Load Testing for Assessment and Rating of Highway Bridges

Clemson University recently completed Research Project No. 632, Load Testing for Assessment and Rating of Highway Bridges, Phase II: Development of a Highway Bridge Load Rating and Assessment Program. The Principal Investigator for the project was Dr. Scott D. Schiff.

The first phase of the study, Research Project No. 588, Load Testing for Assessment and Rating of Highway Bridges’ reviewed some of the current and experimental technologies and practices used in the instrumentation (field testing) of highway bridges. The potential benefit that the South Carolina Department of Transportation (SCDOT) could derive from the development of a bridge testing program to assess and rate highway bridges in their existing inventory was also investigated. The conclusions indicated that the SCDOT would benefit from having the capability to field test bridges and use the data to assess and rate bridge structures in their inventory.

The main objective of Phase II was to select and purchase equipment needed to instrument and collect data from a field test and to set-up a mobile field office to facilitate the activities related to the instrumentation of bridges and the collection of field data. Another major objective focused on the analysis of the field data and augmentation of these data with additional data from the structural analysis of appropriate computer models of bridges. The final objective was to develop a data-driven procedure for the assessment and rating of bridge structures.

Several bridges were identified, field-tested, and modeled to determine theoretical and measured response characteristics for the purpose of developing load ratings procedures. Structural assessment procedures, dependent upon data collected from the field-testing and computer modeling, were developed and (Continued on page 3)
Clemson and Citadel Researchers To Receive Paper Award

The TRB will present an award to researchers from Clemson University and the Citadel for having the best paper sponsored by the TRB WZTCC at the 2004 TRB meeting. Dr. Wayne Sarasua of Clemson and Dr. William “Jeff” Davis of the Citadel were lead authors on the paper “Evaluation of Interstate Highway Capacity for Short-Term Work Zone Lane Closures” which is based on research sponsored by SCDOT and FHWA.

The study focuses on determining the number of vehicles per lane per hour that can pass through short-term interstate work zone lane closures with acceptable levels of delay. Current policy used by the SCDOT limits short-term, interstate, work zone lane closures to periods when traffic volumes do not exceed 800 vehicles per hour per lane. However, the 800 vehicles per hour per lane threshold value is generally believed by highway engineers to be too conservative. The researchers are using specialized cameras mounted on 26’ portable tripods to collect data for this project. The project is currently in its second phase and will be completed sometime in the spring. Dr. Sarasua made the presentation to a standing room only audience last January. Dr. David Clarke (formerly with Clemson University) and former Clemson students Jayaram Kottapally and Pawan Mulukutla were contributors to the paper. The award will be made at the 2005 TRB Annual Meeting in January.

New at SCDOT Research and Materials Laboratory

Temple Short joined the Research and Materials Lab in July as Research Assistant and New Products Coordinator. A graduate of the University of South Carolina with a BS in mechanical engineering, she has been with the SCDOT since 2003 and was previously in the Specifications and Estimates office of Road Design.

Ms. Short is married and lives in Irmo.
2004 Waste Materials Report Published


As in past volumes, the report provides updated information on waste materials approved for use on Department projects. Approved waste materials include fly ash, ground granulated blast furnace slag, chrome and steel slag, asphalt shingles, crushed glass, recycled asphalt pavement (RAP), and recycled PCC. The report also details a continuing investigation on the use of waste tires in landscaping applications.

The report describes a new SCDOT initiative in the use of waste materials. The Department has teamed with the Asphalt Rubber Technology Service (ARTS) at Clemson University to explore the use of rubber-modified asphalt. The primary purpose of ARTS is to promote the use of scrap tire rubber in civil engineering applications by providing grants that will pay the difference in price for utilizing recycled rubber or rubber-modified materials in place of conventional materials. The South Carolina Department of Health and Environmental Control (SCDHEC) funds the grants through a disposal fee collected on each tire sold in the state.

The Department, with the assistance of ARTS, recently placed test sections with rubber-modified asphalt mixes and/or a Stress Absorbing Membrane Interlayer (SAMI) that included tire rubber. The report provides a brief description of the test sections placed on SC 261 in Williamsburg County that included the equivalent of over 10,500 scrap tires. Additional test sections are planned in other areas of the state.

If interested in a copy of the report, contact Mr. Terry Swygert by phone at (803) 737-6652 or e-mail swygerttl@scdot.org.

*(Continued from page 1)*

The experiences gained from field testing, computer modeling and load rating will be used as the basis to develop user manuals for bridge instrumentation, data analysis and computer modeling, and bridge assessment and load rating.

The final phase of this bridge assessment and rating project, Research Project No. 655, *Load Testing for Assessment and Rating of Highway Bridges, Phase III: Technology Transfer to the SCDOT*, was authorized to begin October 12, 2004, and should be completed by July 11, 2005. The primary goals for this project are the development and refinement of these manuals and the training of SCDOT personnel to carry-out the various activities of this bridge assessment and rating program so they will be able to rate other highway bridges in the SCDOT inventory.
With increasing traffic volumes and aging transportation infrastructure in South Carolina, repair and rehabilitation operations have become critical components of SCDOT’s maintenance efforts. Due to the increased traffic, these operations need to be conducted at a faster pace to enable early opening of roads and bridges to traffic both for convenience and safety. To meet the demands for rapid repairs on concrete, new “rapid-set” concrete patching materials have emerged. Also, new technologies have been recently developed in an effort to effectively monitor the true and accurate development of properties in portland cement based materials.

To address some of these issues, the Department awarded a contract to Clemson University to conduct the research project “Rapid Set Patching Materials for PCC Pavements.” The Principal Investigator is Dr. Prasad Rangaraju. The primary objectives of this study are:

1) to evaluate rapid patching materials for repairs on PCC pavements and bridge decks; and

2) to assess the applicability of technologies, including concrete maturity and temperature match-cure, for their use as QC/QA tools in PCC construction, repair, and rehabilitation operations.

Specific tasks included:

- identifying and categorizing types of rapid patching materials and uses required by the Department on roads and bridges,
- field-testing selected repair materials and technologies for determining development of properties identified during the project, and
- developing guidelines for selection of repair materials for specific types of repairs.

The study will help the SCDOT determine and select effective patching materials for repairs that will not only result in rapid operations in the field but also provide a more durable repair. Another benefit of the study is that the Department will develop its first experience dealing with the use of new technologies such as maturity and temperature match-cure for QC/QA purposes. Hopefully, this experience will serve as a basis for future embrace of these technologies in mainstream paving and bridge construction activities. The research supports the motto of “Get In, Get Out, and Stay Out.”

You can avoid these five pitfalls on the job

If you’re not watching how you work, how you act, how you speak and how you dress, you could be sending a signal that says, “When it’s time to cut someone, choose me.”

Ronna Lichtenberg, author of It’s Not Business, It’s Personal: The 9 Relationship Principles That Power Your Career (Hyperion), says you can make yourself indispensable by avoiding these mistakes:

- Not pitching in when others ask for help is a mistake. The busier-than-thou attitude doesn’t make allies.
- Taking everything personally is a mistake. Some decisions must be made without regard to whether your work is appreciated. Your idea may have been passed over, but don’t think it’s because the boss doesn’t like you.
- Confusing business with pleasure is a mistake. At office functions, mingle with people at your level or above, people who are in a position to promote you. Know the difference between business and socializing.
- Seeking perfection is a mistake. Know the difference between having to be perfect and striving for excellence. Be willing to take on new duties. If you make a mistake, admit it and find a solution.
- Neglecting your appearance is a mistake. Many bosses think your appearance is a reflection of your work.
Research Projects Started Between July 1, 2004 and December 31, 2004

SPR No. 650, *Laboratory Evaluation of Anti-Strip Additives in Hot Mix Asphalt*
Principal Investigator: Dr. Serji N. Amirkhanian, Clemson University

SPR No. 651, *Performance of Four Best Management Practices for Highway-Runoff Quality near Beaufort, South Carolina*
Principal Investigator: Noel Hurley, U.S. Geological Survey

SPR No. 652, *Construction Contract Time/Construction Contract Time Extension*
Principal Investigator: Dr. Lansford Bell, Clemson University

SPR No. 653, *SCDOT Maintenance Outsourcing*
Principal Investigator: Dr. Lansford Bell, Clemson University

SPR No. 654, *Rapid Set Concrete Patching Materials for PCC Pavements*
Principal Investigator: Dr. Prasada Rangaraju, Clemson University

SPR No. 655, *Load Testing for Assessment & Rating of Highway Bridges – Phase III: Technology Transfer to the SCDOT”*
Principal Investigator: Dr. Scott D. Schiff, Clemson University

Research Projects Completed Between July 1, 2004 and December 31, 2004

SPR No. 618, *Development of Profiler-Based Rideability Specifications for Asphalt Pavements and Asphalt Overlays*
Principal Investigator: Dr. Ronald L. Baus, University of South Carolina

SPR No. 634, *Safety Considerations for Night-time/Weekend Construction Activities*
Principal Investigator: Dr. W. Edward Back, Clemson University

Information concerning these and other research projects can be found at the RD&T website at http://www.ces.clemson.edu/t3s/scdot/

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

Terry Swygert
Research Coordinator
1406 Shop Road
Columbia, SC 29201
(803) 737-6652, fax: (803) 737-6649
e-mail: swygerttl@scdot.org
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:

RD&T Newsletter  
Research and Materials Laboratory  
1406 Shop Road  
Columbia, SC 29201

---

Keep hackers away

When you will be away from your computer for a week or a weekend, you can take steps to protect your computer from hackers. Authorities at Counterpane Internet Security say you should turn the computer off, and you can also disconnect the cable or digital-subscriber line that connect you to the Internet.

Their best advice is to back up the contents of your hard drive. Regularly making a copy of everything on the computer’s hard drive is easy even for people who are not tech minded.

A computer that is always on is a target. Hackers can hone in on a computer that isn’t changing. It can be taken over and directed to attack other computer systems without the computer owner’s knowledge or awareness of the situation.