2010-2011
ANNUAL REPORT
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The Gulf Coast Research Center for Evacuation and Transportation Resiliency was initiated in the Fall of 2008 with the mission to fill the critical need for new methods and technologies in emergency and resilient transportation. Although historically overlooked as a transportation subject, evacuation, resiliency, and emergency transportation operations are vital to the national interest, and impact the lives and safety of the public on far greater scales than are often assumed. The Center is a collaborative effort between the Louisiana State University Department of Civil and Environmental Engineering and the University of New Orleans' Department of Planning and Urban Studies.
MESSAGE FROM THE DIRECTOR

Through the combined efforts of the students, staff, and faculty the 2010-2011 academic year has seen many new and exciting advancements in instruction, research, and outreach at the Gulf Coast Center for Evacuation and Transportation Resiliency. The achievements made possible with the direct and indirect support of the UTC program are making direct and measureable impacts in Louisiana and the Gulf Coast Region and are pushing outward to the nation as a whole.

Our greatest source of pride is in our students, whose Center supported work, continued to garner national attention over the past year. One example was University of New Orleans Master’s of Urban and Regional Planning student Max Williamson who was recently awarded a 2011 Dwight David Eisenhower Graduate Fellowship. Two other stellar student performers were Thomas Montz and Scott Parr from Louisiana State University. Thomas, a Master’s Degree graduate in August 2011 and Scott, a PhD candidate, co-authored a combined seven technical papers based on their research. These works were presented and/or published at several national conferences. The enthusiasm and excitement of these students continues to inspire and motivate Center faculty and staff to continue to do even more! One of our notable faculty, Dr. John L. Renne at University of New Orleans, was invited by former President Bill Clinton to speak at the third Annual Meeting of the Clinton Global Initiative University in April at the University of Miami in Florida.

The Center, guided by its mission to fill the critical need for new methods and technology in emergency management, has also continued to support research and develop technologies, systems, and ideas to promote safer and more efficient travel on our nation’s roads. In the spring of 2011, LSU took delivery of its full-scale driving simulator. To inaugurate the simulator research program, the Louisiana Department of Transportation and Development’s Office of Safety teamed with the Center to fund the work of LSU psychology professor Dr. Melissa Beck. Dr. Beck’s research is expected to reduce errors in driver behavior due to distraction and fatigue impaired drivers. The center also continued to support the research of LSU professors Marwa Hassan and Michele Barbato whose work will develop novel and sustainable methods to improve roadway construction. Their latest project will investigate the self-healing properties of concrete materials by using composite action with fiber reinforced polymers and shape-memory alloys. This technology could, one day, lead to the construction of bridge decks that will “repair themselves.”

In February 2012, the Center will host the second National Evacuation Conference in New Orleans. Based on the excitement and demand generated by the first event in 2010 which attracted over two hundred participants with notable speakers from government, industry, academia and non-profits that resulted in two Special Edition research journals, we just couldn’t say no. The 2012 conference promises to be bigger with combined resources of LSU Stephenson National Center for Security Research and Training and commitments from the Sandia National Laboratories and the Nuclear Regulatory Commission. Among many topics, the event will focus on the needs identified and lessons learned from events like the 2011 Japanese earthquake, tsunami, and nuclear power plant disaster. We will also be teaming with the American Society of Civil Engineer’s Natural Hazards Review and the International Journal of Mass Emergencies and Disasters to publish two upcoming special journal editions.

With three years under our belt and a force of talented and motivated students, staff, and faculty, we enter the 2011-2012 academic year with a sense of excitement and look forward to the challenges and discoveries that lie ahead! Watch us as we grow at: www.evaccenter.lsu.edu

Brian Wolshon
THEME

The theme of the LSU-UNO Center is focused on Evacuation and Transportation Resiliency. This theme highlights the multi-dimensional nature of the transportation system to meet everyday needs such as the economic, efficient, and safe transport of people and goods as well as the extraordinary needs of users in times of emergency. Our work includes the development of modeling and analysis techniques; innovative design and control strategies; and travel demand estimation and planning methods that can be used to predict and improve travel under periods of immediate and overwhelming demand. In addition to detailed analysis of emergency transportation processes, The Center provides support for the broader study of transportation resiliency. This includes work on the key components of redundant transportation systems, analysis of congestion in relation to resiliency, impact of climate change and peak oil, provision of transportation options, and transportation finance.
Management Structure

The Center resides in the LSU College of Engineering as part of the Department of Civil and Environmental Engineering and the University of New Orleans’ Department of Planning and Urban Studies within the Meritt C. Becker, Jr. UNO Transportation Institute. The Director and Associate Director formulate any operating policies and administrative procedures not currently addressed by Louisiana State University’s administrative policies. These policies and procedures are then discussed with the Advisory Committees where their input and guidance are solicited. The Center Director acts as a liaison with the consumers of transportation research. This includes identifying relationships with State, Parish, and City Engineers, MPO’s, transit associations, and other organizations with vested interests in emergency and major event and resilient transportation issues. The Associate Director assists in the augmentation of research funding to further the goals of the UTC.
The Center supports a scholarship program during the academic year which is awarded to one undergraduate and three graduate students. The scholarship is intended to be used toward the travel to transportation related conferences.

**Student Scholarships & Awards**

**Eisenhower Graduate Fellowship Awarded**

University of New Orleans Master’s of Urban and Regional Planning student Max Williamson is the recipient of a 2011 Dwight David Eisenhower Graduate Fellowship. The fellowship, through the Federal Highway Administration, is for the pursuit of a master’s degree in transportation-related fields.

Williamson will receive a minimum of $5,000, which he will use to work on his thesis on how to make New Orleans a more bicycle-friendly city. Williamson, a native of St. Augustine, Florida, has a bachelor’s degree in geography and political science from Florida State University.

The objectives of the Eisenhower Graduate Fellowship Program are to attract the nation’s brightest minds to the field of transportation, to enhance the careers of transportation professionals by encouraging them to seek advanced degrees and to retain top talent in the transportation industry of the United States. The program is intended to bring innovation and enhance the breadth and scope of knowledge of the entire transportation community in the U.S.

**UTC Student of the Year**

The Center selected Thomas Montz as the Student of the Year. A reception was held for all UTC Student of the Year recipients in Washington, D.C., prior to the TRB conference. Mr. Montz was selected based on outstanding research effort toward his thesis as well as his willingness to help on other projects at the Center.
Student Involvement

This year, students from both UNO and LSU were able to travel to Washington, D.C. to attend the annual Transportation Research Board (TRB) meeting. The meeting was held January 23rd through the 27th. Peter Bennett and Tara Tolford, both Master’s of Urban Planning students, represented UNO (they are pictured below, left).

LSU Students (above, right) Thomas Montz, Scott Parr, Hector Santiago-Vazquez, and Zhao Zhang (not pictured) were also able to attend the meeting. Thomas Montz also presented during three poster sessions, including one poster directly related to his thesis research titled “Best of Both Worlds: Combining Demand and Simulation Models for Hurricane Evacuation” (11-3320).

UNO Students and Faculty (above) involved in the webinar on “Complete Streets—State of the Practice”
UTC HIGHLIGHTS

Dr. Hassan Gaining National Attention for Pavement Research

Dr. Marwa Hassan is leading research sponsored by the Center which investigates the use of nano-particles to control CO2 emissions from vehicles. Since her research started, she has garnered attention from LSU media, the Baton Rouge Advocate, and the San Francisco Chronicle.

The research is motivated by the significant challenge the US faces in controlling air pollution resulting from transportation activities and the growing population density. A number of regions in the US, including in Louisiana, have been designated by the EPA as nonattainment areas in which air pollution levels persistently exceed national air quality standards. In an effort to reduce air pollution, Dr. Hassan's research is investigating a method to remove vehicle emissions from the air using titanium dioxide (TiO2) on the pavement surface. The use of TiO2 as an air purifier in urban and metropolitan areas has been widely recognized and is receiving considerable attention.

However, current applications of this technology are limited to building facades and gateway elements of bridges not subjected to traffic as in the case of the I-35W Bridge over the Mississippi River in downtown Minneapolis. Expanding the technology to pavements requires creating a new generation of pavements that have photocatalytic capabilities, are durable, safe and cost effective. This project aims to create the first generation of photocatalytic asphalt and concrete pavements. These pavements will have the capability of producing hydroxyl radical intermediates, which are effective oxidizing agents of environmental contaminants including VOC, SOx and NOx. Based on this heterogeneous photocatalytic oxidation process, nitrogen oxides are oxidized into water-soluble nitrates while sulfur dioxide is oxidized into water-soluble sulfate; these substances can be washed away by rainfall. In addition, the project will test the long-term durability and safety of the technology.
Understanding Subsidence in Louisiana

Dr. Joshua Kent presented his current research activities to the LSU School of the Coast & Environment at a seminar on February 18, 2011. Dr. Kent’s research is currently funded by the Center to investigate the impact of subsidence on major evacuation routes in Louisiana. A model will be produced which will be able to forecast subsidence for coastal Louisiana through 2100. Research has revealed that Louisiana’s coastal zone (LCZ) has experienced subsidence at rates as great as 40mm per year during the 20th century. Many natural and anthropogenic processes have been shown to result in subsidence. Combined with the effects of global climate change, our subsiding coastal plain will present significant design challenges for the State’s emergency evacuation plans, including the potential inundation of previously unflooded lands, sea level rise (eustasy), deeper penetration of storm surge into the coastal zone, and the continued retreat of low-lying coastal wetlands. Indeed, these consequences are visible today. An assessment of benchmarks located along LA Highway 1, a hurricane evacuation route, revealed that the road subsided approximately 1 foot (~30.5 cm) between 1982 and 2002. This example foreshadows the long-term implications for the LCZ that will undoubtedly complicate existing evacuation strategies. By leverage the state-of-the-art technological resources of the Center for GeoInformatics (C4G) at Louisiana State University, researchers Joshua Kent and Roy Dokka with the support of the Gulf Coast Research Center for Evacuation and Transportation Resiliency will use the highly accurate positioning capabilities of the Center’s GULFNet* real time network to develop a subsidence forecast model to estimate changes in road elevations in 2025, 2050, and 2100. Subsidence rate estimates will be applied to a digital elevation model (DEM) of coastal Louisiana and used to identify those emergency evacuation routes that are vulnerable to inundation. The threshold for assessing this vulnerability will be made using regional flood maps, storm surge models, and the eustatic changes anticipated through the century. The information gained from this project will provide transportation engineers and emergency managers with insights that were previously unavailable yet instrumental for evacuation modeling, hazard mitigation strategies, sustainability research, and more.

Installation of Driving Simulator Complete

The installation of LSU’s new state-of-the-art driving simulator is complete. The simulator was approved by the LSU System Board of Regents and heavily supported by the Louisiana Department of Transportation and Development, Pennington Biomedical Research Center, and AARP-Louisiana. The simulator was delivered by Realtime Technologies, Inc (RTI), a company based in Royal Oak, Michigan. The simulator set-up is a full cab, one degree-of-freedom motion based vehicle simulator. The motion base consists of a circular path that rotates about the horizontal axis. This motion will result in test subjects feeling a combined pitching motion and the forward/backward motion. The package also includes the company’s own powerful software “SimVista” and “SimCreator” which will allow for the development of various scenarios to test human factor research needs.
Transportation Lecture Series Launched

On December 13, 2010, the Center hosted a public lecture focused on transportation and oil. The evening lecture, held at the Port of New Orleans Administration Building, represented the inaugural address of what is to become an annual Transportation Lecture Series for the Center. The new program is designed to provide a forum to address significant and timely issues that impact the transportation industry. Title sponsor for the event was PARSONS Corporation.

With the spotlight on the Gulf of Mexico’s British Petroleum Deepwater Horizon tragedy on April 20, 2010, oil became an important topic of discussion worldwide. This attention on oil, coupled with the fact that transportation accounts for approximately 70% of our oil consumption, fostered the topic for the lecture -- “The Role of Sustainable Transport to Overcome Oil Dependence.” UNO’s Dr. John Renne acted as moderator for the event, which featured Dr. Anthony Perl, Director of the Urban Studies Program at Simon Fraser University, Vancouver, BC and author of Transport Revolutions: Moving People and Freight Without Oil, as the keynote speaker and a panel presentation by noted transportation experts: Richard A. White, Rail Program Analyst, PARSONS; Robert S. Grandy, PE, Principal, Fehr & Peers Transportation Consultants; and Gary LaGrange, President and CEO, Port of New Orleans. Dr. Renne set the stage for the evening discussion by remarking, “If we don’t find ways to reduce our dependence on oil within the transportation sector, our nation will fail to ever reduce our overall addiction to oil”. In response, the speakers engaged the audience in thought-provoking presentations and discussions on sustainable transport.

Feedback from those attending the lecture was extremely positive with numerous requests for more programs of this nature. The Center extends its gratitude to Mr. P. Takis Salpeas, Senior Vice President of the Rail & Transit Division of PARSONS for his generosity as title sponsor of the event. The Center also acknowledges the support of Fehr & Peers Transportation Consultants, the Port of New Orleans, World Trade Center of New Orleans, and the ASCE Transportation & Development Institute, Louisiana Chapter.

Copies of the presentations are available by request to cshort2@uno.edu
RESEARCH

Research performance

The “Research Performance” goal of the Center is to improve the number and quality of our program of basic and applied research. This research is judged by peers or other experts in the field to advance the body of knowledge in transportation. A peer review process and the building of collaborative relationships among the research and larger transportation community allows the LSU-UNO UTC to produce high quality research that is relevant to the needs of both transportation practitioners and the larger research community.

NEW PROJECTS

Improving the self-healing properties of concrete materials by using composite action with fiber reinforced polymers and shape-memory alloys

**PI: DR. MICHELE BARBATO AND DR. MARWA HASSAN, DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING, LSU**

The goal of this research is to significantly advance the self-repairing capability of RC bridge components and systems. This two-year project is based on the innovative idea of combining composite action and self-healing materials to improve the autonomous healing of RC bridges. This capability is currently limited to the closure of small surface cracks produced in a controlled environment. This self-healing property mimics the self-healing of human skin after small cuts. It is envisioned that composite action can help close larger cracks through a combination of confinement with fiber reinforced polymers (FRPs) and shape memory alloys (SMAs). This project represents a completely innovative and untested idea, since until now composite action has never been used to enhance the performance of self-healing materials. The basic hypothesis will be tested using experimental results on cylindrical concrete specimens and small scale RC beams.

Minimizing Driver Errors: Examining Factors Leading to Failed Target Tracking and Detection

**PI: DR. MELISSA BECK, DEPARTMENT OF PSYCHOLOGY, LSU**

Tracking moving targets while driving can result in a failure to direct attention towards other critical information in the environment (e.g. traffic signals or other vehicles and pedestrians), as well as a failure to maintain tracking on the target itself. These errors can be the result of stimulus factors (e.g. speed, saliency) or driver factors (e.g. driver’s expectation about the path of motion). Tracking while driving requires a limited cognitive resource attention and, therefore, potentially limits the attentional resources available for detecting other information in the driving environment, this can result in roadway accidents. This proposal aims to understand which stimulus and driver factors are most important to improve target tracking and detection with the goal of reducing accidents. A series of driving experiments will be built in
the LSU driving simulator’s virtual environment to observe how drivers perform while tracking targets in a realistic environment. The results of the experiments will provide valuable safety related findings on driving behavior while tracking moving objects. The findings may also have a significant impact on driving safety by improving current practices in roadway design and driver training.

Evaluating the Feasibility for Bicycle Sharing in New Orleans

PI: JAMIE WINE, BIKE EASY (NEW ORLEANS METRO BICYCLE COALITION)

Bicycle sharing is a short-term bicycle rental, available at automated stations around town where a rider can use a credit card to pick up a bike in one location and drop it off at the same rack, or any number of bicycle share stations around town. Many local organizations, companies, bureaucrats and elected officials are highly interested in creating bike share in New Orleans. In other cities it has helped tourists, workers and families travel safely and efficiently while reducing automobile congestion, improving health, and experiencing a city in a visceral way. This study will examine the state of bicycle sharing in America to determine best practices that could be applied to New Orleans. The study will be matched by funds from the City of New Orleans, the New Orleans Convention & Visitors Bureau.

Setup of Driving Simulator for Behavioral Research

PI: DR. SHERIF ISHAK, DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING, LSU

This project is for material and equipment only to setup a driving simulator for behavioral research. This is a preliminary project and at the end of the project a scope of research will be identified, as well as, the benefits that are envisioned for the state of Louisiana.

ONGOING PROJECTS

Active Transportation Measurement and Benchmarking Development: New Orleans Case Study

PI: DR. BILLY FIELDS, DEPARTMENT OF PLANNING AND URBAN STUDIES, UNO

The study aims to improve the policy making and planning framework by creating a comprehensive set of active transportation indicators on current usage and safety trends in New Orleans. New Orleans is significantly expanding the scope of active transportation facilities, moving from under 5 miles of bicycle facilities before Katrina to over 40 miles planned for completion by 2010. This project will conduct user counts of the number of pedestrians and bicyclists both before and after facilities are enhanced at a diverse set of locations around New Orleans to examine the impact of this expansion. The project will leverage resources through partnerships with the Regional Planning Commission and Tulane University to help expand the scope and impact of the project. The two-year project to collect bicycle and pedestrian count data from sites around New Orleans to test the impact of the addition of new bicycle and pedestrian infrastructure on usage rates is just over half way complete. The draft of State of Active Transportation report which provides an overview of walking and cycling conditions has been completed.
Louisiana Intermodal Transportation Infrastructure Study: Feasibility Analysis for Inland Waterway Container Transport Systems within the Lower Mississippi Region and the New Orleans Metropolitan Area

**PI: JAMES AMDAL, DIRECTOR, MERRITT C. BECKER, JR. UNIVERSITY OF NEW ORLEANS TRANSPORTATION INSTITUTE, STAN SWIGART, RESEARCH ASSOCIATE (UNOTI)**

The primary objective of this study is to conduct an analysis of successful inland waterway container transport in selected U.S. locations and to assess the feasibility of this transportation mode within the Mississippi River corridor. A “marine highway” initiative is being proposed by the USDOT to encourage a shift of cargo movements from traditional surface transportation modes to maritime systems. This research will be conducted in partnership with the New Orleans Regional Planning Commission (RPC). As a Metropolitan Planning Organization (MPO), the RPC has the distinct advantage of providing a regional perspective on transportation systems. This project will allow the RPC to expand their traditional perspective to include the region’s extensive maritime transportation assets as well as a perspective of resilient freight transportation utilizing inland waterways as an alternate delivery system.

Incorporating the Ports and Waterways System Capabilities into the Local Emergency Response System

**PI: JAMES AMDAL, DIRECTOR, MERRITT C. BECKER, JR. UNIVERSITY OF NEW ORLEANS TRANSPORTATION INSTITUTE (UNOTI), DR. JAY JAYAWARDANA, TRANSPORTATION ECONOMIST (UNOTI), STAN SWIGART, RESEARCH ASSOCIATE (UNOTI)**

The primary objective of the research is to examine how the ports and extensive inland waterway network can be incorporated into the state emergency management systems currently in place. It will examine the physical facilities available at ports and the necessary agreements required to access these assets in times of emergency. The recent devastations caused by hurricanes in Louisiana and the oil spill currently impacting coastal Louisiana underscore the need for a more effective local emergency management system. A coordinated first response by emergency teams in the area using local resources is the most effective means to minimize loss of human life as well as property and environmental damage.

Active Transportation Measurement and Benchmarking Development Extension: Minneapolis Case Study

**PI: DR. BILLY FIELDS, DEPARTMENT OF PLANNING AND URBAN STUDIES, UNO**

The Active Transportation Measurement andBenchmarking Development Extension: Minneapolis Case Study seeks to take advantage of a unique research opportunity to examine a large scale environmental intervention in Minneapolis where $20 million in active transportation improvements are being implemented as part of the federal Nonmotorized Transportation Pilot Program. Bicycle and pedestrian count data from over 40 locations around Minneapolis have been collected before new facilities were installed. A fall 2011 count at these new facilities will provide an important opportunity to utilize a pre/post design to test the impact of environmental change. Currently, data from the pre-intervention counts are being analyzed and a GIS database of land use and demographic conditions around the sites is being created.
Assessing the Long-term Impact of Subsidence and Global Climate Change on Emergency Evacuation Routes in Coastal Louisiana
PI: JOSHUA D. KENT AND ROY K. DOKKA, DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING, LSU

The proposed study will develop a subsidence forecast model for coastal Louisiana that will estimate the change in evacuation road elevations for 2015, 2025, 2050, and 2100. Vertical displacement estimates will be derived from on-going empirical studies and values published in contemporary scientific literature. Model elevation changes will be applied to a high-resolution digital elevation model (DEM) of coastal Louisiana. Road segments that become inundated according to storm surge models (as used by the National Weather Service) will be identified as vulnerable to climate change and tagged for further assessment. The threshold for climate change susceptibility will be further evaluated for sea level rise estimates anticipated through the century. Information gained from this project will provide transportation engineers and emergency managers with data previously unavailable, which can be used in evacuation modeling, hazard mitigation strategies, sustainability research, coastal restoration efforts, and more.

Environmental Effectiveness of Photocatalytic Asphalt Pavement Surfaces Incorporating Ultrafine/Nano Titanium Dioxide
PI: MARWA HASSAN, DEPARTMENT OF CONSTRUCTION MANAGEMENT, LSU

In spite of the importance of the national transportation network, there is a growing recognition that highway operations have major environmental impacts during construction and service. High traffic volumes cause high concentration of nitrogen oxides and VOCs in the air, which have been linked with serious health hazards to the public. These pollutants may also travel long distances to produce secondary pollutants such as acid rain or ozone. Photo-catalysis compounds such as titanium dioxide (TiO2) can trap and degrade organic and inorganic particles in the air removing harmful air pollutants such as NOx and VOC in the presence of UV light. Current research and applications of this technology are limited to concrete pavement surfaces, which only represent 6% of the national road network. About 94% of the road network in the US is surfaced with hot-mix asphalt, which supports directing future research towards the use of titanium dioxide coating in flexible pavements. To address the aforementioned problem, this research project will investigate the possibility of integrating titanium dioxide on the surface of asphalt pavements to develop a photo-catalytic asphalt pavement capable of oxidizing traffic pollutants. The photo-catalytic properties of TiO2 asphalt pavement as well as its environmental properties will be characterized using a novel environmental laboratory setup. The proposed research is cutting edge and has not been attempted in the US. A recent study attempted to apply the photo-catalytic compound as part of a water-based emulsion in Italy. The mixing of
TiO2 with an asphalt binder at a 6% content of the binder weight was also attempted in China and was used in the construction of an open-graded friction course.

**COMPLETED PROJECTS**

**Resilient Transportation: An Integrated Corridor Management Approach**  
**PI: DR. SHERIF ISHAK, DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING, LSU**

The primary goal of this research is to lay the foundation for the application and implementation of integrated corridor management (ICM) strategies to reduce congestion on the freeway and arterial systems in Baton Rouge. Under the ICM umbrella, the operation of freeways and arterials should be optimized for various functions such as traffic incident management, work zone management, planned special events management, and recurrent day-to-day conditions. An efficient integrated corridor management approach will be developed by utilizing ramp-metering strategy, information dissemination strategy and other ITS strategies along congested corridors. These technologies will be evaluated using DYNASMART simulation. This research will develop theory and algorithms for the efficient implementation of the ramp metering and information dissemination strategies.

**Five Years Later: Emergency Preparedness Improvements in New Orleans, Louisiana since Hurricane Katrina**  
**PI: ROBERT FOGARTY, EVACUTEER.ORG**

Multiple innovations surrounding preparedness have sprouted in New Orleans in the past four years from all levels of government, private enterprise and citizen-led groups, such as neighborhood associations and churches. This research will attempt to answer the following questions:

1. To what extent has New Orleans’ individual, private enterprise and governmental preparedness systems improved since Hurricane Katrina?
2. How can the lessons learned and preparedness strategies in New Orleans are made applicable and valuable to other American Cities as they plan for man-made or natural disasters in their region?
3. How has private enterprise, specifically hotels, improved disaster preparedness techniques in regards to tourists, who usually have little or no knowledge of local hurricane procedures in New Orleans?
4. Finally, if we accept the premise that we learn from experience, what are the top 10 innovations in government, individual and private enterprise preparedness to have appeared in New Orleans and how can these be best shared and applied to other communities across the country?
Historically, passenger trains and streetcars have played key roles in the growth and development of the State of Louisiana and the City of New Orleans. This research project addresses their potential impacts on contemporary Louisiana, the City of New Orleans and the greater New Orleans – Baton Rouge region in a post-Katrina environment, as recovery tools and as enhancements to existing public transportation systems. Through multiple recovery planning processes citizens have debated the merits of new passenger rail service. From these efforts two projects have emerged. The first is a proposed commuter train between Baton Rouge and the New Orleans Central Business District. This project is currently on hold based on Governor Jindal’s opposition to its annual operating costs, which he believes will be a recurring burden for the state. The second project, recently funded by ARRA at 100%, will construct a new streetcar line between the existing New Orleans Union Passenger Terminal and Canal Street. This research evaluates these rail passenger projects in light of national best practices for both new commuter rail services and urban streetcar lines, and examines the relationship between the proposed lines and existing or planned real estate development.

An Integrated Approach to Modeling Evacuation Behavior
PI: DR. SUDIPTA SARANGI, DEPARTMENT OF ECONOMICS, LSU

This project centers on the development of an integrated approach to modeling evacuation behavior that considers both economic and non-economic factors for the decision. The abstract theoretical model takes hyperbolic discounting and peer effects into account. Data from Hurricane Andrew was used to test the theoretical models, and simple experiments were used to collect data on risk attitudes.

Evaluating Privatization as a Strategy to Provide Regional Transit Service
PI: HIROYUKI ISKEKI, DEPARTMENT OF PLANNING AND URBAN STUDIES, UNO

This study will examine efficiency and effectiveness of providing regional transit service through privatization as a strategy to achieve financial resiliency for regional transit systems. In particular, we seek to answer the following two sets of questions in this study. The first set of questions evaluates the consequences of the transit service privatization by measuring changes in service improvements, cost efficiency, and cost-effectiveness of service provision in two individual transit service districts. The second set of questions examine whether or not and how efficiently one private firm that contracts with two different jurisdictions can achieve better regional coordination for transit service in multiple aspects, such as planning, management, operation, and adopting new technologies, while avoiding geographic equity issues and other jurisdictional problems. While the overall cost-efficiency and cost-effectiveness of regional transit service also depend on transaction costs of contracting and actual contractual terms, it is hypothesized that a private firm has a strong incentive to increase ridership to generate more fare revenue and present a good performance for future contracts by combining services in the two separate...
areas through internal coordination. This study will provide valuable information on the effectiveness of transit service contracting, and will improve our understanding of the benefits and costs of privatization as a provision strategy to achieve financial resiliency for regional transit service. It will also help transit managers and policy makers learn about issues that need to be addressed to improve their systems’ cost-effectiveness by privatization. Additionally, State and Federal agencies may increase their capability to design and target technical assistance and financial resources to encourage more cost-effective transit services.

Resilient Transportation Systems in a Post-Disaster Environment: A Case Study of Opportunities Realized and Missed in New Orleans and the Louisiana Coastal Region

PI: James R. Amdal, Department of Planning and Urban Studies, UNO

Research efforts will focus on specific non-highway transportation systems which have been used in response to recent man-made and natural disasters in the United States. The 9/11 terrorist attack on the World Trade Center will be used to establish a national perspective on non-highway modes for disaster evacuation and recovery: i.e. public transit, passenger and freight rail, and maritime. These same systems, serving both New Orleans and Coastal Louisiana, have also been used in post-disaster evacuation and recovery efforts since August, 2005. We will review the impacts to and response of these systems in specific natural disasters: i.e. Hurricanes Katrina and Rita in 2005 and Ike and Gustav in 2008. These storms and their aftermath exposed significant disconnects in our pre-storm disaster planning relative to the use of specific transportation assets. Recommendations will be made per mode so that individually and collectively they will form integral parts of a resilient transportation system serving the region, the state as well as the nation’s Hurricane Belt.

NOTE: All reports for complete projects can be accessed on our website: www.evaccenter.lsu.edu

NON UTC-FUNDED PROJECTS

Strategic Approaches at the Corridor and Network Level to Minimize Disruption from the Renewal Process

Louis Berger Group Inc, et al., Vinayak Dixit, Brian Wolshon, National Academies, Transportation Research Board/Strategic Highway Research Program

The objectives of this project are:

1. To identify and document effective practices for executing highway renewal activities as they affect the corridor and network level by considering construction alternatives, budget limitations, adjacent communities and impact to the traveling public;
2. To identify instances and examples of the transportation agency and project organizational designs that are most and least compatible with these effective practices;
3. To identify and develop new dynamic tools, techniques, and processes to help public agencies execute highway renewal activities at the corridor and network level and measure risks from the perspective of constructability, funding, economic/environmental/social constraints, and congestion and safety impacts;
4. To provide guidance for selecting appropriate tools, techniques, performance measures, and practices during project development (i.e., from planning through construction); and
5. To assess and develop training needs and materials and knowledge transfer methods for implementation.
Evacuation Models and Dynamics

WOLSHON, B., AND C. WILMOT, D. SHAW, B. STICH, B. COOKE AND C. LEWIS, DEPARTMENT OF HOMELAND SECURITY

This project seeks to enhance the capabilities of emerging evacuation modeling systems by increasing their level of detail and the robustness of transportation simulation. In this project, researchers are using enhanced models to more effectively plan regional transportation infrastructure improvements for disaster scenarios, and to test, evaluate, and manage evacuations under a variety of potential conditions. This research will incorporate a multi-step approach to integrate geographic information systems, transportation policy, evacuation travel demand forecasting, and operational-level multimodal traffic modeling on a regional basis.

Collaborative Research: New Methods for Measuring, Evaluating and Predicting the Impact of Road Infrastructure Systems on Driver Behavior

V. DIXIT, B. WOLSHON, S. HAMDAR AND A. PANDE, NATIONAL SCIENCE FOUNDATION

This research focuses on the influence of transportation infrastructure characteristics on driver behavior and the corresponding safety implications in the context of vehicular traffic. The effort entails complementary interplay between analytical and computational work in addressing the role of transportation infrastructure design in determining the dynamics of traffic flow. The objective is to investigate the relationship between the road environment and driving behavior utilizing a new modeling approach that explicitly accounts for risk aversion and cognitive processes followed by drivers under different driving environments. The goals of the research are to (1) systematically identify the network characteristics that influence driver behavior under different traffic situations (e.g., normal routine conditions, freeflow conditions, congested regimes and incident scenarios); (2) study the dynamics of human behavior and response to changes in network geometry as an evolving system with temporal and spatial elements with particular attention to the corresponding safety implications; (3) develop behavior-based models of human decision-making while integrating the geometric road characteristics in the risk-taking perception-judgment-execution processes followed by the drivers; (4) integrate the behavior models in computer simulation systems that improve upon the fidelity and reliability of the such existing systems; (5) validate the formulated behavioral traffic models against statistical models estimated using existing national incident data (NHTSA, 2008); and (6) reveal the interrelationship between microscopic driver behaviors and macroscopic traffic flow so that a deeper understanding of the transportation system performance can be achieved and better strategies can be proposed to improve traffic safety and traffic operations.

Integrated Optimization of Evacuation and Sheltering for Hurricanes

DAVIDSON, R., R. BLATON, N. DASH, R. LUETICH, L. NOZICK, AND B. WOLSHON, NATIONAL SCIENCE FOUNDATION

This research seeks to expand the decision framework and use optimization models to support the full range of strategic and operational evacuation and sheltering decisions, with higher-level objectives such as minimizing life loss, cost, and inequity. These models will be developed through a tight interaction between sociologists and engineers to ensure that they are firmly grounded in the reality of people’s behavior. For the first time, the models will be based on individual hurricane scenarios instead of conservative aggregations of many events, and they will be dynamic, accounting for the fact that officials can update their decisions as an event unfolds and information about the situation changes. The project has 5 main steps: (1) determine a suite of hurricane scenarios for use in evacuation and shelter models such that they probabilistically represent the full range of possible events, but are limited in number to allow detailed analysis with each; (2) conduct focus groups of key decision makers and stakeholders to identify and characterize key decision-
making elements; (3) using the focus group input, develop two mathematical optimization models—one long-term strategic and one short-term operational—for evacuation and sheltering decisions; (4) conduct surveys of affected citizens to test the validity of the optimization model assumptions and results; and (5) demonstrate the models with case study applications in North Carolina and Florida.

**Application of TRANSIMS Platform for the Multimodal Micro Scale Simulation of the New Orleans Emergency Evacuation Plan**

**BRIAN WOLOSHON, FEDERAL HIGHWAY ADMINISTRATION, OFFICE OF TRANSPORTATION OPERATIONS, OCTOBER 2006 – MARCH 2008**

In this project the Transportation Analysis and Simulation System (TRANSIMS) was applied for emergency transportation planning and analysis. In this effort, the TRANSIMS platform was used to develop a transportation model to simulate the travel processes associated with an evacuation of the New Orleans Louisiana metropolitan region. Given the temporal and spatial scales of mass evacuations, it was theorized that the scalability and level of detail afforded by the TRANSIMS program would make it an ideal system to model, test, and evaluate evacuation and other emergency transportation plans.

Through this work, the effort also sought to achieve the following objectives:

- demonstrate the power and utility of the system for emergency transportation analysis,
- illustrate how and where certain aspects of the system are best suited for particular analyses, and
- assist state and local-level transportation agency personnel to become acquainted with the system and realize its greater potential for the modeling and analyses of both emergency and routine transportation system analysis.

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**The Pedestrian / Bicycle Resource Initiative**

**PI:** Dr. Billy Fields, Department of Planning and Urban Studies, UNO

The Pedestrian/Bicycle Resource Initiative (PBRI) is a 3 year, joint project of the University of New Orleans Center for Urban and Public Affairs and the Regional Planning Commission that aims to improve bicycling and walking in the New Orleans metro area. The Pedestrian Bicycle Resource Initiative focuses on three primary tasks: analysis and dissemination of bicycle and pedestrian safety data for the New Orleans region, collection of mode share data to create an accurate count of bicycle/pedestrian usage in key corridors, and the creation and initial implementation of a framework for a Bicycle/Pedestrian Advisory Committee. More information is available at: [http://planning.uno.edu/pbri/](http://planning.uno.edu/pbri/).
**KNOWLEDGE TRANSFER**

**Book Chapters**


**Peer Reviewed Articles**


**Conference Papers**


**Presentations**

“Transit Oriented Development, Pedestrian Oriented Development and Green Oriented Development,” Louisiana Chapter of the American Society of Landscape Architects, February 12, 2011 (Keynote Presentation)

*John Renne*

“Moving to a Sustainable Future,” Transportation Committee, New Orleans City Council, New Orleans, Louisiana, November 23, 2010 (Invited Presentation)

*John Renne*

“States and Sustainable Communities: Energy, Infrastructure and Smart Growth,” Green Matters Conference, New Orleans, Louisiana, October 15, 2010 (Invited Panel Presentation)

*John Renne*

“Transit Oriented and Joint Development: Case Studies and Legal Issues,” 2010 Louisiana Smart Growth Summit, Baton Rouge, Louisiana, August 19, 2010 (Invited Panel Presentation)

*John Renne*

“Linking Rail Systems in Southeast Louisiana,” American Society of Civil Engineers, Transportation and Development Institute, University of New Orleans, June 23, 2010 (Invited Panel Presentation)

*John Renne*
“Multimodal Evacuation Micro-Simulation: A New Orleans Case Study.” Conference on Severe Storm Prediction, Education and Evacuation from Disasters, Rice University, Houston, TX, September 2010.

Brian Wolshon


Brian Wolshon


Brian Wolshon

“Operational Assessment of Joint and Conventional Lane Merge Configurations for Freeway Work Zones,” Joint Meeting of the Alabama and Deep South Sections of the Institute of Transportation Engineers, Gulf Shores, AL, June 2010.

Brian Wolshon

Transportation Research Board (TRB) Annual Meeting
January 24-27, 2011
Effect of Vehicle Lane Position on Approaches to Construction Zone Lane-Drop Joint Merges (11-3897). Session 432.

Wakeel Idewu and Brian Wolshon


Vinayak Dixit, Brian Wolshon, and Thomas Montz


Vinayak Dixit, Thomas Montz, and Brian Wolshon

Best of Both Worlds: Combining Demand and Simulation Models for Hurricane Evacuation (11-3320). Session 598.

Thomas Montz, Vinayak Dixit, and Brian Wolshon


Hana Naghawi and Brian Wolshon


Hana Naghawi and Brian Wolshon

Calibration and Validation of Microscopic Simulation Using Two-Fluid Model (11-4006)

Vinayak Dixit, Jeremy Crowe, and Essam Radwan

Deep South Section ITE Meeting
February 24, 2011
“Network and Corridor Level Evaluation of Renewal Projects”
Brian Wolshon and Vinayak Dixit

2011 Department of Homeland Security University Summit (5th Annual)
March 29-30, 2011
“Utility of Transit Signal Priority (TSP) for No-Notice Urban Emergency Evacuation”
Scott Parr

“Regional-Scale Multimodal Evacuation Planning and Analysis”
Brian Wolshon and Vinayak Dixit

“Integration of Household Decision Making with Dynamic Transportation Planning to Evaluate Hurricane Evacuation”
Thomas Montz
**TECHNOLOGY TRANSFER ACTIVITIES**

**Planned: National Evacuation Conference 2012**

**February 2012**
The Center along with the Stephenson Disaster Management Institute at LSU will be hosting the Second Biennial National Evacuation Conference in New Orleans, LA. The conference is expected to attract officials from around the globe from academia, government, non-profit, and private sectors. The purpose of the conference is to foster an interdisciplinary exchange of ideas surrounding a broad range of evacuation issues. The conference brings together the fields of transportation and emergency management to discuss evacuation planning to accommodate the needs of all people before, during, and after a major disaster.

For more information, please visit www.NationalEvacuationConference.org

**“Complete Streets—State of the Practice” Webinar**

**February 16, 2011**
On February 16, 2011, the Center sponsored a viewing of the Complete Streets: State of the Practice webinar. The program, produced by the Association of Pedestrian and Bicycle Professionals (APBP), examined the current state of the practice for complete streets.

Topics addressed in the session included:
- How support for complete streets is strengthened as collaboration with public health, transit, and other partners increases
- A comparison of existing policies and how they match up to guidelines from the National Complete Streets Coalition
- Examples of best practices at the local and state level

The webinar was attended by UNO faculty, staff, and students.

**Advance Driving Simulator Software Training**

**April 6, 2011**
Heather Stoner of Realtime Technologies, Inc conducted software training in coordination with the installation of the new driving simulator on LSU’s campus. The software training was attended by Professors and Graduate Students at the Center who plan to make use of the simulator for various research projects.

Ms. Stoner presented the basics of using two of her company’s available software packages: SimCreator and SimVista. The purpose of SimCreator is to allow modelers to develop simulation scenarios for the driving simulator with speed and ease. Normally, the process would require lines of C code to program various scenarios, but SimCreator includes a graphical user interface to expedite the modeling process. In addition, modelers are able to easily integrate external software APIs and user their own code into the software. This allows for the greatest flexibility in creating simulation...
scenarios while using the driving simulator. This is especially important for the Center’s simulator as it is expected to be used by a wide variety of fields including: transportation, psychology, medical, and private interest. While SimCreator allows for manipulation of the simulation’s code, the SimVisita package allows modelers to create the virtual reality that research subjects will interact with while inside the simulator. The SimVista software allows for tile-based creation of virtual worlds which can then be scripted to make certain aspects of the world interactive. For example, proximity sensors can be positioned in the virtual world and then a trigger response can be scripted as the test subject drives through it.

Attendees of the training were introduced to and given basic knowledge on the use of these two sophisticate software packages. By the end of the training, they were able to create a small virtual world. However, the training was only the beginning. Researchers will continue to work with representatives from Realtime Technologies as specific projects and simulator needs begin to develop.
Gulf Coast Center for Evacuation and Transportation Resiliency

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Financial Report – FY 10 UTC Funds Committed

- Research: 42%
- Administrative: 25%
- Education: 20%
- Tech Transfer: 9%
- Equipment and Travel Supplies: 2%
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