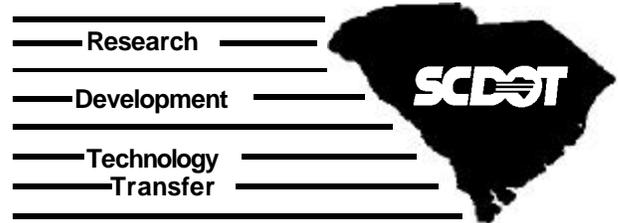


The RD & T Newsletter



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

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USC Civil Engineers to Study Bridge Technology

Dr. Kent Harries and Dr. Michael Petrou of the University of South Carolina (USC) have begun a feasibility study of state-of-the-art bridge technology that will eventually influence the construction of a pedestrian bridge spanning Highway 277, a major connecting route into the downtown Columbia area. While their research seeks information crucial to the advancement of bridge technology, Harries and Petrou will also be involved in solving a dire problem in the surrounding communities.

District Six Congressman Jim Clyburn, concerned about the safety of children who routinely cross the busy highway, made the



A Feasibility Study of State-of-the-Art Bridge Technology is Being Conducted by the University of South Carolina for the SCDOT

pedestrian bridge a priority among several other projects for which federal aid has been received. Since 1987, two pedestrians, including an eleven-year-old girl, have been killed crossing Highway 277, which separates two neighborhoods. While the bridge will keep people off the highway, it will also provide an impressive gateway to Columbia, addressing the concerns of city planners seeking to make Columbia more attractive to newcomers.

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Harries, who emphasizes the idea that civil engineering is mainly “social-oriented,” is excited about the chance to learn more about bridge construction while at the same time having an impact on the community. He and Petrou will investigate the feasibility of several kinds of bridge designs, construction methods, and materials. After the two civil engineering faculty members present their study to the South Carolina Department of Transportation, SCDOT can begin the work with local engineers and contractors to bring the bridge out of the conceptual world and into the Columbia community.



USC will Investigate the Use of Fiber Reinforced Polymer Composite Materials in the Construction of the Pedestrian Bridge

Harries and Petrou are faced with the challenge of evaluating state-of-the-art bridge construction concepts with the financial feasibility of the bridge in mind. There are only a few precedents for the high performance bridge proposed for Highway 277, including the Aberfeldy footbridge in Scotland and the

demonstration PWRI Composite Cable Stayed Bridge in Japan. Harries and Petrou plan to study these and other bridges as part of their feasibility study; they are especially interested in pedestrian bridges constructed with fiber reinforced polymer composite materials, although they are not limiting their study to these novel materials.

Composite materials is currently a hot topic in the field of civil engineering, and this opportunity to study alternative bridge materials with practical application in mind comes at the right time. Petrou and Harries, along with faculty from Mechanical and Chemical Engineering, currently direct a number of research projects involving these materials. Dr. Hanif Chaudhry, Chair of the Civil and Environmental Engineering Department, is enthusiastic about the College’s involvement with the project, stressing that the benefits could extend into the future. “This is giving our faculty an opportunity to provide up-to-date information to a state organization on the use of smart materials for bridge construction. In addition, depending upon the availability of funds, the bridge will be utilized as a real-life, experimental set-up for procuring data on its performance.” Research will continue until February, when the results of the study will be submitted to the Department of Transportation.

Editor’s Note:

This article was adapted, with permission, from *Innovations*, University of South Carolina, Summer 1999.

Review of Class-E Concrete Bridge Decks in South Carolina



The University of South Carolina has completed a research study entitled, "Review of Class-E Concrete Bridge Decks in South Carolina." Class E high performance concrete (HPC) has been used on several bridge construction projects in the upstate region of South Carolina. The majority of these bridge decks, although not all, experienced problems with early-age cracking occurring both before being opened to traffic and immediately thereafter. In an effort to determine the likely causes of the cracking, sight inspections of nine bridges in the Spartanburg, SC area and a thorough review of construction documentation from three of these sights was carried out. Additionally, a review of a South Carolina State University report entitled "A Study of Microsilica Concrete" was conducted. The Class "E" concrete specifications were derived from this project. Finally, a review of bridge deck cracking phenomena and alternative bridge deck designs was also carried out.

It was concluded that the observed cracking had two likely causes. Early-age shrinkage cracking resulted from poor curing practices. Load induced cracking, appearing shortly after the spans were open to traffic, may result from the relatively stiff decks being placed on more flexible bridge superstructures.

Recommendations regarding concrete mix design, application of design parameters and on site quality control are presented in the final report.

If you would like additional information on this project, please contact Mike Sanders at (803) 737-6691 or Terry Swygert at (803) 737-6652.◆

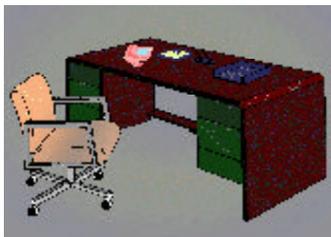
Recycling Facts



Did you know ...

- ☺ Americans throw away enough glass bottles and jars every two weeks to fill the two towers of the World Trade Center (1,350 feet high). Glass never wears out; it can be recycled forever.
- ☺ At least 70-80% of the tin on a can is saved when you recycle it. This cuts down mining waste and preserves a valuable resource.
- ☺ The average office worker generates between 120-150 pounds of recoverable white office paper a year.
- ☺ Americans throw away the equivalent of more than 30 million trees in newsprint each year.
- ☺ States with bottle deposit laws have 35-40% less litter by volume.

From the Office of Research:



Efforts to Improve Research Program Results in Increased Response to Topic Solicitation

The Department's Research and Development Executive Committee (RDEC) recently solicited topics for the 2000 Research Program. Seventy-eight (78) topics were received, fifty-seven (57) from in-state universities and twenty-one (21) from DOT personnel. Though the majority of submittals are from universities, most of those problem statements were developed through discussions between professors and Department personnel from various operating units.

The total number of problem statements received shows a significant increase over previous solicitations. This increase is due in part to efforts to inform more people about the research program and to involve more potential users of the research in the process. First, the membership of the Department's Research Advisory Committee was changed approximately two years ago to include representation from non-engineering units. Also, members of the research staff held a series of meetings with small groups of Headquarters and field unit personnel to discuss the research process and generate interest in the program.

The efforts were rewarded not only by an increase in the number of problem statements received but also by the quality of the topics offered.

The problem statements received were separated by topic, a literature search conducted, and the information was forwarded to appropriate offices in the DOT for review and comments on need. Once all comment sheets are returned to the Research Branch, packets containing all problem statements, information gathered by the literature search, comment sheets, and a ballot will be forwarded to members of the Department's RDEC to rate the potential projects on a scale of 0 to 5. The ballots will be returned, tabulated, and projects prioritized based on average rating. A special meeting of the RDEC will then be held for final prioritization. The process should be concluded by spring of 2000.

Mike R. Sanders
Research Engineer



To obtain information on current research projects, please visit our website:

<http://www.dot.state.sc.us/rml/rmcover.html>

Research Projects Started Between July 1, 1999 and December 31, 1999

SPR No. 597, "Bridge to the Future: State-of-the-Art Pedestrian Bridge and Gateway to Columbia"

Principal Investigator: Dr. Michael F. Petrou, University of South Carolina

SPR No. 599, "Modeling of Floods in Piedmont Streams"

Principal Investigator: Dr. M. Hanif Chaudhry, University of South Carolina

SPR No. 600, "Techniques for Estimating Magnitude and Frequency of Floods in South Carolina, 1998"

Principal Investigator: Tim Lanier, U. S. Geological Survey

SPR No. 601, "Performance Evaluation of High Density Polyethylene (HDPE) Pipe"

Principal Investigator: Dr. Sarah L. Gassman, University of South Carolina

SPR No. 602, "Feasibility of Including Structural Adequacy Index as an Indicator of Overall Pavement Quality in the SCDOT Pavement Management System"

Principal Investigator: Dr. Ronald L. Baus, University of South Carolina

SPR No. 603, "Experimental Investigations of Scour Around Bridge Piers"

Principal Investigator: Dr. M. Hanif Chaudhry, University of South Carolina

SPR No. 604, "Calibrating Pavement Performance Prediction Models for Interstate & Primary Highway Systems in SC"

Principal Investigator: Dr. Charles E. Pierce, University of South Carolina

SPR No. 605, "Technology Transfer Programs for Aggregate & Concrete QC/QA Certification of Contractors and SCDOT Personnel"

Principal Investigator: Dr. M. Hanif Chaudhry, University of South Carolina

SPR No. 606, "Investigation into Improvement of Bridge Approaches in South Carolina"

Principal Investigator: Dr. Charles E. Pierce, University of South Carolina

SPR No. 607, "Development of a Gyratory Design System for Conventional SCDOT Hot Mixed Asphalt Mixtures"

Principal Investigator: Dr. Serji N. Amirkhanian, Clemson University

SPR No. 608, "Fatal Crashes on Rural Secondary Highways"

Principal Investigator: Dr. David Clarke, Clemson University

Research Projects Completed Between July 1, 1999 and December 31, 1999

SPR No. 577, "A Laboratory & Field Evaluation of the Use of Waste Materials in Highway Construction"

Principal Investigator: Dr. Serji N. Amirkhanian, Clemson University

SPR No. 584, "Statewide Sign Management Implementation"

Principal Investigator: Dr. Lansford Bell, Clemson University

SPR No. 590, "Investigation & Evaluation of Roadway Rideability Equipment and Specifications - Phase I"

Principal Investigator: Dr. Ronald L. Baus, University of South Carolina

If you would like a copy of the final report for any of these projects, please contact:
Mike Sanders, P.E., Research Engineer, P.O. Box 191, Columbia, SC 29202
(803) 737-6691, fax: (803) 737-6649, e-mail: sandersmr@dot.state.sc.us



If you have any suggestions for improving our newsletter or know of any topics that should be included, please contact Mr. Mike Sanders at (803) 737-6691. You may also send it to the RD & T Newsletter, SCDOT, Research and Materials Laboratory, P.O. Box 191, Columbia, SC 29202.



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