UTCA
University Transportation Center for Alabama

2010 Annual Report
Celebrating over 10 Years of Service to the Transportation Community

COVER PHOTOS: Left: Tahmina Khan, a doctoral student at UAH, presents at the 5th Annual Awards Luncheon. See page 18. Middle: UAB ITE members joined their faculty advisor, Dr. Virginia Sisiopiku, at the 2010 ALSITE meeting in Guntersville Lake Park. See page 20. Right: an Annual Transportation Institute participant tests his straw bridge. See page 21.
2010 was a year of consolidation, renewal, and accomplishments for UTCA as we continued to promote our theme of Management and Safety of Transportation Systems:

- We celebrated the culmination of our landmark three-year study performed for the Governor’s Study Group on School Bus Seat Belts.
- A student chapter of the Institute of Transportation Engineers opened on our Tuscaloosa campus.
- Our renewed emphasis on externally-funded projects resulted in awards from the Alabama Department of Transportation and Wisconsin Department of Transportation.
- Our outreach activities engaged over 500 members of the transportation research community.
- Our university system awarded three transportation doctorates in 2010.

UTCA’s Executive Committee, staff, and I thank all the individuals, researchers, and our Advisory Board for their help in creating another strong year for UTCA, and we are already planning an equally productive 2011.

Sincerely,

Jay K. Lindly
Mission and Theme

The University Transportation Center for Alabama (UTCA) was created by a resolution of the Board of Trustees of The University of Alabama System (UA System) and began operation on March 15, 1999. The Transportation Equity Act for the 21st Century (TEA-21), Public Law 105-178, provided initial funding and established the UTCA as a “university transportation center” (UTC) under the US Department of Transportation’s Research and Innovative Technology Administration (RITA). The UTCA now operates as a Title III UTC under the 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).

The UTCA conducts transportation education, research, and technology-transfer activities throughout the state and region. All faculty and staff members from The University of Alabama (UA), The University of Alabama at Birmingham (UAB), and The University of Alabama in Huntsville (UAH) are eligible to conduct projects in all of these service areas.

Mission

The UTCA mission contributes to the overall mission of the US Department of Transportation (USDOT). 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).

Theme

The UTCA theme – Management and Safety of Transportation Systems – reflects the transportation needs of Alabama and the expertise of The University of Alabama System faculty. In allocating UTCA funding, the Executive Committee and Board of Advisors give priority to programs and projects that closely follow this theme. In 2006 the Executive Committee narrowed and sharpened the focus of the UTCA research program to emphasize the topic of congestion. Several management-research projects now focus on maximizing traffic management and minimizing congestion. Similarly, safety research projects may now highlight infrastructure sustainability.
Section 2

The UTCA headquarters is located in the Bevill Building at The University of Alabama campus. Each campus (UA, UAB, and UAH) has a branch office operating under the direction of an Associate Director. The Executive Director and Associate Directors form the Executive Committee, which provides guidance and direction for Center activities. Faculty members engaged in UTCA projects work in their own offices on their own campuses.

These six individuals are continuously assigned to UTCA, all on a part-time basis. Researchers from the three campuses are engaged for only the life of a project.

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Mrs. Connie Harris; Administrative Secretary, UA: charris@eng.ua.edu
Mr. Joseph Walsh; Editorial Assistant, UA; jtwalsh@eng.ua.edu
# 2010-2011 Advisory Board

The UTCA has a strong Advisory Board. Members include representatives from public and private transportation-related fields and organizations. The Advisory Board takes an active role in guiding operations and establishing the direction of growth for the Center, particularly in the areas of research and technology transfer. Its members initiate the Annual Research Plan, review proposals, and evaluate UTCA’s annual accomplishments and progress.

<table>
<thead>
<tr>
<th>Transit Agencies &amp; Organizations:</th>
<th>Municipal Planning Organizations:</th>
<th>Transportation Engineering:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Steve Ostaseski, Chair</td>
<td>Mr. James Moore</td>
<td>Mr. James Brown</td>
</tr>
<tr>
<td>Regional Planning Commission for</td>
<td>Transportation Planner</td>
<td>Gonzalez-Strength &amp; Associates, Inc.</td>
</tr>
<tr>
<td>Greater Birmingham</td>
<td>City of Huntsville (AL)</td>
<td>Birmingham, AL</td>
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<tr>
<td>Birmingham, AL</td>
<td>Huntsville, AL</td>
<td></td>
</tr>
<tr>
<td><strong>FHWA Representative:</strong></td>
<td><strong>Highway Representative (Design):</strong></td>
<td></td>
</tr>
<tr>
<td>Mr. Mark Bartlett, Vice-Chairman</td>
<td>Mr. Don Arkle</td>
<td>Mr. Eddie Curtis</td>
</tr>
<tr>
<td>Division Administrator</td>
<td>Assistant Chief Engineer for</td>
<td>Traffic Management Specialist</td>
</tr>
<tr>
<td>Federal Highway Administration</td>
<td>Policy and Planning</td>
<td>Office of Transportation Management</td>
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<tr>
<td>Montgomery, AL</td>
<td>Alabama Department of Transportation</td>
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<tr>
<td><strong>Academic Research:</strong></td>
<td>Montgomery, AL</td>
<td>FHWA Resource Center</td>
</tr>
<tr>
<td>Dr. Brian Smith</td>
<td><strong>Highway Representative</strong></td>
<td>Atlanta, GA</td>
</tr>
<tr>
<td>Center for Transportation Studies</td>
<td>(Geotechnical &amp; Materials):</td>
<td>TBA</td>
</tr>
<tr>
<td>University of Virginia</td>
<td>Mr. Larry Lockett</td>
<td>Construction Industry:</td>
</tr>
<tr>
<td>Charlottesville, VA</td>
<td>Bureau Chief, Materials &amp; Tests</td>
<td>Mr. Billy Norrell</td>
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<td></td>
<td>Alabama Department of Transportation</td>
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<tr>
<td></td>
<td>Montgomery, AL</td>
<td>Executive Director</td>
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<tr>
<td></td>
<td><strong>Highway Representative (Maintenance):</strong></td>
<td></td>
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<tr>
<td><strong>City Engineer:</strong></td>
<td>Mr. George Conner</td>
<td>Alabama Road Builders Association</td>
</tr>
<tr>
<td>Mr. Joe Robinson</td>
<td>State Maintenance Engineer</td>
<td>Montgomery, AL</td>
</tr>
<tr>
<td>City of Tuscaloosa (AL) Engineer</td>
<td>Alabama Department of Transportation</td>
<td></td>
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<tr>
<td>Tuscaloosa, AL</td>
<td>Montgomery, AL</td>
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<tr>
<td><strong>County Engineer:</strong></td>
<td>Highway Representative (Maintenance):</td>
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<td>Mr. Randy Cole</td>
<td>Mr. George Conner</td>
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<tr>
<td>Shelby County (AL) Engineer</td>
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**Logistics/Commercial Vehicles:**
- TBA

**Construction Industry:**
- Mr. Billy Norrell
  - Executive Director
  - Alabama Road Builders Association
  - Montgomery, AL

-FHWA Representatives:
- Mr. Eddie Curtis
  - Traffic Management Specialist
  - Office of Transportation Management
  - FHWA Resource Center
  - Atlanta, GA

TBA
Highlights from the 2010 Advisory Board Meeting

The UTCA Advisory Board held its annual meeting on Tuesday, July 20, 2010, in H.M. Comer Hall on The University of Alabama (UA) campus.

Board Chair Mr. Ostaseski noted a change in Board membership. Mr. Grant Zammit stepped down as one of two Federal Highway Administration (FHWA) representatives on the Board but continues to work in the FHWA Resource Center in Atlanta. Mr. Ostaseski recognized Mr. Zammit’s years of service to the Board and wished him well.

Following the adoption of the agenda and approval of prior minutes, Dr. Lindly gave a brief presentation on UTCA’s mission, theme, education program, technology-transfer program, and funding history. Dr. Fouad then presented a draft Timeline and draft Request for Pre-Proposals for 2011 Projects. Currently UTCA accepts two-page proposals, then it requests full proposals from the most attractive submissions. Dr. Fouad suggested the proposal-review process may be better served by eliminating the pre-proposal round and accepting only full proposals. Dr. Turner thought the change makes sense given the declining number of pre-proposals; however, Advisory Board member and frequent reviewer Mr. Mark Bartlett preferred the two-step process, and Dr. Burcu Keskin said researchers appreciate the ease and speed of the two-step process. No vote was taken on changing the review process during the meeting.

Dr. Keskin from UA presented a summary of her recent UTCA research. Project #09104 – Optimal Traffic Resource Allocation and Management assisted law-enforcement officers in planning and managing the number and deployment of patrol officers to reduce the number of crashes, minimize the response time to a crash, and eliminate idle patrolling while increasing the visibility of officers. Dr. Keskin and her colleagues in Computer Science conducted five seminars in 2010 for the law-enforcement community. The seminars attracted a total of 165 participants, including state troopers, state and local safety officials, and members of ALDOT and the Federal Motor Carrier Safety Administration.

Dr. Lindly then reviewed the projects authorized for 2010, which included eight new UTCA-funded projects. He also reviewed UTCA projects supported with external funding.

The Board addressed a number of issues facing UTCA. First, UTCA received encouragement to fund more projects in the transit area. SAFETEA-LU shifted the funding source for Title III University Transportation Centers to the Federal Transportation Administration (FTA), and transit projects better parallel the FTA’s priorities. The Board agreed that a larger percentage of UTCA’s annual funding will go to transit projects.

Second, the UAB transportation center (UAB UTC) asked UTCA to jointly host a transportation workforce development conference in 2010. After discussion, Dr. Lindly said he would ask UAB-UTC to submit a proposal for the next round of funding. Meanwhile, UTCA will continue to work with the UAB UNC on other initiatives.

Finally, Dr. Lindly announced UTCA will be funded in 2011 as Congress works on the new highway reauthorization bill.

Mr. Ostaseski and Dr. Lindly reviewed the 2010 Annual Research Plan with Board members, which establishes priorities for research funding for the year. The Board then discussed concepts and projects that could be included in the 2011 Plan. Keeping transit projects in mind, the Board agreed to further prioritize funding as follows:

1. National surface-transportation research, which includes mobility and capacity of current and future roadways as well as materials and designs related to infrastructure sustainability.
2. Topics important to UTCA’s future, including diversity, ways to increase participation in UTCA programs, and short courses for transportation professionals.
3. Other projects identified by the Board, such as ways to improve traffic-control devices and create hurricane evacuation plans.

Mr. Ostaseski adjourned the meeting at 3:00 PM. The next meeting of the UTCA Advisory Board will be July 18, 2011.
Research Project Selection

The UTCA continues to encourage all faculty members in the UA System to compete for project funding. The Advisory Board and Executive Committee create an Annual Research Plan to define research topics of highest importance. Peer experts review proposals and recommend projects for funding.

A large number of faculty members have participated in this process, as illustrated in TABLE 3-1 and TABLE 3-2. The degree of participation has exceeded the initial goals of the Executive Committee and has produced a large network of interdisciplinary transportation experts.

The UTCA will have 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 (2006 Strategic Plan, p. 16).

<table>
<thead>
<tr>
<th>Grant Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
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<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Total</th>
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<tbody>
<tr>
<td>Different PIs</td>
<td>13</td>
<td>8</td>
<td>11</td>
<td>10</td>
<td>16</td>
<td>17</td>
<td>14</td>
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<td>10</td>
<td>6</td>
<td>9</td>
<td>8</td>
<td>528</td>
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<tr>
<td>New PIs</td>
<td>13</td>
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<td>3</td>
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<th>Grant Year</th>
<th>1999</th>
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<th>2010</th>
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<tr>
<td>Proposals</td>
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<td>61</td>
<td>49</td>
<td>40</td>
<td>63</td>
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<td>37</td>
<td>27</td>
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<td>25</td>
<td>528</td>
</tr>
<tr>
<td>Projects Funded by UTCA</td>
<td>14</td>
<td>9</td>
<td>11</td>
<td>10</td>
<td>19</td>
<td>19</td>
<td>17</td>
<td>15</td>
<td>10</td>
<td>7</td>
<td>10</td>
<td>8</td>
<td>141</td>
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</table>
The UTCA funded eight projects with 2010 UTC monies. An additional four projects were funded by external agencies. These projects are briefly described in the following pages. Externally funded projects are identified by a “4” as the third digit in the UTCA project-numbering system. We invite readers to visit http://utca.eng.ua.edu/projects/ for additional information on these and other UTCA projects.

**Project #10104 – Characterization of Non-Recurrent Arterial Congestion**, Dr. Steven L. Jones, Principal Investigator, UA. Crashes, adverse weather, construction, disabled vehicles, and special events can all cause non-recurrent congestion. This project is intended to develop a better understanding of the causes and characteristics of non-recurrent congestion on arterials to develop tools that will aid in mitigating its impacts. The project will identify data to characterize the onset of non-recurrent congestion and to understand the relationship between its causes and characteristics and other parameters such as traffic conditions (volumes, speeds, etc.), location on the artery (midblock or intersection), number of lanes, traffic-signal spacing, number of external access points (side streets and driveways), roadway capacity, and driver-behavior parameters (lane changes, queue discharge, gap acceptance, control adherence, etc.). Data will be collected using the UTCA ITS/TMC lab, probes, field measurements, and CCTVs on arterials in and around Birmingham, Alabama.

**Project #10105 – Advanced Transportation Institute 2010**, Dr. Daniel Turner, Principal Investigator, UA. The objective of the Advanced Transportation Institute 2010 (ATI-10) is to introduce junior and senior high-school students, especially those from groups traditionally underrepresented in engineering, to transportation careers. The University Transportation Center for Alabama (UTCA) and the Alabama Department of Transportation (ALDOT) will co-sponsor the Institute. It will held in ALDOT’s headquarters complex in Montgomery, Alabama. The agenda for the week-long program includes presentations on topics such as transportation careers, how to select and enter a university, and how to obtain scholarships. Practitioners will present various sectors of transportation, including planning, design, construction, maintenance, traffic engineering, and bridge design. UTCA and ALDOT’s Fifth Division will also hold a three-day ATI session in Tuscaloosa (ATI-5th Div). Students from local public middle schools will compete in hands-on projects, listen to presentations, and take a field trip.

**Project #10107 – Alternative Future Revenue Sources for Alabama Highways**, Dr. Jay Lindly, Principal Investigator, UA. The nation’s surface-transportation funding situation is facing a defining moment: due to the weakening economy, the ever-improving fuel efficiency of vehicles, and other factors, the traditional funding sources for surface transportation – motor fuel taxes – are having difficulty generating sufficient revenue to meet construction and maintenance needs. To avoid a potential transportation-funding crisis in the state of Alabama, this research will develop a revenue-forecast model to explore alternative financing schemes for Alabama. The study will recommend the most suitable and effective future revenue sources for the Alabama transportation system and will serve as a reference for the Alabama Legislature. The findings could also have impact nationwide.

**Project #10204 - Use of WIM Data for Site-specific LRFR Bridge Rating**, Dr. Nasim Uddin, Principal Investigator, UAB. The typical bridge rating uses Ontario-based load data thought to be representative of heavy truck traffic nationwide, but site-specific load factors would be more useful because they better reflect the bridge’s actual truck traffic and maximum loading. Using AASHTO’s load-and-resistance-factor (LRFR) specifications, this project will develop a method to determine site-specific load factors for more realistic bridge...
ratings using weigh-in-motion (WIM) data. The project will initially focus on two representative WIM sites in Alabama: one state and one interstate route. The approach and methods thus developed have the potential to be used by Alabama and other states. Adaptation of the methods will be beneficial to account for unique site-specific characteristics of truck loads and permitting regulations in different states.

Project #10206 - Impact of Distracted Driving on Congestion, Dr. Despina Stavrinos, Principal Investigator, UAB. Distracted driving has become an epidemic in the United States, particularly among young drivers. Despite the plethora of studies that have demonstrated a link between distracted driving and diminished safety, few studies have examined the association between distracted driving and congestion. This project seeks to fill the research gap by examining driving behavior in a driving simulator across free-, stable-, and unstable-traffic flow and across cell-phone conversation, text messaging, and undistracted conditions. The study will also examine individual differences as predictors of risky driving behavior: we expect high sensation seekers will display riskier behavior (e.g. smaller gap acceptances when turning and changing lanes, smaller intervals to lead vehicles) when in the highest congestion condition (i.e. unstable flow) than those who are low sensation seekers. Distractions may lead to reduced traffic flow (e.g. fewer lane changes, slower driving speed, increased number of multi-vehicle collisions and close calls), especially from text messaging. Results may enhance simulation work completed by transportation engineers by providing a clearer account of distracted driver behavior.

Project #10303 – Transportation Engineering Advancement and Mentoring Program, Dr. Kathleen Leonard, Principal Investigator, UAH. The Transportation Engineering Advancement and Mentoring (TEAM) Program is a hybrid of a past UTCA summer program aimed at middle-school females with the addition of school visits to science classes. This program aimed to produce students who know “how to find out” and “how to examine and evaluate evidence.” Mentors (students and professionals) will make several visits to school classes for one-on-one time and hands-on activities. The activities will comprise basic engineering laboratories tailored for the middle-school student with exposure to physical science from the seventh- and eighth-grade curriculum, such as a bridge-design competition and a solar-car race. This year’s summer program will have a concentration in energy technologies. Students will use real-world examples and new technologies in their hands-on activities. The first visit will coincide with National Engineers’ Week in February and culminate with a campus visit in the fall.

Project #10304 - Multimedia Resource Package for Load and Resistance Factor Rating (LRFR) of Bridges, Dr. Houssam Toutanji, Principal Investigator, UAH. With the introduction of the new AASHTO Load and Resistance Factor Rating (LRFR) for highway bridges, there is a need to assess the impact of implementing the new manual on Alabama Department of Transportation’s (ALDOT) current bridge-rating practices. The proposed package will include a discussion about the (1) load-rating basics (such as the need for rating, when to do rating, what codes to use, who can rate, etc.); (2) load-rating methods (allowable stress rating [ASR], load factor rating [LFR], LRFR, load testing) in brief with emphasis on LRFR; (3) load models for LRFR (truck load, lane load, new AASHTO legal load); (4) load-rating process; (5) LRFR limit states (strength, service, fatigue) and load factors; and (6) step-by-step illustrative examples to calculate LRFR for different types of bridges. A comparison between LFR and LRFR will be presented in brief wherever necessary for better understanding and easier transition from LFR to LRFR. This project will help bridge engineers comprehend and implement state-of-the-art design methodologies for concrete bridge design and rating. It will highlight key design steps for concrete superstructure, including decks and girders. It will focus on unified design for reinforced and prestressed concrete. The LRFR package will include an overview of the latest AASHTO LRFR load-rating procedures and practices as they relate to concrete bridges in Alabama.

Project #10308 - Student Funding to Attend TRB Conference, Dr. Michael Anderson, Principal Investigator, UAH. The objective of this project is to develop a student research symposium, possibly to be hosted by the student chapter of the Institute of Transportation Engineers (ITE) at The University of Alabama at Birmingham (UAB), and to select deserving students from the three University of Alabama campuses to receive funding to attend the Transportation Research Board Annual Meeting in Washington, DC, in January 2011. The proposed presentations will highlight research projects from transportation students of the three campuses. Subsequent attendance at the TRB Annual Meeting will provide invaluable experience and knowledge for the students.
Project #10401 – Pilot Car Driver Certification Program, Dr. Jay K. Lindly, Principal Investigator, UA. Pilot cars are the safety vehicles that accompany oversized vehicles on highways. The State of Alabama recognizes the pilot car driver certifications of other states but does not certify its own. The Alabama Department of Transportation (ALDOT) desires to initiate a certification program and to obtain reciprocity of its certification with other states. In the proposed effort, the University of Alabama (UA) team will work with ALDOT to help implement the program. This initial proposal will cover 19.5 months and will initiate the program and conduct the first five to eight classes that will comprise the first year of the program. The exact number of classes will be determined by student demand. UA will engage course instructors through personal service agreements that will include course presentation and presenter expenses. The courses will be held in locations throughout Alabama, preferably at ALDOT Division Offices. The UA team will establish a website for the certification program and will transfer the site to ALDOT at the completion of the project.

Project #10402 – Training for Highway Safety Manual, Dr. Steven Jones, Principal Investigator, UA. The goal of this project is to provide introductory training on the new AASHTO Highway Safety Manual (HSM) to those involved in safety studies and decisions within the Alabama Department of Transportation (ALDOT). The AASHTO HSM represents a significant enhancement in quantifying roadway safety and introduces many new terms and methodologies. This training will provide an overview and understanding of the content and use of the HSM. This will give ALDOT managers a feeling for the use of the HSM and the improvement in safety decision making that it offers, and it will stimulate implementation within the Department. It will give a uniform understanding of the HSM to those managers and employees who are most apt to use the HSM for decisions or to approve and fund those decisions. Three organizations will be involved in this training venture: 1) ALDOT is the training recipient and project sponsor; 2) UTCA will participate in review of the training materials, tailor them to fit ALDOT, and participate in training instruction; and 3) CH2M Hill (CH2M) will provide the basic training materials and provide instructors. The training will comprise two types. First, there will be a two-hour overview of the HSM that introduces terminology and concepts. It is anticipated that this course will be attended by 40 high-level managers from the Central Office and Division Offices; associated agencies such as FHWA, DPS, and ADECA Governor’s Highway Safety Program; and professors associated with ALDOT safety research, training, or implementation. Second, there will be a two-day overview that will provide a more-detailed look at the HSM so participants will have a more complete understanding of terminologies, methodologies, data needs, modeling, calibration, and other aspects of HSM implementation. This version will be offered twice, with 40 participants in each session. The participants will be persons who might use the HSM: design engineers and traffic engineers at the division level; professionals from traffic engineering, safety section, design section, planning, and other bureaus and sections at the central office; and county engineers.

Project #10403 – University of Wisconsin Madison DOT – Crash and Analysis Mapping Phase II Project, Dr. Andrew Graettinger, Principal Investigator, UA. The Wisconsin Department of Transportation (WisDOT) maintains two geographic information system (GIS) road network maps: the State Trunk Network (STN), which focuses on state, interstate, and US highways; and the Wisconsin Information System for Local Roads (WISLR), which focuses on local roads. Although these systems developed and evolved fundamentally independently of each other, similarities and common data exist between them. As part of Phase I, a pilot study linked data from both systems in Dane and Iowa counties. Phase II will link network maps and crash data for all 72 counties in Wisconsin. Users will be able to search and retrieve data through a web-based map interface. This project will document the maintenance of the new database and GIS components and the processing required to incorporate future crash data.

Project #10404 – Scoping Study for Implementation of the Highway Safety Manual in Alabama, Dr. Daniel Turner, Principal Investigator, UA. The American Association of State Highway and Transportation Officials (AASHTO) published the first national Highway Safety Manual (HSM) in July 2010, but the lack of a systematic, proven plan for implementation of the HSM will delay the use of its new safety procedures. The objective of this project is to develop a plan of action to implement HSM methodologies and the Federal Highway Administration’s (FHWA) supporting software Safety Analyst (SA) and Interactive Highway Safety Design Model (IHSDM). The investigators will examine user needs and data requirements for AASHTO and FHWA software, consider the costs and benefits of the new system, and prepare an implementation plan. The investigators will modify the project as UTCA and ALDOT see fit.
Overview of Revenues and Expenditures for New Projects

Sources of Revenue for New Projects in 2010

As shown in TABLE 3-3, the UTCA received almost half its revenue for new projects funded in 2010 from RITA’s University Transportation Centers Program. The Alabama Department of Transportation (ALDOT) was also an important source of revenue for new projects: it provided nearly 40% of UTCA funds. Additionally, UTCA received funds from the Wisconsin Department of Transportation (WisDOT) and the Alabama Road Builders Association (ARBA) and matching funds from participating universities.

FIGURE 3-2 illustrates the relative roles of these funding sources.

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<tr>
<th>REVENUE SOURCES</th>
<th>Amount ($1000)</th>
<th>Percentage</th>
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<tr>
<td>RITA - UTC</td>
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<td>48%</td>
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<tr>
<td>ALDOT - Non-SPR</td>
<td>402</td>
<td>29%</td>
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<tr>
<td>WisDOT</td>
<td>142</td>
<td>10%</td>
</tr>
<tr>
<td>ALDOT - SPR</td>
<td>113</td>
<td>8%</td>
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<tr>
<td>University Matching</td>
<td>54</td>
<td>4%</td>
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<tr>
<td>ARBA</td>
<td>5</td>
<td>0%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,374</td>
<td>100%</td>
</tr>
</tbody>
</table>

Expenditures for New Projects in 2010

TABLE 3-3 also shows UTCA expenditures in 2010. Roughly 12% of expenditures were related to the administration of UTCA. The remaining 88% was spent on projects. Management was by far the largest category of expenditures for new projects funded in 2010. Safety-related projects represented 22% of expenditures, while bridges and education-related projects each consumed 9% of the budget. Technology-transfer projects accounted for 7% of 2010 expenditures.

FIGURE 3-3 illustrates the breakdown of expenditures. The UTCA emphasis on management and safety is reflected in spending: together they account for 63% of expenditures.

Even though only 7% of expenditures focused exclusively on technology transfer activities in 2010, UTCA faculty were active in a number of technology transfer activities. (See Section 4 of this Annual Report for specific examples.)
Overview of Technology Transfer Program

The UTCA will provide readily-available research results to potential users in a form that can be directly implemented, utilized, or otherwise applied (2006 Strategic Plan, p. 23).

Section 4

TRB’s 2010 Alabama Field Visit

Every year, representatives from the Transportation Research Board (TRB) visit state departments of transportation (DOTs) to identify problems these groups are facing and to investigate how TRB can assist in solving those problems. These visits often include meetings with universities, transit organizations, and industry leaders who work with DOTs.

Mr. Frank Lisle, TRB’s Engineer of Maintenance, performed TRB’s 2010 Alabama Field Visit. On Tuesday, May 4th, Mr. Lisle met with ALDOT officials, including Mr. Jeffrey Brown of ALDOT’s Research and Development Bureau. The next day UTCA Executive Director Dr. Jay Lindly welcomed Mr. Lisle and Mr. Brown to UTCA headquarters in Tuscaloosa.

Dr. Lindly opened the meeting with a discussion about UTCA’s history and mission before the discussion moved to research projects UTCA is conducting in collaboration with ALDOT. These projects include Project #07404 - Work Zone Lane Closure Analysis Model, Project #08402 - Evaluation of Public Private Partnership Proposals, and Project #09403 - Development of Access Management Criteria.

The discussion also covered UTCA’s efforts at the local, state, national, and international levels. Dr. Lindly briefed Mr. Lisle on UTCA’s School Bus Seat Belt Pilot Project (#07407), research into alternative highway-funding sources for Alabama (#10107), Development of a Work Plan for the Second Edition of the Highway Safety Manual (#09401), Distracted Driving Summit (#10206), and research into Ghana’s urban-transportation system, among other projects.

Finally, Dr. Lindly covered UTCA’s plans for the future: to pursue larger national projects, to strengthen its relationship with the Federal Transit Administration, to increase its technology-transfer activities, to increase the number of graduate and undergraduate students working on research projects, and to strengthen its relationships with other university transportation centers.
School Bus Seat Belts

School bus seat belts have been a hot-button issue for years. After the tragic deaths of four students in a Huntsville, Alabama, school bus crash in 2006, Governor Riley formed a study group to investigate whether lap/shoulder belts should be installed on large Alabama school buses, and UTCA and UA’s Center for Advanced Public Safety were jointly selected to conduct the study. Dr. Daniel Turner led the effort to address whether students wear seat belts; whether seat belts affect bus discipline, the attitudes of stakeholders, and bus capacity; whether seat belts are cost effective; and other pertinent issues.

UTCA’s research, which was released October 25, 2010, found that school buses are the safest form of transportation to school even without seat belts. Students are six to eight times safer riding to school in a school bus than in their parents’ cars. Pupil deaths inside school buses are rare in Alabama. Since 1977, when the Federal Government required new school buses to include compartmentalized seating, there have been only five pupil fatalities inside school buses when a crash occurred, despite the large number of students transported: 7,341 Alabama school buses averaged 51 pupils each and traveled a total of 82.3 million miles for the 2009-2010 school year.

Although the addition of seat belts would make already-safe school buses even safer, it poses a number of challenges. Adding seat belts increases the thickness of seatbacks, leading to fewer rows of seats. Depending on the configuration of seats and rows used, the fixed spacing between seat belt buckle latches can negate the option of placing three small pupils or two large pupils on a seat, leading to the loss of one seat per row. This study found thicker seatbacks and fixed buckle spacing could reduce school bus fleet capacity between 5% and 18%. The bus fleet would need to expand 5% to 18% to offset the capacity loss.

Seat belts require taller seatbacks, which partly obstruct the driver’s view. Drivers expressed concern that they will be unable to adequately monitor passenger behavior, leading to increased discipline problems.

Moreover, 170,000 observations of pupils in pilot-project buses showed an average seat belt use rate of only 61.5%. Seat belts cannot save lives and reduce injuries when they are not worn, and estimates of seat belt benefits must be reduced accordingly.

UTCA researchers performed a cost-effectiveness study using National Highway Transportation Safety Administration’s methodology. The estimates suggested the cost of an “equivalent life saved” (which places injuries and fatalities on a common scale) from seat belt implementation in Alabama is $32 million to $38 million. Over 10 years, seat belt costs will likely exceed benefits by $104 million to $125 million. This finding suggests that states should use more cost-effective safety measures rather than implementing seat belts across the fleet of large school buses.

Nationally, roughly three of every four school bus pupil fatalities occur outside buses in or near loading zones. If funding is to be spent on school bus safety, it appears more lives could be saved by investing in enhanced safety measures in loading/unloading zones.

On October 25, 2010, Dr. Turner and Dr. Jay K. Lindly briefed Governor Bob Riley and the Governor’s Study Group on School Bus Seat Belts in Montgomery on the results of the study. Dozens of media outlets, including the Associated Press, reported on the findings.
The UTCA faculty conducted four seminars and short courses in 2010 with 380 transportation professionals in attendance. The following descriptions illustrate that practitioners are receiving the benefits of The UTCA research projects and new transportation courses.

Lindly, Jay K.  TRB Utilities Committee Focus on Research/University Transportation Centers Research Program Overview. Attended by members of the AASHTO Right of Way & Utilities Subcommittee, San Diego, California, April 18-22, 2010. (30 participants)


During 2010 the UTCA faculty and students reported presenting 28 papers at 21 different meetings including one international meeting. The wide range of meetings provided good exposure for the UTCA faculty and their research.

Aboustait, Mohammed.  Cracking in Early-Age High Performance Concrete. Presented at the University of Alabama at Birmingham Student Research Day, Birmingham, AL, February 2010.


Turner, D.S.  Scoping Study to Implement the Highway Safety Manual for ALDOT.  Presented at the AASHTO Lead State Workshop, Chicago, IL, November 2010.


Turner, D.S.  Introduction to the AASHTO Highway Safety Manual.  Presented at the American Society of Civil Engineers (ASCE) Alabama Section Summer Conference, Orange Beach, AL, July 2010.


Faculty members reported that 11 papers were published in refereed journals and conference proceedings in 2010. One faculty member also published a book. These papers and the book were based on the results of UTCA research projects. Specific details of each publication are provided in this section.


Students from the three campuses of The University of Alabama System are engaged in a variety of transportation-related research activities. A UTCA project (#10308) headed by Dr. Mike Anderson of The University of Alabama in Huntsville (UAH) helped identify deserving transportation students and provided a forum in which they could present their research. First, students were invited to present abstracts of their research to a panel of representatives from each campus, and then winners were selected.

These students were invited to present their research at the 5th Annual Student Awards Luncheon on November 19, 2010. This award luncheon, held at The University of Alabama at Birmingham, was organized and hosted by the Institute of Transportation Engineers (ITE) Student Chapter at UAB.

Three students from each campus — UA, UAB, and UAH — presented technical papers to showcase their research activities. The following students made presentations: Ozge Cavusoglu (UAB), Mary Catherine Dondipati (UAH), Bharat Kallem (UAB), Tahmina Khan (UAH), Rong Li (UA), Gaurav Mehta (UA), Zack Ryals (UA), Nitin Sharma (UAH), Dong Wang (UAH), Brian Wysock (UA), and Cheng Zhong (UAB). All presenters received monetary awards allowing them to attend the 90th Annual Meeting of the Transportation Research Board (TRB) in Washington, DC, in January 2011.
The University Transportation Center for Alabama is proud to recognize Ms. Frances Katalyn Lee Green as its 2010 Student of the Year. Ms. Green, who grew up in Montgomery, AL, is pursuing a bachelor’s degree in civil engineering with a minor in transportation engineering.

Ms. Green enrolled in the Department of Civil, Construction, and Environmental Engineering at the University of Alabama in 2007. Ms. Green demonstrated strong performance in the classroom, and in her junior year she was named a University of Alabama Scholar Student. She took an interest in transportation engineering, enrolling in graduate-level transportation-engineering courses as part of the Scholar Student program.

Ms. Green was also active in transportation research. She worked as a research assistant to Dr. Yingyan Lou, and she wrote a literature review on contra-flow planning for hurricane evacuation for a project under consideration for funding.

In addition, Ms. Green served as a chair of the Society of Women Engineers Fundamentals of Engineering Review Committee from 2008 to 2010 and as Editor/Marshall for the UA chapter of Chi Epsilon from 2010 to 2011.

The formal presentation of the Student of the Year award occurred in Washington, DC, during the Transportation Research Board’s Annual Meeting. Accompanying Ms. Green to the awards banquet were Dr. Daniel S. Turner, UTCA’s founding executive director; Dr. Jay K. Lindly, UTCA’s current executive director; and Dr. Yingyan Lou, Ms. Green’s advisor.

Ms. Green will receive her bachelor degree in May 2011. She will continue transportation-related research as a full-time graduate student at the University of Alabama in the fall.

Dr. Virginia Sisiopiku was one of 22 University of Alabama at Birmingham (UAB) professors recently honored with the 2010 Graduate Dean’s Award for Excellence in Mentorship during a ceremony on April 12, 2010. Dr. Sisiopiku is an Associate Professor in the Department of Civil, Construction, and Environmental Engineering at UAB.

This award recognizes faculty who have been outstanding mentors, advisors, and role models to the students and trainees with whom they have worked. These faculty honorees have demonstrated effective leadership, enthusiasm, an ability to make difficult information and concepts understandable, the willingness to serve as a role model, and a belief in the importance of mentoring.

Dr. Sisiopiku was also one of 13 faculty members honored with the President’s Award for Excellence in Teaching in 2007. During the past seven years she has been the Principal Investigator on six UTCA projects and the faculty advisor of the Institute of Transportation Engineers (ITE) Student Chapter at UAB.

(Parts of this article are quoted verbatim from a press release from the Office of Media Relations at UAB. The complete press release may be viewed at http://main.uab.edu/Sites/MediaRelations/articles/75811.)
On October 26, 2010, a chapter of the Institute of Transportation Engineers (ITE) at The University of Alabama held its inaugural meeting.

ITE is an international educational and scientific association of transportation professionals who are responsible for meeting mobility and safety needs. ITE facilitates the application of technology and scientific principles to research, planning, functional design, implementation, operation, policy development, and management for any mode of ground transportation.

Dr. Steven Jones, the chapter’s advisor, said the chapter was created “to expose students directly to the transportation profession and to allow them opportunities to meet and interact with transportation professionals in Alabama and throughout the southeast.”

Since the chapter was charted in April, twenty students, including graduates and undergraduates, have joined.

The chapter is planning for a busy year. In addition to regular chapter activities, members are in talks to assist a local non-profit in conducting a traffic study at a school for autistic children, and the chapter will host the spring 2011 meeting of the Alabama Section of the Institute of Transportation Engineers (ALSITE).

UA’s chapter is the third collegiate chapter in Alabama. It joins existing chapters at the University of Alabama at Birmingham (see a story about UAB ITE to the right) and Auburn University.

The Institute of Traffic Engineers (ITE) Student Chapter at The University of Alabama at Birmingham (UAB) continues to grow under the guidance of Dr. Virginia Sisiopiku. 2009-2010 officers are Mr. Cheng Zhong (president), Mr. Bharath Kallem (vice president), Mr. Md. Saidul Islam (secretary), and Mr. Md. S. Imran (treasurer).

Over the past year the ITE Student Chapter organized and participated in field trips, conferences, guest-speaker presentations, fundraisers, and paper sessions. For example, members attended ALTSITE’s 2010 Spring Meeting on March 10 in Montgomery, AL. Several members of the Student Chapter also attended ALSITE’s 2010 Fall Meeting on October 28 at Lake Guntersville State Park, AL. In December, the UAB ITE Student Chapter defeated a team from Auburn in the Traffic Bowl Qualification Competition for the privilege of representing ALSITE at the SDITE Traffic Bowl in April 2011.

The Chapter also took part in hands-on activities. Chapter members have been involved with a study of pedestrian behavior on the UAB campus, including the collection of data on pedestrian crossings, pedestrian destinations, and vehicle traffic. The study aims to determine whether changes can improve pedestrian safety while maintaining operational efficiency.

Additionally, the Chapter organized and hosted the 5th Annual Student Awards Luncheon at UAB on November 19, 2010. (See page 18 for highlights from this event.)
The ninth annual Advanced Transportation Institute (ATI-10) was held in June for rising high-school juniors and seniors from west-central Alabama. There were 25 students who participated in this week-long event that was conducted at the Alabama Department of Transportation (ALDOT) headquarters in Montgomery, AL. Since its inception in 1999, the UTCA has been committed to recruiting minority students to careers in transportation engineering. As in preceding years, ALDOT co-sponsored this important outreach event. This institute was funded by UTCA Project #10105 and organized by Dr. Daniel Turner (UA).

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 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.

The Institute has a history of improving student attitudes toward transportation careers. As FIGURE 5-8 shows, participants have been much more likely to consider a career in transportation after ATI than before. On average, 45% of ATI participants were considering a transportation career before they attended the Institute, but 74% were considering a transportation career after.
Middle School Students Enjoyed Summer TEAM Program

For the past 11 years over 400 middle school students from the Huntsville area have enjoyed summer outreach programs organized by Dr. Kate Leonard from The University of Alabama in Huntsville (UAH). By providing fun learning experiences in an academic setting, Dr. Leonard hopes to encourage students from under-represented groups to consider careers in transportation engineering. **UTCA Project #10303** – the Transportation Engineering Advancement and Mentoring (TEAM) Program – brought female faculty members from UAH and professionals from the Society of Women Engineers together with young women to produce students who know “how to find out” and “how to examine and evaluate evidence.”

Mentors began to visit selected middle-school science classes in February during National Engineers’ Week. They spent one-on-one time with these science students conducting hands-on activities developed in previous UTCA grant programs. These visits culminated with a Civil Engineering (CE) Bridge Competition and solar-car race in April. Over 60 students participated. Winners of the individual competition received t-shirts, and the best classes were treated to pizza parties.

Several students from these middle schools attended a week-long program held on the UAH campus in June. Participants learned about the role of transportation planning, management, safety, and design in modern society, with a focus on alternative-energy technologies. Students used what they learned in the lectures and experiments to solve real-world transportation problems.

A recent survey of alumnae from the 2003-2005 programs suggests that the TEAM Program has had a positive impact. Just under 90% of respondents plan to attend college, and the majority will major in engineering. Dr. Leonard will continue the TEAM Program under **UTCA Project #11301** in 2011.
Transportation faculty members have instituted a rotating two-year program of courses shared between the three UTCA campuses. Each campus teaches its required undergraduate classes, and each semester there are one or two other transportation courses offered via IITS (Intercampus Interactive Television System). This ensures that juniors and seniors can be exposed to three or four transportation electives not available at their home campuses and that graduate students have a continuous choice of courses in their specialty areas.

The IITS arrangement promotes unity and spirit among transportation students and also provides students access to transportation expertise on the other two UA System campuses.

Typically in an IITS course, students from all three campuses meet jointly at least once a semester. This meeting is usually in the form of a field trip, a design session, or a professional conference.

TABLE 5-1. Multi-Campus Courses since 2006

<table>
<thead>
<tr>
<th>Term</th>
<th>Instructor</th>
<th>Campus</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP 06</td>
<td>Turner</td>
<td>UA</td>
<td>Transportation Safety &amp; Security</td>
</tr>
<tr>
<td>FA 06</td>
<td>Anderson</td>
<td>UAH</td>
<td>Urban Transportation Planning</td>
</tr>
<tr>
<td>FA 06</td>
<td>Sisiopiku</td>
<td>UAB</td>
<td>Intelligent Transportation Systems</td>
</tr>
<tr>
<td>SP 07</td>
<td>Sisiopiku</td>
<td>UAB</td>
<td>Non-Motorized Transp. Design &amp; Planning</td>
</tr>
<tr>
<td>FA 07</td>
<td>Sisiopiku</td>
<td>UAB</td>
<td>Traffic Flow Theory</td>
</tr>
<tr>
<td>FA 07</td>
<td>Anderson</td>
<td>UAH</td>
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<tr>
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<td>Lindly</td>
<td>UA</td>
<td>Pavement Rehabilitation</td>
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<tr>
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<td>FA 08</td>
<td>Sisiopiku</td>
<td>UAB</td>
<td>Intelligent Transportation Systems</td>
</tr>
<tr>
<td>SP 09</td>
<td>Turner</td>
<td>UA</td>
<td>Geometric Design of Roadways</td>
</tr>
<tr>
<td>SP 09</td>
<td>Anderson</td>
<td>UAH</td>
<td>Traffic Engineering Operations &amp; Design</td>
</tr>
<tr>
<td>SP 09</td>
<td>Sisiopiku</td>
<td>UAB</td>
<td>Non-Motorized Transp. Design &amp; Planning</td>
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<td>FA 09</td>
<td>Lindly</td>
<td>UA</td>
<td>Pavement Design &amp; Construction</td>
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<td>SP10</td>
<td>Anderson</td>
<td>UAH</td>
<td>Simulation Modeling</td>
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<tr>
<td>SP10</td>
<td>Jones</td>
<td>UA</td>
<td>Signal Timing</td>
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<tr>
<td>SP10</td>
<td>Lou</td>
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<td>Intelligent Transportation Systems</td>
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EXHIBIT A: Performance Indicators for University Transportation Centers

The following Performance Indicators will be reported to RITA as part of the reporting requirements that all UTCs must perform. Where Baseline Measures are cited, they come from UTCA’s Title III Center Strategic Plan accepted by RITA on February 15, 2007.

Research Selection

1. Number of transportation research projects selected for funding using your UTC grant funding (Federal and/or match).  8

   1a. Number of those projects that you consider to be: basic research 0, advanced research 2, and applied research 6. Projects may be included in more than one category if applicable.

2. Total budgeted costs for the projects reported in #1 above. $541,241.00

Research Performance

3. Number of reports issued that resulted from transportation research projects funded by the UTC grant. 15

4. Number of transportation research papers presented at academic/professional meetings that resulted from projects funded by the UTC grant. 28

Education

5. Cumulative number of transportation-related courses that have been added since the beginning of the grant to the number of courses you reported in Baseline Measure 1 in your UTC Strategic Plan. Include courses added to the university course catalog whether or not they were conducted during a particular grant year.

   Undergraduate: 1   Graduate: 2

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

   Undergraduate: 26   Graduate: 40

Human Resources

7. Cumulative number of transportation-related advanced degree programs that have been added since the beginning of the grant to the number of degree programs you reported in Baseline Measure 3 in your UTC Strategic Plan.

   Undergraduate: 0   Graduate: 0

8. Number of students enrolled in transportation-related advanced degree programs (the baseline programs and any added since the beginning of the grant).

   Master’s Level: 21   Doctoral Level: 15

9. Number of students who received degrees through the baseline and any added transportation-related advanced degree programs.

   Master’s Level: 2   Doctoral Level: 3

Technology Transfer

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

    4

11. Number of transportation professionals participating in those events.

    380