of transportation research projects selected for funding.

54

1a. Number of those projects that you consider to be: basic research 7, advanced research 12, and applied research 44. Projects may be included in more than one category if applicable.

2. Total budgeted costs for the projects reported in 1 above.

\$ \$5,375,000

Research Performance

3. Number of transportation research reports published.

52

4. Number of transportation research papers presented at academic/professional meetings.

78

Education

5. Number of courses offered that you consider to be part of a transportation curriculum. Report courses shown in the university course catalog as being offered, whether or not they were conducted during the academic year being reported.

Undergraduate: 34
Graduate: 55

6. Number of students participating in transportation research projects. Count individual students (one student participating in two research projects counts as one student).

Undergraduate: 21
Graduate: 88

Human Resources

7. Number of advanced degree programs offered that you consider to be transportation-related.

Master's Level: 13
Doctoral Level: 8

8. Number of students enrolled in those transportation-related advanced degree programs.

Master's Level: 125
Doctoral Level: 44

9. Number of students who received degrees through those transportation-related advanced degree programs.

Master's Level: 61
Doctoral Level: 21

Technology Transfer

10. Number of transportation seminars, symposia, distance learning classes, etc. conducted for transportation professionals.

57

11. Number of transportation professionals participating in those events.

1623

APPENDIX B

Sample Work Plan for Consortium Partners

Proposed Work Plan for Academic Partnership Under CFIRE

Background

This document provides an overview of the planned activities that will be undertaken by the {PARTNER} under the auspice of the academic partnership with the National Center for Freight and Infrastructure Research and Education (CFIRE). CFIRE is one of the ten National University Transportation Centers that were established by the SAFETEA-LU. CFIRE is led by the University of Wisconsin, Madison (Dr. Teresa M. Adams, Director). CFIRE will "...focus on issues of sustainability and freight transport as it advances technology, knowledge and expertise in the planning, design, construction and operation of sustainable freight transportation infrastructure and its associated systems."

Each consortium partner will receive \$100,000 per year for the five-year span. Consortium members must provide a cost sharing of at least one dollar for every dollar received. Information on the cost sharing requirements is specified in <http://utc.dot.gov/GENPROVS.doc>. Useful information on cost sharing partners can be found at <http://www.wsdot.wa.gov/NR/rdonlyres/3F9356EF-6640-46AF-AE39-35C00193C72F/0/UTCMatchingPaper61406.pdf>

{PARTNER} places a priority on supporting activities that will advance the state-of-the-art of freight transportation planning especially {subject area}. Also, the program will provide graduate students to work on freight-related research, education, and outreach activities. It is expected that the program described in this work plan will graduate up to four master's students with either a full or partial funding from CFIRE. Research projects undertaken by these students and faculty supervisors, along with outreach and support for conference participation, will make a significant contribution toward advancing the freight transportation research in many fronts.

Key personnel

List key personnel.

Planned activities and expected key participants

In addition to providing the required matching funding, its documentation, and the performance indicators specified in Appendix A of the CFIRE strategic plan, each partner will submit its planned activities annually. These must include an allocation to develop the undergraduate scholars program identified in section II of the strategic plan.

Budget

Total of \$500,000 for the 5-year duration. Each partner is required to provide a minimum of one-to-one match (see <http://utc.dot.gov/GENPROVS.doc> for details) for the sum of all expenditures over the 5-year time period. Partners are not required to meet the match

