Since becoming a university transportation center of the US Department of Transportation in 1999, the University Transportation Center for Alabama (UTCA) has conducted transportation education, research, and technology transfer activities throughout the state and region. Faculty and students at The University of Alabama (UA), The University of Alabama at Birmingham (UAB), and The University of Alabama in Huntsville (UAH) have participated in all of these service areas.

Our mission reflects the mission of the US Department of Transportation. Specifically, the UTCA seeks to advance technology and expertise in the multiple disciplines that comprise transportation through the mechanisms of education, research, and technology transfer while serving as a university-based center of excellence (2006 UTCA Strategic Plan, p. 12).

Our theme – Management and Safety of Transportation Systems – reflects the transportation needs of Alabama and the expertise of The University of Alabama System faculty. Last year the Executive Committee narrowed and sharpened the focus of the UTCA research program. Many management research projects now focus on maximizing traffic management and minimizing congestion. Similarly, some new safety research projects highlight infrastructure sustainability.

The UTCA has a strong Advisory Board, and this issue of UTCA News features their activities. Members include representatives from public and private transportation-related fields and organizations. They initiate the Annual Research Plan, review proposals, and evaluate UTCA’s accomplishments and progress.

The UTCA Advisory Board held its annual meeting on Friday, August 29, 2008. This meeting marked several milestones, and we are delighted to share session highlights with you. I appreciate the dedication of our Advisory Board members. Their service to our organization is invaluable.

Sincerely,
Jay K. Lindly
Students Enjoy Summer GUTEP

For the past nine years over 240 middle school students from the Huntsville area have enjoyed the Summer Gearing Up for Transportation Engineering Programs (GUTEP). During this summer’s week-long event, participants learned basic concepts of materials, structures, safety, and other transportation engineering topics by engaging in a variety of hands-on experiments. Civil engineering professors from The University of Alabama in Huntsville and local professional engineers were instructors.

Field trips were also an important component of the program. During these outings, students saw real-world applications of the concepts they learned in the classroom. Seeing this connection between theory and practice reinforced the importance of transportation engineers to our community. For example, following a classroom session on public transportation, students were asked to use the city’s public transit system to travel from the UAH campus to the downtown Huntsville traffic operations center and the railroad depot museum.

An additional event sponsored by the UTCA was the Civil Engineering (CE) Bridge Competition. High school students participating in this outreach program were introduced to civil engineering design concepts during the UAH High School Open House.

2008 Advanced Transportation Institute a Success

The University Transportation Center for Alabama’s (UTCA) 2008 Advanced Transportation Institute (ATI) was held in June for rising high school juniors and seniors from the west-central region of Alabama. This Institute was funded by UTCA Project #08111 and organized by Dr. Dan Turner (UA). Since its inception in 1999, the UTCA has funded seven ATIs in an effort to recruit minority students to careers in transportation engineering. As in preceding years, the Alabama Department of Transportation (ALDOT) co-sponsored this week-long event held in ALDOT’s headquarters in Montgomery, AL.

The Institute curriculum featured presentations by ALDOT professionals and university faculty. Activities and presentations were designed to prepare students for university life and transportation careers. Students learned about university admission procedures and transportation career opportunities. Other presentations during the week focused on transportation planning, design, construction, maintenance, and safety.

The highlight of the week was a series of design competitions. The passenger container design, informally known as the egg drop competition, was a student favorite. Following a presentation on passenger safety, students were asked to design a container that would protect an “egg” passenger during a simulated accident. Working in teams with specific materials, students designed containers that would protect a raw egg as it fell to the ground from one of ALDOT’s bucket trucks. In previous years some students reached the full capacity of the truck (50’) without breaking their egg.

Prior to the Institute, only 42% of the students were considering a career in engineering/transportation.

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A Synthesis of Safety Implications for Oversize/Overweight (OS/OW) Vehicles

The goal of UTCA Project #07115 was to prepare a synthesis of safety implications for oversize/overweight (OS/OW) commercial vehicles. This project is one of seven implementation opportunities identified by members of the 2006 Commercial Motor Vehicle Size and Weight Enforcement (VSW) Scan Tour conducted by the Federal Highway Administration (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO). The project demonstrates the commitment by the University Transportation Center for Alabama (UTCA) to support the national surface transportation research program.

VSW Scan Tour members were impressed by the European approach to granting permits for OS/OW vehicles, an approach which identifies safety as a primary consideration. Officials in the United States typically grant or deny permits to OS/OW vehicles primarily on minimizing infrastructure damage to bridges and pavements. Mr. George Conner, a member of the VSW Scan Tour and Bridge Maintenance Engineer with the Alabama Department of Transportation (ALDOT) asked Dr. Daniel Turner, Professor of Civil, Construction, and Environmental Engineering at The University of Alabama (UA), to prepare a synthesis of safety implications for OS/OW vehicles.

Case studies conducted by The Kentucky Transportation Center (KTC) confirmed the findings of the literature review. Kentucky allows overloaded coal haul trucks that can legally weigh up to 56,700kg. Kentucky coal haul roads were found to have crash rates similar to other roads, but with higher fatal crash rates. Kentucky has also documented the difficulty in collecting data after a large truck crashes. Reconstructing the crash to determine causality is often extremely expensive.

“The continuing growth of large trucks mandates attention and analysis,” said Dr. Turner. “Normal crash data collection and analysis procedures have been inadequate, and a major new effort is needed. The new effort should be national in scope and involve highly-trained teams to investigate crashes and crash sites.”

In May 2008, Dr. Turner, Miss Leslie Anne Nicholson (UA graduate research assistant), and Mr. Ken Agent (research engineer) from The Kentucky Transportation Center presented the findings of this project at the International Conference on Heavy Vehicles in Paris.

In a 2007 press release, organizers described this exciting new conference.

In May 2008, two international conferences related to Heavy Vehicles will be combined – the 10th Heavy Vehicles Transport Technology Conference and the 5th International Conference on Weigh in Motion.

The . . . [single integrated] conference will address the broad range of scientific and technical issues related to heavy vehicles, surface transport technology, safety and weight measurement systems (International Conference on Heavy Vehicles).

References

The UTCA Advisory Board held its annual meeting on Friday, August 29, 2008, in Room L210 of Shelby Hall at The University of Alabama (UA) campus. Members of the Advisory Board are Mr. Don Arkle, Mr. Mark Bartlett, Mr. James Brown, Mr. Randy Cole, Mr. Eddie Curtis, Mr. Larry Lockett, Mr. James Moore, Mr. Billy Norrell, Mr. Steve Ostaseski, Dr. Brian Smith, Mr. George Overstreet, Mr. Joe Robinson, Mr. Don Vaughn, and Mr. Grant Zammit.

Dr. Jay K. Lindly, Executive Director, called the meeting to order at 11:00 AM. He welcomed Board members and introduced Mr. Steve Ostaseski as the new Advisory Board Chair. Mr. Ostaseski has been a member of the Advisory Board since 2000. He is a principal planner with the Greater Planning Commission of Greater Birmingham.

This meeting marked two milestones. First, Dr. Daniel Shelton Turner, Founding Executive Director, stepped down in January in order to devote more time to research, teaching, and service to the university and community. Secondly, Mr. Don Vaughn, the organization’s first and only Advisory Board Chair, rotated off the Board this year. Mr. Vaughn is Chief Engineer and Deputy Director of the Alabama Department of Transportation (ALDOT).

Dr. Turner presented Mr. Vaughn’s plaque honoring his generous commitment of time, support, and inspiration as the Inaugural Board Chairman, 2000-2008. Mr. Larry Lockett, Chief of the Bureau of Materials and Tests at ALDOT, accepted the award on Mr. Vaughn’s behalf. Mr. Vaughn was meeting with Governor Riley and other emergency personnel in preparation for the arrival of Hurricane Gustav.

Dr. Lindly presented Dr. Turner a plaque honoring his outstanding vision, dedication, and commitment to excellence as the Founding Director of the UTCA, 1999-2008.

Following the adoption of the agenda and approval of prior minutes, Dr. Lindly provided an overview of the Center’s operations. This overview included the history, mission, theme, and organizational structure of UTCA. He also highlighted recent accomplishments in UTCA’s education, technology transfer, and research programs.
Professors from two campuses presented brief summaries of current UTCA projects while the group enjoyed lunch. Dr. Dan Turner (UA) shared Project #08112 – Transit Evacuations: Two Case Studies. This project addresses the transit emergency evacuation of individuals without personal vehicles or the means to acquire them during coastal extreme events. It will be a joint effort of the UTCA and the Center for Transportation Policy Studies (CTPS) at the University of North Carolina in Charlotte. The project will include extensive interactions with city, regional, and state emergency management authorities and will identify appropriate volunteer agencies or groups to communicate with and support the evacuees as the process is initiated and conducted.

Dr. Houssam Toutanji from The University of Alabama in Huntsville (UAH) shared Project #05315 – Multimedia Package for LRFD Steel Bridge Design. This project developed a Load and Resistance Factor Design (LRFD) multimedia package to provide a practical introduction and an in-depth understanding of the new technological advances in the design of steel bridges. This package can be used to train engineers, architects, designers, and personnel who are in charge of the design, construction, maintenance, and rehabilitation of bridges. The complete package includes instructions of how to design a steel bridge with AASHTO load and resistance factor design recommendations and specifications.

Following their presentations, Dr. Lindly reviewed lists of projects authorized for 2007 and 2008. In 2007 and 2008, UTCA funded 17 new projects and conducted eight additional projects that were funded by other agencies.

Mr. Ostaseski and Dr. Lindly reviewed the 2008 Annual Research Plan with Board members. They asked for concepts and projects that could be used to update the current Plan. The Board discussed many possible research topics including managed lanes, oversize/overweight (OS/OW) vehicles, infrastructure sustainability, transit-oriented development, and traffic control devices, to name a few. The 2009 Annual Research Plan was drafted during this work session. It can be downloaded from the Center’s website at http://utca.eng.ua.edu.

Mr. Steve Ostaseski thanked UA for its hospitality and congratulated the Advisory Board on a productive meeting. He adjourned the meeting at 3:00 PM. The next meeting of the UTCA Advisory Board will be in the summer of 2009.
The 36th Annual Meeting of the Alabama Section Institute of Transportation Engineers (ALSITE) was held June 4-6, 2008 in Gulf Shores, AL. The University Transportation Center for Alabama (UTCA) and The University of Alabama at Birmingham-University Transportation Center (UAB-UTC) sponsored an entire session devoted to meeting the transportation challenges of older drivers.

Dr. Karlene Ball, Professor of Psychology at The University of Alabama at Birmingham (UAB) and Director of the UAB Edward R. Roybal Center for Research in Applied Gerontology, was one of the session’s featured speakers. Her presentation – Enhancing the Safety and Mobility of the Older Driver – addressed several unique concerns faced by older drivers.

According to Dr. Ball, the number of licensed drivers in the United States over the age of 65 increased by 17% during the 1990s. In 2004 there were over 28 million drivers aged 65 and older, and demographic studies suggest the number of older drivers will continue to increase substantially. As the number of older drivers on the road has increased, so has their involvement in motor vehicle crashes. Over the past 30 years, the rate of motor vehicle crashes involving drivers 70 years of age and older has increased 33%. Older drivers are more likely to be at-fault when involved in crashes and are more susceptible to injuries and fatalities from such crashes.

Many studies have identified risk factors for increased crash involvement among older drivers:
- Poor vision
- Decreased speed of processing as measured by the Useful Field of View Test (UFOV)
- Dementia-related cognitive impairments
- Decreased physical functionality due to natural aging or conditions such as diabetes and cardiovascular disease
- Adverse reactions from medications used to treat various disorders

Studies have also shown that older male drivers are at particular risk for crash involvement. Declines in cognitive abilities, speed of processing in particular, are often the strongest independent predictors of crash involvement among older drivers. Similarly, impairments in these abilities have been associated with driving cessation.

Cognitive training techniques can enhance the cognitive performance of older adults. This enhancement translates to improved performance of essential activities of daily living as well as improved health-related quality of life.

Of particular interest is research on cognitive speed of processing training. Such training results in improved scores on the Useful Field of View Test. This finding is meaningful, given the relationship of UFOV performance and crash involvement. Accordingly, Roenker and colleagues (Roenker, et al., 2003) demonstrated that among older drivers with speed of processing difficulties, cognitive speed of processing training not only enhanced UFOV performance, but also translated to improved on-road driving safety.

As the number of older drivers continues to rise, improving their on-road driving safety must remain a transportation research priority.

References

Did You Know?
Many Departments of Motor Vehicles (DMVs) take a proactive approach to assisting older drivers. DMVs in some states have taken the following actions:
- Developed driver-assessment programs or assessment counseling;
- Hosted driving-training programs;
- Offered pamphlets or conducted information campaigns on safe driving;
- Participated in transportation committees to improve drivability of roads and review alternatives to driving;
- Shortened the time span between renewal periods for a license based on the driver’s age. Other states issue restricted licenses to drivers based on individual capabilities (only daytime driving, only driving a designated number of miles from home) (*DriveWell*, p. 30).

References
International Workshop on B-WIM Technology Hosted by UAB

The expansion of freight shipments on the nation’s highways has led to a substantial increase in road traffic congestion. Of particular concern is the increase in the number, size, and weight of commercial vehicles. Members of the 2006 Commercial Motor Vehicle Size and Weight Enforcement (VSW) Scan Tour recognized the potential use of the Bridge Weigh-in-Motion (B-WIM) systems in the management of oversize/overweight (OS/OW) commercial vehicles in the United States. A B-WIM system is analogous to using radar to detect speeders on the highway. With the installation of sensors under the deck of a bridge, the existing bridge becomes a portable platform weight scale to detect overweight vehicles.

The University Transportation Center for Alabama (UTCA) and the Alabama Department of Transportation (ALDOT) co-funded two projects to investigate commercially available B-WIM technology developed by CESTEL, a Slovenian company. Dr. Wilbur Hitchcock, Professor of Civil, Construction, and Environmental Engineering at The University of Alabama at Birmingham was the principal investigator on both projects. The first research project evaluated the requirements, benefits, and limitations of the B-WIM system. Additionally, a field demonstration was performed on an Alabama bridge. This was the first installation and demonstration of B-WIM technology in the United States.

“We are privileged. . .,” said Dr. Hitchcock, “to be on the leading edge of this technology in the United States.”

The goal of the second project is to improve the overall accuracy and reliability of B-WIM technology. In this project researchers will test the B-WIM system on two additional bridge structures of differing primary girder type. The team will recommend additional sensor technology configurations which could significantly contribute to more reliable and versatile B-WIM systems.

As part of these UTCA/ALDOT-funded projects, an international workshop on B-WIM technology was organized and hosted by researchers at The University of Alabama at Birmingham on August 11 and 12, 2008. Experts from Ireland, France, the Netherlands, Slovenia, Canada, and the United States met to review the state-of-practice of B-WIM technology, discuss benefits and challenges related to the implementation of B-WIM systems, and identify future research, collaboration, and deployment opportunities.
Active Traffic Management is the practice of dynamically managing both recurrent and non-recurrent congestion based on prevailing traffic conditions. In practice, it seeks to provide reliable travel times for all users, reduce both recurrent and non-recurrent congestion, and provide enhanced information to drivers (Mirshahi, et al., 2007). Active Traffic Management typically relies on comprehensive automated systems to continuously monitor and adjust roadway management strategies as traffic conditions change, unlike many existing systems which are deployed manually and only in response to an incident or non-recurrent congestion. Examples of active management strategies include speed harmonization, dynamic lane management, dynamic vehicle routing, and real time incident management.

The objective of this project is to build on research interests of the Federal Highway Administration by developing guidelines for implementing Active Traffic Management strategies in the United States. This congestion management approach consists of a combination of operational strategies that fully optimize the use of existing infrastructure and provide measurable benefits to the transportation network and the motoring public. This UTCA project will (a) assess the state of the practice for Active Traffic Management strategies such as variable speed limits, temporary shoulder use, managed lanes, junction control, and dynamic signing and rerouting; and (b) develop practical guidelines for implementing Active Traffic Management systems in the United States.

Congestion management is certainly not a new concept. Ramp metering and managed lanes (e.g., HOV lanes) are used in several cities to address recurrent congestion, which typically accounts for about 45% of all congestion in the United States. Many cities address non-recurrent congestion through the use of advanced surveillance to detect incidents and incident response plans to clear them quickly. Active Traffic Management uses many of these same strategies but does so in a unified system that enhances the effectiveness of the individual strategies. By stressing continuous system monitoring, dynamic response, and coordination of systems, Active Traffic Management provides a holistic approach to transportation system management.

An example of an existing congestion management strategy that can benefit from this approach is the temporary use of shoulder lanes on freeways. In a typical application, motorists are allowed to use shoulders as an extra driving lane during the AM and PM peak hours. The use of shoulder lanes provides a temporary capacity increase for congested freeways during the times when demand is greatest.

Speed harmonization is another congestion strategy often used to improve traffic flow. Speed harmonization systems use changeable speed limit signs posted over each freeway lane at regular intervals to constantly regulate freeway speeds based on prevailing traffic conditions.

The implementation of speed harmonization and shoulder lane usage systems together could enhance the effectiveness of these strategies. However, their deployment is a significant investment, so the potential benefits would have to be clearly defined and sufficient to justify the costs. To better define these costs and benefits, Mr. Sullivan and his team are performing a case study analysis of a temporary shoulder lane usage system combined with speed harmonization on a segment of I-65 in Birmingham, AL. The case study will use the VISTA simulation model developed in UTCA Project #07204 – Managed Lanes: Current Status and Future Opportunities and modify it to model a temporary shoulder lane use system combined with speed harmonization on a segment of I-65 in Birmingham, AL. The case study will use the VISTA simulation model developed in UTCA Project #07204 – Managed Lanes: Current Status and Future Opportunities and modify it to model a temporary shoulder lane usage strategy for a congested segment of the interstate. The VISTA model will allow researchers to model not only shoulder lane use but also different dynamic implementation strategies. The operational benefits of this strategy will be evaluated and used to determine the feasibility of implementation.

Active Traffic Management is a natural evolution of existing congestion management practices. This research team will develop a set of practical guidelines that transportation professionals may use to understand the various strategies; assess the potential benefits for their transportation system; and identify steps, costs, and potential barriers to implementation.

References