



# The RD & T Newsletter

A Publication of the South Carolina Department of  
Transportation Research and Materials Laboratory

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## SCDOT Holds Research Workshop

The South Carolina Department of Transportation (SCDOT) held its first Research Workshop on August 14, 2003 at the Sheraton Hotel and Conference Center in Columbia, South Carolina. The Transportation Technology Transfer Service (T3S) at Clemson University, the Department's LTAP Center, provided logistical and administrative support for the event. The workshop was intended to market the research program and to serve as the primary research topic solicitation for the Department's Research and Development Executive Committee's (RDEC) consideration for funding as studies in the State Planning and Research (SPR) Program.



**Terry Swygert Moderates a  
Breakout Group**

To promote the workshop and to identify participants, members of the Research Unit met with the Department's upper management, including various division heads and unit supervisors. As a result, participation in the workshop was outstanding. Over 90 people, including representatives from the SCDOT, Federal Highway Administration (FHWA), United States Geological Survey (USGS), academia, and industry, attended the workshop.

The workshop began with a plenary session of all participants during which an overview of the research program was provided and the purpose and format of the workshop were explained. Workshop participants had been pre-assigned to one of seven breakout groups, each on a different subject area. A moderator from the SCDOT's Research and Materials Laboratory was assigned to each breakout group. The seven breakout groups included:

- ▶ Construction Materials
- ▶ Maintenance/Bridge Maintenance
- ▶ Traffic/Safety
- ▶ Design
- ▶ Project Development/Planning
- ▶ Operations & Business Practices
- ▶ Field Operations

The first breakout session was held before lunch for each group to identify research topics. A second breakout session was held after lunch to prioritize the topics identified in the morning session. Topics were prioritized in each group using one or more voting techniques, such as multi-voting, ranked voting, or weighted voting, at the moderator's discretion. A closing session with all participants

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was held and each moderator presented the top four or five topics from his or her group. A listing of the topics from the closing session is shown below.

The workshop was considered a success, with over 150 potential research topics identified, approximately half of which were identified as higher priority topics. A contact person from the DOT was identified for each of

the higher priority topics and problem statements prepared. The RDEC will ballot the topics and develop a final prioritized list to pursue as research projects.

*A report was prepared for the Research Workshop. To obtain a copy, contact Mr. Terry Swygert by phone at (803) 737-6652 or by e-mail at [swygerttl@scdot.org](mailto:swygerttl@scdot.org).*



**Milt Fletcher Moderates a Breakout Group**

### **Construction/Materials**

- Feasibility of fines in highway materials
- Life cycle costs for pavement design
- Development of pocket guides for field inspectors
- Self-consolidating concrete study
- Rapid set concrete patching materials for PCC pavement
- Evaluation of recycled asphalt pavement in Superpave mixtures

### **Maintenance/Bridge Maintenance**

- Development of performance-based specifications for maintenance activities
- Fill slope rehabilitation/repair
- Performance monitoring of Cooper River Bridge/wind tunnel testing
- Rapid deployment, emergency repair techniques
- Which maintenance activities would be most cost effective to outsource

### **Traffic/Safety**

- Curriculum design and implementation to address traffic safety behavior and knowledge level of citizens of SC
- Seasonal and recreational factors for traffic counts
- Better management for speed control in work zones
- Advanced warning for traffic signals
- Use of cameras for automated enforcement

### **Design**

- Performance of best management practices (BMP) for highway runoff (design requirements)
- Impacts of highway runoff on receiving water
- Scour monitoring devices
- Rail/ sidewalk/ intersection design
- Self-consolidating concrete (SCC)
- Develop guide for implementing LRFD deep foundation design at SCDOT
- Develop guide for seismic assessment

### **Project Development/Planning**

- Streamline permit process in state government
- Phased implementation of the use of GIS data in environmental and planning activities
- Evaluate best practices to determine construction contract time
- Impact of highway runoff on impaired streams/waterways
- Best practices to identify early in the process the ROW needs for drainage
- Feasibility of toll facilities

### **Operations and Business Practices**

- Evaluation of outsourcing of maintenance activities
- Economic and lifestyle impacts of failing to increase funding to address transportation needs in high growth areas
- Funding and needs assessment for the next 20 years—program specific
- Evaluate potential efficiencies in handling cash disbursement by SCDOT
- Research the barriers to statewide coordination of mass transit services

### **Field Operations**

- Evaluate best methods to determine contract time and time extensions
- Identify best management practices for roadside vegetation
- Evaluate various material treatments under guardrail
- Evaluate full reclamation versus 2-ft widening on low volume roads
- Conduct engineering study on borrow material in bottom of fill

# Evaluation of Interstate Highway Capacity in Short-Term Work Zones

## First Phase of SPR No. 627 Recently Completed

The SCDOT's policy limits short-term interstate work zone lane closures to periods when traffic volumes do not exceed 800 vehicles per hour per lane (vphpl). This substantially limits the timeframe that work requiring lane closures can be conducted on most interstate routes. To determine if traffic volumes through the work zones could be increased without substantial delays, the SCDOT initiated a research project with Clemson University to quantitatively examine the development and implementation of a methodology for use in determining an updated lane closure policy within work zones along the interstate highway system. Dr. Wayne Sarasua and Dr. David Clarke of Clemson University, and Dr. W. Jeff Davis of the Citadel were the Principal Investigators.

Data collection on the study was accomplished through the use of video surveillance cameras, radar speed detection, and manual queue length measurement at 22 work zone sites. Based on the analysis of the data, the following model was developed to estimate short-term work zone capacity:

$$C_{WZ} = (1460 + I) \times f_{HV} \times N$$

where:  $C_{WZ}$  = the estimated capacity of a short-term work zone (veh/hr).  
 $f_{HV}$  = heavy vehicle adjustment factor.  
 $N$  = number of lanes open through the work zone.  
 $I$  = adjustment factor for type, intensity, length, and location of the work activity.

This equation, very similar to the one identified in the *Highway Capacity Manual 2000*, indicated that the 800 vphpl threshold was lower than values inferred from the data collection sites and considered by the researchers to be very conservative.

A second phase of the study is now underway to test the findings of the original project by allowing an increased traffic volume in selected work zones and monitoring the results.

*To obtain a copy of the report prepared for the initial phase of the study, contact Mr. Terry Swygert by phone at (803) 737-6652 or e-mail [swygerttl@scdot.org](mailto:swygerttl@scdot.org).*

## Distracted Drivers

Though cell phones are a favorite target of legislators, a new study by the American Automobile Association shows that calling is far from the most frequent of driver distractions. The camera survey photographs showed that:

- ▶ 97% of drivers were reaching for something or leaning.
- ▶ 91% were fiddling with the radio.
- ▶ 77% were talking to passengers.
- ▶ 71% were eating or drinking.
- ▶ 46% were grooming themselves.
- ▶ Only 30 percent were making calls from behind the wheel.
- ▶ About 40 percent were seen reading or writing while waiting for a red light to change.

These and other distractions cause 1.2 million crashes a year and about 12,000 fatalities.

## 2003 Waste Materials Report Released



In response to the “South Carolina Solid Waste Management Act of 1991,” the SCDOT investigates, evaluates, and utilizes waste materials in highway construction. By incorporating recycled material into highway applications, the SCDOT helps reduce the problem of solid waste disposal in South Carolina. To document efforts to find and use recycled products in its work, the Department’s Research and Materials Laboratory prepares an annual report for the Governor and General Assembly.

The report for 2003, “Utilization of Waste Materials in Highway Construction and Maintenance, Volume 13,” was published in November. The report provides information on waste materials approved by the Department for routine use in highway construction. These materials include:

- ▶ Fly ash in flowable fill and portland cement concrete (PCC).
- ▶ Ground granulated blast furnace slag in PCC.
- ▶ Recycled PCC.
- ▶ Chrome and steel slag in hot mix asphalt concrete (HMAC) for low volume routes.
- ▶ Asphalt shingles in HMAC.
- ▶ Reclaimed asphalt pavement (RAP) in HMAC.
- ▶ Recycled glass aggregates in embankments, aggregate underdrains, and HMAC for low volume routes.

A section of the report also describes an effort to use various waste materials, or products that utilize waste materials in their pro-

duction, in improvements made to a rest area adjacent to the southbound lanes of I-95 in Colleton County.

The initiative included:

1. the use of landscaping products made from shredded tires.
2. the use of recycled concrete, removed from projects in South Carolina, as graded aggregate base (GAB) under portions of the pavement.
3. the use of cement from a local plant that utilizes waste oils, solvents, and other flammable wastes in their kilns.

*If interested in a copy of the report, contact Mr. Mike Sanders by phone at (803) 737-6691 or e-mail [sandersmr@scdot.org](mailto:sandersmr@scdot.org).*



**Mulch Made from Shredded Tires**



**Walkway Made from Waste Tire Chips**

## **Research Projects Started Between July 1, 2003 and December 31, 2003**

SPR No. 646: *ITS and Construction Management Modules: SCDOT Resident Construction Engineer Academy*  
Principal Investigator: Dr. M. Hanif Chaudhry, University of South Carolina

## **Research Projects Completed Between July 1, 2003 and December 31, 2003**

SPR No. 616: *Development of a Quality Assurance Program for Asphalt Paving Mixtures in South Carolina—Phase II*  
Principal Investigator: Dr. Jim Burati, Clemson University

SPR No. 622: *Funding Options for Meeting Transportation Infrastructure Needs in the State of South Carolina*  
Principal Investigator: Dr. Jim London, Clemson University

*If you would like a copy of the final report for any of these projects, please contact:*

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## **Myths That Push Workers Toward Burnout**

*Many companies are now engaged in work redesign in order to keep key employees sharp and enthusiastic. In the process, they are discovering a few myths that lead to worker burnout.*

**Myth:** *When a client says jump, the only answer is "How high?"*

One accounting firm had employees working five days a week at the client's office in another city. When they changed the schedule to four days a week with the fifth worked in the home office, people felt less pressured and could plan their weekends. Surprisingly, the client found the arrangement to be better as well.

**Myth:** *Decreasing workloads will turn them into slackers.*

Wrong, it has been proved that putting the brakes on overload can allow people to produce more and better work. One senior manager quoted in *The Wall Street Journal* says some people won't admit to burning out. The only time you find out about it is at the exit interview. Then it's too late to change things, and you've lost a valuable worker.

**Myth:** *If an employee is working himself into the ground, it's his own fault.*

Often the manager thinks overwork is due to inefficiencies. But studies such as those at the International Food Policy Research Institute, a Washington nonprofit group, show that a "crisis mentality" was driving scientists to work incredibly long hours. Their time was not valued. Analysis showed that the scientists were involved in many activities and meetings that were cutting into research time. A change in routine helped to solve the problem. Long seen as the failing of an individual, the time bind is organizational in many cases.

## Comments and Suggestions

The *RD&T Newsletter* is published on behalf of the SCDOT by the SC Transportation Technology Transfer Service at Clemson University (T<sup>3</sup>S).

If you have suggestions, comments, or article submissions for the newsletter, please contact Mike Sanders at 803-737-6691, or mail them to:

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***The one thing that unites all human beings, regardless of age, gender, religion, or ethnic background, is that we all believe that we are above average drivers.***

***—Dave Berry***

## Keep Your Mind Sharp

Dr. Peter Rabins of Johns Hopkins Medical Centers says here's how to stay sharp:

- ▶ **Keep your blood pressure under control.** Treating high blood pressure maximizes blood flow to the heart and brain.
- ▶ **Eat well.** Your diet should contain low-fat dairy products, fruits, vegetables and omega-3 fats from fish and nuts.
- ▶ **Exercise.** High levels of fitness bring better cognitive function.
- ▶ **Drink only in moderation.** Having more than four alcoholic drinks can lead to memory problems.
- ▶ **Watch for prescription interaction.** If you regularly take drugs for any medical condition and have noticed memory problems, speak to your doctor.
- ▶ **Exercise your brain.** Learn a language, play a game, or take a class.
- ▶ **Get enough sleep.**
- ▶ **Take safety precautions.** Wear protective headgear for active sports and bike riding.

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