RESEARCH PROJECTS - FY 2009

The results of the fiscal year 2009 research selections are final. Proposals for six solicited projects were approved for funding by the Research Selection Committee. Two proposals for ODOT’s Partnered Research Exploration Program and four student studies were also selected. We would like to thank everyone who submitted ideas this year and we look forward to your continued interest in ODOT’s research program.

**Solicited Projects**

PS-09-02  Tracking of Indiana Bat Migration - This project was withdrawn by the Office of Environmental Services.

PS-09-03  Update Data and Procedures for Estimating Design Hour Volume - The Office of Technical Services will revise this RFP to be included in a future solicitation.

PS-09-04  Rapid Orthophoto Development System - The Ohio State University, Dr. Charles Toth

PS-09-05  Statistical Validation of Speeds and Travel Times Provided by a Data Service Provider - University of Akron, Dr. Bill Schneider

PS-09-06  Long-Term Validation of an Accelerated Polishing Test Procedure for HMA Pavements - University of Akron, Dr. Robert Liang

PS-09-07  GPS-Based Household Interview Survey for the Cincinnati, Ohio Region - Abt SRBI, Dr. Peter Stopher

PS-09-09  Resilient Modulus Predictive Models for Granular Base and Subgrade - This project was withdrawn by the Office of Pavement Engineering

PS-09-10  Develop a Traffic Counter Bench Tester with 8-Lane Testing Capacity - Athens Technical Specialists, Mr. Jeff McKnight

continued on page 2
Investigate Feasibility of Using Ground Penetrating Radar in QC/QA of Rubblization Projects

Inframe, Dr. Arudi Rajagopal

ODOT uses a variety of methods to maintain and repair the roadways. One method is called rubblizing and rolling (R&R). Basically, R&R is breaking up a concrete pavement into small pieces (which functions as a thick base layer) and then applying a layer of asphalt on top (which functions as the new road surface). This method has shown to be successful in extending the life of a road and delaying the more costly and timely process of replacement. In particular, R&R is used in Ohio to control reflection cracking in pavements.

When an R&R project begins, a test pit is typically dug to see if the concrete is being consistently broken into the appropriate size pieces. Once an engineer has confirmed the requirements are met, the project continues without any additional test pit checks. Instead, field personnel will look at patterns formed on the top layer of asphalt and assume that a similar pattern is present throughout the depth of the concrete. However, preliminary testing conducted by Dr. Arudi Rajagopal of Infrastructure Management and Engineering Inc., has shown that this visual observation is not always correct or reliable. While the surface may look as though desired rubblizing has occurred, lower levels may not necessarily be broken down to the correct size. This lack of proper breakage could be caused by a variety of things such as the presence of reinforcing steel within the concrete which prevents lower layers from easily breaking. Previous spot repairs in the pavement which resulted in newer, thicker, and stronger sections of concrete throughout the roadway could also affect the consistency of the breaking pattern.

Since an inconsistent breaking pattern results in decreased pavement performance and longevity, a reliable and cost-effective method to prevent this from occurring is needed. Test pits are expensive, time consuming, and destructive, but we will be investigating an alternative procedure. Dr. Rajagopal has proposed a project to investigate use of a ground penetrating radar (GPR) device to provide real-time quality control and assurance at a fraction of the cost and time of test pits. To conduct this 16-month study, Dr. Rajagopal will be partnering with Specialites Company, Valley Asphalt Corporation, Flexible Pavements of Ohio, and Kokosing Construction Company.
Optimum Loop Placement That Balances Operational Efficiency and Dilemma Zone Protection - University of Cincinnati, Dr. Heng Wei

Every driver has experienced the apprehension of approaching an intersection only to have the traffic signal “suddenly” change from green to yellow. Do you speed up and hope to make it through the intersection before the light turns red (and the camera takes your picture)? Or do you stomp on the brakes and hope that the car behind you doesn’t become your new bumper sticker. It isn’t the twilight zone that you have entered, it is the dilemma zone. A dilemma zone is the space in which a vehicle approaching an intersection during a yellow signal cannot make it safely through the intersection or stop comfortably before the light changes to red. Dilemma zones are dangerous places to be, but unfortunately are unavoidable. However, with the help of research, ODOT is working towards finding ways to improve dilemma zones and lessen the need for motorists to make the crucial decision of whether to “gun it” or “slam it”.

So, exactly what causes the traffic signal to change? At some intersections, sensors, known as loop detectors, are placed in the pavement at certain spots in front of the signal. As vehicles drive over top of the loop detector a message is sent to the signals’ control to keep the light green a little bit longer for the approaching vehicle. This gives vehicles the chance to drive safely through the intersection before the light changes. However, the light can’t stay green forever. There is a maximum amount of time that the change from green to yellow can be delayed. Once that time is met, the signal will automatically change whether or not a vehicle is driving over the loop detector. This is the realm of the dilemma zone has been entered. Travel through the dilemma zone is further complicated by a variety of factors such as the actual speed of vehicles versus the posted speed limit, driving conditions, behavior and attentiveness of drivers, and the design/layout of the intersection itself.

Just how is the placement of loop detectors determined? In Ohio, the placement is based on studies that were completed several years ago, but things change over time. Advances in vehicle technology and increases in the number of older drivers are just a couple of the items that have impacted our roadways. There is a need to reexamine the methods used to determine the placement of loop detectors to ensure they are operating at an optimum level and drivers are protected in dilemma zones to the greatest extent possible.

Dr. Heng Wei of the University of Cincinnati has proposed a project to investigate this concern. This research has two objectives: (1) identify the dynamic features of dilemma zones in Ohio; and (2) update the current loop placement tables as necessary. To conduct this 16-month study, Dr. Wei will be partnering with Dr. Ping Yi of the University of Akron.

Student Study Selections for Fiscal Year 2009

Evaluation of Geotextile Fabric in Undercut on MSE Wall Stability – Cleveland State University

Pavement Maintenance Practices for Asphalt Surfaced Roads – University of Akron

Develop a Method to Predict Pile Set-up for Soils in Ohio – Cleveland State University

Beneficial Utilization of Lime Sludge for Subgrade Stabilization: A Pilot Investigation – Case Western Reserve University
Wendi Snyder Joins R&D Staff

The Office of R&D has gained a new member. Wendi Snyder joined the team on April 28, 2008. Wendi comes to ODOT from the Ohio Board of Regents. During her three years at the Board, Wendi served in a variety of capacities including auditor, coordinator for the North West Ohio TANF Education Awards Program, and as an assistant to the Vice Chancellor of Operations in the Chief Legal Division. Prior to that, she was an admissions counselor at the Med Central College of Nursing in Mansfield, Ohio. Wendi has a Bachelors in Business Economics from The Ohio State University. She and her husband, Rich, have two children, Macie (3 years) and Eli (1 year), and reside in Marion.

Wendi’s duties in R&D will include (among many things) processing contracts and Requests for Proposals, general program monitoring, and office management. She can be reached at 614-644-8135 or Wendi.Snyder@dot.state.oh.us.

New Research Reports Available on the WWW

We’re getting a makeover! Our new SharePoint is now live but, it may take us a little while to get all of the information on our current website transferred to the new website. We hope to minimize the inconvenience as much as possible. These changes are all in an effort to improve the services we provide to the research community.

Please visit http://www.dot.state.oh.us/research/default.asp to get copies of the following project reports completed since the last newsletter as well as other ODOT projects completed since 2000.

Geotechnical
Topic 8 / State Job No. 134165: Landslide Hazard Rating Matrix and Database, University of Akron (December 2007)

Materials
Topic 17 / State Job No. 134221: Refine AASHTO T 283 (Resistance of Compacted Bituminous Mixture to Moisture Induced Damage) for Superpave, University of Akron (January 2008)
Topic 18 / State Job No. 134317: Verification of the Use of a Carbon Blocking Agent for Fly Ash in Concrete, University of Cincinnati (December 2007)

Pavements
Topic 49 / State Job No. 134148: Pavement Forecasting Models, University of Toledo (March 2008)

Safety
Topic 8 / State Job No. 134166: Crash Base Rates for Intersections in Ohio, University of Cincinnati (February 2007)

Traffic
Topic 19 / State Job No. 134257: Innovative Methods for Calculation of Freeway Travel Time Using Limited Data, University of Akron (September 2007)
Topic 20 / State Job No. 134218: Smart Sign Enhancement - Phase 2, University of Akron (September 2007)
R&D Focuses on Implementation and Technology Transfer

Research is a valuable tool for providing solutions to problems and increasing the overall knowledge base of an organization. However, without proper follow through to ensure findings are appropriately put into practice, the actual benefits of performing research may not be realized. The end result could be another one of those ubiquitous dust collectors suspected of occupying the shelves of numerous research programs.

With ODOT’s approach for developing and selecting research projects, it is obvious that a project exists to meet a specific need. That need can be anything from developing a new specification to designing and testing a barrier or evaluating a construction method. ODOT’s process for getting projects up and running is mature and efficient. But even though we address implementation throughout the entire process, this is an area that could use even more focus.

The Office of R&D is now putting an extra emphasis on the implementation of research results. True implementation can come in a variety of forms. It can range from the incorporation of a new standard into ODOT’s operations to a decision not to adopt a new process or product. Our overall goal is to ensure that every research project provides the Department with usable output. To accomplish this, there will be a push to capture the actual as well as tacit values of research at both the project and program levels. Establishing and tracking performance measures will be an integral part of this task. Encouraging and facilitating technology transfer activities is another area that will be highlighted by R&D.

These efforts are being lead by Vicky Fout. Feel free to contact Vicky to discuss our new direction. She can be reached by phone at 614-387-2710 or via email at Research@dot.state.oh.us.

New IT Restrictions at ODOT Impact Researchers

In order to ensure that data and documents are safe and secure, new technology restrictions are being implemented statewide. Laptops, desktops, servers, and external drives are being encrypted to help keep confidential information out of the hands of unauthorized individuals. With this more secure environment comes some limitations on system accessibility. All encrypted external disk drives will function as Read-Only devices. This includes USB hard drives, flash drives, digital cameras, and CDs/DVDs. While researchers will be able to access information on these devices from ODOT computers, they will not be able to edit, save, or copy information to them.

Certain types of attachments are common carriers of viruses which may not be detected by virus scanners. As a prosactive measure in the fight against email viruses, ODOT has also enacted the practice of blocking files in the following formats: .zip, .bat, .cmd, .com, .exe, .msi, .pif, and .scr. If you try to send an attachment that is formatted in any of these ways, the server will strip the attachment from the message. If you need to send information to an ODOT employee in one of these formats, please contact the individual in advance to determine the best method for providing the information. ODOT personnel should contact their local IT support staff with any questions.
Transportation Research Program Administration International Scan

In April 2008, ODOT’s Research Administrator, Monique Evans, was part of a team of eleven transportation research, asset, and policy management experts from the United States that visited Sweden, The Netherlands, Belgium (European Commission), France, Japan, and South Korea to examine transportation research program administration (TRPA) practices.

Their goal was to identify unique and successful international practices for administering research programs that could be applied in the U.S. to improve the overall effectiveness of public sector R&D programs and maximize the use of program resources. The team was optimistic that such practices would also help improve transportation research programs in academia, the private sector, and in other organizations.

The team discussed four basic themes with their hosts in each country. A few of the findings relative to each theme are noted below, but three common values stood out during discussions in every country:

1) Transportation research, quality of life, and a robust national economy are inseparable.
2) Sustainable growth and employment result from a balance between research, education and innovation.
3) Building leadership on a knowledge-based society is considered essential for long-term success.

These values seem to be the driving forces behind their programs, which were well-supported, highly-valued, strategic, comprehensive, collaborative and effective.

Theme 1: Setting the Research Agenda

- Strategic and policy driven agendas for transportation research are the norm.
- Agendas include comprehensive transportation research roadmaps.
- Transportation research agendas are aligned with a common vision and many topics are being addressed by cross ministerial R&D activities.

Theme 2: Partnership Models and Joint Research Activities

- Partnerships and joint research efforts are essential, ubiquitous, and actively promoted.
- Collaboration activities begin earlier than they generally do in the U.S
- Academic partners are integrally involved.

Theme 3: Conduct of Research: Performance, Quality, and Value

- Funding appears to be substantially greater than U.S. investments for comparable activities.
- Quantifying the benefits of research results is a continuing challenge.
- Transportation R&D is accepted as a valuable contribution for the national or societal good.

Theme 4: Delivery: Getting the Research Results into Widespread Practice

- Common intellectual property rights (IPR) practices facilitate the delivery of research results.
- Common international processes and procedures will encourage collaborations and technology transfer.
- There are many research forums for international sharing of research results that are not currently apparent to U.S. research managers.
Implementation Strategies

A critical aspect of the TRPA scan is determining how the outcomes of the visits will positively affect transportation research program administration in the U.S. The team identified the following six implementation strategies, which focus on research collaborations; coordinated, multi-modal transportation research agendas; missing links between knowledge creation and knowledge application; tools to foster information sharing; and program evaluation and improvement. Some of the recommended strategies can be addressed within the existing transportation research infrastructure. Others may require policy-level decisions or legislation to realize the desired outcomes and benefits. The findings and best practices identified during the scan will be disseminated throughout the U.S. via presentations, workshops, reports, articles, and web-based applications.

1. **Build international relationships and cooperation in transportation research to achieve global goals and leverage scarce resources.**

2. **Promote the development and implementation of a national, coordinated, multi-modal transportation research agenda.**

3. **Strengthen the innovation process by examining international research institutes and other models of collaboration to link knowledge creation and knowledge application.**

4. **Investigate the effects, application, and future potentials for intellectual property rights in the U.S. and abroad.**

5. **Integrate and enhance accessible Internet forums, portals, or other tools to coordinate information and knowledge resources at a global level.**

6. **Promote a systematic and consistent practice for program evaluation and improvement.**

The Transportation Research Program Administration (TRPA) Scan was conducted through the International Highway Technology Scanning Program, jointly sponsored by FHWA and AASHTO in cooperation with the Transportation Research Board’s National Cooperative Highway Research Program (NCHRP), the private sector, and academia. The full report is expected to be published by spring 2009. A detailed summary report is available on the following website: http://international.fhwa.dot.gov/pubs/trpm/01.cfm.

TRPA Scan Team
Many state departments of transportation (DOTs) face situations where reams of valuable geotechnical data used for design, construction, and maintenance – much of which does not change over time – are rendered inaccessible because the agencies lack the means to store and disseminate the information electronically. In general, much of the data obtained in the last decade was not placed in permanent storage and eventually was discarded. Thus, when a state DOT wants to initiate a new project at a location where geotechnical data was previously collected, the agency must undertake a difficult and timely search of archived data or gather the information again. In addition, the data management systems that many transportation agencies currently use are incomplete and not standardized from agency to agency. Currently, the Ohio DOT (ODOT) maintains nearly $700 million dollars worth of geotechnical information dating back to the 1920's.

In 2003, ODOT initiated a study to develop a generic framework for a web-enabled geotechnical data management system to provide a one-stop access portal for all available geotechnical data. The system can be used to store, retrieve, and manipulate data; store, retrieve, or otherwise access geologic information; provide a means to efficiently and proactively manage geotechnical assets and geologic hazards; store and manage project data and test data; function as a tool to share information among interested entities; and accommodate modifications to meet local needs. When complete, the system will consist of a central hub that will link participating geotechnical databases. To facilitate this effort, a pooled-fund research project was developed in 2004 to establish a standard schema and data dictionary for the electronic exchange of information. To develop this system, the participating organizations will adopt standardized software protocols and terminology, and the data will meet an international standard for data interchange amongst geoenvironmental and geotechnical specialists.

The Federal Highway Administration (FHWA) and ODOT took the lead in assembling the basic structure of this study. The work is being accomplished through the collaborative efforts of a special interest group consisting of the University of Florida’s Department of Civil Engineering (UF), Association of Geotechnical and Geoenvironmental Specialists in the United Kingdom (AGS), Consortium of Organizations for Strong-Motion Observation Systems (COSMOS), and other selected specialists. Oversight of development by the special interest group is provided by the Geotechnical Data Coalition (GDC) with representation from UF, AGS, COSMOS, Construction Industry Research and Information Association (CIRIA), FHWA and ODOT. The Geotechnical Management System Group (GMS Group) composed of representatives from 12 state DOTs, FHWA, US Environmental Protection Agency, US Army Corps of Engineers, and the US Geological Survey has been formed to govern the development of the standards for geotechnical data and to provide all final decisions. This highly collaborative effort was made possible through a pooled fund study project led by the Ohio Department of Transportation.

The GMS group directed the development of the data structure and data dictionary for borehole and laboratory data. Because of their effort and the cooperation of private, state and federal agencies in the United States and Europe, a draft standard for geotechnical Data Interchange for Geotechnical and Geoenvironmental Specialists (DIGGS) has been established. The work generated, to date, includes: a data dictionary, data structure or schema, usage guide, business case example, validation software, and a web site: [http://www.diggsml.org/](http://www.diggsml.org/). The vast majority of this work has been volunteered or donated by technical specialists from academia, industry, and government (US and Europe).
At one of the early meetings, the GMS group identified the need to partition the work into priority areas for the development of the data exchange standards. Of highest priority, the standards for borehole and laboratory data (the original SIG) were needed. Next, the geoenvironmental standards (the second SIG) would be initiated. Additional areas of development included, but were not limited to: (1) two and three-dimensional data, (2) geophysical data, (3) electronic documents, (4) geologic hazard inventories and risk assessments (i.e. landslides, rockfalls, mine voids), (5) geotechnical asset management (i.e., retaining walls, drilled shafts), (6) instrumentation and monitoring, and (7) other testing.

This study is expected to produce tremendous benefits. It will enable efficient, compatible, and understandable information sharing among agencies. The centralized system will allow for quick retrieval of past data, improved storage of new data, increased data sharing, and reductions in error due to the direct transfer of data. This will result in significant cost savings to the department as data searches for archived information will not be time consuming and the need for field and laboratory technicians to duplicate past data collection and testing is eliminated. It will capitalize on the synergistic benefits of collaborative development as compared to individual development of multiple independent systems. Software makers will be able to develop programs that fit within the framework and are compatible nationwide and internationally thereby reducing costs to users and increasing interchangeability among programs. Finally, in addition to transportation agencies, other potential users that can benefit from this system include natural resource and environmental agencies, consultants, and academics.

The principal investigator for this pooled fund study, TPF-5(111), is Dr. Marc Hoit of the University of Florida. For more information on this project, visit the DIGGS website at http://www.diggsml.org or contact Kirk Beach of ODOT’s Office of Geotechnical Engineering at Kirk.Beach@dot.state.oh.us or Thomas Lefchik of FHWA at Thomas.Lefchik@fhwa.dot.gov.

**ODOT R&D Issues Call for Student Study Problem Statements**

To better accommodate the academic calendar and encourage involvement in this program, ODOT’s Office of R&D has moved the solicitation of Student Study Problem Statements to September. Please note the criteria for selecting student studies has also changed.

For complete information on the above solicitation please visit the Announcements page of our website: www.dot.state.oh.us/Divisions/Planning/Research/announcements/Pages/FY2010CallforStudentStudyProblemStatements.aspx

To be considered for a student study, submit a problem statement to the Office of R&D by 4:30 PM (EST) on October 8, 2008. **Absolutely no extensions will be granted to this deadline.**

Announcement of student studies selected for funding will be made by March 2009. Successful problem statements will be developed into proposals. Start dates for these projects will be subject to availability of funding and approval by the Federal Highway Administration. Student studies are administered in the same manner as standard research projects and are subject to the RD&T² Manual of Procedures. Time extensions may be granted, under special conditions, but no funding extensions will be approved. The standard ODOT educational organizational contracts will be used with modifications that address issues specific to these studies, such as the number of copies of the final report. If you have any questions about student studies or the problem statement requirements, please contact the Office of R&D at 614-644-8135 or via email at research@dot.state.oh.us.
When Personnel on Research Projects Change

In today’s society, people join and leave employers as frequently as traffic moves on the highways. Research teams conducting projects for ODOT are not immune to the job-shift trend. When personnel changes are going to occur on an ODOT research project, it is necessary for the research agency to contact ODOT’s Office of R&D (R&D) as soon as possible to make sure the programmatic requirements are satisfied. Approval must be obtained from R&D to make modifications to the research team. This includes, but is not limited to: adding additional technicians, students, and Co-Principal Investigators; replacing personnel due to departure from the organization or changes in position/duties within the contracting agency; adding or changing subcontractors, and transferring the duties of the Principal Investigator to another team member.

To modify the make-up of the research team, the Principal Investigator should submit a written request to R&D. Before submitting the request, the Principal Investigator should do a thorough review of the project’s budget and timeline to determine whether or not this personnel change impacts the ability to complete the project within the remaining budget and schedule. At a minimum, the request should include the following items: name of the project, the state job number, names and titles of all pertinent personnel, an explanation for the requested change, and a copy of a 2-page resume for all personnel not previously provided with the proposal.

If additional funds are also needed, the Principal Investigator should be sure to include the amount of additional funds being requested, the purpose these funds will be used for (e.g.: salary and wages, supplies, travel, equipment, etc.); and justification for the need of the additional funds. Appropriate supporting documentation (e.g.: quotes for equipment, budget for subcontractor, etc.) and a breakdown of expenses (e.g.: details for travel costs, supplies, etc.) must also be provided. If multiple budget categories will be impacted, a budget form should be completed and submitted with the request. The budget form should include only the additional funds being requested; do not include remaining balances of approved project funds on the budget form.

If additional time is needed, the Principal Investigator should be sure to include the current contractual completion date, amount of additional time requested (in months), requested new completion date, an explanation of the delay, and a revised project schedule.

Upon receipt of the request, R&D will evaluate the request with input from the Technical Liaisons. Modifications will be considered, if adequately supported, to allow the project to be satisfactorily completed by competent personnel and within a reasonable budget and timeframe. Approval of requests will be based on the justification provided. R&D may request additional information from the Principal Investigator as necessary to process requests. Multiple requests made over time for a single project will be heavily scrutinized.

If you are not sure if a request is needed or are unclear as to what information to include, contact R&D for clarification.
Calendar of Events

**September - 2008**

**September 1** - Labor Day - ODOT Closed

**September 10-12** - TRB Conduct of Research Mid-Year Committee Meeting in Woods Hole, Massachusetts— for more information go to [http://www.mrutc.org/COR/](http://www.mrutc.org/COR/)

**September 15-17** - 2008 Ohio Conference on Freight in Toledo, Ohio – for more information go to [http://www.tmacog.org/ocf.htm](http://www.tmacog.org/ocf.htm)

**October - 2008**

**October 13** - Columbus Day - ODOT Closed

**October 15-16** - Annual TRB State Visit

**October 28-29** - 62nd Annual Ohio Transportation Engineering Conference in Columbus, Ohio - for more information go to [http://www.otecohio.org](http://www.otecohio.org)

For information on TRB sponsored conferences and workshops go to [http://trb.org/calendar](http://trb.org/calendar)

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**OTEC 2008**

On October 28-29, 2008, the Columbus Convention Center will be the place to be for the 62nd annual Ohio Transportation Engineering Conference 2008 (OTEC). The theme of the 2008 Conference is: *The Power of Multi-Modal Transportation: Linking Ohio to the World on All Fronts.*

Even though the preservation and maintenance of Ohio’s transportation system cannot be ignored, according to ODOT’s 2008-2009 business plan, to turn around Ohio and open a gateway to international commerce, the department must also embrace a multi-modal approach to transportation. Research will play an important role in helping to accomplish this by providing access to useful information, identifying opportunities for the state to partner with others on key initiatives, and investigating critical topics.

The results of several research studies will be highlighted in a variety of sessions at OTEC this year, but we would like to call your attention to the session entitled: “Current Issues in Transportation Research” scheduled for October 28th, 10:30-11:30AM. Larry Orcutt, Chief of the CALTRANS Division of Research & Innovation, will discuss research that addresses multi-modal issues, how the results are being applied in California, and the associated benefits. Monique Evans will discuss findings and recommendations from the Transportation Research Program Administration International Scan she recently took to Europe and Asia.

OTEC 2008 is a two-day conference attended by over 2,400 people from across the state of Ohio. It is co-sponsored by the Ohio Department of Transportation and The Ohio State University. The conference is organized to provide something for everyone interested in Ohio’s transportation industry. For more information on OTEC, including on-line registration, visit the conference website: [http://www.otecohio.org](http://www.otecohio.org).

And while at OTEC, be sure to stop by the Office of R&D booth in the exhibit hall!
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