



The Innovative Engineer

“Innovative Engineering Against Hazards”

Vol. 2, No. 1

Spring 2008

From the Director

by Dr. Kevin C. Womack

This past April, the Federal Highway Administration announced the winning contractor team for the initial five year award in the Long Term Bridge Performance (LTBP) Program contract. This team is lead by the Center for Advanced Infrastructure and Transportation (CAIT) at Rutgers University and PB out of New York City. Other team members are the Utah Transportation Center (UTC) at Utah State University, the Virginia Transportation Research Center, Siemens Corporation, Advitam, Bridge Diagnostics, Inc. and the Institute of Transportation Studies at the University of California, Berkeley.

To say the least, we here at the Utah Transportation Center are extremely excited about our role on the winning team for the LTBP Program, which is designed to be a 20 year program. We are off and running on the first five years! Dr. Marvin Halling is the Principal Investigator for the UTC./USU team. Dr. Paul Barr and myself are co-Principal Investigators. This project will entail instrumenting a number of bridges to determine the performance of the most common types of bridges constructed in the country today. The UTC/USU team will be responsible for instrumented bridges west of the Mississippi.

The objective of the program is to help the state DOT's determine best practices for the designs, materials and construction methods that will contribute toward the improved durability and performance of the nation's bridges. The goal is to define the bridge of the future that will last 100 years!

(See DIRECTOR on page 3)

Center Colleagues

Awarded \$5 Million as Part of Bridge Study

source: USU Public Relations

Three Utah Transportation Center colleagues, Drs. Marvin Halling, Paul Barr and Kevin Womack, were awarded \$5 million as part of the Long-Term Bridge Performance Program. The 20-year Long Term Bridge Performance (LTBP) project will include detailed inspection, periodic evaluation and testing, continuous monitoring and forensic investigation of representative samples of bridges throughout the country. The end result will be a database of information to help engineers improve bridge management.

“The Minnesota bridge collapse in the summer of 2007 made bridge safety a more important topic to the public,” Dr. Halling said. “But the public should know that the Federal Highway Administration has been looking into this issue long before that tragedy happened. Most bridges are designed to have a life span of 30 to 40 years, and the [federal] government and state highway offices are well aware that many bridges have outlived their life span.”

During the project, USU will work as a sub-contractor for Rutgers University, a fellow member of the university transportation centers program. Rutgers received \$25 million to lead the effort. Rutgers will give \$5 million to the Utah Transportation Center project over five years to study the monitoring and inspection frequency of bridges in the western United States.

(See AWARD on page 3)

USU Bridge Team Wins Region, Goes to National Competition

The Utah State University (USU) AISC/ASCE Steel Bridge Competition team attended the national competition at the University of Florida, in Gainesville, held May 23-24, 2008. The USU team earned the honor of competing in the national contest by winning a regional competition at the American Society of Civil Engineers (ASCE) Rocky Mountain Region Conference in Golden, Colorado at the Colorado School of the Mines over the first weekend in April. By winning their region, the USU team automatically qualified for the national competition.

At the national competition the USU team placed 30th out of the 42 competing teams. The team's best effort was in the Display category, where they placed 17th.

This competition is a great way to provide a realistic steel design experience to civil engineering students, and offers a good deal of fun along the way. The Utah Transportation Center is proud to be one of the sponsors for the Utah State University team.



Members of the USU bridge team with faculty member Kevin Heaslip and Department Head Bill Rahmeyer (6th and 7th from left).

Find us on-line at:

<http://transportation.usu.edu>

New Center Projects

Development of a Decision Support Tool for Assessing Vulnerability of Transportation Networks

PI: Dr. Anthony Chen

Transportation networks are a significant part of the infrastructure lifeline, particularly in the movement of goods and freight that benefit society. Given their critical and yet fragile nature (in the functioning of modern society), it is important to understand their vulnerability and the consequences to disrupting the movement of freight. This project will develop a decision support tool for the analysis of transportation network vulnerabilities to address the critical issue of freight bottlenecks and chokepoints in the state of Utah and make recommendations to mitigate their vulnerability.

Synthesis Study and Field Evaluation of In-situ Culvert Rehabilitation in Utah

PI: Dr. Blake Tullis

In Utah, as well as across the country, a large number of existing culverts are deteriorating; some to the condition of compromising the stability of roadway structures. Re-lining culverts is a rehabilitation method that can be economical and practical (avoiding road closures) for which the Utah Department of Transportation has no established standards. The objective of this project is to evaluate existing culvert lining techniques and end treatments. A matrix will be developed that can be used as a tool for designers to select the most appropriate product, installation process and inlet/outlet features for a slip lining application; needed standards and specifications will also be developed.

Evaluation and Laboratory Testing of Pre-cast Decks for ABC Construction

PI: Dr. Marvin Halling

In recent years the use of Accelerated Bridge Construction (ABC) methodologies has grown considerably. The use of ABC methods enables bridges to be replaced rapidly, preventing long roadway closures and potentially reducing labor costs. A major element in many ABC approaches is the utilization of pre-cast deck panels. One concern in this approach is the behavior

of the connection between deck panels. This research project will examine typical panel-to-panel joints and panel-to-girder joints. The research will determine the behavior of these connections, and provide designers information on the effectiveness of connections that are typically used today.

Investigation of the Use of Texel Sensors and Signal Process for High Accuracy Passenger Counting

PI: Dr. Scott Budge

This project will develop a high accuracy prototype system for counting passengers as they enter and exit a bus; this will assist transit agencies in determining bus and route usage. The accuracy of this prototype is expected to be such that an individual passenger may be identified as they enter and exit the bus; providing not only rider counts, but rider distances as well. This information, in the past, has been extremely hard, if not impossible, to secure. With this information, transit agencies have the potential to become much more efficient in their use of buses and the design of routes.

Center “Projects in Progress”

- UTC0701 “Evaluation of Bridges for Seismic Retrofit,” Dr. Keri Ryan, PI. Co-funded by the Utah Department of Transportation (UDOT).
- UTC0702 “UDOT’s Calibration of AASHTO’s New Prestress Loss Design Equations,” Dr. Paul Barr, PI. Co-funded by UDOT.
- UTC0703 “Strong Motion Instrumentation Plan for UDOT Bridges: Array Design, Typical Details, and Specifications,” Dr. Marvin Halling, PI. Co-funded by UDOT.
- UTC0704 “Failure Modes Analysis of UDOT’s MSE Wall Inventory,” Dr. James Bay, PI. Co-funded by UDOT.
- UTC0705 “Logan Bluff Landslide Risk Analysis,” Dr. James Bay, PI, state funded.
- UTC0801 “Synthesis Study and Field Evaluation of In-Situ Culvert Rehabilitation in Utah,” Dr. Paul Tullis, PI. Co-funded by UDOT.
- UTC0802 “Development of a Decision Support Tool for Assessing Vulnerability of Transportation Networks,” Dr. Anthony Chen, PI. Co-funded by UDOT.
- UTC 0803 “Evaluation and Laboratory Testing of Pre-Cast Decks for ABC Construction,” Dr. Marvin Halling, PI. Co-funded by UDOT.
- UTC 0804 “Investigation of the Use of Texel Sensors and Signal Process for High Accuracy Passenger Counting,” Dr. Scott Budge, PI. Funded by UTA.

DIRECTOR (continued from page 1)

Another highlight of the spring is the participation of a number of our Civil Engineering students in the AISC Steel Bridge competition. The Utah State University team won the Rocky Mountain region competition and competed at the national competition at the University of Florida. Our team took 30th place out of 42 competing teams. Congratulations!!

Lastly, on the 24th of April I had the opportunity to participate, and make a presentation, at a symposium held at the National Academies, sponsored by NIST and the National Academies, on National Needs in New Technologies. My presentation was on infrastructure and technology needs. I focused on the need for national leadership in the renewal of our infrastructure, primarily transportation infrastructure. It was a great opportunity, and I am always glad to raise the awareness of this nation’s transportation infrastructure needs!

We will see you at the CUTC meeting. Until then, for comments or questions, please feel free to contact me at kevin.womack@usu.edu.

AWARD (continued from page 1)

Funding was provided by the U.S. Federal Highway Administration Office of Infrastructure, Research and Development. The State of Utah and the Utah Transportation Center are also providing \$1.15 million for the study of Utah bridges.

Dr. Halling explained that most of the research will be on “typical overpass bridges commuters use daily” rather than iconic structures like the Golden Gate Bridge.

LTBP’s program manager, Hamid Ghasemi, said the research is sorely needed. “In 2005 there were approximately 156,000 structurally deficient or functionally obsolete bridges in the United States,” he continued. “This number is likely to increase in coming years due, in large part, to increased traffic demand, continued bridge aging and deterioration, and limited funds for rehabilitation and maintenance.”

For details and updates on the Utah Transportation Center part of this project, watch for information in future issues of this newsletter.



Utah Transportation Center
 Department of Civil & Environmental Engineering
 Utah State University
 4110 Old Main Hill
 Logan UT 84322-4110

Center Recognizes “Student of the Year” *Shane D. Boone*

The Utah Transportation Center is pleased to recognize Shane D. Boone as our “Student of the Year!” Shane is from Johnson City, Tennessee and is currently pursuing a Ph.D in Civil Engineering at Utah State University.

Under the direction of Dr. James Bay, Dr. Paul Barr, Dr. Marv Halling, Dr. Kevin Womack and Dr. Thomas Fronk, his research efforts focus on applying stress wave propagation techniques to perform nondestructive testing of concrete structures. His ultimate goal is to develop instrumentation to be embedded in all concrete structures which would be capable of taking continuous stress wave readings in order to assess instantaneous material properties. Mr. Boone is currently employed by the Department of Energy (DOE) in Oak Ridge, TN.

About the Utah Transportation Center

Center Staff

Director Kevin C. Womack
 Associate Director..... Marvin W. Halling
 Newsletter Editor Julie Duersch

Phone/Fax (435) 797-21144/797-1185
 E-mail..... kevin.womack@usu.edu
 Web site..... <http://transportation.usu.edu>

Advisory Board

Dr. William Rahmeyer, P.E. (Chair)..... USU
 Bryan Cawley, P.E..... FHWA
 Clair Fiet UTA
 Ian M. Friedland, P.E. FHWA
 Ron Hynes..... FTA
 Jim McMinimee, P.E..... UDOT
 Benjamin Tang, P.E..... Oregon DOT

USU is an equal opportunity education institution/equal opportunity employer.