

The RD & T Newsletter

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

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SCDOT to Hold Research Workshop in August

The SCDOT will conduct a Research Workshop in August 2003 in Columbia, SC. The Transportation Technology Transfer Service (T³S), South Carolina's LTAP Center, is hosting the one-day meeting. The purpose of the workshop is to promote the Department's Research Program and to discuss research needs.

A presentation on the Research Program, including a discussion on the availability of funds, will be made to the entire group. Attendees will then disperse into one of seven pre-assigned breakout groups covering various areas of the Department's work to discuss specific research needs and to develop a list of research topics. These groups include:

- ◆ Construction/materials.
- ◆ Maintenance/bridge maintenance.
- ◆ Traffic/safety.
- ◆ Design (road, bridge, hydrology).
- ◆ Project development/planning.
- ◆ Operations and business practices (strategic planning, executive support, training, finance,

mass transit, communications, etc.)

- ◆ Field operations.

A report summarizing the workshop and outlining the research topics developed by each breakout group will then be prepared by T³S.

The workshop will involve SCDOT personnel from various units in Headquarters and field offices as well as representatives from Construction Resource Management groups involved in the Department's "27 in 7" Program.

Organizations from outside the SCDOT that will be involved include:

- The Federal Highway Administration (FHWA).
- The U.S. Geological Survey (USGS).
- In-state universities that have conducted research studies for the Department.

Trade organizations in the state, including the Asphalt Pavement Association, the Concrete Pavement Association, the Aggregate Producers Association, and the

Associated General Contractors, will also be invited to attend and participate.

For additional information on the workshop, contact Terry Swygert, by phone at (803) 737-6652, or by e-mail at swygertt1@scdot.org.

Volume IX, Number 2

In This Issue...

SCDOT to Host Research Workshop
Page 1

Retroreflectivity Study
Page 2

Workforce Planning Project
Page 3

Customer Input Concerning Highway Maintenance
Page 4

Research Projects Update
Page 5

Kids Not Safe in Front Seat
Page 6

Study Completed on Retroreflectivity of SC Interstate Pavement Markings

The South Carolina Department of Transportation (SCDOT) initiated a research project with Clemson University to develop a systematic methodology to quantitatively evaluate pavement marking materials used on the state's Interstate highways. Dr. Wayne Sarasua and Dr. David Clarke of Clemson University and Dr. William Davis of the Citadel were the Principal Investigators for SPR 595, *Evaluation of Interstate Pavement Marking Retroreflectivity*. In addition to developing models that could predict the degradation of retroreflectivity over time, the study compared devices for measuring retroreflectivity.

A literature review focusing on numerous aspects of pavement marking retroreflectivity indicated that a unique aspect of this project would be the extensive amount of field data that needed to be collected. A vehicle mounted mobile retroreflectometer (Laserlux) was used to measure all pavement edge



Using Reflectometers on a Test Section

markings and skip lines on South Carolina's Interstate Routes.

In addition, multiple readings on edge lines were taken with three different handheld retroreflectometer units at over 160 Interstate locations throughout the state. The units used were the Delta LTL 2000, the Mirolux MP-30, and Pot-

ter's Industries MX-30.

An innovative Geographic Information System (GIS) application was developed to inventory and display the pavement marking retroreflectivity data. The extremely versatile system was capable of allowing the user to visualize the changes in retroreflectivity values obtained with the mobile unit along the Interstate Routes. Also, values obtained with the handheld units could be shown along with the data from the mobile unit. (See the figure on page 3)

In general for the handheld units, the researchers found good correlation between the LTL 2000 and the MX-30. Though the correlation between the LTL 2000 and the MP-30 was good if outliers are removed, the data showed that variance increased with increasing retroreflectivity readings. The cause of this phenomenon was attributed to the sensitivity to ambient light of the MP-30 unit used in the study.

While there was significant scatter in data sets comparing handheld units to the mobile unit, trends did exist. The researchers reported that it was apparent from the comparisons between the mobile unit and handheld data that areas of low readings ($<80 \text{ mcd/m}^2/\text{lx}$), medium readings ($80\text{--}200 \text{ mcd/m}^2/\text{lx}$), and high readings ($>200 \text{ mcd/m}^2/\text{lx}$) will generally fall within the same ranges. This is especially significant from the human factors standpoint because slight variations in retroreflectivity are not noticeable to the driver.

The research also identified sev-

(Continued on page 3)



Laserlux Retroreflectometer Attached to Van

Workforce Planning Project for the SCDOT

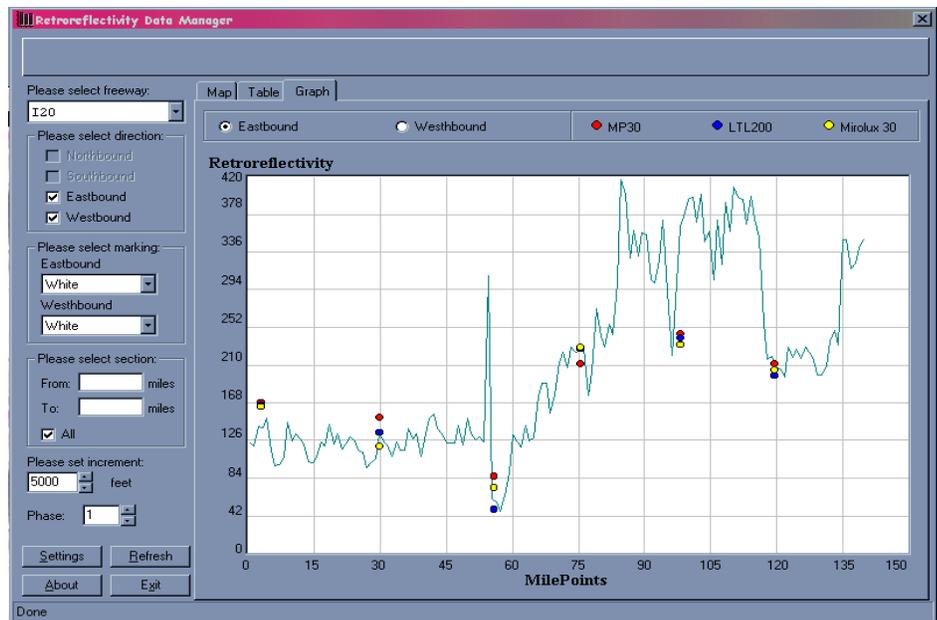
The roles and responsibilities of DOTs are changing more rapidly today than ever before. Add to this the changing workforce and the emerging technologies being utilized by this workforce, and the task of having the right number of people with the right skills, experiences, and competencies in the right jobs at the right time becomes almost impossible. Yet, for any organization to be successful, it must be able to project future workforce needs and take steps to assure that this workforce is in place. Therefore, SCDOT has initiated a project with Clemson University entitled *Development of a Workforce Plan for the South Carolina Department of Transportation*. This project will receive contributing input from representatives at Clemson in the Department of Civil Engineering, Office of Human Resources, and School of Business and Behavioral Sciences.

This project is seen as the first step in developing a workforce plan for SCDOT. The focus of the study is to develop a comprehensive program development process for Trades Specialist 1–5 in the Maintenance Unit. Tasks include an extensive literature review and a comparison with other DOT's with similar program types. A summary analysis of the current Trades Specialists workforce will be conducted along with projections for future workforce requirements. Career ladders for the classification series, including prototype position descriptions and cost structure determinations, will be developed. The successfully completed program will include obtaining required submissions and approval by the Office of Human Resources, Budget and Control Board, and the final program implementation as reviewed and approved by SCDOT.

(Continued from page 2)

eral factors having significant impact on retroreflectivity degradation and developed statistical models of degradation rates for thermoplastic and epoxy markings. Both the thermoplastic and the epoxy markings showed substantial initial rise in retroreflectivity when freshly painted. Nonlinear models were developed to represent this early curvature of new markings. Linear models were developed to represent the degradation pattern after the end of nonlinear models or after the retroreflectivity of a remarking started on a linear downward trend. It was noted that maintenance activities such as snowplowing greatly influenced the degradation of pavement marking retroreflectivity.

For more information on the study or to obtain a copy of the final report, contact Mr. Terry Swygert at (803) 737-6652 or e-mail swyger@scdot.org.



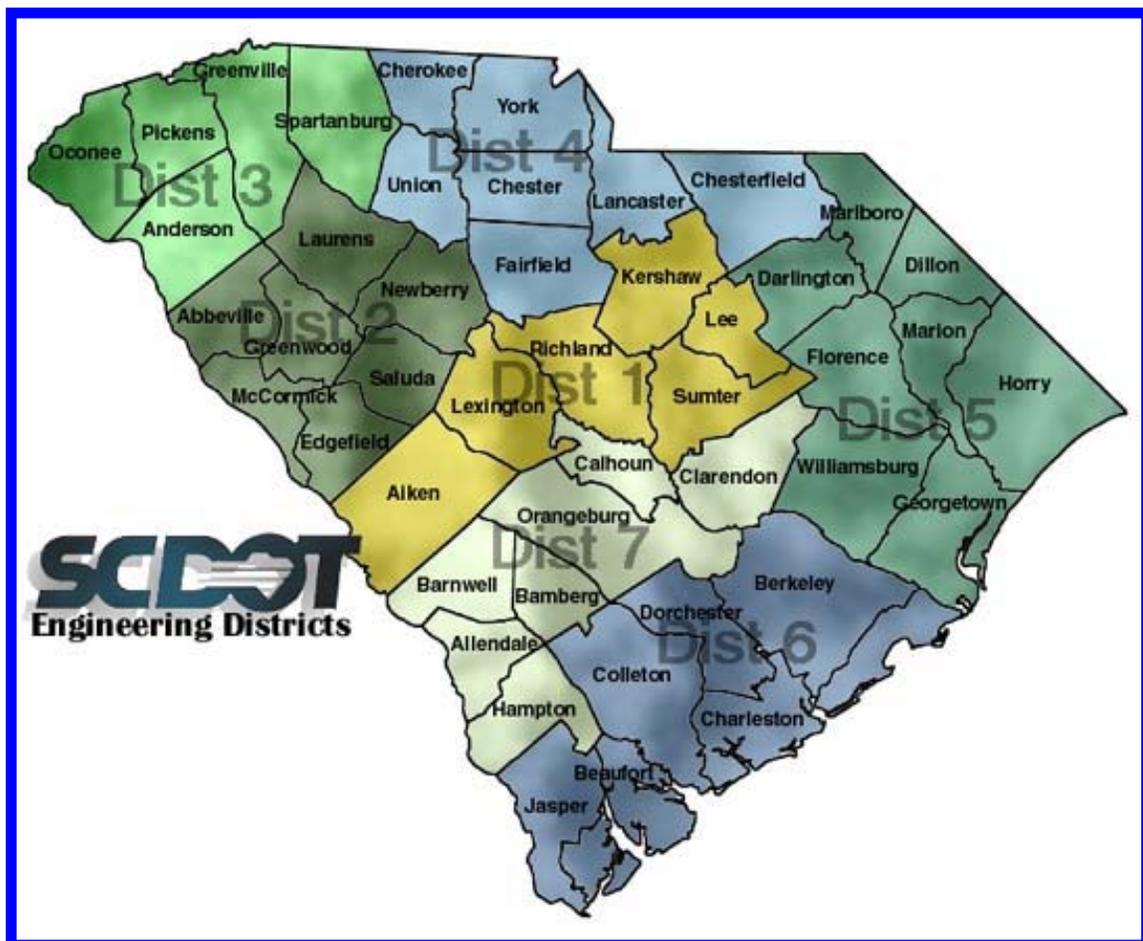
Graphed Data Obtained with Laserlux and Handheld Units

Customer Input Concerning Highway Maintenance

The South Carolina Department of Transportation (SCDOT) wants to know the opinions of the citizens of South Carolina concerning highway maintenance. Therefore, SCDOT has initiated a research project entitled *Customer Input Concerning Highway Maintenance*. The project will be conducted by the University of South Carolina's Division of Research at the Moore School of Business. The primary objectives of this project are to survey South Carolina residents regarding their opinions on alternative SCDOT highway maintenance programs, to analyze those data, and to report the findings to SCDOT for consideration in establishing funding priorities consistent with public consensus.

To achieve the research objective, a mail survey of the general public in South Carolina will be executed. Survey participants will be randomly selected from South Carolina's adult (driving) population. The seven engineering districts of South Carolina will be used for reporting purposes. Once all completed surveys are returned, they will be analyzed using the *Statistical Package for the Social Sciences (SPSS)*. The analysis will include development of frequency distributions for all survey questions and relevant statistical tests to determine differences, if any, among the seven engineering districts (see map below). The results of the survey data analysis will be documented in a final report prepared for SCDOT.

The primary benefit of this study will be the general public's ranking, in terms of importance, of various maintenance targets. The results can be used to direct SCDOT's efforts to assure effective and efficient allocation of its resources.



The Seven Engineering Districts

Research Projects Started Between January 1, 2003 and June 30, 2003

SPR No. 645: *Development of a Workforce Plan for the SCDOT*
Principal Investigator: Dr. David Clarke, Clemson University

Research Projects Completed Between January 1, 2003 and June 30, 2003

SPR No. 608: *Fatal Crashes on Rural Secondary Highways*
Principal Investigator: Dr. David Clarke, Clemson University

SPR No. 627: *Highway Capacity in Work Zones*
Principal Investigator: Dr. Wayne Sarasua, Clemson University

SPR No. 631: *Long Range Program Cost Estimating Methodology*
Principal Investigator: Dr. Lansford Bell, Clemson University

SPR No. 638: *The South Carolina Department of Transportation and Its Economic Impact on the State of South Carolina*
Principal Investigator: Dr. Donald Schunk, University of South Carolina

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

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Failure to buckle up is still the biggest factor in vehicle deaths

Recent statements by the top auto-safety regulator angered some auto industry executives. Jeffrey W. Runge, head of the National Highway Traffic Safety Administration, spoke about the high centers of gravity and poor rollover safety scores on some sport utility vehicles. Runge made an even more significant point: 72 percent of those who die in light-truck rollovers aren't wearing seat belts. The main reason people get killed in rollover accidents is that they get thrown out when the pickup or SUV rolls. Chances of staying in the cab are much better if you are wearing your belt. It's only since about 1990 that the majority of American drivers have been buckling up, says Dr. Runge, formerly an emergency-room physician. In 1983, only 14 percent of us wore seat belts. In 1990, the rate had risen to 49 percent. As mandatory seat-belt laws came into effect, the usage rate went up to 75 percent in 2002. Note that in Europe usage rates are about 90 percent. Dr. Runge says that if 90 percent of Americans wore seat belts, 6,600 lives per year would be saved and 140,000 injuries would be prevented, saving society more than \$26 billion annually. Advanced safety technology won't deliver the maximum benefit unless those in the car are wearing seat belts. Jay Cooney, director of safety communications at General Motors Corp., said the major reason for fatalities in rollovers is a lack of seat-belt use.



Comments and Suggestions

The *RD&T Newsletter* is published on behalf of the SCDOT by the SC Transportation Technology Transfer Service (T³S) at Clemson University.

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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Albert Einstein said...

- The important thing is to not stop questioning.
- Imagination is more important than knowledge.

Kids are not safe when riding in the front seat

Too many infants and young children are riding in the front seat, says the National Highway Transportation Safety Administration (NHTSA). These children are at increased risk of injury from crashes or deploying air bags even if they are in infant seats. Their recent study shows that 15 percent of infants are riding in front, as are 10 percent of 1- to 3-year-olds and 29 percent of 4- to 7-year-olds. The American Academy of Pediatrics recommends that children 12 and under ride in the back seat.

Fortunately, child deaths in auto accidents have been declining since 1998 with only 1,248 killed in 2001, the last year for which figures are available.

A 2001 NHTSA survey shows that the use of seat belts and child safety seats continues to increase, but too many kids are riding up front.

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