OHIO TRANSPORTATION CONSORTIUM NEWS

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New Research Projects Awarded

Inside this issue:

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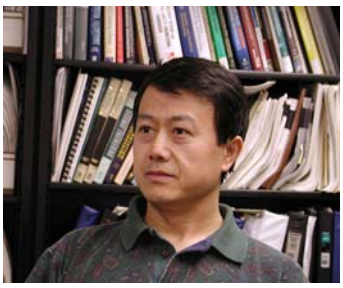
A second round of proposals has been reviewed and the OTC is pleased to announce that five new research proposals have been selected for funding for the upcoming year. The wide range of knowledge and expertise among OTC partnering universities and their researchers allow for a variety of research topics ranging from improving transportation efficiency to increasing safety for drivers. Seven of the eight consortium member schools will be involved in the five projects thereby enhancing cooperation among OTC partnering schools while allowing each member to draw on the strengths of his or her university. The following includes a brief explanation of each funded project.

Determination of Traffic Control Device Selection for Nighttime Maintenance of Traffic

PI: Dr. Deborah McAvoy, Ohio University

In order to guide motorists through work zones in a safe, efficient and smooth manner, various traffic control devices are used including temporary warning signs,

Projects *continued on page 6*



A Message from the Director

The OTC continues its commitment to supporting the participating universities to engage in research, teaching, and outreaching activities in transportation. In the most recent round of project solicitation, the Center selected tofund research and education initiatives in data systems, safety, pavement, traffic impact, and students training. OTC researchers and student continued to be featured this year in presentations and publications in TRB and other international, regional, and local transportation conferences. A call for student paper competition at both undergraduate and graduate levels has also recently been initiated.

The government's economic stimulus package will provide direct and immediate assistance to the transportation and infrastructure improvement in Ohio. We will continue to work with the regional and local transportation agencies to solve practical problems in our transportation systems, and participate in workforce development for the next generation of transportation engineers and researchers.

Dr. Ping Yi

Identifying and Modeling Dynamic Features of Dilemma Zones Using Trajectory Data

By: Dr. Heng Wei, Assistant Professor and Zhixia Li, Graduate Student
Civil & Environmental Engineering, University of Cincinnati

Under the leadership of Dr. Heng Wei, University of Cincinnati has successfully completed a research project titled "Characterize Dynamic Dilemma Zone and Minimize its Effect at Signalized Intersections," which was funded by the Ohio Transportation Consortium. This project proposed a new approach for modelling the locations and lengths of dilemma zones using video-capture techniques and vehicle trajectory data. Key concepts such as dilemma zone (or conventionally Type I dilemma zone, or "risk zone"), option zone (or conventional Type II dilemma zone), and indecision zone are clarified through analysis of yellow-onset vehicular trajectory data along with in-depth literature review. The intersection of OH-4 and Seward Rd in the Greater Cincinnati area of Ohio was selected as the study site where the speed limit is 50 mph on the OH-4 (Dixie Highway) approaches. There is an intersection closely located in the upstream of eastbound traffic, where progression is set up between these two intersections. In order to guarantee the full coverage of the risk zone and option zone, two camcorders were placed along the right side of the eastbound approach of OH-4 at the distances of 300 and 500 ft from stop line, respectively. They were synchronized before videotaping and a 6.5-hour period of traffic operation was videotaped at this location.

Conventionally, the location of the dilemma zone is expressed as a function of critical (or minimum) safe brake stopping distance $\mathbf{X_c}$ and maximum safe yellow passing distance $\mathbf{X_0}$. Two scenarios are refereed to the dilemma zone: Type I dilemma zone (or risk zone) as $X_c > X_0$, and Type II dilemma zone (or option zone) as $X_c < X_0$. However, vehicles within the risk zone are quite difficult to be observed or identified in real-world observations. We can only use the observed locations of vehicles at the onset of yellow indications, which actually stopped before and/or passed the stop line during the yellow period, to statically analyze possible distribution of X_c and X_0, and calculate the length of the option zone with values of X_c and X_0. When a vehicle locates within the option zone at the onset of the yellow indication, the driver is facing two choices: either passing the intersection or slowing down and stopping before the stop line during the yellow time. Unlike Type I dilemma zone, vehicles falling into the option zone are observable with observed trajectory data. To better clarify those theoretical concepts and their associated observable data, a hierarchy of contributing factors analysis for dilemma zone modeling is developed as shown by Figure 1.

One critically important result is the dilemma zone look-up charts that are developed based on the calibrated dilemma zone models. Figure 2 shows an example of such a look-up chart, which provides a visual tool to identify locations and lengths of dilemma zones at any speed interval and yellow duration conditions. It tells you whether risk zone (Type I dilemma zone) or option zone (Type II dilemma zone) exists, and what are the location and length of dilemma zone, at a specific speed interval and duration of yellow light. In Figure 2, it is not hard to identify that when the yellow duration is set as 4 seconds, the risk zone is almost eliminated for higher speed inputs and the absolute value $|X_c - X_0|$ is meanwhile minimized.

The research team is thankful to Dr. Ping Yi at University of Akron and Ms. Angela Brodie, Program Assistant at OTC for their strong support to the project. Gratitude goes to Ph.D. students, Mr. Zhixia Li and Mr. Qingyi Ai, and M.S. students, Mr. Vijay Krishna Nemalapuri and Mr. Sudhir Reddy Itekyala for their strongly effective assistance in the field data collection.

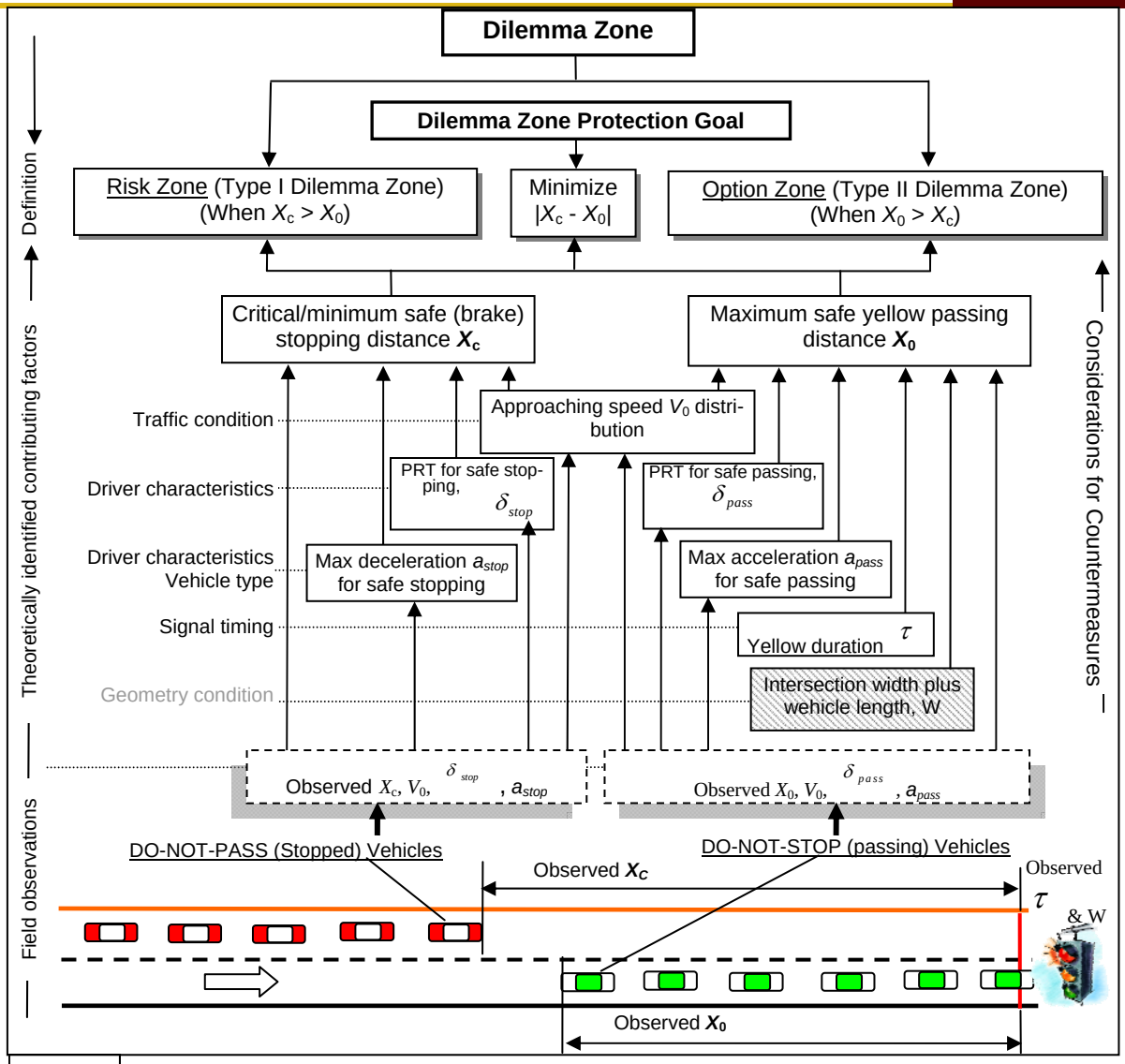


Figure 1

In particular, Mr. Zhixia Li took the lead in data collection and analysis and participated in drafting the report. Finally, the research team also expresses our appreciations to Ms. Brenda Slaughter, Senior Grant Administrator at UC Sponsored Research Services and Mr. Tom Davis, Senior Grant Administrator at UC Department of Civil and Environmental Engineering for their strong administrative support. This research could not be successfully completed without all the active participations, critical contributions, and strong support..

To view the final report for this project, go to http://www.otc.uakron.edu/research.php.

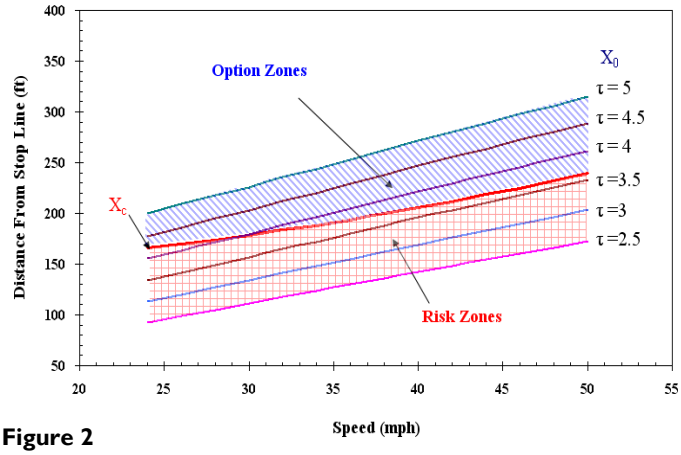


Figure 2

Research Internships in Transportation at Case Western Reserve University

By: Aaron A. Jennings, Ph.D., P.E.
Department of Civil Engineering, Case Western Reserve University

The Research Internships in Transportation (RIT) program at Case Western Reserve University was modeled after the National Science Foundation Research Experience for Undergraduates (REU) program, which has been used successfully to recruit students into the Department's programs in Environmental and Geotechnical engineering. Ultimately, the RIT program will lead to an increase in the number of engineers pursuing advanced degrees in Transportation Engineering in the State of Ohio, and to a series of research proposals designed to help CWRU partner with other Ohio universities and professional organizations to conduct innovative transportation research. This project was successful in recruiting four undergraduate students into the program, including two minority students underrepresented in science and engineering. This group of students worked as a team on three research projects:

- Analysis of Urban Pavement Battery Litter at Case Study Location
- Initial Assessment of Yard Waste Carbonization Processes
- Identification of International Soil Contamination Standards

Each student was asked to take a leadership role for one aspect of one of the projects, but, wherever possible, team efforts were used to accomplish essential tasks.

Analysis of Urban Pavement Battery Litter at Case Study Location

The analysis of battery litter on urban pavements is an ongoing research effort at CWRU. Battery litter is a major source of urban stormwater contamination and the problem originates from batteries littered on the pavements of our transportation infrastructure. Research on this subject has been ongoing at CWRU since 2001. In the summer of 2008, students assisted by conducting monthly litter surveys at case study locations in the greater Cleveland area. The students also characterized all of the littered batteries recovered in these surveys and prepared data summaries for entry into a database on battery litter. The efforts of summer 2008 yielded a total of 626 littered batteries which increased the database size to data on over 7,000 littered batteries.

Surveys were conducted monthly at each case study location using the procedures described in Jennings and Clark (2002). All littered batteries were identified using the battery identification guide of Jennings and Kiedrowski (2008). The physical and chemical conditions of all collected batteries were also quantified using the classifications schemes described by Kiedrowski (2003). The cell types were identified using the "type" classifications of Krouse (2006). All of this information was reported in the form of a site survey report and entered into the CWRU battery litter database.

Initial Assessment of Yard Waste Carbonization Processes

Urban yard waste poses solid waste management difficulties for many communities. In many areas, municipal solid waste is disposed of in sanitary landfills. However, yard waste may not be landfilled. Communities must collect and dispose of this separately. With the increasing cost of fuel, separate yard waste collection is an increasing financial burden on these communities. Furthermore, there are few waste management alternatives for yard waste. Most communities compost the waste but this is not an ideal solution:

i. Composting takes time, energy, and a signifi-

cant amount of land.

ii. Yard waste compost is not in demand as a consumer product.

iii. Composting yard waste releases all of the CO_2 potential of this organic waste fraction.

A project was initiated at CWRU to evaluate a different method of managing yard waste. This project evaluated the potential of managing yard waste by carbonization. This offers the possibility of allowing for co-collection, yard waste management at landfill sites, production of soil amendment products that permanently sequester CO_2, and production of other valuable byproducts including the possibility of recovering bitumen that could be used to manufacture non-petroleum-based bioasphalt.

Students participated in four phases of the project (i) a laboratory-scale apparatus was developed for proof-of-concept testing of the carbonization process (ii), a series of yard waste components were collected and carbonized to determine their carbon and byproduct yield potential , (iii) a pilot-scale apparatus was developed that is capable of carbonizing yard waste in large volume, and (iv) plant growth experiments were conducted to determine the degree to which charcoal made from urban yard waste can serve as a soil amendment.

Students Paul Manglona & Maurice Gayle Preparing Charcoal-Amended Soils

Identification of International Soil Contamination Standards

The analysis of U.S. and worldwide soil contamination standards is also an ongoing effort at CWRU. Dr. Jennings is a well-published authority on this subject. Previous efforts (see Jennings and Hanna, 2008, Jennings 2008) led to the assembly of a database titled **S^3RGV** (State Surface Soil Regulatory Guidance Values) that contains data on soil contamination of all 50 U.S. states, and to **IS^2RGV**(International Surface Soil Regulatory Guidance Values). These are supporting some very interesting analysis of how our soil contamination efforts are emerging in the U.S. and worldwide. However, it is much easier to identify U.S. regulations because of familiarity with state regulatory structures and our common use of English. It is reasonably easy to identify similar regulations in Canada and European countries, but it becomes substantially more difficult to do so elsewhere in the world.

The students were asked to assist in this process by conducting internet searches for surface soil regulations in countries anywhere in the world that had not been previously identified. The students identified soil standards for 16 nations that had not been previously identified.

Although this task did not relate directly to Transportation Engineering, it allowed the students to participate on a fundamentally different aspect of engineering research, to improve their professional communication skills, and to help generate enthusiasm for more advanced studies. It also provided data that will be valuable to future research efforts at CWRU. Any publication that makes use of this data will acknowledge the students' participation and the OTC funding source.

For a complete report on this research project, including references, go to http://www.otc.uakron.edu/education.php

Projects *continued from page 1*

pavement markings, and channelizing devices such as drums, cones, markers and barricades. In most work zones, numerous drums with alternating orange and white retro-reflective strips are used as traffic control devices to channelize traffic through the work zone. The retro-reflective strips make them highly visible, even during the nighttime. Currently there are three types of retro-reflective strips utilized on these drums: engineer-grade, high-intensity sheeting and diamond-grade sheeting. A new full cube diamond-grade sheeting (DG 3) has been introduced that can reflect 60 percent more light back to vehicles than the traditional diamond-grade sheeting at nearly five times the cost of engineer-grade sheeting.

There have been concerns voiced by transportation engineers as well as local agencies that the retro-reflectivity of the diamond-grade sheeting may reflect too much light from vehicles' headlights back to drivers, potentially causing glare and limiting the ability of drivers to continue safely along their travel path. Dr. Deborah McAvoy of the Department of Civil Engineering at Ohio University will lead a project to evaluate the effectiveness of drums with high-intensity sheeting as compared to drums with D3O diamond-grade sheeting in work zones with regard to delineation and safety. An economic analysis will be completed comparing the cost effectiveness of both types of sheeting in work zones for various types of highway work zone situations and weather conditions.

On-Road Mobile Source Pollutant Emissions: Identifying Hotspots and Ranking Roads

PI: Dr. Ramanitharan Kandiah, Central State University

A considerable amount of pollution to the air in the forms of Hydrocarbons, Carbon Monoxide, nitrogen oxides, particulate matter and air toxics comes from on-road mobile sources. Estimation of the emissions of these pollutants and quantification of the pollutants released are the most important initial steps in the process of controlling the air pollution. Dr. Ramanitharan Kandiah of Central State University will conduct a study proposing a methodology (1) to account the On-Road Mobile Source Air Pollutant (ORMSAP) emission, (2) to identify and delineate ORMSAP hotspots, (3) to rank the roads based on the presence of ORMSAP, and (4) to estimate the portion that ORMSAP contribute to the total air quality. This methodology will be applied to a case study in the Miami Valley Region of Ohio to the historic air quality and ORMSAP data available in the literature and to the data that will be collected by the researchers during the project. The objective is to develop a methodology for identifying similar ORMSAP clusters and pollutant hotspots in a transportation network using a combination of deterministic and data driven mathematical models.

Linking Sustainable Transportation in a University Community

PI: Dr. Dave Kaplan, Kent State University

Within the past several years, there has been a growing realization that economic, public health, and environmental concerns must be addressed in a sustainable fashion if communities are to grow and succeed. Sustainable transportation seeks to enhance mobility in support of economic development, while at the same time promoting a healthier environment, a healthier community and healthier behaviors. Dr. Dave Kaplan of Kent State University plans to continue his research in the area of sustainable transportation at Kent State University and the City of Kent with a project that will look at the factors that can facilitate the development of sustainable transportation networks in and around campus communities. Existing infrastructure and community attitudes will be explored to determine potential actions to increase the share of people who undertake trips by foot, bicycle or bus. An increased understanding of the barriers to nonautomotive transportation will also be determined. This research will potentially lead to suggestions of how to

better facilitate sustainable transportation. Improvements in this area should aid in the overall economic development of Kent and its connection to the university.

Developing an Economical and Reliable Test for Measuring the Resilient Modulus and Poisson's Ratio of Subgrade

PI: Dr. Xiangwu (David) Zeng, Case Western Reserve University

The resilient modulus and Poisson's ratio of base and sublayers are important parameters in the design and construction quality control of highway pavements. There is an urgent need to develop an economical and reliable test that can measure the resilient modulus and Poisson's ratio of compacted soils in the foundation of pavements. As a result, a new laboratory testing technique has been developed in the geotechnical laboratory of Case Western Reserve University (CWRU) to measure these characteristics using piezoelectric sensors. The technique has been proven to produce reliable results. Dr. Xiangwu (David) Zeng of CWRU will lead a project that will develop and verify a low cost test based on this technique lending the way for private commercial production of the testing units. This could have a significant economic impact on the costs of determining resilient modulus and improving design of highway pavements.

Optimal Loop Placement and Models for Length-based Vehicle Classification and Stop-and-go Traffic

PI: Dr. Heng Wei, University of Cincinnati

Co-PI: Dr. Deogratias Eustace, University of Dayton

Collaborator: Dr. Ping Yi, The University of Akron

Loops are increasingly used specifically for vehicle length-based classification at Ohio Department of Transportation (ODOT) traffic data collection sites. These sensors provide, with some degree of precision, traffic volume, average traffic volumes, and speeds within fixed time periods and at specific locations in the network. ODOT currently utilizes a number of in-pavement sensors to collect traffic data. Most traffic counters rely on constant velocity to determine speeds and correctly classify vehicles. The capability of measuring vehicle lengths makes dual-loop detectors a potential real-time data source for enhancing travel demand and freight studies. Accurate data from traffic detectors plays a key role in decision-making and control actions. To increase accuracy of vehicle volume and length-based vehicle classification, methods and stands for loop detectors need to be evaluated to provide a basis for developing applicable models and strategies for the distinct travel behaviors and environments of Ohio highways. Upgraded software VEVID (**Ve**hicle **Vi**deo-Capture **D**ata Collector), developed by Dr. Heng Wei, will allow efficient collection of more accurate trajectory data over time intervals in dilemma zones. The proposed project, led by PI Dr. Heng Wei, University of Cincinnati; Co-PI Dr. Deogratias Eustace, University of Dayton; and Collaborator Dr. Ping Yi, The University of Akron, has two goals. The first is to construct loop models for length-based vehicle classification under stop-and-go conditions. The second is to develop standards for optimal loop installations and locations for reliable traffic measurements from loops. The results of this study can be used by ODOT as reference to provide a basis for updating guidelines on the design, layout, and deployment of dual loops and other ITS sensors over a network, as well as for determining priority locations towards optimal traffic information coverage of roadway networks.

Look for updates on all of these projects in the Fall issue of *OTC News.*

Goodyear Riverwalk Project: A Cooperative Effort

The Goodyear Riverwalk Project is a topic that peaks the interest of anyone living in or near the city of Akron. On December 11, 2008, approximately one hundred area Civil Engineers and other interested guests gathered for the OTC co-sponsored ASCE meeting to listen to Bradford Beckert, Senior Project Manager for the City of Akron, discuss the project in some detail. This ambitious project has been acclaimed as the largest single development in the City of Akron totaling $900 million in combined private and public funds.

The project, estimated to take eight to ten years to complete, will result in a new 554,000 square foot Goodyear Global and North American Headquarters building with a courtyard, atrium, parking and additional green space as well as an industrial park and retail and residential space. The new facility will be linked to the existing World Technical Center which will also undergo renovations. These offices will replace the existing 100-plus-year-old Goodyear buildings on East Market Street which will be renovated for other uses as part of this project. The new modern-looking Headquarters will create a campus environment aimed at attracting and retaining young talent while affording Goodyear the opportunity to leverage their assets into a new Global and North American Headquarters.

As Mr. Beckert explained, a project of this size requires considerable cooperation from individuals within both the public and private sectors. Team players from the city, county and state levels have been working with individuals from Goodyear, IRG, and consulting and law firms to bring this project to fruition. A key player is developer Stuart Lichter of Industrial Realty Group (IRG). Mr. Lichter, has garnered much attention in Ohio for his recent acquisition of the Hoover Company's North Canton campus, along with Cleveland's former Ryerson Inc. plant and the defunct Ford Motor Company plant in

Left: Preliminary concept plan for the project.

Opposite page left: Pictured L-R are ASCE Akron-Canton Section President Mike Cook, City of Akron Senior Project Manager Bradford Beckert, OTC Program Assistant Angela Brodie

Opposite page right: Mr. Beckert addresses the audience

Lorain, just to name a few. His success in redeveloping local properties such as BF Goodrich and Lockhead Martin has many people excited about his role in this project

IRG has pledged $700 million towards the project and the remaining $200 million will come from public funds. Many of these public funds have been raised through grants such as 629 Road Development, funds from the Ohio Public Works Commission (OPWC), Community Foundation donations, Summit County Port Authority sales tax savings and parking and revenue bonds, along with others. Mr. Beckert stated that the City was fortunate to receive OPWC and Ohio Department of Transportation funds to cover some of the infrastructure restructuring costs. The project has approximately $45 million budgeted for roads, bridges and utilities involving plans to construct a large roundabout and to rebuild several streets near the new Headquarters.

The Goodyear Riverwalk Project will satisfy some of the City of Akron's needs such as increasing the tax base through job creation and retention, redeveloping neighborhoods, utilizing land through brownfields remediation and redevelopment, and providing a safe landing for existing industrial and commercial businesses. Many in attendance expressed their appreciation towards the City of Akron for its role in promoting this project. Securing the Goodyear World Headquarters in Akron preserves a long-standing relationship between the City and The Goodyear Tire & Rubber Co., founded by Frank Seiberling in 1898.

OTC Hosts RITA Site Visit

The OTC received their first official RITA visit when Robin Kline and Amy Stearns travelled to The University of Akron campus to learn more about the OTC and meet some key individuals. Ms. Kline and Ms. Stearns are both University Programs Specialists with the Office of Research, Development and Technology at the U.S. Department of Transportation Research and Innovative Technology Administration (RITA). The visit on November 17, 2008 was the first opportunity for the two of them to see the wide range of programs, services, and equipment available to students and to interact with Dr. Yi, OTC Director, key university officials, and individuals representing area businesses and organizations with which the OTC collaborates.

After a quick tour of the OTC office, the group travelled to The University of Akron's Student Union where Kenneth Preston, Associate Vice President of Research/Director of Technology Transfer and Wayne Watkins, Associate Vice President of Research, provided details on research funding including the proper channels that all subcontract funding must follow as well as The University of Akron's role in promoting OTC research funding.

Ted Curtis, Vice President of Capital Planning and Facilities Management discussed the many completed and recently proposed projects to improve the campus emphasizing the advantages these projects bring to the students and how they help the university attract and retain high quality students. Some of these projects, such as the currently in-progress Infocision football stadium, not only attract students but allow real-life study of engineering practices. Currently, Dr. Yi is using data from the stadium project in his Senior Design Class (capstone). Mr. Curtis also discussed the student titanium bridge competition that The University of Akron plans to host. The competition would address the possibility of a titanium bridge linking the newly acquired Quaker Square silos, which currently serve as both student housing and hotel accommodations for overnight visitors to the university, to the main university campus. This competition would combine civil engineering skills with unique materials knowledge, promoting increased understanding of the potential use of titanium in a variety of civil structures. The idea for this bridge competition stemmed from the titanium conference that the OTC sponsored last spring.

Dean George Haritos of the College of Engineering discussed the quality of professors within the college of engineering as well as the many engineering programs offered at The University of Akron. He noted the fact that the university has several full-time professors in transportation teaching and research in traffic control and operations and pavement and foundation testing for civil structures. Dean Haritos also commented on the growing popularity of the engineering programs at the university, acknowledging that the college has grown nearly forty percent in the last four years.

In an effort to demonstrate the unique

partnerships that the OTC has with local transportation organizations and companies, Dave Gasper, Chief Engineer of the City of Akron, Kirt Conrad, Director of Planning and Development at Akron Metro RTA, Eric Smith, Vice President and Operations Manager for URS and Monique Evans, Administrator of Research and Development at Ohio Department of Transportation (ODOT), each shared details regarding their collaborations with the OTC. Mr. Gasper highlighted the working relationship he has with Dr. Yi and his graduate students. The students have been working on a turning movement research project and the City of Akron has been generous in allowing the students to use the city's equipment to facilitate the research. Mr. Gasper also served as a keynote speaker at the OTC co-sponsored ITE meeting last spring. Next, Mr. Conrad expressed a strong desire to collaborate with the OTC in future projects. He addressed some of the projects that Akron Metro RTA hopes to participate in with the OTC on alternative transportation energy. Mr. Smith gave the unique perspective of a student/teacher/corporate executive. Mr. Smith is a University of Akron graduate who at one time taught at the university and now employs several of its graduates. He noted the quality of the engineering program on campus and how the program, through both its courses and its commitment to the co-op program, prepares its graduates for the "real world". Finally, Ms. Evans addressed some of the projects that ODOT has sponsored or collaborated with OTC researchers in the past. She also addressed some of the potential future needs for ODOT and projects that might be important for them. This relationship between the OTC and ODOT opens the door for continued collaboration and increased opportunities for OTC researchers and graduates.

The highlight of the day came when the group was taken on a tour of the engineering labs on

campus. Dr. Wieslaw Binienda, Department Chair and Professor of Civil Engineering, led a tour through the Turbine Building on campus. He described the "hands-on" experiments that students and researchers take part in by utilizing equipment such as the Environmental Chamber, Laser Vibrometer, Laser Shearography, and the ARAMIS image correlation system with regular digital cameras and high speed cameras. Everyone was particularly interested in the six-inch in diameter 24-foot long gas gun (shown above) funded by NASA Glenn Research Center that will be used to test aged composite panels under high velocity impact. From the Turbine Building, Dr. Yi led everyone through a tour of the Transportation Lab (shown opposite page left) demonstrating equipment such as Data Acquisition Systems (video, laser, and spread spectrum radio), Signal Control Systems and GPS tracking equipment. He explained how this equipment helps transportation engineering students as both learning tools and research aids.

After completing the tours, Dr. Yi discussed the OTC's significant accomplishments to date including current and completed research projects, technology transfer activities, and Ohio UTC col-

RITA *continued on page 13*

2009 OTC Student Paper Competition

Submission deadline is May 15, 2009. Contest winners will be announced June 15, 2009

Two Separate Competitions: Undergraduate and Graduate
Each winner will receive the following: $300.00, a certificate, an abstract of their article in the OTC newsletter, and their paper published on the OTC website.
Multiple winners may be awarded in each competition.

Undergraduate Paper Guidelines:

1. The undergraduate student competition will be based on an essay that can involve either primary or secondary research. It can be a paper reporting on some research conducted by the student or a critical analysis of some transportation issue.
2. The essay should not exceed 4000 words (not including references, tables, and graphics).
3. Each essay must be related to some aspect of transportation: planning, system analysis and control, infrastructure, policy, etc.
4. Essays will be judged on strength of argument, scholarship, and quality of writing.
5. The work can be from a project done with others, including a faculty member or as part of a funded research opportunity, and the ideas can be discussed with others. However, writing should be that of the student.

Graduate Paper Guidelines

1. The graduate student competition will be a research article. Our preference is for a study that used primary data, although a synthesis of existing literature will be considered.
2. The article should not exceed 5000 words (not including references, tables, and graphics).
3. Each article must be related to some aspect of transportation: planning, system analysis and control, infrastructure, policy, etc.
4. Articles will be judged on strength of argument, analysis of empirical evidence, scholarship, and quality of writing.
5. The work can be from a project done with others, including a faculty member or as part of a funded research opportunity, and the ideas can be discussed with others. However, writing should be that of the student.

There is no limit on submissions from any one school.

Mail entries to:

Student Paper Competition
Ohio Transportation Consortium
The University of Akron
Akron, OH 44325-6106

OHIO TRANSPORTATION CONSORTIUM

Email entries to:

otc@uakron.edu
Please indicate *Student Paper Competition* in the subject line

RITA *continued from page 11*

laborations. He highlighted each OTC-funded research project giving credit to the principle investigators and their home universities. Of special note is the fact that all of the OTC partner universities, even those universities that do not have a transportation engineering program, were included in project funding for the 2007-2008 year because of their needs in transportation research and education. The OTC has made an effort to tie various disciplines together by encouraging research from all of the consortium partner schools which offers a unique perspective in OTC-funded research.

The day concluded with a quick tour of The University of Akron Student Union and Student Recreation Center providing Ms. Kline and Ms. Stearns with an overall picture of the resources available to the students. While the visit did not, unfortunately, allow for a tour of all of the consortium partner schools, Ms. Kline and Ms. Stearns were able to gain a better understanding of the vast abundance of services, expertise and equipment available through the OTC as well as the many collaborative efforts of our partners.

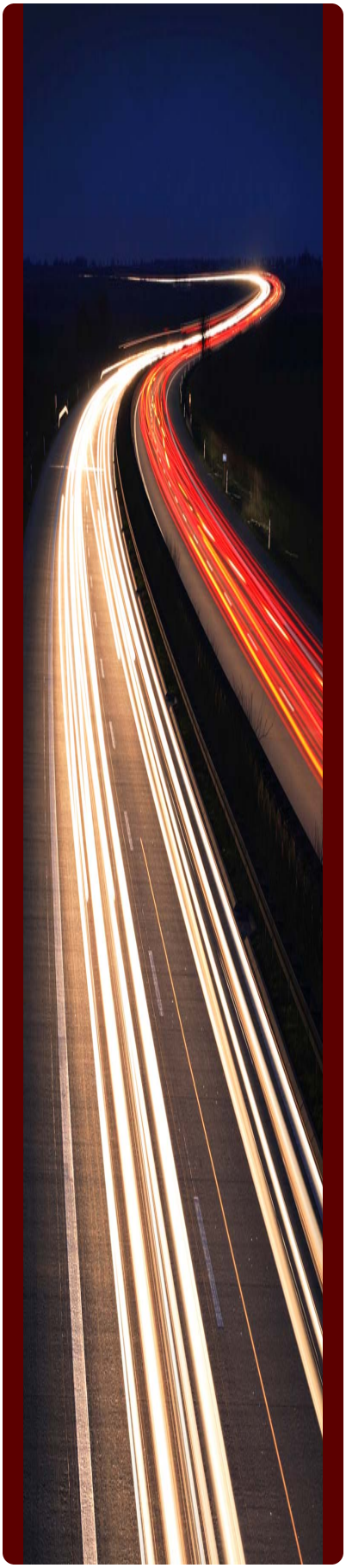
Scholarships

The Institute of Transportation Engineers (ITE) has $1,000. $3,000 and $4,000 scholarships available to graduate students in Transportation Engineering. For details or to apply, visit: http://www.ite.org/education/scholarships.asp

The American Society of Civil Engineers (ASCE) has several scholarships and fellowships available to both graduate and undergraduate engineering students. Visit their website for more information or to apply: http://www.asce.org/inside/stud_scholar.cfm

The National Society of Professional Engineers (NSPE) has scholarships available to graduate and undergraduate students. Applications are available at: http://www.nspe.org/scholarships/sc1-peg.asp

Each OTC member university has individual scholarships available to new and continuing students. If you would like more details regarding these scholarships including amounts, criteria and deadlines, visit the individual university websites. A link to OTC participating universities' websites can be found on the Board of Director's page of the OTC website at http://www.otc.uakron.edu/about-board.php



Upcoming Events

JUNE

June 3-7, 2009
ASHE National Conference
Atlanta, GA

June 14-17, 2009
26th International Bridge Conference
Pittsburgh, PA

JUNE/JULY

June 30-July 2, 2009
2009 CUTC Summer Meeting
University of Massachusetts
Transportation Center
Amherst, MA

AUGUST

August 9-12, 2009
ITE Annual Meeting and Exhibit
Henry B. Gonzalez Convention Center
San Antonio, TX

OCTOBER

October 27-28, 2009
Ohio Transportation Engineering
Conference (OTEC)
Columbus, OH

OTC Board of Directors